OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF ALASKA

CONNECT ALASKA®

April 1, 2011

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ALASKA COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Alaska offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Alaska has played in creating such a powerful tool that will surely benefit not just Alaskans, but consumers and businesses nationwide.

Therefore, as the State Broadband Designated Entity, in partnership with the Alaska Department of Commerce, Community, and Economic Development, please accept this submission from Connected Nation on behalf of the state of Alaska's State Broadband Data and Development (SBDD) Grant Program, known as Connect Alaska.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Alaska: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address

Appendix A:	3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A:	4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A:	4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)		n/a	Accuracy and Verification Report
n/a		DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a		n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Alaska program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

This April 2011 semi-annual data update under the State Broadband Data and Development Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 90.91 percent of the Alaska provider community, or 20 of 22 total providers. Of the 20 participating providers, 9 supplied an update to their network or coverage area(s), while 11 have reported no change. A complete roster by provider depicting participation status and contact record is contained herein. Of the 2 providers that are not represented in the attached datasets, 1 has refused to participate in the voluntary program and the remaining provider is currently in some form of progress toward data submission but was not able to submit coverage areas at the time of this submission. By the time of the deadline to receive and approve data for this April 2011 submission, the provider Alaska Communications Systems (ACS) had refused to participate, but there have been recent developments as a result of the Alaska Broadband Task Force and it is expected that ACS will participate and be represented in the October 2011 submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Alaska principals that all commercially reasonable efforts were made to account for 100 percent of the known Alaska broadband provider community, pursuant to this semi-annual data update submission.

Connect Alaska has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Alaska conducts field validation efforts. To date, 12 (54.55 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Alaska launched a website to create awareness about the initiative. Connectak.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Alaska website encountered 1,587 unique visits during this reporting period (3,397 total to date for the life of the grant awarded on June 1, 2010). Additionally, this pronounced Web activity netted 9 broadband inquiries over this same reporting period (31 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Alaska website and the Connect Alaska Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Alaska mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Alaska has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Alaska Department of Commerce, Community, and Economic Development, outreach was conducted during this data update reporting period by Connect Alaska to continue identification of existing, centralized sources for CAI connectivity data. Connect Alaska worked closely with the Alaska State Library to gain access to library connectivity data from its contacts across the state for inclusion during this reporting submission. Additionally, outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Alaska website. During this reporting period Connect Alaska has developed a number of new relationships with statewide associations such as the Division of Community and Regional Affairs, the Alaska Village Council, the Alaska Department of Education & Early Development, and the Alaska Regional Development Organizations to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Alaska will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Alaska will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Alaska, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Alaska efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Alaska, Connected Nation has previously engaged all federally recognized native communities in the area covered by the Connect Alaska SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period Connect Alaska plans to continue to engage directly with Native Alaskan communities and will also conduct affirmative outreach with Native Alaskan organizations that are active within the area. Connect Alaska understands the connectivity challenges facing these communities, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Alaska program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Alaska, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: ALASKA COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Alaska, working in close coordination with the state of Alaska, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Alaska has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Alaska has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Alaska through ESRI ArcGIS software.

Connect Alaska continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Alaska website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Alaska will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectak.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_AK_5852

Connect Alaska and the state of Alaska have worked closely during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. During this reporting period the Alaska State Library provided a database on the connectivity of 99 public libraries in the state, and efforts are still ongoing to complete the geocoding of this file. Connect Alaska will continue to locate existing connectivity data in the state especially focusing on the public safety sector in the coming months.

In tandem with these efforts to identify existing data, Connect Alaska continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. During this reporting period Connect Alaska has coordinated with the Alaska State Library, Alaska Department of Community and Regional Affairs, Alaska Division of Rural Affairs, and the Alaska Department of Education and Early Development to distribute our survey and identify library, village, and education contacts.

Connect Alaska has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. During this reporting period Connect Alaska developed a CAI newsletter to be distributed quarterly beginning in March 2011. The newsletter will highlight a CAI in Alaska, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data especially for public safety and higher education CAI. Connect Alaska will continue its ongoing work with the state of Alaska and key organization contacts in an effort to raise awareness of this project among CAI. The newly formed Alaska Broadband Task Force will be briefed on the current CAI data and provided information so they can assist with outreach and promotion over the coming months.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	631	570	631	66	309	287
Libraries	126	126	126	45	43	43
Healthcare	70	70	70	2	4	1
Public Safety	309	135	309	0	0	0
Higher Ed Institutions	9	9	9	0	0	0
Other Government	553	199	553	17	14	14
Other Non-Government	347	208	347	2	2	2
Total	**2,045**	**1,317**	**2,045**	**132**	**372**	**347**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Alaska.

Inventory of Deliverables, Connect Alaska: April 1, 2011

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Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Alaska have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

ALASKA FIELD VALIDATION NARRATIVE

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Alaska on the following providers: Ace Tekk Wireless Internet, AlasConnect Inc., Alaska Telephone Company, AT&T, Borealis Broadband, Clearwire Corporation, Copper Valley Telephone Cooperative Inc., GCI Internet, Ketchikan Public Utilities, Matanuska Telephone Association, SPITwSPOTS LLC, and TelAlaska Long Distance Inc.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 12 companies (out of a universe of 22 viable providers) totaling 54.55 percent within the state of Alaska.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 13.64 percent of Alaska households do not have terrestrial fixed broadband service available, and approximately 8.78 percent[1] of Alaska households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 23.85 percent of rural Alaska households do not have terrestrial fixed broadband service available, and approximately 15.37 percent[3] of rural Alaska households have neither mobile nor fixed broadband service available.[4]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet.

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem.

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Alaska project has received a total of 9 inquiries (31 grant inception to date). As more inquiries are submitted to Connect Alaska, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Alaska project launched BroadbandStat on September 1, 2010, and has received a total of 810 visits to date, of which 432 occurred this reporting period.

SPEED TEST METHODOLOGY

The 412 speed tests that are represented in the Connect Alaska Speed Test Report during this reporting period (781 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Alaska speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Alaska project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Alaska with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Alaska.

Broadband Provider Log

Complete	25
Non-Responsive/Refused	4
In Progress	2
Count of Datasets by Viable Status	**31**
Total Unique Providers Represented	**22**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Corp. Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	
Copper Valley Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/11/2010	
Ketchikan Public Utilities	Fiber	Data Added to Statewide Inventory	1/8/2010	
Ketchikan Public Utilities	ILEC/CLEC	Data Added to Statewide Inventory	1/8/2010	
Matanuska Telephone Association, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	6/15/2010	
SPITwSPOTS LLC	Fixed Wireless	Data Added to Statewide Inventory		
TelAlaska, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	6/7/2010	
Yukon Telephone Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	6/23/2010	
Kodiak Kenai Cable Company	Backhaul	Backhaul Provider Only Processing Complete	2/7/2011	
Ace Tekk Wireless Internet	Fixed Wireless	No Update to Provide		
Adak Eagle Enterprises, LLC	ILEC/CLEC	No Update to Provide	12/22/2009	
AlasConnect, Inc.	Fixed Wireless	No Update to Provide		
Alaska Telephone Company	ILEC/CLEC	No Update to Provide	2/26/2010	
Alaska Telephone Company	Fixed Wireless	No Update to Provide	2/26/2010	
Borealis Broadband Inc.	Fixed Wireless	No Update to Provide	2/1/2010	
Borealis Broadband Inc.	Backhaul	No Update to Provide	2/1/2010	
Copper Valley Telephone Cooperative, Inc.	Mobile Wireless	No Update to Provide	1/11/2010	
Cordova Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide		
Craig Cable TV, Inc.	Cable	No Update to Provide	7/27/2010	
GCI Internet	Backhaul	No Update to Provide	2/25/2010	
GCI Internet	Cable	No Update to Provide	2/25/2010	
GCI Internet	Mobile Wireless	No Update to Provide	2/25/2010	
MCI Communications Services, Inc.	Backhaul	No Update to Provide	12/14/2009	
OTZ Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide		
Alaska Communications Systems (ACS)	Fixed Wireless	Refused to Participate		[FEB-07-11 Jill Lindgren] Spoke with provider, they have decided not to participate in this round.
Alaska Communications Systems (ACS)	Mobile Wireless	Refused to Participate		[FEB-07-11 Jill Lindgren] Spoke with provider, they have decided not to participate in this round.
Alaska Communications Systems (ACS)	Backhaul	Refused to Participate		[FEB-07-11 Jill Lindgren] Spoke with provider, they have decided not to participate in this round.
Alaska Communications Systems (ACS)	ILEC/CLEC	Refused to Participate		[FEB-07-11 Jill Lindgren] Spoke with provider, they have decided not to participate in this round.
Atcontact Communications, Inc.	Backhaul	Other		[MAR-07-11 Brian Dudek] Provider representative indicated that they are only a satellite backhaul provider in Alaska. At the present, this transport is not required by the
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Cordova Telephone Cooperative, Inc.	Mobile Wireless	Offers Service but Below FCC Definition		
TelAlaska, Inc.	Mobile Wireless	Offers Service but Below FCC Definition	6/7/2010	
TelAlaska, Inc.	Cable	Offers Service but Below FCC Definition	6/7/2010	

State Broadband Data and Development Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised March 31, 2011

CostQuest Associates

LinkAMERICA Alliance

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Overview

The following documentation provides an overview of how the third required data set was collected and processed for the State Broadband Data and Development Program (SBDDP) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested modifications based upon NTIA guidance
    a. Inclusion of satellite, changes to service overview table, FRN verification process
4. Consumer Feedback, Crowd Sourcing and Social Media campaigns.
5. Development and posting of a Technical Standards document.

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods

As anticipated, the SBDD program continues to mature and evolve. Technical leadership and strong guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices.   Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the October 1, 2011 “Round 2” submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early January 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines associated with each round. Where necessary, we execute new NDAs with providers. In “Round 3”, this effort continued on a daily basis until we reached our final data submission deadline on February 18, 2011.   After February 18, we continued to work with providers who were not able to meet the deadline. In most cases were able to “crash” our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 3 only providers who

responded in the last two weeks of March were excluded from the final dataset. Data from those providers will be updated this summer and included in our Round 4 submission.

Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program's aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Three. We've also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in Round 1 or 2, they were giving an additional opportunity to do so in Round 3. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA's, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA's were individually negotiated to address specific provider concerns. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since two prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 3. This allowed us to provide two response options to providers. The first was for them to review PDF check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

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[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers like Megapath, New Edge Networks, American Fiber. These providers seem to resell and/or provision within their own network opportunistically. In this submission we begin to bring them into the analysis as a provider type "other". As the inclusion of this category isn't our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 3 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New Providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in Rounds 1 & 2, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning Providers: While many Broadband providers submitted datasets in Rounds 1 & 2, many of those submissions did not contain 100% of the requested data. To help identify gaps, and to make the Round 3 submission process as simple as possible, every Round 2 survey was reviewed for completeness, as well as accuracy and formatting compliance. Notes were made regarding gaps, and specific instructions were developed for providers in Round 3. These instructions not only explained what data was missing, but also provided directions on how to include that information in the Round 3 submission.

Check maps were also developed to show each provider how their service area would be displayed on the resulting interactive state map. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 3 survey in early January 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice by telephone or e-mail during the months of January and February. The initial data submission deadline was set for February 18, but, as previously noted, we continued to accept “straggler” submissions well into March.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of “known providers”. We believe the vast majority of those we were unable to reach were small wireless providers who have simply ceased to exist[2].

[2]The complete list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 3, given the data vintage of December 31, 2010, we began this process immediately after the New Year. The last submissions were accepted in mid-March, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBDD program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- GeoResults Telecom Research Data. This data was used to help estimate the Broadband services likely provided to certain classes of Community Anchor Institutions (CAI).

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBDD program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

a. Geographic Data Files
    i. US Census TIGER data[4]
b. Sources that helped isolate providers, identity management or provider service areas
    i. NECA Tariff 4
    ii. State produced exchange boundaries
    iii. Carrier produced wirecenter boundaries
    iv. FCC 477 provider filers
    v. FCC Coals reports (321/325)
    vi. FCC FRN API lookup tool
    vii. FCC/FAA Antenna Registration System
    viii. FCC FRN Lookup Tool (plain text search)
    ix. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
    i. USAC Grant lookup tool
    ii. USAC High-Cost FCC Filing Appendices
    iii. HRSA data warehouse
    iv. NCES data lookup
    v. State managed lists of schools (K-12), post-secondary institutions and libraries List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section below.

[4] Census data were derived from < http://www2.census.gov/cgi-bin/shapefiles2009/state-files?state=01>, Census 2000 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas. Finally, licensed data from Georesults were used to derive estimates of Broadband connectivity for hospitals within the Anchor Institution category. The actual value from Georesults was not used, but our estimate is modeled from their input data. We also use the name and address as provided by the State data provider, not Georesults.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities, the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a fairly traditional telephone survey approach, focused on the consumer market. In addition, we are currently advancing our crowd sourcing process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are summarized below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBDDP grant was in place. Subsequent consumer surveys funded by the SBDDP grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming. These surveys will be repeated after two years to establish and evaluate trends. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for internet users and one for non-users. The telephone survey approach allows us to reach the non-internet user group as well as the current internet user. A secondary online approach is also used to augment input from current internet users. For non-users, the surveys help determine why they don't have or don't use Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their

daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the consumer survey in Wyoming was designed to produce results relevant to the state's seven Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBDDP's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBDDP program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific internet use in specific communities (i.e., regions).

The 2010 surveys were launched in July 2010 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. The surveys were closed on November 30, 2010. Telephone surveys were completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers (e.g., 80,000 random Wyoming residence telephone numbers were acquired as the foundation for the Wyoming survey). Mobile phones were not included in the initial surveys. Upon evaluation of the survey statistics, an auxiliary survey was executed to ensure younger groups (i.e., age 18 – 25) were adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market (age 18 – 25) was surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics point to the complexity of the telephone-based survey process. Survey volume achieved statistical validity ranging from a 95% confidence level and a ± 1.7% margin of error for the statewide data in Wisconsin to a 95% confidence level and a ± 3% margin of error for Wyoming's statewide data. Most regions in the 3 states have a 95% confidence level with a ± 5% margin of error.

Call volume and disposition is summarized in the chart below

BROADBAND MARKET RESEARCH - ID, WI, WY - FALL 2010

	TOTAL		IDAHO		WISCONSIN		WYOMING	
TOTAL RECORDS CALLED & % OF STUDY	106,592	100%	22,144	100%	57,445	100%	27,004	100%
NO ANSWER	53,507	50%	11,974	54%	25,886	45%	15,647	58%
TOTAL DEAD NUMBERS	23,962	22%	4,529	20%	14,611	25%	4,822	18%
HARD REFUSALS	9,304	9%	1,728	8%	6,048	11%	1,528	6%
QUALIFIED REFUSAL	643	1%	101	0%	403	1%	139	1%
BUSY	3,652	3%	754	3%	1,903	3%	995	4%
ANSWERING MACHINE	6,385	6%	1,314	6%	3,388	6%	1,683	6%
NON-WORKING NUMBER	5,072	5%	943	4%	2,983	5%	1,147	4%
CLAIMS PREVIOUS INTERVIEW	113	0%	16	0%	68	0%	29	0%
NON-RESIDENTIAL	454	0%	104	0%	239	0%	110	0%
LANGUAGE BARRIER	1,003	1%	223	1%	562	1%	218	1%
OTHER PHONE PROBLEMS - FAX/MODEM	907	1%	205	1%	500	1%	202	1%
PORTED NUMBER	272	0%	68	0%	149	0%	54	0%
BREAK OFF - SCREENER	556	1%	103	0%	301	1%	153	1%
TERM Q3 - UNDER 18	122	0%	22	0%	65	0%	36	0%
		99%		100%		99%		99%
TOTAL COMPLETES	5,758	5%	1,080	5%	3,420	6%	1,259	5%
AVG Completion Time (minutes)	**16**		**15.8**		**15.4**		**16.1**	

As noted above, the telephone survey process represented in the statistics above was augmented by providing online access to the survey. Participation in the online survey was promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, this was a long survey. As noted above, the survey averaged sixteen minutes across the three states. While this clearly contributed to the number of survey call attempts that were required to reach the level of statistical validity, it was not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBDDP efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use YouTube, LinkedIn, Facebook and Twitter to support our work. YouTube and LinkedIn postings are used to promote awareness. As noted above, we were able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we are currently engaged in two specific social media tests (in Alabama) to gauge how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising. For example, with a fairly limited 'following' a single Facebook post aimed at driving traffic to the online speed test, had 282 impressions (i.e., the number of times the post was viewed), which contributed to an increase in 71 more visits to the Facebook page generally, and a volume of 60 hits (over a three day

period) on the web site page that hosts the speed test. Our normal volume of speed test page hits is in the neighborhood of 7 or 8 per day (vs. the average of 20 per day experienced during this test). Preliminary data suggests that about half these page hits resulted in a speed test being executed.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and budgetary constraints allow. It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us take advantage of increasing specialization and proficiency with certain types of data and management responsibilities. In this submission, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

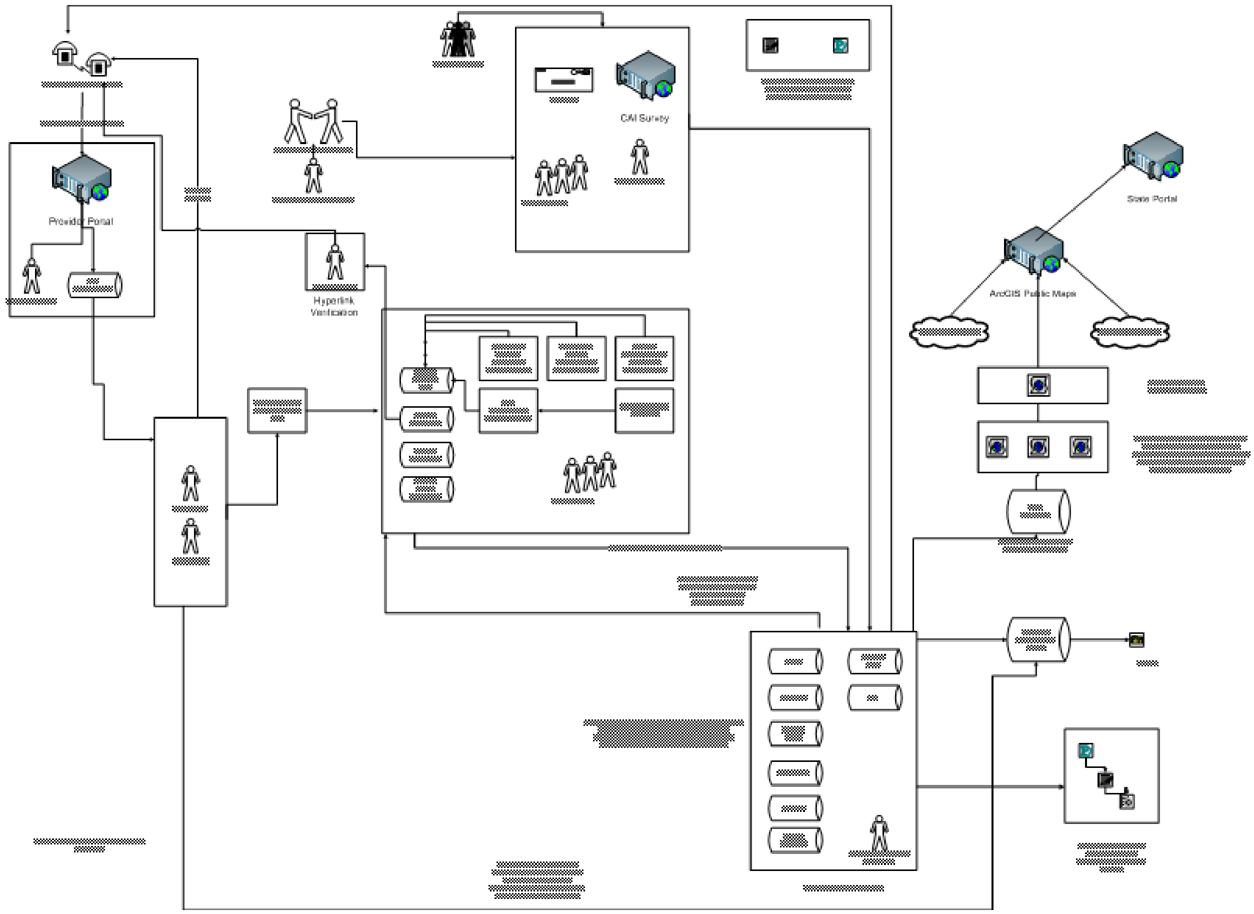

Figure 1--SBDD Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- Provider and network ownership certainty

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2000) of 2.00 or less square miles
2. Covered Street Segments (2000) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the georeferenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

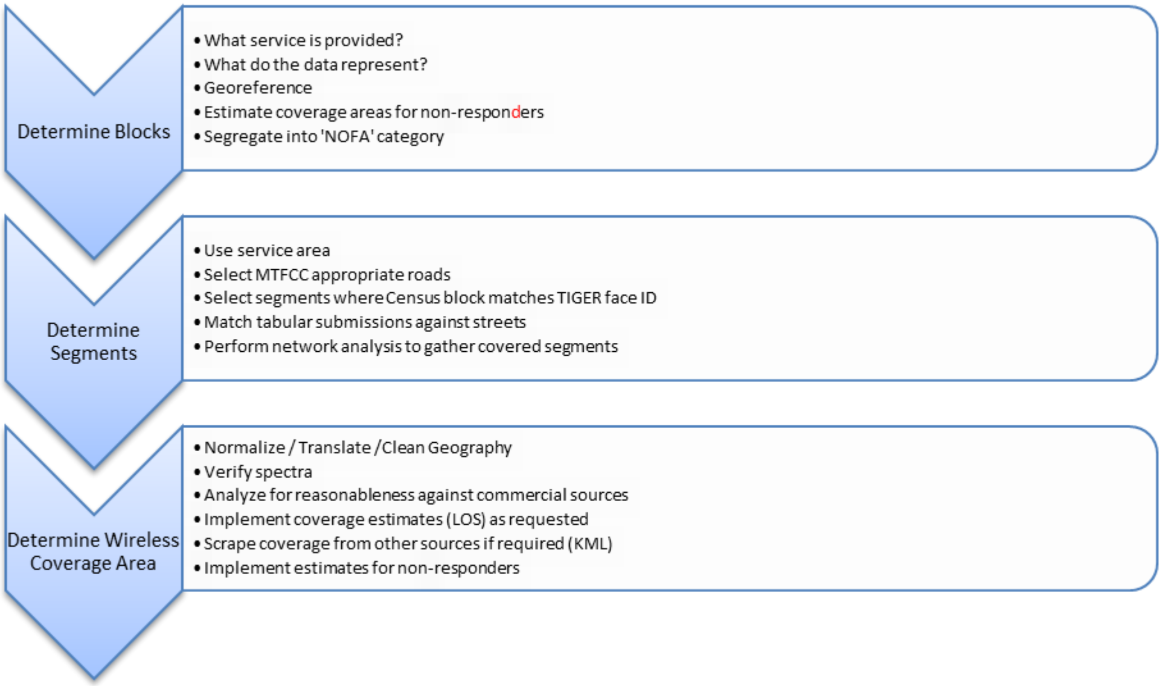

Figure 2-Broadband Coverage Process

Impact of Program Change

There were four important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 3.

The first was the development of a "provider match" submission metric whereby the grantee's complete list of known providers in the state is compared against lists from third party sources. The provider match specification was discussed on a webinar prior to the release of the national map. Although, to this date, there has been no clarification on how this metric is established or exactly how it will be used. We have invested significant resources to support an internal process to compare our provider lists with several additional sources. This has been manifest in at least three ways.

Within our provider verification process we work to derive a state level match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context.

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify,

or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of ‘other’ to bring some aspect of the provider’s data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to receiving Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as Provider Type “other”. Our sense is Provider Type “other” will continue to expand in the fourth submission as we pull in more providers who are facilities-based and reseller.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this “other” provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or Microwave link despite the fact that the hospital next to them in the same Census block can get this service.

The final set of changes was a second verification check against reported FRNs. As NTIA is stressing the importance of this attribute, we increased its visibility in our Check Map process. FRN is now listed on both the tabular verification report and the provider PDF map. Beyond this increased visibility we had an analyst verify each FRN in our system against the FCC API[9], as well as FCC textual search[10]. Because the FRN is not an identity management tool, we are unsure if the FRNs we’ve included are those desired by NTIA, but we have at the very least, verified the existence of the FRN via the FCC system.

Trends in Provider Supplied Data

With this third submission we take note of three important trends.

First, with larger providers, we are seeing an increase in data stability relative to earlier submissions. In informal discussions, several providers have noted changes and stabilization in internal data processes. The firms have invested internal resources in stabilizing this data feed.

We see this reflected in very stable counts of Census Blocks and road segments. This does not mean that complex problems like segment identification or dispersion in data have been ‘fixed’. It does mean that the format and methods to produce inputs for NTIA are increasingly stable.

Second we note that several providers have been particularly concerned with an appropriate identification of Maximum Advertised speeds. In some cases this involves identification of very small areas (sometimes below the level of a Census block) and appropriate assignment to technology of transmission and maximum advertised speed tiers. In other cases, questions arise regarding maximum advertised speeds that could be sold based upon network design, but that are not generally “advertised” or otherwise stated to the general public.

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[9] http://reboot.fcc.gov/developer/frn-conversions-api
[10] https://fjallfoss.fcc.gov/coresWeb/simpleSearch.do

Third when comparing submission three results relative to submission two it is important to recall the inclusion of much new data within the Provider Type “other” category. This change does not necessarily reflect a change in the size of the market, rather it reflects new data coming into the analysis and segregated into a distinct category..

Coverage Geoprocessing Methods

The next section discusses how data were geo-referenced and geoprocessed given a particular submission format.

In most cases, in Round 3 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[11]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to “belong” is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[11] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

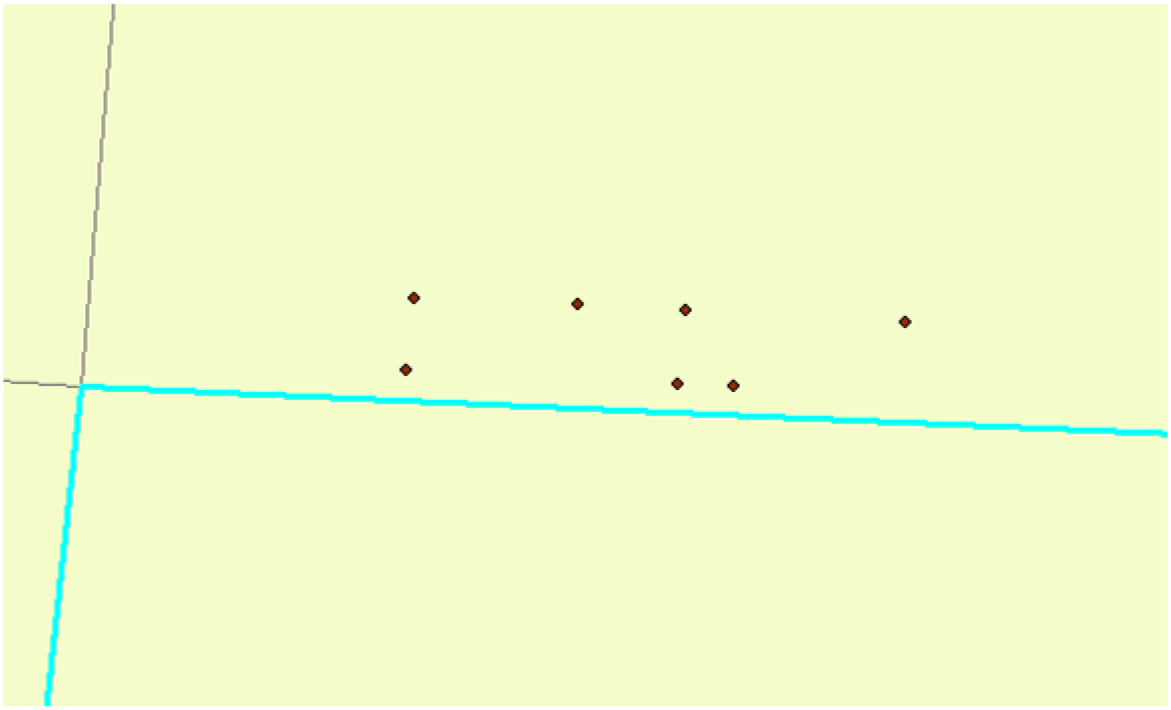


Figure 3-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

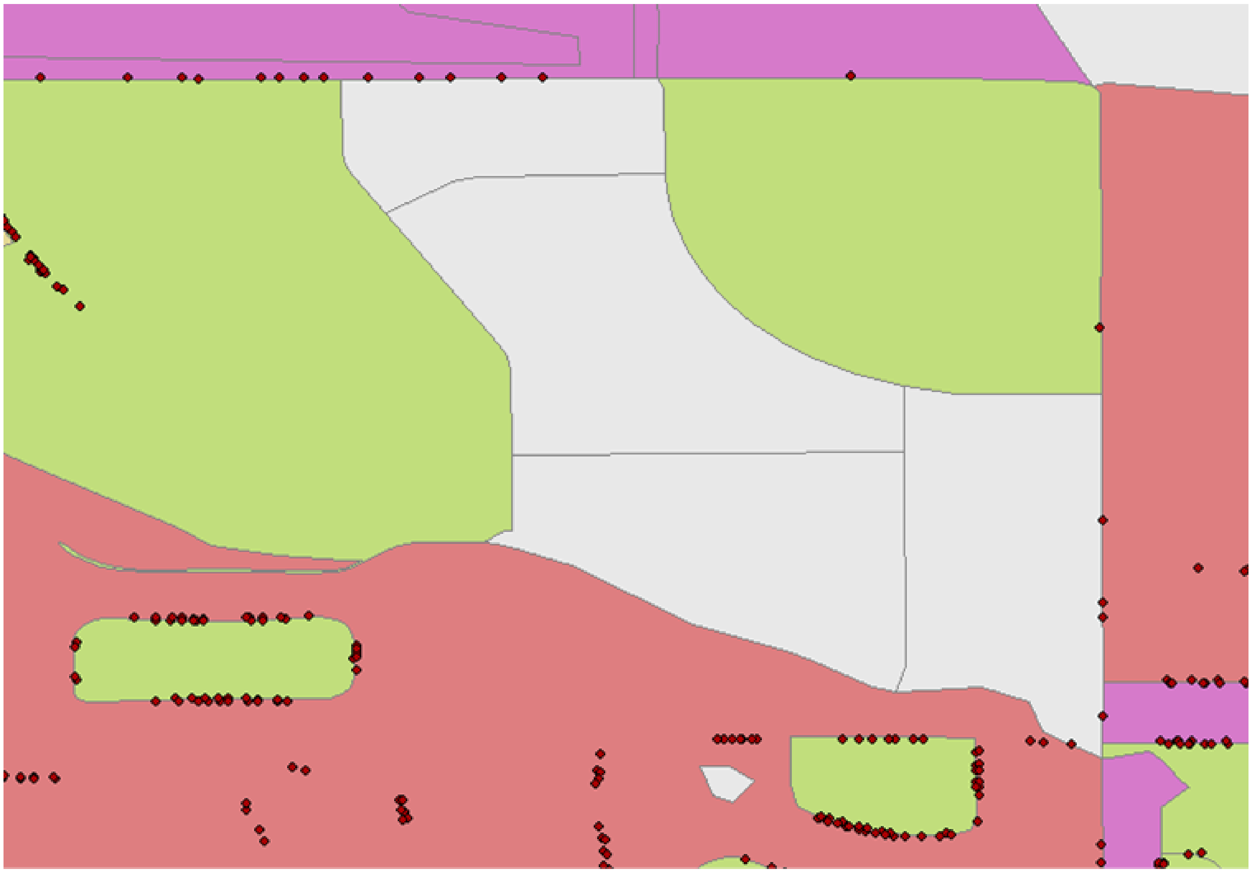


Figure 4-Block Coverage

For this reason, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas. Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate – specifically in areas where the coverage is attributed.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

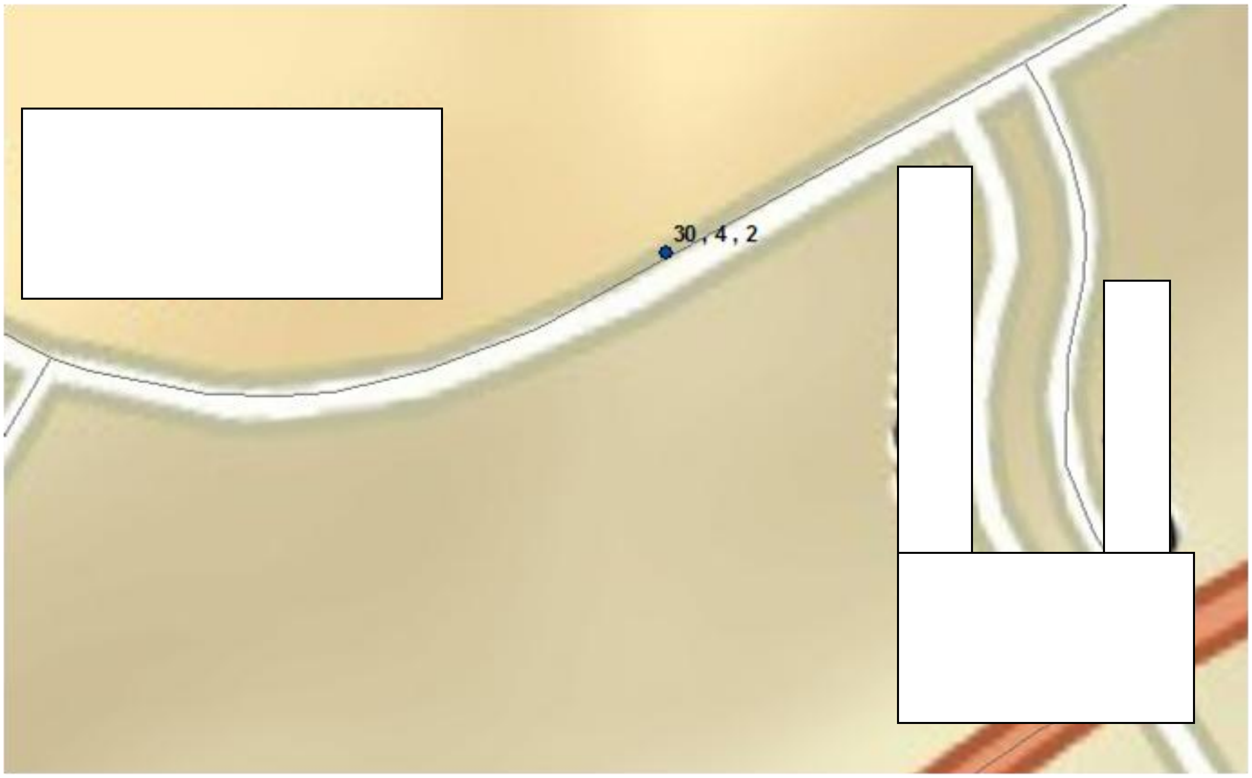


Figure 5-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a situation comparable to customer point level submission in that we have most of the network footprint captured.

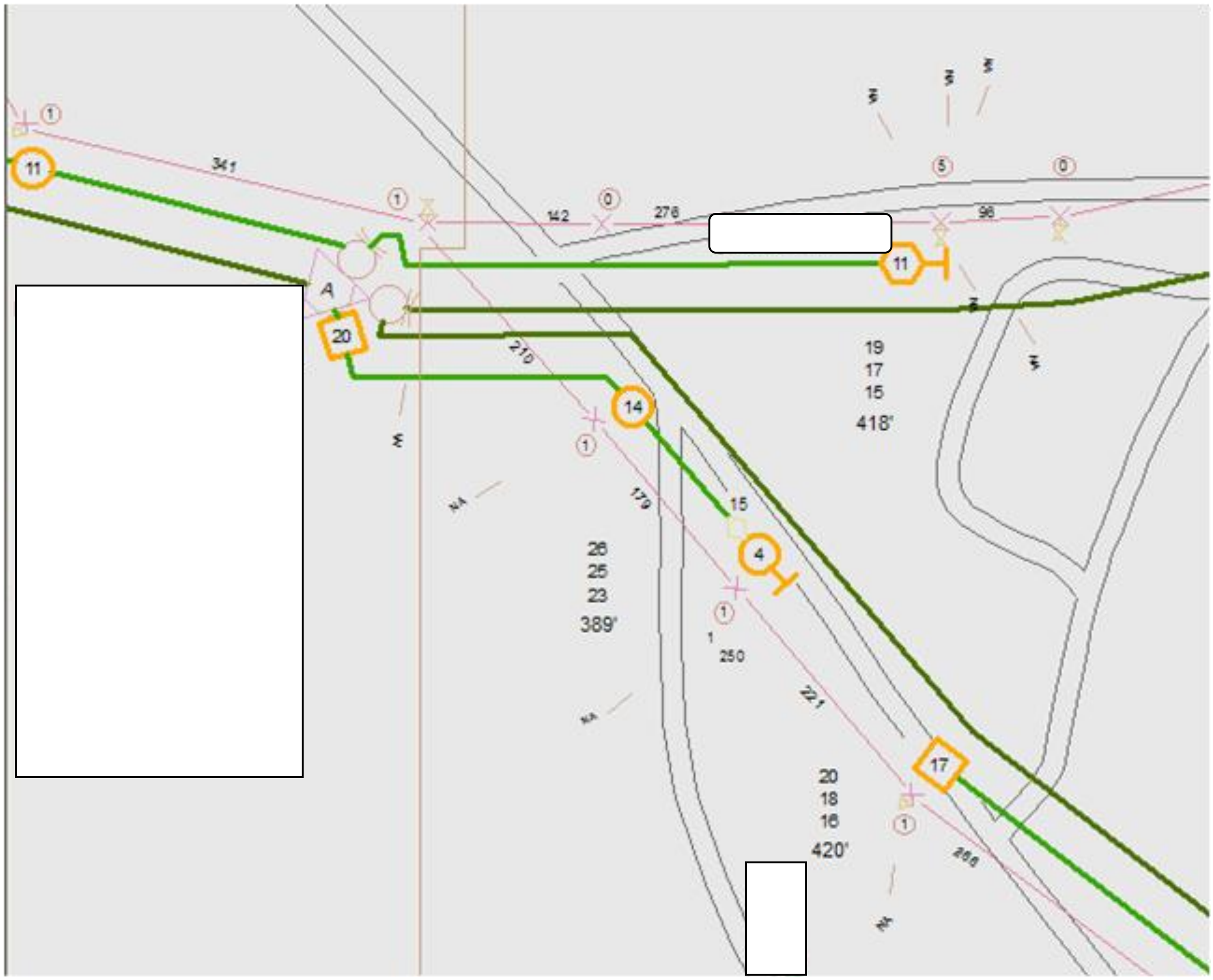


Figure 6-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our team had geo-registered the image into an approximate position. In this case, the boundary streets

were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

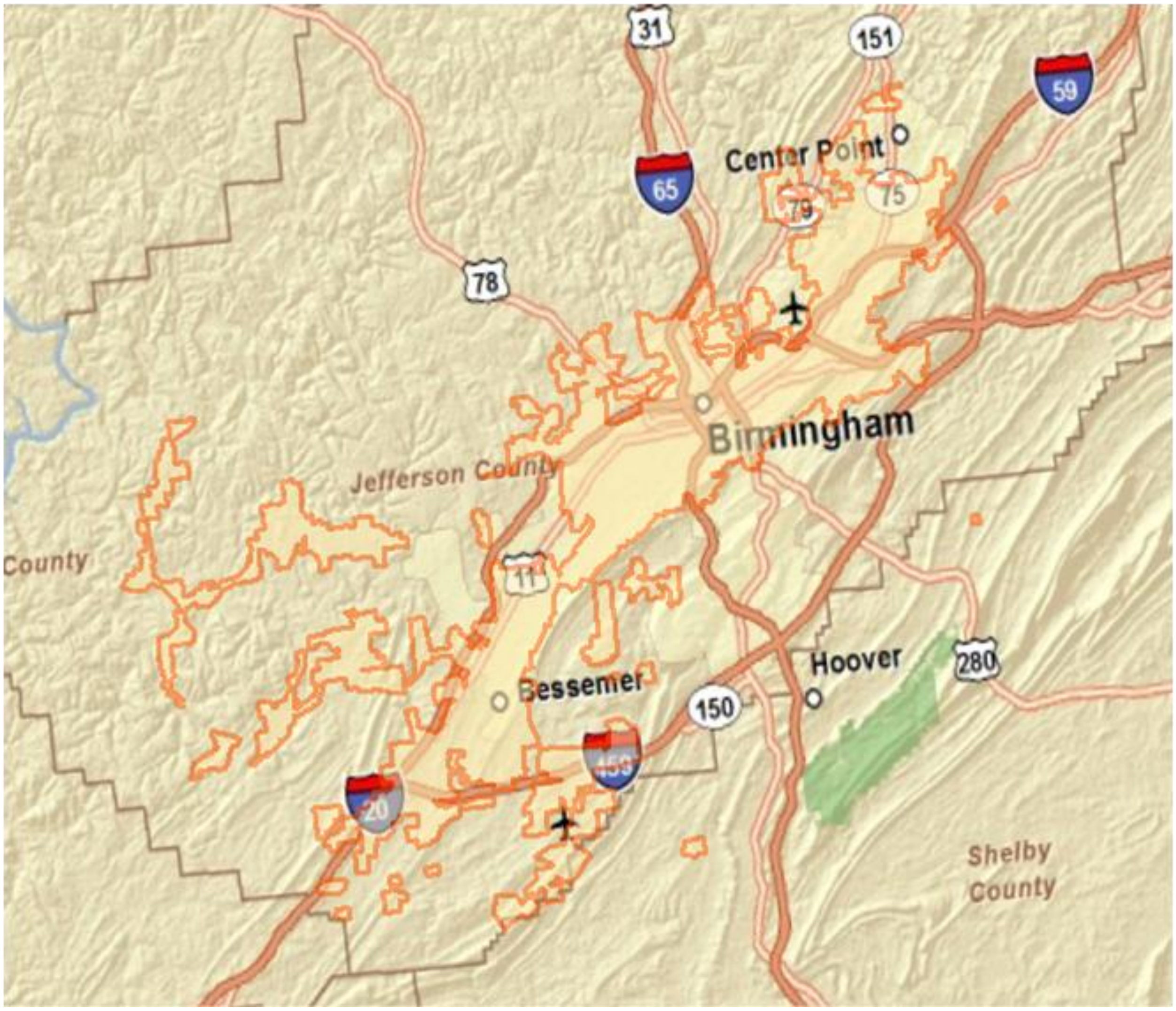


Figure 7-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with a provider to derive service areas based upon point plant data. In these cases we were given a primary serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

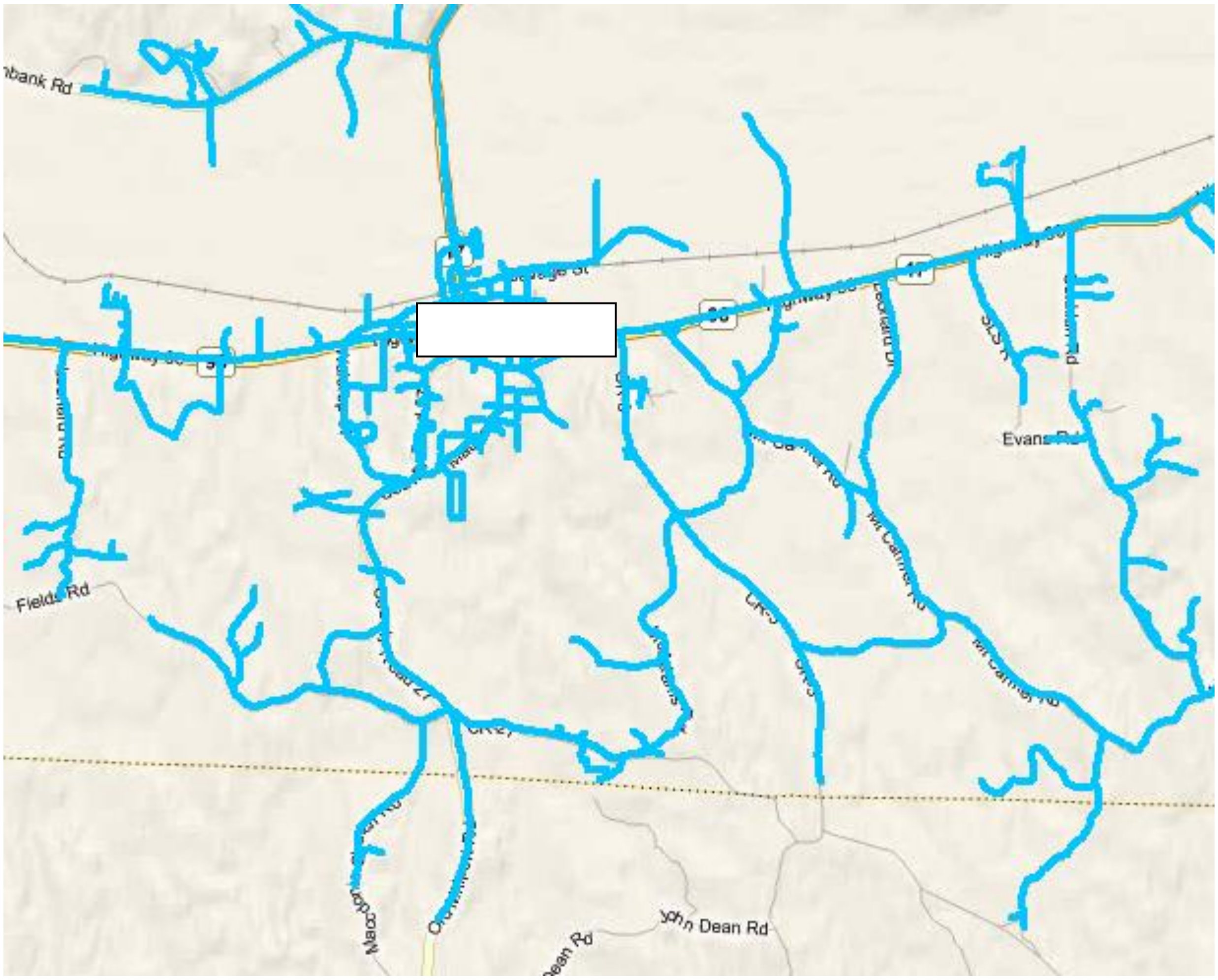
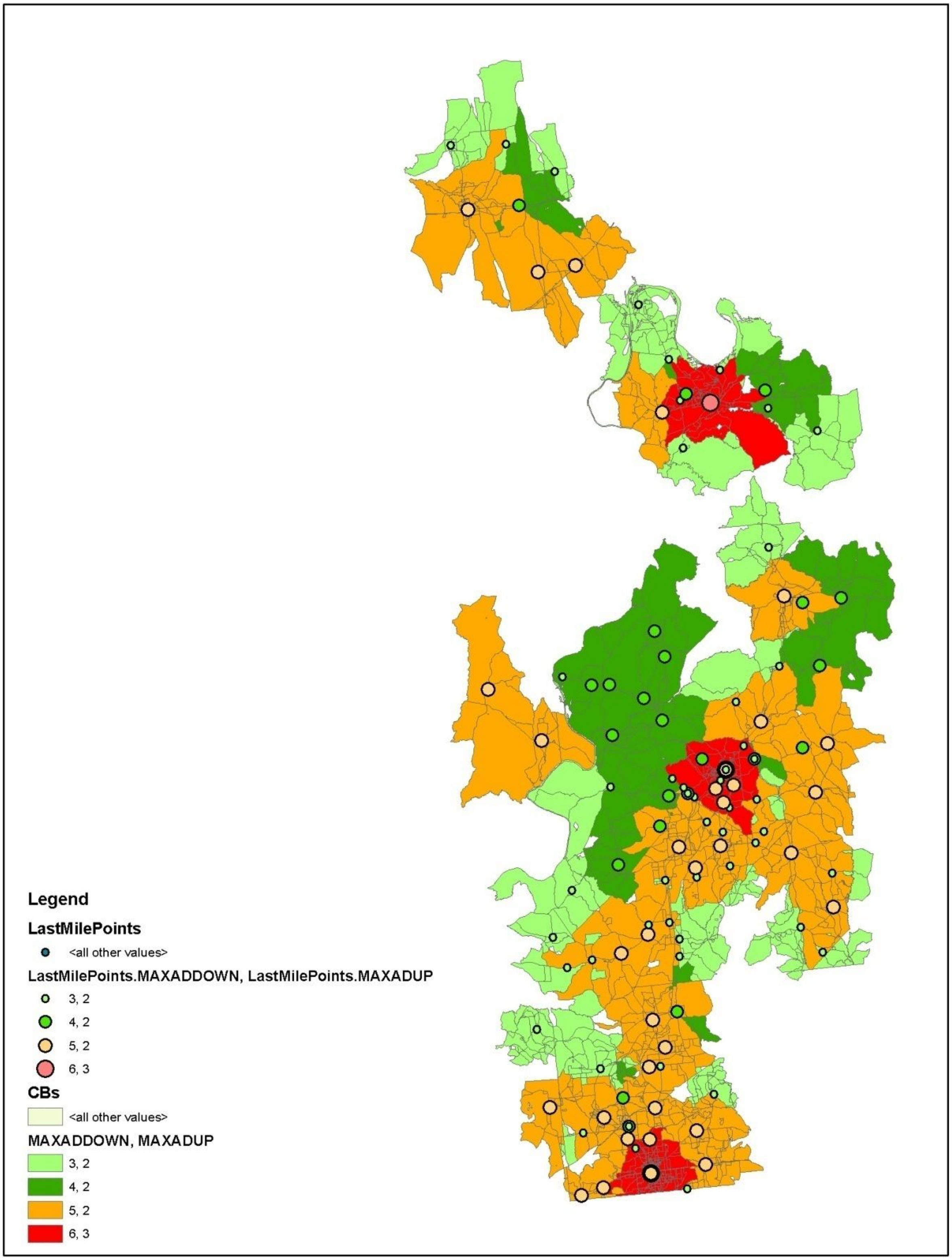


Figure 8-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In Rounds 2 and 3 -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[12]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[12] Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level below a Block and did not get picked up within a spatial query).

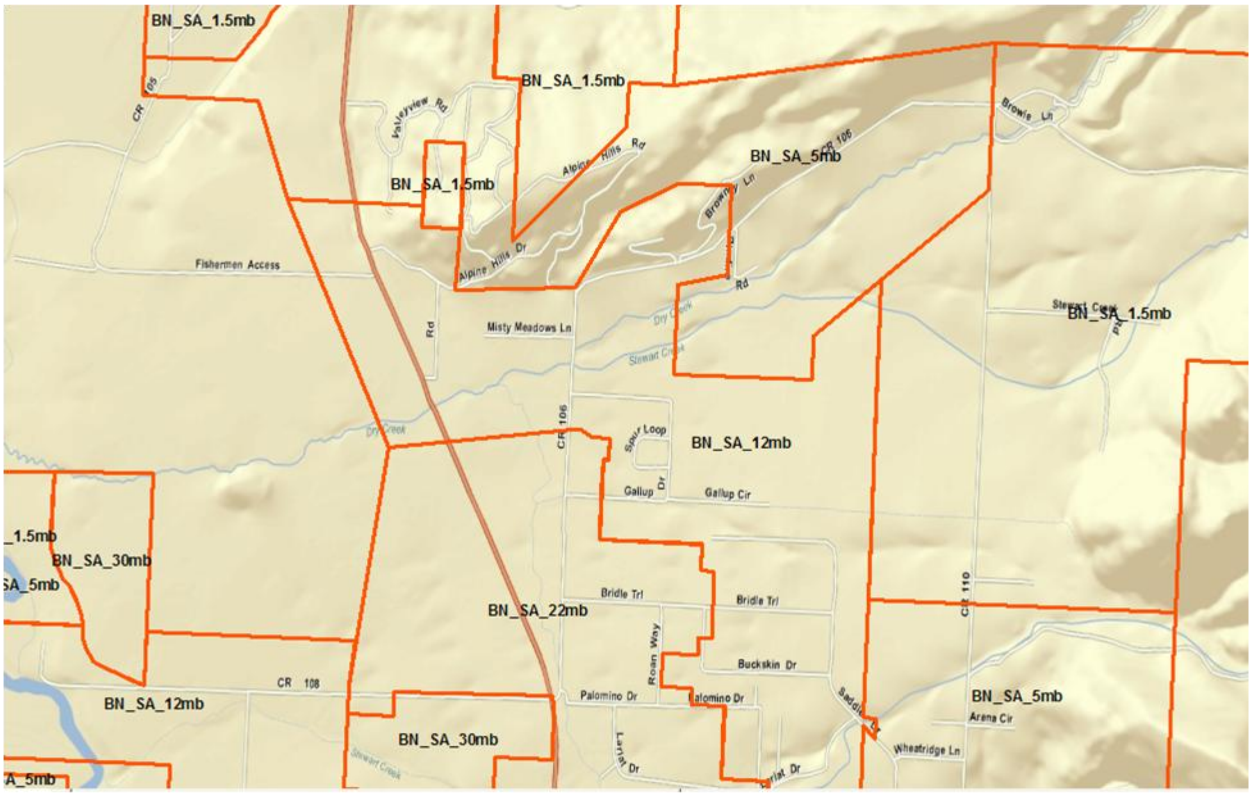


Figure 9-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without.
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[13]

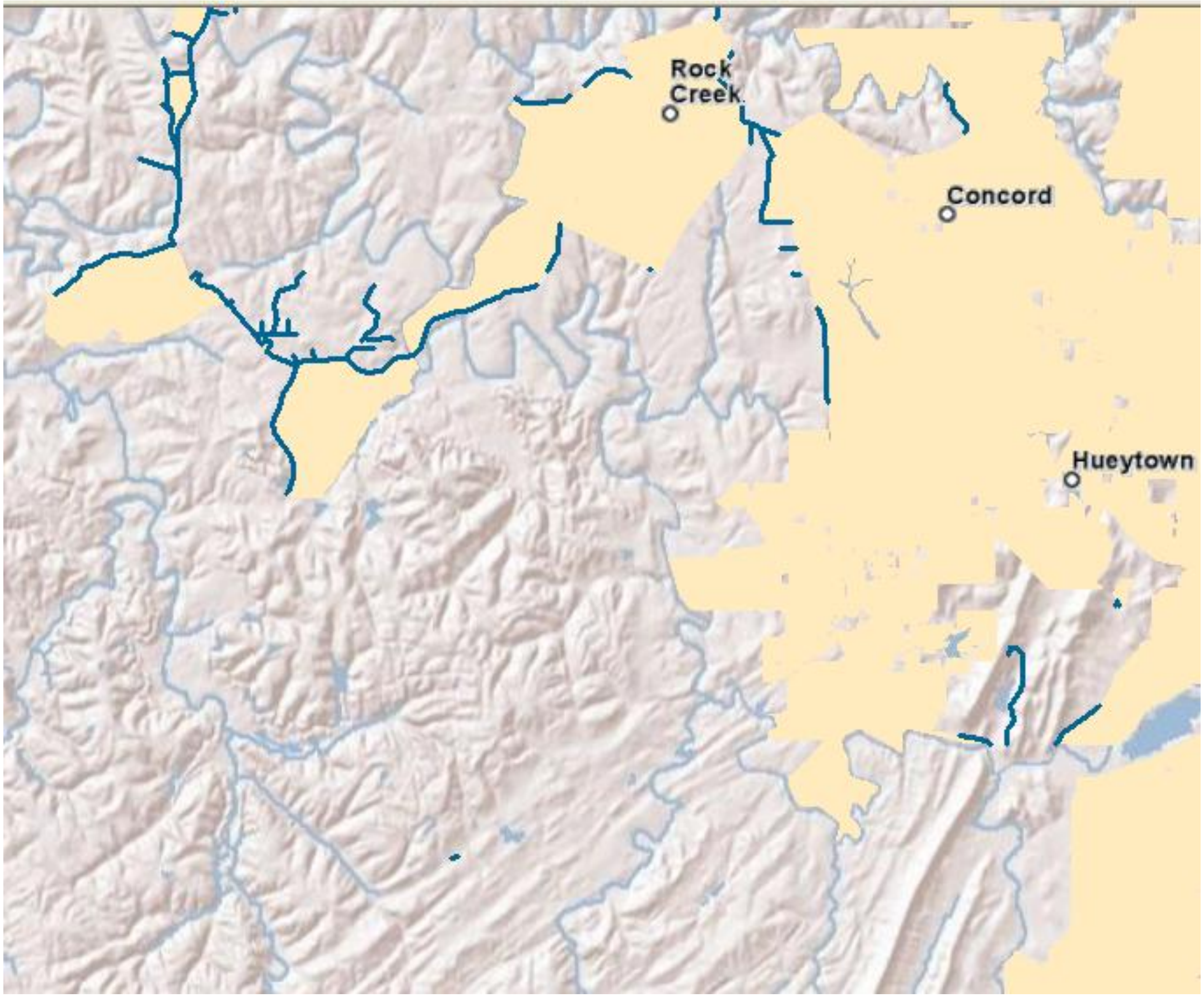


Figure 10-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2009 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[13] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

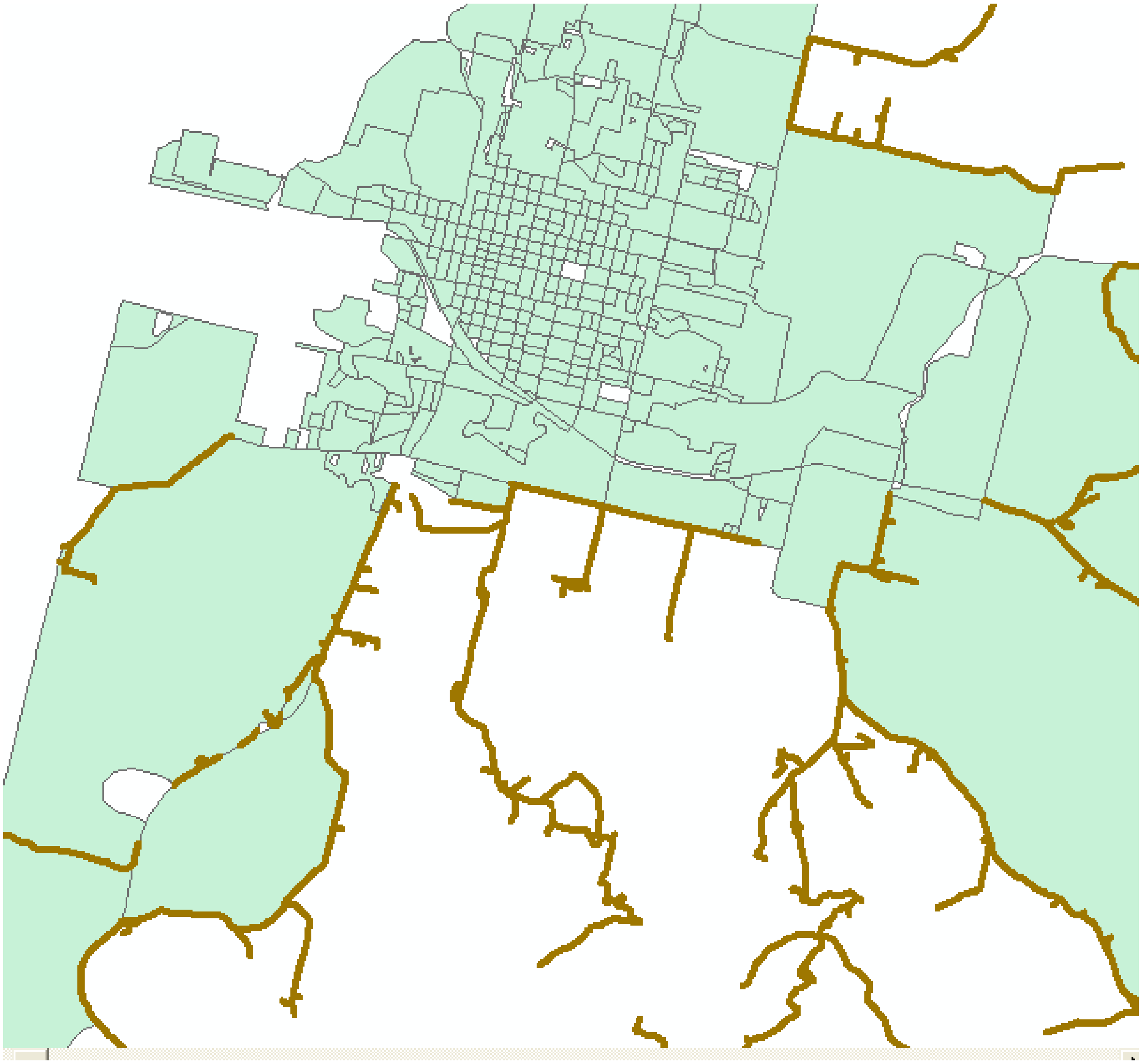


Figure 11-Provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

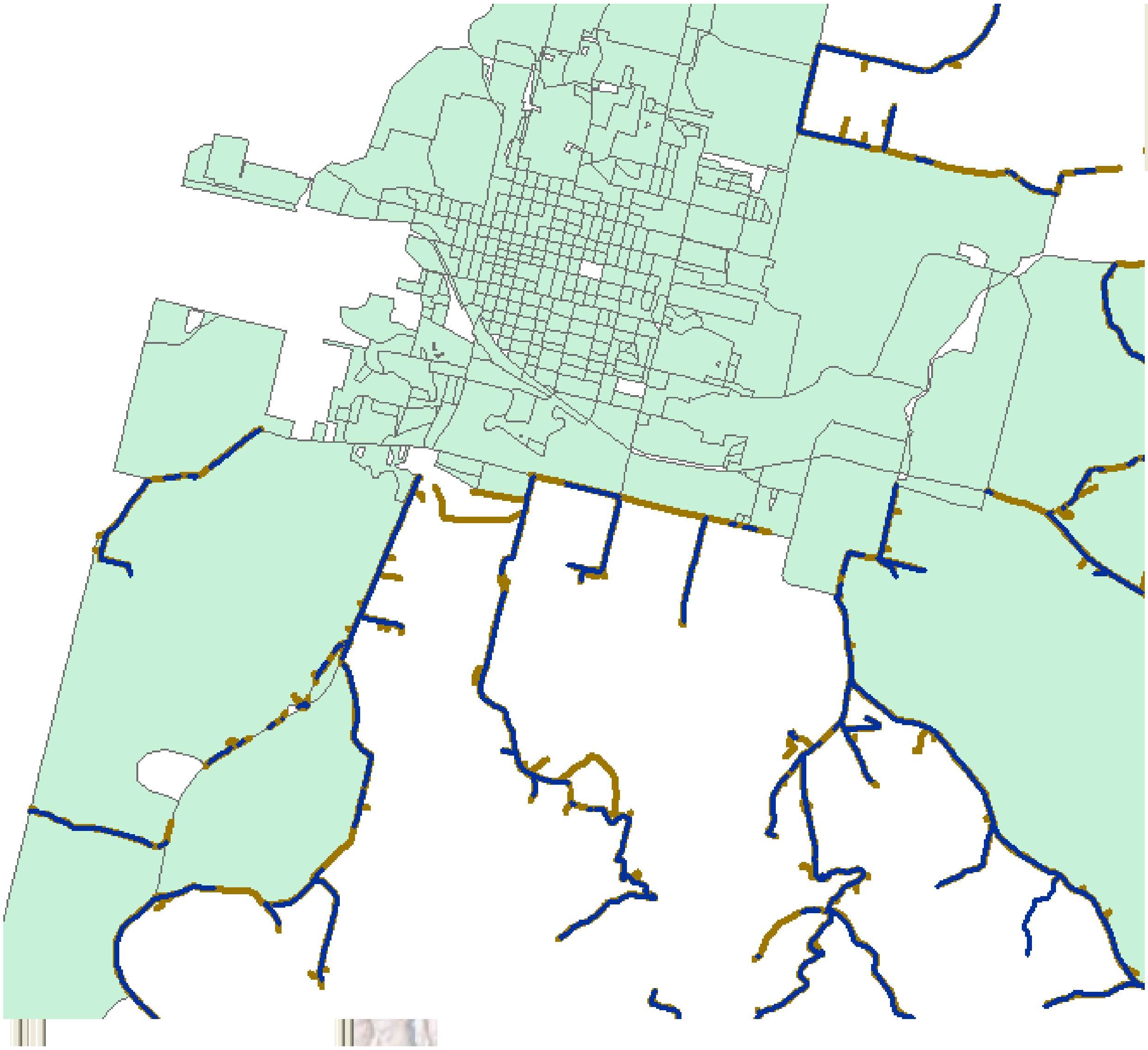


Figure 12-Provider submitted segments in gold, selected TIGER 2009 in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2009 road segments (MTFCC like 'S%') that face (CB = CBLeft2000 or CB = CBRight2000) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGERroads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by ProviderID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[14]

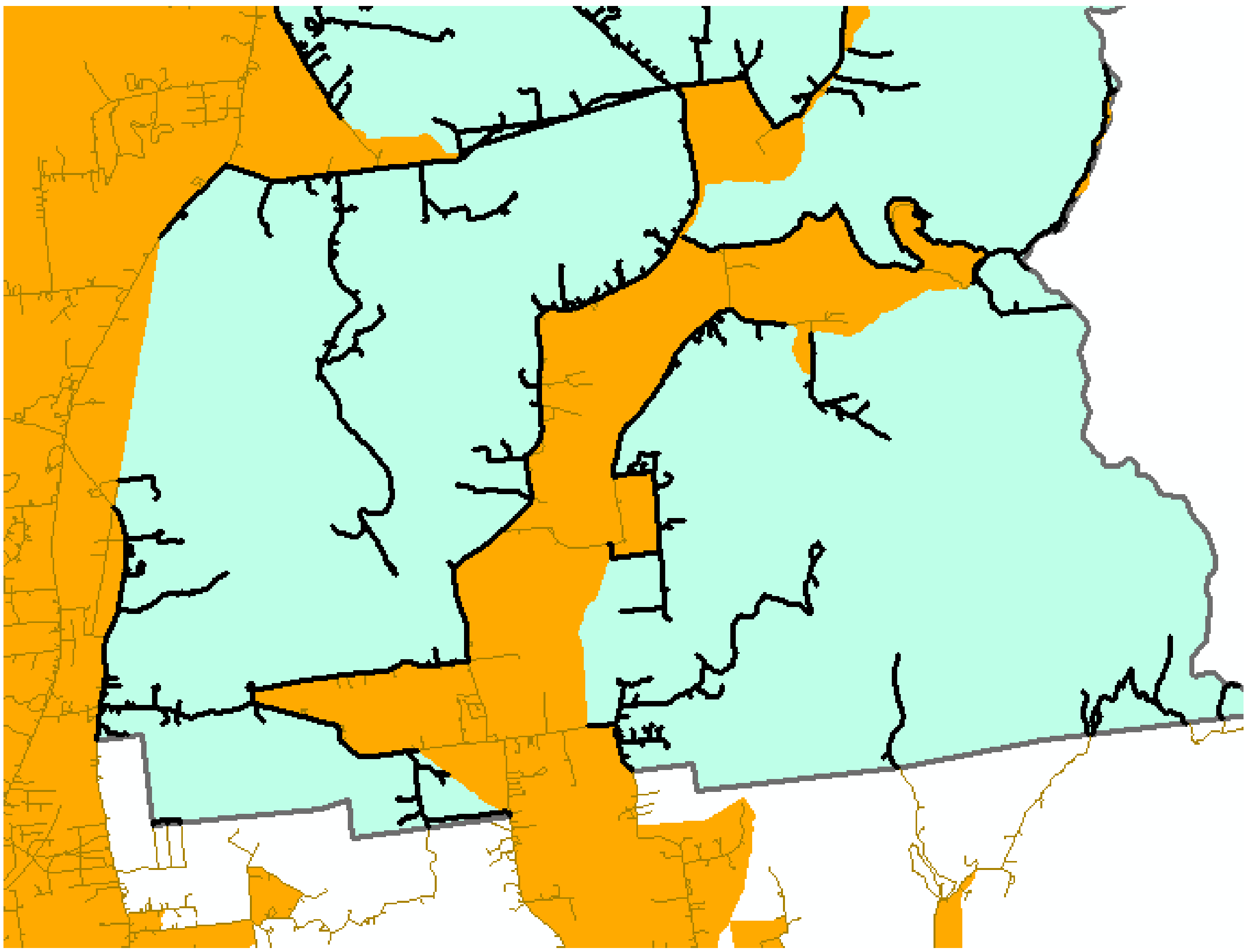


Figure 13-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[15]

[14] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

In this submission LinkAMERICA made an aggressive effort to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 3 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[15] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we have hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBDD formats. Some of our WISP submissions have taken over 12 hours to normalize into SBDD formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[16]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

[16] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information. From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned.

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[17] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[18]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to scrape coverage maps. When these maps were available, we georeferenced them and tried to use the outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[19]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't

[17] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[18] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

[19] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[20]

In circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBDD planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we

[20] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations.

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that has strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community ‘anchor points’. In other words, it isn’t solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBDD planning process.

The above implies two significant points. First, the team’s goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaging in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Further, the team continues to rely on the notion of Internet Intensity Zones. As the Broadband coverage information is developed, if we do not have definitive connectivity information from other sources (e.g. a phone survey, web survey, listing provided by a facility owner) in this study, those Anchor points that fall into an existing area of SBDD Broadband coverage will not be left out or submitted with NULL values. Rather, the adjacent coverage area will be the first estimate of Broadband coverage for

the facility. The use of an estimate allows the site to come into the analysis and learn a bit about the accessibility of that facility, but it also frees resources to examine those anchor points that are more dispersed and likely under/un-served. The team will conduct targeted surveys to discover connectivity and, more importantly, applications in use at prioritized CAIs.[21]

We close this section with a figure that we hope reinforces our CAI process.

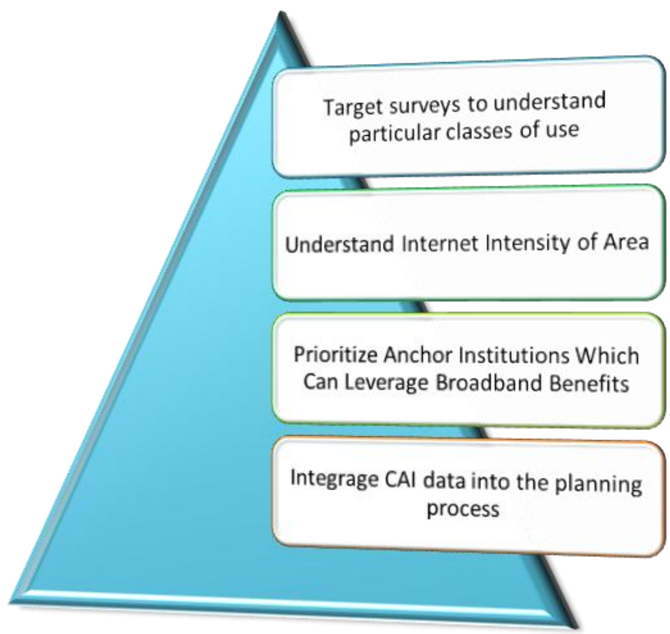


Figure 14-Anchor Institution Process

Recall from our first submission analysis, in most cases, CAI points are clustered and on average less than 1 ¾ miles away from one another. Relying on The First Law of Geography[22], this likely means that the Broadband accessibility is very comparable for CAIs that are close together. We believe this means Broadband accessibility may be less about connectivity than it is about the ability of a CAI to afford, successfully adopt and utilize Broadband to support its mission. Therefore, an important part of where SBDD mapping and planning come together understands what Broadband is used for, potential barriers to adoption, and how it is an essential component in a planning region's investment scenario.

[21] We track internally those features with Broadband connectivity defined via an estimate but within the current transfer data model we lack a mechanism to propagate that information to NTIA. Appendix One expands upon our thoughts regarding a series of audit fields in the transfer database which would be helpful to inform downstream users regarding the source of data or use of estimates.

[22] http://en.wikipedia.org/wiki/Tobler's_first_law_of_geography. We are attaching connectivity based upon the highest speed wireline provider in that block. This provides a ceiling for what can be obtained, although the CAI may not be purchasing this level of service based upon needs, budget, mission, etc..

Anchor Institution Survey

During the third submission period we began a survey process to both verify received connectivity information and garner additional connectivity information from CAIs. As with WISPS we wanted to aggressively target and improve this data section.

The process began with the Round 2 CAI list. Again, we prioritized schools, libraries and healthcare institutions. A small team made outgoing phone calls to discover relevant contact names. In Wisconsin, we were able to gather about 150 email addresses based upon 440 calls. There were only 14 refusals.

While one team worked on improving the contact list, a second team designed and developed a simple online survey system called CAVS (Community Anchor Verification Survey).

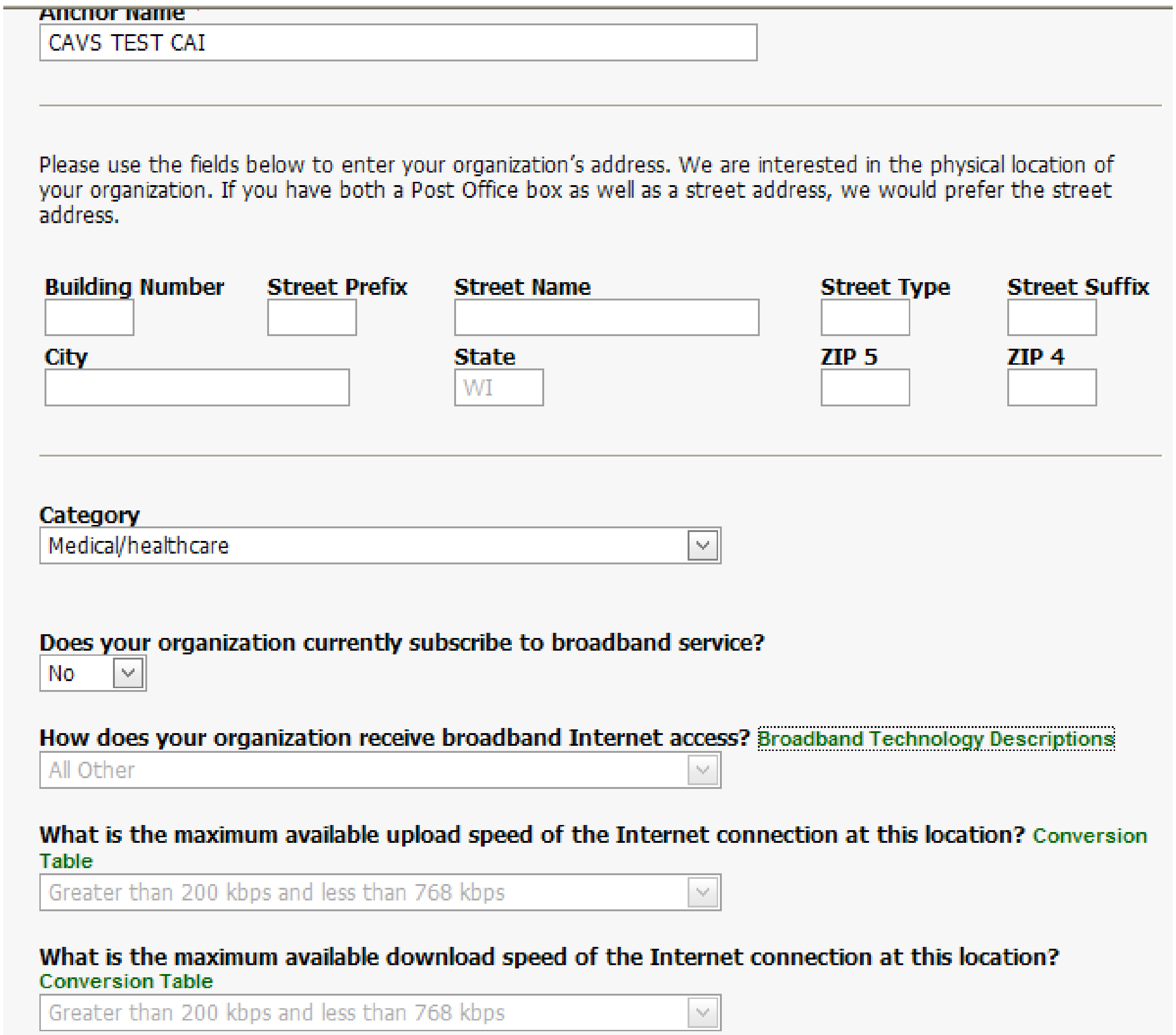


Figure 15--CAVS Screen

Users were invited into the CAVS system by the receipt of a postcard with an organization specific code printed on the mailing label. Beyond the questions shown above, there was a second page to the survey dealing with use of Broadband. Those results are directed to the planning teams.

The table below summarizes outgoing contact activities by state. This includes both a post card as well as for some organizations in which we had contact information a follow up phone call.

States	Post Card	Calls
WI*	2033	75
ID	1059	259
WY	345	30
AL	1640	14

As of 3/16, verification[23] statistics were as follows:

State	Verified / Total Records	Percent Verified
AL	72/2137	3.3%
ID	172/1596	10%
WI[24]	1187/3945	30%
WY	169/796	21%

We are keeping the survey open after the Round 3 submission to NTIA and will continue to collect data. In Alabama we have also begun to use resources from the planning teams to make outgoing calls and better target the surveys.

Clearly this survey was resource intensive but it did yield an increase in verified, rather than estimated, CAI data. We are unsure if we can sustain it in the next submission, but is has proven to yield new information.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

[23] We say a record is verified when it has been opened by the CAVS test user. It means at least one field was modified.

[24] In Wisconsin several large school districts supplied files with connectivity information; we performed a bulk update in these cases. We attribute it to the survey as the survey triggered this response.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submission, we are using public domain sources of information for public safety-category 4. The vast majority of these locations are estimated with respect to connectivity. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[25] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," but the bandwidth is estimated based upon the number of channels purchased. We also had difficulty obtaining both the upstream and downstream channel capacities. In large part, we made the speeds symmetrical, but this is an assumption on our part.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP code.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what it is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[26]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

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[25] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

[26] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the question was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[27]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider_Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[28] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied

[27] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[28] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, Provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the Provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information. It also involves a validation with supplied speeds.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The

second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the "islands" of coverage isolated by significant distance from other covered areas. This is the opposite of the Internet Intensity Zone notion discussed in the Community Anchor Institution section. In other words, Broadband Internet likely doesn't exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

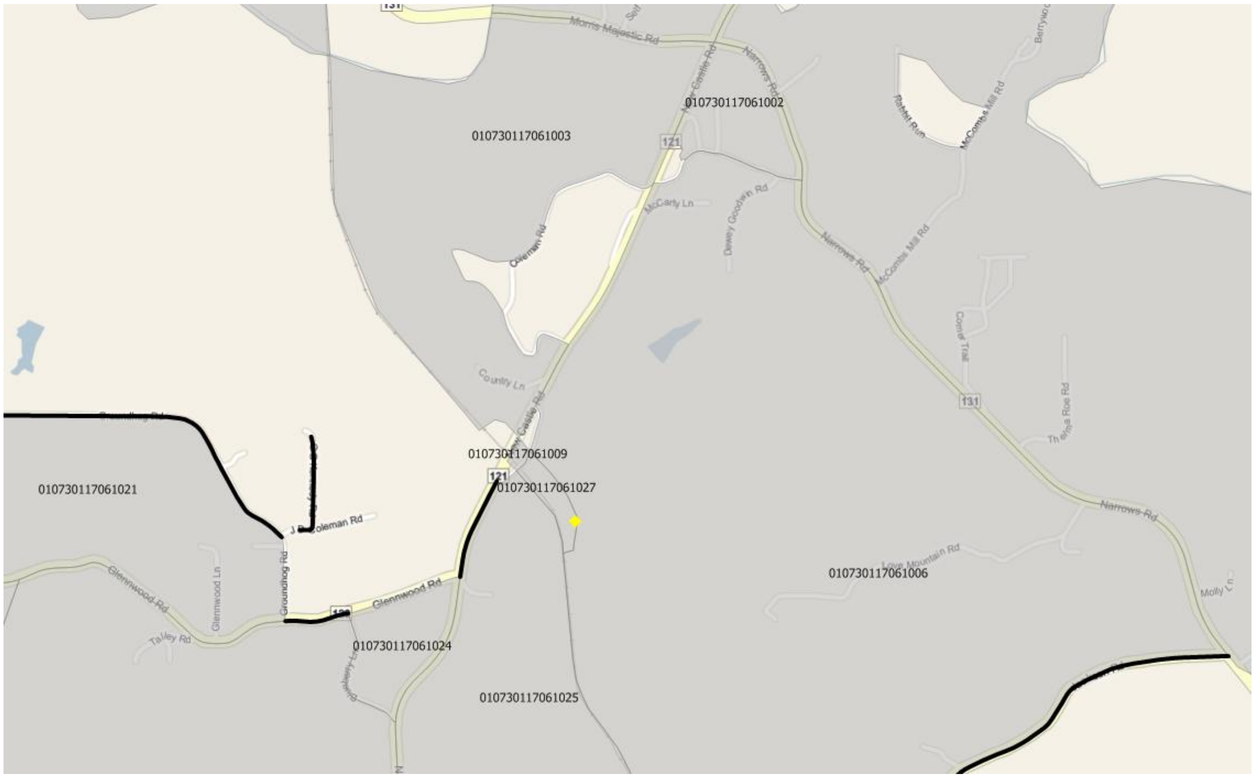

Figure 16--Sub block variation

Because the SBDD program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

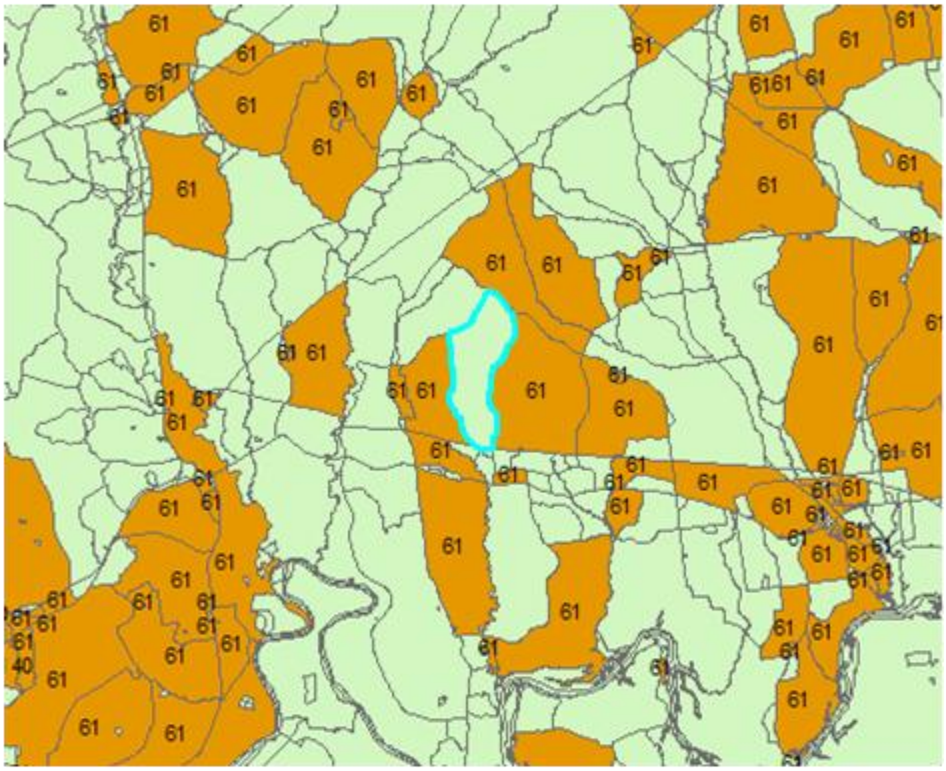

Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example, at a somewhat larger scale, shows where an interpolation process requires some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

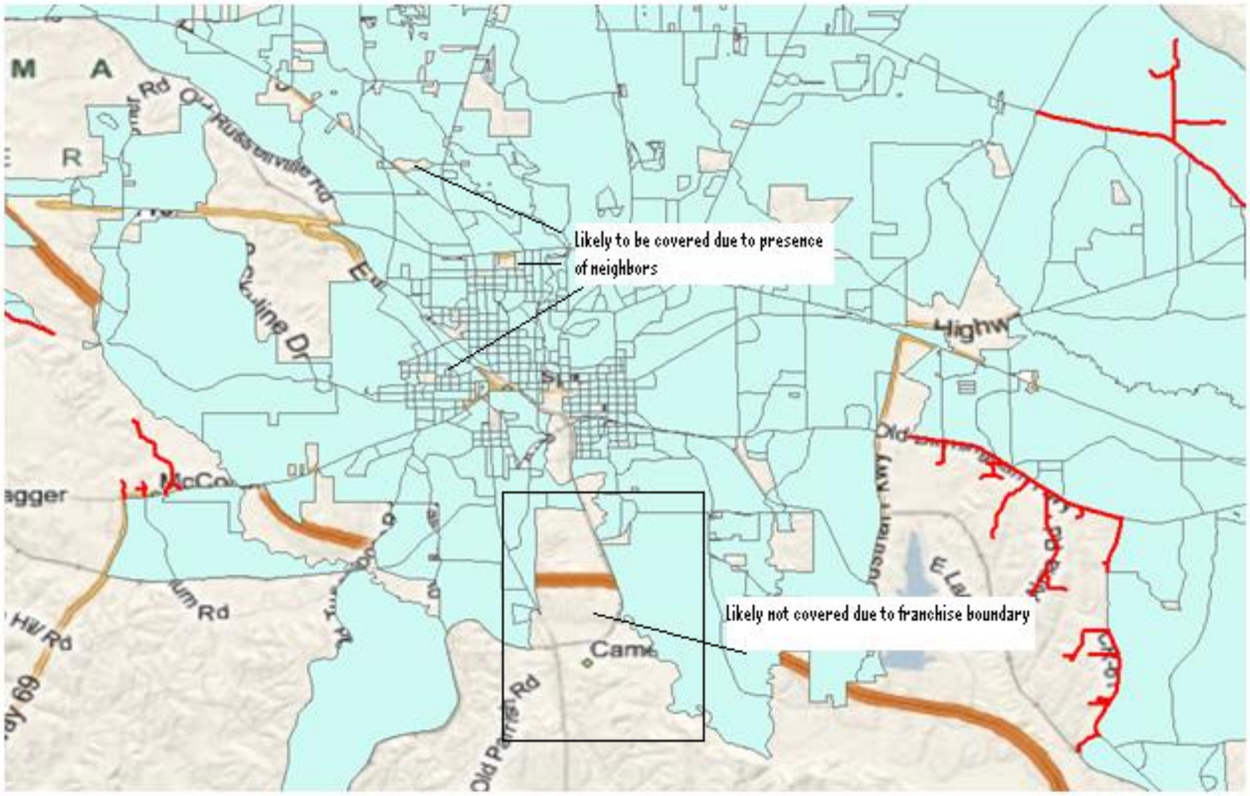

Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

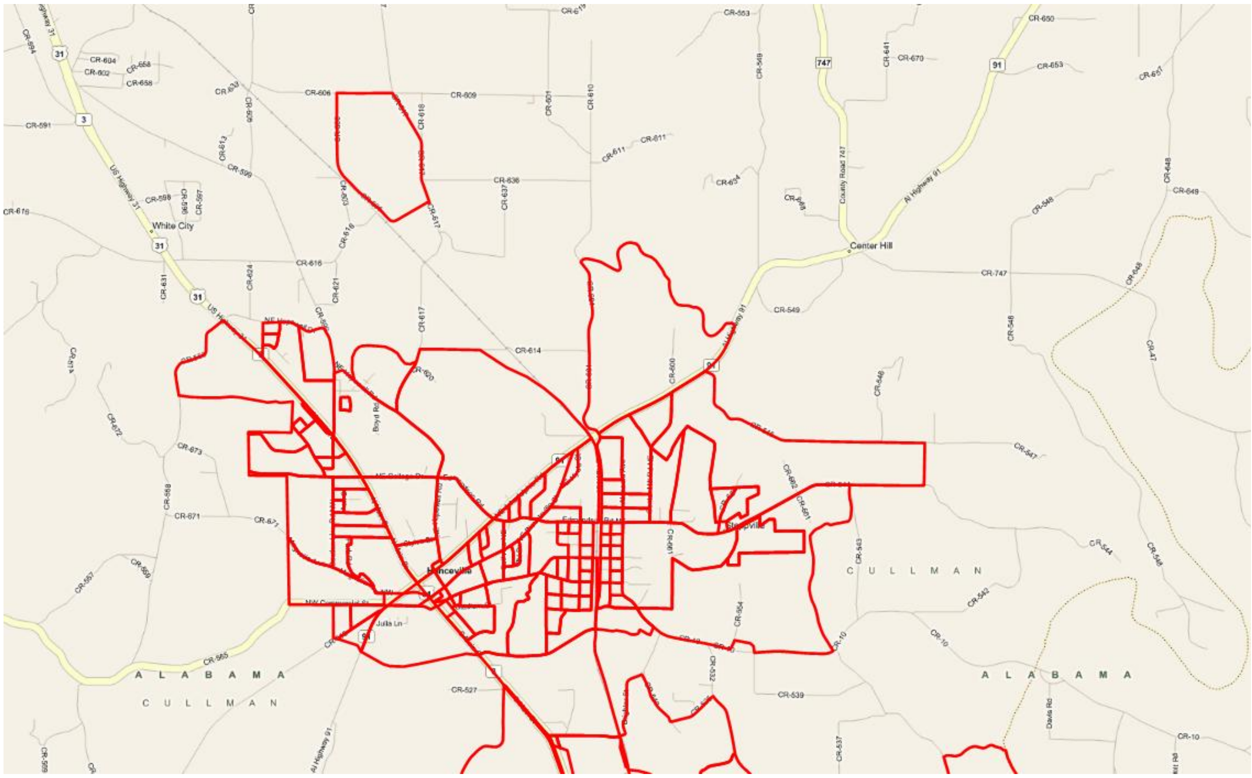

Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider’s territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the second round, they received both a tabular data summary and a mapped output. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the April, 2011 Round 3 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from

this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

Now that our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBDD data model. As an example, consider the figure below.

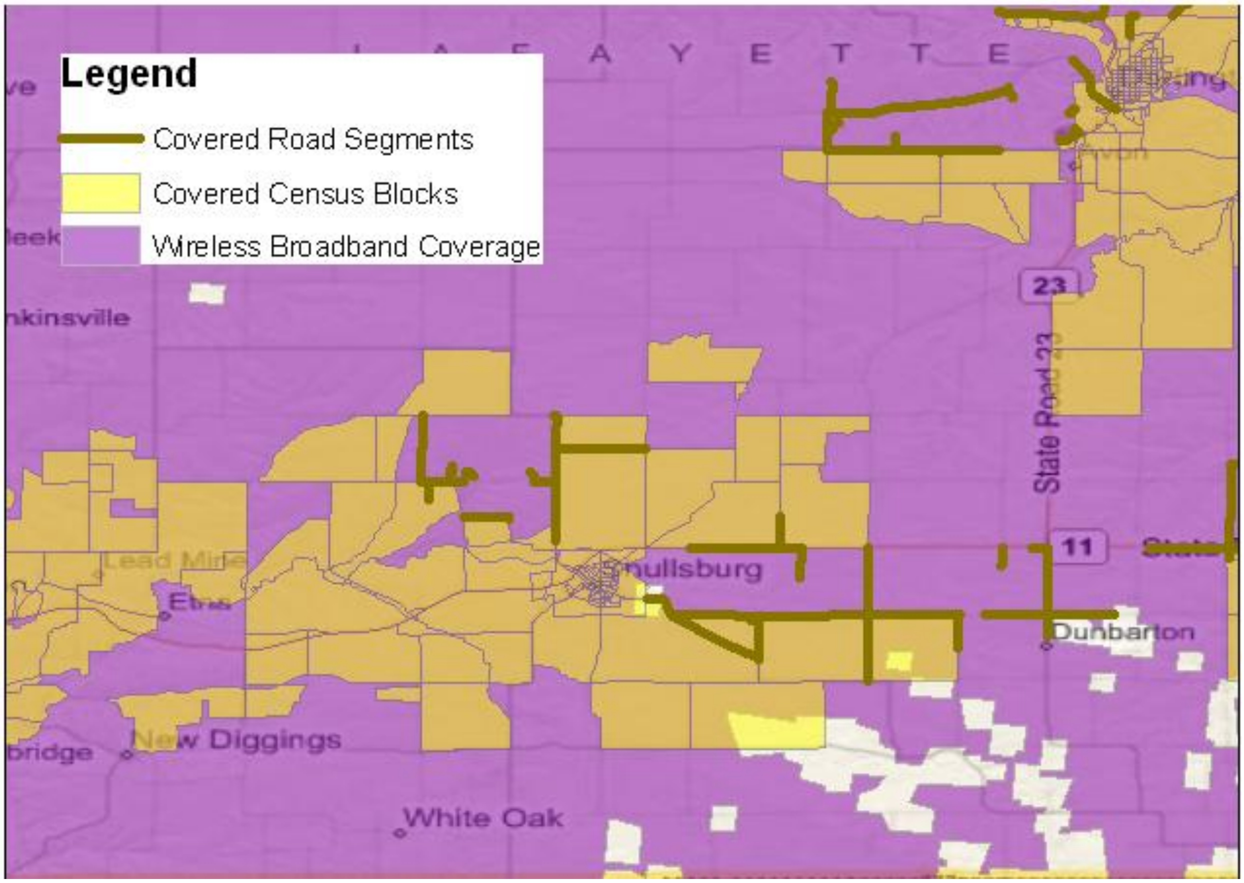

Figure 21--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of COLR Obligations

Wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300'. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

National Broadband Map Experiences

When the National Broadband Map launched, our phones began to ring.

Responding to a number of provider inquiries as well as emails from citizens provided some insights. It also illustrated that we now bear a second dimension of external verification. That is, we must be prepared to respond to people who are confused by apparent inconsistencies between the State and National Broadband Maps[29].

The case below, based upon a call we received, illustrates some interesting intersections between the State and NBM.

In this example a Citizen called inquiring about the difference in results between the National Broadband Map and our State of Alabama map. The issue in question was coverage at his home. The Alabama map showed he had coverage at his home, but the National Broadband Map said he did not.

In the image below, the green dot represents the geocoded location of his home. Based upon imagery, the geocode is quite accurate. The olive colored polygon represents a covered Census block less than or equal to 2.0 square miles. The Census block shows coverage by a number of wireline providers.

The geocoded point is about 170’ from this covered Census block.

[29] We have a similar concern regarding textual data extracts. We may translate our SBDD submission into covered Census Blocks in a way that is different from NTIA.

Figure 22-NBM Covered Census block example

In the next image, covered TIGER road segments are shown in green. It is important to note how far the TIGER road centerlines are from the actual roads in the subdivision. It appears the geocoded point is reflecting more recent and more accurate road centerlines, placing the green dot at the correct location. Since the SBDD data is submitted in terms of TIGER 2000 the road on our map shows up about 100-200 ft away from where that road is located today.

As mentioned previously, however, our online maps buffer road segments to 300 feet on either side of the road centerline. In this case then, our state map buffer is large enough to return valid service providers for this green dot. The NBM, on the other hand, does not appear to buffer segments or the edges of census Blocks and will not return providers for this location. Our intent in this example is not to criticize the national map; rather, it is to illustrate that we may inadvertently make trade-offs between false positives and false negatives, differently.

This case illustrates several important tensions between the data as we present it to NTIA, map it ourselves and because of how it may be viewed within NBM context. A lack of agreement on how to handle these inconsistencies in the source data and differences in mapping approaches may cause consumer confusion.

The issues seem to come down to this

a) How do you (or can you) handle the impact of time when roads move between TIGER versions or between TIGER and other road products? In this case, online map road traces will not show up in the right area.

b) Given the inconsistencies between TIGER geometry used in submission and underlying roadbases used for geocoding online, how do you (or should you) insulate the viewer from the inconsistencies. There appears to be a strong likelihood that TIGER judges a particular point to be in a larger than 2.00 sq mile Census block while that same location could be in a small block area in the online view.

c) How much tolerance should be introduced when returning a list of valid providers? Is it better to error on gathering too many providers or too few?

d) Since the NBM gathers feedback based upon its representation of coverage, how can/how should this crowd sourced feedback influence data presented in a different manner elsewhere?

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

Most carriers submitting Census level information provided 2000 Blocks. A few provided 2009 or alternative (TeleAtlas, possibly) Blocks. Especially with the need to derive segment geographies, we would prefer to message the providers a specific Census standard—but we'd like to be consistent with other Grantees so as to minimize work from the provider community. As of now, that standard is Census 2000. If NTIA anticipates using Census 2010 for Fall 2011 collection, it would be helpful to message that as soon as possible.

Also there seem to be several methods by which providers are calculating the area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband Providers not Meeting the NOFA "Provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband Provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[30]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how

[30] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the Provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband Provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[31]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn't forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn't a consistent method used to derive Broadband coverage. Some providers appear to be using a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data

[31] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the Provider_Type is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on Provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy of other base layers. Although we may be trading off absolute accuracy, our standard has been to conflate data to TIGER 2000 Blocks and TIGER 2009 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to December 31, 2010. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network

types (why is wireline down at the block when wireless is half the state, etc.). Finally we are also noting a significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to an anticipated geographic deliverable also increases the complexity of the effort.

Change Management Process

One thing that is becoming clear is that a change management process that is consistent between the data provider and NTIA is needed. In this light, publication of the current data transfer model beyond the PBWorks community would also be helpful. Many providers are designing their data extracts with the NOFA in mind and the NOFA structures have been supplemented in the current model.

Finally, it would be helpful, as early in the next cycle as possible, to know what Census Block vintage we are expected to deliver to NTIA. It would also be very helpful to maintain a stable geographic base for the next deliverable so that the basis of verification doesn't change.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.

5. In tables with mandatory Zip5 (Service Address), if the End_User_Zipcode was not available, we have inserted '00000'
6. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category.
7. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
8. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL).
9. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems.

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users

Technical Whitepaper
Arkansas Broadband Data Submitted for April 1, 2011 to NTIA

Submitted By Connect Arkansas

Connect Arkansas

Connect Arkansas, a private, non-profit, is implementing a community-based initiative to promote internet access and education. The Connect Arkansas Broadband Act was signed into law by Governor Beebe on March 28, 2007, to ensure the creation of a competitive broadband, or high speed internet, infrastructure that will not only improve personal lives, but also the economic capabilities and of all Arkansans.

To facilitate statewide broadband access, Connect Arkansas, a "delivery platform neutral" entity focuses on three major components: Determination of existing broadband infrastructure in Arkansas, Education, and Accessibility to computer devices. The first of these components, determining existing infrastructure, facilitates the requirements of the SBDD Program adequately.

Identification of Broadband Providers

As of March 1st, 2011, Connect Arkansas has identified by DBA name Seventy-eight (78) Broadband Providers in the state of Arkansas. These providers are identified as having infrastructure in the state and are not identified as being resellers. Of these providers, Seventy-two (72) submitted to Connect Arkansas at least partial data to map coverage. Of the remaining six (6) Broadband Providers, three (3) have agreed to provide data in the future. From the Fall 2010 list two (2) providers are either no longer in business (Vista Vox) or planning to discontinue providing Broadband in the near future (IOCC).

Data Collection and Processing

For the Spring 2011 data set all providers were contacted first via mail, then email, and finally with telephone calls to the point of contact for each company. Sixteen (16) companies updated coverage information as far as speed or coverage area. The other fifty-six (56) participating Broadband providers chose to display data as unchanged from the Fall 2010 NTIA Data Submission.

The format of data collected has been in various formats as listed below:

ArcGIS Shape files
Tab delimited files of Address Ranges
Tab delimited files of Addresses
Physical maps of coverage
Tower information for propagation

Shape files were easily formatted to conform with standards in the SBDD Data Model.

All tab delimited address files were geocoded using the ESRI geocoding engine in ArcGIS. These geocoding passes were used against the standard ESRI database, as well as U.S. Census Tigerline data, and Arkansas Geographic Information Office's Street Centerline and Address Points. In the rural areas of Arkansas the accuracy of geocoding is much lower than in urban areas. To help remedy this, Connect Arkansas reviewed the geocoding results with each provider, giving each the opportunity to correct any issues. Note: any geocoding results that fell outside of a providers existing telephone exchange or know service areas were discarded. From these results, nearest road centerlines or census blocks (less than 2 square miles) containing the geocoded points, were selected to represent the Broadband Providers Coverage. Note: only two (2) Broadband Providers provided data at the address level.

Any physical maps of coverage (including those submitted in pdf format) were used as a basis to manually select line segments from existing road centerlines in the state (based on U.S. Census Tigerline data). From these results census blocks (less than 2 square miles) that contained the digitized road centerlines were selected along with the road centerlines in areas of larger census blocks, to represent the Broadband Providers Coverage.

Fixed Wireless tower information (including Latitude, Longitude, Frequency, Power, Height) were gather and entered in to EDX Signal software to model signal propagation. This software also took into consideration terrain elevation as well as ground clutter to accurately model the Broadband signal, in most cases to a twenty (20) meter degree of accuracy. These raw propagation models were processed in ArcGIS into more organicly smooth shapes to conform with standards in the SBDD Data Model.

The results of the processes above were loaded into the SBDD Data Model and the latest CheckSubmission script was run. All resulting failed processes were analyzed and addressed to result in No Fails in Census Blocks, Road Segments, or Wireless Coverage data sets.

Middle Mile information that was received (most Broadband Providers view Middle Mile as proprietary information and elected not to submit) as tab delimited text files or as a spread sheet in Microsoft Excel. This information was brought into ArcGIS, processed, then formatted to conform with standards in the SBDD Data Model and uploaded.

Community Anchor Institution data is information received from 3rd party sources in regards to institutions as outlined in the NOFA. Most of the data collected is from phone surveys to each location. In some cases difficulties were presented in finding a suitable technical point of contact to collect information. Arkansas Department of Information Systems has agreed to help provide information for public schools as well as HITArkansas for Health Systems, in future submissions. Only Community Anchor Institutions that could be geolocated were included. Connect Arkansas has also decided with this submission to include commercial locations with publically available broadband (typically via WiFi).

Verification Processes

Connect is currently using several methods to verify data collected. The format of data collected has been in various formats as listed below:

Telephone surveys
FCC released Form 477 data
Telephone Exchange Boundaries
Data collected from feedback on maps.connect-arkansas.org
Data collected from speed tests on www.connect-arkansas.org
Speed test data released from Broadband.gov

General Notes

The majority of Broadband Providers Submitted Maximum Advertised Speeds at the MSA/RSA level, or overall coverage areas which in some cases represent a large portion of land, in some cases several counties. At the direction of Andrew MacRae with NTIA, Connect Arkansas has pushed these speeds down to the census block and road segment level. Some inaccuracies can be seen in the data as actual Maximum Advertised Speeds in some cases vary from zipcode to zipcode in some cases.

All Census Block data is 2000 vintage, and all Road Segments are based on Tigerline 2009.

Connect continues to identify small providers, in particular fixed wireless providers that do not advertise or have a web presence. It is possible that several more of these providers will be identified in future data submissions.

It should be noted that in some cases relating to Cable Companies in Arkansas several of these described their Broadband Coverage area as "all streets within XX city limits".

American Samoa

Broadband Mapping Project
Product Release White Paper

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Product Specification: Spring 2011 NTIA Data Model
Product/Process: NTIA – April 1st, 2011 Data Deliverable
Dataset Submission QC: NTIA – SBDD_CheckSubmission.py

Document Control

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.
- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is as accurate and comprehensive and possible, provider validation and internal verification activities are utilized. Following the initial mapping of providers' coverage area and serviceability claims, additional reviews are performed using the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality review results are tracked by provider / technology type and stored and maintained within a "Validation" table. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
  - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

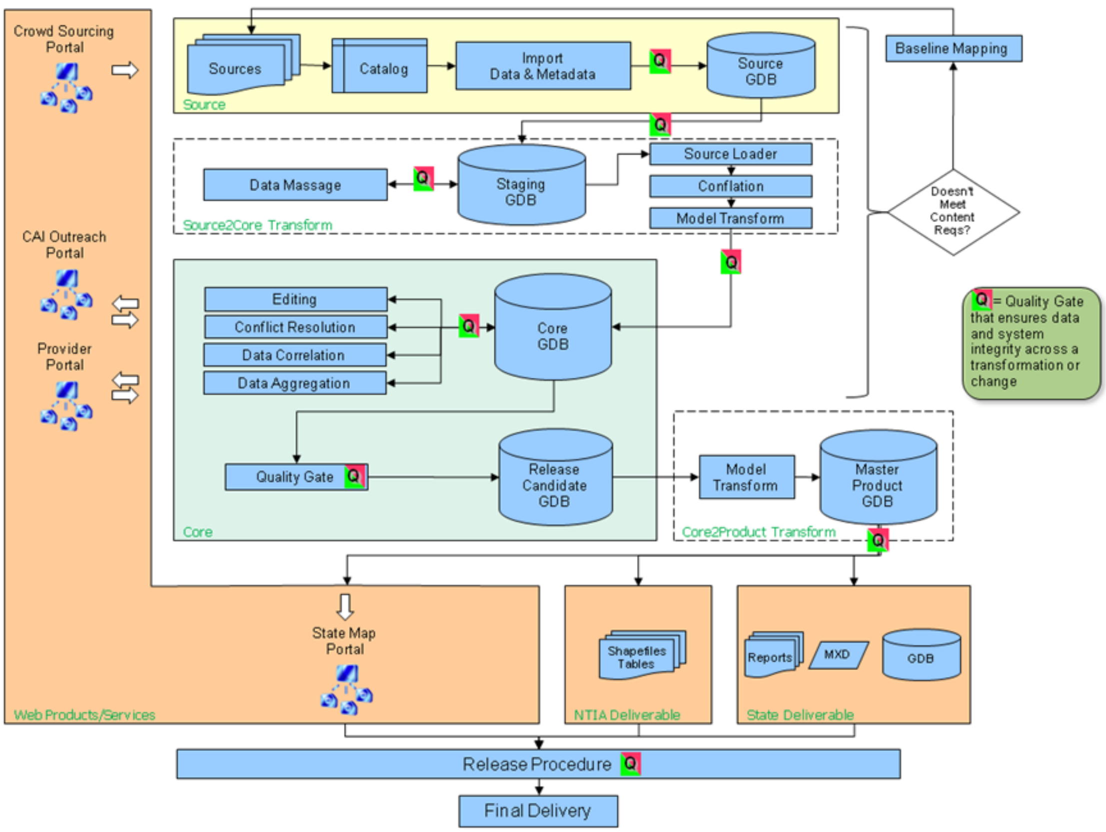
Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link:
https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

- Longitude values for States outside the lower 48 (any table)
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is 'No' or 'Unknown'
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.
8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application

2) Regular email

3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email

   a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site

2) Place copy of raw data on local computer in a working directory.

3) Review data and determine course of action based on type of data received.

4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:

Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

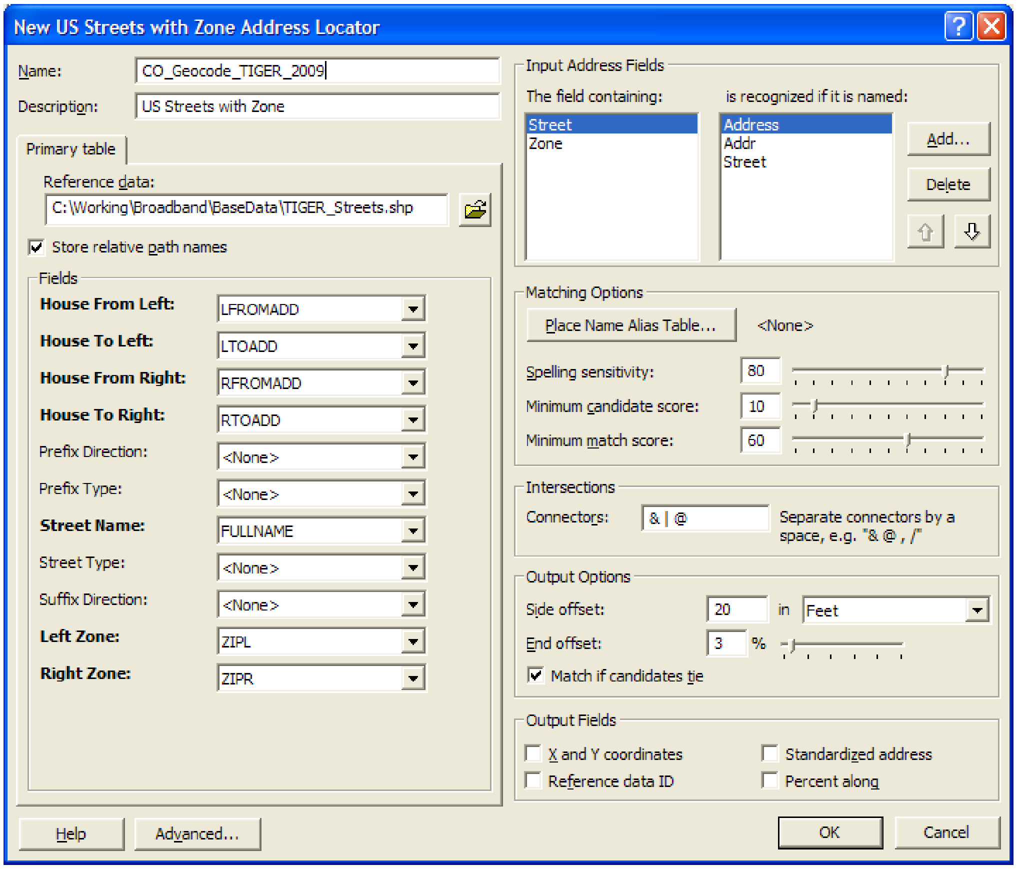
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

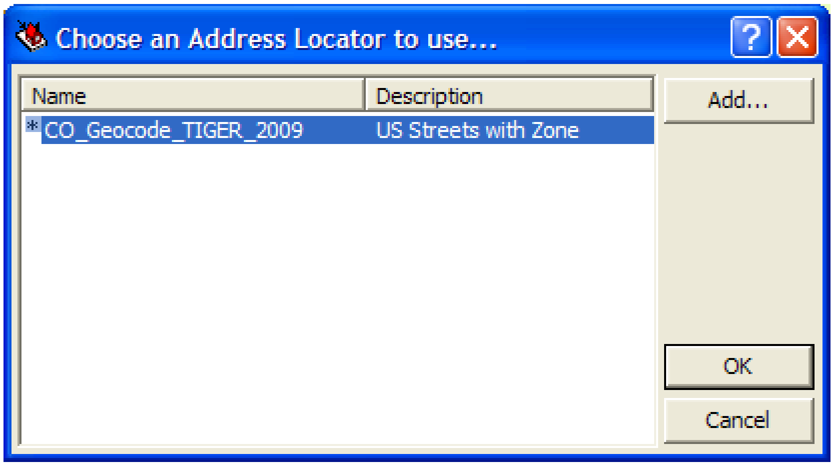
In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
    a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
    b) Select "US Streets with Zone" and press OK.
        i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
    c) Navigate to the TIGER Streets 2009 file and press OK.
    d) Fill in the dialog box as seen below:

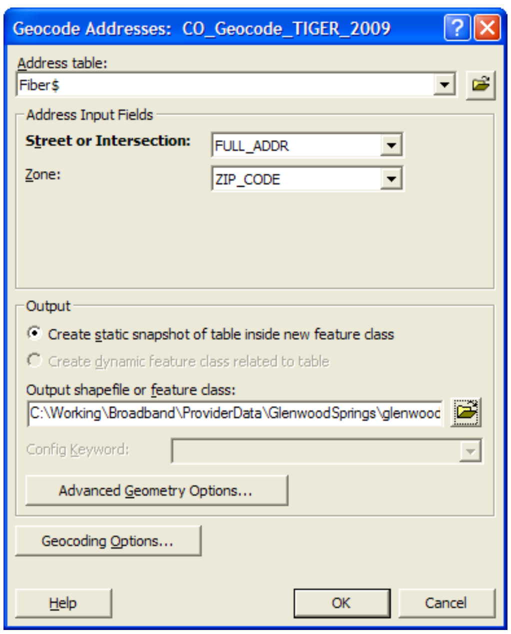


e) Click OK.

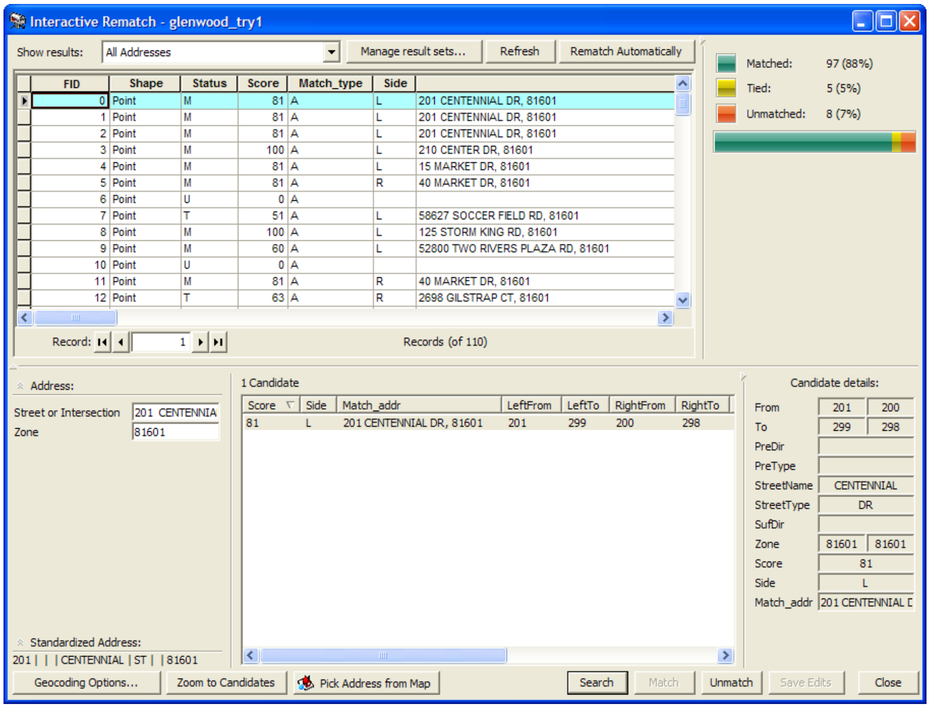
3) Open up ArcMap, and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.
5) Select the appropriate address locator by clicking Add…. then OK.



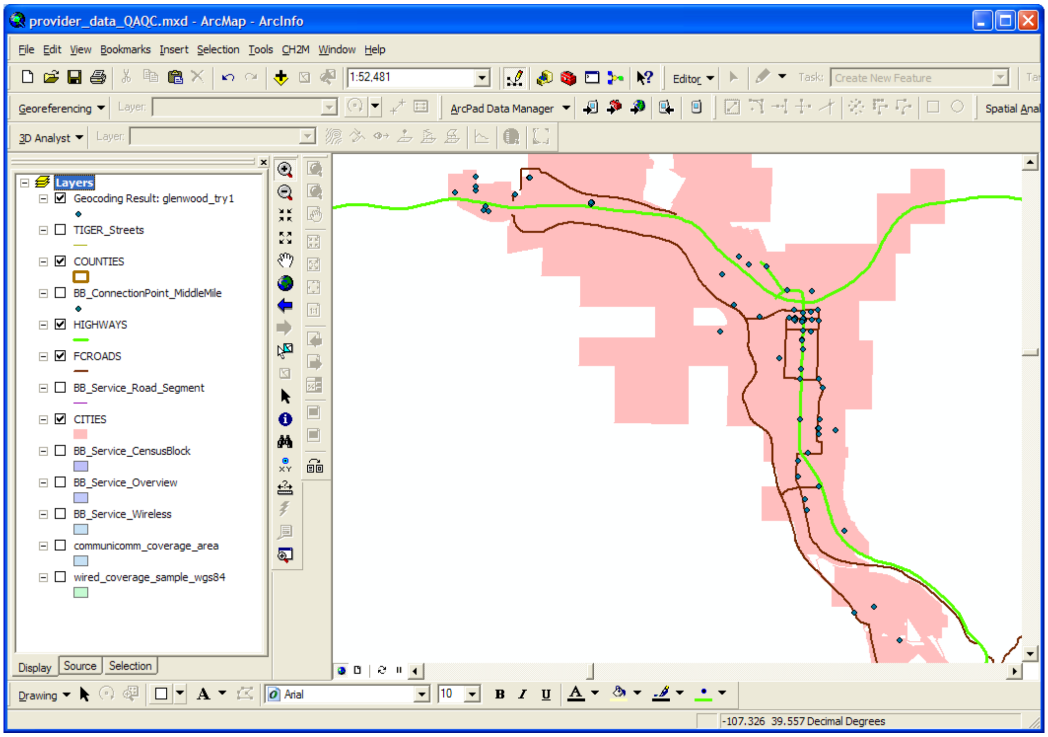
6) Fill out the Geocode Addresses dialog box as shown below:



7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.
8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:

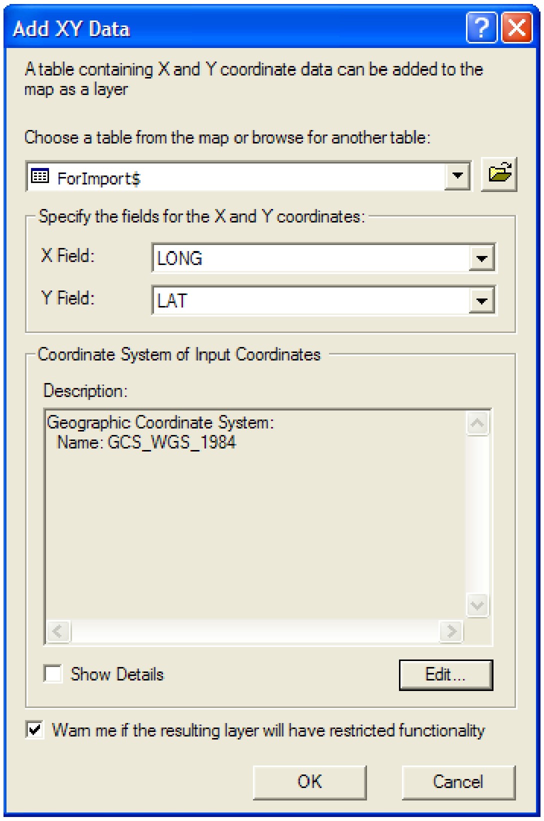


12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.
    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.
    b. Make sure that XY locations are in decimal degrees.
        i. To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).
        ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.
2) Open up the Excel worksheet in ArcMap.
3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

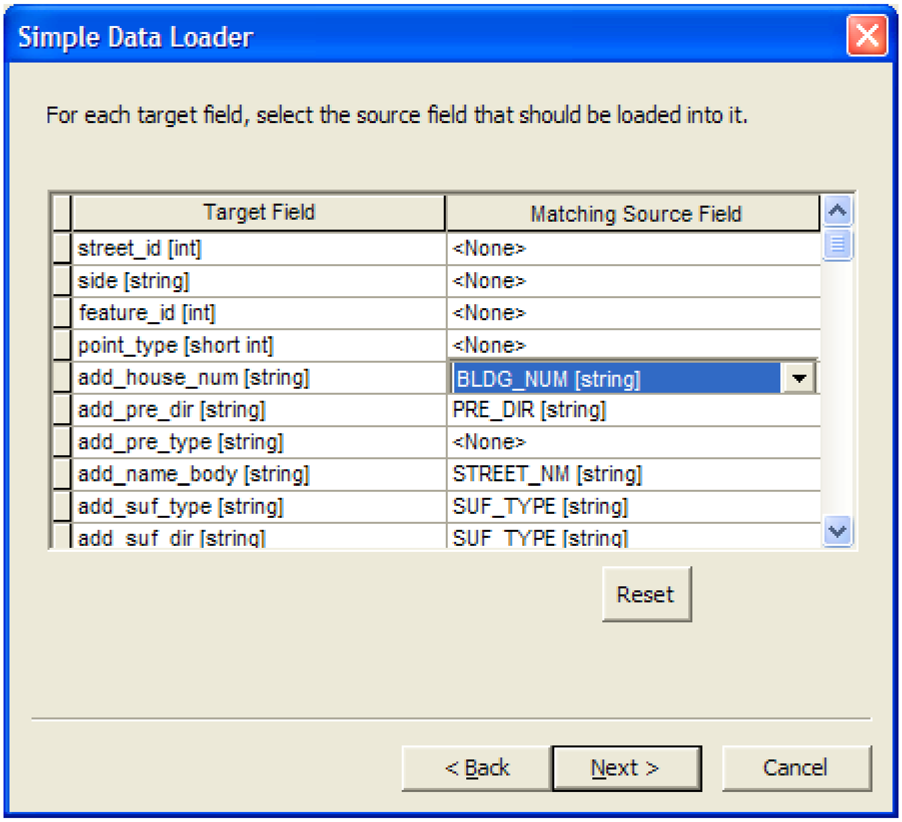
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

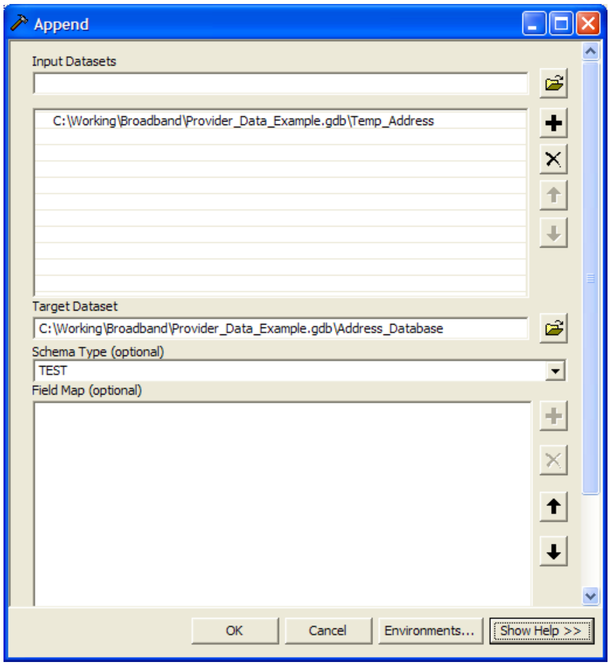
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

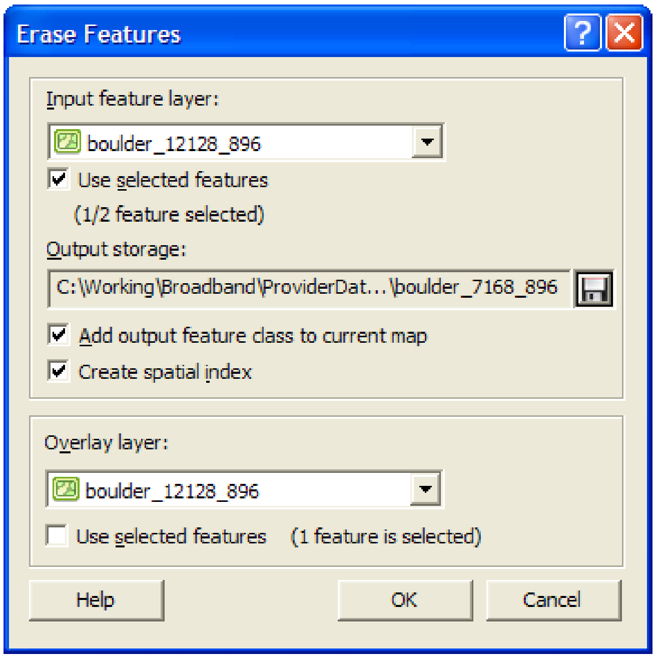


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. <u>Within ArcGIS</u>
      i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
         1. This will save as a DBF table. Keep track of location for future reference.
      ii. Buffer county address point featureclass to 150'.
         1. During buffer command, dissolve on "ad_down"; "ad_up"; "provider"; "dba"; "frn"; "tt"; 'all metadata fields'; "stctyfips". Save as…. county_fastestdown_fastestup.
         2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
         3. Note: these attribute fields are specific to the Point Address database.
      iii. Select the features that represent the lowest speeds
   b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
      i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
      ii. Use the same feature class for Input and Overlay
      iii. Check Use selected features on the Input feature, as seen below.

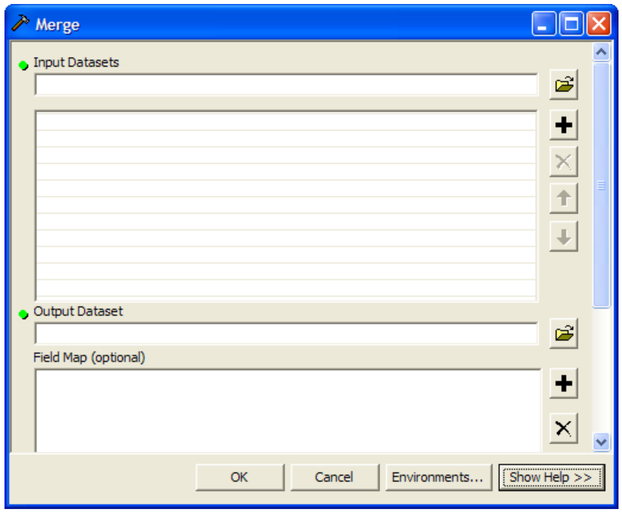
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. Within ArcGIS

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).

iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.

v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

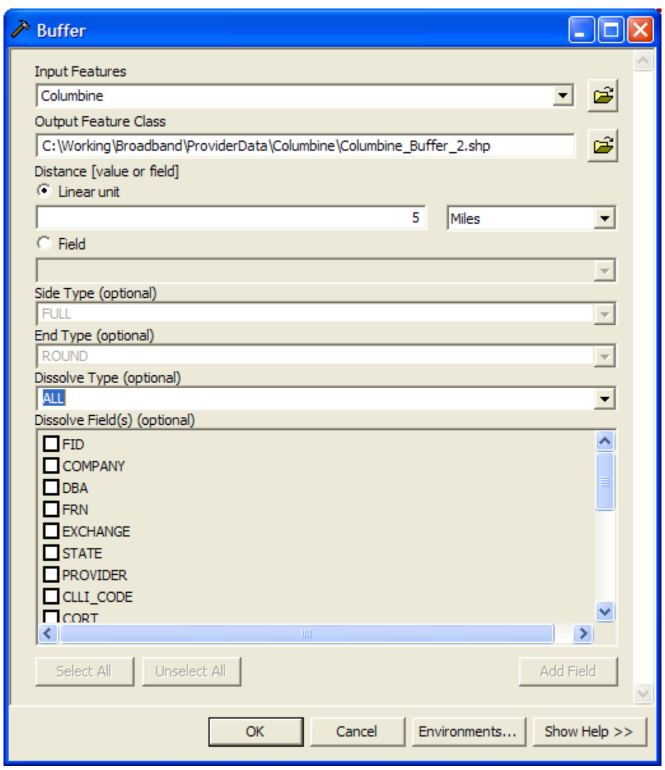
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.6 DSLAM or Central Office Location – GIS Data

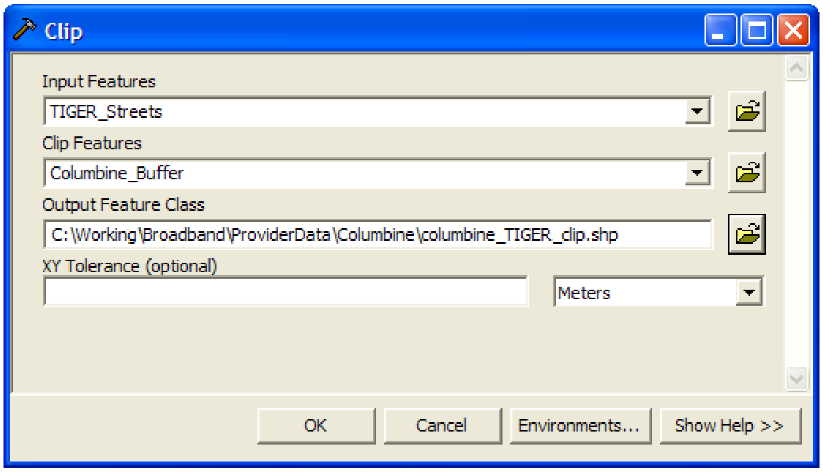
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

1) Buffer the DSLAM/Central Office points feature class
   a) Add the point feature class to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
   c) Set the buffer distance to 5 miles
   d) Set the dissolve type to ALL
   e) Name the output feature class
   f) Typical Buffer tool is seen below:



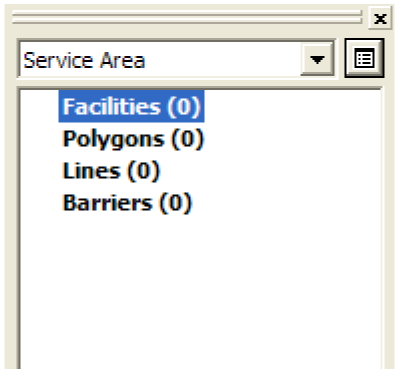
   g) Press OK

2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
   a) Add TIGER street layer to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
   c) Complete the dialog box as seen below:

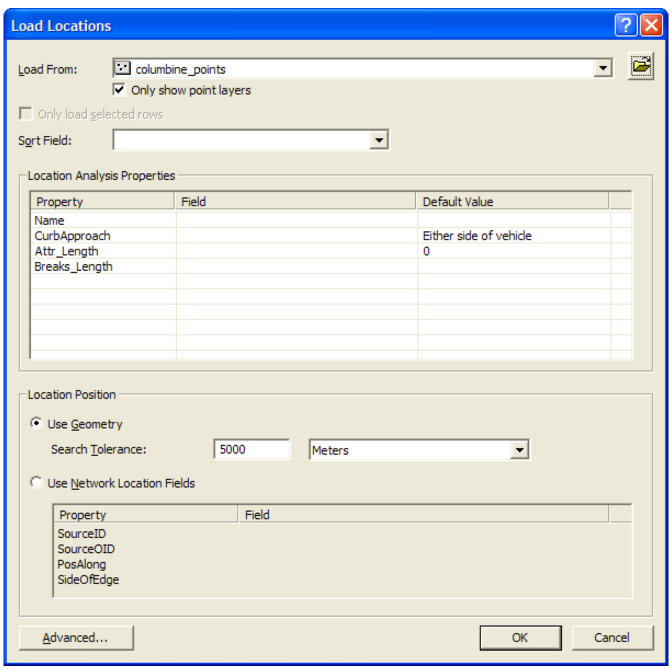


- d) Press OK.

3) Using ArcCatalog and within the file geodatabase:
   - a) Right Click and create a new Feature Dataset
     - i) For the Feature Dataset settings:
       - (1) Name the feature dataset accordingly
       - (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
       - (3) No vertical coordinate system needed
       - (4) Leave all x,y,z,m values at default.
       - (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
   - a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create "New Service Area"
9) Open up the Network Analyst Window by selecting the button.



10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.



11) Press OK.

12) Click the Service Area Properties button

13) For the following tabs change the following properties:

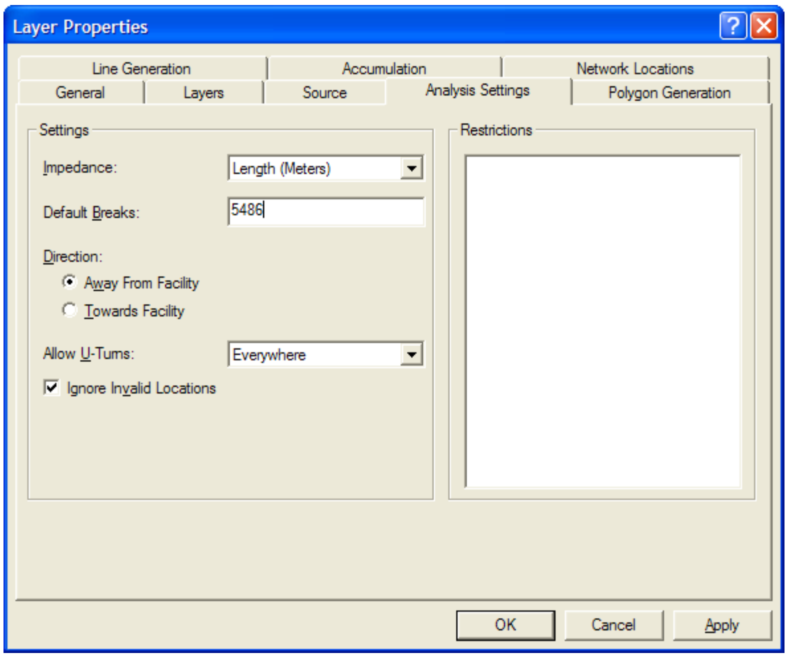
a) "Polygon Generation" tab

i) Select "Merge by break value"

ii) Also disable the Trim Polygons option

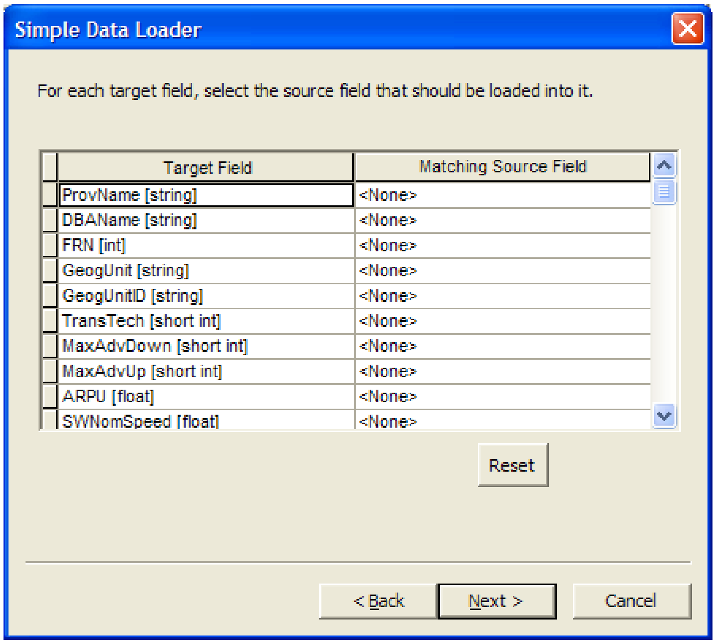
b) "Analysis Settings" tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the "Default Breaks" location

i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

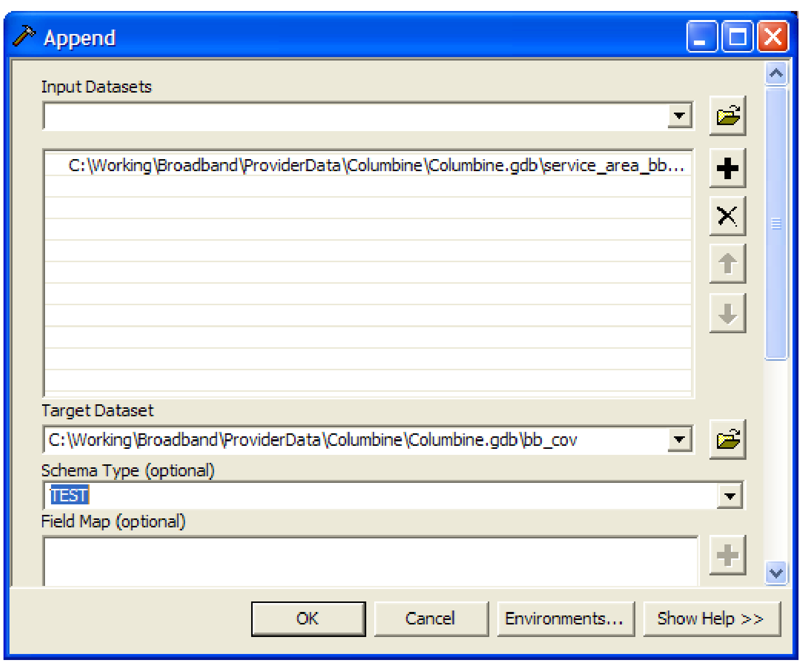
14) On the Network Analyst Toolbar click the "Solve" button to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
    a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST
21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

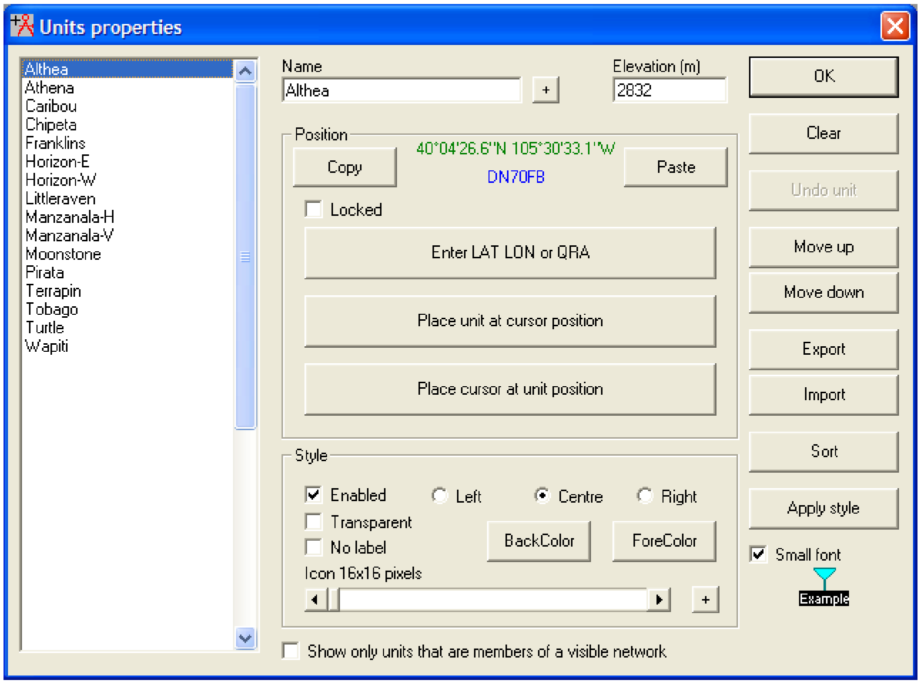
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

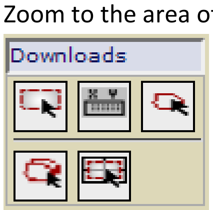
3.5.2.8.1 Broadcast Tower Location – GIS Data

In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

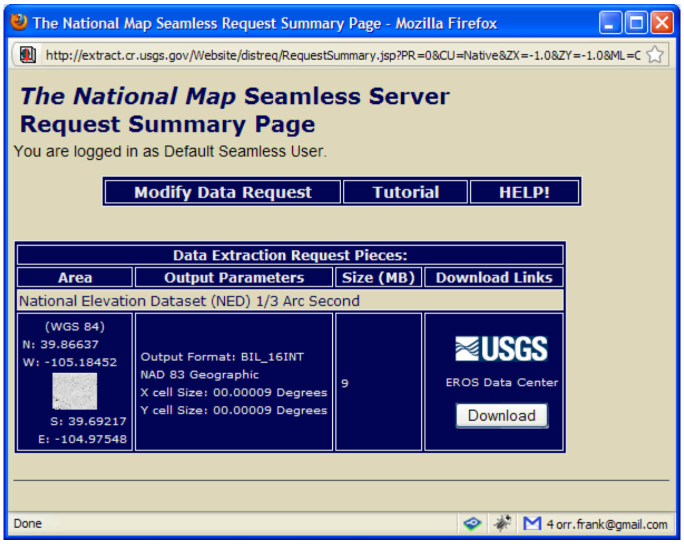
1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
    a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
    a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
    b. Zoom to the area of interest and use the Download tools:

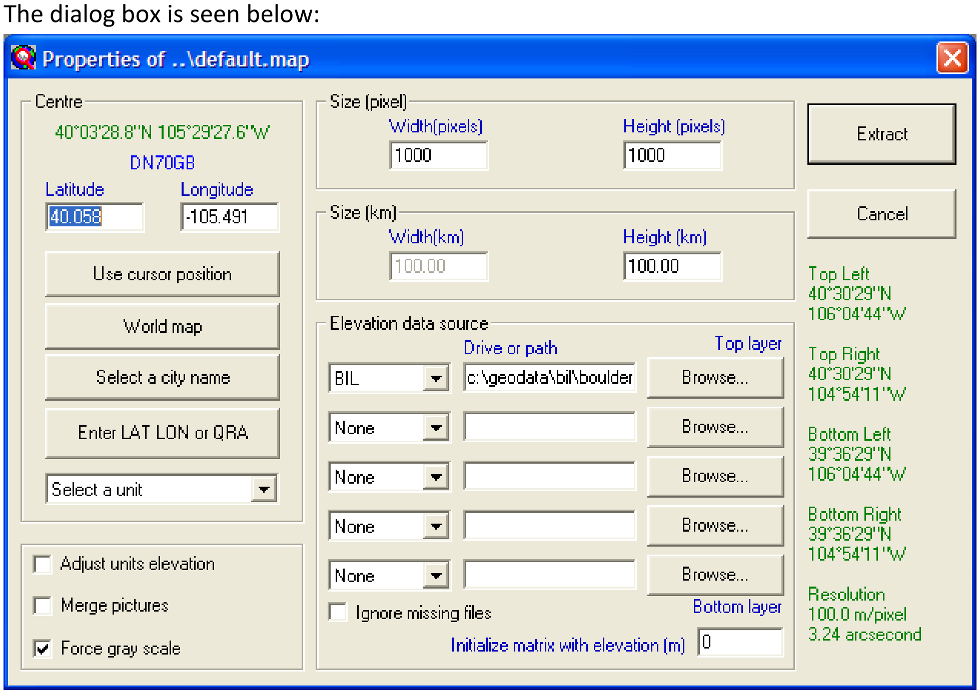


to define the area to download.
    c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:

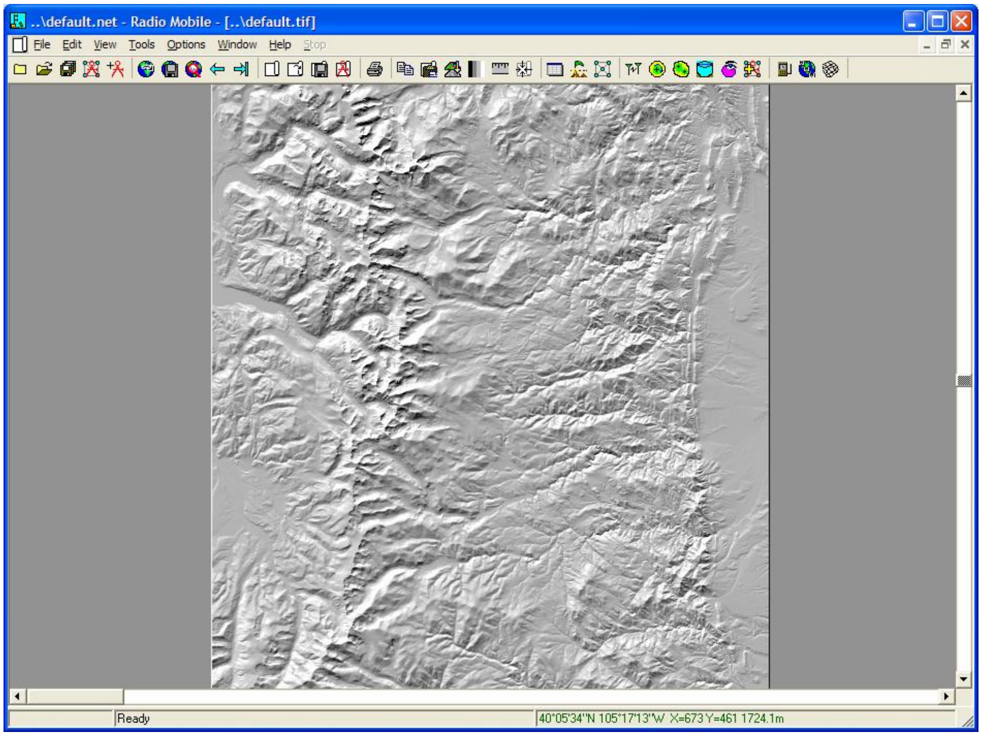


d. Download the data and unzip it.

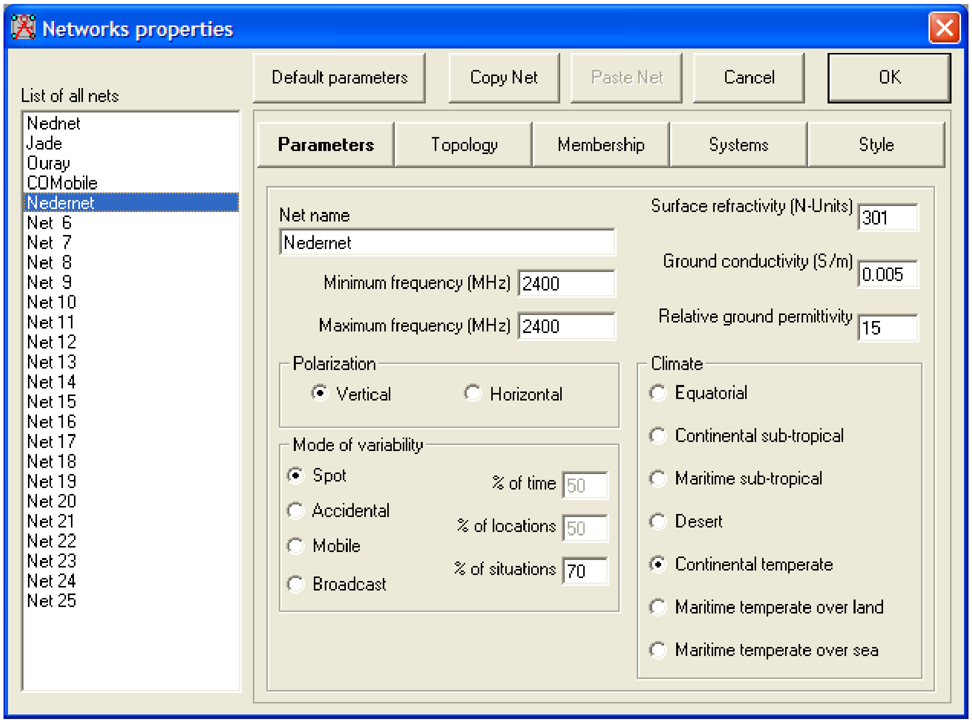
7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:



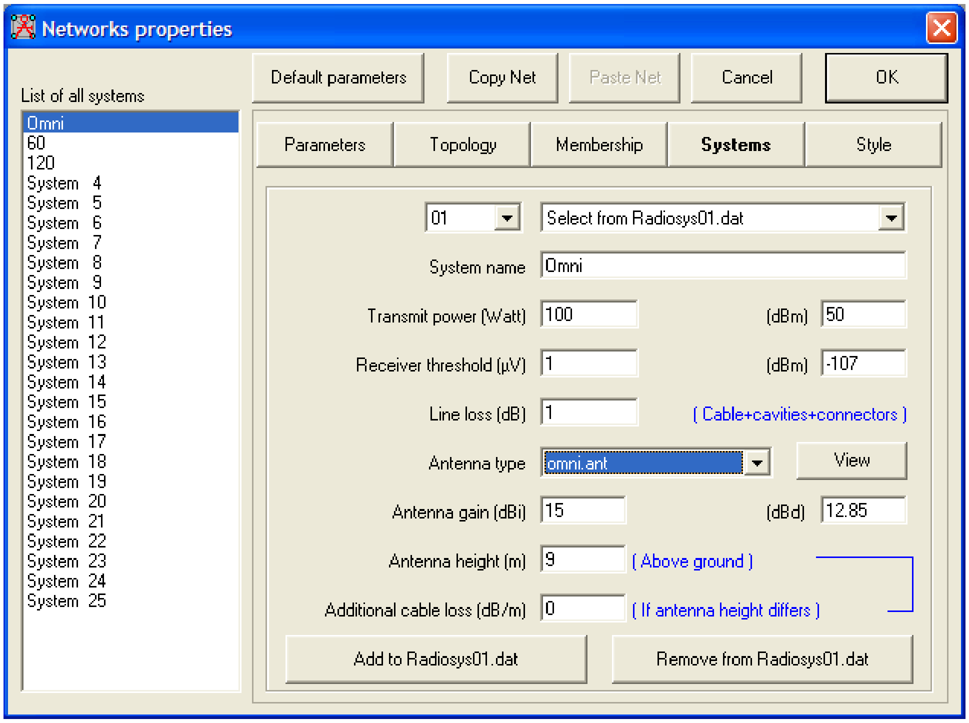
12) Hit Extract.
13) The elevation data is render as a hill shade, as seen below:



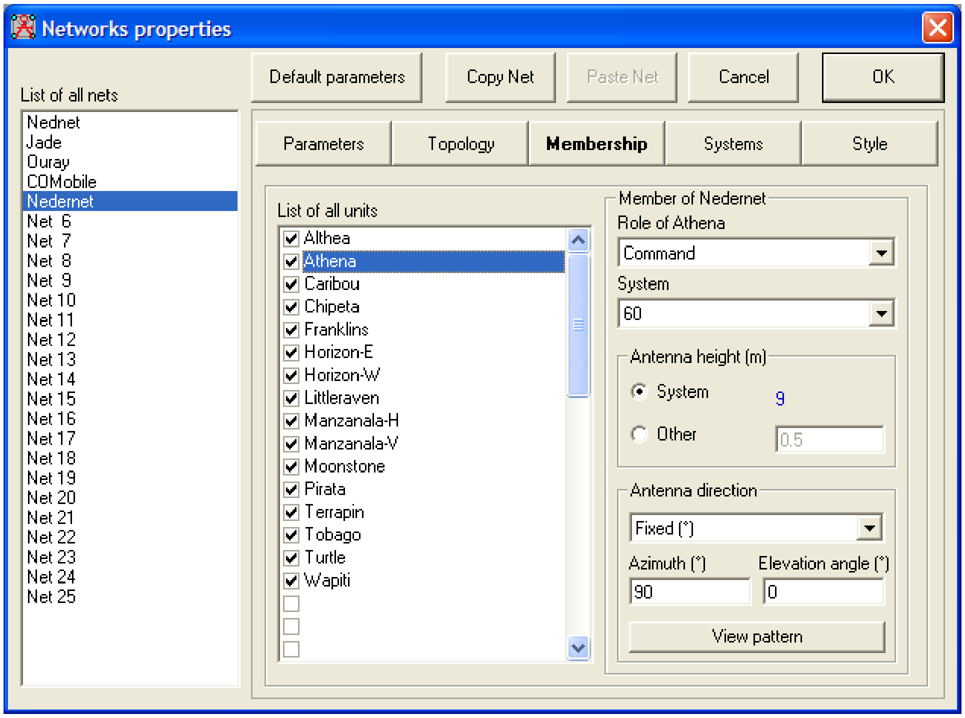
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



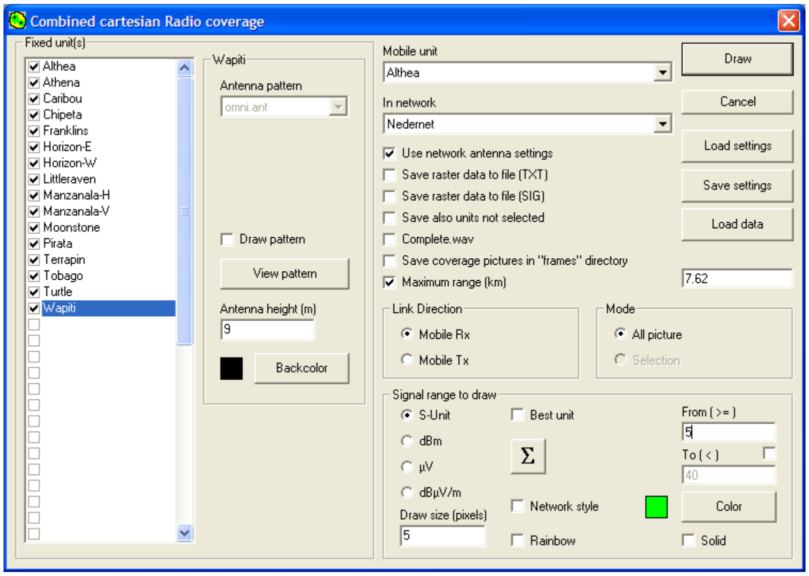
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



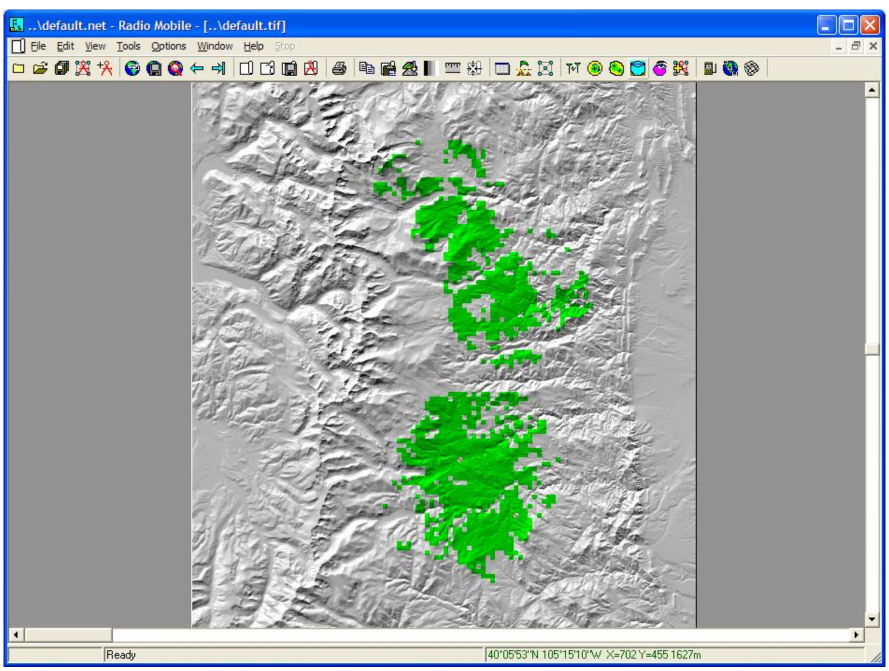
18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:



19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:



23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.
24) Press Draw.

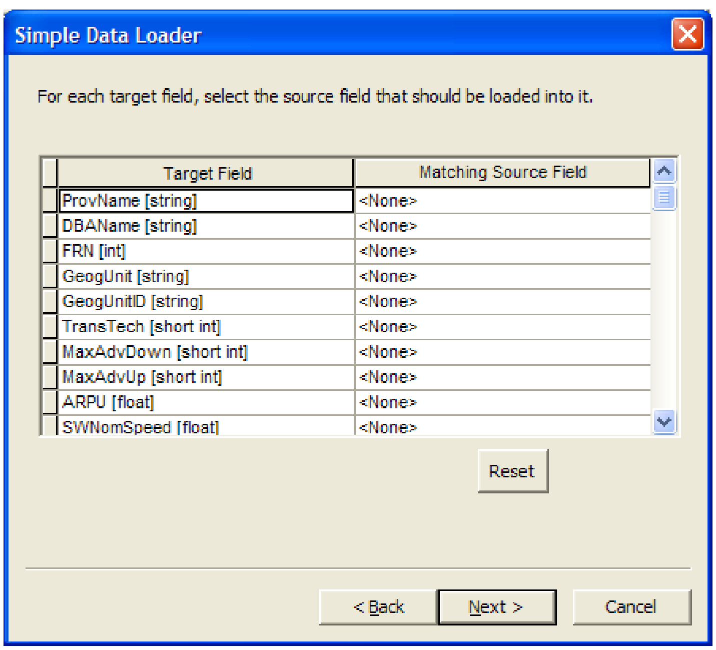


25) Save the resulting image as a TIF by selecting File>Save Picture as.
26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.

a. The corners of the data can be seen in the TIF image.

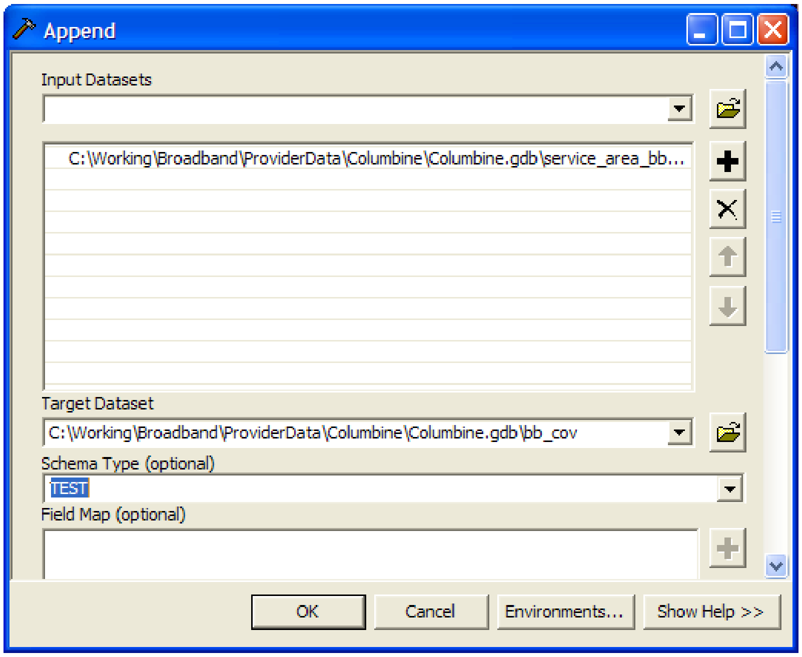
28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.
29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.
30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:

31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



    e. Press Next, then Next again, then Finish.

33) In ArcToolBox, go to Data Management Tools>General>Append
34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



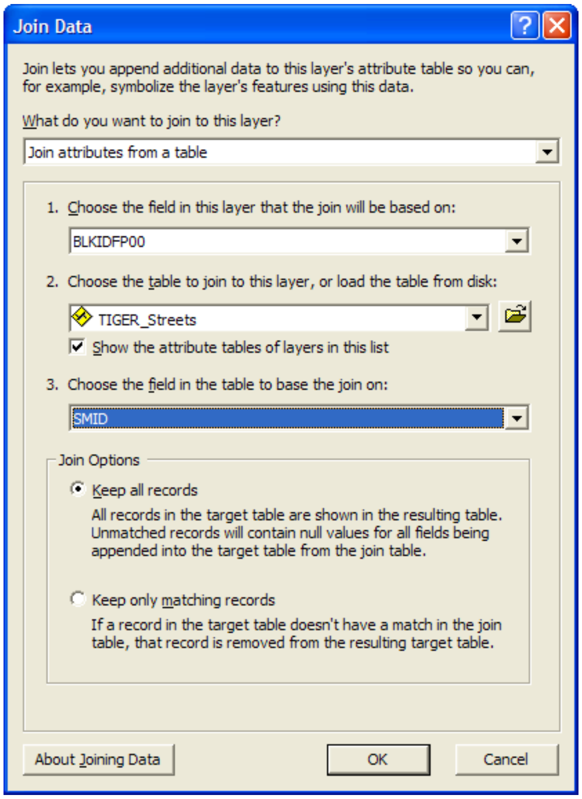
35) Leave the Schema Type as TEST
36) Press OK.
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
      i) Load both data sets into ArcMap
      ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
      iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:



iv) Press OK

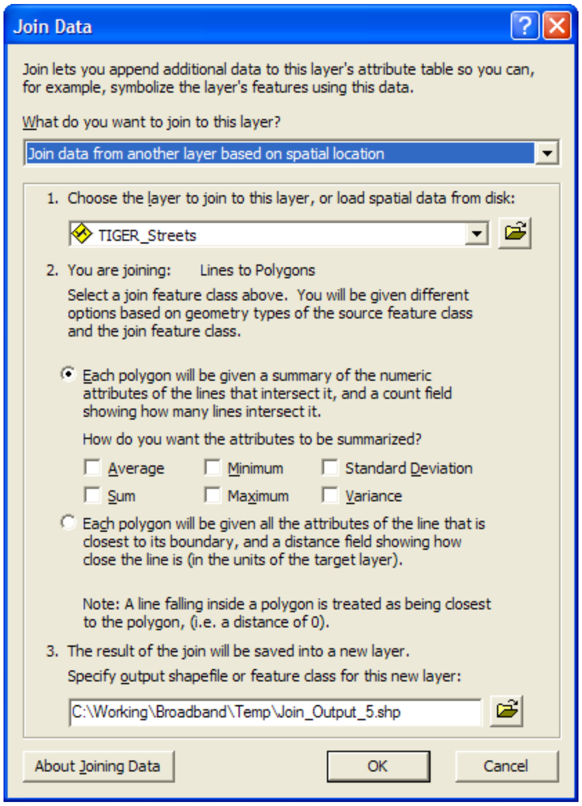
b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID

i) Load both data sets into ArcMap

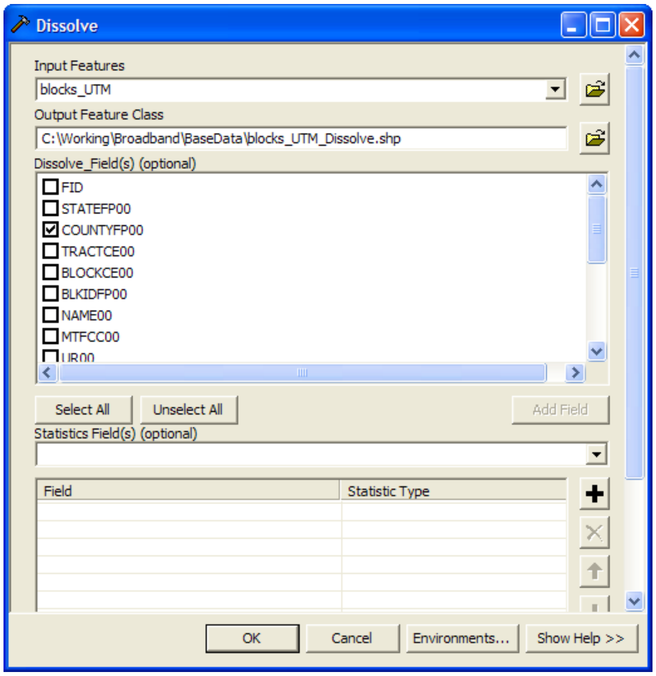
ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join

iii) Select “Join data from another layer based on spatial location” from the dropdown menu

iv) Complete the dialog box as seen below and press OK.



2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
   a) Use the County FIPS code to dissolve by county.
   b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
   c) Complete the Dissolve dialog box as seen below:



d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

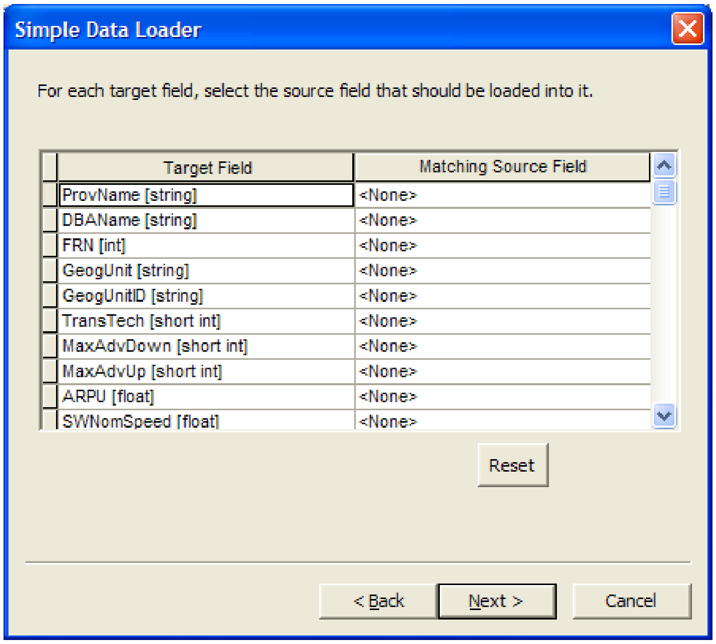
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class

b) Press the Add button, hit Next

c) Accept the defaults and hit Next

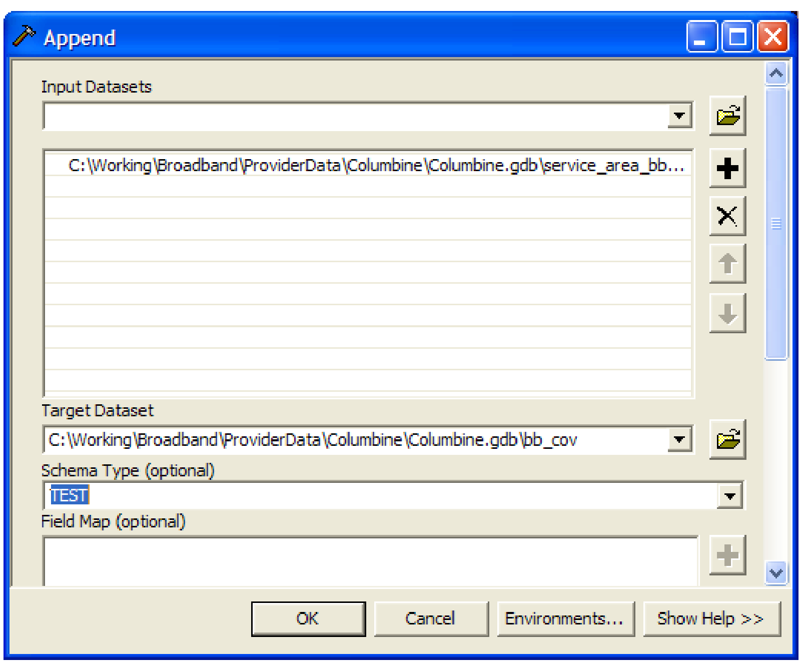
d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



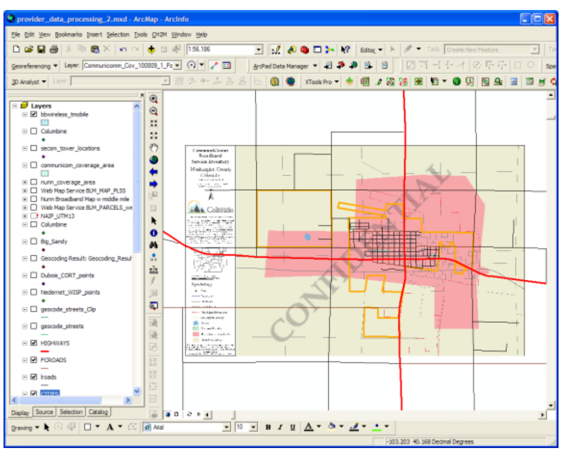
8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

3.5.4 Polygonal Data

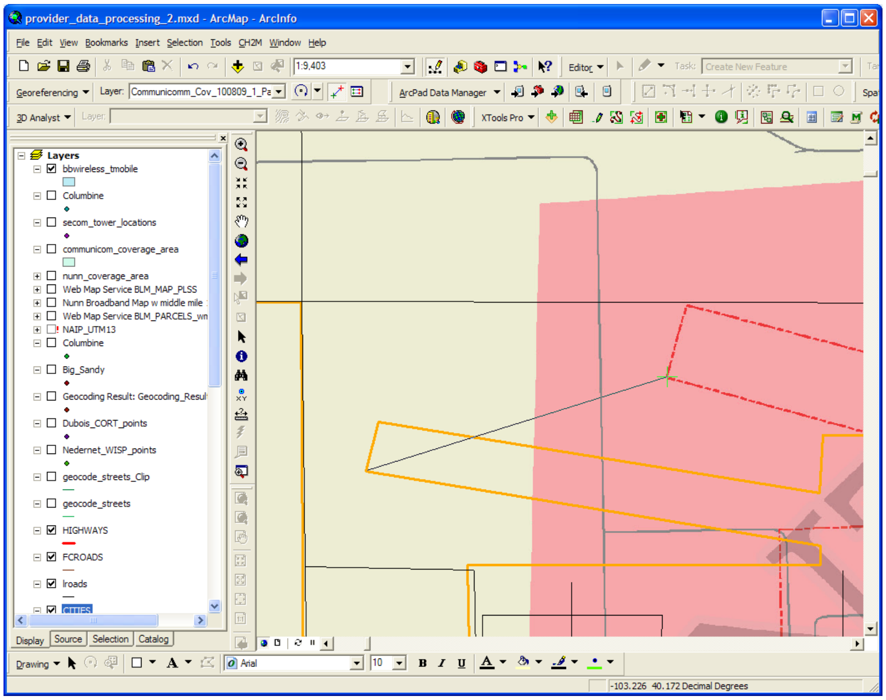
3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
   a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
   a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button to add control points to the map
9) Use common points in the base data set and the JPG image
   a) For example, find major street intersections, county/city boundaries, etc.
   b) Try to distribute the points more or less in the four corners on the image for the best transformation
10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:

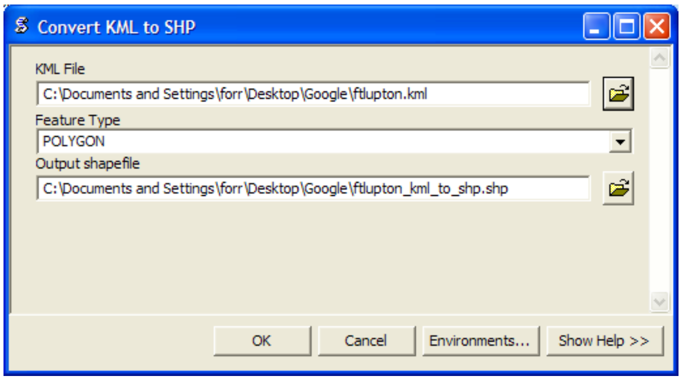


11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
17) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

1) Use a KML to SHP converter to translate file into an ESRI format
2) http://arcscripts.esri.com/details.asp?dbid=15603
3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

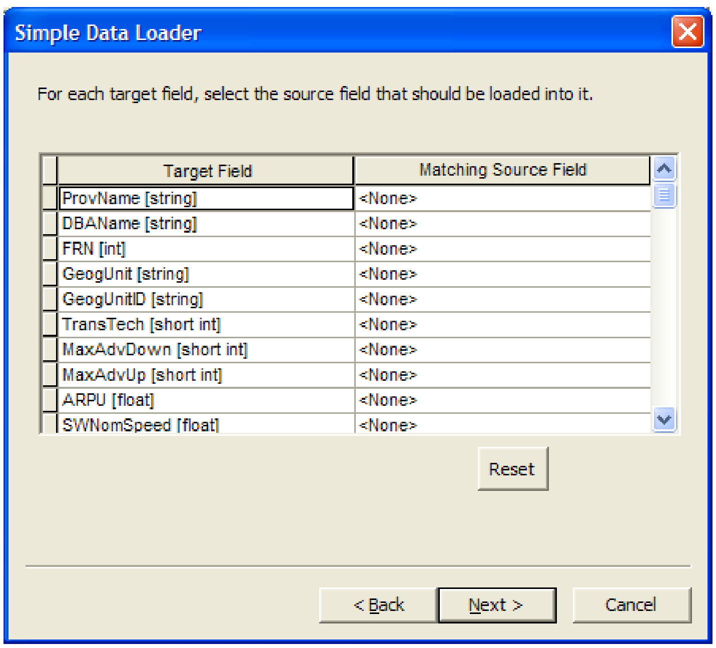
In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
    a) To do so, follow the instructions provided above in "Coverage Area – PDF/JPG/Other Image Format."
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
8) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

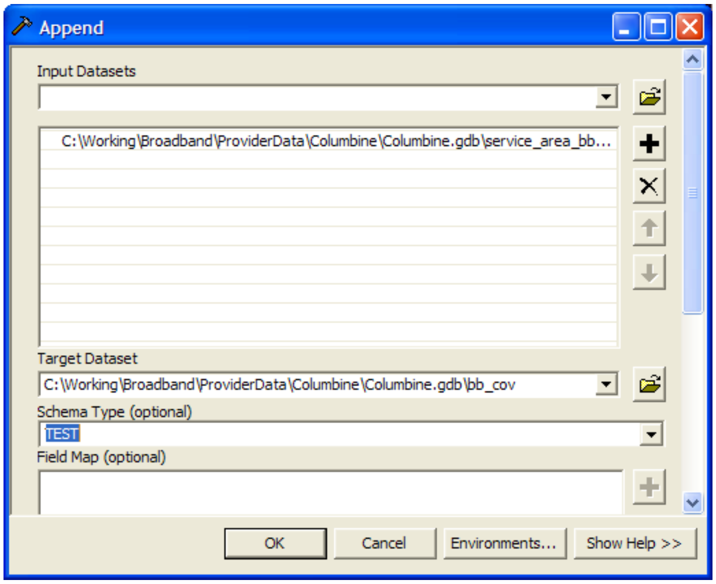
3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



   e) Press Next, then Next again, then Finish.
2) In ArcToolBox, go to Data Management Tools>General>Append
3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state “Composite Locator”
- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.
- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.
- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.
- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.
- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

- Un-join the county data from the geo-code subscribers list.

- Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

- Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

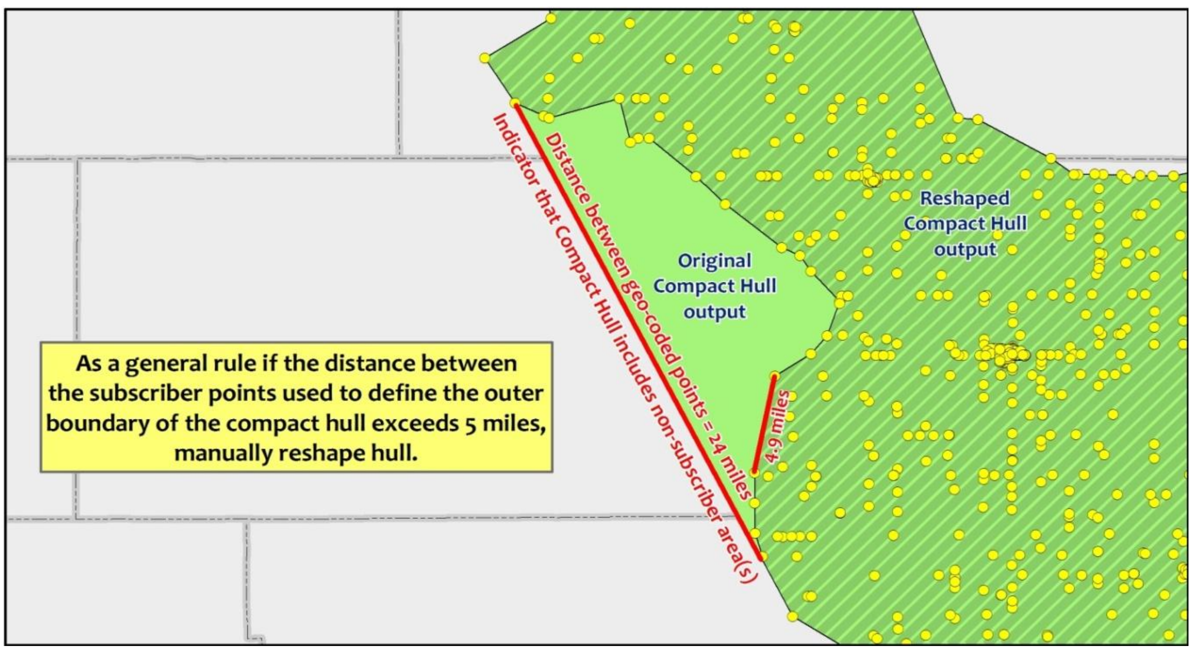


FIGURE 3a- Compact Hull: Manual Resolution Required

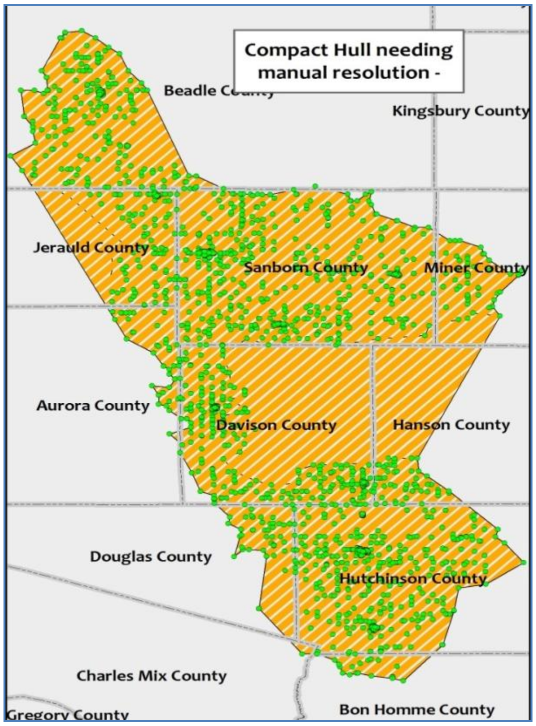
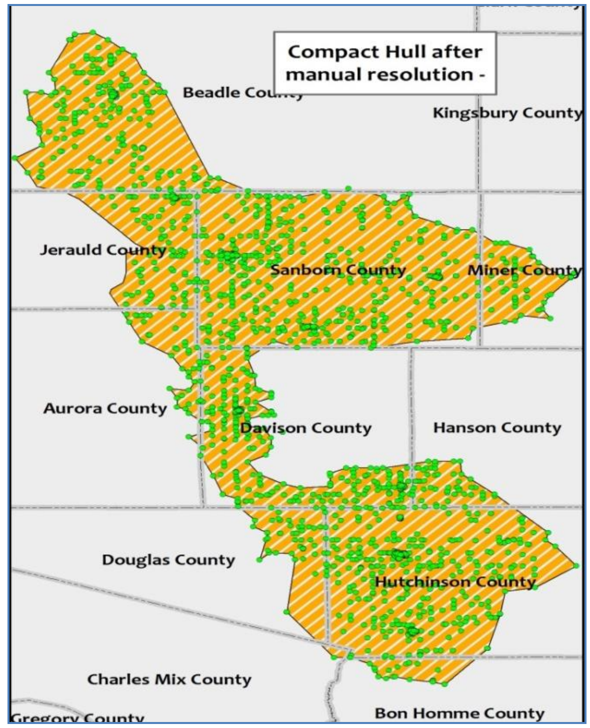


FIGURE 3b- Compact Hull: After Manual Resolution



- To attribute the compact polygon - Perform a "Spatial Join" where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate "stcty_fips" field. Also use the county name field to populate the "BBCov_Name" field.

    - Exceptions is where a provider's coverage is distributed throughout more than one area of any given county where the "BBcov_Name" should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

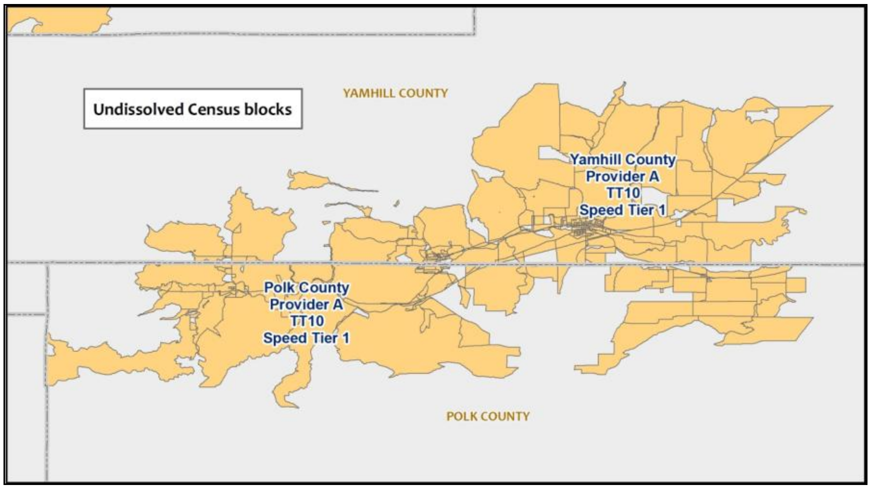


Figure 1: Undissolved census block polygons

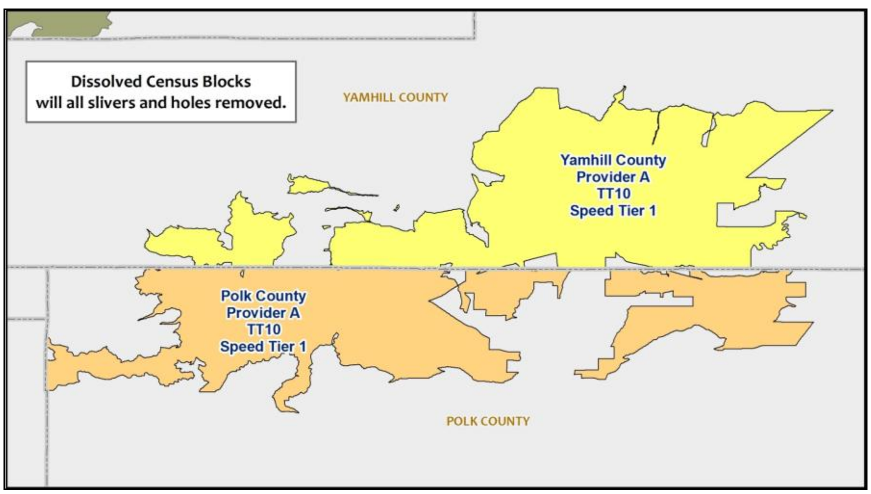


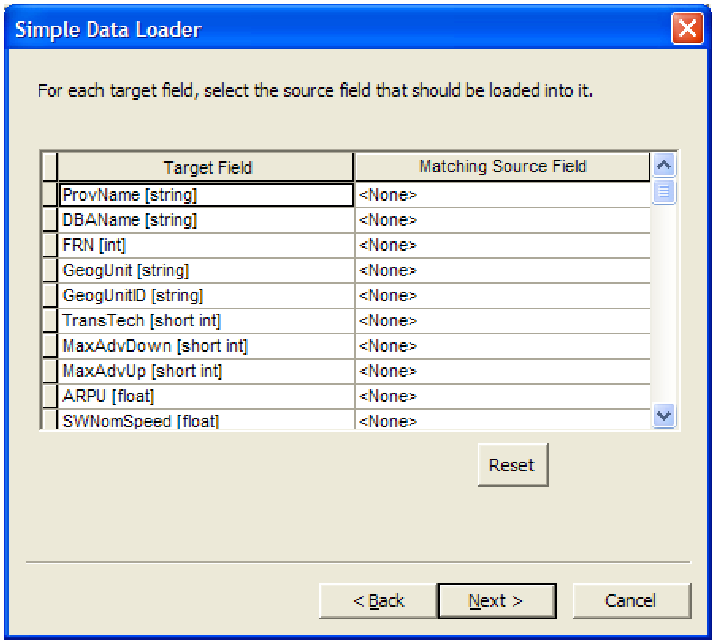
Figure 2: Census block polygons dissolved by county

2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b. Press the Add button, hit Next

c. Accept the defaults and hit Next

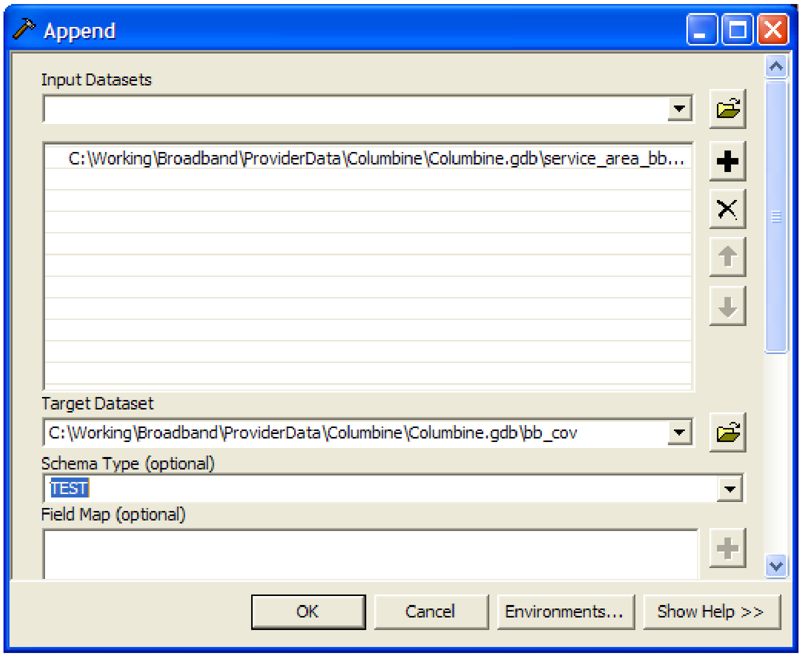
d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

    b. Example of command line:

<path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

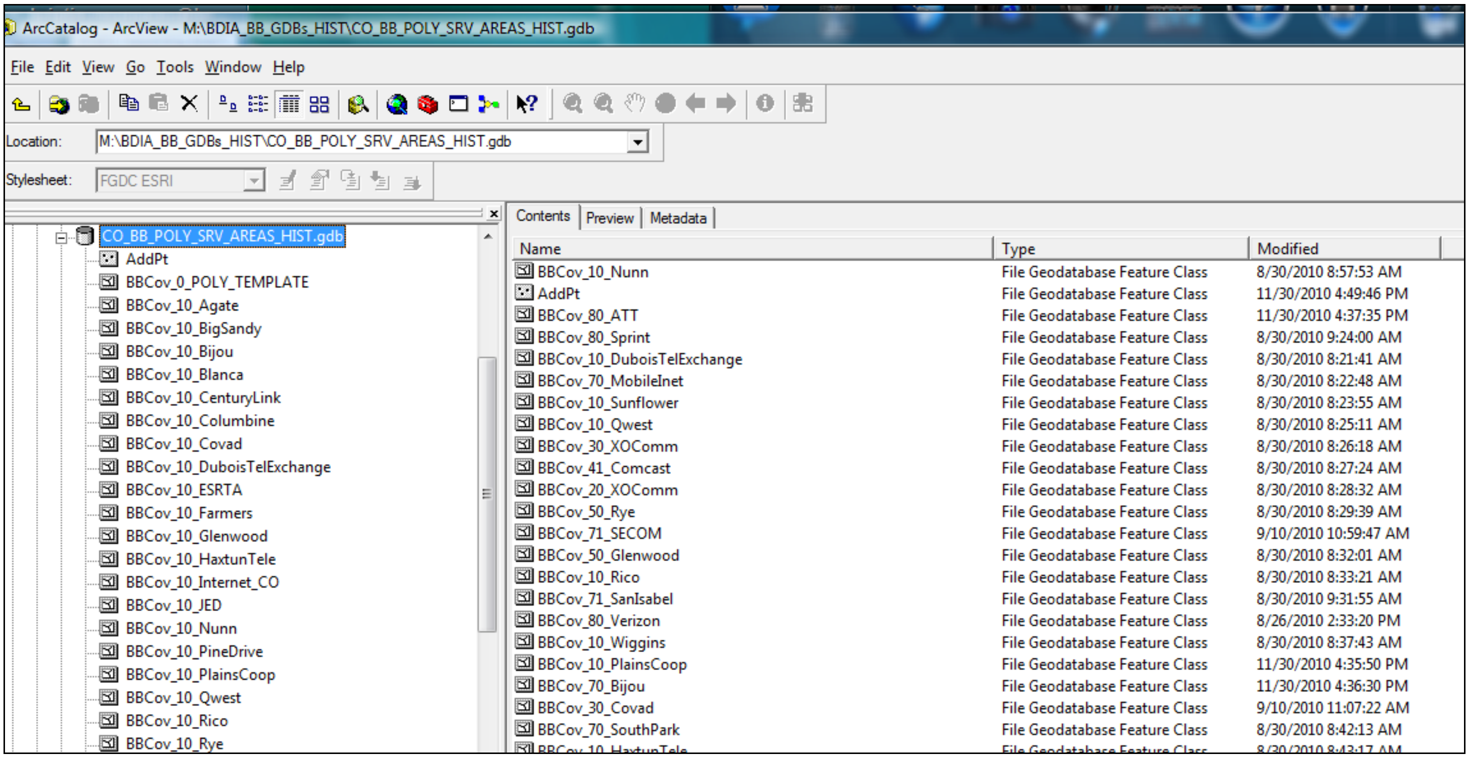
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
-------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb
    a. The transactions scripts records changes at a feature level.
    b. Below is a screen shot supporting the directory structure of the historical fGDB.



c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:

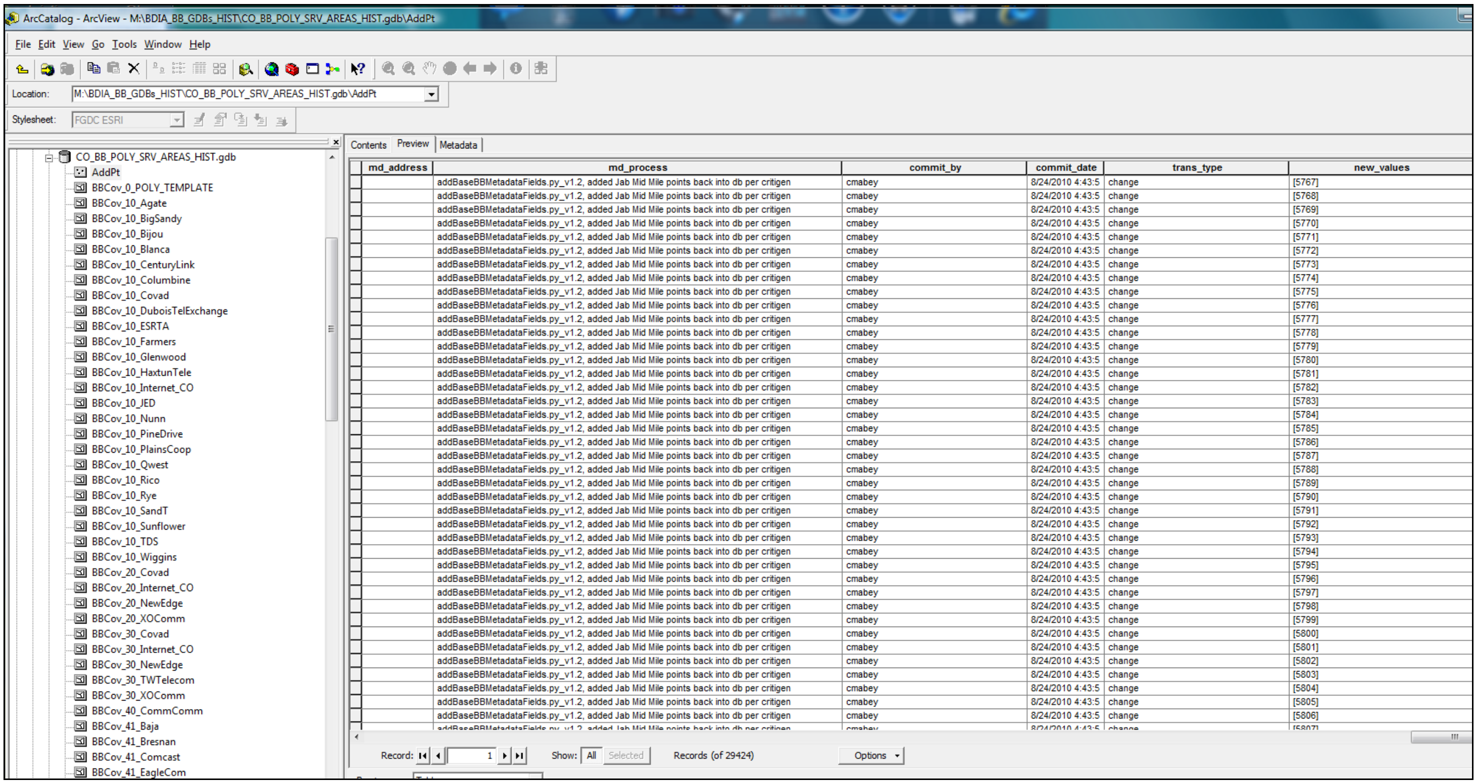
   i. Commit_by
      1. Records the GIS-Analyst that committed the changes to the historical fGDB.

   ii. Commit_date
      1. Records the date and time stamp that the changes were committed.

   iii. Trans_type
      1. This field reflects the type of change recorded.
      2. Categorized by:
         a. Adds/Change/Deletes

   iv. New_values
      1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where the data provider supplies subscriber speed information , the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

These obtained or calculated values are used to update the service overview layer. This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer to join to and select Joins and Relates>Join… from the dropdown menu. Then navigate to the table to join to and select the join fields from the drop down list. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.

3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)

Name	Alias	Description
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.
This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes. If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.

Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). this is accomplished via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

After the provider has validated its coverage areas, a 3rd party source comparison and analysis is performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments are applied to be reviewed later with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
InfoUSA	Consumer and Business Listings	Community Anchor Institutions Can also be used for demographic information supporting the State websites
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41)
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All findings and results from the above-mentioned validation and verification activities, plus internal peer quality reviews are captured and tracked in a Validation table and form the basis of the confidence value assigned for each provider and then each technology.

The confidence values are as follows:

- 0 = Coverage area has not been reviewed
- 10 = Extremely Low. Single Source QC.
- 20 = Very Low. Needs Additional Validation\Verification
- 30 = Low. Even with Validation\Verification, Coverage is still suspect.
- 40 = Acceptable, confirm with State prior to shipment.
- 50 = Meets requirements to be included in shipment.
- 60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
- 70 = High. Accurate representation of coverage based upon TT.
- 80 = Very High. Multiple validation\verification with most 3rd party sources
- 90 = Extremely High. Multiple validation\verification sources
- 100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.

The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories
    - 1: School: K through 12
    - 2: Library

- 3: Medical/Healthcare
- 4: Public Safety
- 5: University/College
- 6: Other Government
- 7: Other Community non-government
- None: Unknown Category
  - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately

- Reports out the following counts
  - Total CAIs within that category
  - Total CAIs that contain partial BB coverage
    - Contains any of the following information for given CAI:
      - BB Subscriber, Transmission Technology, Speed Down Speed Up
  - Total CAIs that contain full BB coverage
    - Contains all of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
  - Correct names and format of data deliverables
    - BDIA_QC_SUITES (please see below for details)
  - Correct Projections/Datum
    - Manual interaction with product
  - Metadata Present and Correct
    - Manual interaction with product
- Table Structure
  - All required tables included
    - BDIA_QC_SUITES
  - Extraneous tables identified
    - BDIA_QC_SUITES
- Field Structure
  - All fields included

- BDIA_QC_SUITES
- Extraneous fields identified
  - BDIA_QC_SUITES
- Correct field names, types and widths
  - BDIA_QC_SUITES

- Field Domains
  - Values in all tables are constrained to the specified values specified
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
  - Identify if all layers have the correct geometric representation
    - Manual review of the BB_ServiceOverview layer
    - Dependent on NTIA and client requirements
- Geographic Extent
  - Product includes the necessary Geography associated with Product?
    - Manual Review - ArcGIS
  - Is there extraneous geography included in Product?
    - Manual Review - ArcGIS
- Completeness
  - Products contain the expected amount of data?
    - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product
    - Provider Validation
    - Verification using 3rd Party Data
    - Verification against reality, where applicable
- Data Regression
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations
- Prior Issues Resolved
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes
  - Have agreed upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium

- Has the product medium been verified?
  - Manual review
- All files present
  - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size
- Correct location
  - Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries

- which_build – this determines the current build and passes information to the configuration scripts

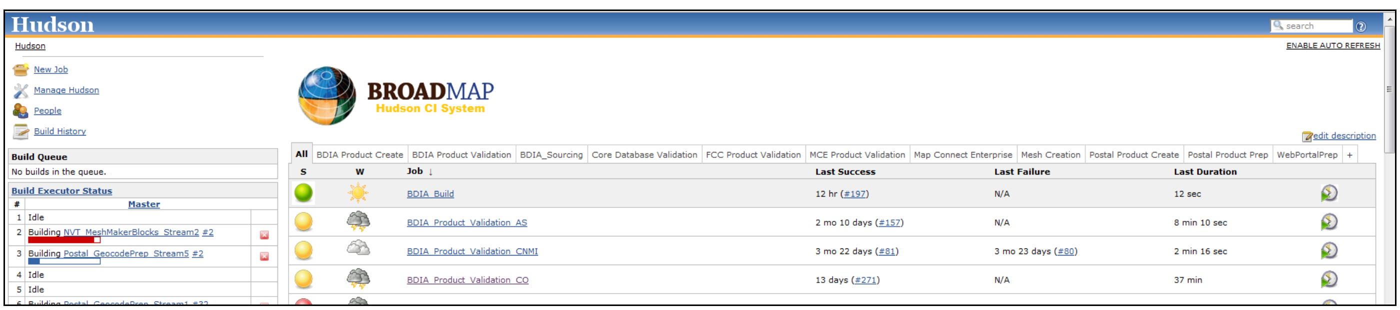
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

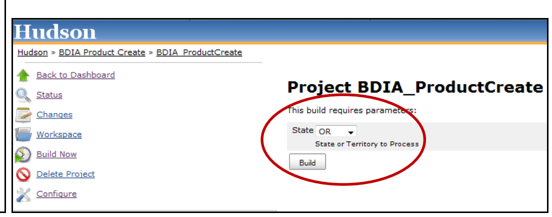
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

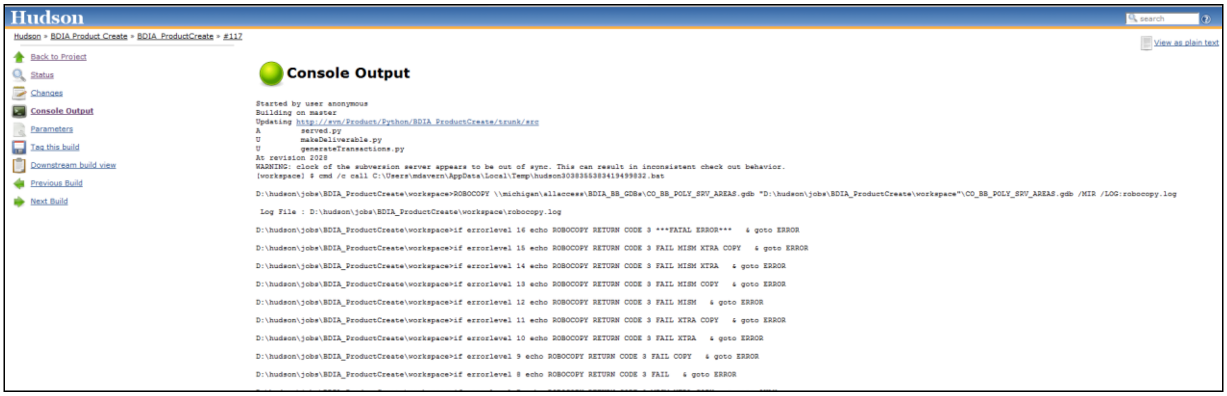
Below is an example of the main page where the type of product build can be selected.



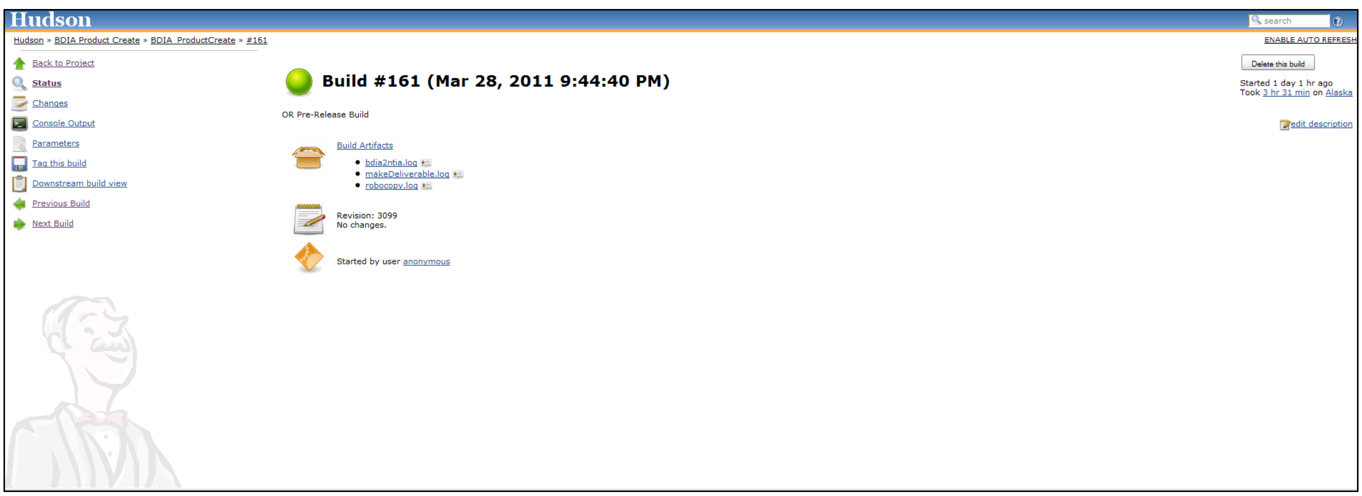
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



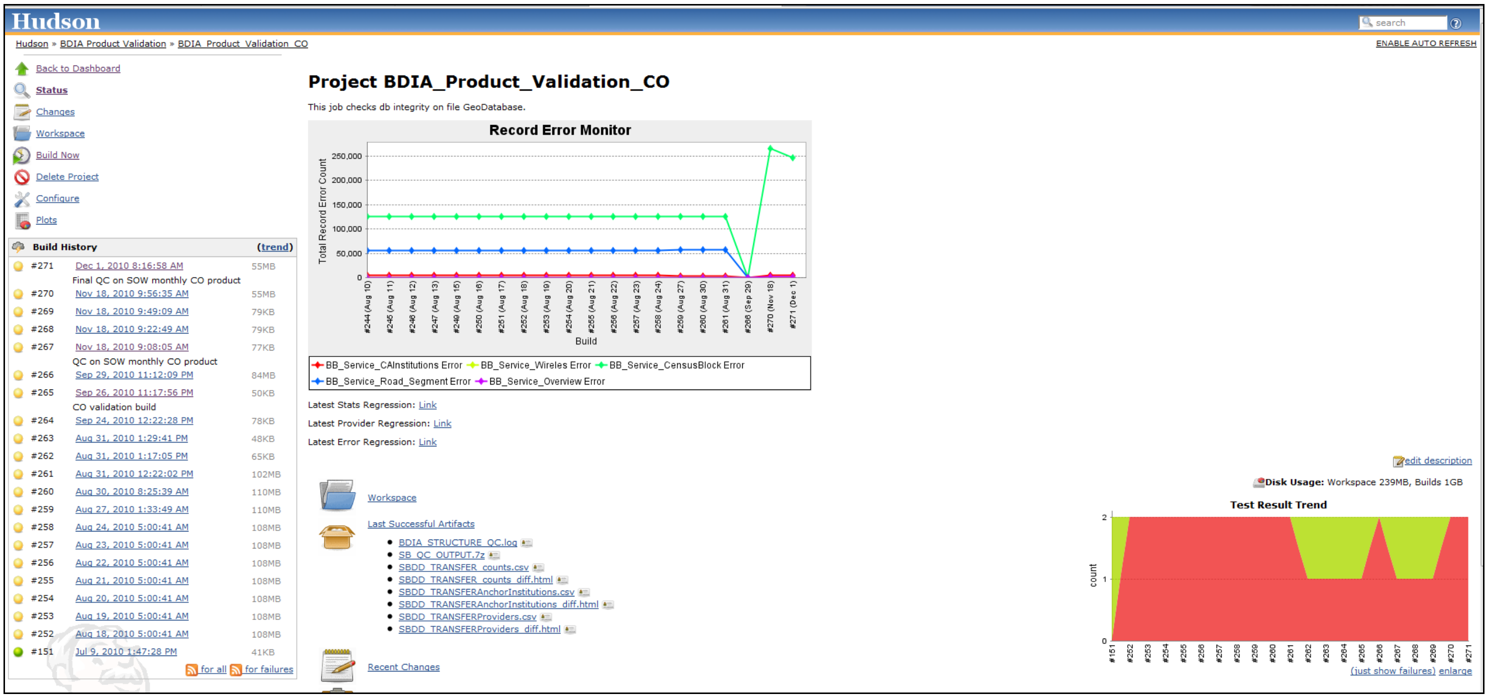
All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



3.10.2 Product Validation and Statistics

Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.
All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

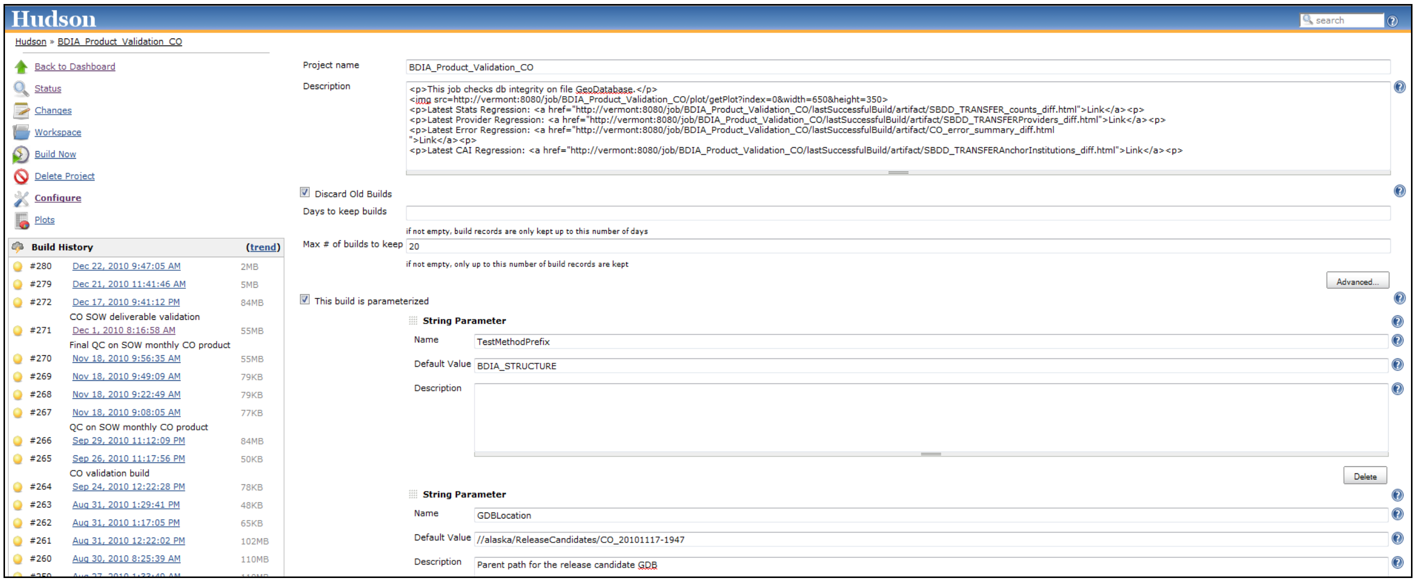
Below is an example of the report provided based on various control points running over a specified time period:



Similar to the Product Create process, all results from the process are maintained:

Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.

Further detail on the Hudson CI System environment can be found by navigating to the following link: http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson

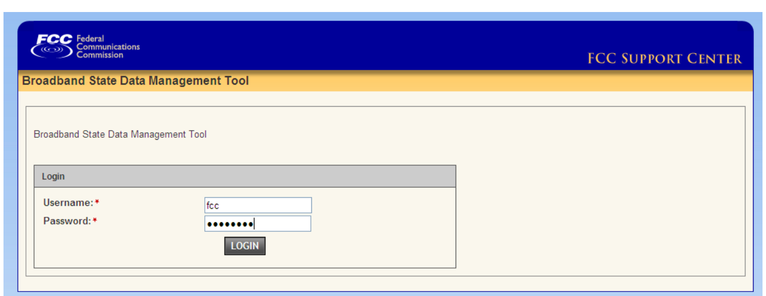


3.11 Product Extract Data Delivery

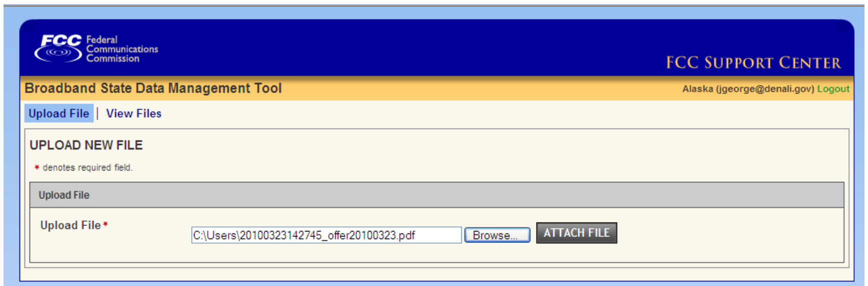
Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

2) NTIA Submittal
   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field
   e) Browse to local file for submission using the 'Browse' button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen

g) A receipt of submission is emailed to username e-mail address

State of Arizona
Government Information Technology Agency

Arizona Broadband Assessment Project
White Paper

Submission 3 - April 1, 2011

May 20, 2011 - Final

State of Arizona
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Arizona Broadband Assessment Project White Paper

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State of Arizona
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Arizona Broadband Assessment Project White Paper

As is widely noted, the ubiquitous availability of Broadband has become as essential to quality of life as are the availability of other essential infrastructures of power, water, and transportation. There is no longer any doubt regarding the necessity of broadband capacity as a critical component for a region's economic well-being, job creation, and future prosperity for its citizens. Indeed, our increasing reliance on broadband communication for everything from commerce and public safety to education and healthcare, and to the efficient operation of government has marked this first decade of the 21st Century as the "Information Age." Accurately knowing the conditions of broadband availability, its capacity, and deficits in all parts of our State, especially underserved rural areas, is critical information for decision-making and informed policy.

Because the GITA Broadband Team has now spent its first full year developing the Arizona Broadband GIS Survey and Assessment data, tools, and deliverables under our National Telecommunications and Information Administration (NTIA) Broadband Mapping grants, we can now begin to identify the actual availability and deficits in the State, on behalf of Arizona's broadband stakeholders, with a reasonable degree of accuracy. There is still much to do to make the data yet more accurate and useful to stakeholders as the data currently provided by service providers currently may overstate actual availability in two dimensions.

First, for wireline services, availability is frequently shown as availability throughout an entire service territory and does not show in which streets, census blocks, and neighborhoods where physical plant is not actually available to connect users.

Second, as agreed with service providers, download and upload speeds for all types of services are reported as maximum advertised speeds. These numbers vary considerably when compared to actual speeds experienced by users in most instances. To address these issues, so as to provide more accurate data to our stakeholders, we have begun a verification program using licensed databases and crowd-source data and speed-test data captured by independent third parties. As the amount of this data is accumulated to a statistically significant level, we will begin to incorporate it in our broadband maps. We will also continue working with our service providers to obtain more granular and accurate service availability data wherever possible.

Finally, as we begin using the Broadband Survey and Assessment data and begin moving into our Capacity Building phase supported by a second NTIA grant, as a basis for accelerating the build-out of broadband capacity in Arizona, our service provider stakeholders tell us that non-uniform, inconsistent permitting and rights-of-way reuse policies at all levels of government are *the* major source of delays and economic disincentives to building-out more capacity, especially in underserved rural areas. We are committed to helping remove or reduce such barriers.

Many State and Federal agencies that control land and right-of-way do not yet appear to be committed to the national agenda for accelerating broadband capacity by expediting and simplifying their processes and working in a coordinated and uniform way with each other, the states, municipalities and the private sector. For example, we have determined that the cost of laying fiber-optic conduit along a highway right-of way that is under repair or construction is roughly equivalent to the cost of putting the paint stripes on the highway. If such conduit could be installed in these circumstances (especially along rural highways), it would yield “Two Highways for the Price of One. Quite a bargain! However, because the Federal Government provides the bulk of highway funding it would require rule and policy changes by the USDOT to make such a program a reality. Such a program (even if limited to just rural areas) would transform the ROI equations for serving rural areas and create profitable new broadband last-mile markets that now often go un-addressed by both small and major providers.

Other possibilities for accelerating rural build-out and increased broadband speeds are reflected in the recent FCC Notice of Inquiry (NOI) regarding broadband rights-of-way policy recommendations for economically reusing existing pole, duct, conduit, canal, pipeline, and rail rights-of-way for broadband deployments especially for increasing middle-mile capacity. Therefore GITA is very supportive of the types of ideas contained in the FCC NOI.

As we expand from just surveying and accessing to creating policy and programs for actually accelerating broadband availability, available speeds, performance, and utilization, working with other states and the Federal Government to mitigate and resolve these impediments to broadband growth (and therefore economic growth and opportunity) will become a major focus for our work. This white paper documents in significant detail the methods we have used to create the current version of the Arizona Broadband Map, and how the Broadband Survey and Assessment data that underlies it was obtained and processed. We would like to thank our core team of GITA personnel, as well as the Arizona State Land Department (ASLD) and our contractor Data Site Consortium, Inc. (DSCI) for their vision, commitment, and good work.

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Arizona Broadband Assessment Project Overview

The purpose of the Arizona Broadband Assessment Project (AZ BAP) is to identify both the availability and speed of broadband services, and the location of broadband infrastructure throughout Arizona. This project is provided through the American Recovery and Reinvestment Act of 2009 (ARRA) and the Broadband Data Improvement Act (BDIA), and in conjunction with the National Telecommunications and Information Administration (NTIA).

The information collected has been processed, verified, and shared with the Federal Communications Commission (FCC) and NTIA to develop a national broadband availability map, as well as to be used in Arizona to inform policy makers; identify opportunities to install new, or improve existing, broadband infrastructure; and to develop a state-level broadband availability map.

This white paper describes the data integration and verification processes employed by the State of Arizona in preparation of the broadband availability data set submitted to NTIA April 1, 2011. This data collection, processing, and submittal are to be conducted on a semi-annual basis over a five-year period. Spring 2011 was the third of ten semi-annual submissions by the State of Arizona and attempts to capture and reflect broadband availability and conditions in the field as of December 31, 2010.

AZ BAP White Paper Recommendations

The AZ BAP White Paper identifies many issues encountered as the project team developed broadband data for submission to NTIA, the FCC, and the state broadband availability map. The purpose of this section is to bring attention to several issues and proposed recommendations, contained within this white paper, that we believe are important.

Reverse Mapping: What Is It and Why We Use It

- The reverse mapping process for a given provider involves first determining a provider’s outside plant infrastructure, technologies, and locations from which we deduce its likely service types and potential speeds. Then, we use engineering tools, such as ESRI’s Network Analyst and Wireless Application Corporation’s eCoverage, to create one or more coverage maps based on well-known propagation physics. These steps are followed by reviewing the probable coverage maps/speeds with the provider when possible, transforming the maps into ESRI shapefiles and publishing the results.

- We typically deploy the reverse mapping process where a provider 1) does not initially provide data, or 2) provider provides sparse data—back of the envelope sketches, etc. Most providers respond positively to our request for joint review of the reverse-mapped data. Some request rights to use the data on their websites—we always say yes. A few do not embrace the data, providing no real feedback as to its validity. See Reverse Mapping Role & Processes Section on Page 17.

Native American Mapping Efforts Going Forward

- Arizona is home to 21 federally recognized Tribes and over 250,000 Native Americans (http://edrp.arid.arizona.edu/tribes.html). In many cases, mapping of these Tribal Lands is covered when we map the underlying carriers that serve those areas. Hopi Telecommunications Inc. (HTI), Gila River Telecom Inc. (GRTI), San Carlos Apache Telecommunications Utility, Inc. (SCATUI), and Saddleback Communications (Salt River Pima-Maricopa Indian Community) have not been initial-providers of data. We have reverse mapped these four providers, have not obtained meaningful feedback from three of these four providers, and have leveraged public-data sources for purposes of confirming our reverse mappings. See Native American Mapping Efforts Going Forward Section on Page 17 and Appendix C - Arizona Broadband Provider Case Studies.

Metrics for Distinguishing Served, Underserved, and Un-Served Areas.

- The Arizona mapping team has concluded that it will utilize the number of broadband providers, within defined speed ranges, as its primary basis for categorizing Arizona regions as either, served, underserved or un-served. It is possible that other characteristics of broadband may be considered as we understand which of those characteristics relate to enabling substantial groups of users, such as telemedicine and e-learning. See Definition of Unserved and Underserved Communities Section on Page 18.

Data Processing Issues

- We are working to improve the geocoding reference sources we use to process Provider data by accessing local version of street networks and parcel databases where available. TIGER road segments are either not present or missing address attributes in many areas of Arizona, especially rural areas. Commercial data sources do not allow use to their geometry in our submittals to the NTIA. See Data Processing Issues - Improving Address, Census and Road Segment Section on Page 19.

- We are buffering commercially geocoded points to identify nearby TIGER road segments, even those without address attributes. This is a reasonable approach as there is likely to be service available within a few hundred feet of a current subscriber and it is a more realistic representation as we do not miss road segments due to lack of address attributes. See Data Processing Issues - Improving Road Segment Identification on Page 20.

- We are using buffered middle mile points to improve the definition of broadband footprints in rural areas where geocoding rates are very low. See Data Processing Issues - Improving Rural Area Broadband Areas Section on Page 20.

Community Anchor Institutions (CAIs) without Building Numbers

- Many western states may also face this issue and it would be useful for us to have an option which would allow us to include CAI features that have an accurate x, y coordinate and lack good address and building number data. A later section of this white paper recommends how x, y locations for CAIs that were developed through GPS or digitizing could be retained for inclusion for submission to FCC. See CAIs without Building Numbers Section on Page 25.

Broadband Data Description

For the State of Arizona broadband availability data set submitted to NTIA April 1, 2011, the summary of the data submission follows:

BB_Service_CensusBlock - 274,391 Census 2000 polygons less than or equal to two square miles in area representing the service area of 36 broadband providers. Multiple instances of a census block polygon exist where a provider has two or more technology types in a block or multiple providers have service in that block. Only the fastest upload and download speeds in a census block are reported for a given provider and technology type. Some providers supplied a list of census blocks they serve, while others reported their service as a list of addresses or as a service polygon (KML or shapefile). Addresses were geocoded and then aggregated to Census blocks. Footprint geography was used to select the underlying census blocks using a “centroid in” rule.

BB_Service_RoadSegment - 91,890 TIGER 2009 road segments that fall inside Census 2000 polygons greater than two square miles representing 26 broadband providers. Multiple instances of a road segment exist where a provider has two or more technology types on a segment or multiple providers have service on the segment. Only the fastest upload and download speeds on a segment are reported for a given provider and Technology type. The TIGER segments have all been clipped to fit entirely within a census block. The address ranges were not interpolated to accommodate any clipping. Some providers supplied a list of TIGER road segments they serve by TLID number, while others reported their service as a list of address ranges or as a service polygon (KML or shapefile). Address ranges were geocoded and then aggregated to Census blocks. Footprint geography was used to select the underlying road segments using a “centroid in” rule.

BB_Service_Wireless - 38 wireless service area polygons representing 31 broadband providers. Polygons fully or partially overlap where a single provider offers service over two or more technology types or spectrums or where multiple providers offer service in an area. Only the fastest upload and download speeds are reported for a given provider, spectrum and technology type. Some wireless broadband providers supplied a list of census blocks they serve, while others reported their service as a list of addresses or as a service polygon (KML or shapefile). Addresses were geocoded and then aggregated to Census blocks and census blocks were dissolved by technology and spectrum to create service area polygons.

Footprint geography was used to select the underlying census blocks using a "centroid in" rule. In some cases, the wireless service area was "reverse engineered" from publicly available data sources on tower locations, technology types and spectrum information.

BB_Service_MiddleMile - 517 middle mile points representing 19 broadband providers. Middle mile points were generated from provider data from Lat/Long (converted to decimal) and from Addresses (converted to decimal) both directly from providers. Elevation attributes were added by overlaying on a statewide 10-meter Digital Elevation Model.

Broadband Provider Participation

Broadband Providers Included

70 Total Providers (Some both Wireline and Wireless)

37 Unique Wireline Providers (TechID's 10-50, Unique FRN's)

31 Unique Wireless Providers (Tech ID's 60-80, Unique FRN's)

4 Unique Providers, Middle Mile Only (Excluding GovNET)

18 Total Middle Mile Providers (Excluding GovNET)

35 unique providers have a census block features in this submittal

They may have submitted just addresses and we converted

They may have submitted census blocks directly

We may have reversed engineered the service area where we selected census blocks

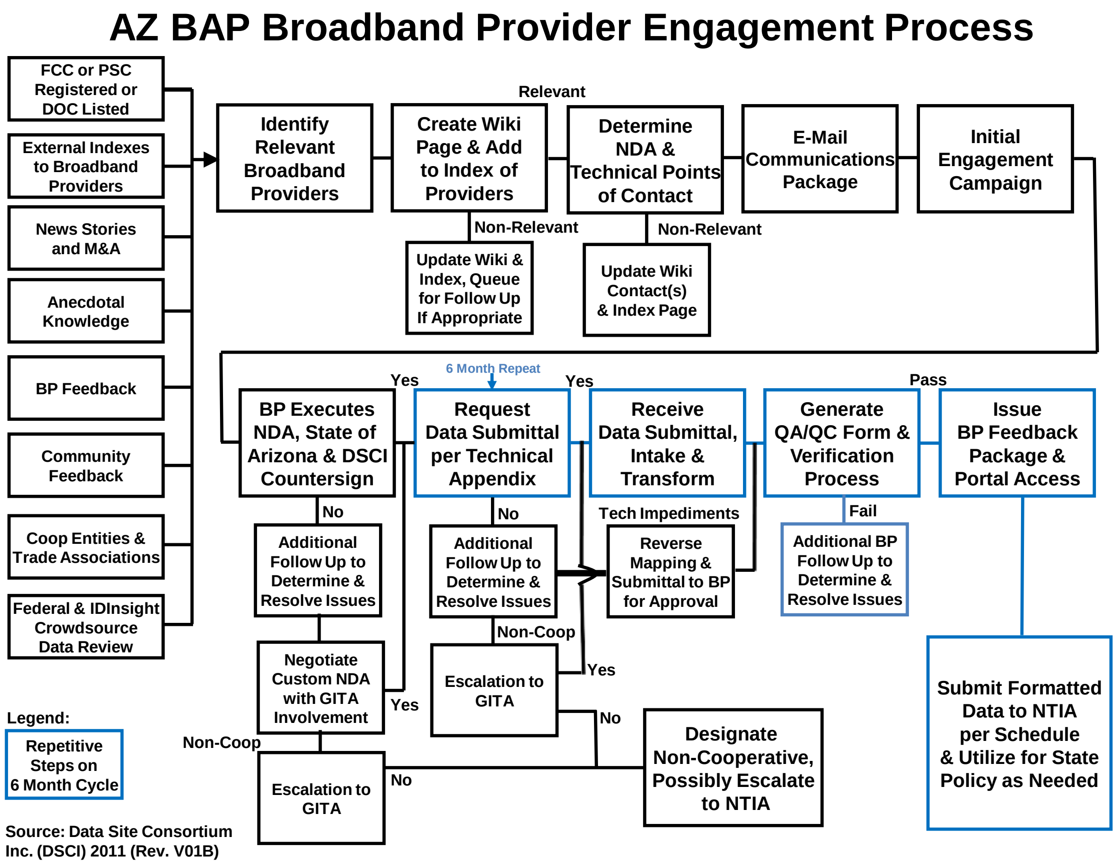
0 providers submitted at the County level

For the State of Arizona broadband availability data set submitted to NTIA on April 1, 2011, the summary of provider cooperation as contained in the datapackage.xls (including unique Broadband Providers, as well as those with multiple FRNs) was as follows:

	Provided Data	Will Provide Data	Will Not Provide Data	Non-Responsive
Provider	44	0	1	18
Reseller	5	0	0	0
Other	2	0	0	0
N/A	0	0	0	0
Total=70	51	0	1	18

Broadband Providers Identification Strategy

The whole nature of the Arizona Broadband Assessment Project (AZ BAP) revolves around data collection from relevant Broadband Providers (BPs), thus the comprehensive identification of relevant BPs active in the Arizona market and definition and determination of relevancy are the key initial steps in constructing the universe of target BPs for subsequent engagement. Additionally, the market will be dynamic over time as BPs go out of business, merge, startup or otherwise transition requiring an ongoing strategy and actions for adding to and updating the relevant BP universe.



The process began with reviewing and mining the Federal Communications Commission's (FCC) Universal Licensing System (ULS) for registered providers with FCC Registration Numbers (FRN), Arizona Corporation Commission (ACC) registered ILECs and CLECs, and Department of Commerce (DOC) listed telecom firms, as well as external indexes to broadband providers (e.g. - top Arizona ISP lists, web lists), extracting relevant details, contacts, and reference information. Additionally, membership in coop entities (carriers/providers that share infrastructure under a common name) and trade associations was reviewed to identify potential providers. The Contractor also acted as a collection point to mine team and external anecdotal knowledge of potential BPs, get references and intelligence from conversations with, and feedback from BPs, and continually monitor news, especially as it relates to merger and acquisition (M&A) activity. After these lists were assembled, the identified providers were analyzed to determine which are relevant BPs.

DSCI, along with GITA, has periodically reexamined the above sources. Additionally, DSCI has reviewed federal and IDInsight crowdsource data, converting and analyzing IP addresses as necessary, to identify previously unknown BPs.

DSCI has continued on with selected non-relevant resellers which are capable of providing data that can be utilized for verification purposes through their use of a relevant BP's infrastructure or otherwise have unique middle mile infrastructure or other telecom assets of interest to the State.

Over time, DSCI will retire (deem non-relevant) BPs who merge into other named entities or go out of business, tracking and documenting the non-relevant providers to provide a reference source as to who they are and how the non-relevancy determination was made, as well as document the consideration of the widest practical range of potential BPs for the project's purposes, providing a reference source for team knowledge capture and reference.

Broadband Providers Engagement Strategy

First for relevant Broadband Providers, the appropriate NDA engagement and follow on technical contacts need be identified. If a relevant BP has a FCC FRN listing, we extract the FRN listed contact and contact vectors as the starting point. If DSCI or GITA team members are already familiar with a BP's Arizona responsible personnel, we capture and document that contact information. Of course, the BP's website, business registrations, and other common sources are used as needed.

Then DSCI calls the identified contact person(s), provides a brief overview of the project, and determines if they would be the appropriate party to engage in NDA consideration, negotiation, and approval, or data transfer activities (it is recognized that many companies will want to address the NDA before identifying a data contact person). If so, DSCI will document the conversation and information obtained to the wiki and proceed to the next step providing an E-Mail Communications Package.

If not, the contractor will solicit name(s) and contact info of the appropriate NDA authorized parties. If the above process doesn't yield needed NDA authorized contact, the contractor will research the company website and other sources to identify other possible parties, follow the path/chain to determine and reach the appropriate NDA authorized contact, and escalate to GITA for assistance if appropriate contact cannot be determined.

During exchanges with a BP's appropriate NDA contact, the contractor will solicit name(s) and contact info of relevant Technical point of contact for data ask and submittal facilitation when appropriate. DSCI offers and describes cooperative technical assistance that could be provided in response to specific questions or expressions of concern as to the complexity or difficulty of complying with the request for data. DSCI then enters all gathered information and a brief log of activities, progress, and issues to the wiki.

The E-Mail Communications Package was developed as a collaborative effort between DSCI, GITA, and ASLD. It is organized into a cover letter under the signature of the GITA Director (State of Arizona CIO), followed by a more detailed and specific letter from DSCI, a copy of the standard project NDA, and an Arizona Broadband Provider Technical Appendix (See Appendix A). The two letters give the project explanation, value proposition, and call to action with the NDA and Technical Appendix yielding expanded and supporting documentation.

DSCI has developed a standard cover e-mail template which is adapted as needed (perhaps based on elements from previous conversations) to comprise the body of the cover e-mail for transmittal of the E-Mail Communications Package. DSCI then fields any initial e-mail, letter, phone, or in-person responses or questions from the provider and moves to the Initial Engagement Campaign.

DSCI then telephones the appropriate NDA contact to ensure receipt of the cover e-mail and Communications Package, as well as field any initial response or questions, inquire as to general receptiveness to NDA and anticipated internal process for review and execution, note on the provider’s wiki page any suggested/committed timeframe(s) for anticipated BP response or requested follow up by them, e-mail and/or call periodically consistent with above item and project timeframes to keep on BPs “radar” and attempt to keep the process moving forward. Again, if the process stalls out at any level, DSCI notifies the Arizona project team members and asks for advice and/or assistance.

DSCI directly notifies Contractor project leaders if any specific objections or issues are noted by a BP and escalates if the response to those objections or issues requires specialized domain knowledge or decisions from a “higher authority.” If there are questions on the NDA content or an expressed desire to modify or negotiate the NDA, DSCI escalates to DSCI’s NDA negotiating parties. If the BP proves unresponsive or reluctant over a period of time, DSCI notifies the Arizona project team members and asks for advice and/or assistance to escalate and follow up.

If the BP indicates a willingness to execute the standard NDA, the data gatherer solicits its signature and forwards the signed document to the DSCI’s legal advisor who in turn forwards it to GITA for counter signature. If the BP has questions on the NDA content or an expressed desire to modify or negotiate the NDA, the data gatherer escalates to the NDA negotiating parties on the DSCI team. The team’s legal advisor determines the nature of BP questions, concerns, and/or issues and seeks to address them within the context of the standard NDA. If deemed necessary, the team’s legal advisor works with the State and BP to reach a mutually agreeable modified NDA and proceeds to manage its execution.

Upon conclusion of review and/or negotiations for modification, the DSCI’s legal advisor receives the BP executed standard or modified NDA, provides it to the State for counter signature, counter signs on behalf of DSCI, and provides the fully executed version back to the BP and GITA, posts a copy to the wiki (notated on the provider’s wiki page), and updates the Index to Providers status page.

If the BP seems unable to meet the technical appendix requirements for data submittal, DSCI qualifies the apparent difficulties, as well as explores and negotiates cooperative technical assistance that could be provided by DSCI in response to issues in complying with the request for data. If the BP is only willing/able to submit FCC Form 477 data, lists of facilities, raw coverage maps, or other relevant but insufficient data for a full federal submittal, the contractor with knowledge and agreement of GITA will offer a reverse mapping option whereby available data sources will be mapped to estimated coverage by census blocks and delivery speed(s) consistent with the BP's technology, presented back to the BP for confirmation or feedback leading to iterative adjustments, and resulting in a "best guess" for their current delivery footprint.

Non-Disclosure Agreements (NDA)

NDA Overview

Some of the Arizona providers opted-out of the non-disclosure agreement ("NDA") process. However, the vast majority of the providers chose to participate, by negotiating and signing a NDA. Of the providers that chose to opt-out, they fall into two groupings. A first group consists of providers that were not sufficiently concerned with misuse of their data to be motivated to execute a NDA. All providers within this group provided data as required for the submittals to date. A second group consisted of providers that chose to largely boycott the mapping process. Members of the second group generally have not provided data. However, we have been successful in interfacing with the majority of these providers via our reverse mapping processes wherein we obtain relevant data from third parties and present the data to each provider for discussion and corrections (see other portions of this report for more details regarding reverse mapping).

Confidential Data

The Federal Program Definition of "Confidential Data," as pertains to Notice of Funds Availability (NOFA) NDAs with Broadband Providers, was originally sourced from the Mapping NOFA provided in the Federal Registry on July 8, 2009. This definition was subsequently clarified, as it pertains to NDA's between "service providers and awardees" in the BDIA. BDIA §§106(c)(3) and 106(h)(2), 122 Stat. at 4101-2 requirements apply only to information submitted by the FCC or a broadband provider to carry out the provisions of the BDIA and shall not otherwise limit or affect the rules governing public disclosure of information collected by any federal or state entity under any other federal or state law or regulation.

Further, the BDIA directed that "as a condition of grant funding under this Program, awardees may not agree to a more restrictive definition of Confidential Information than the definition adopted by this Program." Thus, the BDIA controlled conceptually all provider data that may be considered confidential as between the service providers (“Providers”) and awardees (the “States” and their agents). However, the BDIA allowed for lesser scopes of confidential data.

General NDA Approach

Because Arizona determined that it would utilize a contractor for the purposes of collecting and processing provider mapping data, necessarily the contractor would see and have at least temporary custody of the mapping data. Therefore, to be effective, the NDA must bind not only the State but also its agent, the contractor. As a result, the State evaluated alternatives by which it could efficiently process NDAs that would bind the provider, the State, and its agent. The State considered a dual NDA approach, wherein it and the provider signed a first NDA, and it and its agent signed a second (mirror) NDA. Though effective in legally binding all three parties, this approach received push-back from the provider community and portions of the internal reviewing staff at the State. Thus, a second approach was coined in which a single 3-way NDA was devised. Under this approach all three signatories signed each NDA. The State used this approach as the Arizona Baseline NDA excepting incumbent local exchange carriers.

The Arizona Baseline NDA

The Arizona Baseline NDA was drafted for sharing Confidential Information in an advantageous manner for both the provider and the State. This Baseline NDA is an agreement wherein the provider (“discloser of the information”) achieves specified safeguards and the State (“receiver of the information”) is allowed specific uses of the information for a specified period of two years. Together the discloser and receiver are known as the parties. Both the safeguards and the specific uses are framed within a consistent set of duties and obligations to which the parties mutually agree as follows:

1. **Definition of the parties and their respective objectives (these are whereas statements)**. The Baseline NDA was construed between a disclosing party and a recipient party, wherein the disclosing party may be an owner of the Confidential Information or merely may have a present right-of-use of the information.
2. **Definition of the confidential information**. Herein, the parties negotiated what information is confidential-within the context of the NOFA/BDIA definition. This negotiation generally strikes a reasonable compromise between the information discloser wants for broad inclusive language and the recipient’s desired narrow and specific language. The definition was constructed as general categories of Confidential Information followed by specific instances within those categories.
3. **Exceptions to confidential information**. Exceptions, described both as general categories and specific instances, were negotiated in an effort to adequately characterize the confidential information.

4. **Ownership of the confidential information**. The Confidential Information provided by a disclosing party was not always owned by that party, but was rightfully possessed under an existing license or similar right-of-use of the information. Thus, provisions were included for this limitation, in which appropriate descriptions and indemnities were devised, and notice was provided to the underlying property owner associated with the confidential information.

5. **Definition of obligations of confidentiality**. Obligations of confidentiality focused to acceptable use and unacceptable misuse of the Confidential Information by the recipient. Such obligations also covered secondary disclosures by the agent of the recipient with appropriate need-to-know requirements and recordkeeping.

6. **Exceptions to the obligations of confidentiality**. Confidential Information by its nature must be confidential to someone or in some respect. Once the Confidential Information loses its confidential nature, it generally becomes freely available to all comers. Because information that is initially thought to be confidential may not be so, the NDA also delineated such exceptions. Thus, the NDA listed specific means under which disclosed information is not deemed confidential, such as the Confidential Information becoming publicly known by acts of others or discovered by the recipient by other means.

7. **Definition of what constitutes breach of the agreement**. Gravamen of breach of the NDA centers on intentional and unintentional disclosure of the information within the established term of the agreement. Related considerations included the materiality of a disclosure and whether it as volitional. It was important that the types of breach were identified in detail. Again, as with the definition of Confidential Information, it was helpful to also specify instances that do not constitute breach.

8. **Agreement of available remedies for each type of breach**. Generally, all breaches might require that the breaching party immediately notices the disclosing party of such breach. The NDA provided for such notice, should a breach occur, that provided sufficient time for the disclosing party to intervene for protecting its rights to the confidential information where possible. Further, it was appropriate that the recipient agree that certain breaches equate to irreparable harm to the disclosing party, giving the disclosing party injunctive rights.

9. **Term of the agreement**. A term generally entails defining a period required for the parties to effectively disclose and utilize the information. Here, the NDA term is 2-years. At the end of the term, and with a potential extension, the recipient must either return or destroy all confidential data and provide an affidavit to the disclosing party that it returned or destroyed the information. We anticipate that a second 3-year term will be negotiated during which the parties will agree to maintain confidentiality of the information.

10. **Miscellaneous issues**. These issues include agreed to law, integration, assignment rights, notice addresses, dispute resolution means, and the like.

Qwest and Arizona Local Exchange Carrier Association (ALECA) NDA Variants

When the Contractor initially interfaced with Qwest Communications, one of the Arizona local exchange carriers, the Qwest legal department had already formulated an NDA that was to their liking and which they desired to make the sole NDA under which they would provide mapping data to all states. The Qwest NDA was a two party NDA. In subsequent negotiations, each organization attempted to maintain its particular NDA format and content. However, as negotiations continued, it became obvious that give-and-take was required. The grand compromise largely involved Qwest relenting on its definition of what constituted Confidential Data to the NOFA/BDIA definition; and Arizona consented to Qwest's 2-party NDA framework. Also, in order to bind Arizona's agent (Contractor) a second mirror image NDA was signed by Qwest and the Contractor.

Once the Qwest NDA was fully executed, conversations with the other Arizona local exchange carriers which had been held in abeyance were accelerated. Ultimately, all the Arizona local exchange carriers followed through with the dual NDA approach, based on the Qwest language, wherein it and each of the other local exchange providers signed a first NDA with the State and then signed a second NDA with the State's agent, the Contractor.

Wireless Carrier NDA Variant

The wireless carriers, led by Sprint-Nextel, had also developed their standard NDA prior to the Arizona NDA team approaching them for securing a mutual NDA. Subsequent negotiations resulted in Arizona standardizing on a hybrid between its Baseline NDA and the wireless carriers' standard NDA. This NDA contained all the elements of the Arizona baseline NDA, but with modified wording. It also added specific language allowing the provider a right to enjoin wrongful disclosure of its Confidential Data.

Data Collection and Integration

Primary Data Collection

Overview

The State's contractor Data Site Consortium Inc. (DSCI) solicits and receives the BP data submittals, doing intake processing and usability crosschecks. DSCI's GIS subcontractor TerraSystems Southwest (TSSW) transforms the data to prepare it for federal submittal, documents the technical steps performed during that preparation for quality assurance and BP feedback, leads the team in collaborative data verification sessions, as well as supports further State use of the data in mapping and policy processes.

Reverse Mapping Role & Processes

The use of reverse mapping was key to depicting broadband coverage for: Broadband Providers unable to supply coverage area information; Broadband Providers with incomplete coverage area information; and Non-responsive Broadband Providers. Regardless of the scenario, DSCI and TSSW employed a number of logical methods to derive "where and which" broadband services a Broadband Provider likely had available.

Some of the key elements used to initiate reverse mapping included:

- FCC Form 477 data, though dissolving census blocks greater than 2 square miles into applicable road segments required special techniques and attention
- Central Office (CO)/Digital Subscriber Line Access Multiplexer (DSLAM) location (wireline) - used in conjunction with distance buffers to best determine "where" outside plant infrastructure would reside. We used multiple public information sources to discover CO and DSLAM locations.
- Tower location (wireless) - used propagation models to determine "coverage/reach" based on services provided (frequencies, lat/long, terrain). We used an "E-coverage" tool from Wireless Applications Corp as well as "Radio Mobile's" radio frequency coverage tools.
- Service Book/Offerings - usually determined through publicly available information (technology of transmission, speeds, etc.).
- Tribal boundary information (From FCC) - GIS shapefile used to determine Tribal boundaries and census blocks/road segments contained therein.
- Public Information Sources - from various sources including BPs' own websites to provide a "picture" of their network, services, and coverage.

Such reverse map estimations of the BP's coverage and technology were then presented back to the BP for confirmation or feedback leading to iterative adjustments, sometimes via collaborative online viewing sessions, and resulting in a "best guess" for their current delivery footprint. BPs without current GIS capabilities were frequently impressed with our techniques and interested in internally and externally using the reverse mapping outputs.

Native American Mapping Efforts Going Forward

Arizona is home to 21 federally recognized Tribes and over 250,000 Native Americans (http://edrp.arid.arizona.edu/tribes.html). In many cases, mapping of these Tribal Lands is covered when we map the underlying Incumbent Local Exchange Carriers (ILECs), cable companies, and other broadband providers that serve those areas. Six providers are Native American owned and controlled, serving both on- and off-Indian Land areas. Of these providers, Hopi Telecommunications Inc. (HTI), the Tohono O'odham Nation, and Fort Mojave Nation have provided mapping data or directly supported reverse mapping efforts, are fully cooperative, and we anticipate will continue providing semiannual updates of their data. Gila River Telecom Inc. (GRTI), San Carlos Apache Telcom Utility, Inc. (SCATUI), and Saddleback Communications (Salt River Pima-Maricopa Indian Community) have not been initial-providers of data. Thus, we have reverse mapped these three providers. However, we have not obtained meaningful feedback of our mapped data directly from these three providers. But, we have leveraged Federal Communications Commission filings and crowdsourcing data, as well as like-kind public-data sources for purposes of confirming our reverse mappings. See Appendix C - Arizona Broadband Provider Case Studies.

Project WIKI Role

The AZ BAP wiki serves as a collaborative platform and shared workspace under PBWorks utilized by all project personnel to capture and track relevant knowledge and project deliverables through the entire project lifecycle. Its purpose is to capture knowledge on a near real-time basis, organize such knowledge in an accessible manner, inform participants as needed, and codify project deliverables, process, and incremental activities for documentation and tracking purposes.

Toward that end the wiki includes an Index to Providers page that lists all in-play Providers for a given submittal. The Index contains progress status information for each submittal. It includes links to (1) the associated Broadband Provider (BP) page that contains relatively persistent data and to (2) the more dynamic Quality Assurance/Quality Control (QA/QC) page for each BP. The QA/QC page summarizes the data submitted by a given BP for a given submittal cycle. The Index to Providers page is refreshed for each six-month period, and providers who are no longer in play (due to mergers, acquisitions et al.) are moved to a separate "holding" page, called the Not-in-play Providers page, from which they can be resurrected should they become active providers at a later date. Copies of the Index to Provider pages, the Not-in-play Providers page and the QA/QC pages are saved in the Historical Documents folder after each round of data submittals.

The BP page contains semi-persistent data including the DBA Name, the FRN, the contact person, a link to the signed NDA if one exists, and usually a link to the BP's website.

Comments are used with all wiki BP pages to record interactions between DSCI personnel and the BP. The Comments are saved as part of the monthly Backup/Export procedures.

Definition of Unserved and Underserved Communities

Following the Rural Telecommunications Congress (RTC) conference in Mesa in November 2010, we discussed the definitions of underserved and unserved areas (ignoring satellite coverage). Relying on input from former FCC Commissioner Rachelle Chong we tentatively agreed to the following definitions:

- Unserved is defined to be an area where there is no Broadband Provider offering a minimum of 3 Mbps down and 1 Mbps up.
- Underserved is defined to be an area where there is at least one Broadband Provider offering a minimum of 3 Mbps down but there is no Broadband Provider offering a minimum of 5 Mbps down and 1 Mbps up.

The FCC target for ubiquitous broadband coverage has been 4 Mbps down and 1 Mbps up. Arizona policy makers and stakeholders plan to use a working definition for underserved and unserved areas that will resemble the above specifications, but remains subject to change going forward.

Standardized BP Naming Conventions

We have developed a standardized BP naming convention for our use in Arizona. Since provider names vary considerably depending on the context (e.g., Holding Company names, DBA names, abbreviated names, truncated name portions, et al.) we decided to create a list of relatively short definitive names that would be familiar to the general public for each BP. In a few cases where two names are frequently used, such as T-Mobile and Deutsche Telekom, we have opted to use both, placing one name in parentheses. Wherever possible we have associated the standardized name with the FRN associated with the latest data set submittal from the given BP. We are using the standardized names in the Index to Providers page and in the interactive Arizona Broadband Map as ASLD has incorporated these names to the State map implementation.

Data Processing Approaches

Census Block: Sources of census block submittals have been either lists or shapefiles of addresses passed or served or lists of 2000 census blocks served.

Address lists are geocoded against an ESRI composite address locator using the latest available Navteq road centerline file as a primary reference data set with TIGER 2009 as the secondary source. Address points falling in census blocks less than or equal to two square miles are summarized by census block identifier. One summary table for each technology type is created with one record per census block containing only the fastest reported speeds in each of the four speed fields (maximum advertised or typical up and down speeds).

Road Segment: Sources of road segment submittals have been either lists or shapefiles of addresses passed or served, lists of census blocks, or lists of TIGER 2009 road segments (by TLID number).

For address lists or shapefiles, an Esri Near analysis is performed on the address points falling in census blocks greater than or equal to two square miles. This analysis provides a list of the TIGER 2009 segment ID's nearest to each address point within a maximum search radius of 225'. The list of TIGER segment ID's is summarized by each technology type, keeping only the fastest reported upload and download speeds for each segment. The TIGER segments are intersected with dissolved polygons representing census blocks greater than two square miles, thereby clipping the extent of these segments to the boundary of the census block areas.

For lists or shapefiles of census blocks, the blocks greater than or equal to two square miles are used to spatially select the underlying TIGER road segments using a "centroid in" selection rule. The road segments inherit the technology and speed attributes of the overlaying census blocks.

For lists of TIGER line ID's, these lists are summarized by technology type, keeping only the fastest upload and download speed for each segment and then joined to the TIGER line file to extract the geometry and attributes of those segments.

Wireless Polygons: Sources of wireless service area are either lists of addresses served, lists of census tract (477 data) or blocks served, or a shapefile or KML file of estimated service area boundaries. In some cases, the DSCI team generated these service areas by feeding tower locations and various technology and spectrum attributes into an RF propagation program.

Middle Mile: Wireline Middle Mile points were generated from provider data from Lat/Long and from addresses both directly from providers. Wireless Middle Mile points were derived from lat/long coordinates from the provider, through a commercial database from Wireless Applications Corp., or from public information. Ownership and backhaul type was derived from a combination of public sources and provider information. In either instance, information was converted to decimal latitude/longitude coordinates. Elevation attributes were added by overlaying on a statewide 10-meter Digital Elevation Model. Census block attributes (FULLFIPSID) were added through an overlay process.

Data Processing Issues

Improving Address, Census and Road Segment: TIGER roads are the source of geometry for our road segment submittal. TIGER files have a large number of records with no address element information, especially in rural areas. For the Spring 2011 delivery we added local streets in Cochise County to help improve low match rates from a particular provider in that area. In the future we will be transitioning to more local geocoding references (streets and parcels) as they become available. From these local sources we can not only geocode but also pull geometry into the NTIA deliverables. We are also working on an application that will parse and fix address elements that have obvious errors prior to geocoding. We may also use commercial geocoding services where we cannot find a match through other means. We do not plan to manually match provider addresses.

Improving Road Segment Identification: For this delivery we have moved from identifying road segments strictly by geocoding to TIGER and instead are using geocoded points derived from both Navteq and TIGER reference data to find TIGER arcs within 225’ of these points for inclusion in our deliverable. Using only TIGER, we often experience a very low geocoding rate and are therefore likely under-reporting broadband availability. Based on an analysis of our Fall 2010 technique against this new “buffer” approach, we determined we would get an average of about 85% of geocoded points involved in the road selection process vs. 40-60% in many cases using only TIGER. One downside to this approach is that we likely include roads that are not actually in the Providers’ databases, but we assume that if a road is within 225’ of one that is serviced, there is a good chance that new road can be serviced as well. A second drawback is that we may be selecting road segments that fall in census blocks <= 2 square miles. We handle this by intersecting our road networks with census block areas > 2 square miles, leaving only the portions or entire road segments that fall in the larger census blocks. When we have obtained local, highly accurate and maintained road networks and we can get geocoding rates up into the mid 80’s or higher, we will likely return to a geocoding approach for identifying road segments in the larger census blocks.

Improving Rural Area Broadband Areas: For very rural areas where even the combined Navteq/TIGER geocoding rates are low, we have opted to use buffered middle mile points to identify census blocks in the service area. For example, we processed a list of DSLAM locations and service radii from the Frontier telecom group, buffered them by a provider-declared radii distance of 15,000 feet and then selected census blocks that intersected. In the Fall 2010 delivery we obtained only a 2% match rate on the Frontier - Navajo Telecomm groups submittal and therefore did not include their service in that delivery. For the Spring 2011 delivery, we used buffered DSLAM to identify census blocks and road segments which resulted in a significant increase in the census and road segment matches. In other Frontier areas, we kept Census Blocks that geocoded for the Fall 2010 delivery and added those census blocks that intersected a DSLAM buffer. We only kept road segments in Census Blocks greater than 2 square miles that intersected the DSLAM buffers, as review with local experts indicated this was a more reasonable depiction of where service actually was provided.

Reporting Multiple Speeds by Census Block or Road Segment: We use a summarize function with speed fields set to MAX so that only the fastest up and down speed for any given census block or road segment for any given Provider and Technology is reported. For example, a census block for a given Provider with three reported speeds (3,2, 3,3, 4,2) would get a 4,3 reported.

Errata:

- Provider Name: we get rid of all commas but leave in periods assuming a CSV export would be less useful if commas were left in.

- For road segment data, we use a script that gives us the minimum and maximum address numbers across the four TIGER address number fields thereby meeting the NTIA requirement for these fields.

Data Processing Automation Project

For the September 2011 delivery, DSCI through GIS subcontractor TSSW is developing and testing a sophisticated data formatting and validation application that should improve the speed and accuracy of the numerous manual steps we now undertake to format and evaluate/fix anomalies in provider data submittals.

Community Anchor Institutions (CAI)

CAI Data Sources

Data for the Community Anchor Institutions (CAIs) reside in many different locations throughout Arizona and were collected from data custodians and/or data integrators throughout the State. This effort has two major components, the identification and geo-location of the CAI entities and the collection of data related to the status of their broadband usage. Both of these components have significant challenges for development and maintenance. The State does not currently have any centralized databases that could serve as a core basic backbone for CAI data development. Thus a sizeable data collection and standardization effort exists. The Arizona Broadband Mapping Project provides impetus for one of the first State efforts to consolidate CAI data into one database.

A considerable effort in basic data development working with local government websites and one to one contacts has been required to address some basic aspects of the CAI data collection. Numerous organizations in Arizona maintain locational information regarding some categories of CAI data but these are all of varying formats and currency. In many cases the project has had to assist CAI location data custodians in the update of some aspects of the basic locational data. The Project also is, in most cases, the first time that CAI managers have developed information regarding the level of broadband services for their institutions. This poses a host of challenges regarding a large number of existing processes in many organizations. Some aspects of these challenges are described in the CAI challenges part of this paper.

CAI locational and broadband data (for some broadband data items in some categories) was collected from the following sources listed below. Each incoming data set is completely unique and locational information, addresses and their formats and coordinate locations and their formats varied widely. Contributions from the Arizona State Land Department listed below constituted both original data creation and supplemental work on certain categories of data. Along with these data sources several additional data sources, not listed here, are starting to be incorporated into the data set to complete certain categories of data for their basic locational information.

Category 1: Public Schools (K - 12)

Arizona Department of Environmental Quality (ADEQ)
Victor Gass
Email: Gass.Victor@azdeq.gov
Phone: (602) 771-4517

State Cartographers Office (SCO)
Tim Colman
Email: Tcolman@land.az.gov
Phone: (602) 542-3249

Arizona Counter Terrorism Information Center (AcTIC)
Sharon Nicholson
Email: Snicholson@azdps.gov
Phone: (602) 644-5830

Arizona Department of Education (ADOE)
John Eickman
Email: John.Eickman@azed.gov

Category 2: Libraries

Arizona Counter Terrorism Information Center (AcTIC)
Sharon Nicholson
Email: Snicholson@azdps.gov
Phone: (602) 644-5830

Arizona State Land Department (ASLD)
Anthony Maslowicz
Email: amaslowicz@land.az.gov
Phone: (602) 542-2606

Libraries Consultant
Malavika Muralidharam
Email: mala@lib.az.us

Phone: (602) 926-3601

Category 3: Medical/Healthcare

Arizona Department of Health Services (ADHS)
Angela Wills
Email: WillsA@azdhs.gov
Phone: (602) 364-0462

Arizona Counter Terrorism Information Center (AcTIC)
Sharon Nicholson
Email: Snicholson@azdps.gov
Phone: (602) 644-5830

Category 4: Public Safety

Arizona State Land Department (ASLD)
Anthony Maslowicz
Email: amaslowicz@land.az.gov
Phone: (602) 542-2606

Arizona Counter Terrorism Information Center (AcTIC)
Sharon Nicholson
Email: Snicholson@azdps.gov
Phone: (602) 644-5830

Category 5: Universities, Colleges and Post-Secondary

Arizona Department of Environmental Quality (ADEQ)
Victor Gass
Email: Gass.Victor@azdeq.gov
Phone: (602) 771-4517

Category 6: Other Government Buildings

Arizona State Land Department (ASLD)
Anthony Maslowicz
Email: amaslowicz@land.az.gov
Phone: (602) 542-2606

Arizona Counter Terrorism Information Center (AcTIC)
Sharon Nicholson
Email: Snicholson@azdps.gov
Phone: (602) 644-5830

Arizona Department of Health Services (ADHS)
Angela Wills
Email: WillsA@azdhs.gov
Phone: (602) 364-0462

Category 7: Other Non-Government Buildings

Arizona State Land Department (ASLD)
Anthony Maslowicz
Email: amaslowicz@land.az.gov
Phone: (602) 542-2606

Arizona Department of Health Services (ADHS)
Angela Wills
Email: WillsA@azdhs.gov
Phone: (602) 364-0462

CAI Process Steps

After the data was collected from multiple sources listed above it was processed with the goal of populating the CAI Feature Class within a Geodatabase constructed for delivery to NTIA. The NTIA geodatabase specifications were utilized for the target geodatabase which was to receive the CAI data and to be transferred to NTIA. In our initial approach incoming data sets of various formats were processed into Esri shapefiles for the various CAI categories and then loaded in the CAI feature class of geodatabase. Data were received from sources as either Excel files or ASCII text files of address locations or as Esri shapefiles which already had the locations as X,Y points and usually also contained some form of street addressing as well. The formats of all of these incoming files were different.

In general a set of processing steps was applied to the data to eventually convert it into an Esri shapefile that was loaded into the final geodatabase. The steps listed below were utilized in the processing of Excel and ASCII text files. For incoming shapefiles step one does not apply and step four was not necessary. Some datum and projection transformations were also performed on the shapefiles to standardize those formats.

General CAI Data Processing Steps

1. Excel Tables or ASCII text files containing names and addresses of Community Anchors were obtained from various sources.
2. The data were then brought into Microsoft Access and the ADDRESS field(s) were parsed into BLDGNBR, PREDIR, STREETNAME, STREETTYPE, SUFFDIR, CITY and ZIP5. Data were then exported out as .dbf files for additional processing
3. The STATECODE field was added with the value set to AZ in ARCGIS as was subsequent processing.
4. The Esri Geocoding Software Tool was used to generate WGS84 Latitude/Longitude Coordinates in Decimal Degrees using the parsed Address Fields.
5. The resulting file, with (X, Y) data points was converted to a shapefile in Geographic Coordinates using Datum WGS84.
6. The resulting shapefile with Point Data was overlaid on the 2010 TIGER/Line Census Block shapefile in order to extract the FULLFIPSID information.
7. The CAICAT field was added to enable the data to be sorted based on the 7 Community Anchor Categories.
8. A unique CAIID value was assigned to each Community Anchor record.
9. The following Broadband attributes were added: BBSERVICE, PublicWiFi, TRANSTECH, MAXADDOWN, MAXADUP.
10. This resulted in a set of formatted shapefiles for the various CAI categories which were then loaded into the CAI feature class of the geodatabase.

CAI Issues

CAIs without Building Numbers: We had to drop a significant number of CAI data points for our April 2011 submission. These data points were located in Rural Areas where they did not have an address or Building Number. It is not unusual to have Rural Addresses that lack this information. In very rural areas of Arizona, which are often the areas which would most benefit from improved broadband services, locations are given by how many feet from an intersection or how close a building is to a known landmark (for instance, fire stations are notated as "…four hundred feet from the intersection next to the billboard sign." We often had a valid Lat/Long coordinate pair that was not derived from address geocoding. Many CAIs are located by heads up digitizing from digital orthophotos or locating by field GPS units. Based on the Lat/Long coordinates, rather than an accurate or valid address, we obtained a point on the map that was spatially accurate and valid. This data was often provided by state agencies that were required to locate offices for their programs. They did not have good address data and sent out staff to GPS the location of required offices. Unfortunately, we had to drop these CAIs, which had accurate x, y coordinates, from our submission, because they failed the Python QA Script check. Currently, the QA Script flags all records that do not have a Building Number as "failed". Arizona is not just rural, but in some places, still frontier. Many western states may also face this issue and it would be useful for us to have an option which would allow us to include CAI features that have an accurate x, y coordinate and lack good address and building number data. One option may be to add a data field that identifies x, y locations that were developed through GPS or digitizing and should be retained. These data would then still be able to be submitted to FCC and appear on maps and be available for spatial analysis and planning for broadband development.

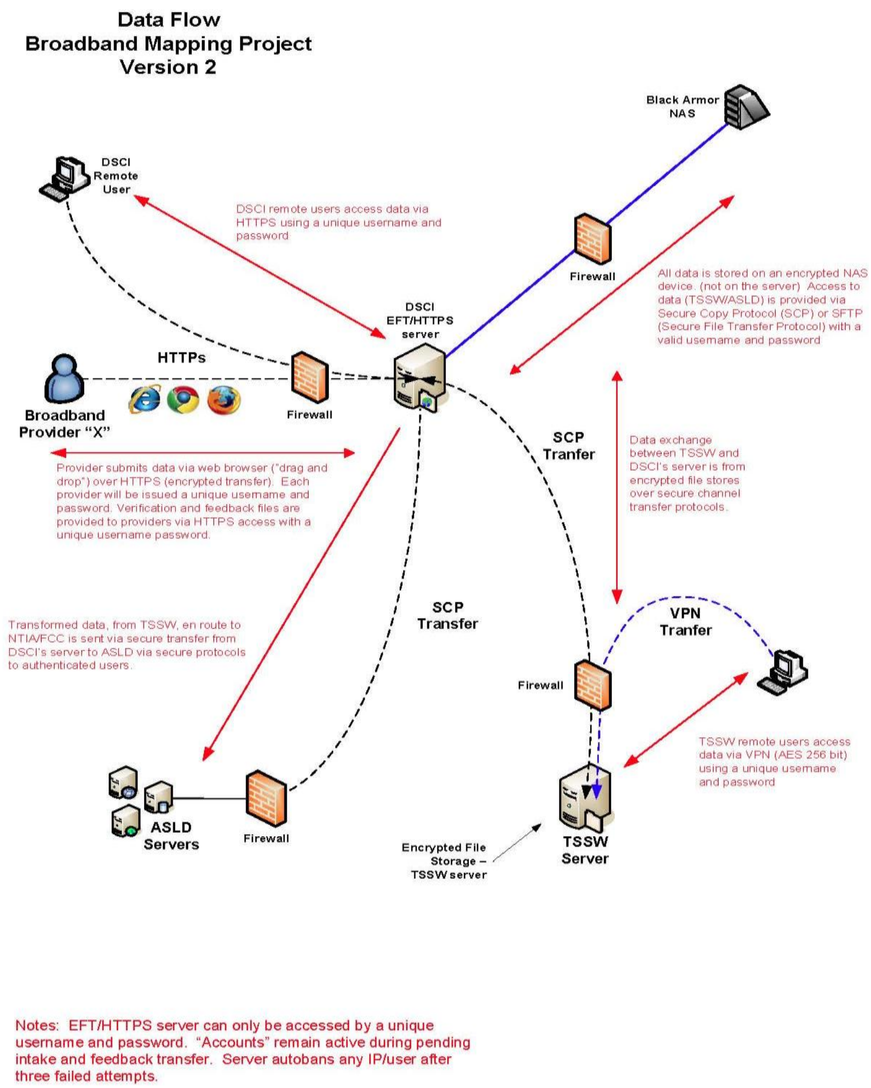
Broadband Provider Requests for CAI Information: All Broadband Providers on State contract for telecom services and others known or suspected to be providing broadband services to CAIs were sent a request letter and associated spreadsheet to enter data on the identified CAIs that they serve. None responded, however future plans include requiring those on State contract for telecom services to do so as part of their contract obligations and expectations.

Managing the Diversity of CAI Data: We are well on the way to having a good database of Arizona CAI locations, but need to deal with additional complexities related to developing data for the level of broadband service provided to the CAI locations in our database. We are putting together a State work group and are conducting outreach to those CAIs that have state agencies to act as data custodians for location and we can communicate and coordinate with those data custodians to develop methods for those institutions to self report their level of broadband services. In many cases, the databases and maps we are developing as part of the AZ Broadband Mapping Project provide incentive for agencies or data custodians to obtain information about their facilities. It is much harder to obtain broadband service levels from local government agencies due to the distributed nature of their managing agencies.

To that end, ASLD has done substantial outreach to local government agencies, throughout the state, and has created a comprehensive listing of local government facilities. ASLD has been developing a master database and data structure for these local government CAI facilities as well as for all other CAI categories. This will help us populate both location and broadband service levels, and more readily provide this data to NTIA, as the data becomes available to us from data custodians or integrators. A critical benefit of this approach is that feature level metadata can be added and fields for controlling data status currency and sources can be added. These will be critical in managing large amounts of incoming and diverse data and staging the data for update provision and updates of the Arizona Broadband Maps community anchor layer. Appendix B shows our initial data structure for the CAI management database. The structure is expected to change some as we gain more experience with its use and operations.

Project Data Flow and Security

Data Site Consortium Inc. (DSCI) provides a secure web browser-based portal supporting the Arizona Broadband Mapping Project for use by DSCI personnel, GIS subcontractor TerraSystems Southwest (TSSW), the Arizona State Land Department (ASLD), the Government Information Technology Agency (GITA), and participating Broadband Providers (BP). To submit data the BP user logs in to the portal on the server, which can only be accessed by a unique username and password. The BP may use any web browser (Internet Explorer, Firefox, Safari or Chrome) to access the portal. After a successful login, the BP can "drag and drop" files to the browser window for upload. The BP user account is deactivated after successful transfer. The data is stored on an encrypted device in a secure facility. After data transformation and data examination and correction, along with related processing, the data is made available for review and verification by the BP user. The BP user can access and review the transformed data (as formatted for federal submittal in GIS readable format) and derived data (such as maps in PDF and KML formats) prior to its delivery to NTIA as part of DSCI's BP feedback process and for verification tasks.



Validation

Validation Overview

Receipt of Broadband Provider data sets by DSCI in response to an active submittal request or via the private portal as a preferred direct means triggers DSCI staff to perform a “first touch” analysis consisting of inspection of the data set(s), noting of specific technical characteristics, and determination of whether the data is sufficiently present and formatted for subsequent processing. If so, this is noted on the provider wiki page and the responsible DSCI staff member records meta information pertaining to the data submittal on the QA/QC wiki form for the data submittal. The data set then is processed as necessary to be compliant with federal data format requirements, and loaded into the data repository. The received data is then scheduled for review in a collaborative verification session with appropriate parties. The collaborative verification session identifies any data quality issues and assignments for additional verification activities and note anomalies, observations, and planned remedial actions to the wiki.

DSCI and TSSW staff reviews all BP data sets in a collaborative real-time shared view environment to verify and further qualify the submitted data. Collaborative verification sessions look specifically for spatial and technical logic issues present in provider submissions as detailed in Appendix D. Additional resources are employed such as community anchor institution data, licensed databases, lists of COs and DSLAMs, federal and state crowd-sourced data, field verification testing, etc. If the team identifies any significant perceived anomalies in coverage and speed, generates appropriate notes and documentation, then seeks to resolve by providing feedback to BPs to explain or correct the data submittal for the current round or in subsequent rounds.

DSCI staff then prepares a brief Provider Technical Feedback Form for each BP data submittal distilling the content of the QA/QC form into a brief and more readable format for inclusion in the BP Feedback Package to be issued by GITA. Identified anomalies and issues are highlighted and the BP is engaged to consider and help correct them.

Business Logic Rules

Data is submitted in collections called data sets, data files and records. A data file is one particular file submitted by a provider (e.g. address-specific data file, census block data file, middle-mile data file, etc.) Data files correspond directly to a feature class (GIS) or table (SQL). A data set consists of all files submitted by a provider. This corresponds to a feature data set (GIS) or database (SQL). The top-down hierarchy is: Data set contains data files contains records.

The attributes we validate immediately upon receipt of a data set are: currency of the data, evaluated by the date the BP specifies or the date received if the BP does not specify a date (the data is then assumed to be current); accuracy of the data, including both content accuracy and spatial accuracy; cleanliness or edited quality of the data (e.g., misspellings, typos, transcription errors, missing field values); granularity of the data (e.g., street address, street or road segment, census block, census tract); data format (e.g., text file, shapefile, spreadsheet); and overall completeness (all BP customers are represented as opposed to a subset of customers).

Confidence/Reliability Index Development

As we collect broadband data from a variety of sources we need to assign some kind of indicator to the various data sets to indicate how reliable the data is. Such a reliability metric is sometimes referred to as our level of confidence in the data. Some other terms that are used to describe this metric are data quality and data validity. Another metric that is relevant refers to the value of the data. Data may be very reliable but still be of little value to us (e.g., it may be out of date). So we need to account for its value as well as its reliability.

The “Reliability” Index measures how reliable the data is (how well does it reflect the “real” situation). It is derived mainly from the accuracy, cleanliness, completeness and format of the data.

The “Value” Index measures how valuable the data is to the project. The data might be very reliable, but it may be old and not very specific. While subjectively assigned, the “Value” Index helps to prioritize processing and verification tasks. The “Value” Index is derived from the currency, granularity, completeness and format of the data.

Feedback Loop

If DSCI’s first touch data inspection detects submission issues (omissions, errors, structural inconsistencies) to an extent that would prevent subsequent processing and submittal, DSCI will designate the data as having a “Not Passed” status and enter information describing the deficiencies onto the appropriate wiki pages. DSCI will then work with the provider to address the issues for the current submission and/or in subsequent submissions.

In cases where technical issues present a barrier to a successful data submission by the BP, the DSCI team employs creative solutions that assist the BP in providing a data product that contains the minimum content necessary to transform the data to meet the minimum NTIA/FCC specifications. Such solutions include the provision of PDF or KML format maps of their service territory upon which providers can mark up their service area, speeds, and technologies, and spatial analysis of BP service areas based on the known operating characteristics and physical constraints of the technologies employed.

If the DSCI and TSSW team identifies any significant perceived anomalies in coverage and speed, it generates appropriate notes and documentation, then seeks to resolve the anomalies by providing feedback to BPs to explain or correct the data submittal for the current round or in subsequent rounds. When possible such issues will be incorporated into the Provider Technical Feedback Form included with the feedback packet. Otherwise, identified issues are brought directly, via email, to provider data contacts by the contractor team. GITA relies on the Contractor for the provision of broadband-specific technical information and logic that should be incorporated into the data review sessions.

Statistical Models

No statistical models are currently applied to compile and analyze the data.

3rd Party Publicly Available Data

FCC Form 477 Data: The FCC requires all facilities-based providers to submit a Form 477 data which is then used to produce Local Telephone Competition and Broadband Data for analysis and reporting. The associated FCC Registration Number (FRN) is a key data identification and indexing element and the underlying data, though significantly limited in the desired broadband accuracy and granularity, has proved useful for identifying relevant Broadband Providers and as a starting point for some reverse mapping activities.

American Roamer: DSCI licenses American Roamer data for Arizona from Esri which provides a substantial view of wireless voice and advanced services coverage patterns. The data set has proven of substantial use in cross checking mobile Broadband Providers' declared coverage and gaps. With the dynamic nature of the mobile industry and advancing 3G and 4G deployments, American Roamer data will be licensed on an ongoing basis to support DSCI verification activities.

Cable Boundaries/Media Maps: DSCI licenses Cable Boundaries data from Esri for Arizona for use as a primary verification source for cable wireline providers. It is based on information from MediaPrints developed by Direct Group and Warren Communications and updated quarterly. Cable Boundaries data provides current information about cable services by area and has data variables including primary ownership, subscribers, miles of plant, and digital capability. The data are available in a variety of geographies. Though initially useful in verification for comparing declared cable broadband coverage, it generally has proved to grossly overestimate the BPs broadband service territory and is a coarse tool of limited utility.

TeleAtlas Central Offices & Wire Centers: DSCI licenses TeleAtlas Central Offices & Wire Centers from Esri for ILEC and CLEC base facilities identification. Such data is available from a variety of sources and tends to remain relatively constant over time. Also, since it doesn't capture Digital Subscriber Line Access Multiplexer (DSLAM) locations, it must be complemented by other means to be useful in verifying wireline LEC coverage and gaps.

Wireless Applications, Corp. SiteSync: PowerSearch manages queries to multiple databases including FCC, FAA, licensed microwave, and tower companies to look for structures or towers placed in designated areas and often reveals the specific broadband providers collocating on those towers. eCoverage projects signal propagation and terrain coverage using high-resolution terrain data and Longley-Rice frequency calculations through an easy to use downlink coverage and contour generator with easily adjustable parameters like antenna, azimuth height, frequency, and power.

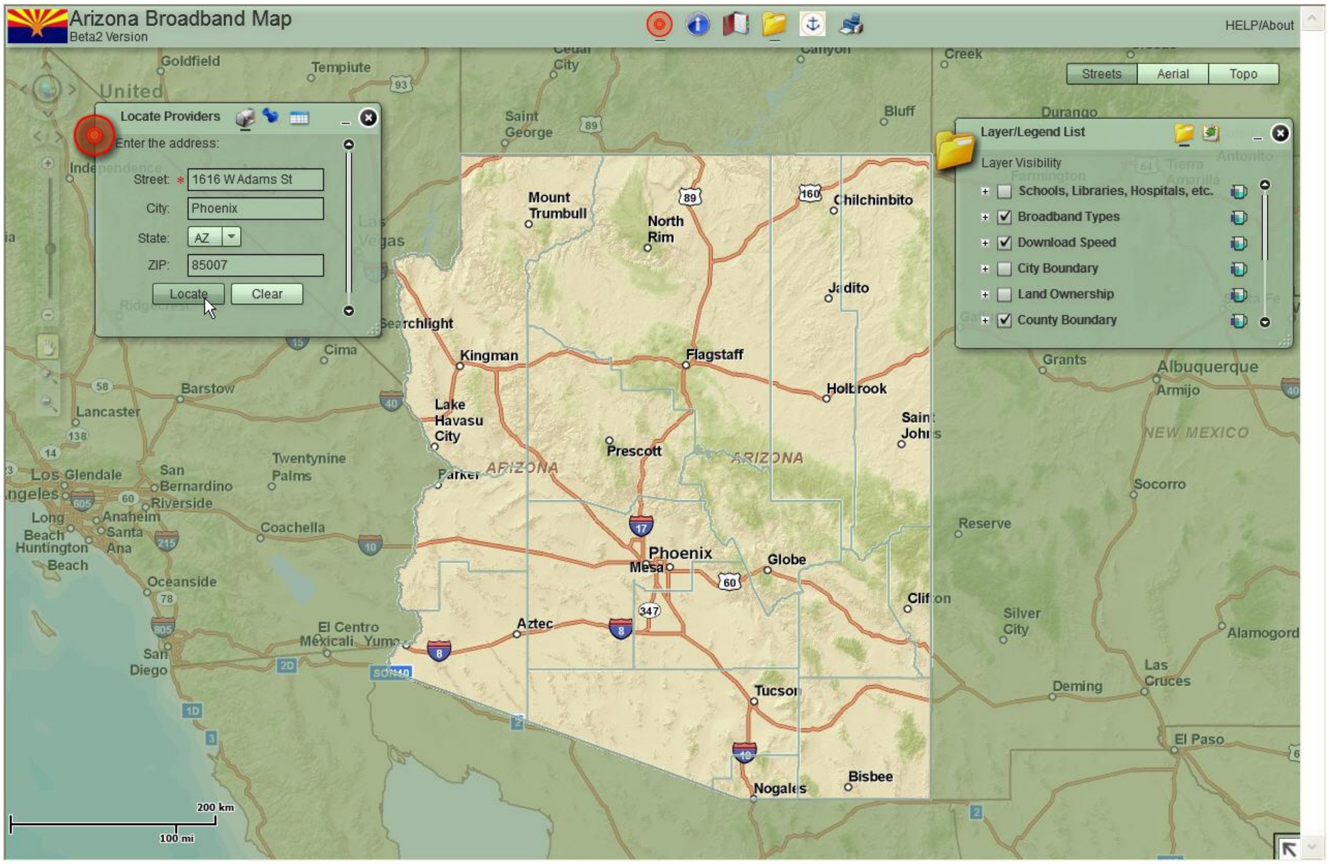
Federal Crowdsourced Data: The FCC offers an online Consumer Broadband Test (http://www.broadband.gov/qualitytest/about/) to give consumers additional information about the quality of their broadband connections and to create awareness about the importance of broadband quality in accessing content and services over the internet. The FCC complements the data collected from the Consumer Broadband Test with the submitted street address and other data, aggregating it to several monthly files grouped by State and available for secured download. DSCI processes the wireline and wireless results files, converting IP addresses to named Broadband Providers, and otherwise prepares the data for use in collaborative verification procedures. These data sets have proved extremely useful in confirming declared and/or estimated BP coverage and speeds, leading to detection of core data anomalies and issues that have largely been corrected with BP participation, thus yielding much more accurate and reliable data submittals.

ID Insight Crowdsourced Data: DSCI licenses the BroadBand Scout database from ID Insight for all 15 Arizona counties. ID Insight uses proprietary analytic modeling, demographic data, and retail Internet order data that include physical and IP addresses, to detail consumer access types and transmission speeds keyed to geographic locations which contribute to our verification views of BP footprints and coverage gaps. To date, this data source has proved complementary to the FCC crowdsourced data and only contributed incremental knowledge and detection of data set anomalies in a limited number of cases. However, detailed review of IP addresses and BPs has led to the identification of several additional relevant BPs that have since been successfully engaged by DSCI.

Arizona Broadband Map

Arizona Broadband Map Overview

The Arizona Broadband Map (http://broadbandmap.az.gov/map) is an interactive mapping application designed for the end-user to find and list Broadband Service Providers at any location within Arizona.

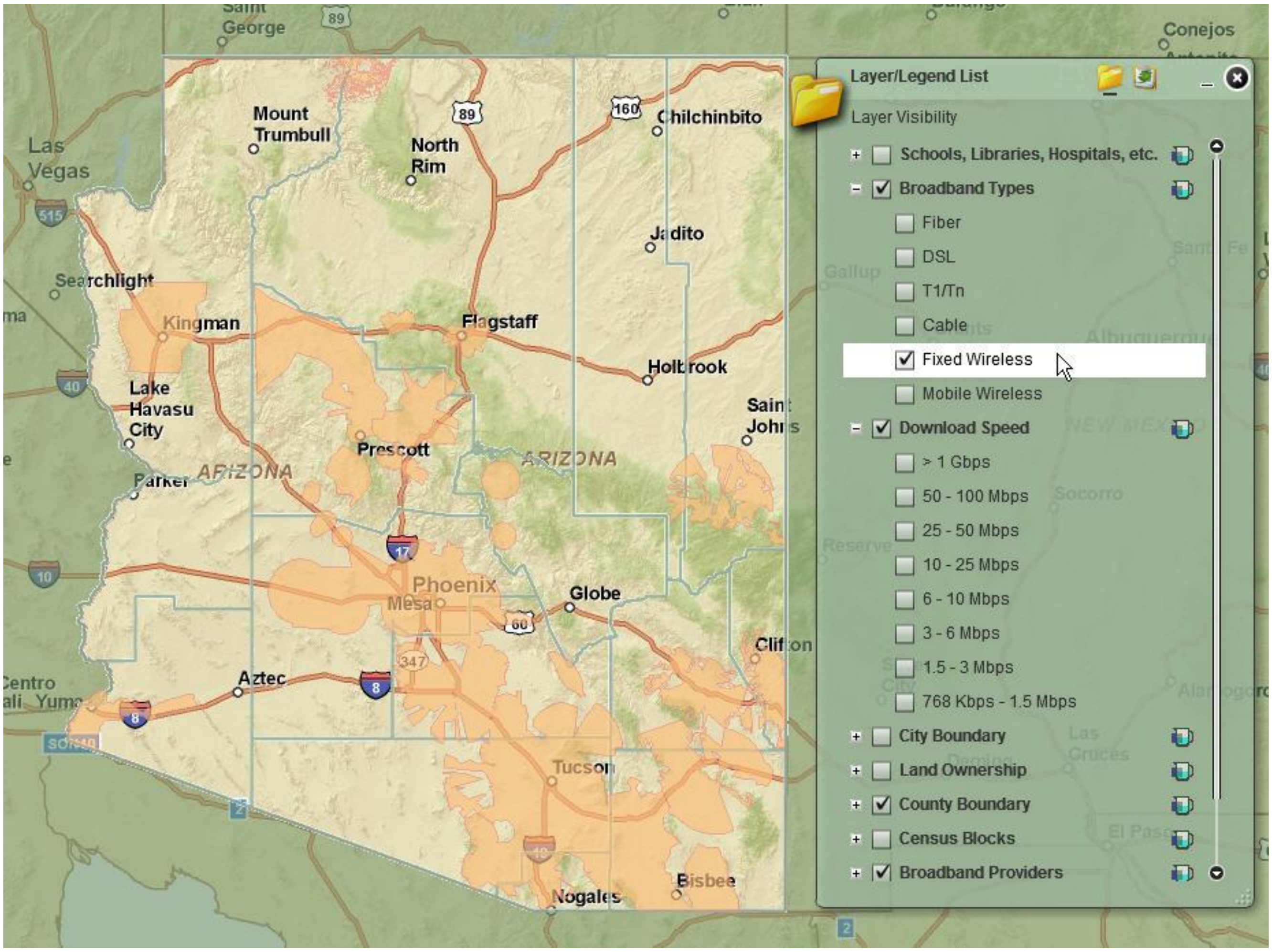


The application allows the end-user to enter a street address to zoom to a location and identify the Broadband Service Providers in the immediate vicinity.


Arizona Broadband Map
Beta2 Version
HELP/About
Streets
Aerial
Topo
Locate Providers
Locations found: 15
1616 W Adams St, Phoenix, AZ, 85007
Score: 100
1598 W Adams St, Phoenix, AZ, 85007
Score: 78
1700 W Adams St, Phoenix, AZ, 85007
Score: 78
Layer/Legend List
Layer Visibility
Schools, Libraries, Hospitals, etc.
Broadband Types
Download Speed
City Boundary
Land Ownership
County Boundary
W Monroe St
W Adams St
N 19th Ave
N 18th Ave
N 17th Ave
N 15th Ave
N 13th Ave
N 12th Ave
W Washington St
State Capitol
Bolin Memorial Park
S 14th Ave
W Jefferson St
S 19th Ave
S 18th Ave
S 13th Ave
S 12th Ave
W Madison St
N Laurel Ave
200 m
500 ft


Arizona Broadband Map
Beta2 Version
HELP/About
Streets
Aerial
Topo
List Providers
Broadband Providers
Provider: Covad Communications
Type: DSL (Asymmetric)
Download: 3 - 6 Mbps
Upload: 200 - 768 Kbps
Broadband Providers
Provider: Qwest Communications
Type: DSL (Asymmetric)
Download: 25 - 50 Mbps
Upload: 10 - 25 Mbps
Broadband Providers
Provider: Covad Communications
Type: DSL (Symmetric)
Download: 3 - 6 Mbps
Upload: 3 - 6 Mbps
Broadband Providers
Provider: Covad Communications
Type: T1/Tn
Download: 3 - 6 Mbps
Upload: 3 - 6 Mbps
Broadband Providers
Provider: Integra Telecom
Type: T1/Tn
Download: 6 - 10 Mbps
Upload: 6 - 10 Mbps
Broadband Providers
Provider: Cox Communications
Type: Cable
Download: 50 - 100 Mbps
Upload: 3 - 6 Mbps
Broadband Providers
Provider: Airband
Type: Fixed Wireless
Download: 6 - 10 Mbps
Upload: 1.5 - 3 Mbps
Broadband Providers
Provider: Wydebeam
Type: Fixed Wireless
Download: 1.5 - 3 Mbps
Layer/Legend List
Layer Visibility
Schools, Libraries, Hospitals, etc.
Broadband Types
Download Speed
City Boundary
Land Ownership
County Boundary
Broadband Providers
Provider: Covad Communications
Type: DSL (Asymmetric)
Download: 3 - 6 Mbps
Upload: 200 - 768 Kbps
W Monroe St
N 17th Ave
N 15th Ave
N 13th Ave
N 12th Ave
W Washington St
Bolin Memorial Park
S 14th Ave
S 13th Ave
S 12th Ave
W Madison St
200 m
500 ft

Several data layers are available for the user to turn on to obtain visual displays of the locations of various types of Broadband Services (Fiber, DSL, T1/Tn, Cable, Fixed Wireless, and Mobile Wireless). Maximum advertised Broadband download speeds can also be shown on the map by various Speed Tiers of download speed.



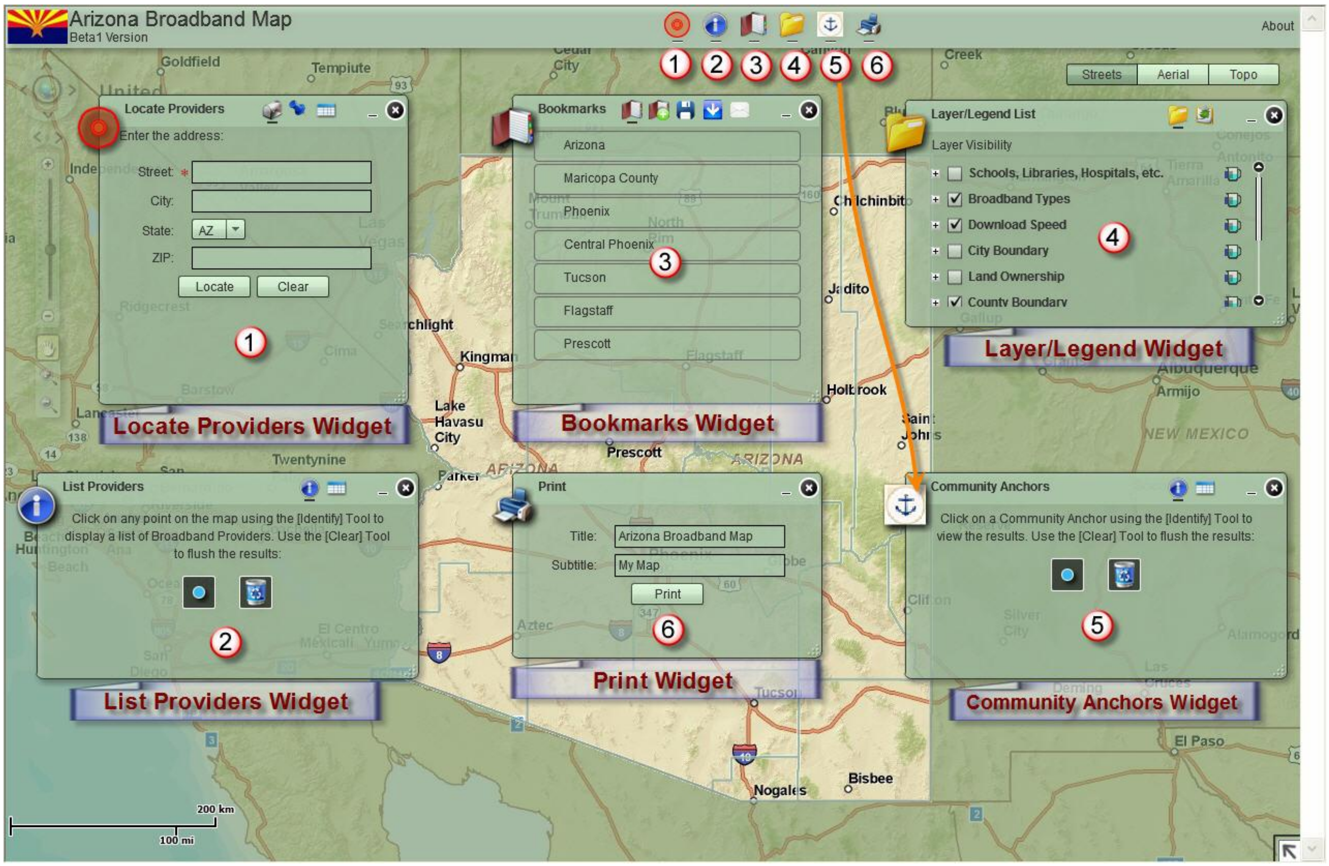
The application also allows the end-user to display related map layers like Community Anchor Institutions, City Boundaries, Land Ownership and Census Blocks less than 2 square miles that have some kind of Broadband Service.

Arizona Broadband Map Details

The Arizona Broadband Mapping Application is built upon Esri's ArcGIS Server 10.1 Technology.

A light-weight Adobe Flash based browser application is used on the Client Side to view the Broadband Map Services served by the ArcGIS Application Server running on the Server Side. The Client Side Adobe Flash based browser is based on the Esri Flex Viewer Template 2.2 that utilizes the ArcGIS API Library for Flex, designed and coded by Esri.

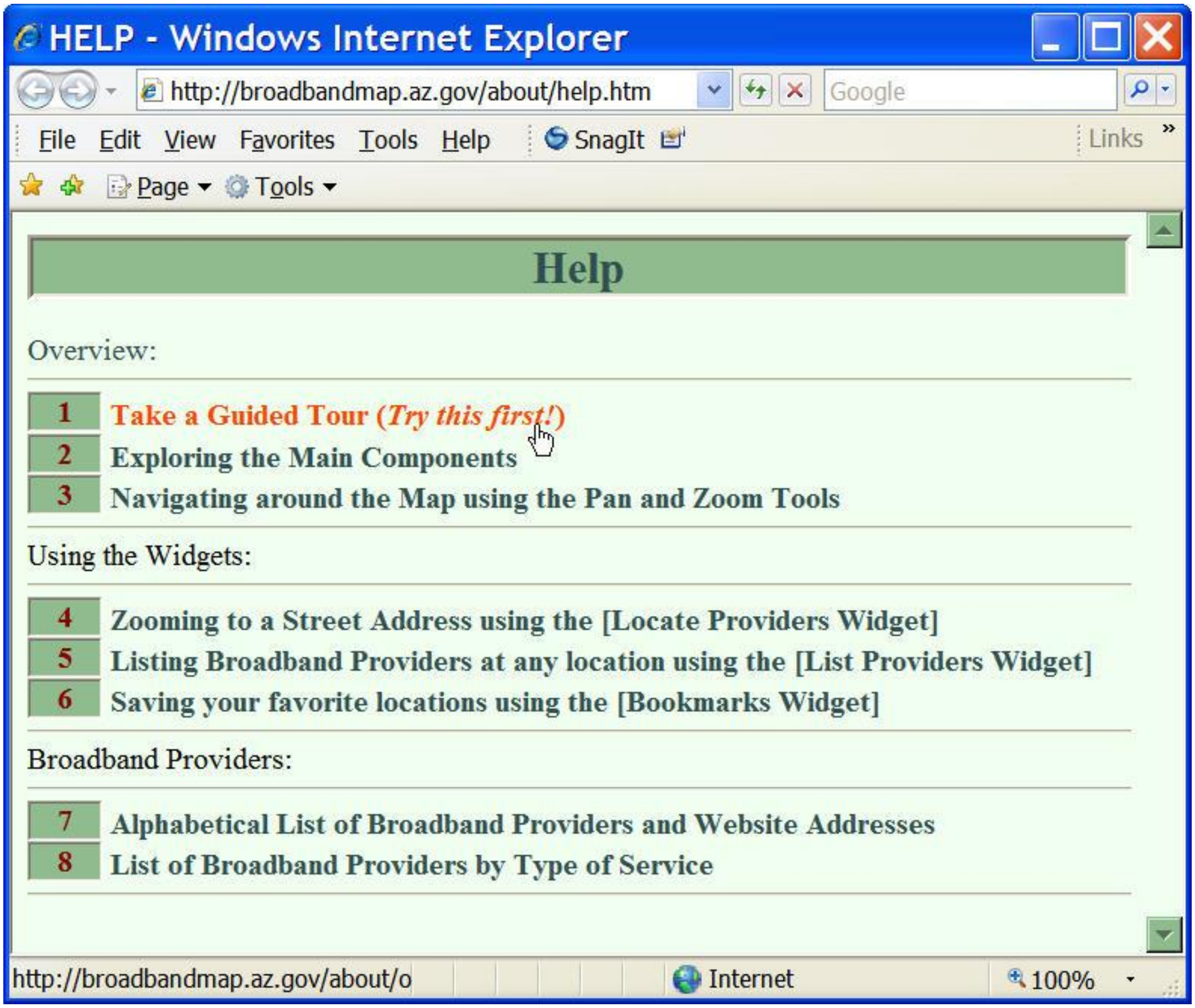
The application contains 6 widgets to help the end-user locate an address, list the Broadband Providers, create Bookmarks, view and manage the map layers, identify the Community Anchors and print a hard copy.



A Help/About section is provided to include the Disclaimers, Privacy Policies, Information on the Map, Contact information and links to take a Speed Test.

The Help/About section also includes an extensive Help component with a comprehensive Guided Tour to show the end-user how to use the application.

http://broadbandmap.az.gov/about/help.htm



The initial version of the map as described above has been developed. Additional customization will be added to future versions of the map to contain additional broadband status and planning information and greater user capabilities. The Arizona Broadband Map will have its main access point from the Arizona State Broadband Portal described in the next section.

Arizona Broadband Portal Plans

GITA is developing an Arizona Broadband Information Portal as a government website. The initial release of this portal will be available to the public by June, 2011 at http://www.azbroadband.gov/. This website will provide the public with general information about Arizona's Broadband Planning and Mapping Initiatives funded under our NTIA grants. The site will provide links to the sites for the State of Arizona Broadband Map (http://broadbandmap.az.gov/map), as well as the NTIA National Broadband Map (http://www.broadband.gov/maps/), and will provide a mechanism for users to do speed tests on their current broadband services and report the results to us for use speed verification efforts. This data will be incorporated into our broadband database and made available on our Arizona Broadband map. The site will also provide information about our community - outreach efforts as well as links to other state and local resources interested in or providing support for broadband and economic development in Arizona. Additionally, the site will provide information about the sources of data behind the map and how the mapping data is processed, the potential residential and commercial uses for the map.

The Arizona Broadband Information portal will also be integrated with social media capabilities such as RSS feeds, Twitter, and Facebook supported by experts within our State Health Department who have successfully developed outreach programs based on these new media capabilities.

Additionally, on pages requiring a secure log-in, the GITA portal will support the reporting of Community Anchor Institution connectivity, speeds, costs, and miscellaneous contact information, and help us establish their rural broadband deficits in response to a comprehensive out-reach campaign GITA will initiate in mid-2011.

Appendix A - Arizona Broadband Provider Technical Appendix

OVERVIEW

This document provides data specifications and delivery options for the Arizona Broadband Mapping Project, which is part of the nationwide NTIA Broadband Data and Development Program.

Under the NTIA program, each **Broadband Provider (BP)** is requested to provide information regarding the availability and delivery of broadband services if their company or organization:

- Offers broadband services to end users in Arizona, or could do so within a typical service interval without extraordinary effort, or
- Owns facilities in Arizona that make possible the delivery of broadband services by other companies meeting the description above.

Throughout this document, we address how data may be formatted, submitted and securely transferred to the State of Arizona. The availability and validity of the data is critical to portray each BP accurately.

While we ask every BP to submit as much data as required in the NTIA formats described below, we recognize the effort this may require. Ultimately, we seek the data in a format easiest for the BP and we're glad to provide support in the preparation and submittal of the data.

Provider data may be uploaded to the State of Arizona through a simple, safe and secure channel at https://www.azbbmp.com. Each provider will be given a unique username and password that will be active only during the submittal process. (Refer to page 9 of this document for additional details)

DEFINITIONS

"Broadband service" is the provision, on either a commercial or noncommercial basis, of data transmission technology that provides data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (kbps) downstream, and greater than 200 kbps upstream, to end users.

A "facilities-based" broadband provider offers service connections to end user locations if the company or organization:

1. Owns the portion of the physical facility that terminates at the end user location
2. Obtains unbundled network elements (UNEs), special access lines or other leased facilities that terminate at the end user location and supplies or equips them as broadband, or
3. Supplies or equips a broadband wireless channel to the end user location over licensed or unlicensed wireless spectrums including satellite transmission.

An "end user" of broadband service is a residential or business party, institution, or state or local government entity that may use broadband Internet service for its own purposes, and that does not resell such service to other entities or incorporate such service into retail Internet-access services that it provides. (For this purpose, Internet Service Providers "ISPs" are not "end users.")

REQUESTED DATA

The State of Arizona asks that each BP contribute detailed data for both wireline and/or wireless coverage areas. In addition to coverage areas, information regarding transmission technology, upstream and downstream speed is also requested.

All data submittals should include "common" information, including,

1. Technology of Transmission
2. Speed (Upstream/Downstream)
3. FRN (FCC Registration Number)

Technology of Transmission

The technology of transmission refers to the methodology or platform(s) by which a BP services their customer. The NTIA has developed a "model" where specific codes depict different technologies:

Code	Description
10	Asymmetric DSL
20	Symmetric DSL
30	Other Copper Wireline - T1, NxT1, EOC
40	Cable Modem - DOCSIS 3.0
41	Cable Modem - Other
50	Optical Fiber/Fiber to the End User
60	Satellite
70	Terrestrial Fixed Wireless - Unlicensed
71	Terrestrial Fixed Wireless - Licensed
80	Terrestrial Mobile Wireless
90	Electric Power Line
0	All Other

Speed Tables

Speed of Broadband service(s) should be specified as both maximum advertised upstream and downstream speeds as well as "typical" speeds achieved by end users. The NTIA has established a set of codes for Upstream and Downstream bandwidth speeds:

Speed Tier Codes Table		
Upload Speed Tier	Download Speed Tier	Description
2	n/a	Greater than 200 Kbps and less than 768 Kbps
3	3	Greater than or equal to 768 Kbps and less than 1.5 Mbps
4	4	Greater than or equal to 1.5 Mbps and less than 3 Mbps
5	5	Greater than or equal to 3 Mbps and less than 6 Mbps
6	6	Greater than or equal to 6 Mbps and less than 10 Mbps

7	7	Greater than or equal to 10 Mbps and less than 25 Mbps
8	8	Greater than or equal to 25 Mbps and less than 50 Mbps
9	9	Greater than or equal to 50 Mbps and less than 100 Mbps
10	10	Greater than or equal to 100 Mbps and less than 1 Gbps
11	11	Greater than or equal to 1 Gbps

Please note that, for a particular transmission technology, not all speeds are applicable, and submitted data will be checked against the NTIA established applicable speeds.

FCC Registration Number (FRN)

We ask that each BP provide their FCC Registration Number(s) (FRN). If any BP has more than one FRN, we ask that each data set submitted be tied to one and only one FRN. If in doubt concerning your FRN, please visit https://fjallfoss.fcc.gov/coresWeb/simpleSearch.do for verification.

Wireline Broadband Coverage

Wireline coverage area may be reported by any of the following:

1. Individual street address* where broadband service is available to end users.
2. Road Segments, *allowable only for areas where census blocks are greater than 2.0 square miles in area, using:*
    a. Arizona road centerline data - shapefile format road segments from current local sources are preferred, including all NTIA required fields for address ranges (minimum and maximum address on the segment), street prefix direction, street names, street type, street suffix direction, city, ZIP5 and ZIP4 (if available), with each element in a separate field. Alternatively, each segment can be identified in a table (non-GIS format) with a beginning and ending address range, street prefix direction, street name, street type, street suffix direction, city and ZIP codes in separate fields. Please note that a segment identifier (ID) field to your street network segments will not help us as we do not have access to that network.

    b. US Census TIGER/Line Road Files - shapefile format road segments from the latest Census TIGER files (2009 or 2010) including all NTIA required fields for address ranges, street prefix direction, street names, street types, street suffix direction, city, etc. Alternatively, each segment can be identified in a table (non-GIS format) with a TIGER Line ID (TLID) for the 2009 or 2010 version of Census TIGER files. BPs should indicate which Census version (2009 or 2010) was used in preparing the submittal.

3. Census block, *allowable only for areas where census blocks are less than or equal to 2.0 square miles in area.*

* *Please note that in all cases, wireline broadband availability will be aggregated to Census Block (for blocks <= 2 sq mi) or Street Segment (for blocks > 2 sq mi) as per the NTIA specifications,* ***and in no case will specific addresses be included in the Arizona or federal broadband maps.***

For those providers who wish to submit FCC Form 477 data, it is imperative that we have information that is more granular than census tract data. Any provider offering service boundary/areas, please make available in GIS (Geographical Information System/Esri shapefile) or Google Earth (KML) format

Data Format

By Address - Defined as broadband service available, including service type and advertised speed, to a specific "end user" by physical address. Typical submittal formats include excel spreadsheets, flat text files (.csv or .txt), and database tables (Access or SQL). Data should represent the following fields:

FRN	Address	City	State	ZIP4	Technology of Transmission	Maximum Downstream Speed	Maximum Upstream Speed	Typical Downstream Speed	Typical Upstream Speed
19567460	123 Main St	Here	AZ	88888	10	6	2	5	2
19567460	222 1st Ave	There	AZ	88800	41	5	2	4	1
19567460	445 Elm St	Every	AZ	87654	50	10	7	9	7

Where possible, include the category of end user by the following:

Code	Description
1	Residential user
2	Governmental user
3	Small Business user
4	Medium or Large Business user
5	Other

By Census Block - In lieu of reporting address-specific data, BPs may provide list of all census blocks, **two square miles or less in area,** in which broadband service is available to end users, along with the same service characteristics address points contain (technology of transmission and maximum and typical speeds).

If this option is employed, BPs are encouraged to use geographic information system (GIS) compatible software to select a subset of census blocks. Please include the full 15 digit FIPS (Federal Information Processing Standards) Census Block ID. These can be identifiers for Census 2000, 2009 or 2010 Census Blocks; please specify which version was used. GIS formats for these resources can be found at the US Census Bureau download site (Census 2000 is included with either 2009 or 2010 downloads)

- US Census Bureau's 2009 TIGER/line files at http://www.census.gov/geo/www/tiger/tgrshp2009/tgrshp2009.html
- US Census Bureau's 2010 TIGER/line files at http://www.census.gov/geo/www/tiger/tgrshp2010/tgrshp2010.html

Data should represent the following fields:

FRN	Census Block 15-digit FIPS	Technology of Transmission	Maximum Downstream Speed	Maximum Upstream Speed	Typical Downstream Speed	Typical Upstream Speed
19567460	40059412001036	10	6	2	5	2
19567460	40159501003174	41	5	2	4	1
19567460	40139410001010	50	10	7	9	7

By Road Segment - in lieu of reporting address-specific data, BPs may report a list of street segments with address ranges in which broadband service is available to end users along with the same service characteristics address points (technology of transmission and speed).

If this option is employed, BPs are encouraged to use geographic information system (GIS) compatible software to select a subset of road segments (from either of the GIS data sets listed below). The basic service information fields (Technology of Transmission, Maximum Advertised Downstream/Upstream speed and Typical Downstream/Upstream speed) should then be attached to each road segment to characterize the broadband service along each road.

US Census Bureau TIGER/line shapefiles can be accessed at the previously listed sites. Again, please report which data set was used in preparing your data.

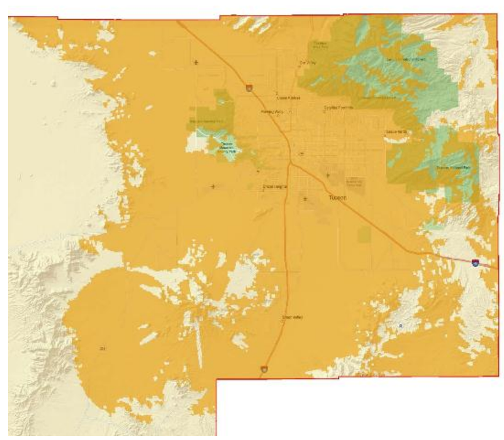
FRN	Min Address	Max Address	Prefix Dir	Street name	Street type	City	State	ZIP
19567460	1	100	E	Easy	Ln	Here	AZ	88888
19567460	101	250	E	Easy	Ln	Here	AZ	88888
19567460	301	399	W	First	St	There	AZ	87654

<u>Wireless Broadband Cover - Fixed, Mobile & Satellite</u>

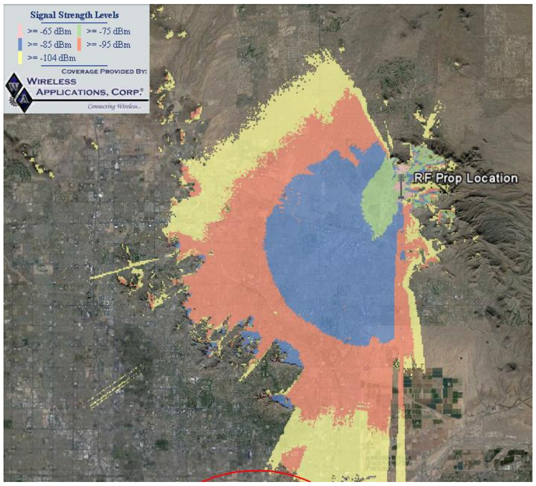
We would <u>prefer</u> that all information submitted for this requirement is in a **geographic data format with polygons depicting wireless service areas** and associated service characteristics (technology of transmission, speed), but may be reported by any of the following:

1. Geographical data format with polygons depicting wireless service areas (Esri shapefile)
2. Google Earth as either .kml or .kmz
3. Tower location, including
   a) Latitude and Longitude
   b) Tower height and/or Equipment height
   c) Spectrum Used
   d) Antenna specifications (omnidirectional, sectorized, etc) - if using sectorized, provide direction and beam width (60 degrees, 90 degrees, 180 degrees)

Esri Shapefile - include metadata depicting technology of transmission, lat/long, tower height and maximum upstream/downstream speeds.



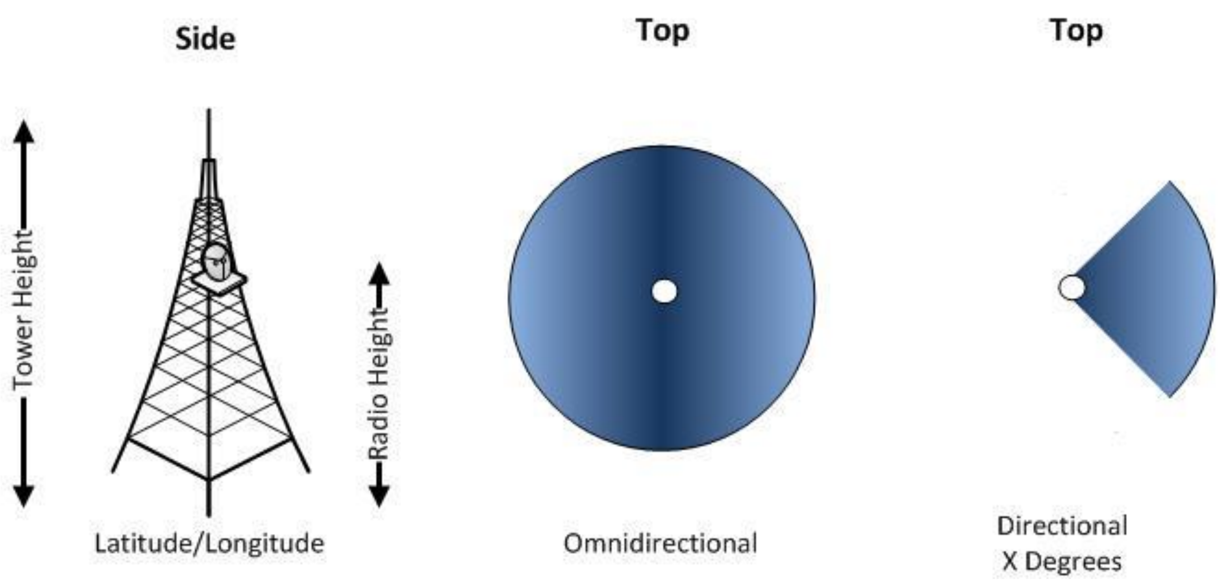
Google Earth - include metadata depicting technology of transmission, lat/long, tower height and maximum upstream/downstream speeds.



Tower Location - for BP that do not have coverage data in a geographical/polygon format, a description of tower location with lat/long, height, spectrum, speed as follows:

Tower Height/Equipment (ft)	FRN	Latitude	Longitude	Technology of Transmission	Maximum Downstream Speed	Maximum Upstream Speed
100/60	0019567460	33.419028	-112.142889	70	5	3
70/60	0019567460	32.995917	-111.745806	70	5	3
50/50	0019567460	35.241944	-111.610722	71	6	4

*include typical upstream/downstream where possible



Wireless Spectrum

The NTIA has developed specific codes for wireless spectrum use, as follows:

Code	Description
1	is Cellular spectrum (824-849MHz; 869-894) used to provide service
2	is 700 MHz spectrum (698-758 MHz; 775-788 MHz; 775-788 MHz) used to provide service
3	is Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995) used to provide service
4	is Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service
5	is Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service
6	is Unlicensed (including broadcast television "white spaces") spectrum Used to provide service
7	is Specialized Mobile Radio Service (SMR) (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz)
8	is Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz), 3650-3700 MHz
9	Satellite (L-band, Big LEO, Little LEO, 2 GHz)
10	is other licensed spectrum

Speed Tiers

Wireless speed tiers differ slightly from the aforementioned wireline speed tiers and fixed wireless differs from mobile wireless, as follows:

Speed Tier Codes Table Fixed Wireless		
Upload Speed Tier	Download Speed Tier	Description
3	3	Greater than or equal to 768 Kbps and less than 1.5 Mbps
4	4	Greater than or equal to 1.5 Mbps and less than 3 Mbps
5	5	Greater than or equal to 3 Mbps and less than 6 Mbps
6	6	Greater than or equal to 6 Mbps and less than 10 Mbps
7	7	Greater than or equal to 10 Mbps and less than 25 Mbps
8	8	Greater than or equal to 25 Mbps and less than 100 Mbps

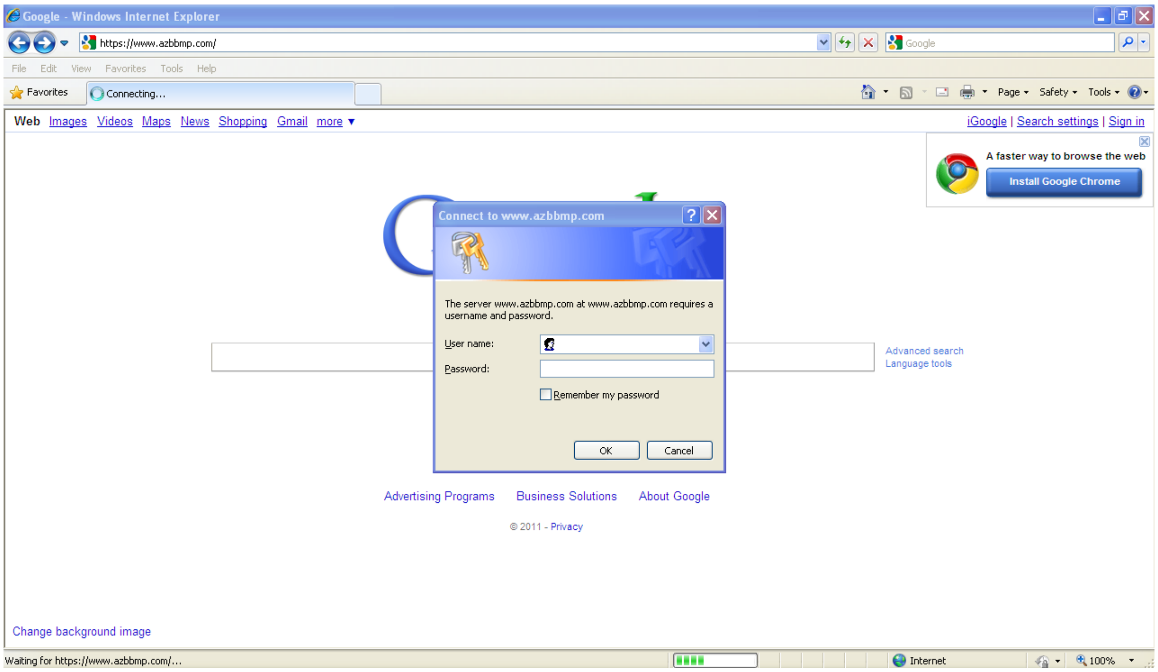
Speed Tier Codes Table Mobile Wireless		
Upload Speed Tier	Download Speed Tier	Description
2	n/a	Greater than 200 Kbps and less than 768 Kbps
3	3	Greater than or equal to 768 Kbps and less than 1.5 Mbps
4	4	Greater than or equal to 1.5 Mbps and less than 3 Mbps
5	5	Greater than or equal to 3 Mbps and less than 6 Mbps
6	6	Greater than or equal to 6 Mbps and less than 10 Mbps
7	7	Greater than or equal to 10 Mbps and less than 25 Mbps

Arizona Broadband Mapping Portal
www.azbbmp.com

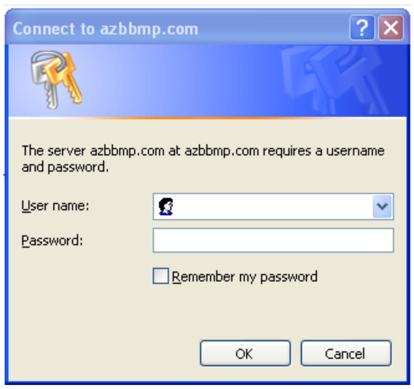
The Arizona Broadband Mapping Portal was exclusively designed for Arizona Broadband Providers so that they may securely transmit and receive data throughout the life cycle of NTIA/FCC project.

To establish a secure and simple platform, an HTTPS web interface is coupled with unique credentials (username/password) for each broadband provider. There is no need to download any software to use the platform. It will work on any Internet browser, including; Internet Explorer, Safari, Firefox and Chrome.

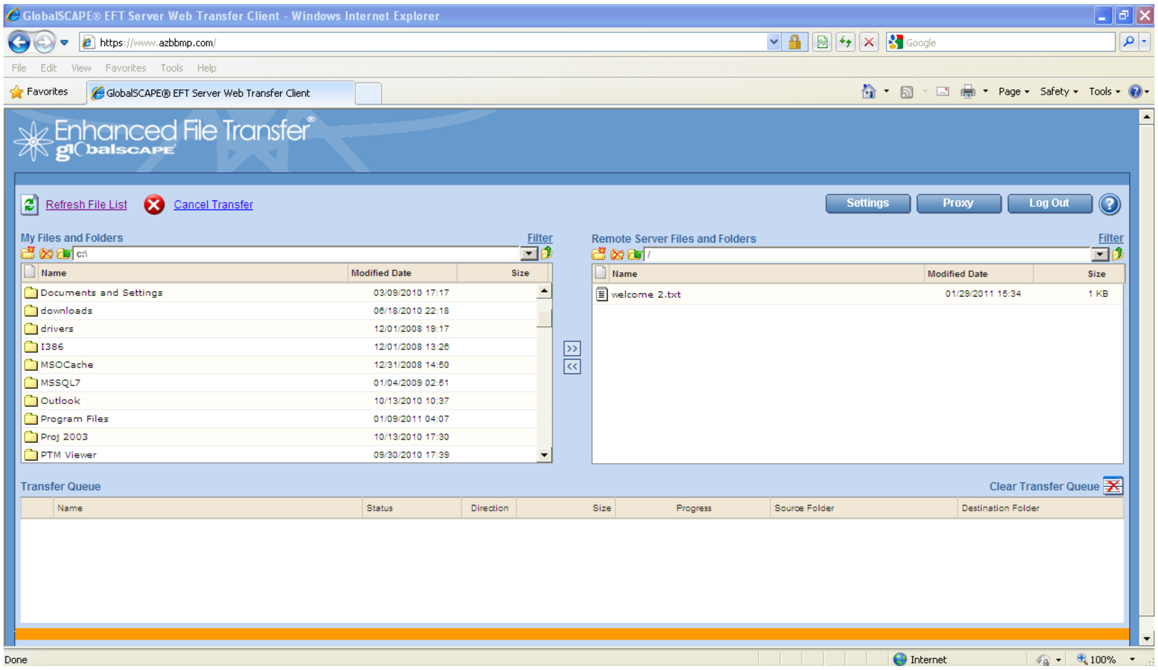
Once a provider has received their username and password, they can reach the portal via www.azbbmp.com. (https://www.azbbmp.com)



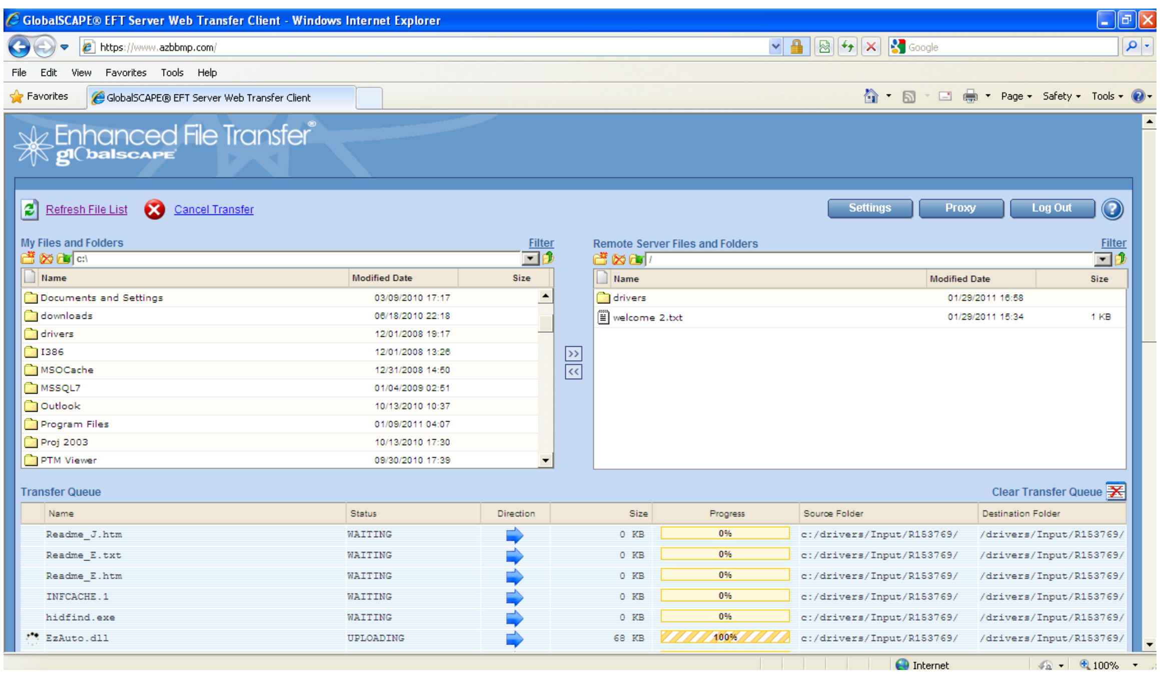
The user will be prompted for their unique credentials to enter the portal. Credentials will only be active during upload and verification timeframes and will be changed for each submittal cycle.



The portal interface enables the end-user to drag and drop files from their PC to the server. (right pane - user, left pane - server)



File transfer progress can be monitored from the bottom pane of the portal interface.



Once all the files have been transferred to the server, click the “logout” button to complete the session.

After the files have been successfully uploaded, the user credentials will be deactivated and the files will be transferred to an off-net, secure and encrypted Network Attached Storage device.

Additional portal information can be found at:
http://help.globalscape.com/help/eft6-2/HTTP_S_Transfer_Client.htm

Support

Please direct any questions regarding this document, in its entirety, to:

Nolan Straabe
Data Site Consortium Inc.
E-mail: nolan@straabe.com,
Mobile: 602-999-0143

Appendix B - Community Anchor Institution Master Database

Initial Data Structure

This data structure is being used to load in Community Anchor Institution (CAI) records for use as a base for developing and enacting improvements in the CAI update process. This database will be used as a source of data to update the CAI feature class data within the NTIA geodatabase.

The Community Anchor Master Database is currently an EXCEL Spreadsheet, although it is likely to be converted to other file format in the future. It is an evolving structure that will used to house CAI data for NTIA transfer and mapping purposes. The current spreadsheet is divided into 4 column categories: “Anchor Name”, “ID Code”, “Location” and “Broadband”. These categories represent types of data fields relevant to identifying and categorizing the CAI locations, providing locational information and information on sources of data. The “Broadband” category provides fields to hold the NTIA required information on the Broadband status at the CAI location.

These major data categories are divided into a total of 43 subcategories (43 unique columns of data) which represent the current fields in the CAI database. In order to facilitate navigation around the spreadsheet, each category has been color-coded. Subcategories that are required by the NTIA are asterisked.

Category: Anchor Name

This category provides basic address and function information about each Community Anchor Institution (CAI) including physical address & phone number, facility function & type, and source data information. It also has a field for notes that may apply to a particular circumstance surrounding a CAI record. The Anchor Name category is divided into 18 sub-categories and is Color-Coded Green on the spreadsheet.

Subcategories

***ANCHORNAME:** The name of the CAI currently in occupation of the building or facility - e.g. Pima County.

***ADDRESS:** The complete physical address of the CAI, down to the 5-digit zip code, where possible - e.g. 1631 South 10th Avenue Tucson AZ 85713

***BLDGNBR:** The parsed building number from the ADDRESS field - e.g. 1631

***PREDIR:** The pre-direction of the street - North, East, South, or West

***STREETNAME:** The street name as it appears in the ADDRESS field - e.g. 10th Avenue

***STREETTYPE:** The type of street as it appears in the ADDRESS field - Street, Road, etc.

***SUFFDIR:** The suffix direction of the street, if applicable - North, East, South, or West

***CITY:** The name of the city, town or community where the CAI is located.

COUNTY: The name of the county where the CAI is located.

***STATECODE:** The 2-digit state code of the CAI.

***ZIP5:** The 5-digit zip code of the CAI.

***ZIP4:** The 4-digit zip code extension of the CAI.

ADD_SRC: The source of the address information. The various data sources being used to compile the ANCHOR NAME categories have been coded as follows:

> **ADOA** - Data provided by ***ADOA***
>
> **ADOT** = Data provided directly by ***ADOT***
>
> **ASFM** = Data provided by ***Arizona State Fire Marshal's*** Office
>
> **AWS** = Data obtained directly from the ***Community Anchor's*** website
>
> **CAI** = Original ***Community Anchor Institute*** data (data that we received at the beginning of the project)
>
> **COGIS** = Data provided by a ***County GIS*** department in a GIS format (shape or geodatabase)
>
> **CWS** = Data acquired from ***County*** website
>
> **DC** = Data provided through ***Direct Contact*** with the CAI (either through E-mail or by telephone)
>
> **GM** = Google Maps used to locate facility when all other attempts to locate do not work
>
> **NR=** Not recorded - data that was obtained from an unknown source at the beginning of the broadband project (typically from Google and other web searches used when more traditional sources of data were not available).

ADD_DATE: Month & year that the Address Source information was created, credited to, or, in cases where records were acquired from the internet, the date that these records were acquired. If the date field is blank this means that the address data has not been verified or that the information was never recorded by ASLD/SCO.

DESCRIP: Descriptive text field explaining the CAI function performed at a specific address e.g. "*Wilcox Animal Control".*

PHONE: The telephone number of the CAI, including area code. When multiple phone numbers are listed for a CAI, an attempt has been made to use the main switchboard telephone number. In the case of emergency services (fire, police), the non-emergency number has been listed.

TYPE: The general category of CAI, useful for sorting records e.g. "*Fire", "Government Office", "Detention Facility".*

NOTES: A field used to provide additional information with regards to a particular CAI record. e.g. *"Closed for 2010 Season"* or "*2 miles west of I-10 on East Pinal Airpark Road."*

Category: ID CODE

The purpose of the ID CODE category is to assign a unique Identification code to each CAI for internal use and in order to satisfy NTIA submission requirements. For reference purposes, and with future updates in mind, an additional field has been included in order to log any unique ID numbers or codes used by external data sources. The ID CODE category is divided into 6 sub-categories and is Color-Coded Yellow on the spreadsheet.

Subcategories

***CAICAT:** A contraction of *"Community Anchor Institute Category".* The NTIA have requested that the following category code numbers be used:

1= Schools -Public/Tribal

2= Libraries

3= Medical-Health Care

4= Public Safety

5= University/College

6= Other Government

7= Other Non-Government

PRE_CAICAT: A single-letter code that identifies the level of government of the CAI. Non-government entities are coded 'N'.

C= County

I= City or Town (Incorporated)

F= Federal

M= Military

N= Non-Government

O=Other

R=Regional

S= State

T= Tribal

Z= Nothing, No value - used as a temporary place holder

SUB_CAICAT: A 3-letter code used to identify the general type of CAI facility. Letters only are used, no numbers or symbols.

APO= Airport

ANM= Animal Care, Animal Control or Animal Shelter

CRT= Court, Municipal, Juvenile, County, etc.

CTH= City, or Town Hall, County Seat or main County Government Complex.

CUL= Cultural Facilities: Cultural Centers, Civic Centers, Museums, Visitors Centers, Nature Centers, etc.

ENV= Environmental Facilities: Landfills, Recycling Centers, Waste Tire Yards, Water Treatment Plants, etc.

FIR= Fire Stations and related facilities, including: Administrative Offices, Training Centers, Equipment Storage Yards, etc.

HEL: Health related facilities: Clinics, etc.

LAW= Law Enforcement: Police, Sheriff, Constables, Detention Facilities, etc.

LIB= Libraries, including Public Libraries, Law Libraries, County Libraries

MTN: Maintenance Yards & Facilities, including Storage Yards & Warehouses

MSC= Miscellaneous - facilities that did not fit neatly into any other category. Includes: Rest Areas, Ports of Entry, Laboratories, etc.

OFC= General government office facilities, not including City/Town Halls or County Seats/main County Government Complex's.

REC= Recreation Facilities: Community Centers, Pools & Aquatic Centers, Senior Centers, Youth Centers, Sports Complex's, etc.

WTR= Water/Wastewater related infrastructure: Water Reclamation Plants, Water Treatment Plants, Water Quality Facilities, etc.

CAI_KEY: A 5-digit unique ID number developed internally for tracking purposes. Numbers only are used, no symbols or letters.

***CAIID:** The CAIID subcategory is created by merging (in sequence as listed) the following subcategories to create a 10-digit ID Code: CAICAT, PRE_CAICAT, SUB_CAICAT, CAI_KEY. For example, if we examine the CAIID number 6IREC00475 we can see that it is a recreation facility that belongs to a city or town.

CAICAT,	PRE_CAICAT,	SUB_CAICAT,	CAI_KEY
6	**I**	**REC**	**00475**
↗	↑	↑	↖
Other Government	City or Town	Recreation Facility	Unique ID #

EXT_ID: This field is to be populated by any unique ID numbers/codes which are provided by outside data sources, in order to easier share and maintain future versions of the database.

Category: Location

This category contains locational information about each CAI, including latitude & longitude coordinates in decimal degrees (Datum: WGS 84) and the date & acquisition method of these coordinates. If the lat/longs are derived from geocoding then the type of geocoded output is recorded. Any apparent geocoding errors (and fixes for these errors) are also noted. A Full FIPS ID Code is also included in this category. The Location category is divided into 8 sub-categories and is Color Coded Orange on the spreadsheet.

Subcategories

***LAT:** The latitude of the CAI, in decimal degrees, to six decimal places.

***LONG:** The longitude of the CAI, in decimal degrees, to six decimal places.

LL_MET: The method used to derive the latitude and longitude of a CAI (geocoding, GPS, field measurements, etc). The following code has been adapted from the ADEQ Geocoding Check Method.

DIG= Digitally verified against raster data or other data set

NON= Non-specific, multiple methods of verification (digital, geocoding, etc.)

GPS= Global Positioning System - Field Collected

GEO= Originally geocoded - address matched (location verified by other methods)

LL_DATE: The date that the lat/long coordinates were collected or generated.

GC_TYPE: The type of result returned from geocoding software if the lat/long coordinates were derived by this method.

STREET_ADD= The software geocoded to the street address level

ZIPCODE= The software geocoded to the centroid of the zip-code

NONE= The CAI address information was not run through the geocoding software

GC_ERROR: If the geocoding software generates spatially inaccurate point data then the specific error is noted here.

GC_FIX: Any geocoding errors that are corrected are logged in this field, along with the method of correction.

***FULLFIPSID:** The Full 16 digit Census Block ID that contains the State Code, County Code, Census Tract, Census Blocks, Census Block Groups and Group ID.

Category: Broadband

This category provides information on each Community Anchor Institution's broadband capabilities including whether, or not, they receive a broadband service, broadband upload and download speeds, and the kind of transmission technology being used at the location. Contact information about the broadband data source is also listed. The Broadband category is divided into 11 sub-categories and is Color-Coded Blue on the spreadsheet.

Subcategories

***BBSERVICE:** A Yes/No field asking whether a CAI has broadband service or not.

***BB_SRC:** The Source of the broadband information for the CAI.

BB_DATE: The date that the broadband information was provided to the project.

BB_TITLE: The title of the person providing the CAI broadband information.

BB_LNAME: The surname of the person providing the CAI broadband information.

BB_FNAME: The first name of the person providing the CAI broadband information.

BB_EMAIL: The e-mail address of the person providing the CAI broadband information.

BB_PHO: The phone number of the person providing the CAI broadband information.

***TRANSTECH:** Type of Technology of Transmission: Cable, T1, DSL, etc. Each type of broadband service has a 2 digit code.

Code	Technology of Transmission
10	Asymmetric xDSL- DSL (Asymmetric)
20	Symmetric xDSL- DSL (Symmetric)
30	Other Copper Wireline- T1/Tn
40	Cable Modem- DOCSIS 3.0 Down Cable
41	Cable Modem- Other Cable
50	Optical Carrier/Fiber to the End User Fiber
60	Satellite- Satellite
70	Terrestrial Fixed Wireless-Unlicensed Fixed Wireless
71	Terrestrial Fixed Wireless- Licensed Fixed Wireless
80	Terrestrial Mobile Wireless- Mobile Wireless
90	Electric Power Line

0 All Other

***MAXADDOWN:** Maximum Advertised Download Speed. These are the codes for the Download speeds:

<u>Code</u>	<u>Speed Tier</u>
3	768 Kbps - 1.5 Mbps
4	1.5 - 3 Mbps
5	3 - 6 Mbps
6	6 - 10 Mbps
7	10 - 25 Mbps
8	25 - 50 Mbps
9	50 - 100 Mbps
10	100Mbps - 1 Gbps
11	> 1 Gbps

***MAXADUP:** Maximum Advertised Upload Speed. These are the codes for the Upload speeds:

<u>Code</u>	<u>Speed Tier</u>
2	200 - 768 Kbps
3	768 Kbps - 1.5 Mbps
4	1.5 - 3 Mbps
5	3- 6 Mbps
6	6- 10 Mbps
7	10- 25 Mbps
8	25- 50 Mbps
9	50- 100 Mbps
10	100Mbps - 1Gbps
11	> 1 Gbps

Appendix C - Arizona Broadband Provider Case Studies

Hopi Telecommunications Inc. (HTI)

Hopi Telecommunications Inc. (HTI) is the ILEC for the Hopi Tribe's reservation in Northeastern Arizona, having forced out the previous incumbent, funding their purchase with RUS loans. HTI is owned by the Hopi Tribe, but has its own Board and profit center goals. They have invested heavily in fiber backhaul and DSL upgrades over the past decade and can serve much of the reservation, though several villages (Old Oraibi, Moenkopi) remain resistant to infrastructure deployment and thus unserved.

HTI proved reluctant to sign a NDA and generally to cooperate with requests for broadband data submittal. The DSCI team reverse mapped estimated coverage from FCC 477 data and knowledge of the reservations demography, topography, and infrastructure. When we presented the reverse mapping estimates and indicated our intent to submit them as part of our Spring 2011 submittal as having been derived from public sources and anecdotal knowledge, HTI agreed to cooperate in reviewing and improving the data. An hour long collaborative viewing session with HTI personnel led to the addition of multiple census blocks under 2 square miles deemed to be covered and significant fine tuning of the road segments deemed covered in census blocks over 2 square miles. As HTI does not yet have in-house GIS capabilities, they developed a keen interest in receiving full GIS output of the adjusted coverage estimates for future internal use and are expected to be generally cooperative in reviewing and adjusting coverage in subsequent biannual data collection and submittal cycles.

Gila River Telecom Inc. (GRTI)

Gila River Telecommunications, Inc. (GRTI) was established in 1988 for the purpose of providing the Gila River Indian Community with affordable telephone services. GRTI has grown with the vast growth of the community and providing a variety of telecommunication services. GRTI has more than 3,600 access lines which includes business and residential with service offerings including phone lines, Internet, High Speed (DSL) Internet and data lines. GRTI has significant fiber assets as well as an improvement plan with more than 66 miles of new fiber optic cable.

However, GRTI felt that it was beyond their ability both technically and in terms of required staff resources to comply with our requests for broadband coverage data. They do not have a customer billing database, as that function is performed by a third party and are otherwise limited in technical support areas. The State interceded and brokered several conversations that in the end proved fruitless. DSCI proceeded to reverse map their estimated coverage based on known Central Office locations, knowledge of some of their fiber placements, and other community service indications.

The estimated coverage was provided to GRTI prior to the Fall 2010 submittal and again prior to the Spring 2011 submittal with significant improvements in our coverage estimation modeling as we refined our base information and processes. We operated under the concept of prior notification and having told the BP that our data was developed from public sources and would be submitted, we carried through and did so. We continue to provide BP feedback packages with various versions of the underlying coverage data, encouraging GRTI to engage and cooperate more fully on future data collection and submittal cycles.

Valley Telecom Group (VTG)

Valley Telephone Cooperative, Inc. was established in 1962 and provides telecommunications services to over 27,000 rural and remote customers in southeastern Arizona and southwestern New Mexico. Copper Valley Exchange was purchased from US West in 1995 and has approximately 4,500 access lines in rural Arizona. Valley Connections, LLC is another operating entity serving customers in non-contiguous rural Arizona areas. They have been maintained as three separate Broadband Providers with unique FRNs and have a mix of delivery technologies (DSL, wireless, fiber) across the three operating entities.

Though VTG was generally cooperative and their data was included in the Fall 2010 submittal, there were substantial technical issues both in their submittal and our processing of it which led to significant gaps in their reported coverage versus their actual deployments. When the national broadband map launched they quickly realized the gaps in the coverage and were quite upset at the perceived oversights and wanted to withdraw from future cooperation. They strongly believed that accurate data would be good marketing leading potential customers to be able to “find” them and that accurate coverage would factor into preventing inappropriate grants to competitive providers where their coverage and existing competition were sufficient to preclude. In short, they “got it,” but didn’t have confidence in our approach and commitment.

We worked closely with them to turn the situation around, investigating and sharing the findings of where the problems had lain in the Fall 2010 submittal and offering various approaches to fixing the technical issues on both sides. After several conference calls, the kinks were worked out and new data submitted for the three operating entities delivering over the three technology types in a variety of data formats (customer lists, census blocks, wireless polygons). Several collaborative viewing sessions were hosted by DSCI with the VTG team participating where detailed review of operating entities, technology of delivery, and declared coverage areas lead to fine tuning the coverage to VTG’s satisfaction in time for inclusion in the Spring 2011 submittal.

Casa Grande Internet (CGI)

During our first quarter 2011 efforts, the Arizona mapping team encountered a single provider, Casa Grande Internet (CGI), which refused to participate in the broadband mapping process. CGI's website (http://www.casagrandeinternet.com/) indicates it has been providing Internet services in in the Phoenix metropolitan area for over 10 years, during which it has acquired several smaller Internet Service Providers (ISPs). Additionally, CGI provides computer repair and end-user networking services.

Our mapping status is that we have determined that CGI provides both point-to-point and point-multipoint wireless Internet service, but we do not know its current coverage area for these services. CGI did not answer our initial inquiries. However, third parties have informed us that CGI resells DSL services in limited areas, as well as being a wireless provider. Based on multiple inputs the DSCI team received, we constructed a possible mapping of CGI's offerings and presented a map of estimated coverage to CGI as a starting point for subsequent discovery. A co-owner of CGI responded that he did not have available time for the query and requested that we not submit any findings in the April 1, 2011 submittal. Thus CGI became the only BP of the 71 identified relevant Arizona BPs not included in our Spring 2011 submittal.

In summary, we know CGI uses multiple technologies that are capable of providing broadband services in excess of 1-Mbps and that its coverage areas likely vary with each of its deployment technologies. However their specific admonition not to submit the estimated coverage data without further interaction and correction to it led us to withhold it from the Spring 2011 submittal. We will continue working with the CGI principals for further discovery of their broadband offerings with the intent of being able to obtain their cooperation so as to be able to include their approved broadband coverage data in the October 1, 2011 submittal.

Appendix D - Broadband Provider Data Verification Table

	Wireline	Cable	Mobile Wireless	Fixed Wireless	Fiber	Satellite
Verification Sources	• ACC ILEC boundaries • Tele Atlas licensed database & otherwise known COs, Wire Centers, DSLAMs & POPs • Coverage modeling • Federal & ID Insight Crowdsource Data • Community Anchor Institutions • Market Knowledge • Primary survey data (not currently being used for data verification)	• Municipal Cable license information • Cable Boundaries/ Media Maps licensed database • Federal & ID Insight Crowdsource Data • Community Anchor Institutions • Market Knowledge • Primary survey data (not currently being used for data verification)	• American Roamer licensed database • BP published public coverage maps • Known tower & transmission locations • Federal & ID Insight Crowdsource Data • Community Anchor Institutions (technology being used by few CAIs) • Market Knowledge • Primary survey data (not currently being used for data verification) • FCC cellular & PCS licensed areas (not currently being used for data verification) • Wireless coverage modeling from propagation models (not currently being used for data verification) • Wireless field verification testing (not currently being used for data verification)	• BP published public coverage maps • Known tower & transmission locations • Federal grants & loans for WISP projects • Federal & ID Insight Crowdsource Data • Community Anchor Institutions (technology being used by few CAIs) • Market Knowledge • Primary survey data (not currently being used for data verification) • FCC spectrum licensed areas (not currently being used for data verification) • Wireless coverage modeling from propagation models (not currently being used for data verification) • Wireless field verification testing (not currently being used for data verification)	• BP public fiber maps & on net building lists • Federal Crowdsource Data (expect such data in few if any instances) • Community Anchor Institutions • Market Knowledge including known FTTx projects in specific areas • Primary survey data (not currently being used for data verification)	• Federal & ID Insight Crowdsource Data • Community Anchor Institutions (expect such data in limited instances) • Market Knowledge • Geographic & topographic shadow modeling (not currently being used for data verification) • Primary survey data (not currently being used for data verification)

Coverage Anomalies	• Inconsistencies with ACC ILEC boundaries • Map overlays indicate significant over or under coverage from known T-1/T-3 & DSL delivery points as modeled • Map overlays show significant crowdsource &/or CAI data voids or outside data points from declared coverage	• Map overlays indicate significant over or under coverage from Cable Boundaries/ Media Maps data • Map overlays show significant crowdsource &/or CAI data voids or outside data points from declared coverage	• Map overlays indicate significant over or under coverage from American Roamer data &/or coverage estimates from known transmission locations • Map overlays show significant crowdsource &/or CAI data voids or outside data points from declared coverage	• Map overlays indicate significant over or under coverage from coverage estimates from known transmission locations • Map overlays show significant crowdsource &/or CAI data voids or outside data points from declared coverage	• Map overlays indicate significant over or under coverage from BP fiber maps & on net building lists • Map overlays show significant crowdsource &/or CAI data voids or outside data points from declared coverage	• With BP statewide shapefile use without geographic shadow modeling, limited coverage considerations
Speed Anomalies	• Use CAI and crowdsource data to confirm typical and maximum speeds in expected ranges	• Use CAI and crowdsource data to confirm typical and maximum speeds in expected ranges • Monitor expansion from DOCSIS 2 to 3	• Use CAI and crowdsource data to confirm typical and maximum speeds in expected ranges	• Use CAI and crowdsource data to confirm typical and maximum speeds in expected ranges	• Use CAI and crowdsource data to confirm typical and maximum speeds in expected ranges • Fiber speeds readily provisioned upward by DWDM over time	• Use CAI and crowdsource data to confirm typical and maximum speeds in expected ranges
Technology Anomalies	• Most likely to be “confused” with fiber delivery overlays	• Possible to be “confused” with fiber delivery overlays claimed to be direct customer connected	• Claimed upgrades &/or delivery protocols planned but not yet in place	• TBD	• Possibly to be “confused” with Wireline or Cable delivery overlays	• Not anticipated
Threshold of Concern/Action	• TBD	• TBD	• TBD	• TBD	• TBD	• TBD
Verification Schedule	• Annually if expansion of coverage areas or increases in speeds claimed	• Annually if expansion of coverage areas or increases in speeds claimed	• Biannually with expected dynamic expansion of coverage areas &/or increases in speeds claimed	• Annually if expansion of coverage areas or increases in speeds claimed	• Annually if expansion of coverage areas or increases in speeds claimed	• Review crowdsource and CAI data annually for general trends & confirming any speed increases

Data Processing Methods

Primary Data Collection

The California Public Utilities Commission (CPUC) sent out a Data Request to broadband providers to initiate the Round 3 data collection. Potential providers were widely encouraged to submit broadband service availability data to the CPUC. We expressed our preference for providers to use a file geodatabase format when possible while tabular data was also accepted. To assist providers with the process, template files, sample shapefiles, record formats, and data submittal instructions were posted on the CPUC Broadband Mapping Website at:

http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/BB+Mapping.htm

The data submittal instructions guide each provider to wireless and/or wireline datasets which are separated into sections for those with GIS data (shapefiles/FGDB) and those without GIS data (text/excel files). For providers with GIS capabilities, statewide census block and TIGER/Line shapefiles were provided on the CPUC website for download and use for their data submission. The square mileage of each block was calculated in advance in the sample census block shapefile. Providers could then easily determine which blocks in their footprint were less than two square miles and which were two square miles or greater and therefore needed to be represented using the road segment shapefile. For providers without GIS capabilities, excel spreadsheets were provided incorporating record field formats adhering to the NOFA data submittal requirements.

Community Anchor Institutions (CAI)

CAI data initially came from the eligible entries of California Teleconnect Fund (CTF) program. The CTF program provides 50% discounts on telecommunications bills for qualifying schools, libraries, government-owned and operated hospitals and health clinics, and other community based organizations, thus providing a good initial list of CAIs. The CAI addresses were geocoded to point locations and loaded into the file geodatabase. Technology of transmission and speeds data were included and identified either through information received from the Institutions themselves (as in the case of libraries) or from those service providers who responded to our request for such information. To provide CAI ID information (as in the case of schools), the California Department of Education search engine website (http://www.cde.ca.gov/re/sd/) was utilized.

Provider Participation

A total of 48 providers participated in Round 3 data collection. These providers comprise over 99.9% of the total broadband connections in California reported to the FCC on form 477, which constitutes a very complete set of data

CPUC Initial Data Verification

After obtaining files submitted by the providers, a data inventory spreadsheet was used to reflect the assigned GIS team member and record count. Each file was reviewed against the GIS data model posted in the SBDD Network website to see if mandatory fields were filled in, and each field was checked for the appropriate range of values. Where possible, team members loaded the submitted data into the corresponding geodatabase table to make certain that appropriate field headers were used and that each field contained the correct data type. When data was found to be missing or incorrect, the provider was contacted and the issue was documented in a separate provider spreadsheet. Some providers submitted nearly perfect data sets while others gave incomplete, unexpected, or incorrect data. New information, correspondence with the providers, and fixes made by the CPUC were also documented in each provider spreadsheet.

Chico GIC Geoprocessing

After the initial CPUC review, data was transferred to the Geographical Information Center (GIC) at CSU Chico for geocoding, geomatching, propagation of wireless service by antenna, and validation of geographic data. In those cases where the CPUC had received street address level data from broadband providers, such addresses were assigned a point location, (geocoded) and then geomatched to census blocks and street segments.

Providers who offer wireless service but could not submit a shapefile or geographic representation of their service area gave tabular antenna information. Wireless antenna parameters were used to model a service area and shapefiles were created for each provider. The wireless propagation model is based on the Longley-Rice, Irregular Terrain propagation model. Individual unit specifications are used to measure performance based on frequency, transmit power, receiver sensitivity, antenna gain, and height. Signal coverage patterns are produced for each individual unit taking into account terrain and vegetation features that may hinder signal dispersion.

CPUC Final Data Verification

The resulting datasets were delivered from Chico to the CPUC in the SBDD transfer model geodatabase for final review and verification. Data sets were checked again and reviewed for unexpected changes resulting from the geocoding /geomatching process. Geoprocessed data was visually reviewed using ArcGIS to verify service area footprints, and the SBDD check submission Python script was run on each dataset to identify unexpected values.

Deliverable Data

The final dataset was delivered to the NTIA/FCC in file geodatabase format with the following feature classes:

BB_ConnectionPoint_LastMile – not required per Clarification to the NOFA.

BB_ConnectionPoint_MiddleMile – Point between the local "last mile" network and the middle mile network which goes on to connect to the internet backbone. This is a confidential dataset.

BB_Service_Address – not included per the CPUC NDA.

BB_Service_CAInstitutions – Community Anchor Institutions: points geocoded from address lists

BB_Service_CensusBlock – Broadband availability polygons for areas less than 2 square miles

BB_Service_Overview – Service overview by County including Subscriber Weighted Nominal Speed

BB_Service_RoadSegment – Broadband availability line segments for areas 2 square miles and greater

BB_Service_Wireless – Wireless service area polygons.

Planned Validation Methods

The following validation methods will be conducted on Round 3 data. Detailed maps showing submitted service area footprints and areas that could not be validated will be distributed to each provider for feedback.

FCC Form 477

FCC Form 477 collects information about broadband connections to end user locations, wired and wireless local telephone services, and interconnected Voice over Internet Protocol (VoIP) services, in individual states, at the Census Tract level. A shape file was created for each provider reflecting the presumed availability of broadband service at each census tract where the provider reported customers to their fixed broadband service. These layers were used to cross reference ISP data submissions to the CPUC.

ID Insight, BroadBand Scout

BroadBand Scout is a third party comprehensive and unbiased data specifically designed to show the carriers, connectivity, speed and usage details of the national broadband landscape. ID Insight's patent-pending process analyzes hundreds of millions of internet transactions that link a consumer's physical address to their internet carrier. BroadBand Scout data is provided as tabular point locations and geomatched to the census block level where less the two square miles in area and to the street segment level where census blocks are greater than two square miles in area. A shape file was created for each provider reflecting the presumed availability of broadband service at each census block or street segment where Broadband Scout reported online customer transactions. These layers were used to cross reference ISP data submissions to the CPUC.

TeleAtlas Wire Center

The Wire Center Premium product is a comprehensive database for mapping and analyzing wire center service areas. It forms the backbone of the Tele Atlas® Telecommunication Products line. This product lists every Local Exchange Carrier (LEC) landline wire center in the United States. The term "wire center" refers to the location where the telephone company terminates the local lines; this is usually the same location as a central office, although a wire center might house one or more central offices. Buffers were created at 12,000 feet and 18,000 feet from provided Wire Center point datasets to cross reference ISP data submissions to the CPUC.

TeleAtlas Wire Center Region

The Wire Center Premium product is a comprehensive database for mapping and analyzing wire center service areas. It forms the backbone of the Tele Atlas® Telecommunication Products line. This product lists every Local Exchange Carrier (LEC) landline wire center in the United States. The wire center boundary is a representation of the area served by all of the switching equipment housed at that physical location. Wire Center Region polygon GIS layers were provided and used for cross referencing ISP data submissions to the CPUC.

FCC Consumer Broadband Test (Non-Mobile App)

The FCC offers an Online Consumer Broadband Test. FCC's Online Consumer Broadband Test collects information regarding the location of the client, the engine used to provide the speed test, download speed, upload speed, latency, jitter, packet loss, minimum round trip time, maximum round trip time, and average round trip time at a specified point location. A shape file was created to represent each location at which speed tests were performed based on geocoded address records. All point locations were then geomatched to the census block level where less the two square miles in area and to street segment level where census blocks are greater than two square miles in area. These layers were used to cross reference ISP data submissions to the CPUC where sub-broadband speeds were reported and/or where there were no tests performed.

FCC Consumer Broadband Test (Mobile App)

The FCC offers a Mobile Consumer Broadband Test for the Apple iPhone and Android mobile platforms. The official name of the App is the **FCC Broadband Test**. This tool can be downloaded to an Apple or Android enabled device by accessing the App Store or App Market on a handheld phone. FCC's Mobile Consumer Broadband Test collects information regarding the location of the client, the client's operating system, the engine used to provide the speed test (always OOKLA for mobile tests), download speed, upload speed, and latency, at a specified point location. A shape file was created to represent each location at which speed tests were performed based on latitude and longitude coordinate pairs. All point locations were then geoprocessed to the census block level where less the two square miles in area and to street segment level where census blocks are greater than two square miles in area. These layers were used to cross reference ISP data submissions to the CPUC where sub-broadband speeds were reported and/or where there were no tests performed.

FCC Broadband Dead Zone Reporting Form

The FCC offers a Broadband Dead Zone Reporting Form for recording address or city level queries against the National Broadband Map, that failed to return any providers at the specified location, or alternately, where a user may know that no service is provided at a specific address. FCC's Broadband Dead Zone Form collects information regarding the location of the client, whether the client has internet access at their home, what type of internet access the client has at their home, and whether or not the client would be interested in purchasing broadband internet if service options were available. A shape file was created to represent each location for which dead zone forms were filled out based on geocoded address records. All point locations were then geomatched to the census block level, where less than two square miles in area, and to street segment level, where census blocks are greater than two square miles in area. These layers were then used to cross reference ISP data submissions to the CPUC where dead zones and/or no services provided were reported.

California State Map Broadband Service Survey Feedback

The CPUC offers the Broadband Service Survey within its interactive map. The survey records user feedback based on address, city, or zip code level queries against the State's Broadband Availability. It collects information regarding the location of the client, whether the client is accessing the internet from their home, place of business, or any other location, whether or not the client purchases broadband service, and if not, why they choose not to purchase broadband service. A shape file based on geocoded address records was created to represent each location for which service surveys were submitted where the respondent indicated non-subscription because of no broadband availability. All such point locations were then geomatched to the census block level, where less than two square miles in area and to the street segment level, where census blocks are greater than two square miles in area. These layers were then used to cross reference ISP data submissions to the CPUC

Chico GIC Data Validation Processes

Each individual provider's submitted and/or created data was validated independently to all applicable validation methods. The following fields were added to each individual provider's data tables, where appropriate; FCC_477 (FCC Form 477), BBSCOUT (ID Insight BroadBand Scout), TA_WC_REG (TeleAtlas Wire Center Region), WC_VAL_12K (TeleAtlas Wire Center 12,000 foot buffer), WC_VAL_18K (TeleAtlas Wire Center 18,000 foot buffer), VAL12k_18k (TeleAtlas Wire Center 12,000 to 18,000 foot buffer ring), DEGRAD_FT (TeleAtlas Wire Center distance), (FCC_TST) FCC Consumer Broadband Test Non-Mobile App, (FCC_MOBL) FCC Consumer Broadband Test Mobile App, (FCC_DZ) FCC Broadband Dead Zone Reporting Form, and (CA_SRVY) State Map Broadband Service Survey Feedback to record validation results and to allow symbology of discrepancies based on validation methods for further interaction with each provider to refine their data submissions. The final step was a summary statistics report of all validation results for all submitted providers. Summary statistics include validity counts and percentages for all validation methods, specific to provider and technology.

Wireline Census Block Validation

A spatial selection was performed on Census Block data, either submitted by provider, or created from submitted address records through a geocoding/spatial selection process, to derive only those blocks which intersect polygons in a given validation layer. Counts are recorded as number of unique blocks which share geographic area with any given validation layer, compared to the total number of unique blocks submitted by, or created for, a given provider. Percentages are recorded as percentage of the total number of unique blocks which share geographic area with any given validation layer, compared to the total number of unique blocks submitted by, or created for, a given provider.

Wireline Street Segment Validation

A spatial selection was performed on Street Segment data, either submitted by provider, or created from submitted address records through a geocoding/spatial selection process, to derive only those segments which intersect polygons in a given validation layer. Counts are recorded as number of unique segments which share geographic area with any given validation layer, compared to the total number of unique segments submitted by, or created for, a given provider. Percentages are recorded as percentage of the total number of unique blocks which share geographic area with any given validation layer, compared to the total number of unique segments submitted by, or created for, a given provider.

Wireless Validation

A spatial selection was performed on Wireless Availability data, either submitted by provider, or created from antenna location and specification information, to select only those polygons which intersect a given validation layer. Results are recorded as a percentage of the total geographic area of wireless coverage sharing geographic area with any given validation layer, compared to the total coverage area submitted by, or created for, a given provider.

Colorado Broadband Data & Development Program
April 1, 2011 Data Delivery Report

For details about the Colorado Broadband Data and Development Program (CBDDP), please see our web site at www.colorado.gov/oit/broadband or visit the National Broadband Map at www.broadbandmap.gov.

Purpose of this Report

The report provides details about a specific data set delivered to the NTIA on April 1, 2011 to support the National Broadband Map. The report describes the various processes used to verify this data set and the results of those processes. The report also describes, in general terms, how CBDDP collects and validates information about broadband availability in the State of Colorado.

Status of Data Collection

The Colorado Broadband Data and Development Program continued the data collection effort begun with signing a data collection contract on March 22, 2010. Data has been collected from almost all service providers of significant size, but effort will continue to capture data from those not yet reporting.

The following table categorizes all possible broadband service providers in Colorado known to CBDDP, and indicates the status of their participation in the program. The table also shows progress made over the first three data deliveries to the National Telephone and Information Administration (NTIA). See the Data Delivery Report at the end of this document for more details on the data.

Service Providers	May 21, 2010	October 1, 2010	April 1,2011
Identified	102	158	161
Duplicates	0	14	14
Not a BB Provider	15	24	29
Working Universe of SP's	87	120	118
Multiple Contact Efforts, Have Chosen Not to Participate So Far, May Not Be a Provider	5	17	50
Data Sets Delivered to NTIA	39	59	65*
Broadband Provider Status Not Yet Known	43	44	0
* Data Received but Not Included in Data Set: 1 Provider that Missed the Cutoff, and 2 Satellite Providers that Report They Cover the Entire State			

The following table describes how many service providers updated their data between the prior and current data delivery.

Service Provider Updates	**April 1, 2011**
New in Data Set	6
Updated Data	16
Responded "No Data Change"	37
Responded Update Not Received	3
No Response	3
Data Sets Delivered to NTIA	65

The following table shows the number of community anchor institutions that have been identified in the state, and how many CAIs for which some broadband information has been collected and included in this data set. In addition, the "Includes Speed Tests" column shows how much of the data in the "Collected" column are actual speed tests.

CBDDP is very pleased with the progress that has been made in promoting speed tests among reporting CAIs. As shown below, 42%, or 1,562 of 3,768, of the data collected for CAI's is from speed tests. An additional 526 CAIs have reported speed tests since October 1.

Community Anchor Institutions	October 1, 2010				April 1, 2011		
	Identified	Collected	Includes Speed Test		Identified	Collected	Includes Speed Test
Cat. 1 - School K -12	2097	1927	665		2106	1995	904
Cat. 2 - Library	246	234	0		252	272	10
Cat. 3 - Medical/Healthcare	694	275	80		709	364	140
Cat. 4 - Public Safety	1813	548	264		1778	774	299
Cat. 5 - University/College	102	23	21		54	43	41
Cat. 6 - Other Government	407	156	6		597	315	165
Cat. 7 - Other non-Government	0	0	0		7	5	3
	5359	3163	1036		5503	3768	1562

Validation and Verification Processes for the April 2011 Data Set

1. **Automated Validation**. CBDDP has been developing and improving automated validation scripts since its first data delivery in May 2010. CBDDP runs both the scripts it has developed as well as the script provided by the NTIA on a monthly basis. Proof that the data delivery passed the NTIA validation script is submitted with the data delivery as required.

In addition to testing everything that the NTIA script tests, CBDDP's automated script:

- Verifies that the Geodatabase has metadata, is in the correct projection, and that the feature classes are properly named
- Verifies all columns are properly named and defined
- Verifies all table value domains are adhered to
- Captures the required information to accurately complete the Records Count and Provider Table tabs for the SDBB Data Package
- Cross references and creates statistical tables technology type and valid speed combinations for both Service Provider and CAI data
- Compares FRN to provider name to ensure consistency across the data set
- Ensures consistency in provider names
- Identifies possible duplicates among CAIs
- Tests all feature classes to ensure they are within the State's boundaries
- Creates a statistical table for all features classes including records details, service provider information and attribution frequencies
- Ensures the data model, business rules and schema are in compliance

2. **Analysis of Changes**. CBDDP has compared the October 1, 2010 and April 1, 2011 data sets for all providers. See the table below which lists only providers with changes. In instances where coverage areas were reduced, 15% of the reduced features for each provider were traced back to the provider's raw data. No errors were found in that data conversion. 80% of the features added to existing providers and new providers were compared to the raw data. Again, no errors were found in the data conversion. In total, over 80,000 new, additional and reduced features were compared back to the raw data during our analysis.

3. **Visual review**.
The coverage areas for new service providers and those with changes to their coverage areas were visually reviewed. No unusual coverage areas were observed.

Difference Between October 2010 and April 2011 Deliveries by Feature Type						
Company Name	**Doing Business As**	**Census**	**Roads**	**Wireless**	**Mid Mile**	**Total**
New Providers						
Eschelon Telecom of Colorado, Inc.	Integra Telecom	49491	29683	0	0	79174
CSC Holdings, LLC	Bresnan Communications	14115	24550	0	0	38665
Cogent Communications, Inc.	Cogent Communications, Inc.	74	0	0	0	74
Grand County Internet Services, Inc.	Grand County Internet Services	0	0	1	1	2
Farmers Telephone Company	Farmers Telecommunications	0	0	1	0	1
Viaero Wireless	Viaero Wireless	0	0	1	0	1
Providers with Additional Features						
Level 3 Communications, LLC	Level 3 Communications, LLC	0	0	0	173	173
New Edge Holding Company	New Edge Networks, Inc.	148	-8	0	0	140
Time Warner Cable	Time Warner Cable	80	28	0	0	108
Dubois Telephone Exchange, Inc.,	DTE	7	72	0	0	79
tw telecom inc.	tw telecom inc.	24	4	0	0	28
Strasburg Telephone Company	TDS Telecom	-1	22	0	0	21
Sprint Nextel Corporation	Sprint	0	0	1	0	1
T-Mobile USA, Inc.	T-Mobile	0	0	1	0	1
Providers with Less Features						
DIECA Communications, Inc.	Covad Communications Company	-507	-5318	0	0	-5825
CenturyTel, Inc.	CenturyTel, Inc.	643	-6406	0	0	-5763
Qwest Corporation	Qwest Corporation	753	-3062	0	0	-2309
Delta County Tele-comm, Inc.	TDS Telecom	-60	-798	0	0	-858
Brainstorm Internet	Brainstorm Internet	0	0	-3	0	-3
J.e.d. Enterprises, Inc.	J.e.d. Enterprises, Inc.	0	-2	0	0	-2

4. **Third Party Data Validation.** Since the October 1, 2010 data delivery, 100% of the service provider coverage areas have been compared to third party data sets. Data sets include American Roamer, ComSearch, Pitney Bowes, MediaPrints, and SpectrumView. In 21 instances, multiple third party data sets were used to validate a single service provider/technology type combination. During the comparison, comments are recorded about coverage areas, geometry and attribution provided for the technology type, and a confidence level is assigned. As a result of discrepancies between the data sets and data from providers, discussions have been held with six providers. In all instances, the providers confirmed their data was correct. After the discussions, an additional confidence level is assigned. Over the next few months, the project will contact an additional eight providers to verify their data.

5. **Feedback loop**. All service providers have been given the opportunity to review the geospatial representation of their data. In addition, when updates to data were solicited, providers were questioned as to the accuracy of the geospatial display of their coverage areas. Approximately six providers have asked questions or provided feedback.

6. **Speed Test Analysis**. There are several issues to consider when comparing speed test data to service provider advertized maximum speeds. Many speed tests do not collect the name of the service provider being tested. In areas where more than one service provider offers varying maximum service speeds, it is not possible to know who is providing the service to the CAI. Also, even if a speed test result is directly tied to a certain service provider, it is unknown if the customer has chosen to purchase the maximum available speed offered by the service provider.

The speed test information CBDDP collects from CAIs requests the name of the service provider. Although CBDDP has collected speeds tests from 1,562 CAIs as noted in the table on Page 2, only 446 of those tests specifically identified the service provider. Service providers report data by speed test tier, and the following table compares how the speed tier for the CAI speed test compares to the maximum advertized speed tier provided by the service provider.

CAI Speed Test (Where Service Provider (SP) is Identified) Compared to SP Max. Adv. Down													
	Speed Test Slower						Speed Test Equals	Speed Test Faster					Total Speed Tests
Number of Speed Tiers Slower or Faster	**-6**	-5	-4	-3	-2	-1	0	1	2	3	4	5	
School K - 12			5	26	27	59	35	24	11	7	2	1	197
Library							1	1					2
Healthcare			2	3	4	5	6	2	3	2	1		28
Public Safety	1	1	1	11	6	37	44	17	7	4	1		130
University, college		1	1	2	4	6	2	1	1				18
Other Government	1	1	1	8	3	19	18	13	4	3			71
Other Non-Government													0
Totals	2	3	10	50	44	126	106	58	26	16	4	1	446
Totals	235						106	105					446

7. Drive Testing Mobile Coverage Areas. CBDDP is testing the mobile wireless coverage areas reported by the service providers. The combined coverage areas of all wireless provider data indicates 95.9% of the square miles in the state have available speeds of greater than 3 Mbps and less than 6 Mbps, and that only 3.9% of the square miles had less than 768 Kbps.

CBDDP has developed a drive test plan that will drive over 5,000 miles of roads. Primary test points are selected along major highways. Secondary points are then tested from one half to one mile away from the primary point to confirm the result of the primary point. Up to four derived points are tested or until at least two tests fail with test speeds of less than 768 Kbps. The tests are all taken via commercially available wireless air cards, identical laptops, and at the same FCC speed test site. Only the major national providers are being tested. The primary points are generally 10 to 15 miles apart, and the derived points are clustered around the A points within 2 to 3 miles.

The following table presents the results of drive testing completed through March 3, 2011. This includes five days of testing for two people and covered 2,300 miles. CBDDP estimates there are approximately six days of testing to be complete the planned route. Test results are shown only for points that fall within the coverage area provided by the service providers to CBDDP.

MOBILE WIRLESS COVERAGE TESTING									
All Points Tested Including Primary and Derived									
Combined Result for Three Providers Tested									
	Tiers Slower				Same Tier	Tiers Faster			Total Tests
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	302		60	29	111	14	1		517
Totals	391				111	15			517
ATT									
	Tiers Slower				Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	79			29	11				119
Totals	108				11	0			119
Sprint									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	85		1		100	14	1		201
Totals	86				100	15			201
Verizon									
			Tiers Slower		Same Tier		Tiers Faster		Total

Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	138		59						197
Totals	197				0	0			197

Primary Points Tested									
Combined Result for Three Providers Tested									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	34		16	9	29	3	1		92
Totals	59				29	4			92
ATT									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	10			9	2				21
Totals	19				2	0			21
Sprint									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	1		1		27	3	1		33
Totals	2				27	4			33
Verizon									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	23		15						38
Totals	38				0	0			38

8. **Demographic Analysis**.
Using the October 1, 2010 data delivered to the NTIA, CBDDP completed an analysis of unserved (available broadband less than 768 Kbps downstream) and underserved (available broadband less than 3 Mbps downstream). The analysis was broken down by wireline, fixed wireless and mobile wireless. Availability analysis was completed at the census block level, and then aggregated to counties. This effort allowed the project team to validate the population numbers presented by the National Broadband Map. CBDDP believes the National Broadband Map accurately reflects served populations based on 2009 Census Data.

Planned Data Verification and Analysis

CBDDP has prepared a Survey Plan for residences. The plan should be implemented in Q2 and Q3 and results used to validate, where possible, service provider information about availability. A business survey is also under development.

Summary of Process

CBBDP follows a data collection process outlined on the National Broadband Map in the "Technical Overview" of the "About" section at www.broadbandmap.gov. If you would like a more detailed, procedural description of the process, please contact CBDDP via email at COBroadband@state.co.us.

The data gathering process begins by contacting the potential broadband providers. Although participation is voluntary, many providers choose to support this effort. The success of this program rests, in part, on that support, and we appreciate their efforts to participate in this program. Broadband providers submit data in a variety of formats, and in a number of cases, CBDDP also conducts technical assistance to support the efforts of smaller providers to participate. For census blocks less than two square miles, the entire census block is presumed to have coverage if any service provider reports broadband anywhere in the census block. For census blocks greater than two square miles, service is reported along road segments. Before submitting data to NTIA, CBDDP integrates the data from each provider into a single dataset using a Data Model required by the NTIA. NTIA and the FCC then integrate CBDDP's dataset along with those from all other states into the single National Broadband Map dataset.

An earlier section in this report titled "Data Verification and Analysis", describes the specific steps that CBDDP took, and the results of those steps, to verify the data before transmission to the NTIA.

The CBDDP has implemented the following data collection and ingestion processes which may vary from other state programs.

1. To spatially represent broadband service where the service provider has given CBDDP address specific information, CBDDP implemented the following process starting with the October 2010 data delivery. A 150 foot buffer is drawn around each point. Any census block touched by the buffered area is selected. For census blocks greater than two square miles, any road segment touched by the buffer is selected. CBDDP has met with the largest service provider in the state that provided address specific data, and they agree that the 150 foot buffer process is reasonable and creates an accurate representation of their service area.

2. Based on clarifications from the NTIA, CBDDP did not provide any features in the BB_Service_Overview feature class since more granular speed information was provided in the BB_Service_CensusBlock, BB_Service_RoadSegment and BB_Service_Address feature classes.

3. CBDDP is not currently collecting pricing information.

3. Reference layers include the U.S Census Bureau 2000 census blocks and 2009 Tiger data for roads.

4. CBDDP made a significant adjustment to the data set starting with the October 2010 data delivery. Very few of Colorado's service providers have reported both their maximum advertized speed and the typical speeds a user might encounter. During an in-person meeting, Qwest stated their advertised speeds are the typical speeds and there is no potential for degraded service during peak periods of use or distance from central office. Based on this information from the service provider, CBDDP is using Qwest advertised as typical speed.

5. CBDDP has created an exception table that will record unusual areas or pockets were coverage may or may not exist. The table will be persistent through provider updates, so these exceptions will not have to be rediscovered with each update.

6. CBDDP reports wireless towers in the Middle-Mile where they are being used for backhaul. When service providers have submitted central office locations, they are included in the middle mile. Qwest and Century did not provide such information, and have requested CBDDP not include publicly available central office locations in the data set.

7. CBDDP is utilizing a data collection contractor during the first two years of the program. Starting October 1, 2011, and through the remainder of the program to October 31, 2014, CBDDP will bring this process in-house. CBDDP has worked closely with the contractor, and has developed skills and experience in validating the information and working with the data sets. It is expected this will be a seamless transition.

8. For CAIs, multiple data sources are compared where available.   However, speed test data is reported in preference to other types of data such as surveys, reports or speeds for which the CAI is paying.

9. Addresses and names that appear to be duplicates are validated. CBDDP chooses to report multiple CAIs at the same address as distinct entities. For example, a county sheriff's office and a 911 call center at the same address are reported as two distinct entities.

Data Summary and Feature Class Statistical Tables

Data Summary

File Summary

File Type	Number of Records
Total Records in all Files	479862
Census Block < 2 sq. miles	305575
Street Segments	167424
Wireless Shape File	42
Service Address	399
BB Service Overview	0
Community Anchor Instituions	5503
Middle Mile	919
Metadata Provided for Geospatial Data	Yes

Provider Information

File Type	Number of Records
Number of ISPs Provided	65

Census Blocks < 2 sq. miles

Data Type	Code	Data Element	Count	%
Records Details		Total Records	3E+05	
		Census Blocks < 2 sq. miles with Broadband	98940	
		Census Blocks < 2 sq. miles in State (with & without broadband)	131655	
		Census Blocks > 2 sq. miles in the State (with & without broadband)	65205	
		in the State (with & without broadband)	141040	
Services Provider Details		Providers	36	
		Number of Distinct "Doing Business As"	33	
		FRN	36	
Technology	10	Asymmetric xDSL	####	47.7%
	20	Symmetric xDSL	41477	13.6%
	30	Wireless	55031	18.0%
	40	DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	62614	20.5%
	50	Optical Carrier/Fiber	711	0.2%
	60	Satellite	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	0	0.0%
	71	Terrestrial Fixed Wireless-Licensed	0	0.0%
	80	Wireless	0	0.0%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
Max. Advertised Download Speed	3	> 768 kps, < 1.5 mbps.	7190	2.4%
	4	> 1.5 mbps, < 3 mbps.	56521	18.5%
	5	> 3 mbps, < 6 mbps.	67773	22.2%
	6	> 6 mbps, < 10 mbps.	1E+05	38.1%
	7	> 10 mbps, < 25 mbps.	35704	11.7%
	8	> 25 mbps, < 50 mbps.	21433	7.0%
	9	> 50 mbps, < 100 mbps	124	0.0%
	10	> 100 mbps, < 1 gbps.	473	0.2%
	11	> 1 gbps.	35	0.0%

Data Type	Code	Data Element	Count	%
Typical Download Speed	3	> 768 kps, < 1.5 mb	13500	4.4%
	4	> 1.5 mbps, < 3 mb	52275	17.1%
	5	> 3 mbps, < 6 mbp	83049	27.2%
	6	> 6 mbps, < 10 mbp	49536	16.2%
	7	> 10 mbps, < 25 mb	20723	6.8%
	8	> 25 mbps, < 50 mb	21393	7.0%
	9	> 50 mbps, < 100 m	48	0.0%
	10	> 100 mbps, < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
		N/A "null"	65051	21.3%
Max. Advertised Upload Spee	2	>200 kps, < 768 kp	38018	12.4%
	3	> 768 kps, < 1.5 mb	147148	48.2%
	4	> 1.5 mbps, < 3 mb	38916	12.7%
	5	> 3 mbps, < 6 mbp	62478	20.4%
	6	> 6 mbps, < 10 mbp	2016	0.7%
	7	> 10 mbps, < 25 mb	16307	5.3%
	8	> 25 mbps, < 50 mb	60	0.0%
	9	> 50 mbps, < 100 m	124	0.0%
	10	> 100 mbps, < 1 gb	473	0.2%
	11	> 1 gbps.	35	0.0%
Typical Upload Speed	2	>200 kps, < 768 kp	60580	19.8%
	3	> 768 kps, < 1.5 mb	60983	20.0%
	4	> 1.5 mbps, < 3 mb	38460	12.6%
	5	> 3 mbps, < 6 mbp	62248	20.4%
	6	> 6 mbps, < 10 mbp	2008	0.7%
	7	> 10 mbps, < 25 mb	16177	5.3%
	8	> 25 mbps, < 50 mb	20	0.0%
	9	> 50 mbps, < 100 m	48	0.0%
	10	> 100 mbps, < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
		N/A "null"	65051	21.3%

Street Segment

Data Type	Code	Data Element	Count	%
Record		Total Records	####	
Services Provider Details		Providers	35	
		Number of Distinct "Doing Business As"	32	
		FRN	35	
Technology	10	Asymmetric xDSL	95232	56.9%
	20	Symmetric xDSL	22875	13.7%
	30	Wireless	14248	8.5%
	40	DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	34893	20.8%
	50	Optical Carrier/Fiber	176	0.1%
	60	Satellite	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	0	0.0%
	71	Terrestrial Fixed Wireless-Licensed	0	0.0%
	80	Wireless	0	0.0%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
Max. Advertised Download Speed	3	> 768 kps. < 1.5 mbps.	8412	5.0%
	4	> 1.5 mbps. < 3 mbps.	66365	39.6%
	5	> 3 mbps. < 6 mbps.	24980	14.9%
	6	> 6 mbps. < 10 mbps.	25394	15.2%
	7	> 10 mbps. < 25 mbps.	15298	9.1%
	8	> 25 mbps. < 50 mbps.	2413	1.4%
	9	> 50 mbps. < 100 mbps	24550	14.7%
	10	> 100 mbps. < 1 gbps.	11	0.0%
	11	> 1 gbps.	0	0.0%

Data Type	Code	Data Element	Count	%
Typical Download Speed	3	> 768 kps. < 1.5 mb	9736	5.8%
	4	> 1.5 mbps. < 3 mb	65342	39.0%
	5	> 3 mbps. < 6 mbps	14294	8.5%
	6	> 6 mbps. < 10 mbp	14456	8.6%
	7	> 10 mbps. < 25 mb	13819	8.3%
	8	> 25 mbps. < 50 mb	2413	1.4%
	9	> 50 mbps. < 100 m	0	0.0%
	10	> 100 mbps. < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
		N/A "null"	47363	28.3%
Max. Advertised Upload Speed	2	>200 kps. < 768 kp	33270	19.9%
	3	> 768 kps. < 1.5 mb	50156	30.0%
	4	> 1.5 mbps. < 3 mb	36839	22.0%
	5	> 3 mbps. < 6 mbps	20436	12.2%
	6	> 6 mbps. < 10 mbp	430	0.3%
	7	> 10 mbps. < 25 mb	26282	15.7%
	8	> 25 mbps. < 50 mb	0	0.0%
	9	> 50 mbps. < 100 m	0	0.0%
	10	> 100 mbps. < 1 gb	11	0.0%
	11	> 1 gbps.	0	0.0%
Typical Upload Speed	2	>200 kps. < 768 kp	33787	20.2%
	3	> 768 kps. < 1.5 mb	36031	21.5%
	4	> 1.5 mbps. < 3 mb	36570	21.8%
	5	> 3 mbps. < 6 mbps	11511	6.9%
	6	> 6 mbps. < 10 mbp	430	0.3%
	7	> 10 mbps. < 25 mb	1732	1.0%
	8	> 25 mbps. < 50 mb	0	0.0%
	9	> 50 mbps. < 100 m	0	0.0%
	10	> 100 mbps. < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
		N/A "null"	47363	28.3%

Wireless

Data Type	Code	Data Element	Count	%
Record		Total Records	42	
Services Provider Details		Providers	33	
		Number of Distinct "Doing Business As"	32	
		FRN	29	
Technology	10	Asymmetric xDSL	0	0.0%
	20	Symmetric xDSL	0	0.0%
	30	Wireless	0	0.0%
	40	DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	0	0.0%
	50	Optical Carrier/Fiber	0	0.0%
	60	Satellite	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	14	33.3%
	71	Terrestrial Fixed Wireless-Licensed	13	31.0%
	80	Wireless	15	35.7%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
Max. Advertised Download Speed	3	> 768 kps. < 1.5 mbps.	8	19.0%
	4	> 1.5 mbps. < 3 mbps.	10	23.8%
	5	> 3 mbps. < 6 mbps.	20	47.6%
	6	> 6 mbps. < 10 mbps.	4	9.5%
	7	> 10 mbps. < 25 mbps.	0	0.0%
	8	> 25 mbps. < 50 mbps.	0	0.0%
	9	> 50 mbps. < 100 mbps	0	0.0%
	10	> 100 mbps. < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
Spectrum	1	800 Mhz Spectrum Use	3	7.1%
	2	700 Mhz Spectrum Use	3	7.1%
	3	1900 Mhz Spectrum Us	4	9.5%
	4	1700 Mhz Spectrum Us	5	11.9%
	5	2500 Mhz Spectrum Us	4	9.5%
	6	Unlicensed Spectrum U	21	50.0%
	7	Specialist Mobile Radi	2	4.8%
	8	Wireless Communicatio	0	0.0%
	9	Satilite	0	0.0%

Data Type	Code	Data Element	Count	%
Typical Download Speed	2	>200 kps. < 768 kp	0	0.0%
	3	> 768 kps. < 1.5 mb	11	26.2%
	4	> 1.5 mbps. < 3 mb	6	14.3%
	5	> 3 mbps. < 6 mbp	10	23.8%
	6	> 6 mbps. < 10 mbp	1	2.4%
	7	> 10 mbps. < 25 mb	0	0.0%
	8	> 25 mbps. < 50 mb	0	0.0%
	9	> 50 mbps. < 100 m	0	0.0%
	10	> 100 mbps. < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
		N/A "null"	14	33.3%
Max. Advertised Upload Speed	2	>200 kps. < 768 kp	4	9.5%
	3	> 768 kps. < 1.5 mb	21	50.0%
	4	> 1.5 mbps. < 3 mb	10	23.8%
	5	> 3 mbps. < 6 mbp	6	14.3%
	6	> 6 mbps. < 10 mbp	1	2.4%
	7	> 10 mbps. < 25 mb	0	0.0%
	8	> 25 mbps. < 50 mb	0	0.0%
	9	> 50 mbps. < 100 m	0	0.0%
	10	> 100 mbps. < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
Typical Upload Speed	2	>200 kps. < 768 kp	8	19.0%
	3	> 768 kps. < 1.5 mb	15	35.7%
	4	> 1.5 mbps. < 3 mb	3	7.1%
	5	> 3 mbps. < 6 mbp	2	4.8%
	6	> 6 mbps. < 10 mbp	0	0.0%
	7	> 10 mbps. < 25 mb	0	0.0%
	8	> 25 mbps. < 50 mb	0	0.0%
	9	> 50 mbps. < 100 m	0	0.0%
	10	> 100 mbps. < 1 gb	0	0.0%
	11	> 1 gbps.	0	0.0%
		N/A "null"	14	#DIV/0!

Middle Mile

Data Type	Code	Data Element	Count	%
Record		Total Records	919	
Service s Provider Details		Providers	37	
		Number of Distinct "Doing Business As"	33	
		FRN	36	
Ownership	0	Owned	112	12.2%
	1	Leased	807	87.8%
Facility Capacity	1	Multiple T1's and less than 40 mbps.	409	44.5%
	2	and less than 150 mbps.	87	9.5%
	3	mbps. and less than 600 mbps.	43	4.7%
	4	mbps. and less than 2.4 gbps.	15	1.6%
	5	gbps. and less than 10 gbps.	2	0.2%
	6	Greater than 10 gbps	363	39.5%

Data Type	Code	Data Element	Count	%
Facility Type	1	Fiber	473	51.5%
	2	Copper	5	0.5%
	3	Hybrid Fiber Coax	1	0.1%
	4	Wireless	440	47.9%
		N/A "null"	0	0.0%
Lat / Lon g		State	919	100%
		Total Lat/Long	919	
Elevation		Number of Data Points	783	
		Lowest Elevation	5	
		Highest Elevation	225	

Community Anchor Insititution

Data Type	Code	Data Element	Count	%
Record		Total Records	5503	
Anchor Category	1	School-K through 12	2106	38.3%
	2	Library	252	4.6%
	3	Medical/healthcare	709	12.9%
	4	Public safety	1778	32.3%
	5	University, college, other post-secondary	54	1.0%
	6	Other community support-govt	597	10.8%
	7	Other community support-non-govt	7	0.1%
Technology	10	Asymmetric xDSL	343	6.2%
	20	Symmetric xDSL	6	0.1%
	30	Other Copper Wireless	1591	28.9%
	40	Cable Modem-DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	129	2.3%
	50	Optical Carrier/Fiber	1236	22.5%
	60	Satellite	14	0.3%
	70	Terrestrial Fixed Wireless-Unlicensed	27	0.5%
	71	Terrestrial Fixed Wireless-Licensed	64	1.2%
	80	Wireless	0	0.0%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
		N/A "null"	2093	38.0%
Max. Advertised Download Speed	1	< 200 kps.	0	0.0%
	2	>200 kps, < 768 kps.	0	0.0%
	3	> 768 kps, < 1.5 mbps.	197	3.6%
	4	> 1.5 mbps, < 3 mbps.	1339	24.3%
	5	> 3 mbps, < 6 mbps.	415	7.5%
	6	> 6 mbps, < 10 mbps.	266	4.8%
	7	> 10 mbps, < 25 mbps.	905	16.4%
	8	> 25 mbps, < 50 mbps.	153	2.8%
	9	> 50 mbps, < 100 mbps.	10	0.2%
	10	> 100 mbps, < 1 gbps.	55	1.0%
	11	> 1 gbps.	70	1.3%
		N/A "null"	2093	38.0%

Data Type	Code	Data Element	Count	%
Max. Advertised Upload Speed	1	< 200 kps.	0	0.0%
	2	>200 kps, < 768 kps.	113	2.1%
	3	> 768 kps, < 1.5 mbp	190	3.5%
	4	> 1.5 mbps, < 3 mbps	1337	24.3%
	5	> 3 mbps, < 6 mbps.	492	8.9%
	6	> 6 mbps, < 10 mbps.	394	7.2%
	7	> 10 mbps, < 25 mbp	661	12.0%
	8	> 25 mbps, < 50 mbp	90	1.6%
	9	> 50 mbps, < 100 mb	8	0.1%
	10	> 100 mbps, < 1 gbps	55	1.0%
	11	> 1 gbps.	70	1.3%
		N/A "null"	2093	38.0%
Y/N Broadband Service	Y	Yes-Subscribers to Service	3410	62.0%
	N	No-Does Not Subscribers to	180	3.3%
	U	Unknown	1913	34.8%
Lat/Long Accuracy	1	Lat/Long thT Flls within the State	5503	
	2	Total Lat/Long	5503	100%
Anchor Names		Total Count Anchors Names	5503	
		Distinct Count of Anchor Names	5356	

Community Anchor Institution Category Count with Broadband Information			Count	BB Info
	1	12	2106	1969
	2	Library	252	210
	3	re	709	326
	4	Public safety	1778	562
	5	University, college, other	54	43
	6	Other community support-govt	597	297
	7	Other community support-non-	7	3
		Totals	5503	3410

Distinct Speed Tiers Provided

Technology Codes		Allowable Down	Allowable Up
10	Asymmetric xDSL	3 to 8	2 to 7
20	Symmetric xDSL	3 to 8	3 to 8
30	Other Copper Wireless	3 to 8	2 to 8
40	Cable Modem-DOCSIS 3.0	3 to 7	2 to 7
41	Cable Modem-Other	3 to 9	2 to 9
50	Optical Carrier/Fiber to End Use	3 to 11	2 to 11
60	Satellite	3 to 6	2 to 6
70	Terrestrial Fixed Wireless-Unlica	3 to 6	2 to 6
71	Terrestrial Fixed Wireless-Licen	3 to 6	2 to 6
80	Terrestrial Mobile Wireless	3 to 6	2 to 6
90	Electric Power Lines	3 to 6	2 to 6
0	All Other	3 to 11	2 to 11

Speed Tier Codes	
1	< 200 kbps.
2	>200 kbps, < 768 kbps.
3	> 768 kbps, < 1.5 mbps.
4	> 1.5 mbps, < 3 mbps.
5	> 3 mbps, < 6 mbps.
6	> 6 mbps, < 10 mbps.
7	> 10 mbps, < 25 mbps.
8	> 25 mbps, < 50 mbps.
9	> 50 mbps, < 100 mbps.
10	> 100 mbps, < 1 gbps.
11	> 1 gbps.

Maximum Advertised Speed				Typical Speed			
Technology	Download	Upload	Freq.	Technology	Download	Upload	Freq.
10	3	2	2633	10	NULL	NULL	15576
10	3	3	7375	10	3	2	11135
10	4	2	26860	10	3	3	6729
10	4	3	36538	10	4	2	23888
10	5	2	4297	10	4	3	34277
10	5	3	10074	10	5	2	21846
10	5	4	571	10	5	3	6841
10	5	5	10171	10	5	5	1090
10	6	2	37498	10	6	2	37498
10	6	3	47046	10	6	3	24065
10	7	3	19486	10	7	3	19486
10	7	4	14757	10	7	4	14757
10	8	5	5929	10	8	5	5585
10	8	7	17857	10	8	7	11290
20	3	3	5297	20	3	3	5297
20	4	4	51003	20	4	4	51003
20	5	5	8052	20	5	5	8052
30	3	3	297	30	NULL	NULL	673
30	4	4	8603	30	3	3	75
30	5	5	58762	30	4	4	8449
30	6	6	1375	30	5	5	58686
30	7	7	182	30	6	6	1326
30	8	8	60	30	7	7	50
41	5	4	582	30	8	8	20
41	6	3	54727	41	NULL	NULL	95615
41	6	6	1071	41	5	4	582

41	7	3	16338		41	6	6	1071
41	7	4	239		41	7	4	239
50	5	3	244		50	NULL	NULL	550
50	9	9	124		50	5	3	244
50	10	10	484		50	5	5	2
50	11	11	35		50	6	6	33
70	3	3	1		50	7	6	8
70	4	3	2		50	7	7	2
70	4	4	1		50	9	9	48
70	5	2	1		70	NULL	NULL	4
70	5	3	4		70	3	3	1
70	5	4	1		70	4	3	2
70	5	5	3		70	5	2	1
70	6	2	1		70	5	3	3
71	3	3	4		70	5	4	1
71	4	3	1		70	5	5	2
71	4	4	2		71	NULL	NULL	5
71	5	3	3		71	3	3	4
71	5	5	2		71	4	3	1
71	6	6	1		71	4	4	1
80	3	2	1		71	5	3	2
80	3	3	2		80	NULL	NULL	5
80	4	2	1		80	3	2	6
80	4	3	3		80	4	2	1
80	5	3	1		80	4	3	1
80	5	4	5		80	5	3	1
80	6	4	1		80	6	4	1
80	6	5	1					

CT Broadband Mapping

Data Processing Report

Supplement

Submission 3

March 31, 2011

CONNECTICUT PROGRAM OVERVIEW

In response to the Notice of Funds Availability published in the Federal Register on July 8, 2009 (NOFA), the State of Connecticut Department of Public Utility Control (CT DPUC) submitted a grant application for consideration under the National Telecommunications and Information Administration's (NTIA) State Broadband Data and Development Grant Program (SBDD), for broadband mapping. The CT DPUC, pursuant to Executive Order 32-A, has been designated as the single Connecticut state entity eligible to apply for funds under this program.

The State has long been committed to regarding broadband delivery and enhanced use as a fundamental goal. The State has developed a planning strategy to marshal the State's resources and stakeholders and establish Connecticut as a leader in broadband usage, in addition to being a leader in "e-Government" and other broadband-dependent endeavors.

The State entered its SBDD initiative not possessing any data related to broadband service, availability, or infrastructure that could readily support the requirements of the Broadband Data and Development grant program. Due to technical considerations, the DPUC has partnered with Applied Geographics Inc., to support the data collection and mapping efforts.

So far CT has been very successful in acquiring the requested information from the broadband service providers, and is utilizing this information on our own http://CT.gov/Broadband website as well as providing the needed information up to NTIA to support their national map.

SUBMISSION 3 OVERVIEW

For submission 3 (s3), roughly 50% of providers stated that their submission 2 (s2) service areas should be reused for s3. The other 50% gave modifications to their data, provided updates to their earlier submissions, or delivered entirely new datasets.

In general, the submission 3 processes followed the same basic approach that was used in submission 2. This document summarizes the following:

- Submission 3 Processing Assumptions
- Reference Data
- NTIA Submission Data Model Schema Changes

SUBMISSION 3 PROCESSING ASSUMPTIONS

Based on NTIA feedback and information provided in NTIA webinar sessions, the submission 3 data processing workflow is based on the following assumptions to meet NTIA submission requirements. Many of these are similar to s2.

1. All census blocks are mapped based on 2000 census blocks. Any data submitted in 2009 format was converted to 2000 for submission. During processing a 'hybrid' census dataset (2000 IDs with 2009 line work) was used to take advantage of the improved 2009 line work. Prior to

submission to NTIA, all features were mapped back to the 2000 census blocks. The Reference Data section below contains additional details.

2. For consistent representation the state road reference data used was 2009 Census Tiger Line IDs (TLIDs). Other data sources (non-TLID features, or 2000 TLID features) were mapped to 2009 TLID features.
3. Overview was removed completely from submission data due to the fact that all maximum advertised up/down speeds are being reported in blocks, roads, and wireless features. IN addition, none of the providers were willing to submit detailed pricing information.
4. Due to our NDA restrictions, address points and last mile points will not be submitted to NTIA.
5. Some providers did not submit middle mile elevation. Wherever possible, we went back to providers to obtain their middle mile elevation information.
6. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were treated as wireless coverage and were delivered as a shape. In cases where a provider served the same technology and spectrum with different speeds, overlapping areas were removed and the higher speed was assigned.
7. The submission 3 Provider data model is currently based on the NTIA data model as of 1/13/11.

SUBMISSION 3: REFERENCE DATA

This section describes the reference data used in submission 3.

BLOCK REFERENCE SETUP

For s3, a hybrid block dataset (2000 IDs with 2009 line work) was used to take advantage of the improved 2009 geometry. The data was set up as follows:

- 2009 BlockID suffix is dropped and the blocks are dissolved (by Block ID) to produce data with 2000 BlockIDs and 2009 shape geometry
- Block size (AREA) is calculated combining the 2000 land area (ALAND) and water area (AWATER)
- AREA is converted from square meters to square miles to calculate square mileage (SMI).
- If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.

ROAD REFERENCE SETUP

To take advantage of the 2009 geometry improvements, 2009 Tiger Line IDs (TLID) were used for data processing in s3. Any non-2009 TLID (i.e. 2000 TLID or other) submitted by providers were mapped to the 2009 reference data. The data was set up as follows:

- The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:
  - The 2009 road segment is completely within a hybrid block that is NOT less than 2 square miles
- Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

REFERENCE DATA SOURCES

The following summarizes block and road reference data sources for submission 3:

BLOCK REFERENCE DATA: 2009 CENSUS BLOCKS

The 2009 Census Block data is the most recent geometry provided by the US Census Bureau and has these characteristics:

- The full 2009 Block ID is made up of the following characters:
  - (2) State
  - (3) County
  - (6) Tract
  - (4) Block
  - (1) Suffix - The 2009 Census Block data allocates a one-character alphabetic suffix to the end of a 2000 Block ID for all blocks that have been subdivided.
- Fields of interest include:
  - [BLKIDFP]:: char(17) – Full Block ID
  - [ALAND] :: double(14) – Land Area
  - [AWATER] :: double(14) – Water Area
- The 2009 Census block geometry has been adjusted to correspond with the revised and amended 2009 Census road data.

- This data was downloaded for each state from the following website: http://www2.census.gov/cgi-bin/shapefiles2009/national-files

ROAD REFERENCE DATA: 2009 CENSUS TIGER LINES

The 2009 Census Tiger Line data contains the most recent geometry provided by the Census Bureau. The following is a list of characteristics:

- The Tiger Line Identification (TLID) system is stored as a double data type, although it contains only integer values
- Fields of interest include:
  - [TLID] :: double(10) -- (Tiger Line ID)
  - [FULLNAME] :: char(100) – (Full Name)
  - [LFROMADD] :: char(12) – (Left From Address)
  - [LTOADD] :: char(12) – (Left To Address)
  - [RFROMADD] :: char(12) – (Right From Address)
  - [RTOADD] :: char(12) – (Right To Address)
  - [ZIPL] :: char(5) – (Zip Left)
  - [ZIPR] :: char(5) – (Zip Right)
  - [ROADFLG] :: char(1) – (Road Flag – Is segment a road?)
- The 2009 Census Tiger Line road segment geometry was adjusted to correct 2000 segments misalignment; street name, type and directional information were concatenated into one database column (FULLNAME) and new road segments were added.
- The Census road data is packaged by county. Roads that exist as the boundary between counties will be duplicated in both county files.
- This data was downloaded by county as full tiger line data at the following website: http://www2.census.gov/cgi-bin/shapefiles2009/national-files
  - Source data was filtered by row were [ROADFLG] = yes to create the reference data set.

SUBMISSION 3: NTIA DATA MODEL SCHEMA CHANGES

The data model released on January 13, 2011 contained the following changes to the s2 data model:

- A new field was added to several feature classes called **Provider Type**
  - Provider Type is “Short Integer” and has domain values of 1, 2, or 3 (1= Broadband Provider, 2=Reseller, 3=other)
  - Most providers are calculated to be “1” (Broadband Provider). In some cases (e.g. State of Washington Public Utility Districts), providers are considered “Other” (value = 3).

- In the CAI feature class, the field **BBService** has been modified:
  - In S2 if the information was not known, the field was left blank (null)
  - In S3, if we do not have the information, Null’s must be changed to code U (for Unknown) – nulls will not be allowed.

- Three new fields have been added to the CAI feature class. Wherever possible, these values have been populated in the CAI data.
  - **PublicWifi** (Y, N or U)
  - **URL**
  - **CAIID**

CONNECTICUT SPECIFIC INFORMATION

Due to Connecticut's geography and population, over 99.5% of the census blocks in the state are less than two square miles. The need for us to break apart coverage based on blocks versus roads leads to a lot of unnecessary confusion as well as creates some distorted pictures when you try to visualize this information on a map. For this reason, all of the maps available on the CT.gov/broadband website are published after we convert all of the data to just use blocks.

In the documentation form NTIA there has been a lot of discussion about making sure that a provider uses the same DBA and FRN consistently across all feature classes. We mentioned this to the providers, but there was some push back, especially from the national carries. In many of these cases the parent organization owns all of the middle mile infrastructure and utilizes one FRN for that. The actual distribution may often times be a smaller division of the organization, or may have been an acquired operation, and so the actual service will be listed under a different DBA and/or FRN.

There is also one provider that has given us two very similar DBA names: "DSL.net, Inc." and "DSLnet Communications, LLC". Each has a unique FRN. When we asked if we could merge these under one name, the company came back and was very adamant that we must keep these as separate and distinct entities. We honored that request and the data was submitted to NTIA as provided to us.

In regards to the NTIA sub domains concerning technology and speed, Connecticut has a few exceptions that we should note:

- Cablevision has reported to us that they serve an area with both Cable-DOCSIS 3.0 and Cable-Other, and that in this region "they advertise a maximum download speed of 101 MBPS (Tier 10)". We did ask the provider to clarify if the Tier 10 speed was for either technology type or only the DOCSIS 3.0 records? We also asked if there was an "Other" technology that might also deliver 101MBPS. Every time we asked, the provider simply responded with their original answer "they advertise a maximum download speed of 101 MBPS." So you will note that Cablevision has records with Technology codes of 40 and 41, with download speed tier 10.
- Verizon New York Inc. reported to us that they provide both fiber to the end user and ADSL service to some areas of the state. Most of their service is in fact fiber to the end user, but in the other locations they report that there is fiber run most of the way, but not into the actual premises. They are advertising this alternative as ADSL, with max advertised download speeds in tier 9.

On the NTIA webinar on March 17th, it was recommended that the states generalize their wireless data submissions, to include filling or dropping small areas, and reducing the number of vertices. Unfortunately due to the extremely late timing of this notice, we were not able to act on these recommendations. Many of our providers require in their NDA's that we process the data and then give them at least 10 business days to review and comment on any changes. Instead, we will look into adopting these changes in our fall submission.

District of Columbia Spring 2011
State Broadband Availability Data Collection and Verification Technical White Paper

Award #:	**11-50-M09011**
Award Period:	**10/1/2009 - 9/30/2014**
Project Type:	**State Broadband Data Development**
Organization Name:	**District of Columbia Office of Chief Technology Officer**
Project Title:	**ARRA SBDD - District of Columbia OCTO**
Contact:	**Barney Krucoff, Geospatial Technology Manager**
Email:	**Barney.Krucoff@dc.gov**
Submission Date:	**April 1, 2011**

Introduction

The National Telecommunications and Information Administration (NTIA), a division of the U.S. Department of Commerce, through the Broadband Data Improvement Act (BDIA), has sponsored the State Broadband Data and Development Grant Program. This Program is designed to fund projects that gather comprehensive and accurate state-level broadband mapping data, develop state-level broadband maps, aid in the development and maintenance of a national broadband map, and fund statewide initiatives for broadband planning.

The following white paper describes the data integration and verification processes employed by the District of Columbia in preparation of the Broadband Availability data set submitted to NTIA on April 1, 2011. This data collection is to be conducted on a semi-annual basis over a five-year period. The "Spring 2011 Technical White Paper" will be the third round of ten semi-annual submissions by the District of Columbia and attempts to reflect conditions in the field as of December 31, 2010 or later.

The paper is divided into seven sections:

Section 1 - Data Description: describes April 1, 2011 deliverables to NTIA;

Section 2 - Provider Participation: summarizes provider cooperation;

Section 3 - Data Collection: describes outreach and collection efforts;

Section 4 - DC geospatial data: describes the role of DC GIS data in broadband data processing;

Section 5 - Data integration and processing: describes data manipulation steps; and

Section 6 - Data validation: describes efforts to validate the data received.

Section 7 – Documentation and Submittal: Includes the NTIA final checklist steps.

SECTION 1 - DATA SUBMISSION DESCRIPTION

The District of Columbia's spring 2011 submission consists of the following files:

DC_SBDD_20110401.zip – Consolidates all other files for the purpose of data transfer.

DC_SBDD_2011_04_01.gdb – An ESRI file based geodatabase that conforms to the data model distributed by NTIA. It contains primary data and metadata. The District provides NTIA with five sets data:

- **Community Anchor Institutions** – The location of community serving institutions and information about their broadband connections – if known.
- **Middle Mile Connections** – The locations and attributes of infrastructure that interconnects broadband networks.
- **Wireless Broadband Availability** – The service territories and attributes of wireless broadband providers including terrestrial fixed wireless and satellite.
- **Wireline Broadband Availability –** The territories and attributes of wireline broadband providers by year 2000 Census Blocks.
- **Metadata –** Information about the data sets described above.

DC_DataPackage_2011_04_01.xls –A report on broadband providers contacted and the status of their submissions.

DC_2011_04_01.txt – An analysis of DC_SBDD_2011_04_01.gdb known as the "data submission receipt." This file is created by an automated script supplied by NTIA.

DC_Methodology_2011_04_01.pdf – An electronic version of the following document.

DC_Readme_2011_04_01.txt – A reduced file with the same information found in the header and section 1 of this white paper.

SECTION 2 - PROVIDER PARTICIPATION

- The PSC initially identified and contacted perspective 146 broadband providers.
- Of those, 34 are believed to be providing broadband service in the District and are listed in DC_DataPackage_2011_04_01.xls.
- Of those provided 28 availability data (either wireline and or wireless).
- Six don't provide service in District within 10 days.
- Only 8 provided middle mile data.

SECTION 3 - DATA COLLECTION

Collection of Broadband Availability Data

The District of Columbia Office of the Chief Technology Officer ("OCTO") was awarded a grant from NTIA to map the availability of broadband services in the District of Columbia ("District"). OCTO has delegated to the District of Columbia Public Service Commission ("PSC") the responsibility for all interaction, including data collection, with the broadband service provider community.

Process Steps

1. **Identifying and Contacting Broadband Providers**
   - The work of identifying providers is conducted by the PSC. The PSC reviewed its own records and those of the FCC. Firm identified as providers were:
     1. All firms in PSC records as providing any kind of telecommunications service in the District.
     2. All firms identified by the FCC has having filed a form 477 for broadband service in the District.
     3. Satellite providers were also contacted.
     4. The initial identification of providers took place prior to the spring 2010 data call and has been refined for each NTIA submission. The PSC reviewed the list of identified providers for fall 2010 and was able to weed out several firms that clearly were not in business within the District.
2. **Contacting providers -** The PSC requested the assistance and cooperation of all commercial broadband service providers that provide service to any residential, business, institutional, or government entity located within the District, to provide the PSC with broadband service location data. Beginning in fall 2010 and continued into spring 2011, providers were asked to submit information regarding technologies and services that they **resell** and were not limited to providing data only regarding **facility-based** services.

   Whenever possible, providers are initially contacted by email. The package of material sent by the PSC to providers:
     - **A letter from the Chairman of the District of Columbia Public Service Commission.** Sample letters can be found in **Appendix 1**. Providers receive one of following three letters:
       - A letter to companies that have never submitted mapping data.
       - A letter to companies who submitted mapping data in round two.
       - A letter to companies who submitted round three data before even being asked.

- **Non-Disclosure Agreement** (NDA) The PSC offers every provider opportunity to enter into a NDA between OCTO and the Provider. The standard OCTO NDA is shown in **Appendix 2**. The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of the public website on broadband services available within the District that is under construction by OCTO. Key provisions of the District's standard NDA include:
    - OCTO will give the data NTIA for the National Broadband Map.
    - The service territories of individual providers will not be made public by OCTO, but OCTO has created a public web site that allows users, including potential broadband service subscribers, to enter any valid address in the District of Columbia and be referred to all the broadband service providers offering service to that location.
    - Form 477 subscriber count data from all companies will be aggregated by OCTO at the Census Tract level. OCTO will use this information to estimate the residential broadband adoption rate by Census Tract. Estimated broadband service adoption rates will be made public, but the market share of individual broadband service providers will not be revealed.
- **Provider submission form -** For spring 2011, OCTO and PSC revised the data request form. The form is a Microsoft Excel based questionnaire which is accompanied by a glossary. **Appendix 3** contains a copy of the form and glossary. The form collects information on:
    - The Provider (Includes: business name, DBA name, FRN#, URL, etc.)
    - Transmission Technology
    - Business type (facility based or reseller)
    - Service Territory
    - Maximum advertised and typical upload and download speeds
    - Wireless spectrum
    - Middle mile connection points

3. **Handling providers –** While we hope that all providers complete our forms, not all do. In practice OCTO will accept a variety of submission types and our policy to is work with providers interactively via email and phone whenever we or they have questions.

SECTION 4 - THE ROLE OF DC GEOSPATIAL DATA

DC GIS maintains several datasets that are integral to processing provider submissions. Each dataset and how it is employed is described below:

DC GIS Data Set (Click link to view and double click and zoom)	**Description**	**How the data is used in broadband processing**
Imagery	6" resolution 2010 ortho corrected imagery	GIS analysts superimpose provider service territory on imagery to ensure that submission fit the ground in a credible way. For example, do we have wireline service over water or parks?
DC Base Map	1" to 100' planimetric map.	Used similarly to imagery.
Master Address Repository	A precisely located point for every address in the District	Used to process address lists submitted by broadband providers. Also used to locate and map Community Anchor Institutions.
Planning, Landuse and Zoning	Includes existing land use in the District	Used to ensure that broadband providers who provide high speed service to business are not shown as providing service in residential areas.
Education Libraries Health Public Safety Recreation	A variety of GIS layers that include Community Anchor Institutions locations	Used to identify and survey as many Community Anchor Institutions as possible.

SECTION 5 - DATA INTEGRATION

1. **Submission Check-in**
   - Provider data submissions are received in several ways
   - Attachments to emails sent to the PSC.
   - Transfer of data by means of a USB drive.
   - Providers upload the data to a secure OCTO FTP site.
   - Provider mails the data to either PSC or OCTO, if data is received directly by OCTO, a GIS analyst will then check-in the data, make a copy and submit the original to the PSC.
   - Entered into a PSC submission tracking spreadsheet.
   - Scanned for viruses.
   - Given an initial review to ensure that each major component is present.
   - PSC will then contact OCTO that new data has arrived. The transfer of the data from.

- **Feedback from returning providers** – PSC and OCTO encourage feedback from returning providers. Providers may reference previous submissions and review check plots.

- **OCTO Submission Processing Data Attributes**
  - After the submission has been checked in by the PSC and received by OCTO, an excel "Provider Status" table is created to follow the progress or status of the broadband data that is being received. The first column lists the date the data was received, the second column, the provider name, the additional columns are represented by the fields in the data model. A "yes" or "no" is placed in the corresponding row of each provider indicating if that data type is received. Processing steps vary based on the type of data submitted [wireless, wire line or middle-mile] and the type of data provided [GIS data, Paper/PDF, data table, etc.].

  - **Wireline Data Processing -** The information that was collected, with regard to the data model on Wireline availability is as follows:
  - Provider Name
  - Doing Business As
  - FRN (Federal Registration Number)
  - Census Tract and Block number
  - Technology of Transmission (DSL, Cable, Satellite, etc.)

Technology of Transmission Codes		
Technology Code	Description	Details
10	Asymmetric xDSL	
20	Symmetric xDSL	
30	Other Copper Wireline	All copper-wire based technologies other than xDSL (Ethernet over copper and T-1 are examples)
40	Cable Modem – DOCSIS 3.0	
41	Cable Modem – Other	
50	Optical Carrier/Fiber to the End User	Fiber to the home or business end user (does not include "fiber to the curb")
60	Satellite	
70	Terrestrial Fixed Wireless - Unlicensed	
71	Terrestrial Fixed Wireless - Licensed	
80	Terrestrial Mobile Wireless	
90	Electric Power Line	
0	All Other	Any specific technology not listed above

- Maximum Download speed (greater than 768 kbps)
- Maximum Upload Speed (greater than 200 kbps)
- Typical Download Speed
- Typical Upload Speed

- **OCTO Submission Processing Geographic**
  - **Service territory description -** In order for a provider to be eligible and have their data processed, the Company's service territory should offer service to new customers within 10 days of a service order without extraordinary effort. Note: A Company can have multiple service territories within the District of Columbia, and those territories need not be contiguous. NTIA requires that the service territory be mapped to the nearest Census Block. Companies have several options for describing their service territory:
  - Initially, it is necessary to determine whether the Company meets the definition of a "**District-wide broadband service provider."** The Company must "offer broadband service" to the "entire District of Columbia." The following definitions apply:
    - o **"Broadband service"** is the provision to end users of two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (Kbps) downstream and greater than 200 Kpbs upstream.
    - o **"Offer"** means that the Company can provide broadband service to end users (a residential, business, institutional or government entity) within 10 business days of a service order without an extraordinary commitment of additional resources. C also interprets offer to be a commercial service we are not mapping free services such as Wifi hotspots at this time. District of Columbia Government free Wifi hotspots are included in the Community Anchor Data.

- The **"entire District of Columbia"** means that a wireline company offers service to residential, business, institutional, or government end users in every Census Block in the District. This definition expressly excludes parkland, cemeteries, institutional campuses, bodies of water, and military bases. The definition also excludes real estate complexes where the landlord, condominium association, or similar entity controls the provision of wireline service. Even if the firm doesn't offer service in some or all of these areas, it can still be a District-wide provider, which simplifies the submission. This caused some problems with OCTO's fall 2010 submission where we now believe some service territories where overstated. In spring 2011 any firm claiming to be a citywide provide received greater scrutiny. In particular providers that service businesses with Ethernet of copper where restricted to reporting service in commercial, high density residential, and industrial areas as shown on the District's **Existing Land Use Map**.
- If the Company meets the definition of a District-wide broadband service provider, the description of the Company's service territory is complete. If the answer was "no," then an option must be selected to describe the Company's service territory. Any of the following may be attached to the e-mail to describe the Company's service territory:
- A **Detailed Map(s)** – Submitted maps should delineate the service area boundaries and label all DC streets within those boundaries. The map may be a PDF file. Geographic Information System (GIS) or Computer Aided Design files may be submitted in lieu of a map.
- A **List of Census Blocks –** The Company may provide a list of Census Blocks in which they offer service. The list should be provided in a Microsoft Excel File or Text File with each Census Block listed on a separate row. ***Excel File***

A3 | fx | 1

	A	B	C	D	E	F	G	H
1	County	Tract	Down	Up	Tech		Residential	%Residential
2	1	18.03	2	3	1		1	100
3	1	18.04	2	3	1		2	100
4	1	21.01	2	3	1		1	100
5	1	22.01	2	3	1		1	100
6	1	22.02	2	3	1		1	100

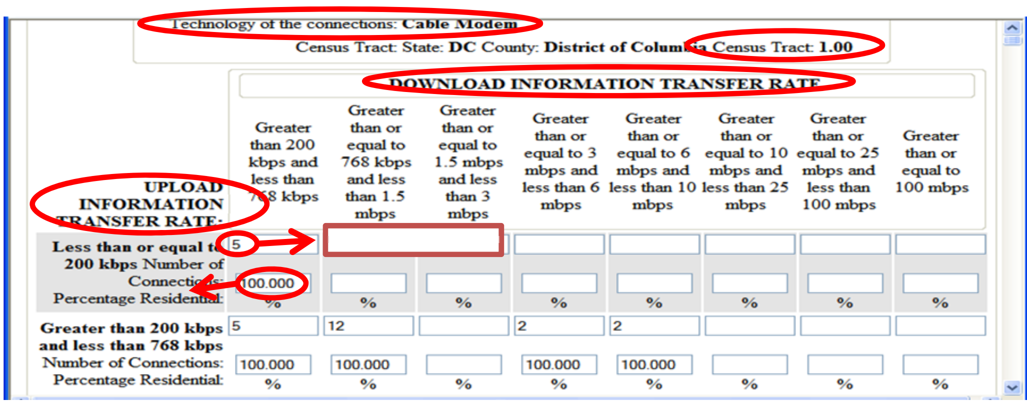
Sheet1 Sheet2 Sheet3

Ready 100%

- A **Written Description –** The Company may describe one or more polygons. For example, a service territory in part of downtown could be described as "East of 23rd Street NW, South of K Street NW, West of 17th Street NW, North of Constitution Ave NW. " Alternatively, the territories can be described by using buffers, for example, "Within 500 feet of 441 4th Street NW Washington DC 20001."

- **Address File** - If service is only offered to certain addresses, a list of those addresses may be submitted. Address lists (whether for buffering or not) should be submitted in a Microsoft Excel table or text file with each address on a separate row. Address lists are geocode to the structure using the District's **Master Address Repository.** OCTO encourages providers to submit all addresses where service can be provided within 10 days not just the address of current subscribers.

- **Form 477** – The Form 477 already includes a list of Census Tracts where the firm has existing customers. Census Blocks nest within Census Tracts. Optionally, the Company may indicate that it wishes to use the Census Tracts already listed within its Form 477, minus a list of Census Blocks within those Tracts in which it does not offer service.



- **Wireless Data Processing-** If the firm is a **wireless broadband (Internet) service provider**, the following questions were asked in a questionnaire:
  - Is Cellular spectrum (824-849 MHz; 862-869 Mhz) used to provide service? (Y/N)
  - Is 700 MHz spectrum (698-758 MHz; 775-788 MHz; 805-806 MHz) used to provide service? (Y/N)
  - Is Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995 MHz) used to provide service? (Y/N)
  - Is Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service? (Y/N)
  - Is Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service? (Y/N)
  - Is Unlicensed (including broadcast television "white spaces") spectrum used to provide service? (Y/N)
  - Is Specialized Mobile Radio Service (SMR) spectrum (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz) used to provide service? (Y/N)

- Is Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz; 3650-3700 MHz) used to provide service? (Y/N)
- Is Satellite (L-band, Big LEO, Little LEO, 2GHz) spectrum used to provide service? (Y/N)
- Wireless providers often provided a polygon shapefile of their coverage areas and if they were a existing provider they communicated if the coverage information has changed. For the most the majority of the wireless providers provided coverage for the entire District.

- **Middle Mile Data Processing -** Broadband service providers were also asked for a list of "middle-mile and backbone interconnection points" in the District of Columbia. Interconnection points are facilities that provide connectivity between (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are middle-mile and backbone interconnection points. Middle-mile and backbone interconnection points typically enable relatively fast data rates, are built to handle substantial capacities, and may be service-quality assured. Examples might include: points of interconnection enabling communications between an incumbent local exchange carrier's central office and the Internet, between a cable aggregation point (headend) and the Internet, or between a wireless base station and the provider's core network elements that connect to other networks, including the Internet.

Record Format for Middle-Mile and Internet Backhaul Connection Points Data for Each Provider

Field	Description	Type	Example
Provider Name	Provider Name	Text	ABC Co.
DBA Name	Doing-business-as name	Text	Superfone, Inc.
FRN	FCC Registration Number	Integer	8402202
Ownership	Is the facility owned (0) or leased (1)?	Integer	0
Serving Facility Capacity	Serving capacity of transport facility (see details below)	Integer	1
Serving Facility Type	Type of transport facility (1=Fiber; 2=Copper; 3=Hybrid Fiber Coax (HFC); 4=Wireless)	Integer	1
Latitude	Latitude in decimal degrees	Float	38.884560
Longitude	Longitude in decimal degrees	Float	-77.028123
Elevation	Elevation relative to grade to the nearest foot (positive integers indicate above grade, negative below grade)	Integer	-10

  - Providers were asked to fill out an excel spreadsheet asking information based on the table shown above. Providers were asked if they had middle mile locations within the DC area and to list each location in the table on the spreadsheet. Locations that fell within the DC area were geocoded and a point file was created.

Data Review and Consultation with Providers

- If a component of the submission is missing, the OCTO GIS analyst will contact PSC for assistance to receive the missing data from the provider.
- PSC and OCTO will schedule several meetings before final submittal: to review what providers has submitted data and who has not; and discuss action points that need to be addressed, i.e. which provider needs to be contacted again. Review the process and how it can be improved.
- The excel "Provider Status" table is reviewed at each meeting and updated several times during the process to follow the progress of the each data submission and to ensure that attempts have been made to contact the provider.
- As a result of inquiries from NTIA about DC's round 2 data, we are spending more time talking to providers, particularly those who claim to offer citywide service. Most providers respond openly and are willing to make changes to their submissions when questions are raised.
- The NTIA receipt script is run against each provider submitted dataset separately. Repairs and reruns are iterated as may be required.

- **Community Anchor Institutions**
  As part of the reporting requirements for the grant, OCTO is required to collect a list of Community Anchor Institutions (CAI). The dataset provides information on the broadband service available at these institutions. The dataset 'District of Columbia Community Anchor Institutions' consists of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities within the District.
  - The data was compiled by OCTO from data submitted by various district agencies and/or institutions contacted directly via a phone and e-mail survey.
  - From this list, DC Government is required to collect specific information on broadband service usage (technology type, and download/upload speeds) for each identified institution.
  - For locations not supported by the District of Columbia, a follow-up survey with the managing agency was conducted to identify the internet service type and service speed. The responses were compiled and attributed as defined by the State Broadband Data and Development Grant Program. Non-government Community Anchors: Non-government community anchors were contacted individually via a phone and e-mail survey. The survey requested the internet service type and service speed at the institution's location(s). The responses were compiled and attributed as defined by the State Broadband Data and Development Grant Program. Appendix 4 contains a copy of the Community Anchor Survey instrument.

- The NTIA receipt script is run against Community Anchor Data separately. Repairs and reruns are made as may be required.

SECTION 6 - DATA VALIDATION

During this stage, data from providers are compared with data from other sources. Discrepancies are noted and sent to the contributing provider for comment. Validation techniques vary by the type of data submitted [wireless, wire line, or middle-mile]. The following steps were taken to validate the data submitted:

1. **Wireless Validation -** The District completed drive testing of major wireless providers. Drive test were completed in a single vehicle employing multiple laptops and GPS. This was accomplished by installing computer and GPS hardware and software in a vehicle and testing and mapping upstream and downstream transmission speeds. Some new wireless providers were not tested during the second round. These are noted in the validation field of DC's data submission. To this time, DC has not shown the drive test data to providers nor discussed our collection techniques with them. This data was collected with public funds and is not covered by NDAs, but DC has not made a decision to release it publically at this time. The good news is all providers who claim to be providing citywide wireless service are providing it, and to that end DC will declare all providers who submitted service territories to be "valid" in tomorrow's data submittal. That said, speed of service does drop below the definition of broadband, and does very across providers, place, and time. Appendix 3, describes the wireless verification results. DC did not conduct new drive testing for spring 2011. The fall 2010 drive testing results can be found in **Appendix 5.**

2. **Wireline Validation**
   - The District, through PSC, has made extensive use of FCC Form 477 data. The Form 477 was used to: verify that we have contacted the correct providers; compare the technology of transmission and speed of transmission between what was reported to the FCC and what was submitted by the provider; Compare the geography reported to the FCC in census tracts with the areas submitted to the District in census blocks. Where discrepancies were found, the providers were asked for more information.

   - The District purchased a database of broadband subscribers from a commercial mailing list company InfoUSA. The dataset is used to crosscheck data coming from providers. The commercial mailing is not definitive, where discrepancies have been found, the providers were asked for more information. **Appendix 6** contains a sample wireline validation map showing a DSL providers submitted service territory and black dots where InfoUSA reported subscribers.

- **Middle Mile Validation –** To date the district has not attempted to validate middle mile data other than checking locations against GIS base data to be sure they are plausible.

3. **Final Review –** Due directly from question we receive following round 2 about DC's data submission, all data, now undergoes a standup review conducted jointly by OCTO and PSC staff. Do service territories seem plausible? Do speeds seem realistic? How do speeds compare to other providers using similar technologies? What is the total DSL, Cable, Fiber, coverage does that seem plausible?

4. **Amalgamation and documentation** - Unless a provider's submission is conclusively invalidated (which hasn't happened) and the issue cannot be resolved with the contributing provider, it is included in the amalgamation phase. Until this stage, OCTO handles each submission separately. During this stage, all successful submissions are appended to the latest version of the NTIA/NSGIC geodatabase model, and FCC-requested transmittal forms are prepared.
    - The data is appended to the NTIA geodatabase model.
    - Quality Review the amalgamated data is given a final quality review by the GIS Analysts involved in the broadband grant program.
    - FGDC Compliant metadata is prepared and included in the geodatabase.
    - The NTIA provided script is run for the last time on the data set as a whole.

SECTION 7 - DOCUMENTATION AND SUBMITTAL

Once past the quality review, the data sets are submitted to NTIA/FCC via secure FTP. FCC data package documents are included. The checklist provided by NTIA is followed:

Number	Question
1	Have you obtained a new clean Transfer Data Model?
2	Have you followed the instructions for loading data into the Transfer Data Model?
3	Have you run the receipt process (SBDD_CheckSubmission) and resolved all data integrity issues?
4	Have you included your receipt text file as part of the package?
5	Have you populated the metadata fields?
6	Have you exported the metadata as .xml files?
7	Have you obtained a new data_package.xls and filled it out appropriately?
8	Have you included methodological description?
9	Have you followed the required naming conventions of all the files?
10	If you are resubmitting any data for the current collection, have you (a) deleted your previous submission (b) informed the Program Office or the FCC of your resubmission and (c) resubmitted your entire data package (e.g., the Program Office is not accepting an partial submissions)?

Appendix 1
Sample Letters
From
DC Public Service Commission
To
Perspective Broadband Providers

PSC Letter to Companies that Have Never Submitted Mapping Data

Dear [Virgil: enter name of Priority #2 company's contact],

The District of Columbia Office of the Chief Technology Officer ("OCTO") has been awarded a grant from the U. S. Department of Commerce, National Telecommunications and Information Administration ("NTIA") to map the availability of broadband services in the District of Columbia ("District"). Pursuant to a Memorandum of Understanding, OCTO has delegated to the District of Columbia Public Service Commission ("Commission") the responsibility for all interaction, including data collection, with the broadband service provider community. To meet the objectives under the NTIA's State Broadband Data and Development Grant Program to create national and state broadband service availability maps, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services. **Please note that broadband service providers are requested to submit information regarding technologies and services that they resell and are not limited to providing data only regarding facility-based services.**

As you know, the Federal Communications Commission requires broadband service providers to file on March 1, 2011 the Form 477 to provide broadband service data, as of December 31, 2010, for their networks. In order to enable OCTO to identify any improvements or changes in the adoption rates for broadband services within the District, I request that you provide us with a copy of the Form 477 for the [Virgil: insert company's name] ("Company") broadband services in the District of Columbia ("District") which you file with the FCC.

Attached to this email is a copy of OCTO's "District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)" which should be filled out by your Company and submitted along with the copy of the March 1, 2011 Form 477 for the District.

The requested copy of your Company's Form 477 for the District and the completed "District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)" should be submitted to the Commission by Monday, March 7, 2011. The March 1, 2011 Form 477 for the District and the completed Round 3 Questionnaire should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. A secure FTP site is available for companies that prefer that method of transmittal.

If the Company does not currently provide broadband Internet services to a residential, business, institutional, or government entity located within the District, please inform the Commission of such fact in an email response to Mr. Young. In such a case, there is no need to submit the Questionnaire.

We are also providing you with a simple Non-Disclosure Agreement (see attachment: "NDA Form.doc" ("NDA")). The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of OCTO's website on broadband services available in the District. At your discretion, to restrict the distribution of your Company's submitted data, review, sign, and return the NDA with the submission of the Questionnaire to the Commission.

Thank you for completing this data request. We have attempted to make the process minimally burdensome, but understand that questions may arise. Should you have any questions regarding this request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman

District of Columbia Public Service Commission

Attachments:

1. District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)
2. District of Columbia - Mapping Questionnaire – Definitions
3. NDA Form

PSC Letter co Companies that submitted mapping data in previous rounds.

Dear [Virgil: insert name of Priority #1 company contact],

The District of Columbia Public Service Commission ("Commission") and the District of Columbia Office of the Chief Technology Officer ("OCTO") would like to thank you for the Fall 2010 (Round 2) submission of broadband service data to map the availability of the [Virgil: insert company's name] ("Company") broadband services in the District of Columbia ("District").

This email concerns the Company's Spring 2011 (Round 3) submission. In order to meet the objectives under the National Telecommunications and Information Administration's State Broadband Data and Development Grant Program to create national and state broadband service availability maps, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services. **Please note that broadband service providers are requested to submit information regarding technologies and services that they resell and are not limited to providing data only regarding facility-based services.**

As you know, the Federal Communications Commission requires broadband service providers to file on March 1, 2011 the Form 477 to provide broadband service data, as of December 31, 2010, for their networks. In order to enable OCTO to identify any improvements or changes in the adoption rates for broadband services within the District, I request that you once again provide us with a copy of the Form 477 for the District which you file with the FCC.

Attached to this email is a copy of OCTO's "District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)" which should be filled out by your Company and submitted along with the copy of the March 1, 2011 Form 477 for the District.

The requested copy of your Company's Form 477 for the District and the completed "District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)" should be submitted to the Commission by Monday, March 7, 2011. If applicable, the original Non-Disclosure Agreement with OCTO is still effective and will be honored. The March 1, 2011 Form 477 for the District and the completed Round 3 Questionnaire should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. A secure FTP site is available for companies that prefer that method of transmittal.

Should you have any questions regarding this request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman
District of Columbia Public Service Commission

Attachments:

1. District of Columbia - Mapping Questionnaire – Spring 2011 (Round 3)
2. District of Columbia - Mapping Questionnaire – Definitions

PSC Letter co Companies only lacking a Form 477

Dear [Virgil: insert name of company contact],

The District of Columbia Public Service Commission ("Commission") and the District of Columbia Office of the Chief Technology Officer ("OCTO") would like to thank you for the recent submission of Round 3 broadband service data to map the availability of the [Virgil: insert company's name] ("Company") broadband services in the District of Columbia ("District").

As you know, the Federal Communications Commission requires broadband service providers to file on March 1, 2011 the Form 477 to provide broadband service data, as of December 31, 2010, for their networks. In order to enable OCTO to identify any improvements or changes in the adoption rates for broadband services within the District, I request that you once again provide us with a copy of the Form 477 for the District which you file with the FCC.

The requested copy of your Company's Form 477 for the District should be submitted to the Commission by Friday, March 4, 2011. As usual, the original Non-Disclosure Agreement with OCTO is still effective and will be honored. The March 1, 2011 Form 477 for the District should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. A secure FTP site is available for companies that prefer that method of transmittal.

Should you have any questions regarding this request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman
District of Columbia Public Service Commission

Appendix 2
Standard Non-discloser Agreement

NON-DISCLOSURE AGREEMENT

(District of Columbia Broadband Service Mapping)

This **Non-Disclosure Agreement** ("**Agreement**") is between the Office of the Chief Technology Officer of the District of Columbia ("OCTO") and _________________ ("Company"), a corporation having a business address at ____________________ ____.

RECITALS

A. Company wishes to disclose and OCTO wishes to receive certain information from Company represented by Company to be confidential and commercial / proprietary information (hereinafter collectively, "Information") pertaining to ________________. This exchange includes all communication of Information between the parties in any form whatsoever, including oral, written and machine readable form, pertaining to the above.

B. OCTO wishes to receive and Company wishes to disclose the Information for the sole purpose of participating in national broadband service mapping activities. OCTO will disclose the information only in the following ways:

To The public:

- The service territories of individual providers will not be made public, but OCTO will create a public web site that allows users, including potential broadband service subscribers, to enter any valid address in the District of Columbia and be referred to all the broadband service providers offering service to that location.

- Form 477 subscriber count data from all companies will be aggregated by OCTO at the Census Tract level. OCTO will use this information to estimate the residential broadband adoption rate by Census Tract. Estimated broadband service adoption rates will be made public, but the market share of individual broadband service providers will not be revealed.

To the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA):

- The broadband service data required by the NTIA in the Notice of Funds Availability; clarification published in the Federal Register; August 7, 2009 (74 FR 40569).

To the Metropolitan Police Department and the District of Columbia Homeland Security and Emergency Management Agency:

- Middle-mile connection points will be added to the District's critical infrastructure data base. This critical infrastructure database is used only for public safety purposes.

These data will not be shared outside law enforcement and homeland security communities.

AGREEMENTS

Therefore, OCTO and Company agree as follows:

1. That the disclosure of Information by Company is in confidence and thus OCTO agrees to:

a. (1) Not disclose the Information to any other person, and (2) use at least the same degree of care to maintain the Information confidential as OCTO uses in maintaining as confidential its own confidential information, but always at least a reasonable degree of care;

b. Use the Information only for the above purpose;

c. Restrict disclosure of the Information solely to those employees or contract staff of OCTO having a need to know such Information in order to accomplish the purposes stated above; The District Government operates an in-house broadband service provider known as DC Net, accordingly, the Information expressly will not be shared by OCTO with DC Net as an organization or its employees.

d. Advise each such individual, before he or she receives access to the Information, of the obligations of OCTO under this Agreement, and require each such individual to maintain those obligations.

2. This Agreement imposes no obligation on OCTO with respect to any portion of the Information received from Company which: (a) was known to OCTO prior to disclosure by Company, (b) is lawfully obtained by OCTO from a third party under no obligation of confidentiality, (c) is or becomes generally known or publicly available other than by unauthorized disclosure, (d) is independently developed by OCTO or (e) is disclosed by Company to a third party without a duty of confidentiality on the third party.

3. This Agreement imposes no obligation on OCTO with respect to any portion of the Information unless such portion is: (a) disclosed in a written document or machine readable media marked as “COMMERCIAL / PROPRIETARY INFORMATION” at the time of disclosure, or (b) disclosed in any other manner and summarized in a memorandum mailed to OCTO within thirty (30) days of the disclosure. Information disclosed by Company in a written document or machine readable media and marked “COMMERCIAL / PROPRIETARY INFORMATION” includes, but is not limited to, the items, if any, set forth in the request for broadband service data from the District of Columbia Public Service Commission (“Commission”); attached hereto. The Commission’s request for broadband service data is incorporated herein by reference. OCTO hereby acknowledges receipt of the items listed in the Commission’s request for broadband service data, if any.

4. The Information shall remain the sole property of Company.

5. In the event of a breach or threatened breach or intended breach of this Agreement by either party, the other party shall be entitled to preliminary and final injunctions, enjoining and restraining such breach or threatened breach or intended breach.

6. OCTO agrees it will not export, directly or indirectly, any technical data acquired from Company or any product utilizing any such data to any country for which the U.S. Government or any agency thereof at the time of export requires an export license or other governmental approval, without first obtaining such license or approval.

7. The validity, construction, and performance of this Agreement are governed by the laws of the District of Columbia, and suit may be brought in the District to enforce the terms of this Agreement.

8. The rights and obligations of the parties under this Agreement may not be sold, assigned or otherwise transferred.

This Agreement is binding upon OCTO and Company and upon the directors, officers, employees and agents of each. This Agreement is effective as of the later date of execution and will continue indefinitely.

Office of the Chief Technology Officer of the District of Columbia

By

Name:________________________________

Title:_________________________________

Date:_________________________________

(Company)

By:

Name:________________________________

Title:_________________________________

Date:___________________________________

Appendix 3
Provider Questionnaire and Glossary
Microsoft Excel

District of Columbia - Mapping Questionnaire Spring 2011 (Round 3)

This questionnaire has three sheets. Each sheet collects a different type of information. Tabs at the bottom of the workbook allow users to switch among the three sheets.

Date Submitted:<mm/dd/yyyy>	
Company Name:	<Company Name>
Doing Business As:	
FRN #:	
Contact Name:	
Contact Email:	
Contact Address1:	
Contact Address2:	
Contact City, State Zip code:	

1.1 Provide a URL of the Company's website to which the District should refer potential broadband service subscribers.

1.2 Is your Company a facility based provider or a reseller? Please select the cell next to the technology that you provide and choose from the dropdown menu which business type applies.

Technology	Business Type	Technology	Business Type
10 Asymmetric		60 Satellite	
20 Symmetric		70 Terrestrial Fixed Wireless - Unlicensed	
30 Other Wireline		71 Terrestrial Fixed Wireless - Licensed	
40 Cable DOCSIS 3.0		80 Mobile Wireless	
41 Cable-Other		90 Electric Power Line	
50 Optical Carrier		0 Other	

1.3 If your company is a resller, who is the facility based provider(s)?

1.4 Complete the following dropdown table for each Technology of Transmission that your company provides.
(One row for each Technology of Transmission - click on the cell to view a list of selections per column).

	Technology Transmission		Districtwide	Maximum Advertised Speed		Typical Speed	
	Code	Description	Yes/No	Download Speed	Upload Speed	Download Speed	Upload Speed
(Ex.1)	*10 Asymmetric*		*Yes*	*768 kbps to 1.49 mbps*	*201 to 767 kbps*	*1.5 to 2.9 mbps*	*768 kbps to 1.49 mbps*
1							
2							
3							
4							
5							

** Districtwide Definition: The Company must be able to "offer broadband service" to the "entire District of Columbia", (residential, business, institutional or government entity within 10 business days of a service order without an extraordinary commitment of additional resources.) with advertised speeds of at least 768 kilobits per second (Kbps) downstream and greater than 200 Kpbs upstream.*

1.5 For each Technology of Transmission that was selected in 1.2 how long does it take to provide service to a customer after service has been ordered? (Click on the cell next to each Technology you provide and select the length of time from a drop-down list).

Technology	Length of time to provide service	Technology	Length of time to provide service
10 Asymmetric		60 Satellite	
20 Symmetric		70 Terrestrial Fixed Wireless - Unlicensed	
30 Other Wireline		71 Terrestrial Fixed Wireless - Licensed	
40 Cable DOCSIS 3.0		80 Mobile Wireless	
41 Cable-Other		90 Electric Power Line	
50 Optical Carrier		0 Other	

1.5 Please provide for each Technology of Transmission that was selected in questions 1.2 any of the following data formats for your service area (each data format should include technology of transmission, maximum advertised download and upload speed, typical download and upload speed):

- GIS or CAD file(s)

- Text file or Excel Spreadsheet listing service addresses

- Text file or Excel Spreadsheet with a list of Census Blocks with Tract numbers

(See graphic examples below of data formats)

In addition, please provide your Form 477 as of December 2010. Provide filename for each file provided below:

Ex. of Spreadsheet - Includes Census Tract and Block; Maximum Download and Upload Speeds; Typical

	A	B	C	D	E	F	G	H	I
1	Tract	Block	Technology	Max_Download	Max_Upload	Typ_Download	Typ_Upload	Total_Users	%_Residential
2	17.01	1000	10	8	8	5	3	25	100%
3	18.01	1000	10	8	8	5	3	175	78%
4	19.01	1000	10	8	8	5	3	62	95%

Sheet1 Sheet2 Sheet3

Ready 100%

Ex. Text File with Service Address - Includes Provider Name; FRN#; End-User Address; Technology of

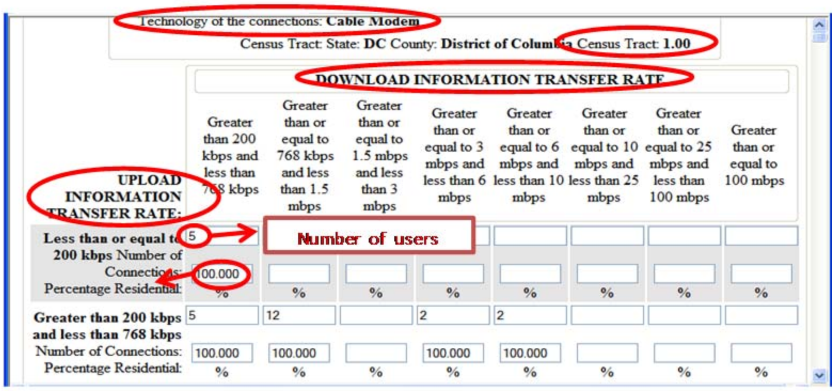
Sample_Address_Availability_DC - Notepad

File Edit Format View Help

```
Provider Name   FRN     ID      End-User Address        City    State   Zip     Technology of Transmission      Maximum Advertised Download Speed
Maximum Advertised Upstream Speed       Typical Download Speed  Typical Upload Speed

ACME Corporation        0001-2345-67    1       123 Main ST NW  123     WASHINGTON      DISTRICT OF COLUMBIA    20036   10      8       8       8       8
```

Ex. of Form 477 by Census Tract - Includes Technology of Transmission; Census Tract; Transfer Rate;



Proceed to Sheet 2 if you provide wireless broadband service.

<Company Name>

Wireless Spectrum Questions (Wireline only companies may skip this sheet.)

2.1 Is cellular spectrum (824-849 MHz; 862-869) used to provide service? (Y/N)

"Yes" or "No"

2.2 Is 700 MHz spectrum (698-758 MHz; 775-788 MHz; 805-806 MHz) used to provide service?

"Yes" or "No"

2.3. Is Broadband Personal Communications Services spectrum (1850-1915 MHz; 19301995) used to provide service? (Y/N)

"Yes" or "No"

2.4. Is Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.5. Is Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.6. Is Unlicensed (including broadcast television “white spaces”) spectrum used to provide broadband service? (Y/N)

"Yes" or "No"

2.7. Is Specialized Mobile Radio Service (SMR) spectrum (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.8. Is Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz; 3650-3700 MHz) used to provide broadband service? (Y/N)

"Yes" or "No"

2.9. Is Satellite (L-band, Big LEO, Little LEO, 2GHz) spectrum used to provide broadband service? (Y/N)

"Yes" or "No"

Proceed to Sheet 3.

Counter	Owned or Leased	*Serving Facility Capacity Code	**Serving Facility Type Code	Facility Address In DC (Street#, Street Name, Street Type, Quadrant)	*** Latitude (Optional if address provided)	*** Longitude (Optional if address provided)	Elevation (in feet from grade. Negative numbers are below grade)
Example	*Owned/Leased*	*(1-6) See below*	*(1-4) See below*	*123 Main Street NW*	*38° 53' 43.6" N*	*77° 0' 56.35" W*	*15*
				…add rows as needed			

* Serving Facility Capacity Code	Data Rate
1	Multiple T1s and less than 40 mbps
2	Greater than 40 mbps and less than 150 mbps
3	Greater than 150 mbps and less than 600 mbps
4	Greater than or equal to 600 mbps and less than 2.4 gbps
5	Greater than or equal to 2.4 gbps and less than 10 gbps
6	Greater than or equal to 10 gbps

** Serving Facility Type Code	Description
1	Fiber
2	Copper
3	Hybrid Fiber Coax (HFC)
4	Wireless

*** Coordinates must be expressed using the WGS 1984 geographic coordinate system.

Record Definitions	
Field	**Definition**
Provider Name	Provider Name
DBA Name	"Doing-business-as" Name
FRN	Provider FCC Registration Number
Technology of Transmission	Category of technology available for the provision of service at the address
Maximum Advertised Downstream Speed	Speed tier code for the maximum advertised downstream speed available at the address
Maximum Advertised Upstream Speed	Speed tier code for the maximum advertised upstream speed available at the address
Typical Downstream Speed	Speed tier code for the downstream data transfer throughput rate that most subscribers to service at the maximum advertised downstream speed (above) can achieve consistently during expected periods of heavy network usage
Typical Upstream Speed	Speed tier code for the upstream data transfer throughput rate that most subscribers to service at the maximum advertised upstream speed (above) can achieve consistently during expected periods of heavy network usage.

Appendix 4
Community Anchor Survey Instrument
Google Docs

District of Columbia - Community Anchor Institutions

The District of Columbia Office of the Chief Technology Officer ("OCTO") is in the third stage of the State Broadband Data and Development Map Program; awarded by the United States Department of Commerce, National Telecommunications and Information Administration ("NTIA") to map the availability of broadband services in the DC region.

One of the grant requirements is to list and track the availability of broadband service of Community Anchor Institutions ("CAI"):
1. Schools - K through 12
2. Libraries
3. Medical /healthcare
4. Public safety
5. University, college, other post secondary
6. Other community support – government
7. Other community support – nongovernmental

We would appreciate your assistance, as a CAI in the DC region, by filling out the questionnaire below. Please provide your response on or before, Friday, February 4, 2011.

If you have any questions, please feel free to contact either Adeola Dokun at (202) 724-2128 or David Lutz at (202) 478-5887. Thank you for your cooperation.

* Required

Contact Name *

Title *

Contact Phone Number: *

Contact Email: *

Name of Institution *

Institution Type *

Select

Address *
Street Address

City, State, Zip *

Institution Website *

Do you currently have broadband (internet) service at this institution? *

- Yes
- No

Name of broadband provider *

What type of Technology of Transmission does the institution use? *
Select

What is the maximum advertised download speed? *
Data transfer speed
Select

What is the maximum advertised upload speed? *
Data transfer speed
Select

Submit

Appendix 5
Wireless Validation

Mobile Broadband Mapping

Commercial Cellular Networks

District of Columbia

Bob Pavlak

Chris San-Gaspar

September 29, 2010

Mobile Broadband Mapping of Commercial Cellular Networks: District of Columbia

Executive Summary

The outdoor downlink and uplink throughput speeds of the commercial cellular networks serving the District of Columbia were measured in September 2010, and compared with measurements made in September 2009. In addition to the three networks tested in 2009 (Verizon Wireless, Sprint, AT&T), our 2010 measurements also include Cricket and T-Mobile.

The results of the drive test measurements are shown in the two attached files (2010 results, and 2009 results), and a qualitative analysis of the results is presented here. A more detailed quantitative analysis will be prepared later.

All five of the service providers deliver broadband service (minimum 768 kbps downlink and 200 kbps uplink) in some areas of the District. However, there is a wide variation in coverage performance. Throughput speeds may be above the "broadband" thresholds in some areas and below the "broadband" thresholds in other areas. This variation in performance is shown by the color codes on the attached citywide maps.

There is also a significant variation in performance between the cellular service providers. The downlink speeds of the AT&T and T-Mobile networks are substantially above the broadband threshold of 768 kbps, with many areas above 1.5 Mbps. The speeds on AT&T's network are substantially higher in 2010 compared to 2009, which we believe is attributed to the 3G upgrade of the AT&T network to HSPA (High Speed Packet Access), a more recent version of 3G. Both AT&T and T-Mobile operate network infrastructure based on the 3GPP (3rd Generation Partnership Project) set of standards.

The uplink speeds on the AT&T network is by far the highest of any of the commercial service providers. We believe this is due to the more advanced version of the 3GPP standard used by AT&T. Uplink speeds on AT&T's network exceed 768 kbps and 1.5 Mbps in all but a few areas of the drive route.

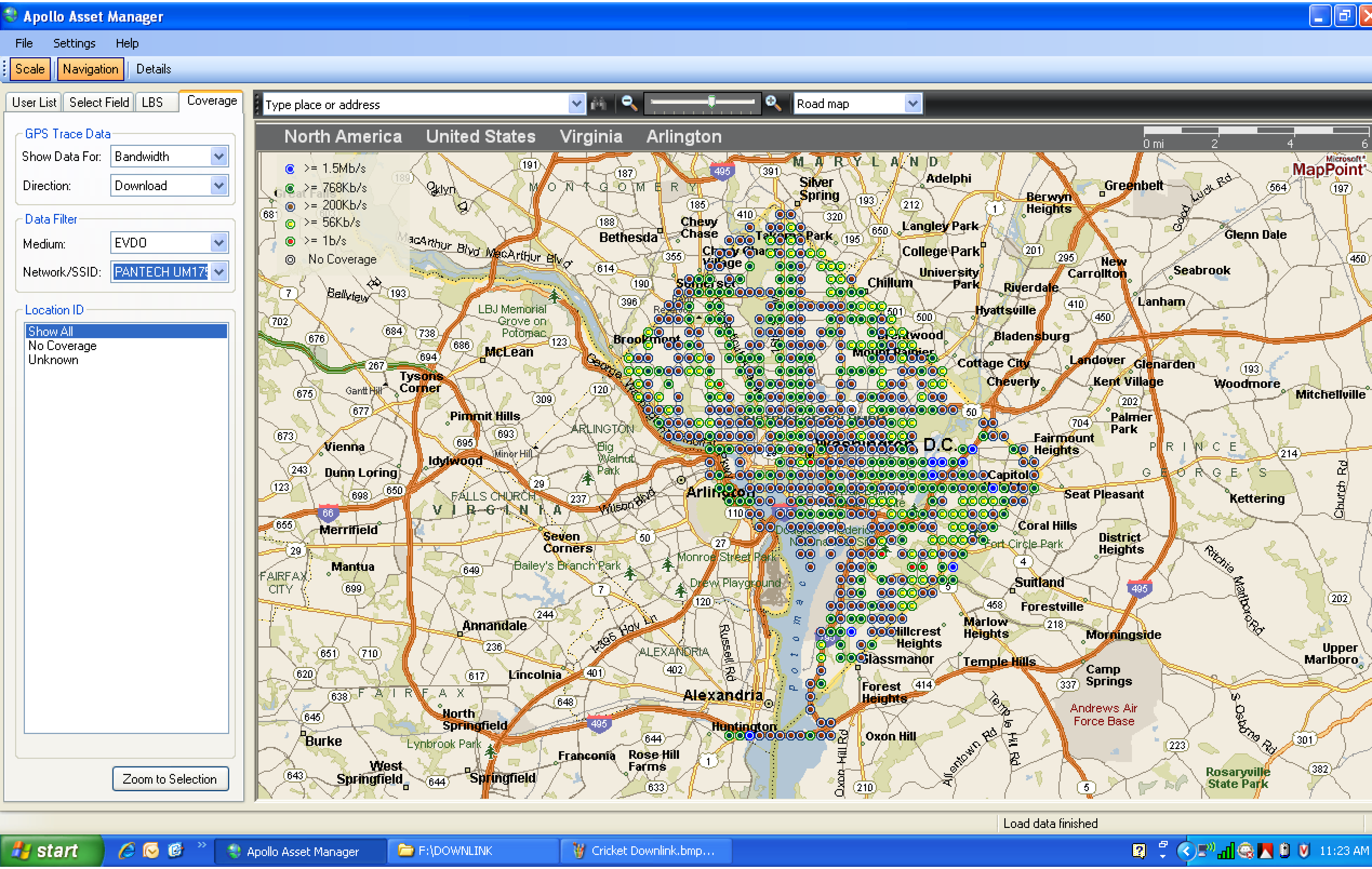
The downlink speeds on Verizon's network, between 2009 and 2010, appear about the same. The uplink performance has improved, with many areas in 2010 above 768 kbps. Many areas in 2009 were above 200 kbps uplink (but less than 768 kbps). Similarly, Sprint's downlink performance appears about the same between 2009 and 2010, and their uplink performance in 2010 is slightly improved from 2009, but not as high as any of the other service providers.

Sprint, via Clearwire, now offers 4G WiMax broadband service in the District. This network was not included in our broadband drive tests because the mobility performance of WiMax is poor. Sessions are frequently dropped during handoffs and the tool used for drive test measurements is unable to accommodate a high dropped session rate.

The authors wish to thank Felix Igbedior for his assistance in performing the drive tests with Chris San-Gaspar.

octo
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

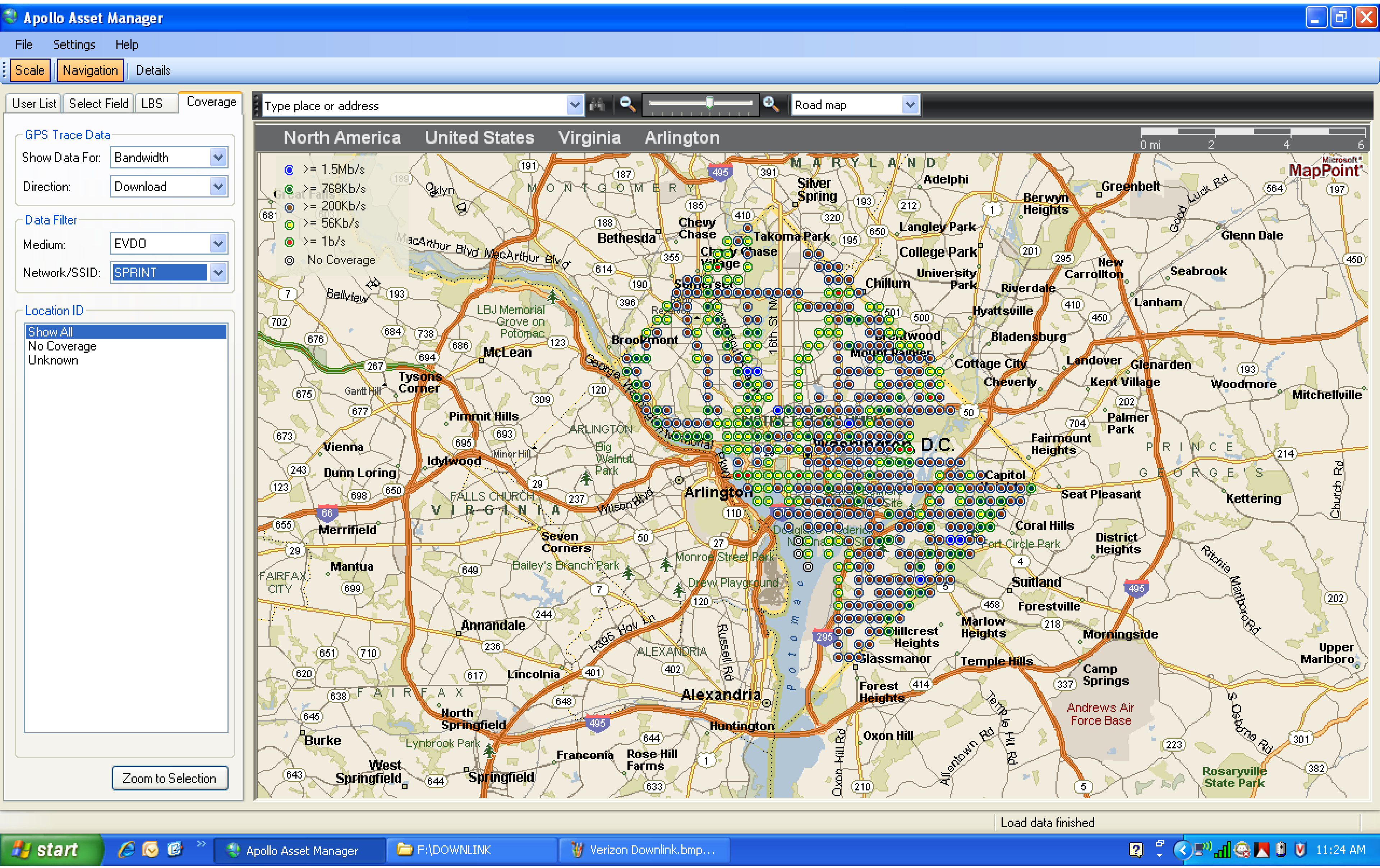
VERIZON DOWNLINK 2010



octo

DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

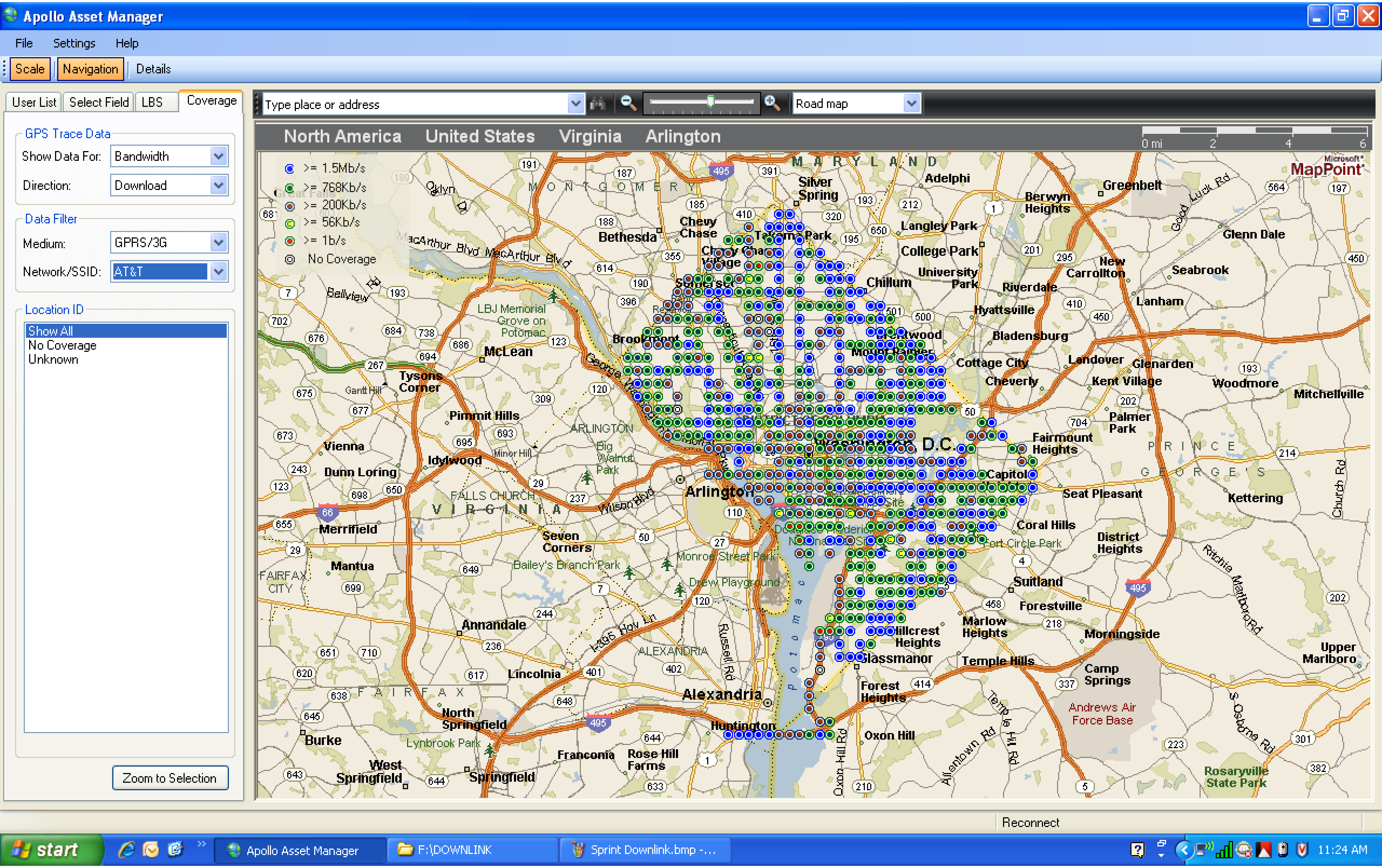
SPRINT DOWNLINK 2010



octo

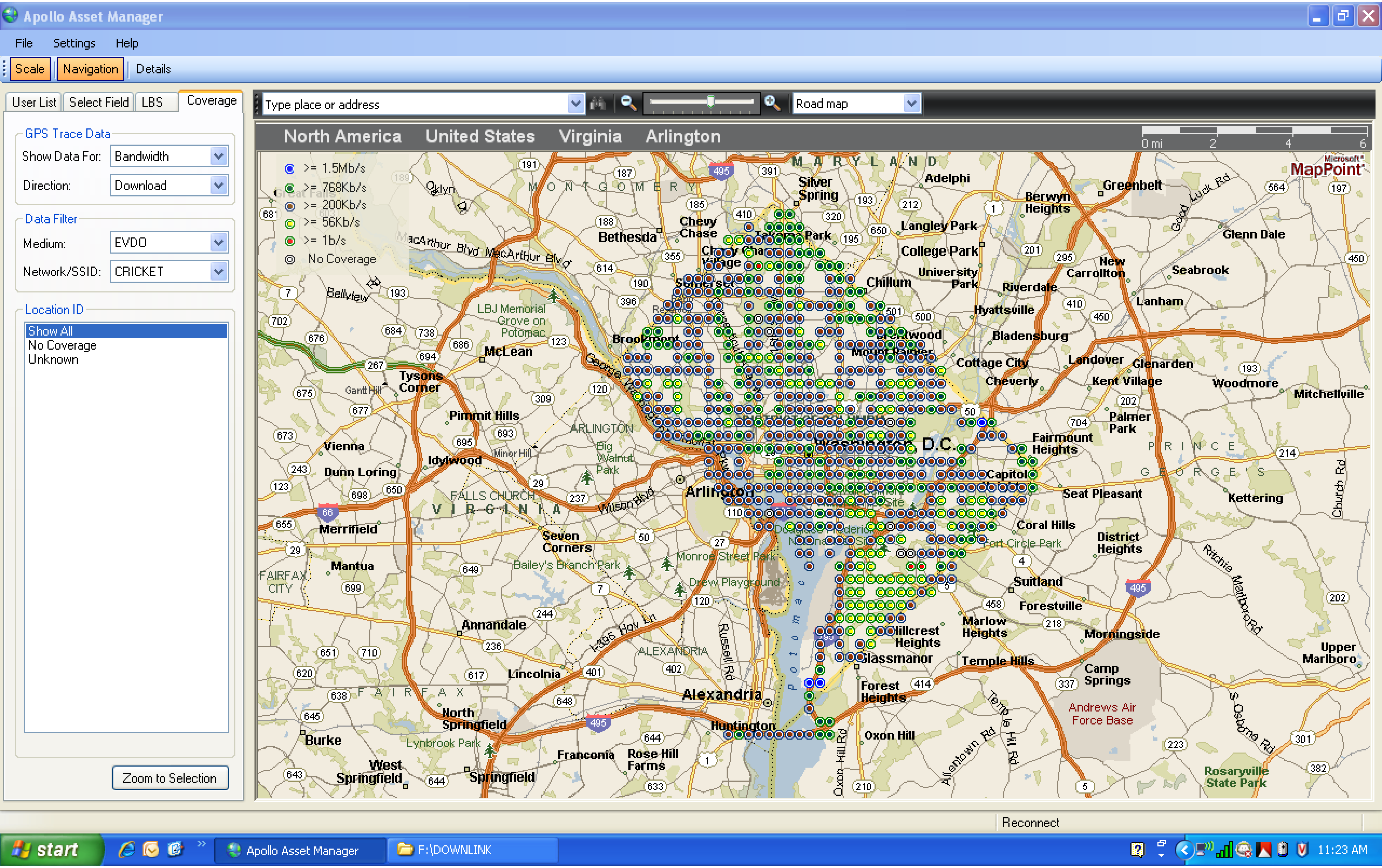
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

AT&T DOWNLINK 2010



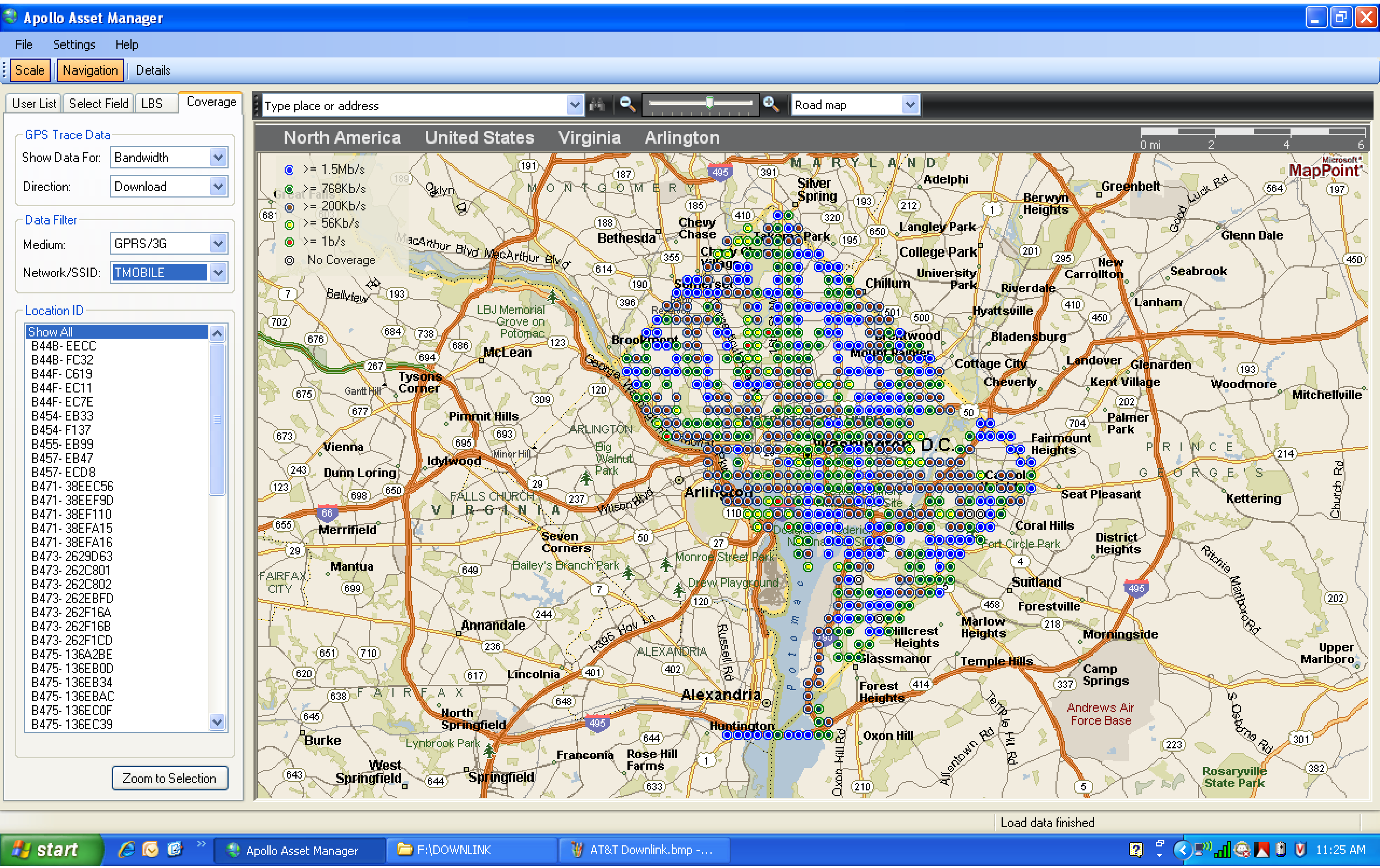
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

CRICKET DOWNLINK 2010



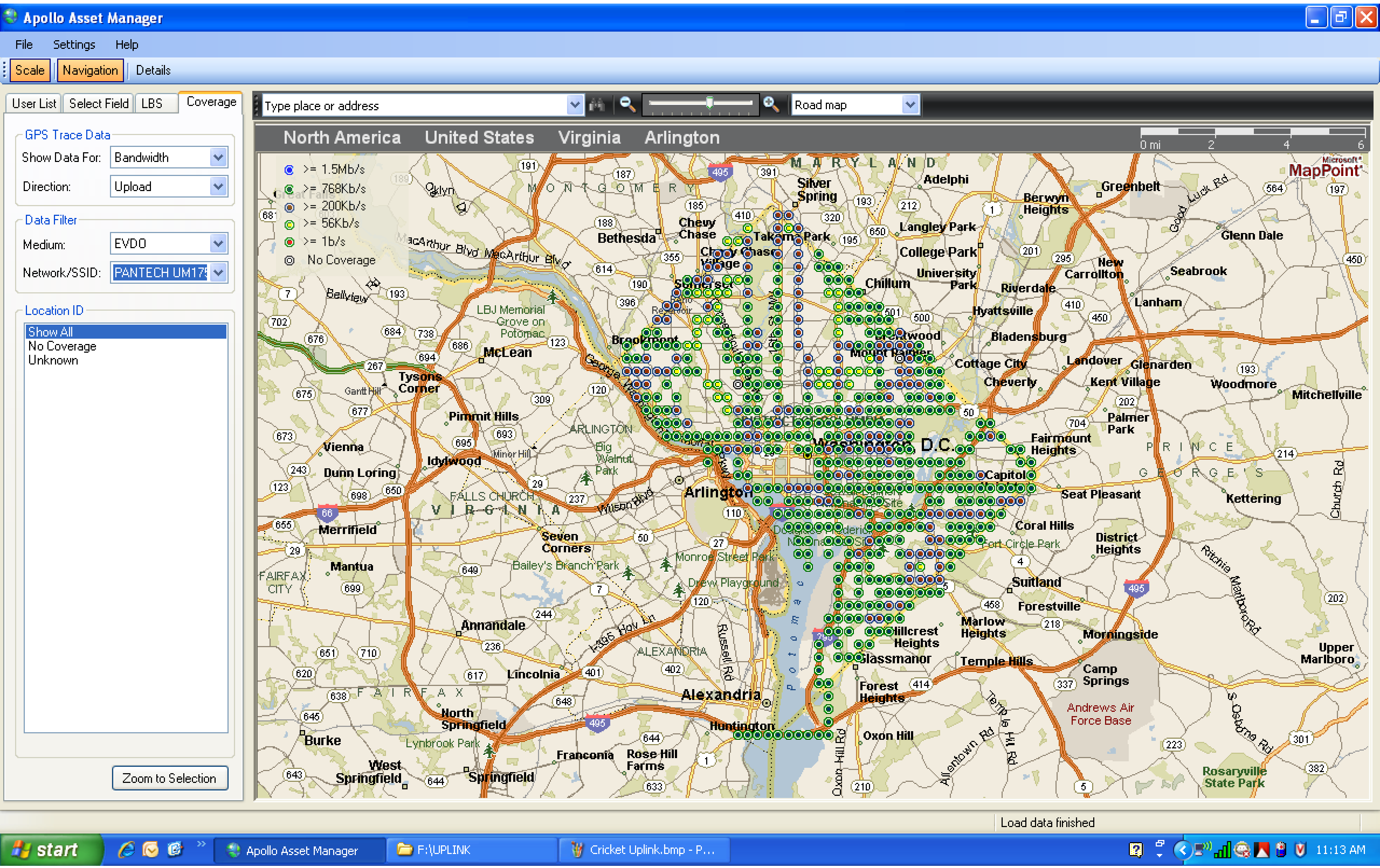
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

T-MOBILE DOWNLINK 2010



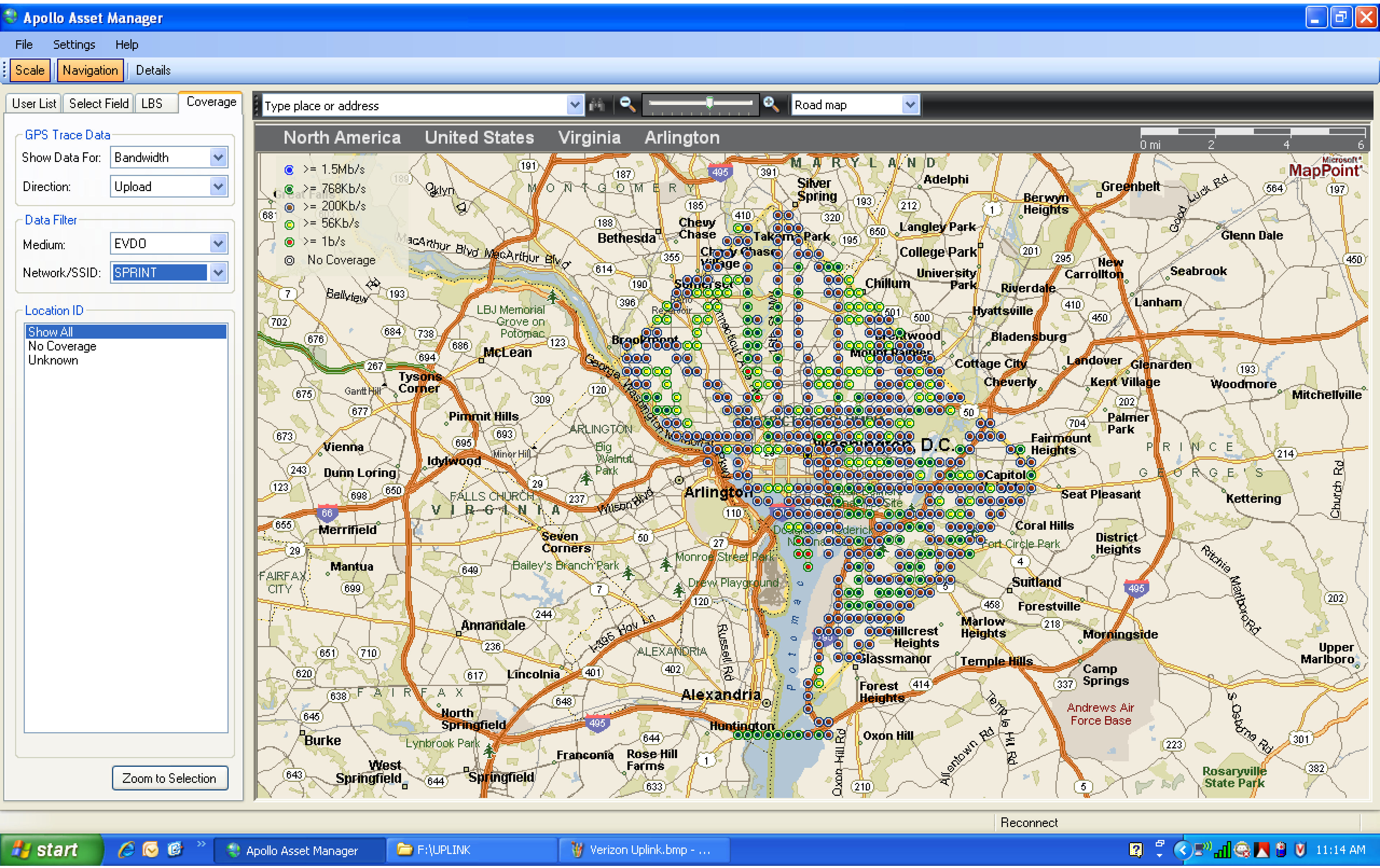
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

VERIZON UPLINK 2010



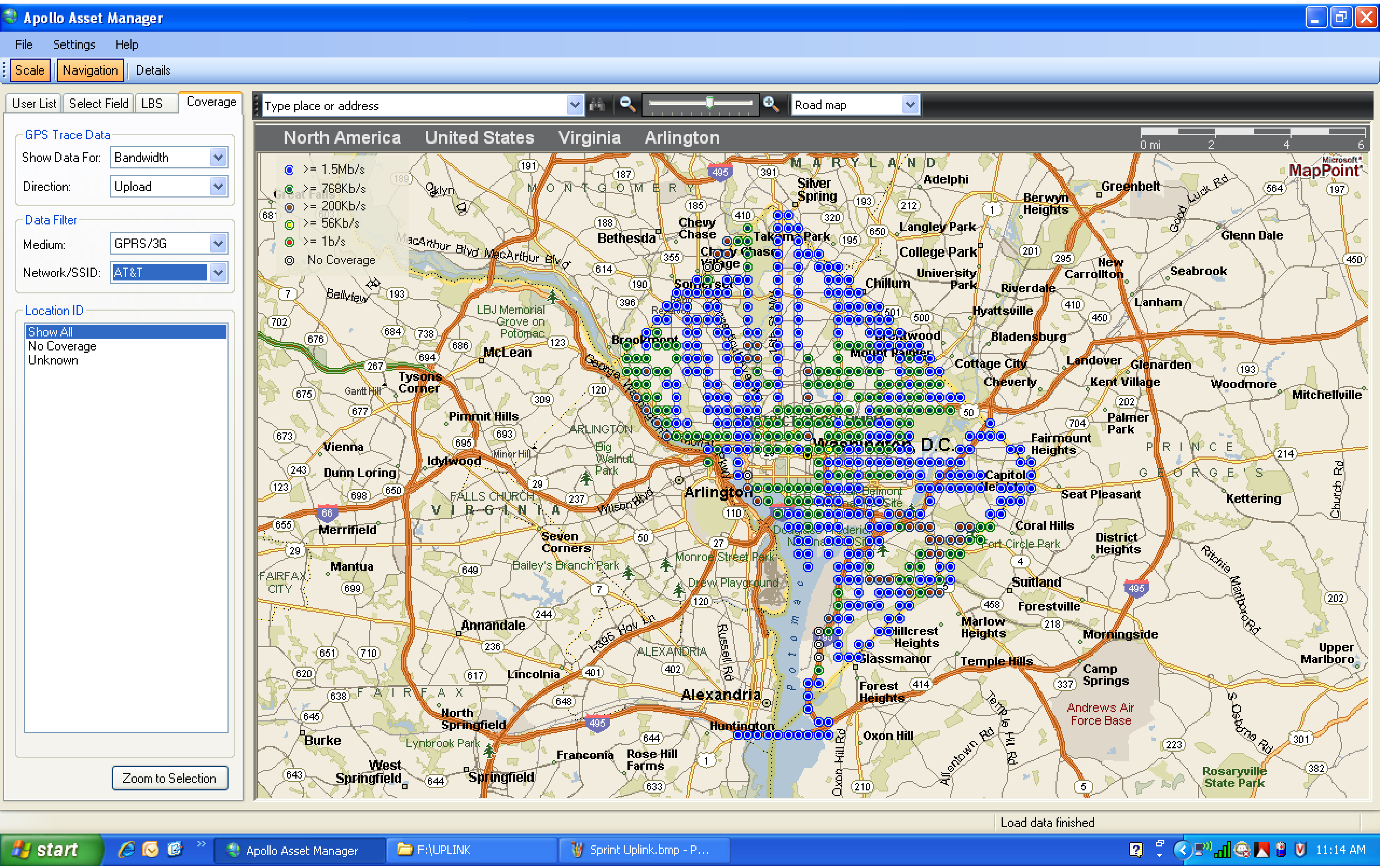
octo
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

SPRINT UPLINK 2010



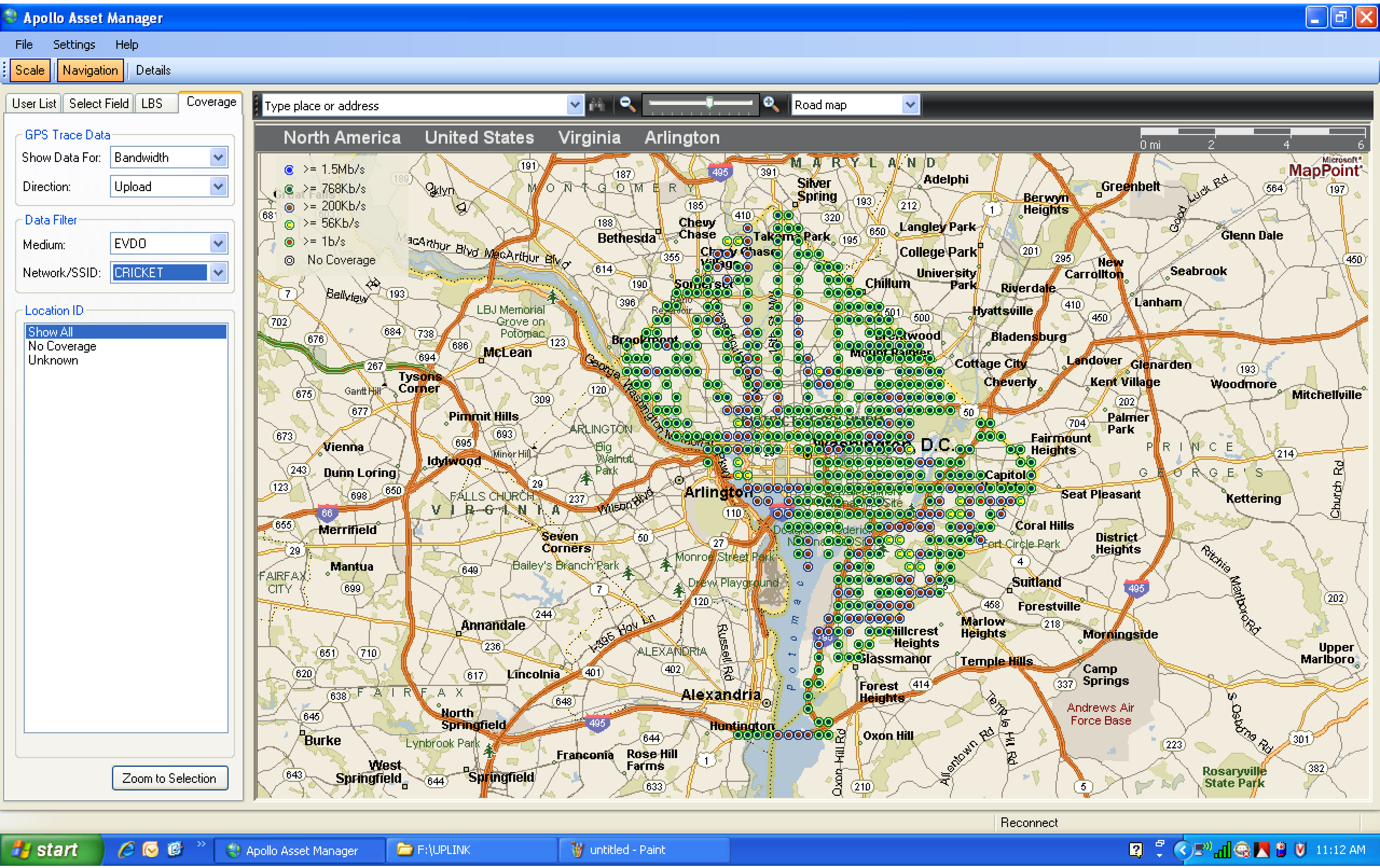
octo
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

AT&T UPLINK 2010



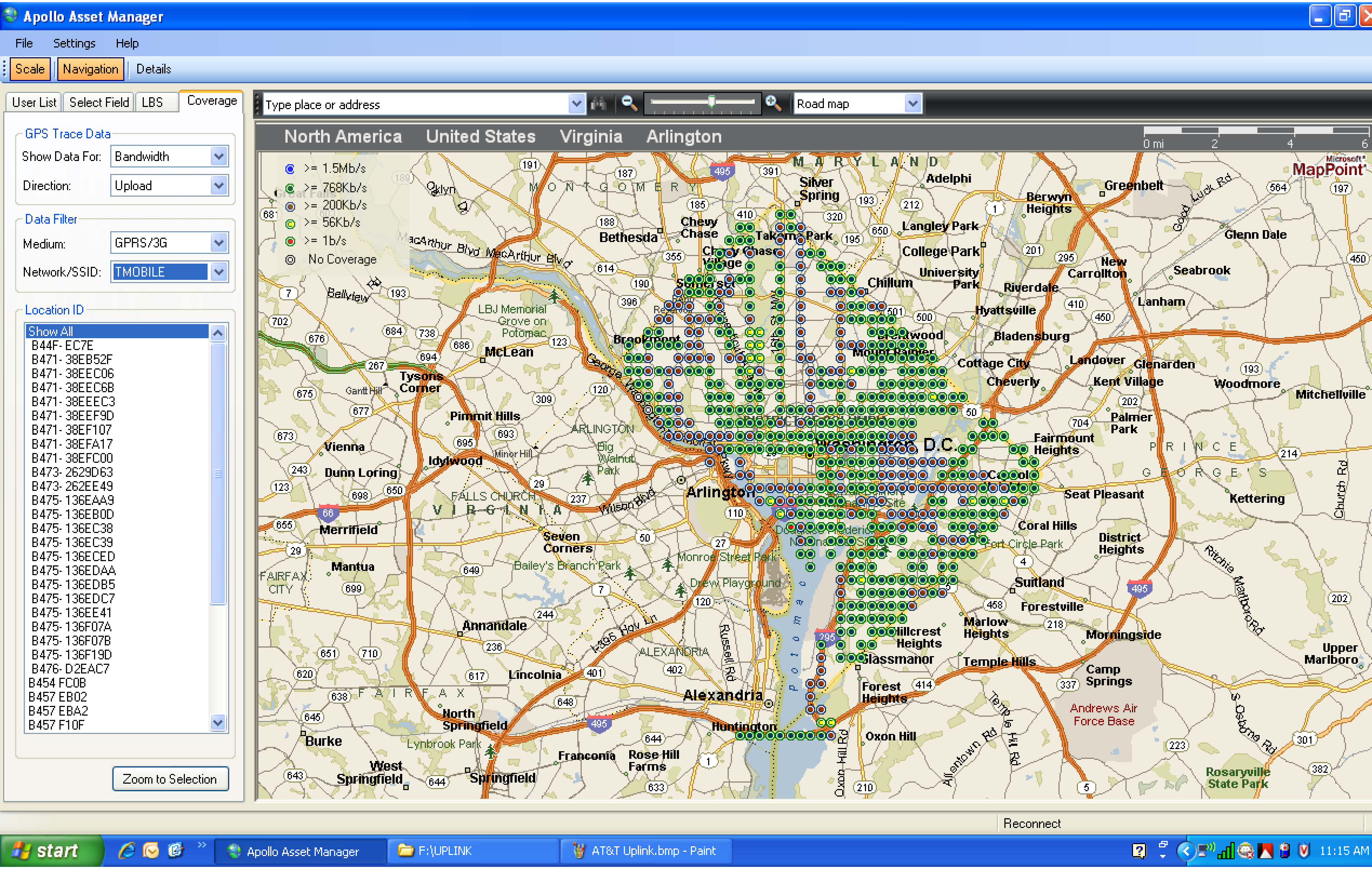
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

CRICKET UPLINK 2010

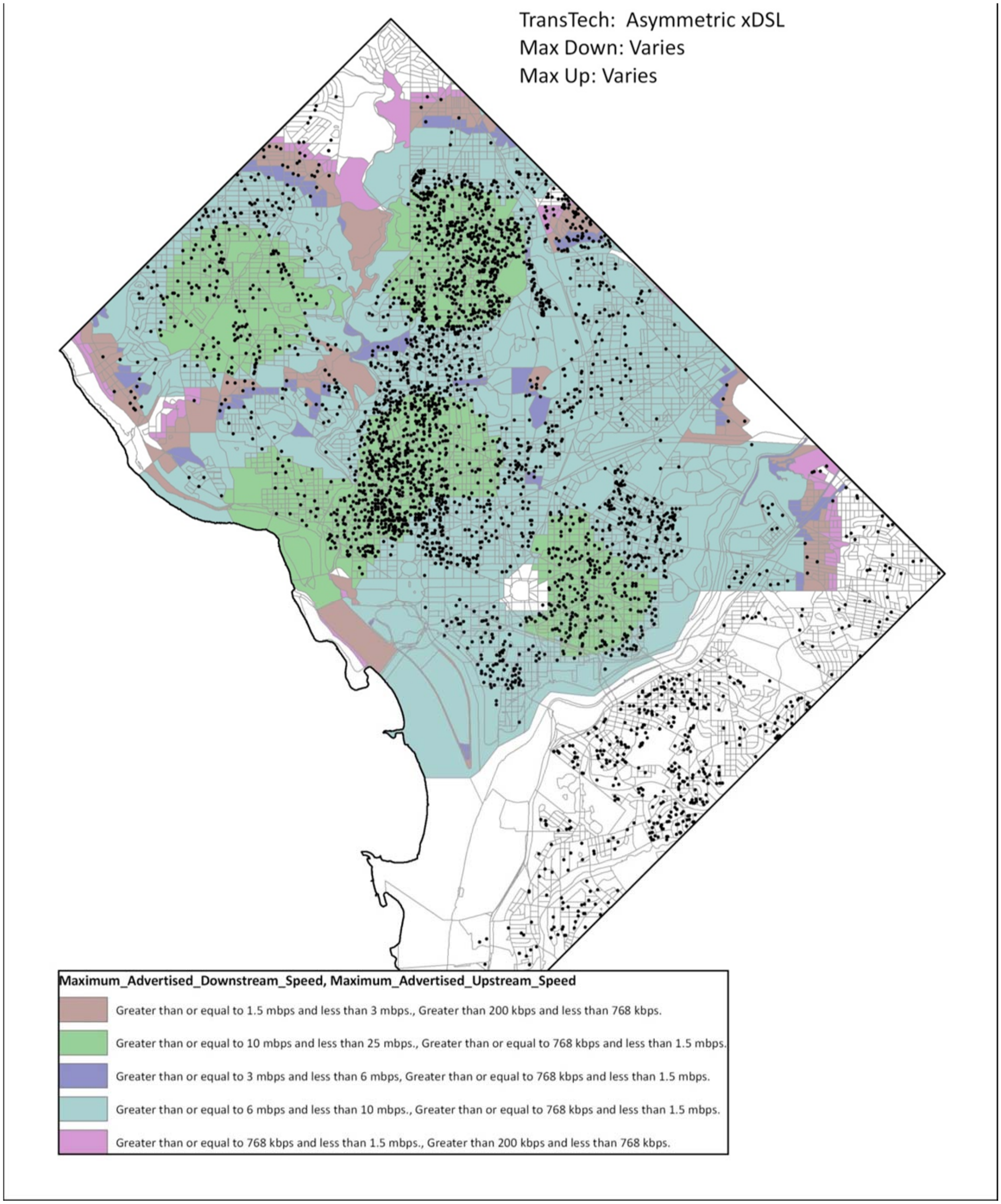


DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

T-MOBILE UPLINK 2010



Appendix 6
Wireline Validation Sample


TransTech: Asymmetric xDSL
Max Down: Varies
Max Up: Varies
Maximum_Advertised_Downstream_Speed, Maximum_Advertised_Upstream_Speed
Greater than or equal to 1.5 mbps and less than 3 mbps., Greater than 200 kbps and less than 768 kbps.
Greater than or equal to 10 mbps and less than 25 mbps., Greater than or equal to 768 kbps and less than 1.5 mbps.
Greater than or equal to 3 mbps and less than 6 mbps, Greater than or equal to 768 kbps and less than 1.5 mbps.
Greater than or equal to 6 mbps and less than 10 mbps., Greater than or equal to 768 kbps and less than 1.5 mbps.
Greater than or equal to 768 kbps and less than 1.5 mbps., Greater than 200 kbps and less than 768 kbps.

Submitted to:

Delaware Department of Technology and Information

Contract No. DTI-08-0013

Delaware Broadband Data and Development

Spring 2011 Data Submission White Paper

Submitted by:

GeoDecisions
A Division of Gannett Fleming

April 26, 2011

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1 Introduction

As part of the American Recovery and Reinvestment Act (ARRA), the National Telecommunications and Information Administration (NTIA) released its State Broadband Data and Development Grant Program[1] Notice of Funds Availability (NOFA). The NTIA then awarded the State of Delaware funding to create a database of broadband deployment (Project) in the State of Delaware (State). GeoDecisions and its team partner CBG Communications, Inc. (CBG) have been retained by the State of Delaware (collectively referred to as the "State Parties") to perform a variety of tasks as part of the Broadband Data Development process, with the goal being creation of maps of the State showing where broadband is available, Providers' names, and speeds or bandwidth provided to citizens, businesses, and anchor institutions throughout the State.

The NOFA requires mapping of facilities-based Providers' availability of broadband speed internet access in the State. The NTIA, in the NOFA, defined broadband as "Broadband service is 'available' to an end user at an address if a broadband service provider does, or could, within a typical service interval (7 to 10 business days) without an extraordinary commitment of resources, provision two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (Kbps) downstream and at least 200 Kbps upstream to the end user at an address."

The following specific project tasks were to be performed and completed by GeoDecisions and CBG with oversight by State staff:

- Drafting, negotiation, establishment, and status reporting of all Non-Disclosure Agreements (NDAs) with broadband service Providers to support the Delaware broadband expansion initiative.
- Mapping of broadband Providers and service attributes, including technologies utilized and advertised speeds available to end users.
- Support of field verification of broadband mapping (using an approximately 35% sampling rate).
- Development of web-based mapping applications.
- Project, task, and contract management.
- Review of Provider marketing materials.
- Assistance in developing criteria for web-based surveys and speed tests.
- Quality Control and review of all deliverables.
- Assistance in the development of a data maintenance document.
- Identification and assessment of broadband infrastructure (using an approximately 35% sampling rate).

[1] http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf

- Participation in weekly status and project meetings with internal staff, NTIA, the University of Delaware, the State of Delaware, Providers, and all other stakeholders.
- Submission of weekly status reports.

The Project began with meetings with the State, GeoDecisions, and CBG to map out the processes that needed to occur in order to produce an accurate map that included all known broadband Providers that were willing to participate in the project. It should be noted that broadband Providers (Providers) were not required to participate in the Project but were encouraged to provide data specific to their networks so the State would have maps that were as accurate as possible. Providers that applied for federal grant funds for network expansion or upgrades, however, would be eliminated from consideration for these grants if they did not cooperate with the State on this project.

1.1 List Compilation

The first task was to compile a list of all known broadband Providers throughout the State and contact information for each of these Providers. Information from FCC databases, Internet research, and the State Parties' overall understanding of the broadband industry was utilized to compile the list.

1.2 NDA Negotiation

Contact was then made to each of the Providers to determine whether they had facilities in the State that provided broadband to end users. If so, the Providers were encouraged to participate in the project by providing the pertinent data needed to create the State's maps. Many Providers believe that some of the information required from them for participation is confidential and cannot be released to the general public. To overcome this obstacle, the State Parties created a Non-Disclosure Agreement (NDA) template whereby information deemed confidential by the Providers would not be released publically by the State Parties. The NDA also ensured that all information requested from the Providers is available for release to the NTIA as required by the NOFA. Based on the variation among Providers on what information is deemed confidential and varying interpretations of the template NDA, negotiations were held with many of the Providers to modify the NDA to meet the Providers' needs while still allowing the State Parties to utilize and share the information as required in the NOFA. Once the Providers and the State Parties signed an agreed-upon NDA, the data gathering process proceeded.

1.3 Data Gathering

As each Provider signed an NDA with the State Parties, they were referred to GeoDecisions' mapping department where they were asked to provide specific data in formats that would be compatible with the State's mapping process. Although many of the Providers had previously provided system data to the Federal Communications Commission (FCC), those submissions showed availability at the Census Tract level. The requirements of this Project were for mapping of network availability at the Census Bock level, which is more granular than previously submitted data. Furthermore, in Census Blocks that are larger than 2 square miles, data was gathered at the street segment level (eg. From # 1 First Street to #111 First Street). As Providers supplied this data, GeoDecisions created maps of the State showing where each of the Providers' footprint(s) was located, as well as other required attributes such as advertised speeds available in these areas and the technologies utilized to provide service to end users.

1.4 Provider Data Submittal

NTIA 3rd data submission included 20 Broadband providers data, 9 of the providers has submitted new data updates; the following is a brief description the data provided:

1- AT&T Mobility LLC.

DBA Name: AT&T

FRN	0004979233
Date of submission	2/10/2011
Type of Data Submission	• Coverage Shape File • Excel Sheet
Census Blocks	N/A
Road Segments	N/A
Middle Mile infrastructure	No
Technology of Transmission	Terrestrial Mobile Wireless
Data description	ATT provided a shape file that showed coverage over the three counties of Delware state. The excel sheet provided contained speed data, Technology of transmission & Mobile Spectrum.

2- Cavalier Telephone LLC.

DBA Name: Cavalier

FRN	0018547729
Date of submission	3/18/2011
Type of Data Submission	• Excel Sheet with Block coverage • Excel sheet with Middle Mile Address
Census Blocks	734
Road Segments	147
Middle Mile infrastructure	14
Technology of Transmission	Asymmetric xDSL Other Copper Wireline
Data description	Two excel sheet, one with blockId and coverage information (speed, technology), the other excel sheet has an address location for Middle Mile Infra-structure.

3- Comcast Cable Communications, LLC.

DBA Name: Comcast

FRN	0004441663
Date of submission	2/11/2011
Type of Data Submission	• Excel Sheet of changes of block coverage since last submission • Excel Sheet of changes of of street coverage since last submission • Excel Sheet with speed information
Census Blocks	10836
Road Segments	1281
Middle Mile infrastructure	No
Technology of Transmission	Cable Modem - Other Cable Modem - DOCSIS 3.0
Data description	Three excel sheets, the excell sheets were expressing the difference in coverage between june 2010 and December 2010.

4- DIECA Communications, Inc.

DBA Name: Covad Communications Company

FRN	0003753753
Date of submission	2/16/2011
Type of Data Submission	• Text file tab delemited with block coverage • Text File with Subscriber-Weighted Nominal Speed
Census Blocks	8564
Road Segments	No
Middle Mile infrastructure	No
Technology of Transmission	Asymmetric xDSL Symmetric xDSL Other Copper Wireline
Data description	Two text file tab deleminted.

5- Leap Wireless International, Inc.

DBA Name: Cricket Communications, Inc.

FRN	0002963528
Date of submission	2/11/2011
Type of Data Submission	• Shape file with Coverage, Technology, Spectrum, and speed
Census Blocks	N/A
Road Segments	N/A
Middle Mile infrastructure	No
Technology of Transmission	Terrestrial Mobile Wireless
Data description	Coverage Shape file.

6- Level 3 Communications, LLC.

DBA Name: Level 3 Communications, LLC.

FRN	0003723822
Date of submission	1/24/2011
Type of Data Submission	• End User Address location text file • Middle Mile Address location and X,Y coordinate text file.
Census Blocks	9
Road Segments	No
Middle Mile infrastructure	12
Technology of Transmission	Optical Carrier/Fiber to the End User
Data description	Two text files; End user text file address location with technology and speed information, and Middle mile Address location with X,Y coordinates, Servicing capacity and Type.

7- Medicom Communications Corp.

DBA Name: Mediacom Delaware LLC.

FRN	0003572633
Date of submission	3/17/2011
Type of Data Submission	• Excel sheet with End User Address location
Census Blocks	1713
Road Segments	224
Middle Mile infrastructure	No
Technology of Transmission	Cable Modem - DOCSIS 3.0
Data description	An excel sheet that has End Users Address, also it contain informatio about End User Type.

8- T-Mobile USA, Inc.

DBA Name: T-Mobile.

FRN	0006945950
Date of submission	2/18/2011
Type of Data Submission	• Shape file with Coverage Area • Text File with technology and Spectrum • Excel sheet with Subscriber Weighted Nominal Speed. • No Middle Mile Notice.
Census Blocks	N/A
Road Segments	N/A
Middle Mile infrastructure	No
Technology of Transmission	Terrestrial Mobile Wireless

Data description	A shape file that provides Broadband coverage with two different speed ranges for upload and download, the Technology and spectrum were provided by a different text file, Nominal speed came from an excel sheet.

9- Cellco Partnership and its Affiliated Entities.

DBA Name: Verizon Wireless.

FRN	0003290673
Date of submission	2/18/2011
Type of Data Submission	• Shape file for 4G Coverage • Shape File for 3G Coverage • Word document with Specturms and speed.
Census Blocks	N/A
Road Segments	N/A
Middle Mile infrastructure	No
Technology of Transmission	Terrestrial Mobile Wireless
Data description	The Two shape file provided Coverage area for different speed range (4G – 3G), a word document gives a discription of the speed and the spectrum used.

1.5 Data Processing

The method for processing the data varies depending on the data recived from each provider, the following is a breif summary of the steps taken to process the data for each provider.

1-AT&T Mobility LLC.

Processing Mobile Coverage Area	• Apply Repair Geometry on coverage Shape file • Load Repaired Shape file into Transfer data model using append. • Use excel sheet values to calculate technology, spectrum and speed. • Result is stored in BB_Service_Wirless

2- Cavalier Telephone LLC.

Processing Census Block Coverage Area	• Census block coverge excel sheet exported into dbf after adjusting column name (less than 11) • Select statement on the dbf file to separate Technology coverage 10 blocks & Technology Coverage 30 blocks. • Template of 2000 Census block < 2SQM joined twice, one time with Technology 10 dbf file (create Census

	block coverage of Asymmetric xDSL), second time with Technology Coverage 30 (create Census block coverage of Other Copper Wireline). • Merge is applied on both Census blocks to create Census Block Coverage • Census Block Coverage is Loaded to Transfer Data model using append. • Result is stored in “BB_Service_CensusBlock”
Processing Middle Mile infrastrcutre Points	• Middle mile address excel sheet is loaded into ArcMap. • Excel sheet is Geocoded using “10.0 US Geocode Services (ArcGIS Online), Middle Mile location (X,Y) acquired • Middle mile is loaded to Transfer data model using append. • Result is stored in “BB_ConnectionPoint_MiddleMile”
Processing Service Overview	• Template County feature class is loaded into ArcMap • Maximum Downaload and upload speed is calculated in each country • Two Overview county layer is produced, one layer per technology. • County layers are merged. • County layer are loaded into Transfer Data model using append. • Data stored in “BB_Service_Overview”

3- Comcast Cable Communications, LLC.

Processing Census Block Coverage Area	• Excel sheet with Census block difference is added to Arcmap and exported into dbf. • Select statement to split dbf file into New (added) block coverage, & Deleted (removed) block coverage • Perform join between previouse submission blocks & Deleted dbf to mark deleted block, then perform delete. • New Template of 2000 block is joined with New (added) blocks (match only), result is exported as New added blocks. • New added blocks is merged with Previouse submission modified blocks to come with Current coverage. • Current Coverage blocks are loaded into Data transfer model using append. • Result is stored in “BB_Service_CensusBlock”
Processing Service	• Template County feature class is loaded into ArcMap

Overview	• Maximum Downaload, upload speed and Subscriber Weighted Nominal speed is calculated in each country • Two Overview county layer is produced, one layer per technology. • County layers are merged. • County layer are loaded into Transfer Data model using append. • Data stored in “BB_Service_Overview”

4- DIECA Communications, Inc.

Processing Census Block Coverage Area	• Load provided text file into excel • Export text file into dbf after altering columns names • Separate dbf file into 3 technologies dbf files (Asymmetric xDSL - Symmetric xDSL -Other Copper Wireline) • Perform Join 3 times with Template census 2000 census block (one join per technology) • Merge the 3 feature classes into one coverage feature class. • Load the output feature class into the transfer data model. • Result is stored in “BB_Service_CensusBlock”
Processing Service Overview	• Template County feature class is loaded into ArcMap • Maximum Downaload, and upload speed is calculated in New Castle county for each technology. • Three Overview county layer is produced, one layer per technology. • County layers are merged. • County layer are loaded into Transfer Data model using append. • Data stored in “BB_Service_Overview”

5- Leap Wireless International, Inc. (Cricket)

Processing Mobile Coverage Area	• Apply Repair Geometry on coverage Shape file • Load Repaired Shape file into Transfer data model using append. • calculate technology, spectrum and speed. • Result is stored in BB_Service_Wirless

6- Level 3 Communications, LLC.

Processing End User Address	• Text file loaded into Arcmap • Geocoded text file using “10.0 US Geocode Services (ArcGIS Online), address location (X,Y) acquired • Format address field to match data model fields. • Load point feature into data transfer model using

	append. • Result is stored into “BB_Service_Address”
Processing Census Block Coverage Area	• Select by location End user points that are located inside Census block less than 2 SQM, and export the result as Points Less than 2SQM • Spatial join end user point and Census block 2000. • Export Joined blocks as a Block Coverage. • Load Block coverage into data transfer model using append. • Result is stored in “BB_Service_CensusBlock”
Processing Middle Mile infrastrcutre Points	• Middle mile address text file is loaded into ArcMap. • Text file is Geocoded using “10.0 US Geocode Services (ArcGIS Online), Middle Mile location (X,Y) acquired • Middle mile is loaded to Transfer data model using append. • Result is stored in “BB_ConnectionPoint_MiddleMile”
Processing Service Overview	• Template County feature class is loaded into ArcMap • Maximum Downaload and upload speed is calculated in each country • Overview county layer is produced • County layer is loaded into Transfer Data model using append. • Data stored in “BB_Service_Overview”

7- Medicom Communications Corp.

Processing End User Address	• Excel file loaded into Arcmap • Geocoded text file using “10.0 US Geocode Services (ArcGIS Online), address location (X,Y) acquired • Format address field to match data model fields. • Load point feature into data transfer model using append. • Result is stored into “BB_Service_Address”
Processing Census Block Coverage Area	• Select by location End user points that are located inside Census block less than 2 SQM, and export the result as Points Less than 2SQM • Spatial join end user point and Census block 2000. • Export Joined blocks as a Block Coverage. • Load Block coverage into data transfer model using append. • Result is stored in “BB_Service_CensusBlock”
Processing Service	• Template County feature class is loaded into ArcMap

Overview	• Maximum Downaload and upload speed is calculated in each country • Overview county layer is produced • County layer is loaded into Transfer Data model using append. • Data stored in “BB_Service_Overview”

8- T-Mobile USA, Inc.	
Processing Mobile Coverage Area	• Apply Repair Geometry on coverage Shape file • Load Repaired Shape file into Transfer data model using append. • calculate technology, spectrum and speed. • Result is stored in “BB_Service_Wirless”

9- Cellco Partnership and its Affiliated Entities. (Verizon Wireless)	
Processing Mobile Coverage Area	• Apply Repair Geometry on coverage on both shape file (4G-3G) Shape file • Load Repaired Shape files into Transfer data model using append. • calculate technology, spectrum and speed, for each type of coverage. • Result is stored in “BB_Service_Wirless”

1.6 Map Creation / Interactive Web Application

An interactive web application was developed to enable the general public to view a map of Delaware’s broadband availability in each of its three counties. Users will be able to see which forms of broadband exist in each area of the State and can also search for Providers by address. This web application is necessary in order to access and employ the data collected. In essence, the data collected is in a static state; this web application will move the data into dynamic, usable form.

With the creation of the web application, the State will move forward in meeting the requirements of this project’s grant as outlined in the NOFA. The web application was created in a manner that honors the guidelines established in each NDA executed with each respective Provider. A publically accessible, interactive website is the best means by which the citizens/taxpayers can be informed of broadband availability and options. The applications serve as a hub of broadband coverage information. The resultant functionality is expected to improve service for several user groups. From a citizen standpoint, the application will serve as a gateway to access or improve access to broadband services. Citizens can use the application to gain knowledge of providers, technologies, and access level at their residence or place of business. Planners can use the site to aid in infrastructure construction plans to improve broadband access and capabilities to their assigned region of the State. The State Legislature will use the application to notify politicians of district relevant broadband capabilities and as a catalyst in policy making and a various array of legislative actions.

1.7 Backlab Verification

As the first version of maps covering each of the State's Providers was completed, the State Parties performed backlab verification of the data gathered and input onto the maps. This backlab verification included researching the Providers' websites to verify that the advertised speeds on the websites were consistent with those documented by the Providers as part of their submission to the State. In addition, the team made phone calls to some of the Providers to further verify service availability and speeds where necessary to gain the highest level of confidence in the data gathered.

1.8 Provider Review

After the backlab process was completed for each of the Providers, the data was sent back to the Providers for their review and acknowledgement of the data as being accurate. This phase of the project also allowed the Providers to update their data if changes had occurred since the intiatial gathering of data by the State Parties. Each of the Providers' data was pulled out from the aggregate data base prior to sending it to the Provider for their review. This ensured that the State Parties maintained the agreed-to confidentiality of each of the Providers' data.

1.9 Field Verification

The final step for the State Parties to verify the accuracy of the data was to perform a field verification process. Prior to beginning field verification activities, The State parties developed a field verification guide for use by each member of the field verification team. The guide included systematic instructions and a checklist related to verification of each broadband system, technology, and service type. The guide and checklist were drafted, reviewed by all State Parties, and finalized prior to the beginning of field verification activities.

To ensure uniformity of the team's approach to field verification, field team training was also held immediately prior to the beginning of field verification activities.

Broadband system coverage was verified by sampling whether services were available at various points shown on the Providers' system coverage maps that were randomly chosen from all of the census blocks that are within the Providers' systems. Points were chosen to represent areas throughout the Providers' service territory, including system boundary edges.

The State Parties team sample looked to provide a sampling of all broadband Providers in the State, including large and small Providers across the State, being sure to include each of the three counties.

Team members spent a total of 19 days performing Field Verification functions including interviews and infrastructure identification at nearly 300 locations. In addition, the team performed approximately 150 speed tests of Cellular based wireless broadband provider networks. Additionally, team members identified 87 tower locations in the State for potential broadband planning activities going forward.

1.10 Speed Tests

As part of the field verification process, State residents and businesses were given a business card-sized handout that briefly explained the project and pointed them to the state-specific speed test website. The State utilized a project-specific speed test web site[2] run by Ookla in order to gain information on users' addresses, satisfaction, and the upstream and downstream speeds associated with their broadband connection. Ookla is a company that provides a private web-based reporting portal where customer-specific testing can be performed and documented over time. The results of the speed tests performed on the Ookla site are stored and available to the State Parties at any time.

Ookla tracks the end users' Provider name, technology of connection, downstream and upstream speeds, and other parameters such as IP address.

In addition, testing similar to that done by residents and businesses was performed by State Party representatives on mobile wireless Providers' networks. This again verified availability and speeds on each of the five major cellular-based broadband Providers in the State.

1.11 Presentation to the NTIA

The data submitted in the State Broadband Data and Development (SBDD) project is governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, on page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, on page 40569 of the Federal Register. According to the NOFA, an NDA may be executed with broadband Providers prior to data collection. The NTIA has proposed a National States Geographic Information Council (NSGIC) data model as a means to store the collected broadband data. The NSGIC model includes five main feature classes as follows:

1.11.1 Broadband Service by Census Block (Less than 2 square miles in area)

This feature provides the atomic unit for mapping provider services that, when tied to census demographic and socio-economic data, can provide guidance for the build-out and adoption of broadband. The Census Block feature class is generated by different methods, depending on the data submitted by the Broadband service Provider. The main methods for generating census block data are as follows:

[2] http://www.delawarespeedtest.com/

- Broadband providers submit a list of served Census Blocks. In this case, the blocks are joined to the State's Census Block data to obtain its spatial location. Finally, the data are loaded into the Geodatabase model, and attributes are either transferred or filled in manually.

- Broadband Providers submit a list of end users. In this case, an overlay is needed between the submitted geocoded end user points and the State of Delaware Census Block feature class to obtain the list of Census Blocks.

- Broadband providers submit shape files or drawings with their boundary(s) of coverage. The boundary(s) is intersected by the Census Block feature class to obtain Census Block coverage.

1.11.2 Broadband Service by Census Block (greater than 2 square miles in area)

In order to provide a more granular representation of availability in Census Blocks larger than 2 square miles in area, these Census Blocks are described at a street segment level of detail.

There are two methods utilized to garner the data needed to generate street segment coverage maps. Depending on the data submitted by the providers, these methods can be summarized as follows:

- The broadband Provider submits a list of end user addresses. The nearest road segment is then selected, based on the attributes of the end user point.

- The broadband provider submits a shape file or drawing showing their coverage area. In this case, street segments are selected based on the intersection of its coverage area and street segment feature class.

1.11.3 Broadband Service - Wireless

The maps of wireless technologies provide a representation of the expected, modeled, or field-verified service areas associated with wireless carriers, their service levels, and their utilized spectrums. The data in this feature class are generated based on a drawing (shape file) submitted by a wireless technology service Provider (Terrestrial Mobile Wireless - Terrestrial Fixed wireless [licensed or unlicensed] - Satellite), as well as through field verification of wireless data.

1.11.4 Broadband Service - Overview

This feature provides a coarse view of speeds at a county level so that any regional or systematic patterns of service and speed can be assessed and mitigated.

The State of Delaware has three counties. The maximum downstream and upstream speed has been stipulated for each provider, along with the technology that they are using to provide these speeds. Most providers were reluctant to provide pricing data, but some have provided data for weighted nominal speed.

1.11.5 Broadband Connection Points – Middle Mile

The purpose of broadband Connection Points, known as Middle Mile locations or points, is to give the locations and elevations of Interconnection points for service Providers working in the State of Delaware. Gathering infrastructure components (Middle Miles) helps leverage opportunities for network deployment after assessing gaps in broadband availability in the State.

The locations of Middle Mile points were provided by Providers either by their geographic coordinates (Latitude & Longitude) or by their street address(s), which are geo-coded to their spatial locations. Intersection between the Middle Mile points and Census block layer is needed to obtain Full Block ID (FULLFIPSID).

The above mentioned processes provided the State with the raw data to develop maps of the State showing where broadband is available, the maximum advertised levels of service, or speed offered to end users, and areas of the State that are unserved or underserved. This information will be updated every 6 months to show changes made by Providers that will impact the broadband landscape throughout the State. This report details some of the most pertinent information derived from the project and can be utilized to help the State during its Broadband Planning Project currently underway.

2 Areas of Delaware Unserved/Underserved by Broadband Providers

One of the main objectives of the NTIA, the State of Delaware, GeoDecisions, and CBG was to determine where broadband is not currently available in the State of Delaware. Having areas where broadband is not available to potential end users helps create a phenomenon known as a Digital Divide. The Digital Divide is defined as the inability of residents to access broadband and Internet services based on economic, educational, or geographic reasons.

The NTIA defines an unserved area as: “An area composed of one or more contiguous census blocks where at least 90 percent of households in the service area lack access to facilities-based terrestrial broadband service, either fixed or mobile, at the minimum broadband transmission speed (set forth in the definition of broadband above). A household has access to broadband service if the household can readily subscribe to that service upon request.”

Furthermore, the NTIA defines an Unserved Area as ”A service area is defined as consisting of one or more contiguous census blocks, where half the households lack access to minimum broadband service, or an area where no land or mobile service offers broadband with at least 3 Mbps, or areas where less than 40% of households subscribe to any service.”

To obtain information about where broadband is not available in the State, the State Parties performed the above tasks to determine where broadband is available in the State and where it is not available to potential end users. After determining where broadband is not available, the State is in the process of utilizing this information to determine what may be done to expand existing networks to provide service to these unserved areas or how new Providers may be enticed into building networks to serve these parts of the State. This is being undertaken by the State and the University of Delaware as part of their planning activities in the next phase of this project.

Although some services delivered by satellite-based Providers meet the requirement for broadband of 768 Kbps downstream and 200 Kbps upstream, for the purposes of this report, we have not included them when detailing broadband availability. While any location within the State is capable of receiving satellite based service as long as there is a clear unobstructed view of the southern sky, the reasoning for not considering satellite-based Internet here is that often times realized speeds on satellite-based networks fall significantly below 768 Kbps in the forward direction and 200 Kbps in the upstream direction. That being said, satellite Internet is an option for citizens and businesses in the State when other high speed connections are not available.

The State of Delaware has the 6th highest population density of the 50 states in the US. This helps the State’s overall broadband availability in that broadband Providers are apt to serve high density areas because the cost to build a network is lower on a per-address passed basis. In other words, the amount of infrastructure needed to connect a given address to the Internet lessens as density increases. Conversely, the cost of building a network to more rural areas increases on a per-address (potential customer) basis to the point of not providing the broadband Provider the minimum potential return on their investment that they have established. Large companies have minimum potential customers per mile that must exist or they will not build infrastructure to an unserved area. For instance, a Provider may require 20 homes or businesses be passed per mile of new infrastructure before they will build it. In rural areas, there may be as few as 1 or 2 homes per mile. Therefore, the area will not be built out.

Although the State of Delaware has a relatively small number of areas, and therefore citizens, that do not have broadband available to them, this should still be a concern for the State and its planning group. As in other locales, the State will likely find during its planning project that broadband is a driving force in many aspects of life today, including economic development, health care, all areas of business and institutional users, education, and entertainment to name a few. Consequently, the State will also likely find that encouraging expansion of broadband into the unserved areas of the State will have a positive impact on all of these aspects. Areas of the State that do not have access to broadband are shown on the map included as Attachment 1.

In addition to determining which areas of the State do not have access to broadband, demographics and socio-economic characteristics can be analyzed in areas of the State that do not have broadband availability. For instance, the State Parties have over-laid age, minority status, and income data onto the maps to determine which groups may be most impacted by the lack of broadband service in their areas. This information may prove valuable as the State's planning project moves forward. In addition, maps including other demographic and socio-economic characteristics can be created by the State Parties to show other groups that are impacted by the lack of broadband availability in areas of the State. The maps showing each of these parameters are included as Attachments 6, 7, and 8.

3 Areas of Delaware Served by a Single Broadband Provider

Similar to areas of the State that are unserved or underserved by any broadband Provider, the NTIA and the State desired to know what areas of the State are only served by a single Provider.

Areas that have a single broadband Provider imply that service is available in these areas but that there is no competition. Therefore, associated benefits that competition may bring, including lower pricing, higher speeds, and better customer service, are also not available in these areas. This project did not ask for or document any of these parameters, and therefore, other than speed and pricing information included in the Broadband Service Tiers – Residential, Business Governmental and Academia section of this report, they are not included in this report.

Similar to the unserved/underserved areas of the State, the State's high density makes it a good business decision for broadband Providers to build out the networks throughout most of the State since even with competition, these Providers can make a good return on their investment. As Attachment 2 shows, in addition to the areas of the State with no broadband availability, there are only a few small areas in the State that are not served by at least two Providers. Some of the areas served by fewer than two Providers include:

- An area east of Highway 301 and south of DE-896 in New Castles County
- Augustine State Wildlife Management Area and Silver Run Wildlife Area in New Castle County
- The area east of Highway 9 from Appoquinimink Wildlife Area southeast to Highway 6 East of Smyrna
- The area northeast of Smyrna to Highway 9

  - The Bombay Hook National Wildlife Refuge area
- Dover Air Force Base
- The area south of Highway 6 between State Roads 42 and 15
- The Milford Wildlife Area
- The Prime Hook National Wildlife Refuge
- The area north of Highway 54 and south of Road 402 between Highway 30 and Highway 113 in Sussex County

As a percentage, the areas of the State with fewer than two broadband Providers equates to less than 0.5% of the Census Blocks in the State. Furthermore, the estimated total number of households in the State that are not served by a broadband Provider is 2,581 or 0.87% of all households. However, as these areas are utilized by residents of the State and as housing and other developments reach these areas, they will not be broadband ready. The lack of broadband availability may hamper expansion into these areas as the need arises in the future.

4 Areas of Delaware Served by Multiple Broadband Providers

The large majority of the State of Delaware has multiple broadband Providers, serving addresses within the area, with over 50% of the State having six or more Providers of broadband service. When including all areas of the State with two or more broadband Providers, over 99% of the State's Census Blocks are offered broadband service by multiple Providers. A map of the State of Delaware with color codes showing the number of Providers is included as Attachment 2 to the report.

Having multiple Providers helps promote competition among the Providers in given areas and should translate into the highest level of speed the Providers can offer at affordable costs. Having multiple Providers in an area also promotes higher customer service standards from Providers as they attempt to keep their existing customer base and increase their numbers of customers.

5 Types of Technology Used to Provide Broadband in Delaware

The NTIA classified broadband technologies into 11 categories plus a 12th category labeled "All Other". These categories represent both hardline cable networks (cable, phone lines, or fiber optic infrastructure connected to the residence or business) and wireless networks (signals are transmitted to and from an address or location). The NTIA further defined each of the technologies into more specific categories. The technologies utilized in Delaware are listed and defined below:

- **Asymmetrical xDSL**
  DSL is a telephone system-based data communications service that utilizes modulation schemes that allow high-speed transmission of data on copper or phone lines. Asymetrical xDSL is a design characteristic where return speed is lower than forward speed. This allows for more of the network's bandwidth capability or throughput to be utilized by the forward portion of the network allowing for faster downloads than uploads. This technology is utilized widely by telephone companies in the State to provide broadband service to end users.

- **Other Copper Wireline**
  Non-DSL telephone system-based data communications service such as T-1 (1.54 Mbps). Other Copper Line technologies tend to be utilized more for business and anchor end users, as bandwidths are often gauranteed verses “up to” speeds.

- **Cable Modem – DOCSIS 3.0**
  A cable modem is a device that converts information from one device (computer) to a usable form for another device (cable TV network). Specifically, information from a computer is converted to a useable format for transport on the cable TV network and converted back to a format useable by a computer at the receive site modem. DOCSIS 3 provides for multiple channels on the cable TV system to be combined and the combination used to enable higher data communications speeds or bandwidths. DOCSIS 3.0 is widely utilized by cable television network-based Providers throughout the State. Cable TV systems currently utilizing previous versions of DOCSIS will likely migrate to DOCSIS 3.0 in the near term to utilize its higher bandwidth capabilities.

- **Cable Modem – Other**
  Similar to DOCSIS 3.0, except these are all prior versions and revisions of DOCSIS including 1.0, 1.1 and 2.0. These versions offer lower bandwidth or speed than DOCSIS 3.0. Only one Provider reported using Cable Modem – Other in the State. This Provider is primarily DOCSIS 3.0 and will likely migrate the remaining areas of the State from earlier versions of DOCSIS to DOCSIS 3.0 in the near future.

- **Optical Carrier/Fiber to the End User**
  A communications network utilizing fiber optics up to or into a household, business, or other facility – also called Fiber to the Home (FTTH) or Fiber to the Premise (FTTP). Fiber optic cables allow for transmission of modulated light along an optical fiber for significant distances. Fiber optic cables are utilized throughout communications systems due to their ability to transmit signals over longer distances with higher bandwidths, while having significant reductions in noise and distortion effects compared to other wireline and wireless networks. This technology is replacing other traditional telephone technologies throughout more densely populated areas of the State. The local phone company in these areas will likely phase out the traditional phone system over the long term.

- **Satellite**
  Wireless service provided between satellites and the end user. A dish-shaped antenna, similar to those used for satellite TV, is utilized at the end user’s location to receive the downstream signal and to transmit the signal upstream. Satellite is available anywhere in the State where a clear view to the southern sky exists. Trees, buildings, and other obstructions are the only obstacles that may keep end users from accessing satellite internet.

- **Terrestrial Fixed Wireless – Unlicensed**

Broadband service typically provided in a point-to-point configuration from a central tower location, or through a series of towers (hops) as part of a mesh network, to an end user location. The frequencies utilized are not licensed by the FCC and therefore are susceptable to interference or competition for bandwidth from other non-licensed networks. The only system to report utilization of Fixed Wireless – Unlicensed is located in and around the Rohoboth Beach area of the State. This is a WiFi-based system that requires a subscription and is password protected.

- **Terrestrial Fixed Wireless – Licensed**
  Broadband service typically provided in a point-to-point configuration from a central tower location, or through a series of towers (hops) as part of a mesh network, to an end user location. The frequencies utilized are licensed by the FCC and therefore are more immune to interference and competition for bandwidth from other networks.

- **Terrestrial Mobile Wireless**
  Broadband service typically provided in a point-to-multipoint configuration from multiple tower locations, as part of a mesh network, to end user locations. The mesh configuration allows for mobile access to the broadband network. These networks are most commonly known as cellular data networks. The frequencies utilized are licensed by the FCC and therefore are more immune to interference and competition for bandwidth from other networks. Terrestrial mobile based, or cellular, broadband is available throughout the State with the exception of a few areas. These are shown on the accompanying maps as unserved areas of the State.

6 Advertised Upstream and Downstream Transmission Speeds

Broadband Providers often advertise both downstream and upstream speeds as “up to” speeds. In other words, a Provider will advertise speeds “up to” 4 Mbps in the downstream direction and “up to” 1 Mbps in the upstream direction. Consumers may believe that those are the speeds they will most often realize when utilizing the Provider’s network for internet access. However, in reality, the actual speeds offered on the network may be significantly less than the advertised “up to” speeds.

Many broadband networks deployed today utilize a shared bandwidth design whereby the network is developed based on customers sharing the total available bandwidth on the network. This is an effective way for a Provider to offer fast speeds to large areas while minimizing the amount of infrastructure needed and thereby reducing the cost of deployment. In many cases, this design provides speeds sufficient for most subscribers’ needs that are well within the definition of broadband. However, the actual speeds will most often be lower than the advertised speeds because of the shared bandwidth design, and in some cases they will fall below the threshold stipulated for broadband.

An example of this is – if a network has a total available bandwidth equating to a download speed of 10 Mbps and one person is accessing the network, they will realize speeds at or near 10 Mbps. However, if 10 people are accessing the same network at the same time, they will divide the available network bandwidth among them. Although the actual results will vary, based on the level of utilization of bandwidth by each of the users, for purposes of this example, the result would be approximately 1 Mbps available to each of the 10 people accessing the network. In this example, we assume all 10 users are accessing significant amounts of bandwidth that may be required to download music, video, and large files or that may be required to watch live video. In reality, all 10 users will likely be utilizing differing levels of bandwidth at any given time. This phenomenon makes it difficult to evaluate advertised speeds within a given system, between systems, and throughout the State and beyond.

The Providers that supplied speed information, as verified during the backlab verification process, reported the following ranges of speed by technology:

- **Asymmetrical xDSL**
  Speeds between 768 Kbps to 10 Mbps in the downstream direction with speeds between 768 Kbps to 6 Mbps in the upstream direction.

- **Other Copper Wireline**
  Speeds between 768 Kbps to 25 Mbps in the downstream direction with speeds between 200 Kbps to 10 Mbps in the upstream direction.

- **Cable Modem – DOCSIS 3.0**
  Speeds between 10 Mbps to 100 Mbps in the downstream direction with speeds between 1.5 Mbps to 25 Mbps in the upstream direction.

- **Optical Carrier/Fiber to the End User**
  Speeds between 50 Mbps to greater than 1 Gbps in the downstream direction with speeds between 10 Mbps to greater than 1 Gbps in the upstream direction.

- **Satellite**
  Speeds between 768 Kbps to 6 Mbps in the downstream direction with speeds between 200 Kbps to 1.5 Mbps in the upstream direction.

- **Terrestrial Fixed Wireless – Unlicensed**
  Speeds between 1.5 Mbps to 3 Mbps in the downstream direction with speeds between 768 Kbps to 1.5 Mbps in the upstream direction.

- **Terrestrial Mobile Wireless**
  Speeds between 768 Kbps to 3 Mbps in the downstream direction with speeds between 200 Kbps to 1.5 Mbps in the upstream direction.

7 Samples of Actual Upstream and Downstream Transmission Speeds

Several methods were used to obtain a sampling of the actual broadband transmission speeds achieved by residents, businesses, and institutions. For example, State residents and businesses were given a business card-sized handout that briefly explained the Project and pointed them to the State-specific speed test and survey website. The State utilized a Project-specific Ookla speed test website[3] and survey in order to gain information on users' addresses, satisfaction, and the upstream and downstream speeds associated with their broadband connection. In addition, the State Parties' team members performed approximately 150 speed tests, primarily on wireless networks. The locations of these speed tests are included on Attachment 3.

Another verification method, in addition to utilizing the above-mentioned methodologies for verifying system coverage and characteristics, was for team members to enter into discussions with residents in the area. Residents were asked if they knew if a particular Provider's service was available, if they were or had recently been a customer, and if they know what speeds they could achieve. Residents often times did not know what their service level and speeds were but did know who the broadband service Provider was. Questions such as how much they were paying for the service led to a better understanding of their service level. Approximately 1,400 speed test cards were handed to residents or left behind where nobody was available. These cards encouraged the residents to visit the State speed test and survey website, as listed on the card, to assist the State in gathering actual speed data. Thus far, nearly 650 speed tests have been performed by both State Party team members on site and residents and business personnel at their locations throughout the State.

It should be noted that there are many variables that can affect speed test results. Of these, the most significant are the performance characteristics of the computer or device being utilized by the end user performing the test, the number of computers or devices at a location accessing the internet at the same time, the level of throughput being utilized by each, and the day and time of day when the tests are performed. For these reasons, speed tests are best analyzed in the aggregate to give a good understanding of typical speeds being realized. In other words, all cellular tests should be averaged to get an accurate understanding of actual speeds that can be expected from that given technology. Furthermore, speeds for a given Provider can be averaged to again get a better understanding of the actual speeds available from that Provider.

Of the nearly 650 speed tests performed to date, the overall average speeds of all technologies and Providers) were approximately 6.8 Mbps downstream and 3.0 Mbps upstream. Further broken down by technology, the average speeds are:

Technology	**Downstream**	**Upstream**
All Technologies Combined	6.8 Mbps	3.0 Mbps
Mobile Wireless	1.5 Mbps	550 Kbps
Cable Modem – Residential	10.7 Mbps	3.2 Mbps
Cable Modem – Business class	11.6 Mbps	3.3 Mbps
DSL	10.3 Mbps	4.4 Mbps

[3] http://www.delawarespeedtest.com/

Fiber To The Premises/Business	23.9 Mbps	14.0 Mbps

As described above, these are aggregate numbers that represent an average of these tests taken by end users. Actual speeds at a given location will vary from these speeds. Overall, the speed tests indicate speeds comparable to those advertised by the providers. For example, mobile wireless providers offer speeds between 768 Kbps to 3.0Mbps (some offer a lower maximum speed) in the downstream direction. The speed tests show an average speed of 1.5 Mbps in the downstream direction. Cable modem DOCSIS 3.0 is advertised to offer speeds between 10 Mbps and 100 Mbps. The average tested speed was 10.7 Mbps. This is on the low end of what is advertised and may reflect end users with a lower than maximum speed plan. In other words, although speeds up to 50 Mbps may be offered to residential end users, many may be signed up for a service with a maximum throughput of 20 Mbps or less, which brings the aggregate average speed for cable modem DOCSIS 3.0 down. Fiber to the premise is similar to cable modem DOCSIS 3.0 in that the tested speeds are lower than the advertised maximum speeds of between 50 Mbps and 1 Gbps. These higher end speeds are more costly and therefore not likely to be the highest selling tier of service. Therefore, the speed tests done on the lower tiered service will bring the overall aggregated average speed down from the advertised “up to” speeds. DSL service is the only technology that had tested aggregated average speeds near the top of the advertised maximum speed range. In fact, the advertised maximum speeds for DSL are between 768 Kbps and 10 Mbps, and the tested speeds for DSL came in at 10.3 Mbps.

8 Broadband Service Tiers – Residential, Business and Anchor Institutions

One of the goals of the project was to find the maximum downstream and upstream speeds offered by the various Providers in the State. The goal was not necessarily to determine the various levels of service or speed being offered up to the maximum by the Providers. However, speed tiers or levels are an important component of determining what services are available to end users, as many will not require or be able to afford the fastest available speeds but do want or need a higher speed connection than is available via a dial-up connection.

Broadband service is provided in many different speed tiers through the various technologies. Most Providers offer more than one level of service or speed whereby end users who need or desire faster connectivity can opt for the highest level of service, and end users who only need lower levels of service can elect to purchase a slower connection at a reduced cost. Speed tiers differ considerably between Providers and are dependent on the technology utilized to provide the service. For instance, Providers using cable modem DOCSIS3 technology offer maximum speeds of between 10 Mbps to 100 Mbps in the downstream direction, while mobile wireless Providers in the State offer maximum downstream speeds between 768 Kbps and 3 Mbps.

Making exact comparisons between broadband service Providers is difficult for a variety of reasons, the most significant of which is that most Providers offer "up-to" speeds. As an example, an end user on one Provider's network with "up-to" speed of 1.5 Mbps may realize close to that maximum speed at most times. However, a customer on another Provider's network with "up-to" speed of 1.5 Mbps may only realize half of that speed at most times. This makes it difficult to accurately determine which Provider has the speeds that will consistently provide the level of service needed by the end user. Other issues that can make shopping for a broadband Provider difficult are introductory pricing, bundled pricing (where broadband service must be purchased with another service such as phone or TV), and long-term contracts. Introductory pricing may provide a benefit in the short term, while offering less competitive pricing in the long term. Long-term contracts can lock an end user into a plan they may not need over the course of the contract term or lock them into a plan that does not fulfill their needs in the future. Additionally, some Providers such as mobile broadband and satellite services have established throughput limits, such as 5 gigabits of throughput per month. After a customer hits that level of throughput, they may be charged additional fees or their service level is cut back significantly for the remainder of the month (such as is done by some satellite based Providers).

Providers are also continually changing their service offerings and pricing. As end users needs for speed continue to increase, Providers continue to offer higher levels of speed with new additional features as discussed elsewhere in this report. Another aspect that must be considered by potential end users is installation, equipment, and activation fees. These can vary from $0.00 to over $100.00. Many Providers that require installation or equipment fees run promotions where these fees are waived or reduced for a limited time.

Other add-ons or extras, which may or may not offer value to the end user, that some Providers offer as a part of their service are security tools such as anti-spam and anti-virus software, home networking, specific web content free such as Disney, ESPN3, and others.

Some examples of available plans and non-introductory, non-bundled pricing as researched on Providers' websites include the following:

Cable Modem Providers (all "up-to" speeds)		
Downstream Speed	Upstream Speed	Price per Month
1.0 Mbps	512 Kbps	$32.95
1.5 Mbps	384 Kbps	$40.95
3 Mbps	Unadvertised	$29.95
15 Mbps	3 Mbps	$59.95
20 Mbps	4 Mbps	$69.95
50 Mbps	10 Mbps	$114.95

Fiber To The Premise (FTTP all "up-to" speeds)		
Downstream Speed	Upstream Speed	Price per Month
15 Mbps	5 Mbps	$54.99
25 Mbps	25 Mbps	$69.99

50 Mbps	20 Mbps	$144.99

Satellite (all "up-to" speeds)		
Downstream Speed	Upstream Speed	Price per Month
1.2 Mbps	200 Kbps	$69.99
1.5 Mbps	256 Kbps	$109.98
1.6 Mbps	250 Kbps	$79.99
2.0 Mbps	300 Kbps	$119.99

Mobile Wireless (all "up-to" speeds)		
Downstream Speed	Upstream Speed	Price per Month
1.4 Mbps	200 Kbps	$40/50/60*
1.4 Mbps	800 Kbps	$20/35/50/80*
*Based on monthly throughput, $20 = 1 Gbit allowance, $80 = 10 Gbit allowance		

DSL (all "up-to" speeds)		
Downstream Speed	Upstream Speed	Price per Month
1 Mbps	384 Kbps	$19.99
3 Mbps	768 Kbps	$29.99
7.1 Mbps	768 Kbps	$39.99
8 Mbps	Not advertised	$39.95

Fixed wireless (Not licensed all "up-to" speeds)		
Downstream Speed	Upstream Speed	Price per Month
1.5 Mbps (residential)	Not advertised	$39.99
1.5 Mbps (business)	Not advertised	$49.99

As the tables above show, shopping for the plan that meets the specific, consistent needs of an end user can be confusing. Many other options and additional features are offered by Providers that are not shown in the examples above, including virus protection, spam filters and pop-up blockers, and subscription only websites. In addition, end users must decide if long-term commitments are a concern for them prior to signing up for many types of broadband service offerings.

Some Providers such as the cable modem, DSL, and wireless Providers also offer business class service. These services may be identical to residential service with additional add-on services, such as Outlook for e-mail, and may include a higher level of, or faster, service response when problems arise.

In addition, some Providers offer faster speeds as business class service at a higher monthly cost. These Providers also will offer business class and residential class services to Anchor Institutions. Some Providers will offer higher speeds on a per site basis, such as fiber optic connections, with speeds as high as 1 Gbps symmetrical such as those supplied to the cities of Dover and Wilmington and the University of Delaware.

As shown below in the Broadband Availability at Anchor Locations section, Anchor locations' requirements vary significantly based on their size, the number of internet users, and the applications being run at the location. Costs will vary on these services based on speed and necessary infrastructure expansions needed to connect the Anchor Institution.

9 Locations of Tower Utilized to Provide Broadband

During the Field Verification portion of the project, the State Parties noted the locations of towers that are utilized by cellular Providers and for other radio communications.

These locations have been plotted onto a map for potential future reference. These locations can serve as transmit and receive sites for wireless broadband Providers. As a potential wireless Provider evaluates whether to deploy a network to offer broadband to residents and businesses, one of the most significant costs can be construction of a tower that is high enough to provide service to the surrounding areas. These existing towers may have space available that can be leveraged for placement of broadband related antennas at a significantly lower cost than building new towers and therefore may allow a Provider to deploy a network where one may not otherwise exist. The available space must be at a height on the antenna that will meet the needs of a new occupant on the tower. Furthermore, like any business, the Provider must recoup their investment over a set period of time. Using a lower cost option such as existing towers may allow a Provider to offer service at a lower monthly cost to the end user.

The goal during the Field Verification phase of the project was to document all towers passed while performing the more pertinent task of verification of broadband availability where the Providers indicated service was available. This process did not identify all towers in the State but does provide a useful database that can be built upon over time. The Towers that were located are shown on the map included as Attachment 4.

10 Wireless Spectrums Utilized to Provide Broadband

Several wireless frequency spectrums are being utilized by the various wireless Providers to offer broadband service. These include both fixed and mobile wireless Providers. As part of the data request sent to all of the Providers, they were asked to include which frequencies they are utilizing to offer broadband service in a wireless format. The spectrums utilized, as reported by the Providers, are as follows:

Cellular Providers are using several spectrum ranges including:

- 700 MHz band
- 698 – 758 MHZ
- 775 – 788 MHz
- 805 – 806 MHz
- 824 – 849 MHz
- 862 – 869 MHz
- 1.850 – 1.915 GHz
- 1.930 – 1.995 GHz
- 1.710 – 1.755 GHz
- 2.100 – 2.155 GHz

A fixed wireless Provider is using the WiFi band of 2.4 GHz to provide service on an unlicensed network. It is open to the public but requires a password to utilize the network. Satellite Providers are using licensed frequencies as provided by the FCC in the L-band, Big LEO, Little LEO, and 2 GHz spectrums.

11 Broadband Availability at Anchor Locations

The NTIA's NOFA required that "Awardees shall provide NTIA with a list of community anchor institutions in their state, along with the associated information described below." The information gathered includes address data, Provider name, technology, and speeds of broadband connection. The NOFA defined Community Anchor Institutions ("Anchors" or "CAI") in the following manner: Schools, libraries, medical and healthcare Providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

The State tasked the Institute for Public Administration at the University of Delaware (IPA) with performing the tasks of gathering the information needed related to Anchor Institutions.

The IPA first compiled a master list of all Anchors throughout the State. This list was then subdivided into categories of:

- Schools – K-12 (public and private)
- Libraries
- Medical/Healthcare facilities (public and private)
- Public Safety entities (public and private)
- Universities, colleges and other post-secondary (public and private)
- Other community support – governmental
- Other community support – non-governmental

The IPA verified each Anchor's name, street address, map coordinates, and proper categorization into the above groups. A few of the small municipalities only have Post Office boxes on file for addresses and were therefore mapped with the Post Offices' mailing address.

The initial list of known Anchors in the State, as reported in May 2010, totaled 650. Through the process of making follow-up contacts to identify the level of Internet connectivity the Anchors were utilizing, a March 2011 adjusted total of 645 Anchors was determined. The IPA has been able to elicit usable responses from 455 of those 645 Anchors. Of that subset of 455 respondents, 440 do have broadband connections, while 15 report that they do not have broadband. The remaining 190 Anchors have been non-responsive, to date. The IPA has received information from 95% of all known public/governmental Anchors in the State, with private institutions making up the majority of the non-responsive Anchors. The IPA continues to attempt to make contact with the Anchors that have not yet been included in the study.

Of the 455 Anchors that have been responsive to date, nearly 97% report they have some level of broadband connectivity to their Internet Service Provider (ISP). This leaves just over 3% that do not have broadband.

The breakdown of all known Anchors is as follows:

- Schools – K-12 (public and private)
  Total = 266
  With Broadband = 233

Without Broadband = 1
Non-responsive = 32

- Libraries
  Total = 32
  With Broadband = 32
  Without Broadband = 0
  Non-responsive = 0

- Medical/Healthcare facilities (public and private)
  Total = 27
  With Broadband = 13
  Without Broadband = 0
  Non-responsive = 14

- Public Safety entities (public and private)
  Total = 119
  With Broadband = 55
  Without Broadband = 1
  Non-responsive = 63

- Universities, colleges and other post-secondary (public and private)
  Total = 22
  With Broadband = 22
  Without Broadband = 0
  Non-responsive = 0

- Other community support – governmental
  Total = 79
  With Broadband = 58
  Without Broadband = 8
  Non-responsive = 13

- Other community support – non-governmental
  Total = 100
  With Broadband = 26
  Without Broadband = 5
  Non-responsive = 69

The speeds achieved by the Anchors vary considerably overall. There are also significant variances within categories of Anchors. For example, of the 218 public schools, 175 reported the use of Optical Carrier/Fiber with downstream and upstream speeds of 10 Mbps, while 43 reported the use of Other Copper Wireline with downstream and upstream speeds of 1.5 Mbps. Technology usage and speeds among the 15 private schools that responded ranged from Cable Modems with downstream speeds of 1.5 - 3 Mbps and upstream speeds of 768 Kbps - 1.5 Mbps, to Optical Carrier/Fiber with downstream and upstream speeds of 25 Mbps or greater. Among the libraries (all of which are on the State network and use Optical Carrier/Fiber), 4 reported downstream and upstream speeds in the range of 100 Mbps - 1 Gbps, while the other 28 reported downstream and upstream speeds in the range of 10 Mbps - 25 Mbps. The highest downstream and upstream speeds of any CAIs (greater than or equal to 1Gbps in both directions, using Optical Carrier/Fiber) were reported by the cities of Dover and Wilmington and the University of Delaware. Of all the entities that did indicate they had broadband service, the slowest connections were reported by non-governmental community support institutions (typically Senior Centers), some of which were using DSL connections with downstream speeds as low as 768 Kbps - 1.5 Mbps and Upstream speeds of 200 Kbps or less.

In addition to determining if Anchors have broadband, the data collection effort for March 2011 addressed whether the Anchor provides public access to WiFi. In the case of Delaware's libraries, the responses are not fully indicative of the level of available public access to broadband. While all 32 of the libraries do provide public access to broadband, only 11 had the capability to provide public WiFi in March 2011. System-wide availability of public WiFi at Delaware libraries was reported as being in the process of implementation, with completion expected in May 2011. In addition to the libraries, several other Anchors had previously reported to the IPA that they did provide public access to broadband. None, however, were responsive to the March 2011 update in terms of specifically identifying the on-site availability of public WiFi. By allowing public access to broadband, anchor institutions can help serve populations in the State that otherwise may not have broadband access available to them. These include people living in unserved areas of the State or who cannot afford access at their residence. IPA plans to focus on these Anchors in its planning activities to determine how such facilities best meet the needs of population groups that do not otherwise have access.

12 Conclusion

The State of Delaware, with direction and grant funds from the NTIA, began the process of determining the level of broadband availability in the State of Delaware in early 2010. As components of the project, Providers were asked to provide data detailing where they provide broadband service, the advertised maximum downstream and upstream speeds, and the technology deployed to offer the service. The data gathered from the Providers was verified using multiple methods, including checking the data against websites; field verification and speed tests by State Party team members and the general public. The data was then sent to the Providers for one final check for accuracy.

Because, in part, the State has a relatively high population density, broadband providers offer service throughout much of the State. Additionally, in more than 50% of the State more than six different Providers offer broadband in the same areas. Over 99% of the State has broadband service availability from at least two Providers.

There are several technology types being utilized in the State to provide broadband to residents, businesses, and Anchors. These vary from telephone-based technologies such as asymmetrical DSL and other copper wireline to cable-modem based technologies, optical carrier or Fiber-To-The end user, satellite, and fixed and mobile wireless. Each of the technologies brings broadband to end users in different ways and fills various needs such as speed, price, reliability and mobility.

Determining and documenting speed offerings can be a complicated task. Most broadband providers offer "up to" speeds. The actual speeds of these networks at a given time may vary drastically from the "up to" speed that is advertised. In addition, Providers often include other services such as virus protection, anti-spyware, and others or require a customer to bundle their broadband service with other services such as phone or TV to get the best price. Consumers need to weigh all aspects of the Providers' service prior to signing up for service and potentially signing a long-term contract.

As a part of the Project, the State Parties documented existing cellular and other communications towers throughout the State. These locations may provide a potential cost reduction for future broadband providers to enter the broadband marketplace.

This may allow the State to encourage build out of existing wireless networks or deployment of new networks where broadband service is lacking today.

The Institute for Public Administration at the University of Delaware (IPA) has had contact with 455 of the 645 known Anchor Institutions in the State. Of these, only 15 do not have broadband service today. The State should continue to make efforts to contact the Anchors that have not responded thus far. The State should then work with the Anchors during its Planning Project to determine if the broadband services available to the Anchors are meeting their needs today, as well as being able to meet their anticipated short- and long-term needs in the future.

The State can utilize availability documentation gathered during this Project to help direct the Planning Project that is currently underway. During the Planning Project, the State and the University of Delaware's Institute for Public Administration will determine broadband-related needs of the general public, businesses, and Anchor Institutions throughout the State in today's environment as well as into the future.

13 Glossary of Terms

Access Point (AP) – Transmitter and receiver utilized to create a wireless connection between devices. End users connect wirelessly to the network via an Access Point.

Asymmetrical Speeds – A network system design characteristic where return speed is lower than forward speed. This allows for more of the network's capability or throughput to be utilized by the forward portion of the network allowing for faster downloads than uploads.

Broadband – (as defined in the NTIA's NOFA) – Data transmission technology that provides two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (Kbps) downstream and at least 200 Kbps upstream to end users, or providing sufficient capacity in a middle mile project to support the provision of broadband service to end users within the project area.

BPL (Broadband-Over Powerline) – A network utilizing electrical conductors (a power Provider's lines) as its transport medium.

Cable Modem – A device that converts information from one device (computer) to a usable form for another device (cable TV network), i.e., Information from a computer is converted to a useable format for transport on the cable TV network and converted back to a format useable by a computer at the receive site modem.

Community Anchor Institutions – Schools, libraries, medical and healthcare Providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Digital Divide – The inability of residents to access broadband and Internet services based on economic or geographic reasons.

Digital Subscriber Line (DSL) – A telephone system-based data communications service that utilizes modulation schemes that allow high-speed transmission of data on copper or phone lines.

Downstream, also known as "download" or "forward direction" – Connectivity path from a network service Provider, or ISP, to the customer's location.

Fiber Optic Cable – Cable made from glass that provides the medium for transmission of light along a designated path. Single mode fiber is utilized to transport light over long distances.

Fiber To The Premises (FTTP) – A communications network utilizing fiber optics up to or into a household, business or other facility, also called FTTH or Fiber To The Home.

Fixed Wireless – Broadband service typically provided in a point-to-point configuration from a central tower location, or through a series of towers (hops) as part of a mesh network, to a customer premise location.

Gigabits per Second (Gbps) – One billion bits of information transmitted between devices in one second, i.e., 1 Gbps = 1,000,000,000 bits of information transported over a network per second.

Internet Protocol (IP) – Internetworking protocol used to transmit data across and between switched networks. Also specifies the formatting and addressing scheme of information packets.

ISP – Internet Service Provider – Private company or other organization offering connectivity to the Internet.

Kilobits Per Second (Kbps) – One thousand bits of information transmitted between devices in one second, i.e., 256 Kbps = 256,000 bits of information transported over a network per second.

Megabits per Second (Mbps) – One million bits of information transmitted between devices in one second, i.e., 1.5 Mbps = 1,500,000 bits of information transported over a network per second.

Middle Mile/Backbone/Backhaul – Transmission media utilized to connect APs or network nodes within a system to each other and to the main network and to the Internet. Backhauls can consist of fiber optic cables, WiMAX, and other wireless technologies.

Symmetrical Speeds – A system design characteristic allowing equal speeds in the forward and return paths of the network.

Upstream – Also known as "upload" or "return direction" – Connectivity from the customer back to the network service Provider or ISP.

Voice over IP (VoIP) – Transmission of voice communications as IP packets, allowing for transportation of voice over the Internet, LANs and WANs.

Wi-Fi (Wireless Fidelity) – Wireless local area networks based on the IEEE's (Institute of Electrical and Electronics Engineers, Inc.) 802.11 standards. 802.11 refers to a group of standards in place today as well as standards that are currently being developed.

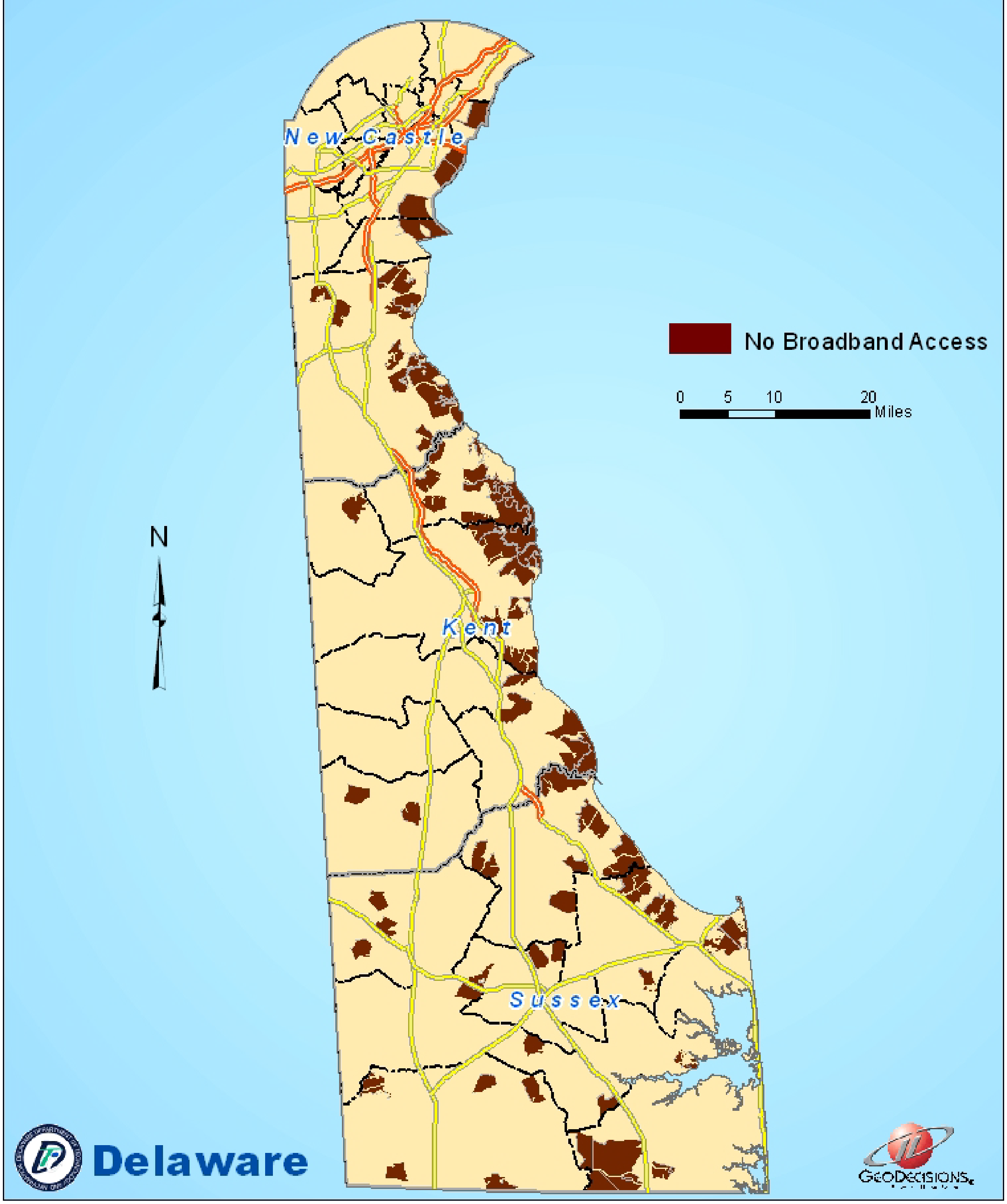
WiMAX (**Worldwide Interoperability for Microwave Access)** – Wireless wide area networks based on the IEEE's 802.16 standards. Capable of transmission speeds up to 70 Mbps over 70 miles with actual speed and coverage far less based on applications and terrain.

Version Information

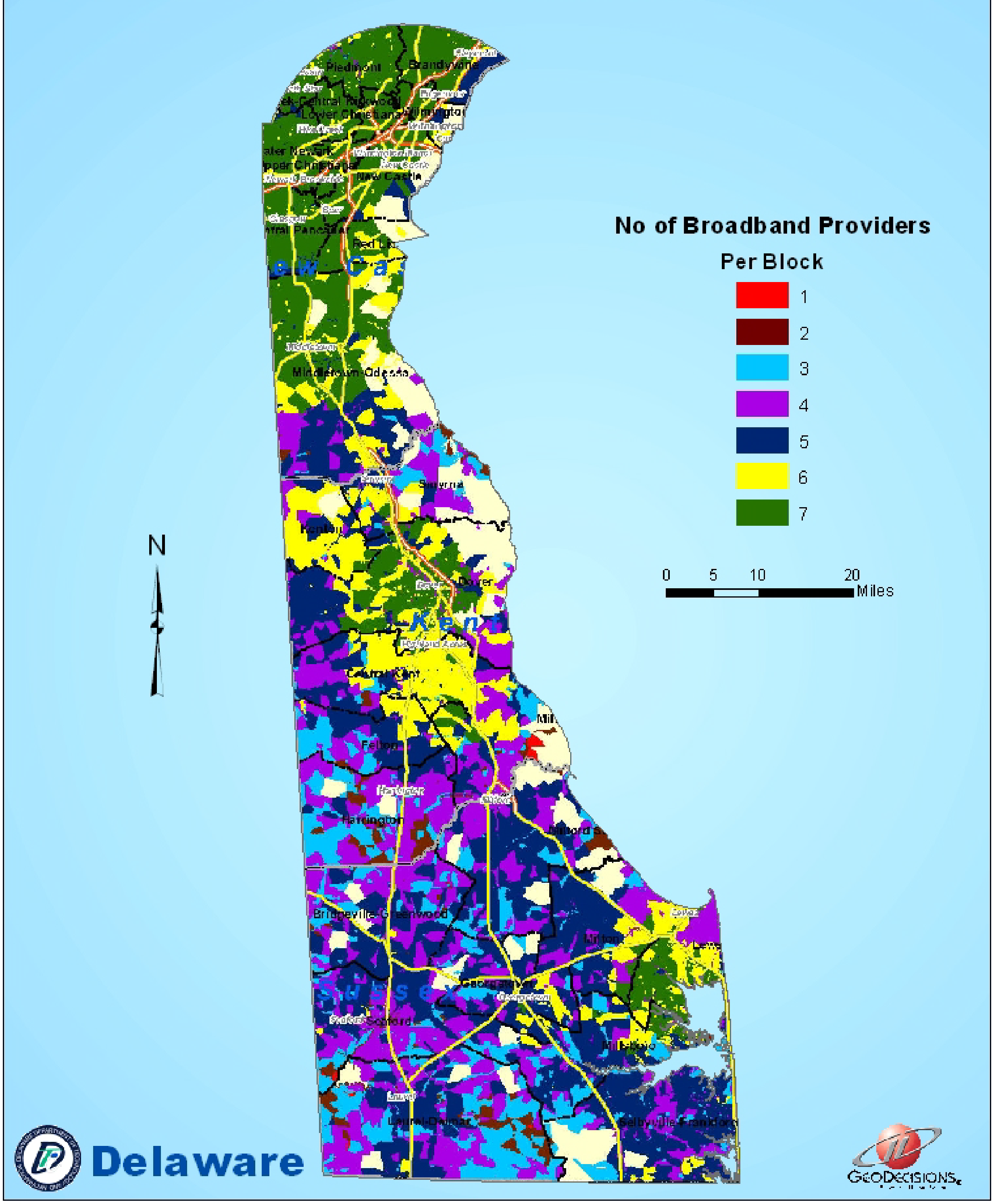
Version Num.	Edit Date	Edited By	Comments
0.1	12/07/10	Nielsen, Robinson	Draft Document
1.0	12/10/10	Jensen, Conway	Draft Document Revisions
1.1	04/26/11	Jensen	Spring 2011 Updates
1.2	6/13/11	Tuttle	Updated 2011 Anchor Stats

Attachments

Attachment 1
Areas With No Access To Broadband



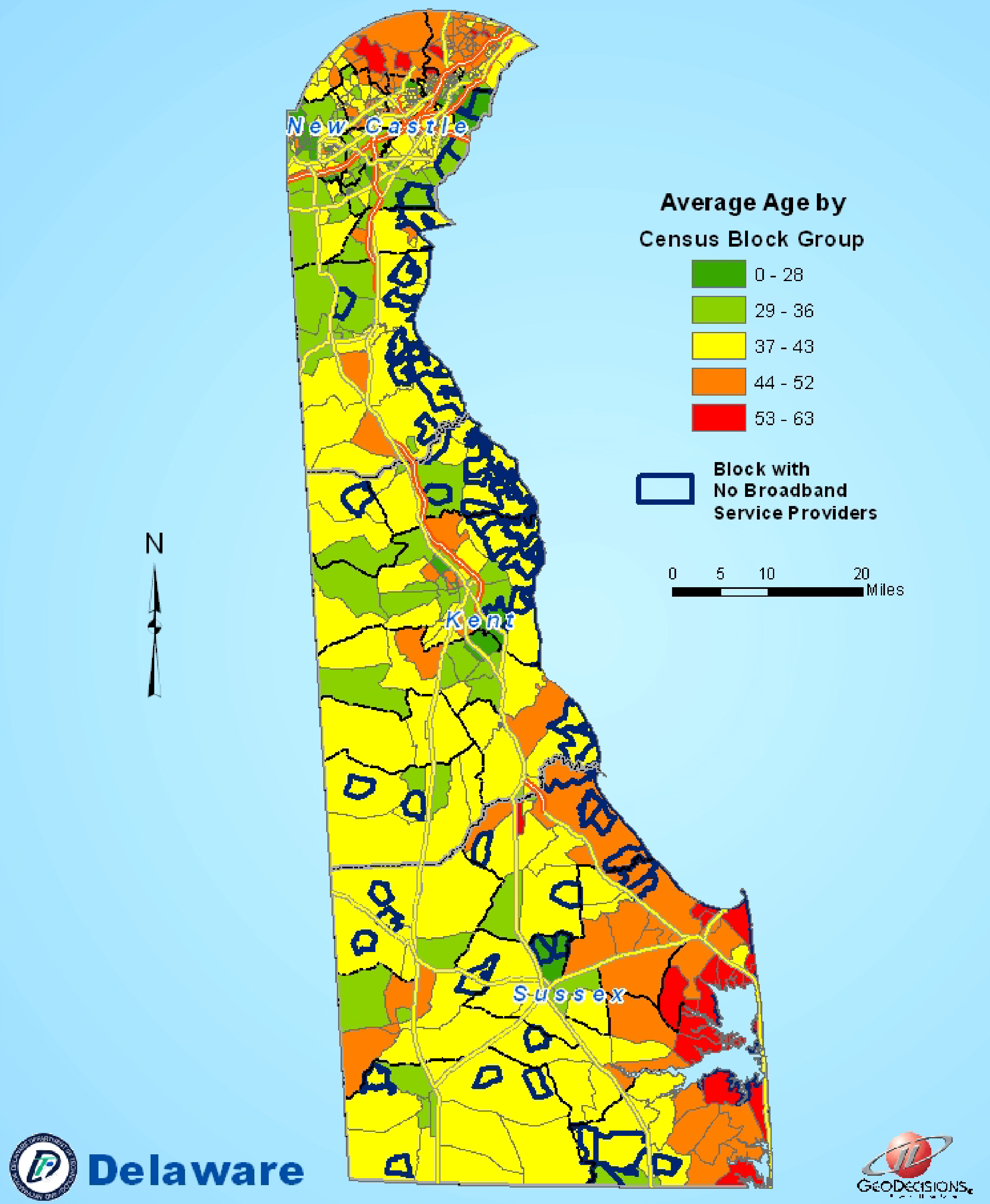
Attachment 2
Number of Broadband Providers per Block

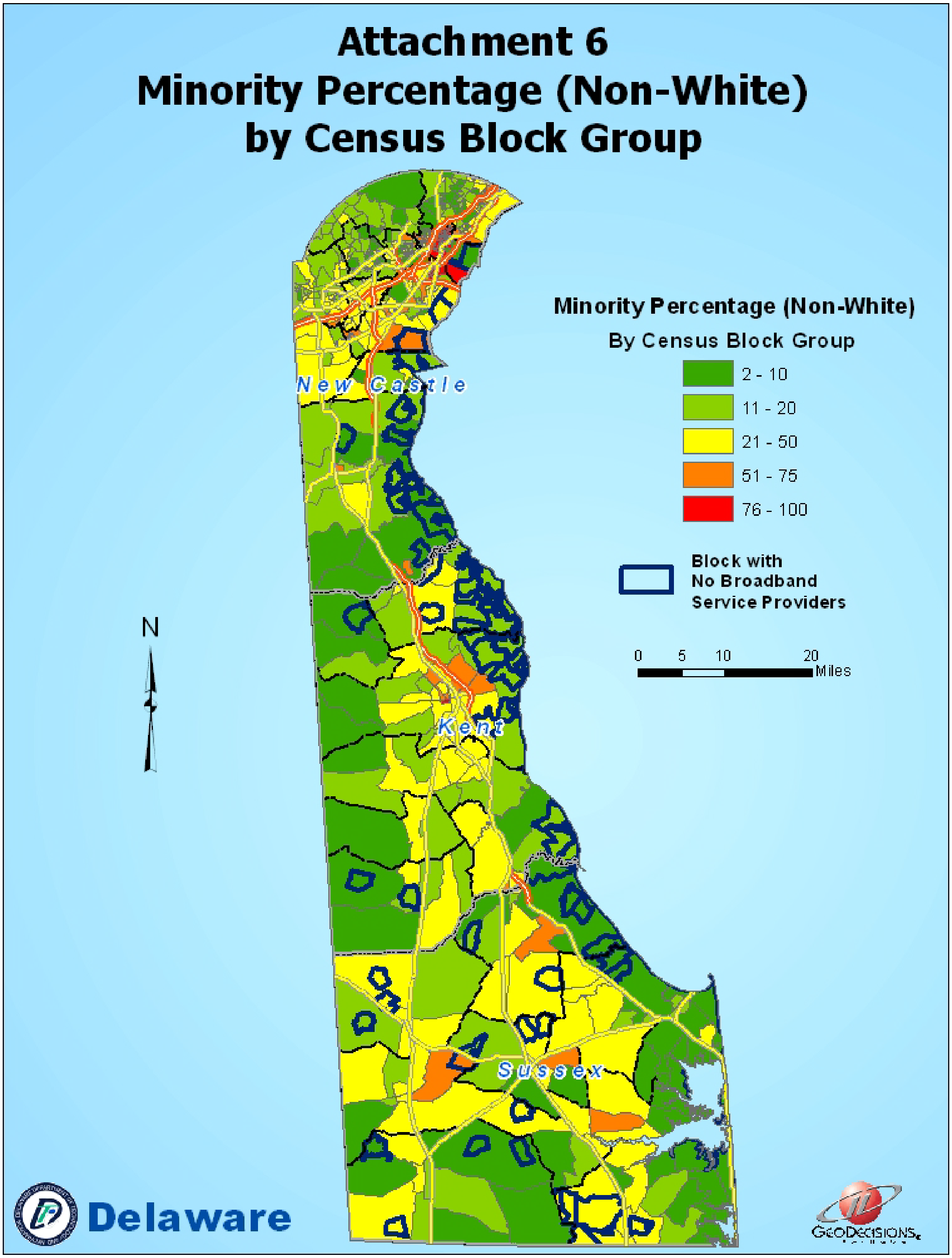


Attachment 3
State Parties Speed Test Locations

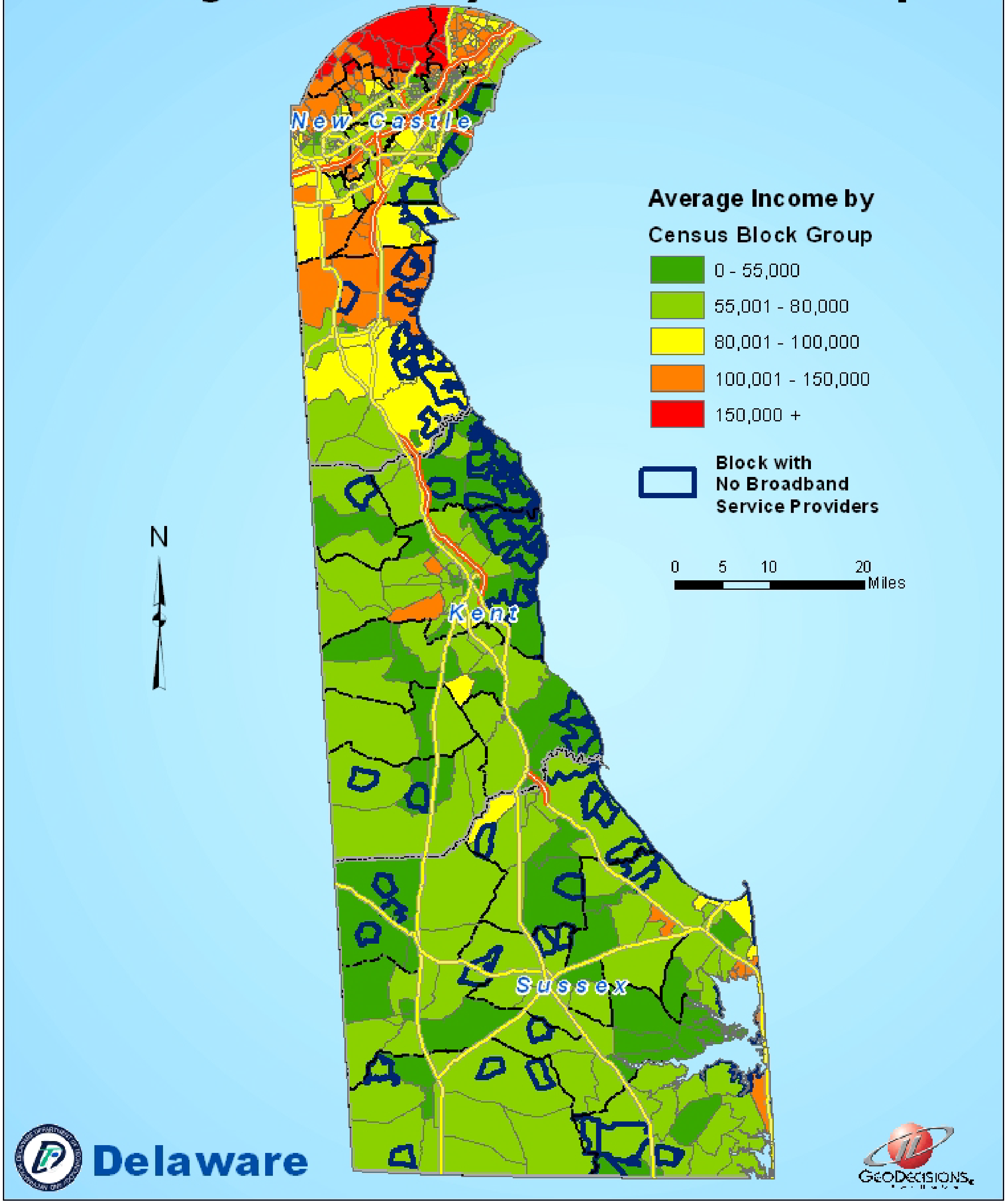
Attachment 4
Known Tower Locations

Attachment 5
Average Age by Census Block Group




Attachment 6
Minority Percentage (Non-White)
by Census Block Group
Minority Percentage (Non-White)
By Census Block Group
2 - 10
11 - 20
21 - 50
51 - 75
76 - 100
Block with
No Broadband
Service Providers
0 5 10 20
Miles
N
New Castle
Kent
Sussex
Delaware
GeoDecisions

Attachment 7
Average Income by Census Block Group



OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF FLORIDA

Connect Florida®

April 1, 2011

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FLORIDA COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Florida offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Florida has played in creating such a powerful tool that will surely benefit not just Floridians, but consumers and businesses nationwide.

Therefore, as the State Broadband Designated Entity, The State of Florida Department of Management Services (DMS), in partnership with Connected Nation, is pleased to present this submittal of the state of Florida's State Broadband Data and Development (SBDD) Grant Program, known as Connect Florida.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Florida: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road

		Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Florida program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Florida program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, and aiding in the development and maintenance of the National Broadband Map.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 55.71% of the Florida provider community, or 39 of 70 total providers. Of the 39 participating providers, 17 supplied an update to their network or coverage area(s), while 19 have reported no change. The remaining 3 represent providers who previously supplied data but were non-responsive in the April 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 31 providers that are not represented in the attached datasets, 12 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect Florida. The remaining 19 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Florida principals that all commercially reasonable efforts were made to account for 100% of the known Florida broadband provider community, pursuant to this semi-annual data update submission.

Connect Florida has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Florida conducts field validation efforts. To date, the October 2010 and this April 2011 data submission, 15 (21.43%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Florida launched a website to create awareness about the initiative. Connect-Florida.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Florida website encountered 1,179 unique visits during this reporting period (3,235 total to date for the life of the grant awarded on December 20, 2009). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Florida website and the Connect Florida Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Florida mapping artifacts.

Community Anchor Institutions

Connect Florida has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Florida Department of Management Services, outreach was conducted during this data update reporting period by Connect Florida to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Florida website. Connect Florida continues to work in coordination with statewide associations such as the Florida Department of Education, Florida Hospital Association, University of Florida GeoPlan Center, and the Northwest Florida Broadband Authority to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Florida will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Connect Florida, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Florida efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Florida, Connected Nation has previously engaged all federally recognized tribal lands in the area covered by the Connect Florida SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period and in coordination with DMS, Connect Florida plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connect Florida understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Florida program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Florida, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Approved for submittal by
Bill Price
Broadband Stimulus Program Manager
Department of Management Services
State of Florida

DATA ACQUISITION: FLORIDA COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Florida, working in close coordination with the Florida Department of Management Services, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Florida has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Florida has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Florida through ESRI ArcGIS software.

Connect Florida continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Florida website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Florida will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connect-florida.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_FL_7864

Connect Florida has worked diligently during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. At this time no additional centralized sources have been identified, but efforts continue to locate any data that may already exist in the state.

In tandem with these efforts to identify existing data, Connect Florida continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. In addition to survey data Connect Florida received connectivity data on approximately 150 hospitals in the state which resulted in a significant increase in healthcare data. Coordination also continued with researchers at Florida State University and the University of Florida surrounding their efforts to gather CAI connectivity data.

Connect Florida has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Florida is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Florida, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Florida will continue its ongoing work with key organization contacts in an effort to raise awareness of this project among CAI.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	4,953	4,953	4,932	184	218	175
Libraries	934	934	929	74	532	92
Healthcare	2,390	2,390	2,389	161	154	151
Public Safety	3,703	3,703	3,697	1,131	1,147	1,139
Higher Ed Institution	488	488	488	38	60	39
Other Government	3,046	3,046	4,044	2,758	2,736	2,720
Other Non-Government	32	32	32	24	20	15
Total	**15,546**	**15,546**	**16,511**	**4,370**	**4,867**	**4,331**

SBDD DATA SUBMISSION METHODOLOGY

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Florida.

Inventory of Deliverables, Connect Florida: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Florida have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Florida Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;

- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Florida on the following providers: AT&T Inc., Cellular South Inc., CenturyLink, Clearwire Corporation, Comcast, Frontier Communications, MetroPCS, Northeast Florida Telephone Company, Orland Telephone Company, PCI Wireless, Sprint, Summit Broadband, T-Mobile USA Inc., tw telecom, and Verizon Florida LLC.

During this reporting period, Connected Nation conducted 7 additional on-site validation tests with AT&T, T-Mobile, Verizon, and Clearwire.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 15 companies (out of a universe of 70 viable providers) totaling 21.43% within the state of Florida.

Accuracy and Verification: Methodology - Provider Validation

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.65% of Florida households do not have terrestrial fixed broadband service available, and approximately 0.4%[1] of Florida households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 5.27% of rural Florida households do not have terrestrial fixed broadband service

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

available, and approximately 0.2%[3] of rural Florida households have neither mobile nor fixed broadband service available.[4]

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)

[3] See footnote 1.
[4] See footnote 2.

21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Florida project has received a total of 4 inquiries (15 grant inception to date). As more inquiries are submitted to Connect Florida, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Florida project launched BroadbandStat on May 26, 2010, and has received a total of 1,146 visits to date, of which 639 occurred this reporting period.

Speed Test Methodology

The 70 speed tests that are represented in the Connect Florida Speed Test Report during this reporting period (397 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Florida speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Florida project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Florida with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Florida.

Broadband Provider Log

Complete	53
Non-Responsive/Refused	16
In Progress	28
Count of Datasets by Viable Status	**97**
Total Unique Providers Represented	**70**

Provider Name	Platform	Status	NDA Execution Date	Notes
airPowered	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Bright House Networks, LLC	Cable	Data Added to Statewide Inventory	4/26/2010	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
ITS Telecommunications Systems Inc.	Fiber	Data Added to Statewide Inventory	4/28/2010	
ITS Telecommunications Systems Inc.	ILEC/CLEC	Data Added to Statewide Inventory	4/28/2010	
Quincy, City of	Fiber	Data Added to Statewide Inventory		
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
TDS Telecommunications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
Verizon Florida LLC	ILEC/CLEC	Data Added to Statewide Inventory	12/14/2009	
Verizon Florida LLC	Fiber	Data Added to Statewide Inventory	12/14/2009	
Verizon Florida LLC	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
City of Leesburg, Florida	Backhaul	Backhaul Provider Only Processing Complete		
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Covad Communications	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
FPL FiberNet LLC	Backhaul	Backhaul Provider Only Processing Complete	6/3/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
TDS Telecommunications Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/27/2010	
Smart City	Fiber	Provider Approval Solicited	6/24/2010	
Smart City	ILEC/CLEC	Provider Approval Solicited	6/24/2010	
Sago Networks, LLC	Fixed Wireless	Partial Data Received		
Talk America Inc.	Backhaul	Partial Data Received		
The Home Town Network, Inc.	Fiber	Partial Data Received	5/5/2010	
Palm Coast-Flagler Internet, LLC	Fixed Wireless	Provider Gathering Data		
Advanced Cable Communications	Cable	No Update to Provide	4/16/2010	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Cellular South, Inc.	Mobile Wireless	No Update to Provide	4/12/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Cox Communications, Inc	Cable	No Update to Provide	1/29/2010	
Cox Communications, Inc	Backhaul	No Update to Provide	1/29/2010	
DeltaCom, Inc.	Backhaul	No Update to Provide	2/16/2010	
Frontier Communications Corporation	ILEC/CLEC	No Update to Provide	1/22/2010	
GTC, Inc.	ILEC/CLEC	No Update to Provide	1/28/2010	
Home Town Cable TV, LLC	Fiber	No Update to Provide	4/21/2010	
Mediacom Southeast LLC	Cable	No Update to Provide	1/12/2010	
Nextlink Wireless, Inc.	Backhaul	No Update to Provide	2/12/2010	
Northeast Florida Telephone Company	Fiber	No Update to Provide	4/16/2010	
Northeast Florida Telephone Company	ILEC/CLEC	No Update to Provide	4/16/2010	
Orlando Telephone Company, Inc.	Cable	No Update to Provide		
Orlando Telephone Company, Inc.	Backhaul	No Update to Provide		
Orlando Telephone Company, Inc.	Fiber	No Update to Provide		
Qwest Communications Company, LLC	Backhaul	No Update to Provide	1/4/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
T3 Communications	Backhaul	No Update to Provide	6/3/2010	
The Home Town Network, Inc.	Fixed Wireless	No Update to Provide	5/5/2010	
tw telecom of florida, l.p.	Backhaul	No Update to Provide	4/22/2010	
Velocity Online	Backhaul	No Update to Provide	4/8/2010	
Verizon Florida LLC	Backhaul	No Update to Provide	12/14/2009	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Florida LambdaRail LLC	Backhaul	No Update Provided - Use Last Submission Data	4/29/2010	
Frontier Communications Corporation	Backhaul	No Update Provided - Use Last Submission Data	1/22/2010	
Gainesville Regional Utilities	Backhaul	No Update Provided - Use Last Submission Data		
Windstream Communications	ILEC/CLEC	No Update Provided - Use Last Submission Data	1/19/2010	
Windstream Communications	Backhaul	No Update Provided - Use Last Submission Data	1/19/2010	
CommFunction, LLC	Fixed Wireless	Solicited Initial Data		
Desoto Life	Fixed Wireless	Solicited Initial Data		
FiberLight LLC	Backhaul	Solicited Initial Data	4/19/2010	
James Cable LLC	Cable	Solicited Initial Data	1/11/2010	
Marco Island Cable, Inc.	Cable	Solicited Initial Data		
Omnispring LLC	Backhaul	Solicited Initial Data		
PAETEC Communications, Inc.	Fixed Wireless	Solicited Initial Data		
PAETEC Communications, Inc.	ILEC/CLEC	Solicited Initial Data		
PAETEC Communications, Inc.	Backhaul	Solicited Initial Data		
PDMNet	Fixed Wireless	Solicited Initial Data	4/20/2010	

Rapid Systems Corporation	Fixed Wireless	Solicited Initial Data		
Reliance Globalcom Services, Inc.	Backhaul	Solicited Initial Data		
Sling Broadband	Fixed Wireless	Solicited Initial Data		
Southern Light	Backhaul	Solicited Initial Data	6/16/2010	
The Ultimate Connection, LLC	Backhaul	Solicited Initial Data		
Birch Communications, Inc.	ILEC/CLEC	Refused to Participate		[JAN-11-11 Jill Lindgren] Provider has chosen not to participate. The main concern was more with the fact he does not want to divulge the information publicly on his speeds or coverage area.
Birch Communications, Inc.	Backhaul	Refused to Participate		[JAN-11-11 Jill Lindgren] Provider has chosen not to participate. The main concern was more with the fact he does not want to divulge the information publicly on his speeds or coverage area.
CyberStreet Inc.	Fixed Wireless	Refused to Participate		[APR-14-10 Lindgren] Provider relayed his wishes not to participate and requested we not call again.
SBB Communications, LLC	Fixed Wireless	Refused to Participate		[MAR-07-11 Dawn Clark] Per note in Provider table, provider requested that we not contact them anymore regarding data submission. There was no further outreach made to this provider.
Break Free Wireless Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between May 25, 2010 and June 24, 2010, two attempts were made during this submission period.
Brevard Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		Nine contact attempts were made between April 5, 2010 and January 13, 2011.
Cablevision of Marion County LLC	Cable	Non-Responsive to Multiple Attempts		Six contact attempts were made between April 7, 2010 and January 13, 2011.
ClearSurf Broadband	Fixed Wireless	Non-Responsive to Multiple Attempts	5/3/2010	In addition to multiple contact attempts made between March 29, 2010 and August 17, 2010, two attempts have been made during this submission period.
GBS Online	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between March 29, 2010 and August 25, 2010, seven attempts have been made during this submission period.
KissimmeeWeb	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 21, 2009 and August 12, 2010, six attempts have been made during this submission period.
Knology of Florida, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between March 16, 2010 and August 24, 2010, six attempts have been made during this submission period.
Knology of Florida, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between March 16, 2010 and August 24, 2010, six attempts have been made during this submission period.
TerraNova Net Internet Services	Fixed Wireless	Non-Responsive to Multiple Attempts		Seven contact attempts were made between April 6, 2010 and January 13, 2011.
TerraNova Net Internet Services	ILEC/CLEC	Non-Responsive to Multiple Attempts		Seven contact attempts were made between April 6, 2010 and January 13, 2011.
US Metropolitan Telecom, LLC	Fiber	Non-Responsive to Multiple Attempts		Thirteen contact attempts were made between March 29, 2010 and January 13, 2011.
US Metropolitan Telecom, LLC	Backhaul	Non-Responsive to Multiple Attempts		Thirteen contact attempts were made between March 29, 2010 and January 13, 2011.
Clearwire Corporation	Fixed Wireless	Other	3/3/2010	[JAN-19-11 Terry Holmes] Clearwire converted their fixed wireless system to a mobile network as of this reporting period, and it is now reported as mobile. They do not have any remaining fixed wireless networks in FL.
CommFunction, LLC	ILEC/CLEC	Other		[MAR-08-11 Chip Spann] Website indicates service offering to business (no mention of residential services). Wireless section of website is blank. Appears they are general resellers of DSL.
Covad Communications	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Wes Kerr] Provider doesn't offer residential DSL, and the last mile data will not be included in the data submission.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Amanda Bentley] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Global Crossing Telecommunications, Inc.	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a provider representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Amanda Bentley] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Amanda Bentley] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

Georgia Broadband Mapping Project

Product Release White Paper

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.
- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is accurate and comprehensive, a holistic approach has been developed to further validate and verify the data. Following the initial mapping of providers' coverage area and serviceability claims, the project team uses the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers were trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality reviews are tracked by provider and then by technology type, which is then stored and maintained within a "Validation" table. A confidence value is assigned based on the collected information to highlight provider coverage areas that require further investigation and enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
  - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

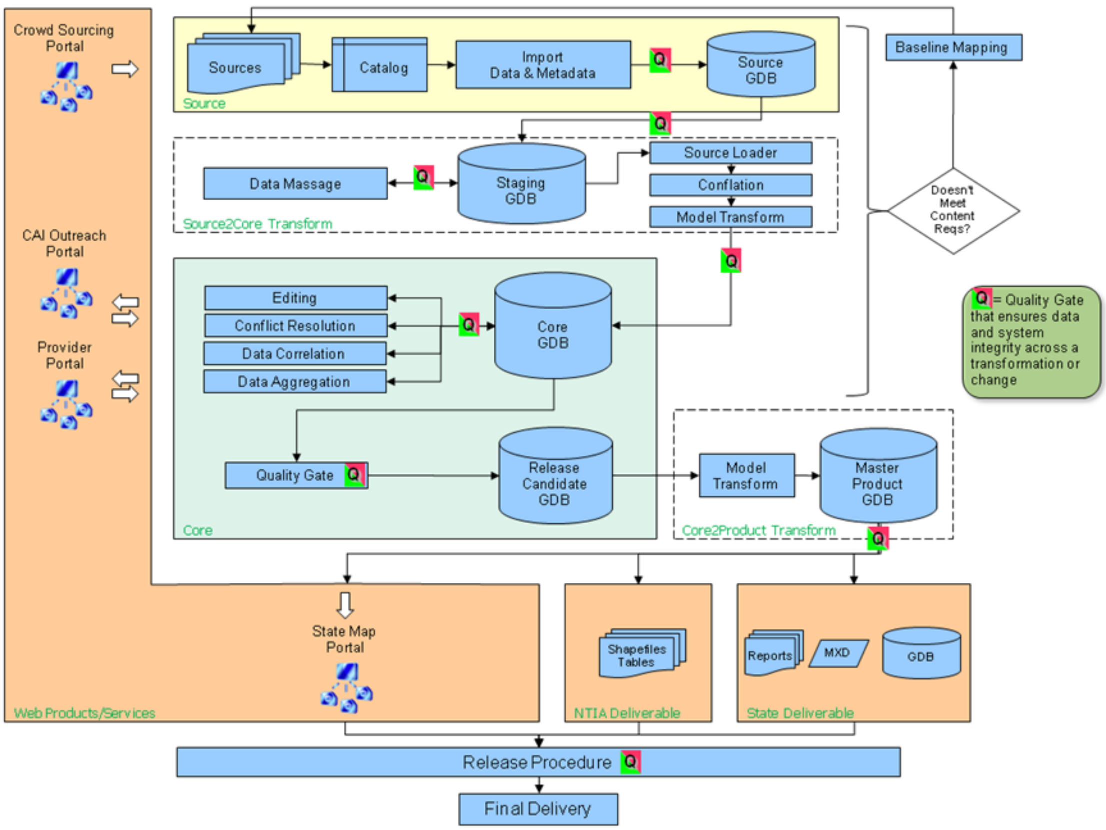
Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link: https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

- Longitude values for States outside the lower 48 (any table)
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is ‘No’ or ‘Unknown’
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.
8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application
2) Regular email
3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email
    a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:
Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

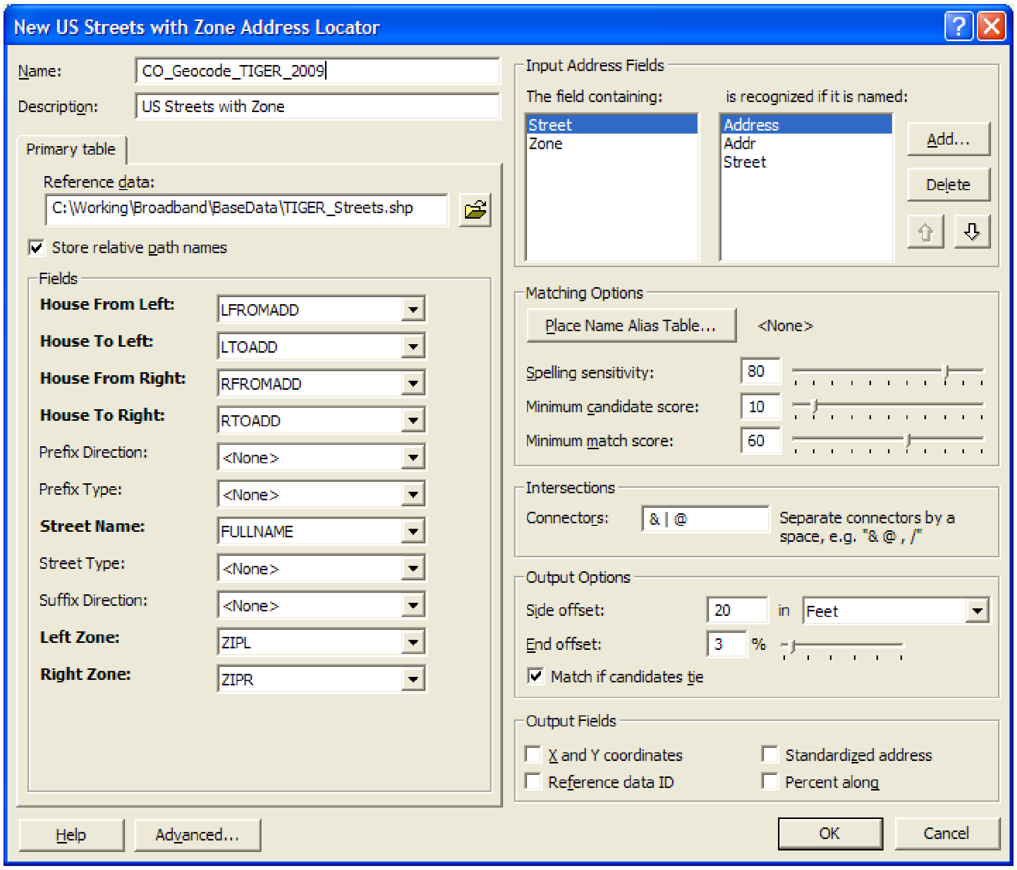
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
    a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
    b) Select "US Streets with Zone" and press OK.
        i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
    c) Navigate to the TIGER Streets 2009 file and press OK.
    d) Fill in the dialog box as seen below:

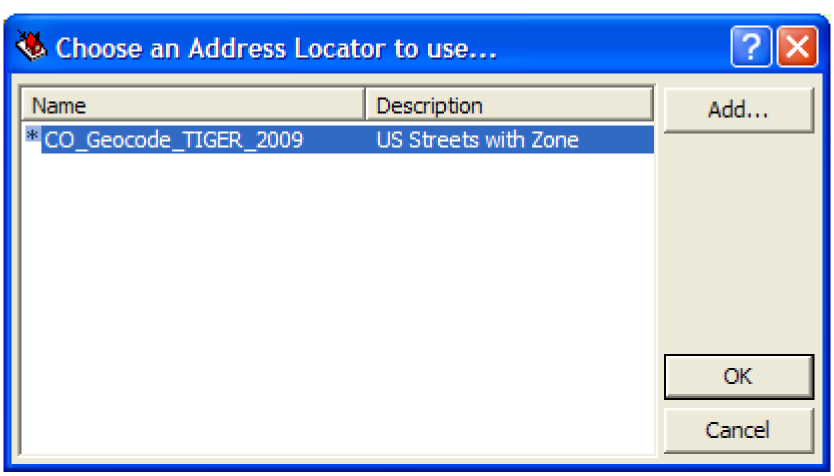


e) Click OK.

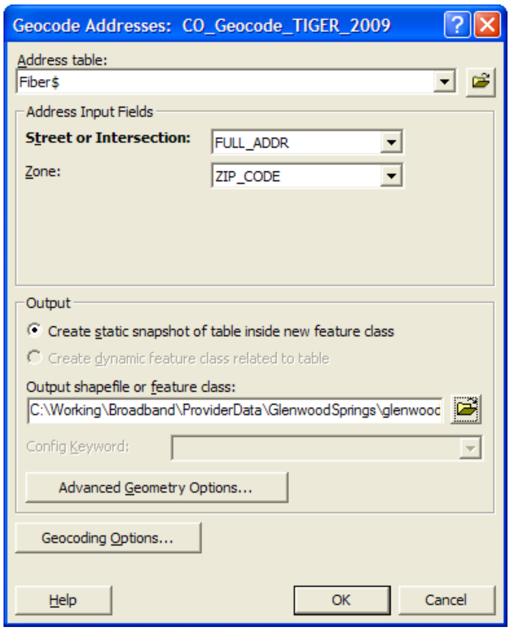
3) Open up ArcMap, and add the Excel spreadsheet with the address information.

4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.

5) Select the appropriate address locator by clicking Add…. then OK.

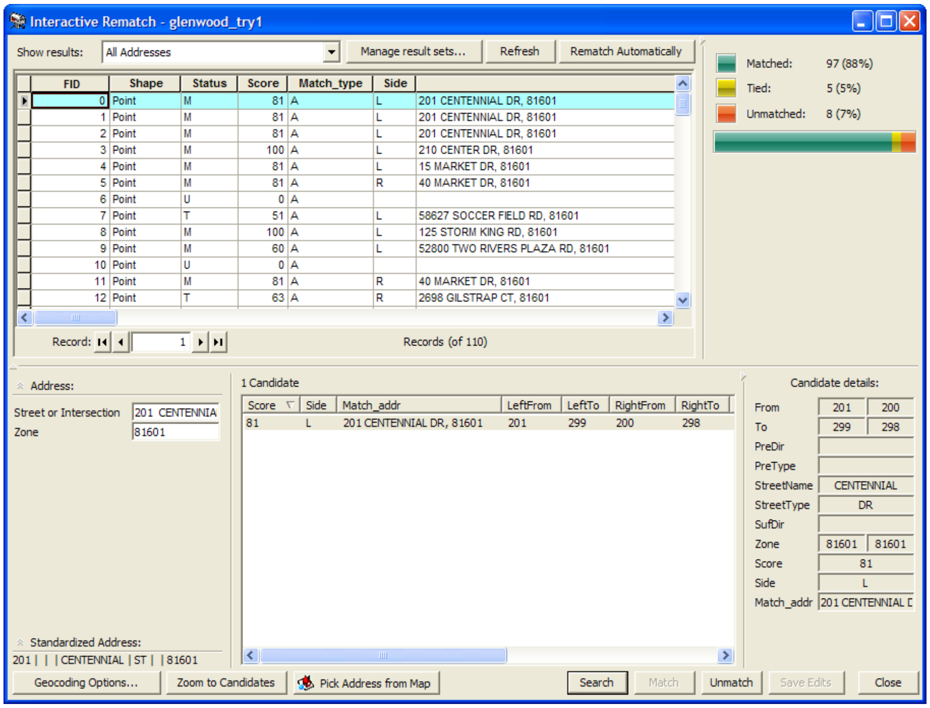


6) Fill out the Geocode Addresses dialog box as shown below:

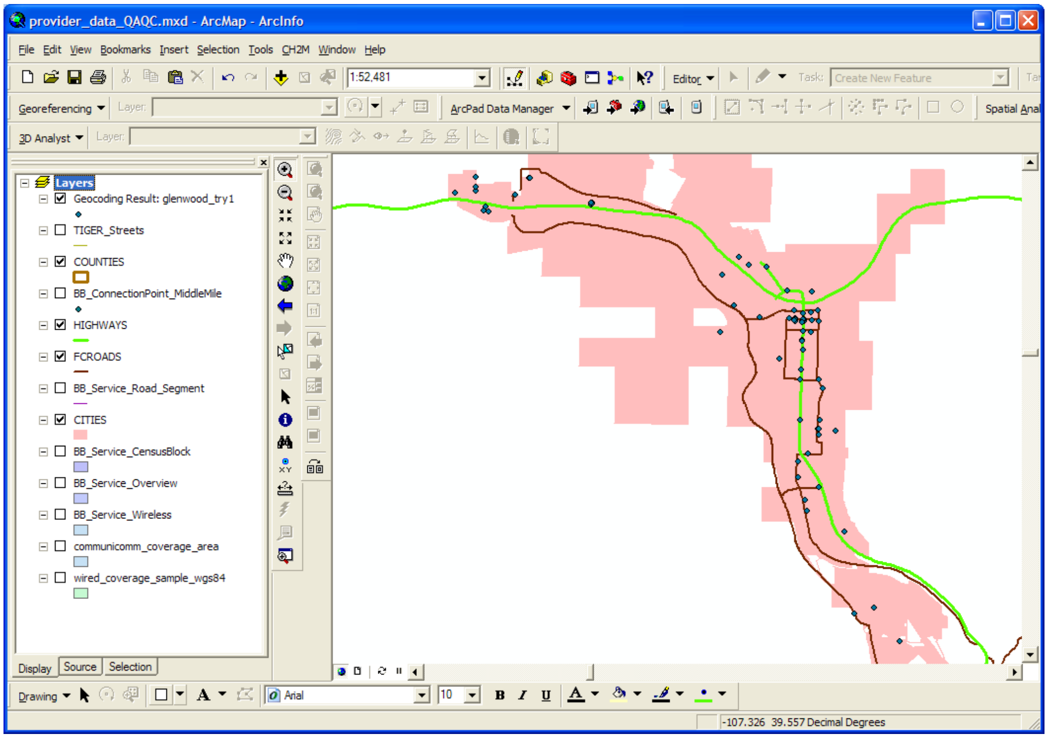


7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.

8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:

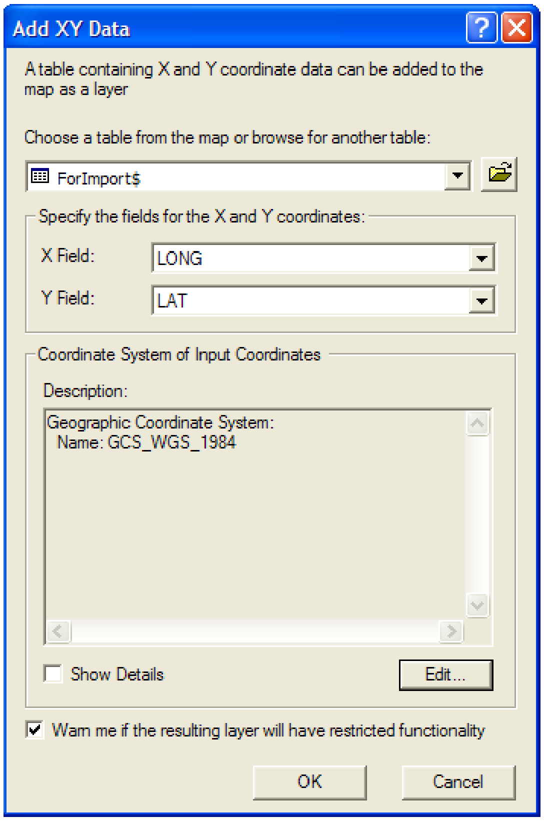


12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.
   b. Make sure that XY locations are in decimal degrees.
      i. To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).
      ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.
2) Open up the Excel worksheet in ArcMap.
3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

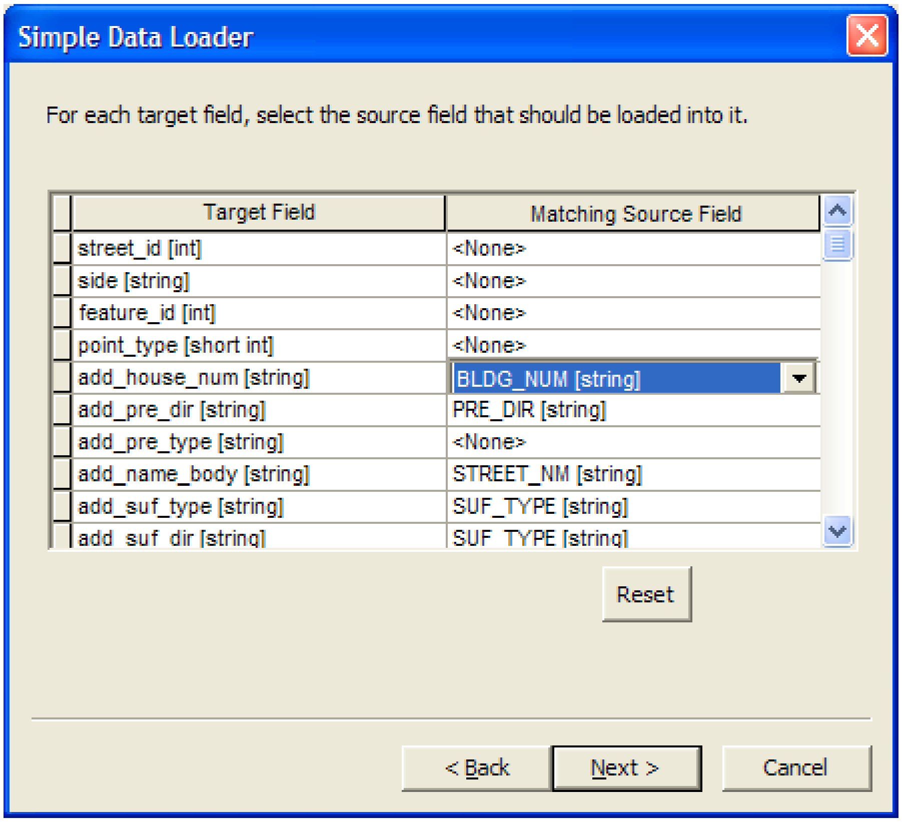
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

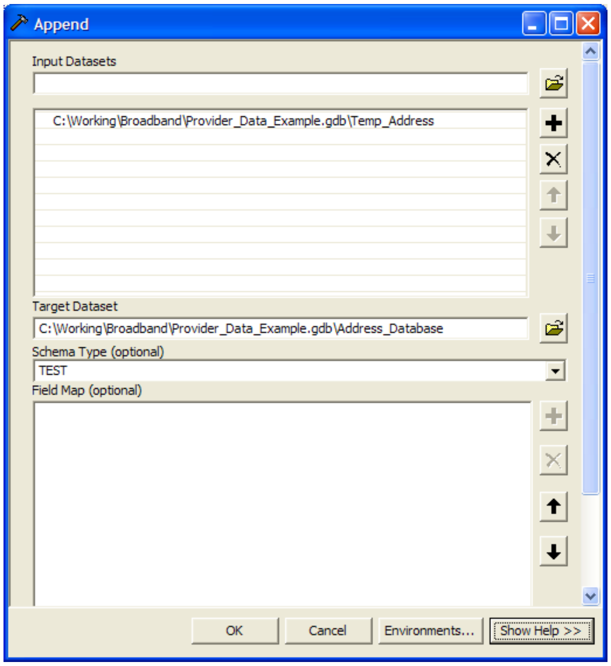
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

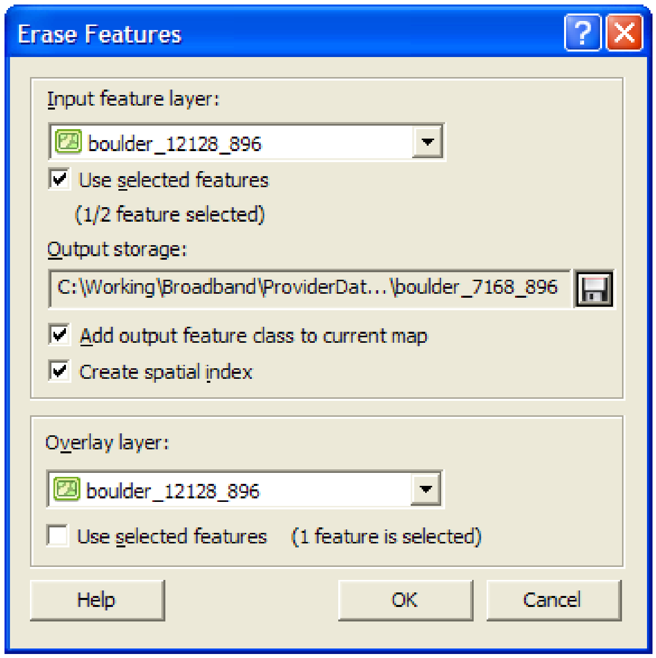


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
    a. <u>Within ArcGIS</u>
        i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
            1. This will save as a DBF table. Keep track of location for future reference.
        ii. Buffer county address point featureclass to 150’.
            1. During buffer command, dissolve on “ad_down”; ”ad_up”; ”provider”; “dba”; “frn”; “tt”; ‘all metadata fields’; “stctyfips”.   Save as…. county_fastestdown_fastestup.
            2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
            3. Note: these attribute fields are specific to the Point Address database.
        iii. Select the features that represent the lowest speeds
    b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
        i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
        ii. Use the same feature class for Input and Overlay
        iii. Check Use selected features on the Input feature, as seen below.

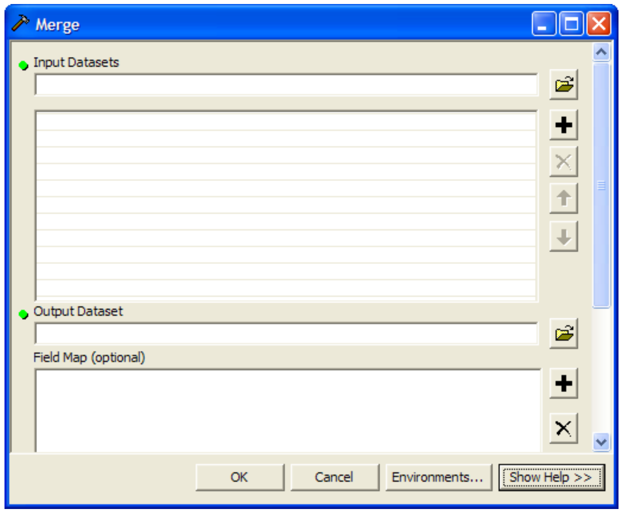
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. <u>Within ArcGIS</u>

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).

iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.

v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

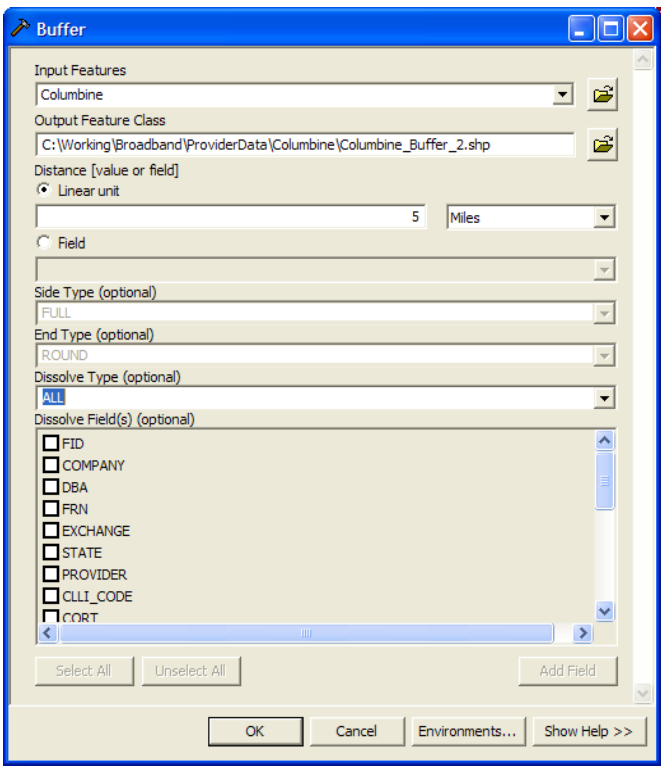
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

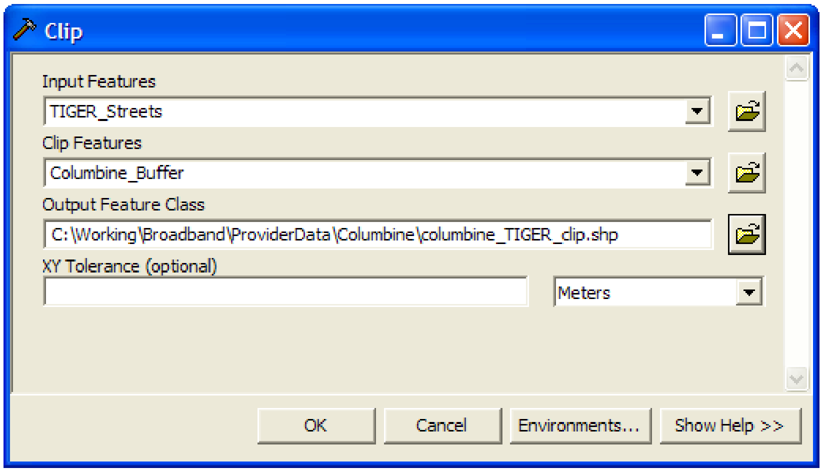
3.5.2.6 DSLAM or Central Office Location – GIS Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

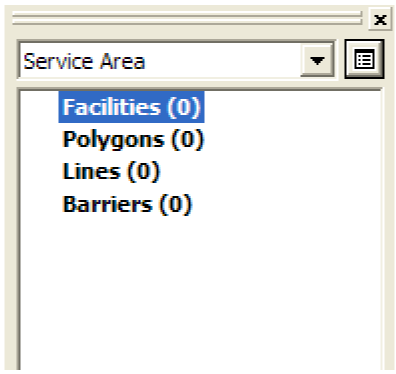
1) Buffer the DSLAM/Central Office points feature class
   a) Add the point feature class to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
   c) Set the buffer distance to 5 miles
   d) Set the dissolve type to ALL
   e) Name the output feature class
   f) Typical Buffer tool is seen below:



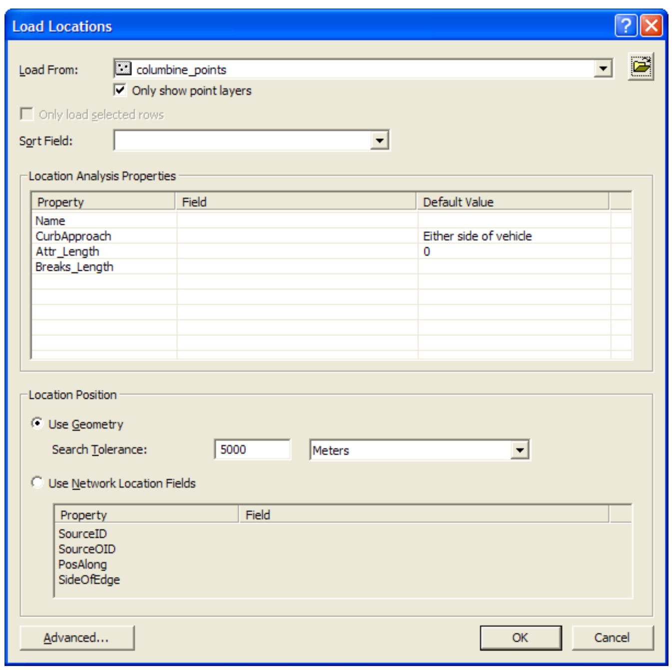
   g) Press OK
2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
   a) Add TIGER street layer to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
   c) Complete the dialog box as seen below:



   d) Press OK.
3) Using ArcCatalog and within the file geodatabase:
   a) Right Click and create a new Feature Dataset
      i) For the Feature Dataset settings:
         (1) Name the feature dataset accordingly
         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
         (3) No vertical coordinate system needed
         (4) Leave all x,y,z,m values at default.
         (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
      a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create “New Service Area”
9) Open up the Network Analyst Window by selecting the button.



10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.



11) Press OK.

12) Click the Service Area Properties button

13) For the following tabs change the following properties:

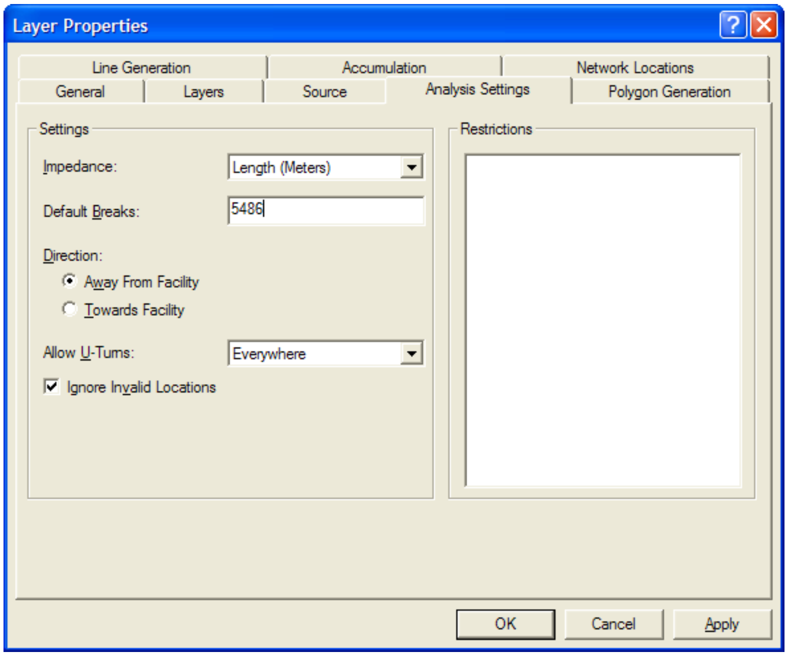
a) "Polygon Generation" tab

i) Select "Merge by break value"

ii) Also disable the Trim Polygons option

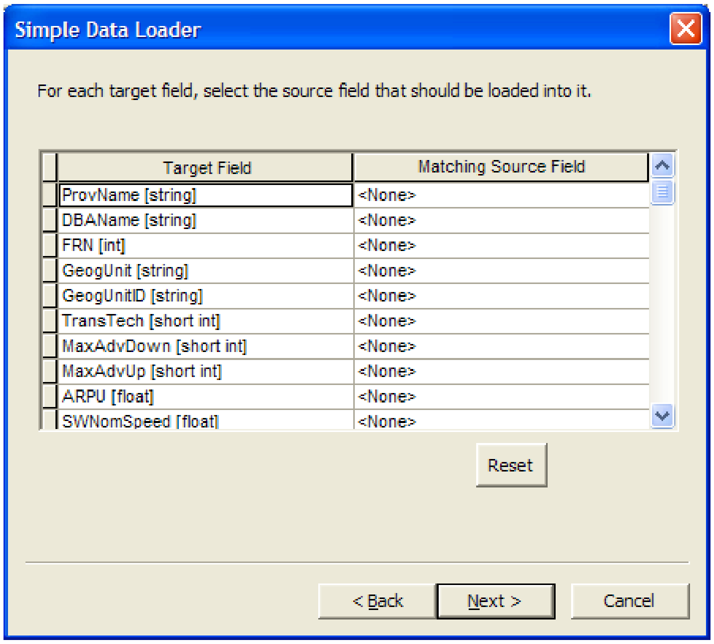
b) "Analysis Settings" tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the "Default Breaks" location

i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

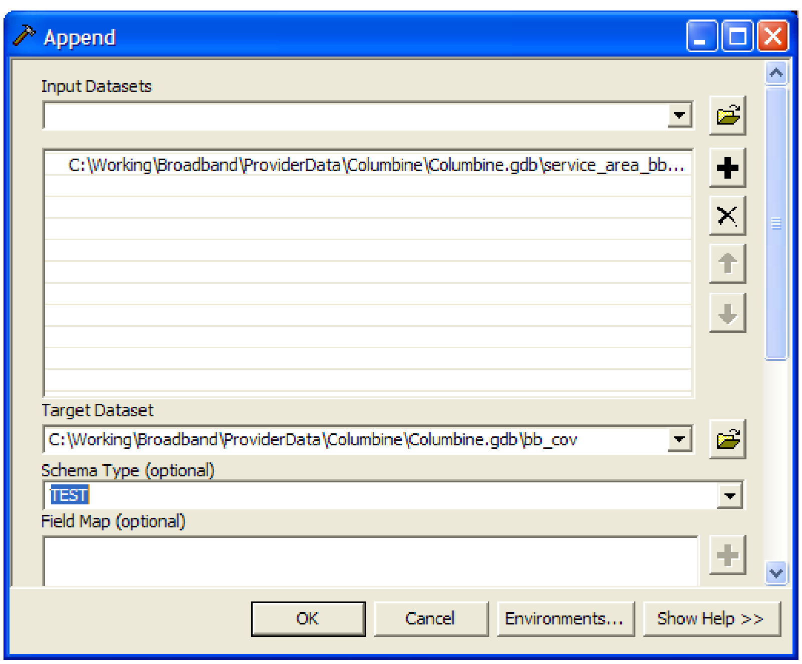
14) On the Network Analyst Toolbar click the "Solve" button to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
    a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST

21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

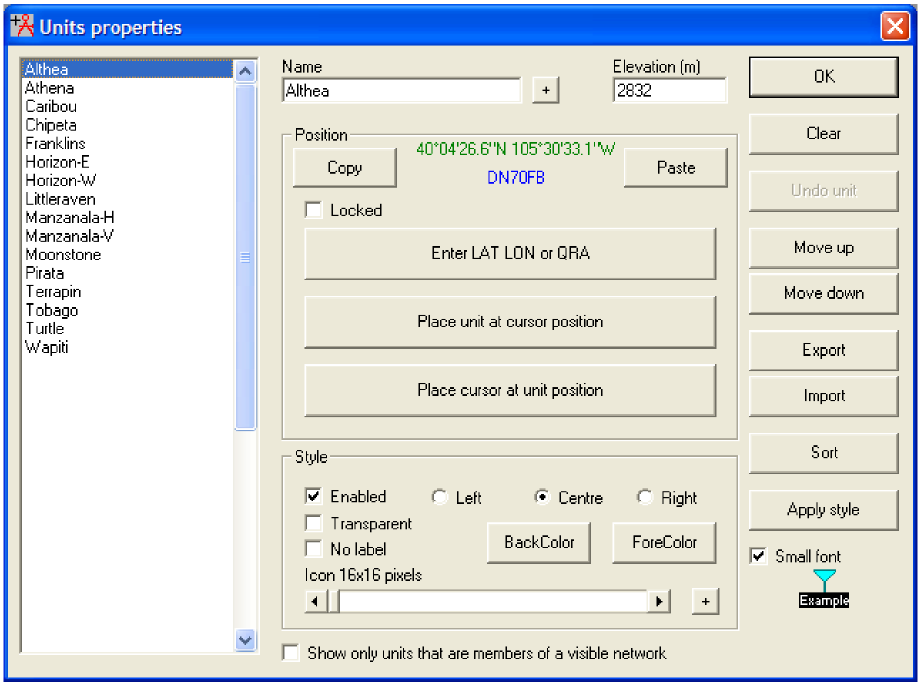
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

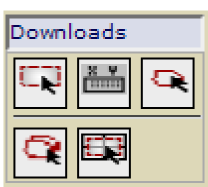
3.5.2.8.1 Broadcast Tower Location – GIS Data

In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

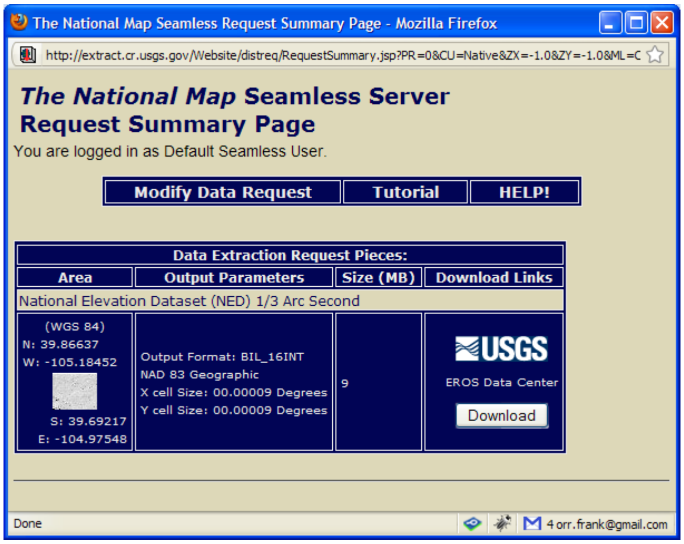
1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
   a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
   b. Zoom to the area of interest and use the Download tools:

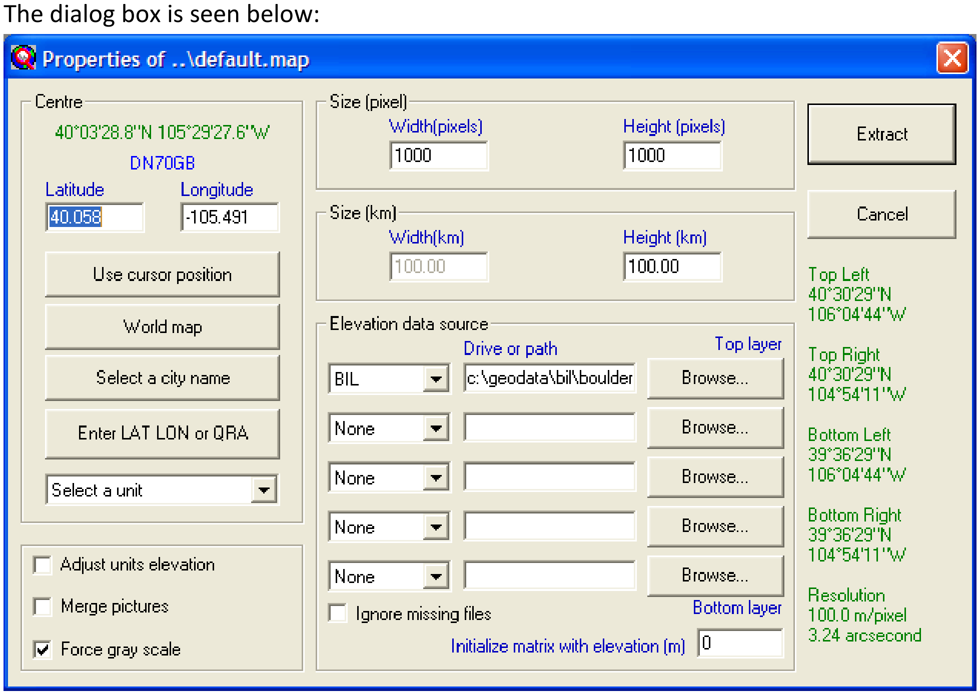


   to define the area to download.
   c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:



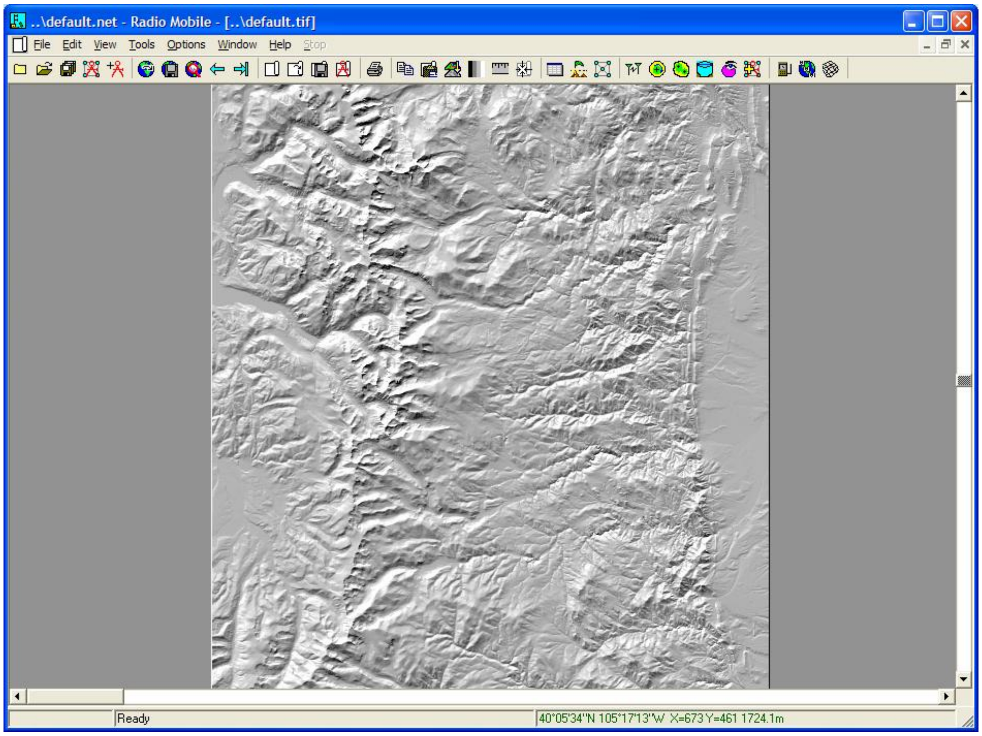
d. Download the data and unzip it.

7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:

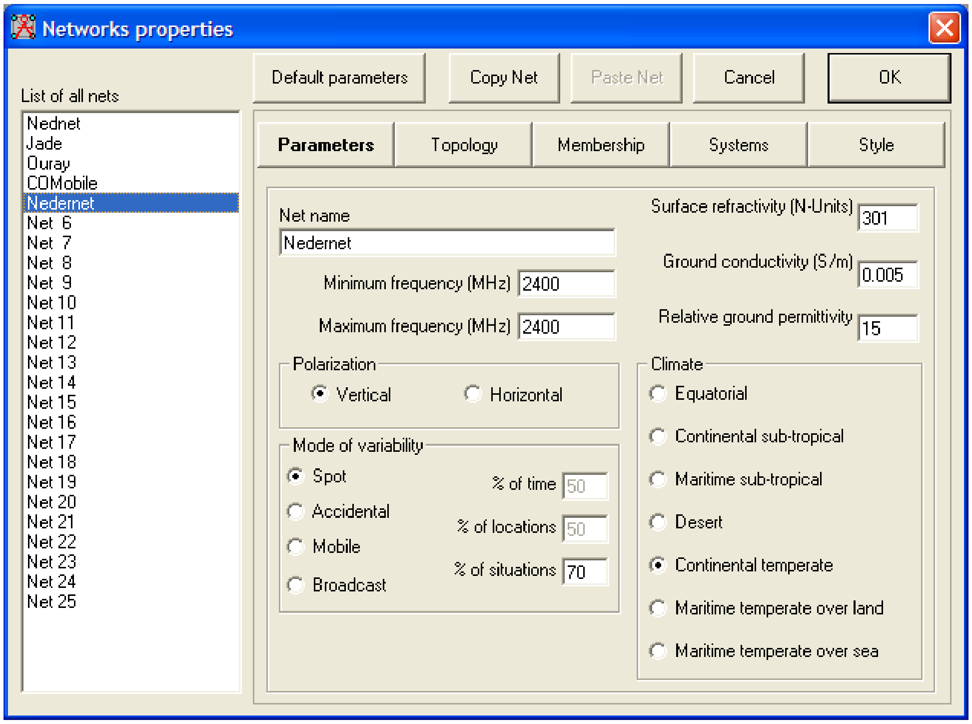


12) Hit Extract.

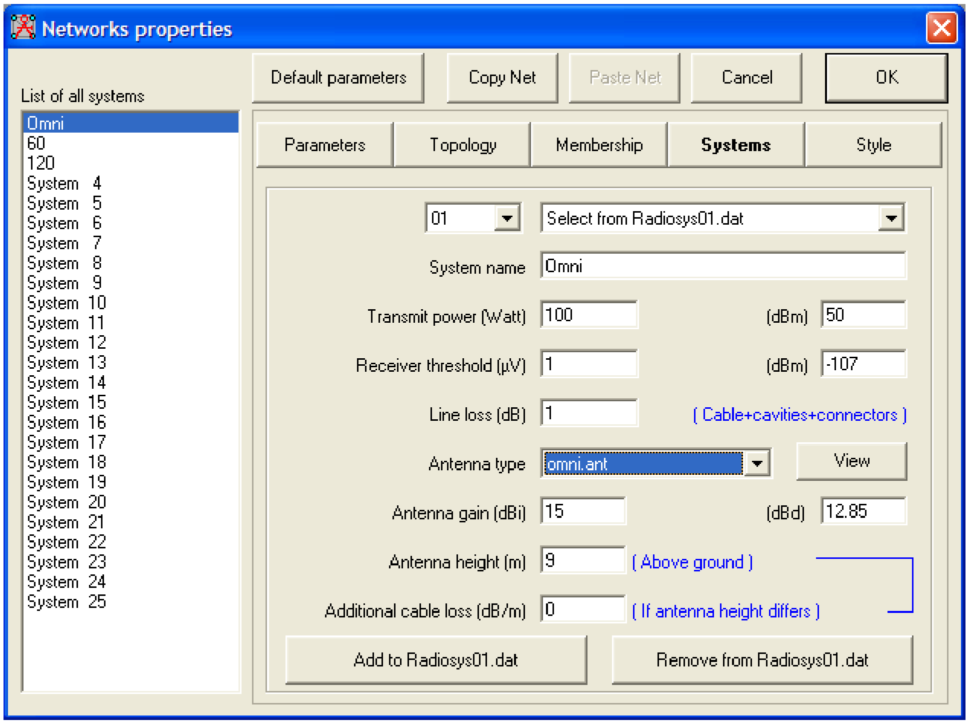
13) The elevation data is render as a hill shade, as seen below:



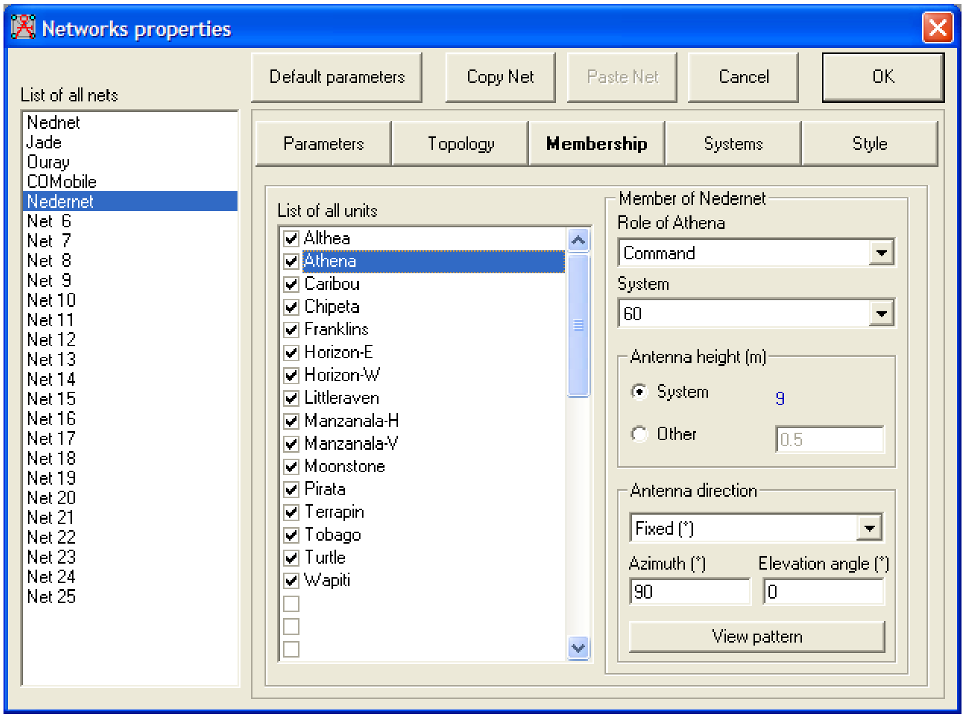
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



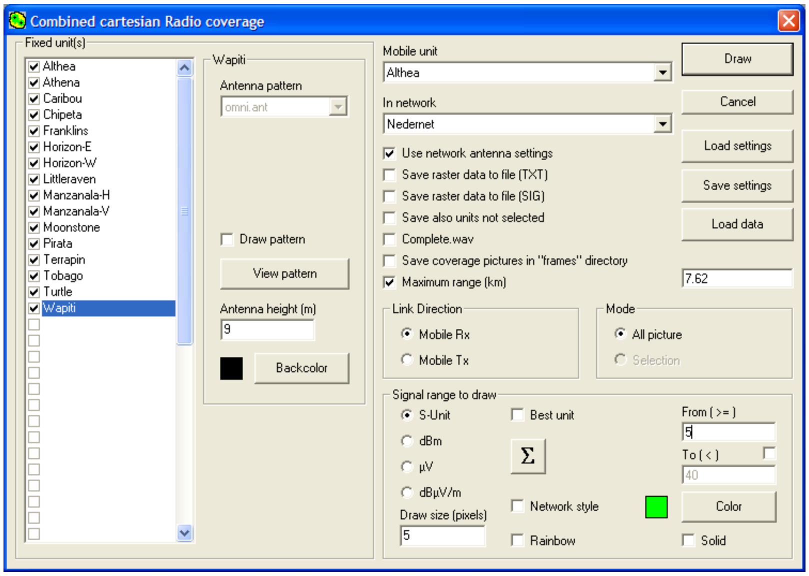
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:

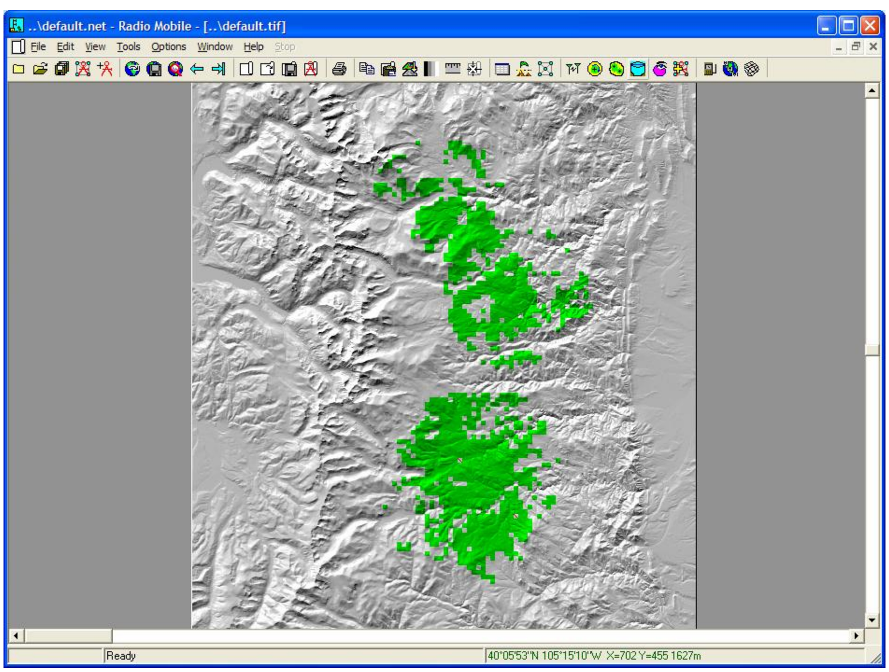


19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:



23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.

24) Press Draw.



25) Save the resulting image as a TIF by selecting File>Save Picture as.

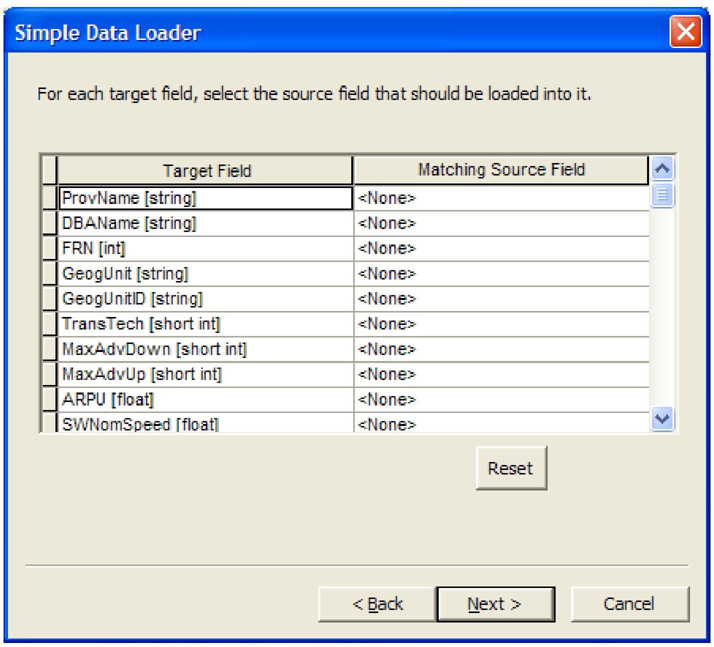
26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.

27) Load the TIF image you created and georeference it using the corners of the BIL data.

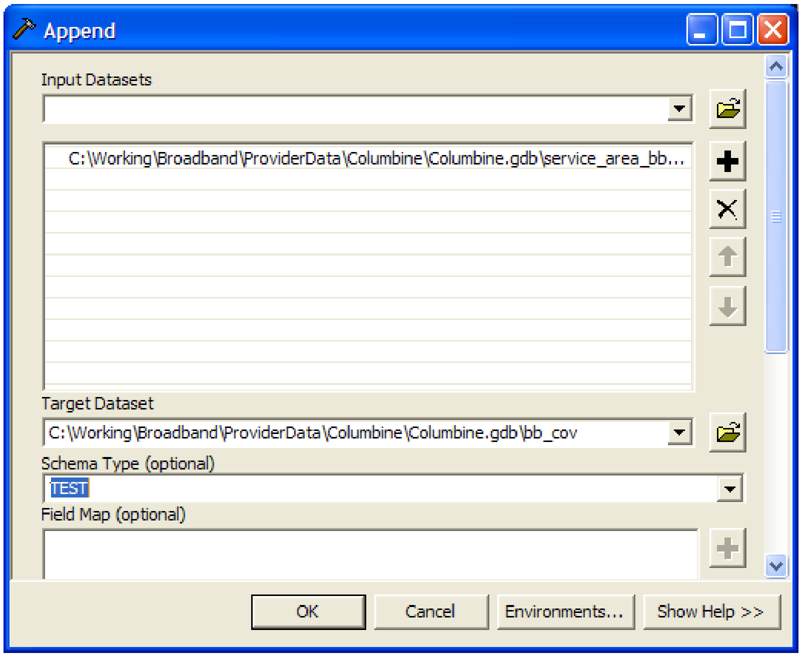
    a. The corners of the data can be seen in the TIF image.

28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.
29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.
30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:

31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



    e. Press Next, then Next again, then Finish.
33) In ArcToolBox, go to Data Management Tools>General>Append
34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



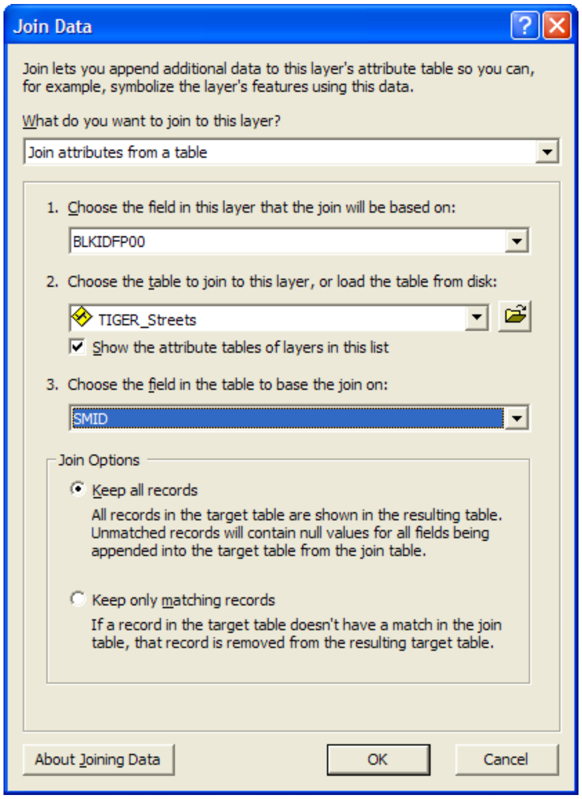
35) Leave the Schema Type as TEST
36) Press OK.
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
      i) Load both data sets into ArcMap
      ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
      iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:



iv) Press OK

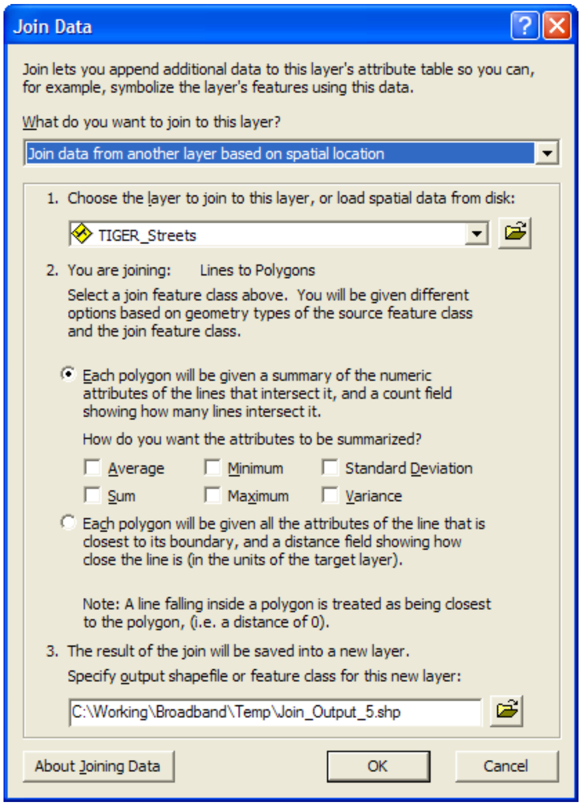
b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID

i) Load both data sets into ArcMap

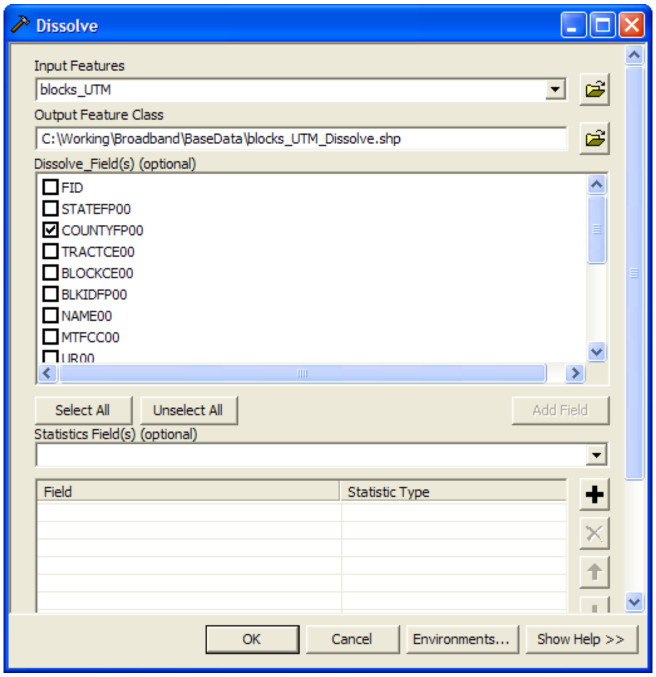
ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join

iii) Select “Join data from another layer based on spatial location” from the dropdown menu

iv) Complete the dialog box as seen below and press OK.



2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
   a) Use the County FIPS code to dissolve by county.
   b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
   c) Complete the Dissolve dialog box as seen below:



d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

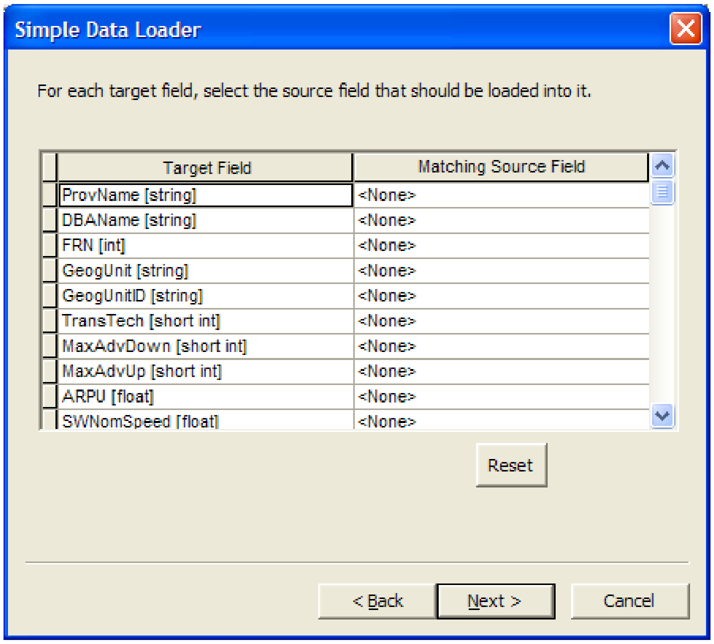
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class

   b) Press the Add button, hit Next

   c) Accept the defaults and hit Next

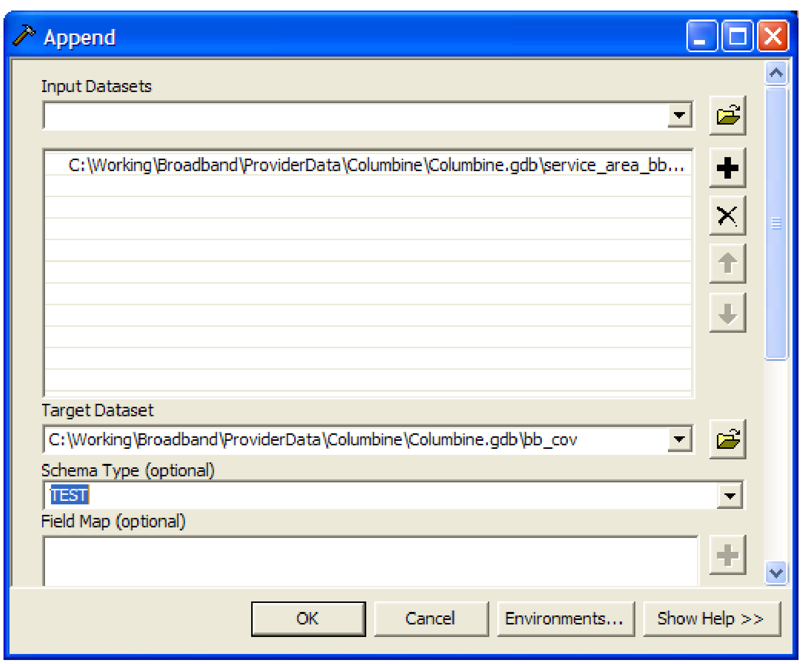
   d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST

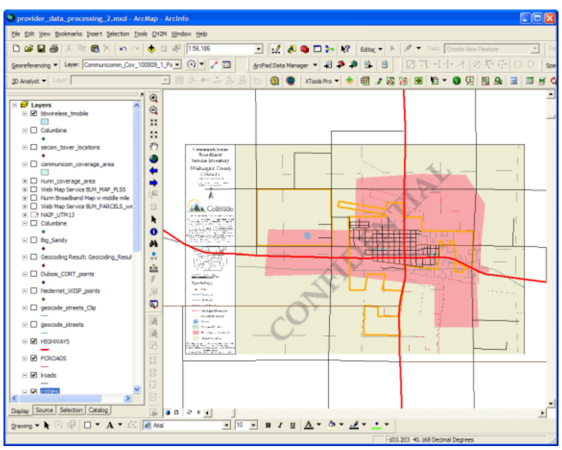
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

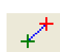
3.5.4 Polygonal Data

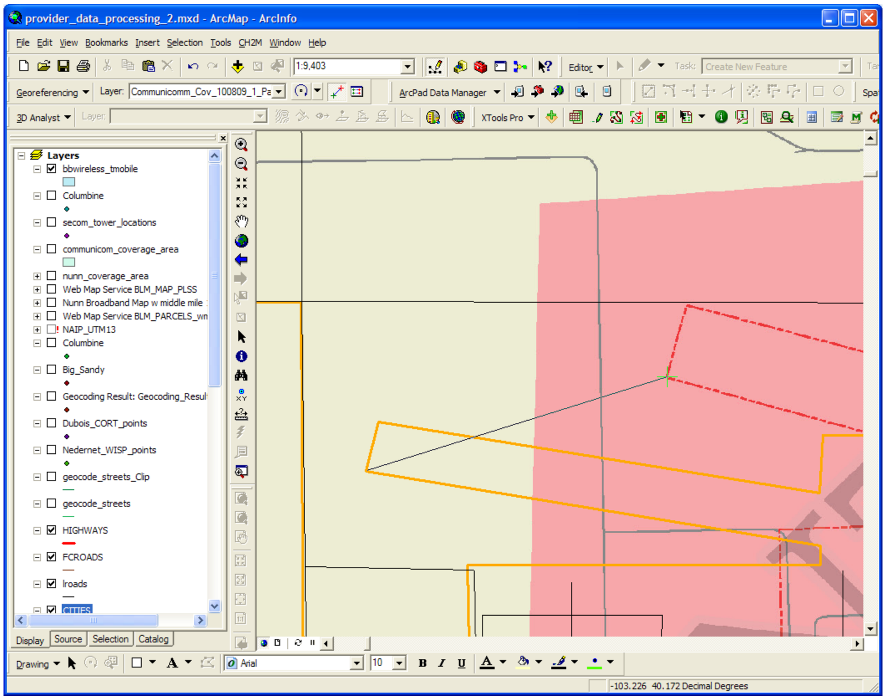
3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
   a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
   a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button  to add control points to the map
9) Use common points in the base data set and the JPG image
   a) For example, find major street intersections, county/city boundaries, etc.
   b) Try to distribute the points more or less in the four corners on the image for the best transformation
10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:



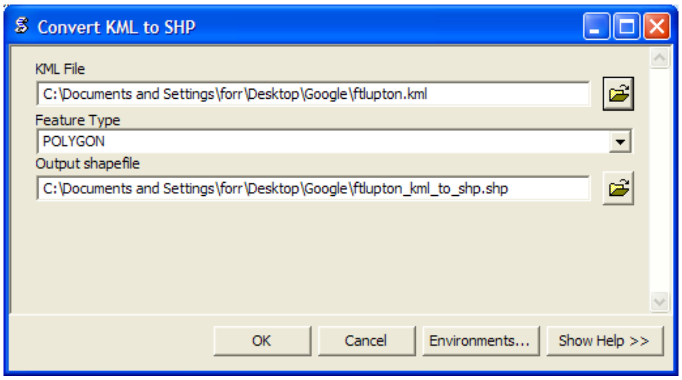
11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
17) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

1) Use a KML to SHP converter to translate file into an ESRI format
2) http://arcscripts.esri.com/details.asp?dbid=15603

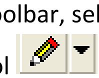
3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
   a) To do so, follow the instructions provided above in "Coverage Area – PDF/JPG/Other Image Format."
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
8) Use the Sketch Tool  to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

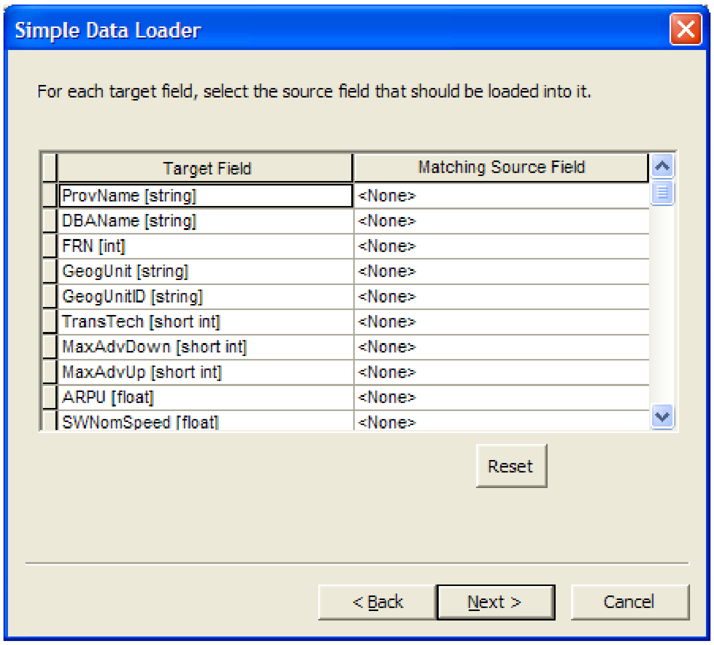
1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.

a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b) Press the Add button, hit Next

c) Accept the defaults and hit Next

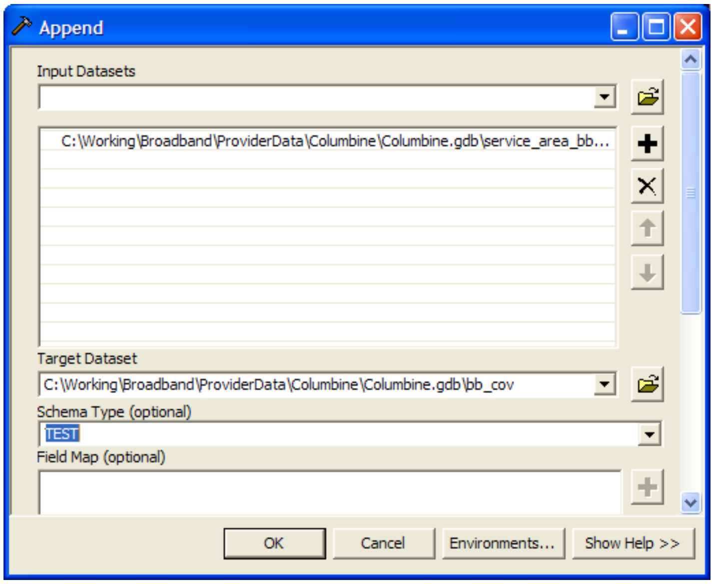
d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

2) In ArcToolBox, go to Data Management Tools>General>Append

3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state “Composite Locator”
- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.
- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.
- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.
- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.
- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

- Un-join the county data from the geo-code subscribers list.

- Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

- Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

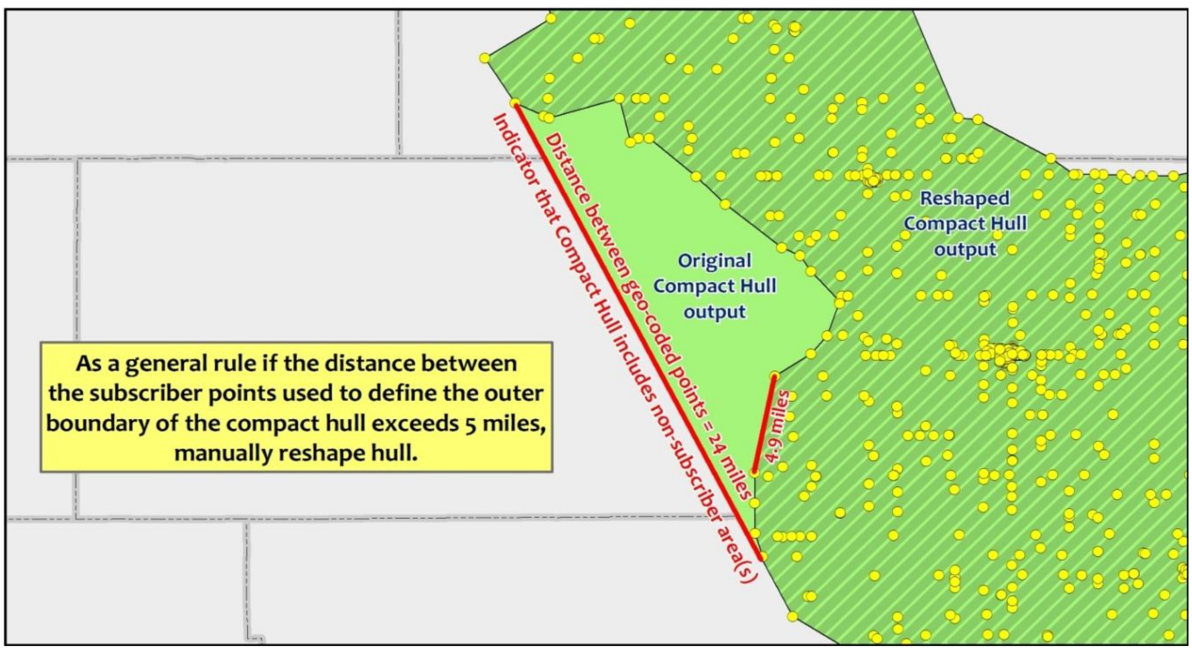


FIGURE 3a- Compact Hull: Manual Resolution Required

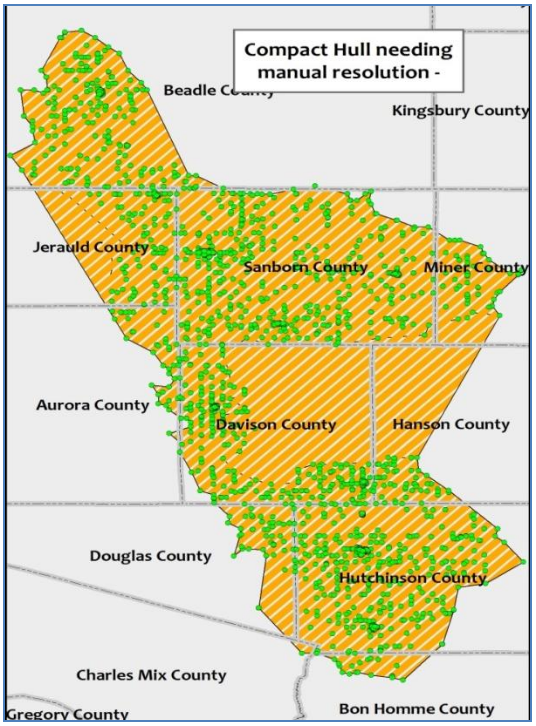
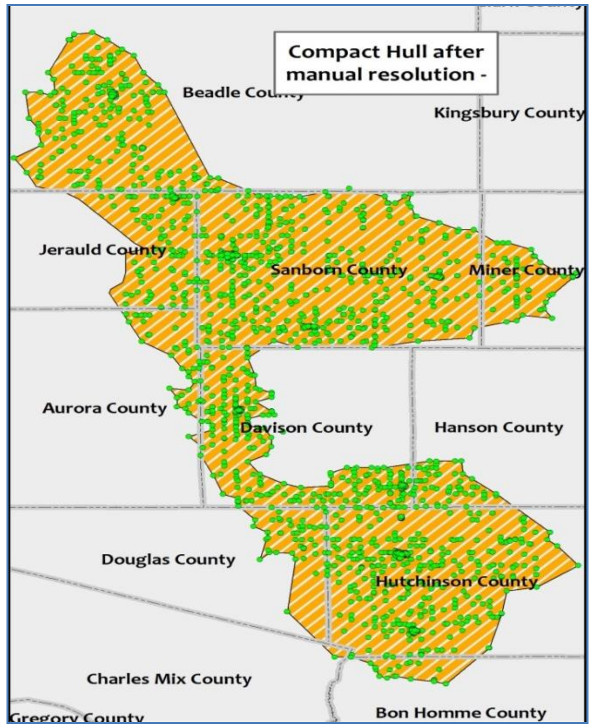


FIGURE 3b- Compact Hull: After Manual Resolution



- To attribute the compact polygon - Perform a "Spatial Join" where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate "stcty_fips" field. Also use the county name field to populate the "BBCov_Name" field.

  - Exceptions is where a provider's coverage is distributed throughout more than one area of any given county where the "BBcov_Name" should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

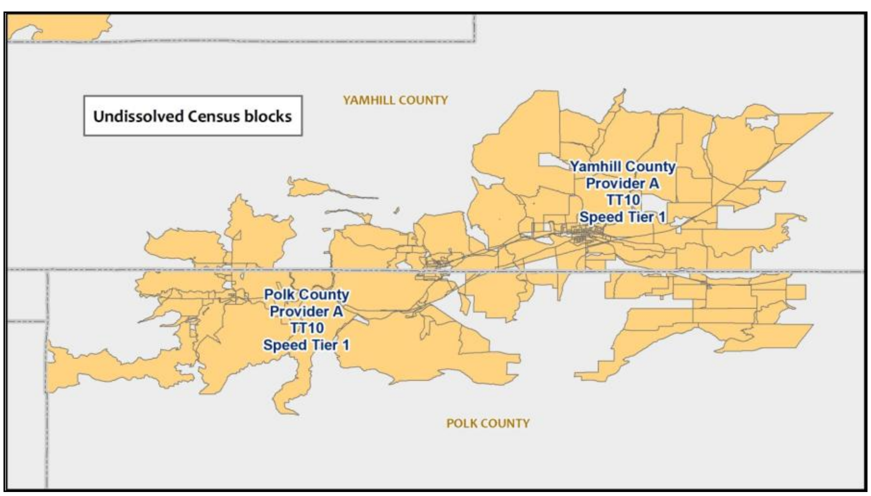


Figure 1: Undissolved census block polygons

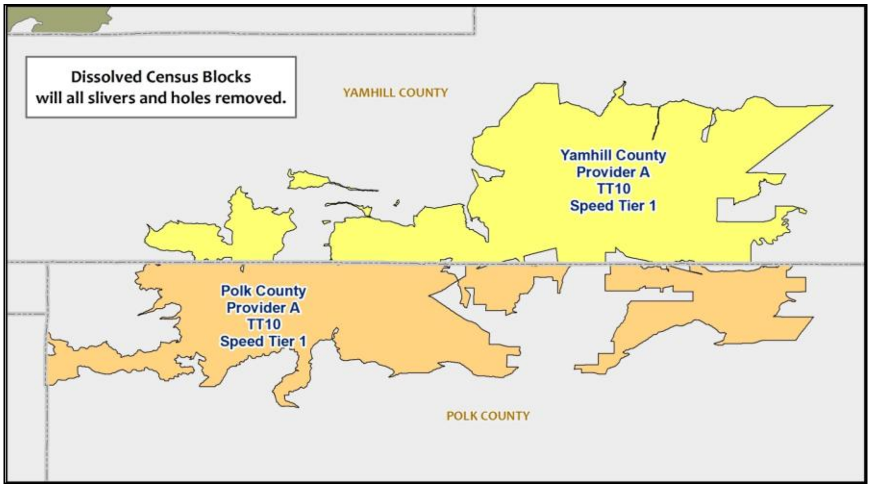
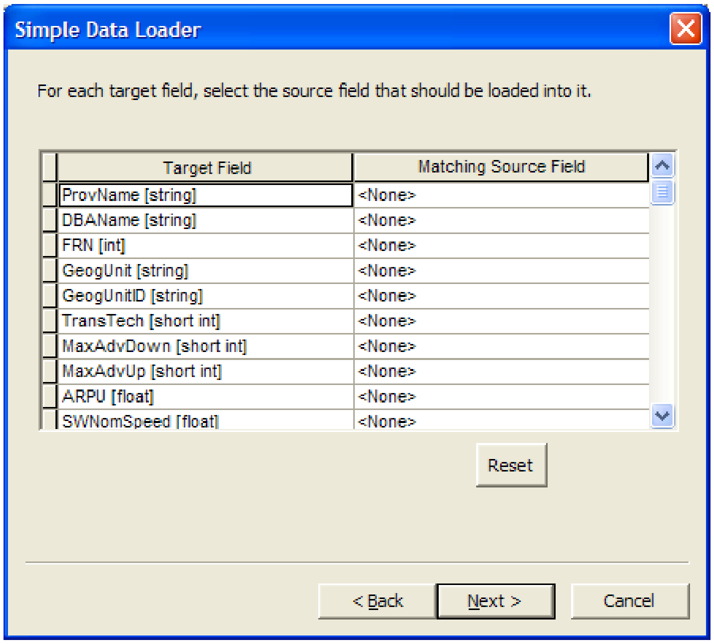


Figure 2: Census block polygons dissolved by county

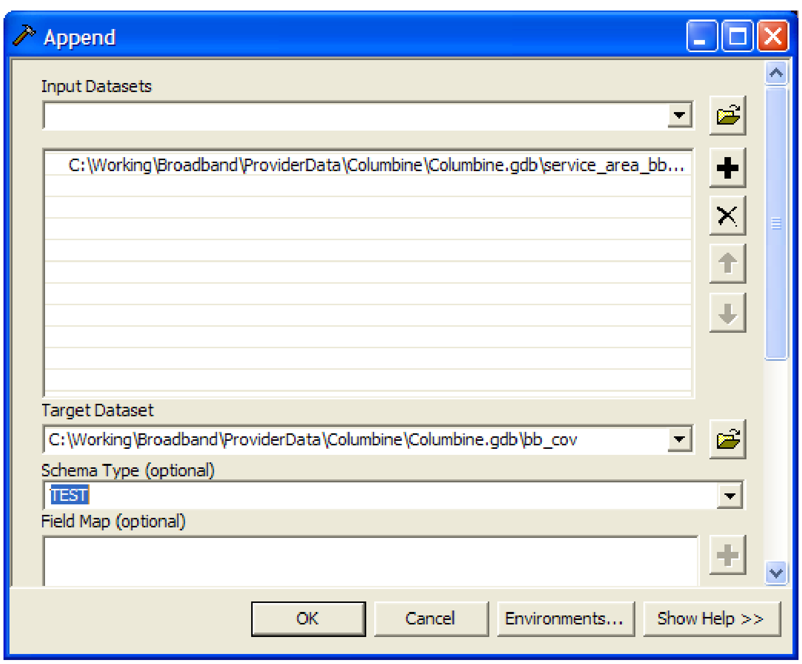
2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST

9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

    b. Example of command line:

    <path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

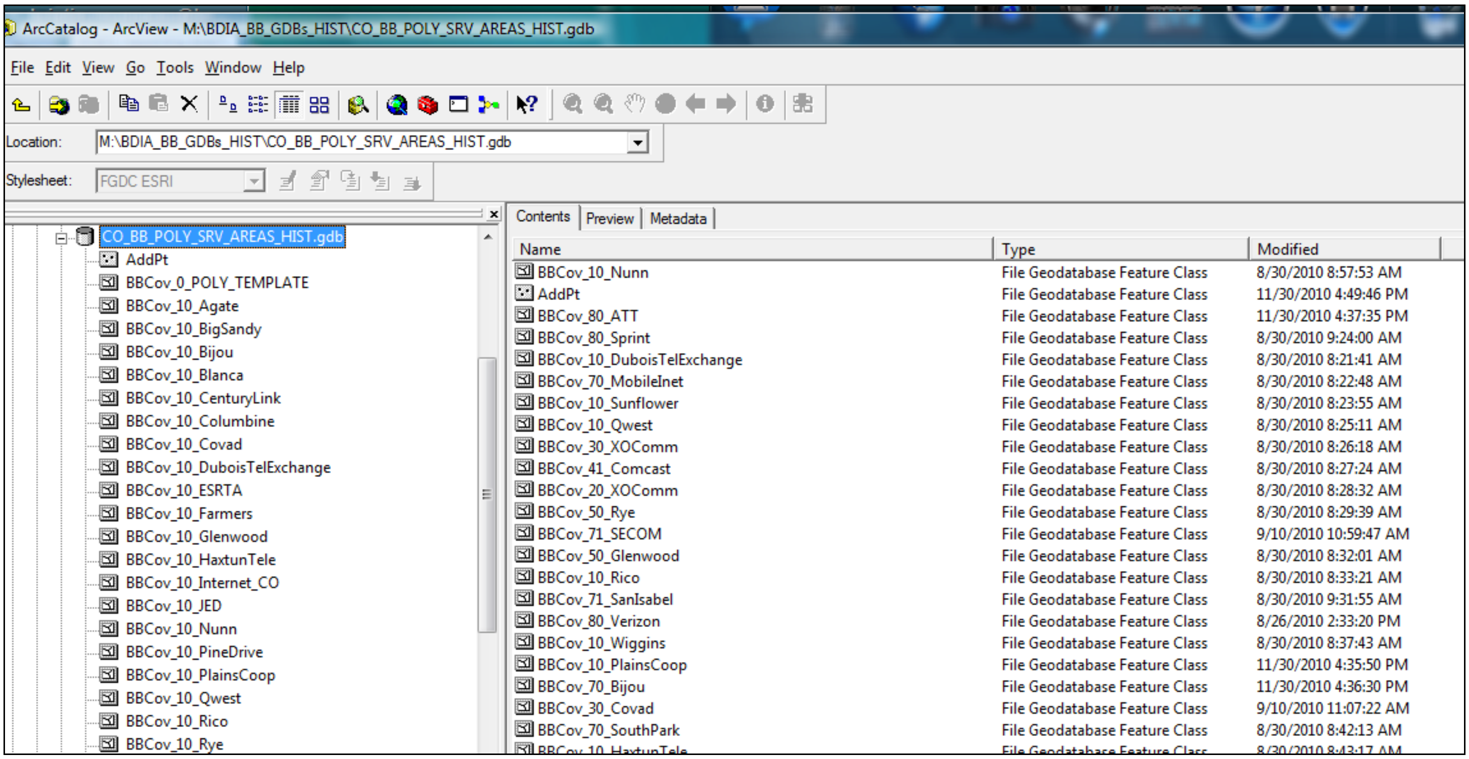
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
*************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb
    a. The transactions scripts records changes at a feature level.
    b. Below is a screen shot supporting the directory structure of the historical fGDB.



    c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:
        i. Commit_by
            1. Records the GIS-Analyst that committed the changes to the historical fGDB.

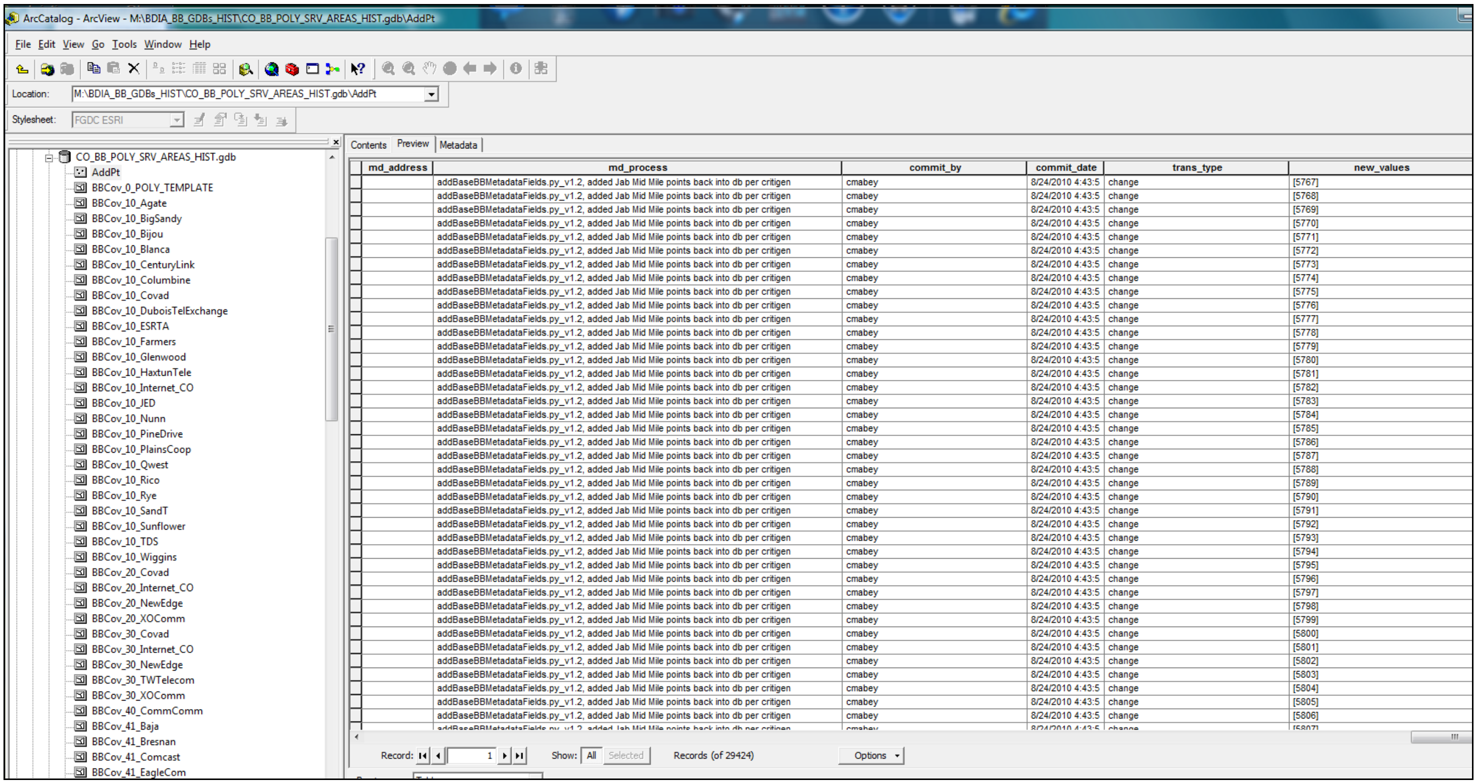
        ii. Commit_date
            1. Records the date and time stamp that the changes were committed.

        iii. Trans_type
            1. This field reflects the type of change recorded.
            2. Categorized by:
                a. Adds/Change/Deletes

        iv. New_values

1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



md_address	md_process	commit_by	commit_date	trans_type	new_values
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5767]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5768]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5769]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5770]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5771]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5772]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5773]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5774]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5775]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5776]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5777]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5778]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5779]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5780]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5781]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5782]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5783]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5784]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5785]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5786]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5787]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5788]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5789]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5790]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5791]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5792]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5793]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5794]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5795]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5796]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5797]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5798]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5799]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5800]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5801]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5802]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5803]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5804]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5805]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5806]

3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where we are supplied with subscriber speed information by the data provider, we use the following formula from the NOFA:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

When these values have been obtained or calculated, they are used to update the service overview layer. This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer you would like to join to and select Joins and Relates>Join… from the dropdown menu. Then navigate to the table you want to join and select the join fields from the drop down lists. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.

2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.
3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)

Name	Alias	Description
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the data is then validated by the provider to ensure the data aggregated is an accurate representation of their coverage area and supporting broadband information. This is completed through the Provider Portal web application, which is a secure interactive map displaying their coverage areas and allows the user to validate, submit feedback or request changes. If changes are requested, then the features on the portal are then updated and an automatic request is sent to the provider to complete the validation effort.

For some providers that did not use the Provider Portal, a PDF was sent displaying their coverage map and validation was then completed via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

Once the provider has validated their coverage areas, a 3rd party source comparison and analysis is then performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments applied so they can later be reviewed with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
InfoUSA	Consumer and Business Listings	Community Anchor Institutions Can also be used for demographic information supporting the State websites
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41)
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All efforts from the above-mentioned validation and verification activities, plus internal peer quality reviews are combined and tracked in a Validation table. Based on the results of this analysis, a confidence value is assigned for each provider and then each technology.

The confidence values are as follows:

0 = Coverage area has not been reviewed
10 = Extremely Low. Single Source QC.
20 = Very Low. Needs Additional Validation\Verification
30 = Low. Even with Validation\Verification, Coverage is still suspect.
40 = Acceptable, confirm with State prior to shipment.
50 = Meets requirements to be included in shipment.
60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
70 = High. Accurate representation of coverage based upon TT.
80 = Very High. Multiple validation\verification with most 3rd party sources
90 = Extremely High. Multiple validation\verification sources
100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is then maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs, address and broadband data.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:

    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.

b. Standardize the address format as defined in the staging CAI database

c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.

d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.

   i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.

2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.

3) Using ArcCatalog, load the new data into the staging CAI database.

4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.

The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories
    - 1: School: K through 12
    - 2: Library
    - 3: Medical/Healthcare
    - 4: Public Safety

- 5: University/College
- 6: Other Government
- 7: Other Community non-government
- None: Unknown Category
  - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately
- Reports out the following counts
  - Total CAIs within that category
  - Total CAIs that contain partial BB coverage
    - Contains any of the following information for given CAI:
      - BB Subscriber, Transmission Technology, Speed Down Speed Up
  - Total CAIs that contain full BB coverage
    - Contains <u>all</u> of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
  - Correct names and format of data deliverables
    - BDIA_QC_SUITES (please see below for details)
  - Correct Projections/Datum
    - Manual interaction with product
  - Metadata Present and Correct
    - Manual interaction with product
- Table Structure
  - All required tables included
    - BDIA_QC_SUITES
  - Extraneous tables identified
    - BDIA_QC_SUITES
- Field Structure
  - All fields included
    - BDIA_QC_SUITES
  - Extraneous fields identified
    - BDIA_QC_SUITES

- Correct field names, types and widths
    - BDIA_QC_SUITES
- Field Domains
  - Values in all tables are constrained to the specified values specified
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
  - Identify if all layers have the correct geometric representation
    - Manual review of the BB_ServiceOverview layer
    - Dependent on NTIA and client requirements
- Geographic Extent
  - Product includes the necessary Geography associated with Product?
    - Manual Review - ArcGIS
  - Is there extraneous geography included in Product?
    - Manual Review - ArcGIS
- Completeness
  - Products contain the expected amount of data?
    - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product
    - Provider Validation
    - Verification using 3rd Party Data
    - Verification against reality, where applicable
- Data Regression
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations
- Prior Issues Resolved
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes
  - Have agreed upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium
  - Has the product medium been verified?
    - Manual review
  - All files present
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size

- Correct location
  - Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries
- which_build – this determines the current build and passes information to the configuration scripts

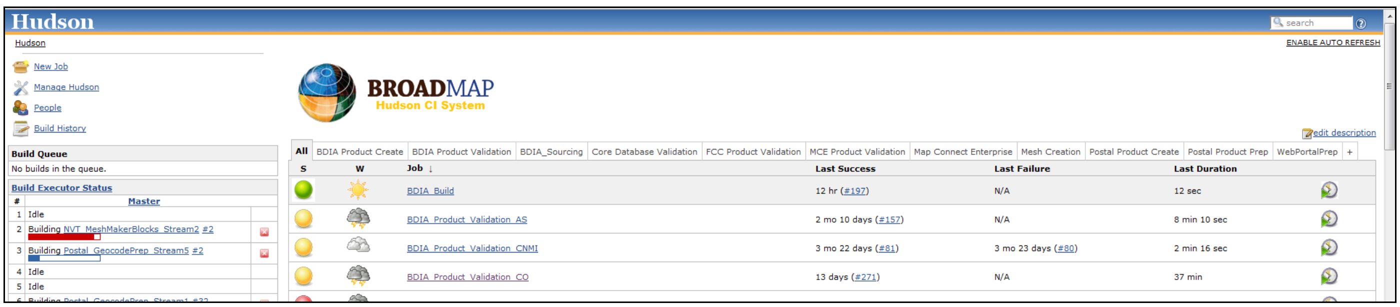
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

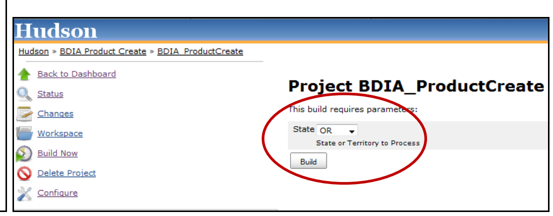
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

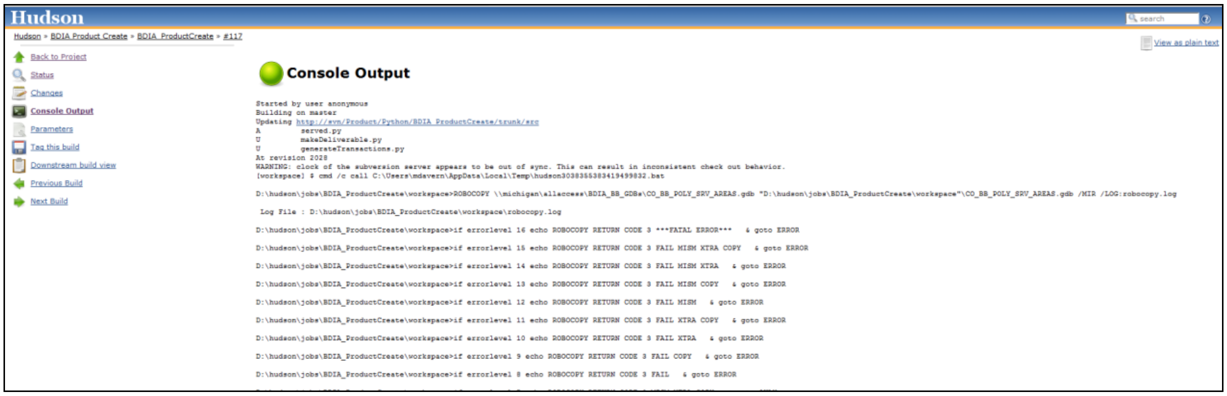
Below is an example of the main page where the type of product build can be selected.



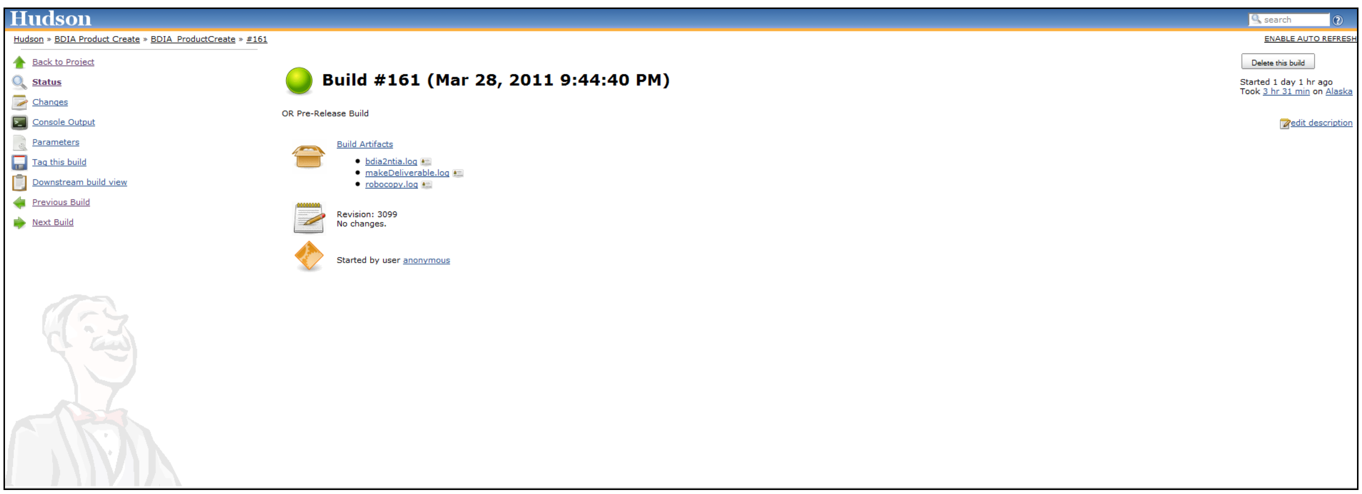
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



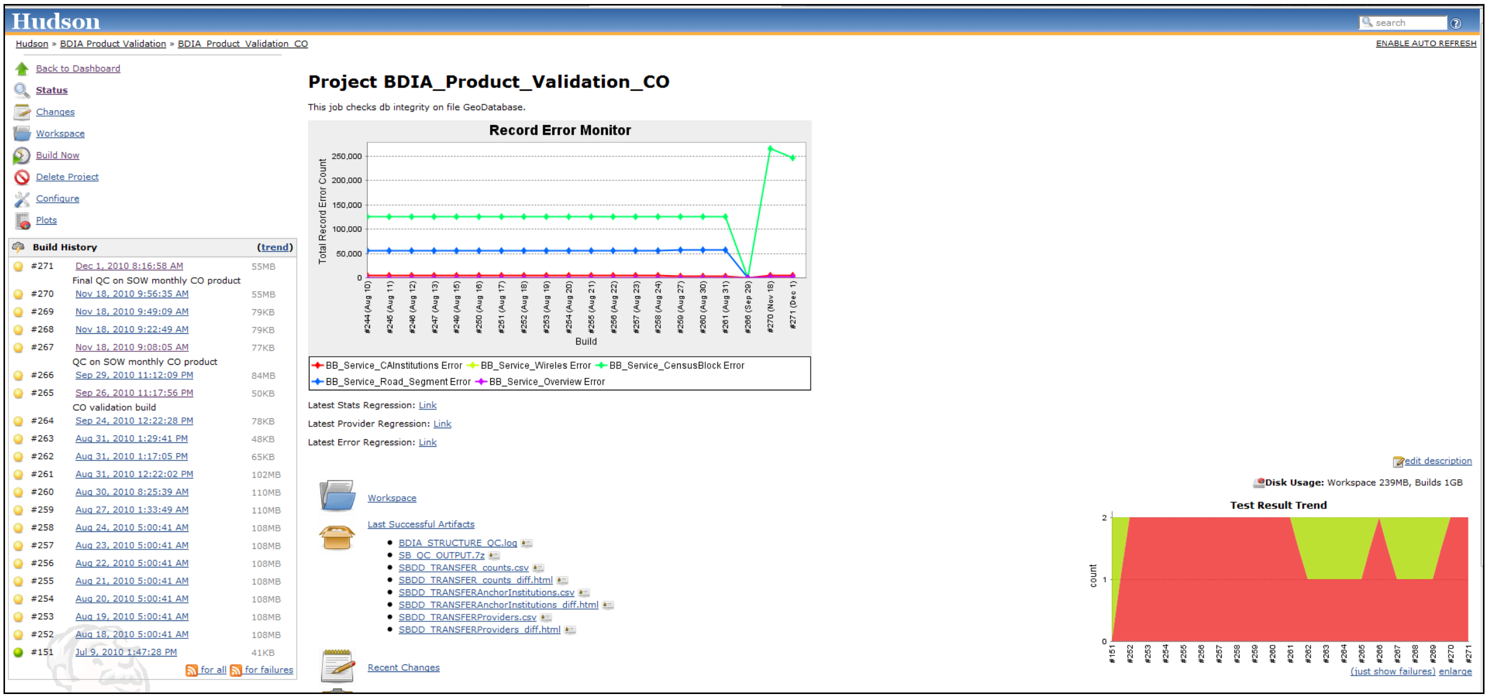
All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



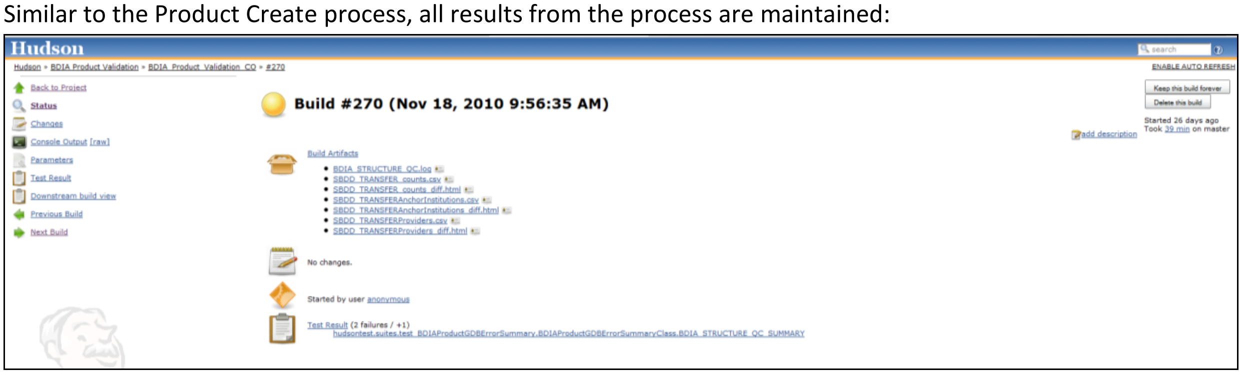
3.10.2 Product Validation and Statistics

Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.
All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

Below is an example of the report provided based on various control points running over a specified time period:

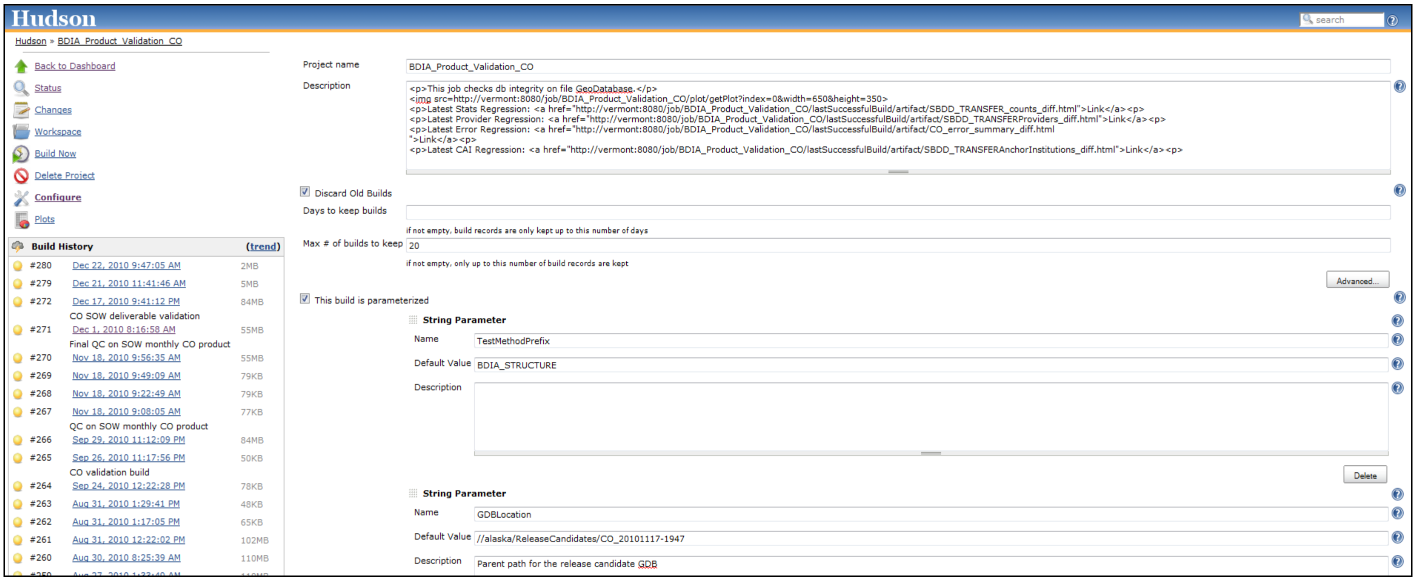


Similar to the Product Create process, all results from the process are maintained:



Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.

Further detail on the Hudson CI System environment can be found by navigating to the following link: http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson

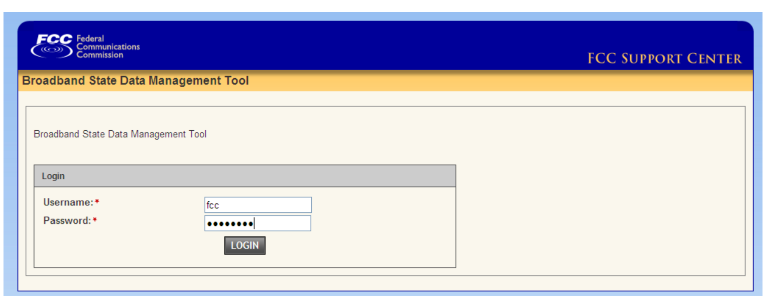


3.11 Product Extract Data Delivery

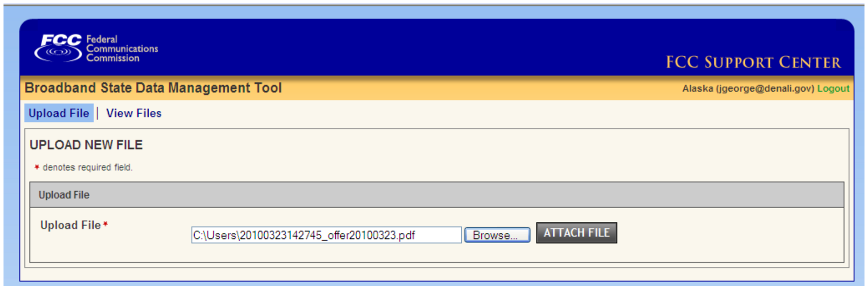
Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

2) NTIA Submittal
   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field
   e) Browse to local file for submission using the 'Browse' button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen
g) A receipt of submission is emailed to username e-mail address

Guam Broadband Mapping Project

Product Release White Paper

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Product Specification: Spring 2011 NTIA Data Model
Product/Process: NTIA – April 1st, 2011 Data Deliverable
Dataset Submission QC: NTIA – SBDD_CheckSubmission.py

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.
- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is accurate and comprehensive, a holistic approach has been developed to further validate and verify the data. Following the initial mapping of providers' coverage area and serviceability claims, the project team uses the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers were trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality reviews are tracked by provider and then by technology type, which is then stored and maintained within a "Validation" table. A confidence value is assigned based on the collected information to highlight provider coverage areas that require further investigation and enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
  - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

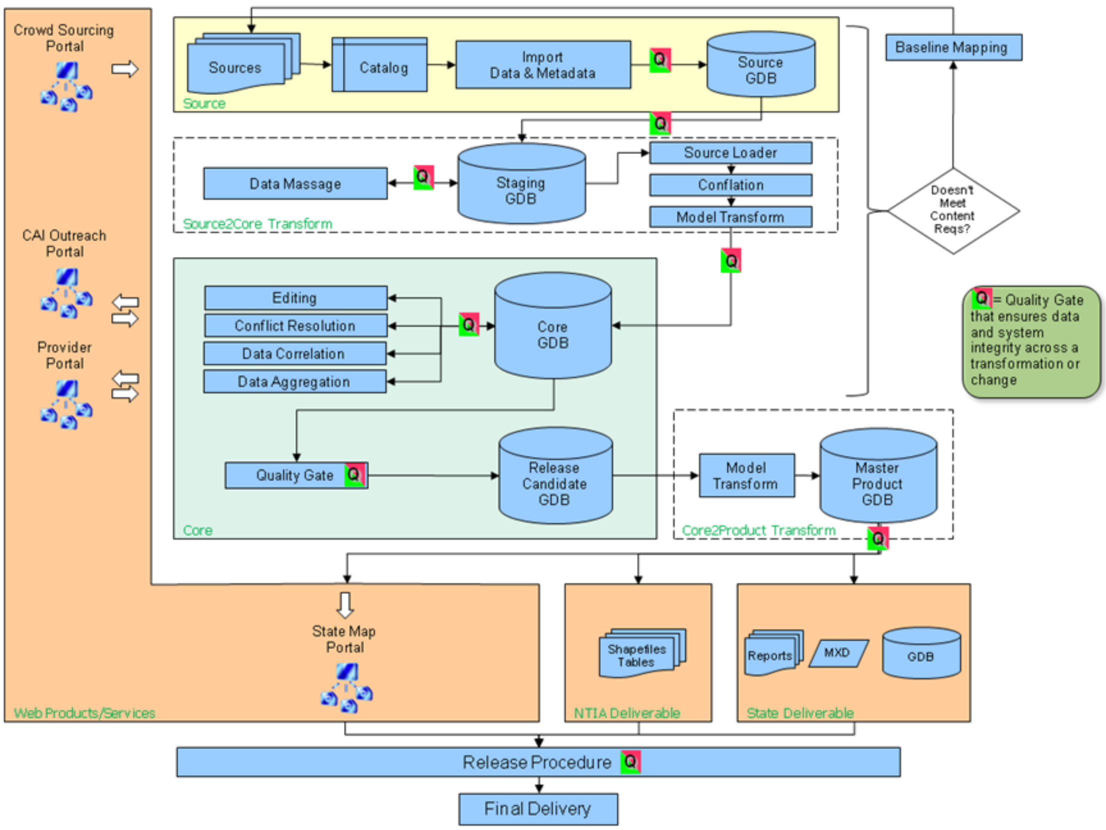
Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link: https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

- Longitude values for States outside the lower 48 (any table)
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is ‘No’ or ‘Unknown’
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.
8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application
2) Regular email
3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email
    a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:

Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

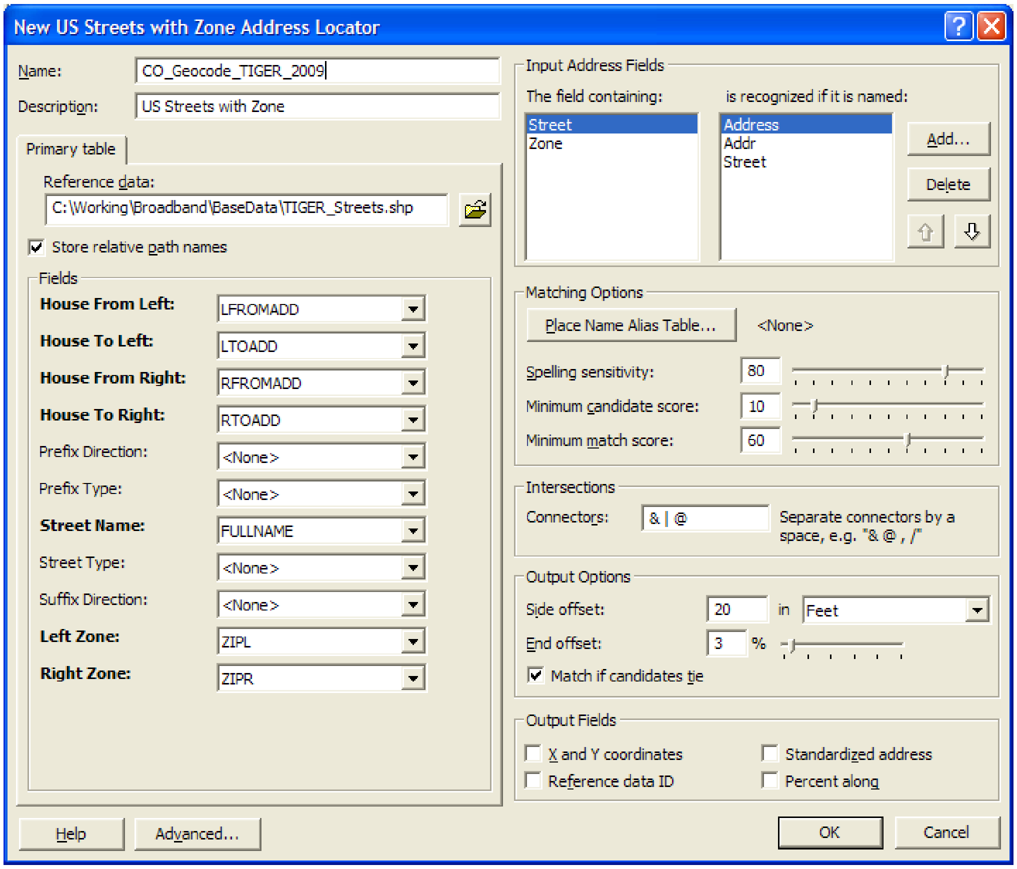
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
    a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
    b) Select "US Streets with Zone" and press OK.
        i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
    c) Navigate to the TIGER Streets 2009 file and press OK.
    d) Fill in the dialog box as seen below:

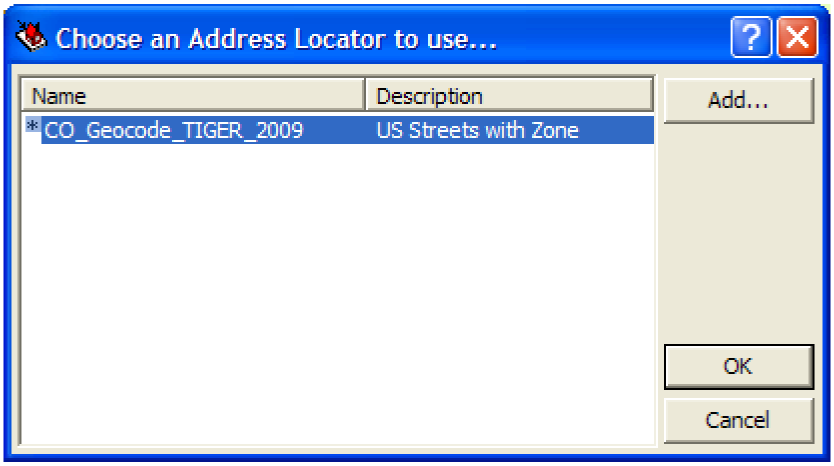


e) Click OK.

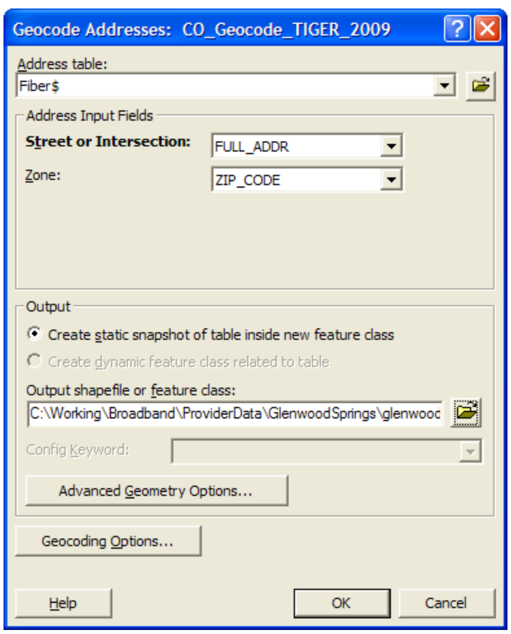
3) Open up ArcMap, and add the Excel spreadsheet with the address information.

4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.

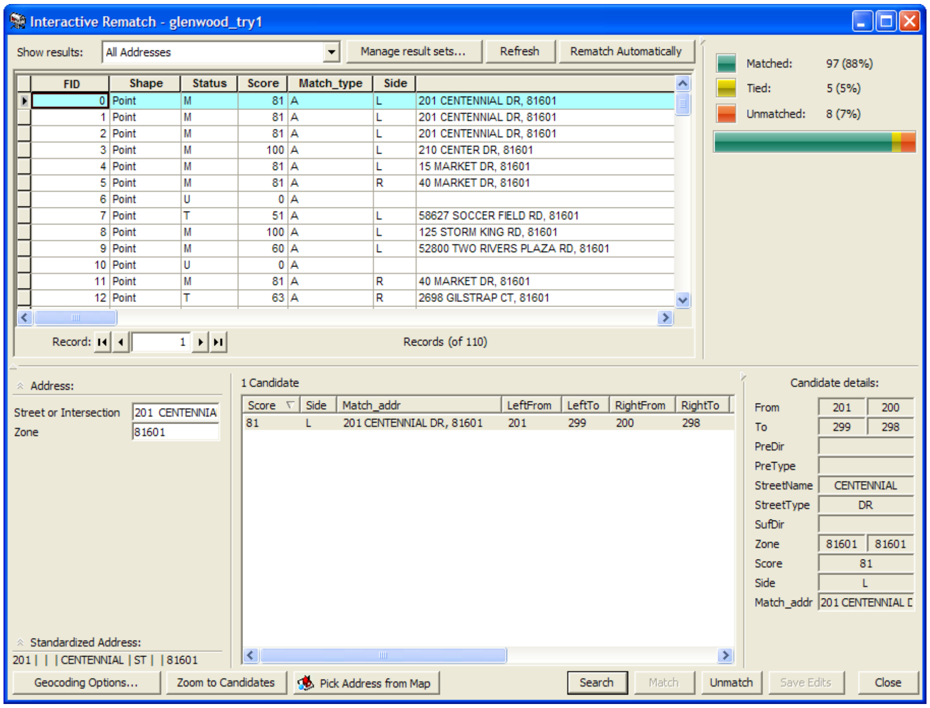
5) Select the appropriate address locator by clicking Add…. then OK.



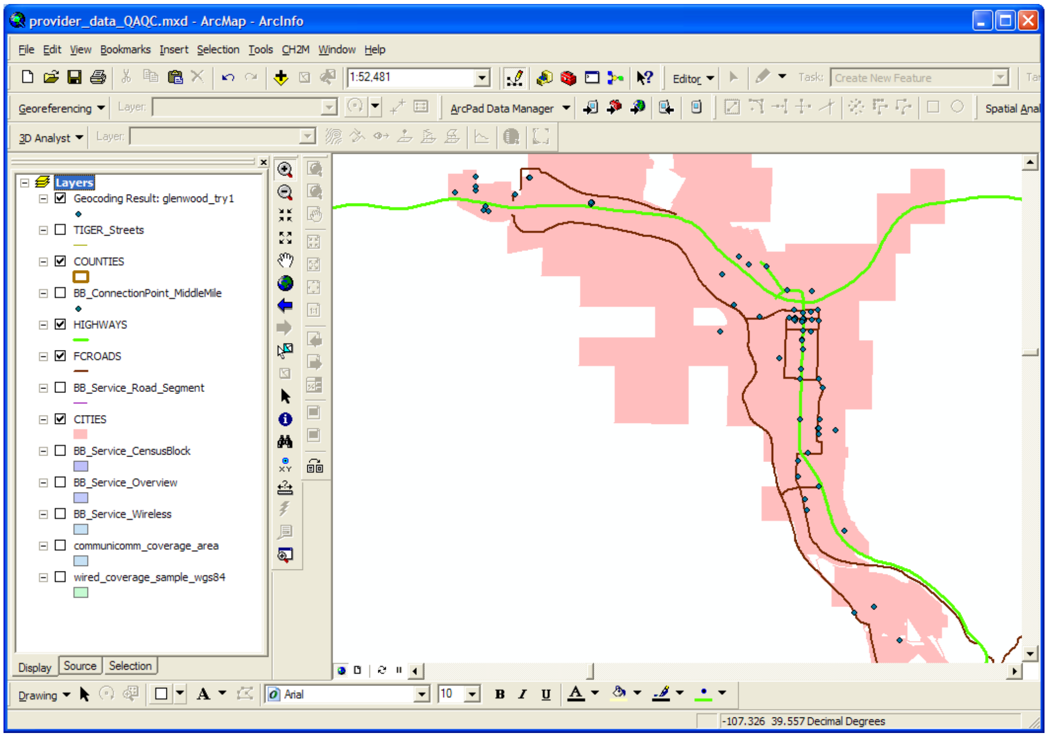
6) Fill out the Geocode Addresses dialog box as shown below:



7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.
8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:



12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.

    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.

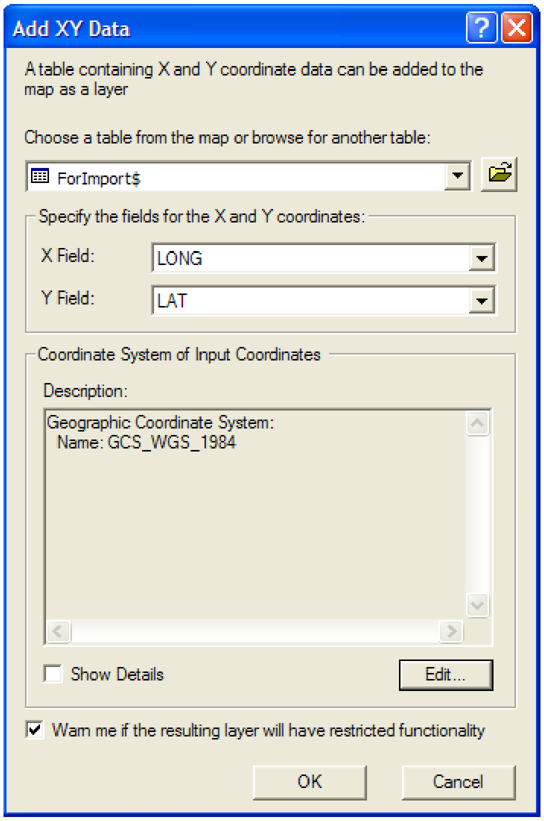
    b. Make sure that XY locations are in decimal degrees.

        i. To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).

        ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open up the Excel worksheet in ArcMap.

3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

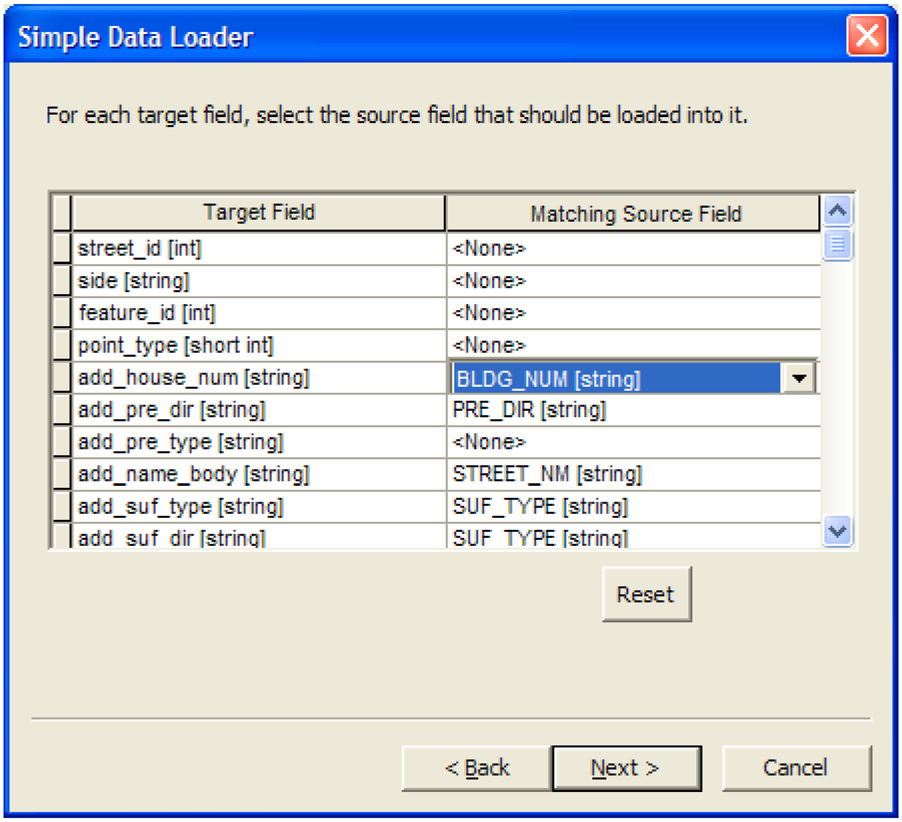
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

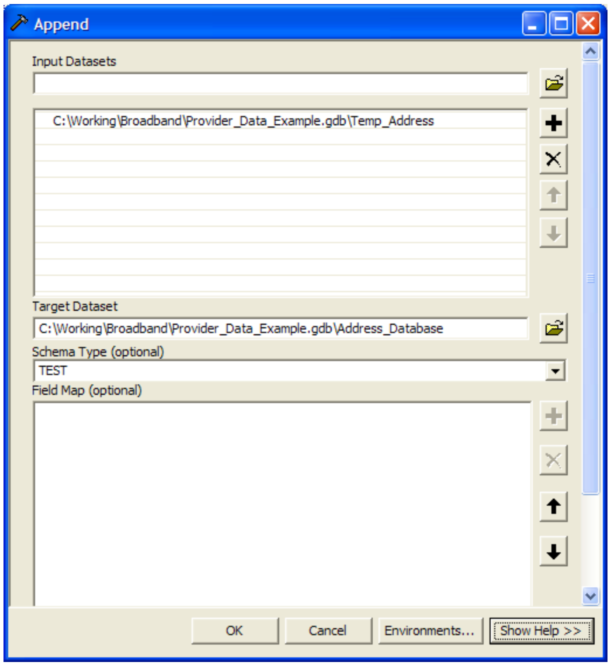
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

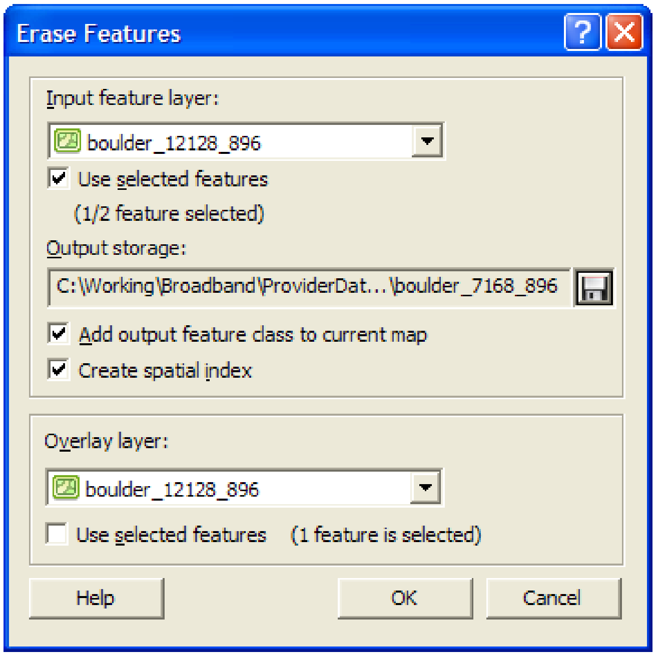


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
    a. <u>Within ArcGIS</u>
        i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
            1. This will save as a DBF table. Keep track of location for future reference.
        ii. Buffer county address point featureclass to 150'.
            1. During buffer command, dissolve on "ad_down"; "ad_up"; "provider"; "dba"; "frn"; "tt"; 'all metadata fields'; "stctyfips". Save as…. county_fastestdown_fastestup.
            2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
            3. Note: these attribute fields are specific to the Point Address database.
        iii. Select the features that represent the lowest speeds
    b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
        i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
        ii. Use the same feature class for Input and Overlay
        iii. Check Use selected features on the Input feature, as seen below.

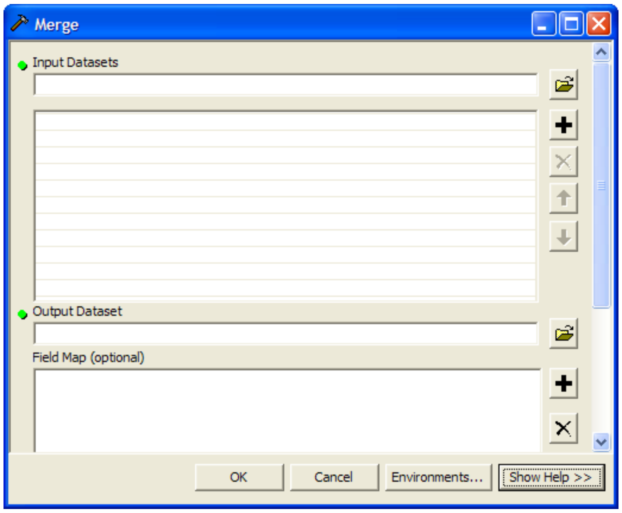
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. <u>Within ArcGIS</u>

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).

iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.

v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

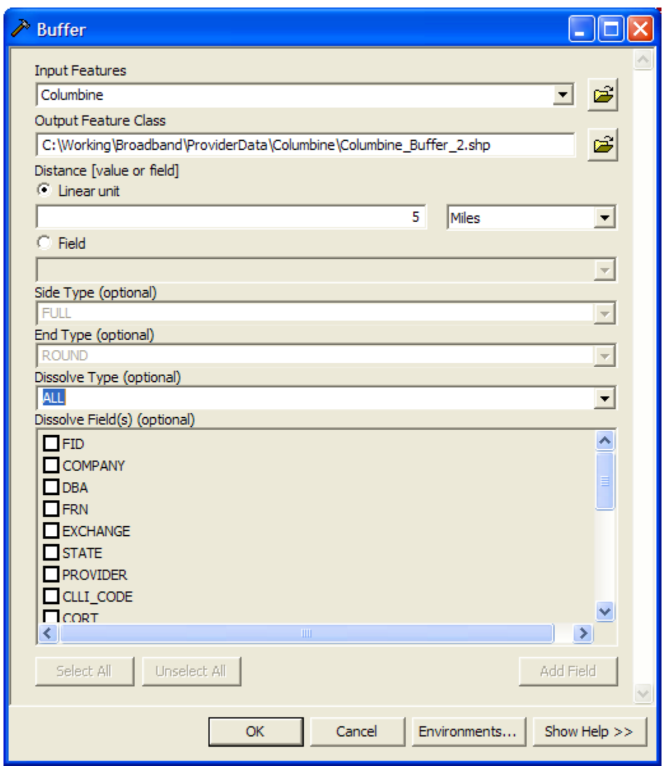
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

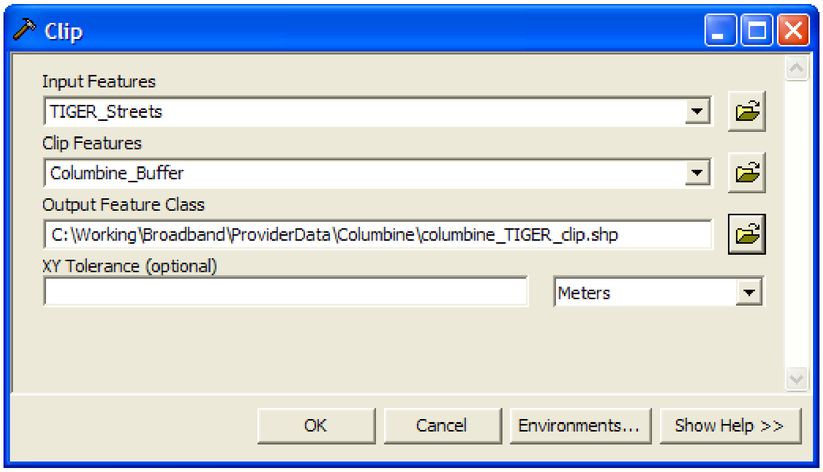
3.5.2.6 DSLAM or Central Office Location – GIS Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

1) Buffer the DSLAM/Central Office points feature class
   a) Add the point feature class to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
   c) Set the buffer distance to 5 miles
   d) Set the dissolve type to ALL
   e) Name the output feature class
   f) Typical Buffer tool is seen below:

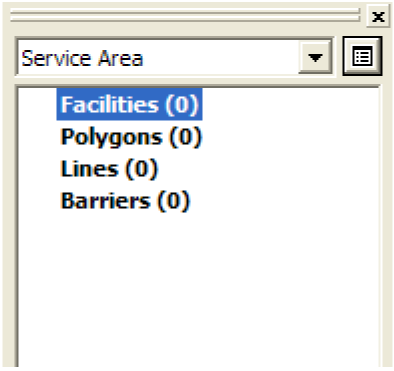


   g) Press OK
2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
   a) Add TIGER street layer to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
   c) Complete the dialog box as seen below:

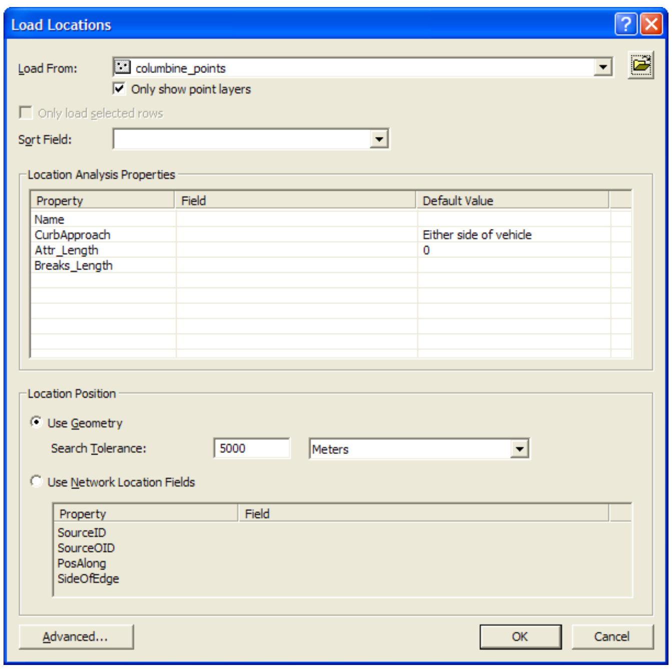


   d) Press OK.

3) Using ArcCatalog and within the file geodatabase:
   a) Right Click and create a new Feature Dataset
      i) For the Feature Dataset settings:
         (1) Name the feature dataset accordingly
         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
         (3) No vertical coordinate system needed
         (4) Leave all x,y,z,m values at default.
         (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
      a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create “New Service Area”
9) Open up the Network Analyst Window by selecting the button.

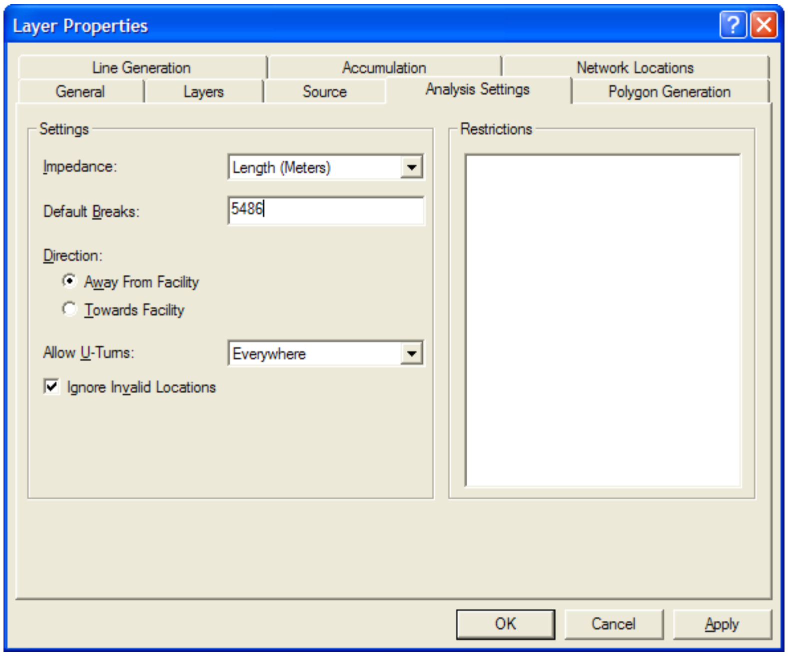


10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.

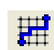


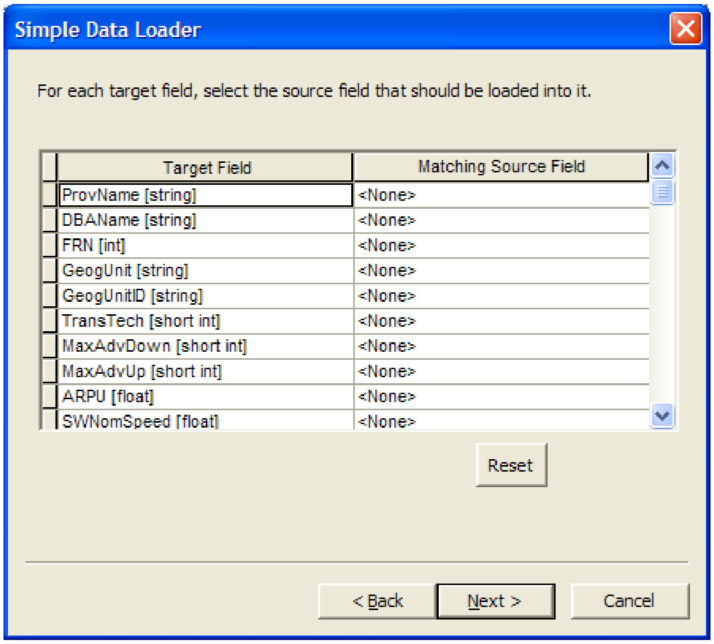
11) Press OK.
12) Click the Service Area Properties button
13) For the following tabs change the following properties:
    a) "Polygon Generation" tab
        i) Select "Merge by break value"
        ii) Also disable the Trim Polygons option
    b) "Analysis Settings" tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the "Default Breaks" location

i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

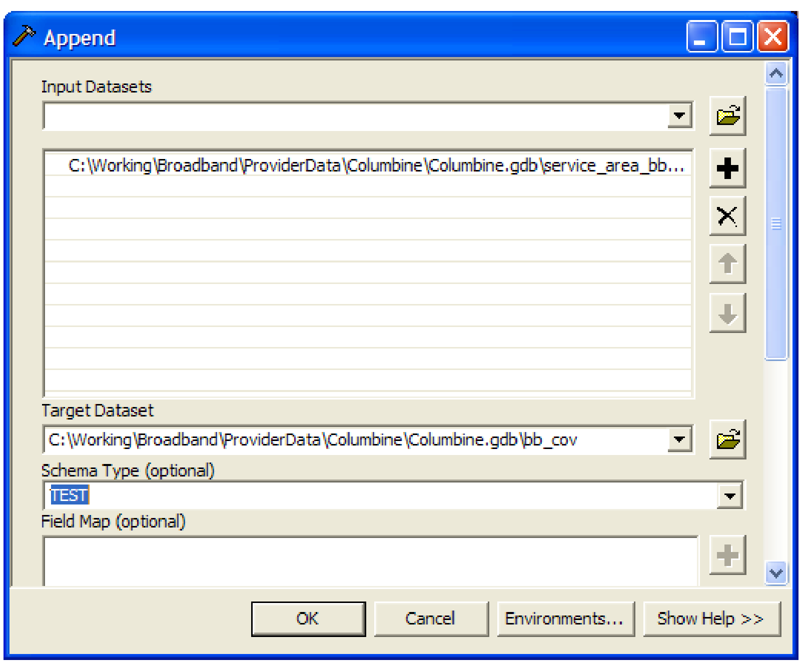
14) On the Network Analyst Toolbar click the “Solve” button  to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
    a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST
21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

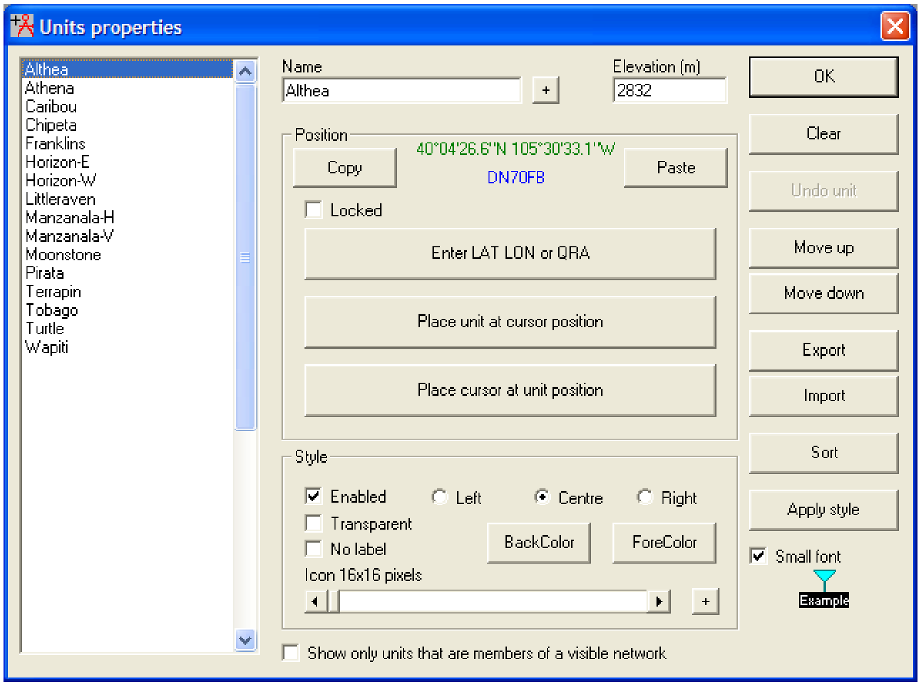
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

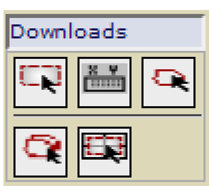
3.5.2.8.1 Broadcast Tower Location – GIS Data

In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

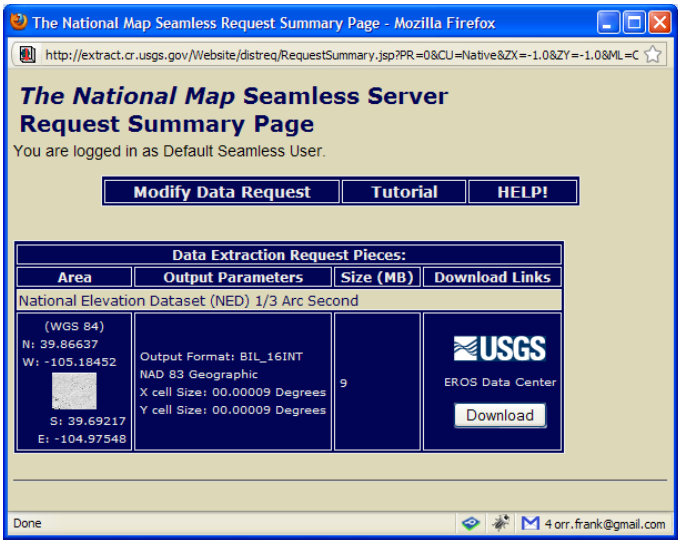
1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
    a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
    a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
    b. Zoom to the area of interest and use the Download tools:

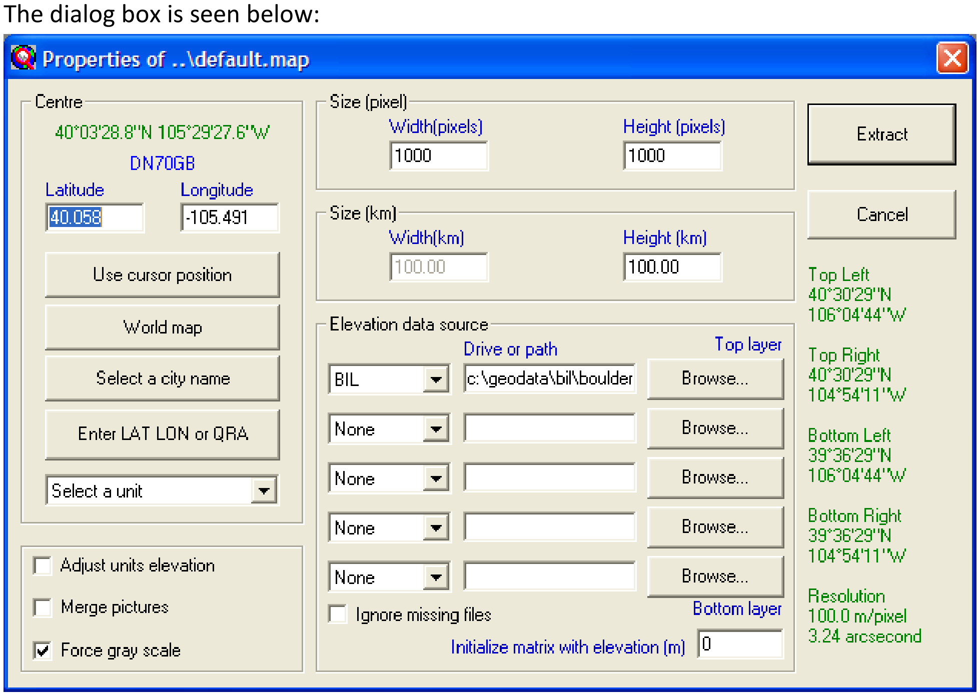


    to define the area to download.
    c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:

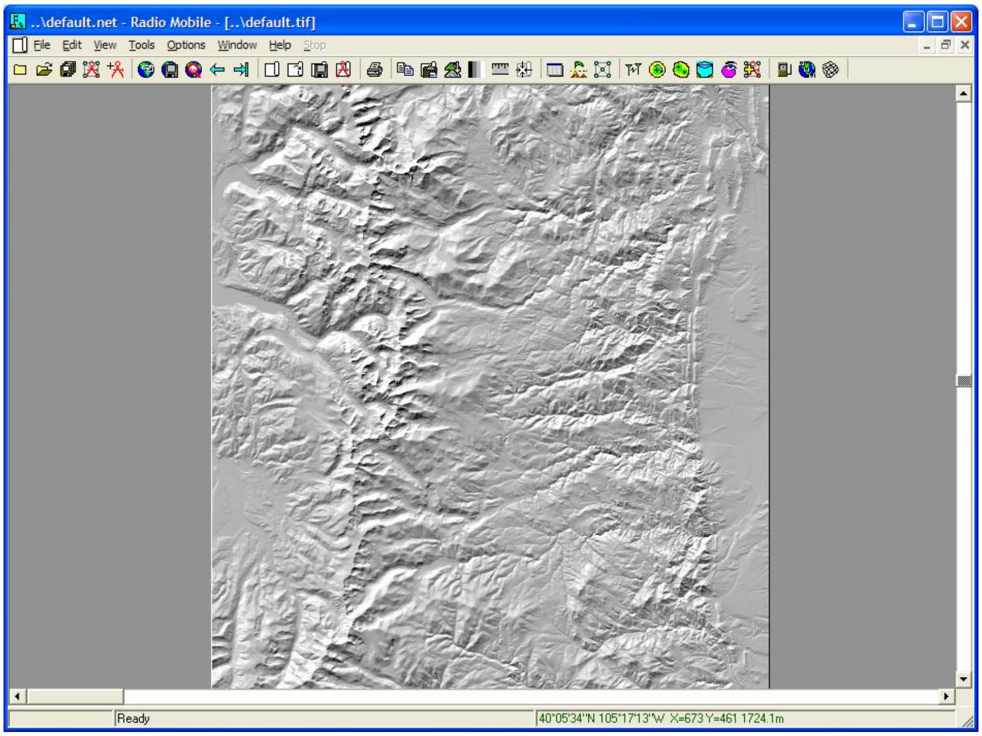


d. Download the data and unzip it.

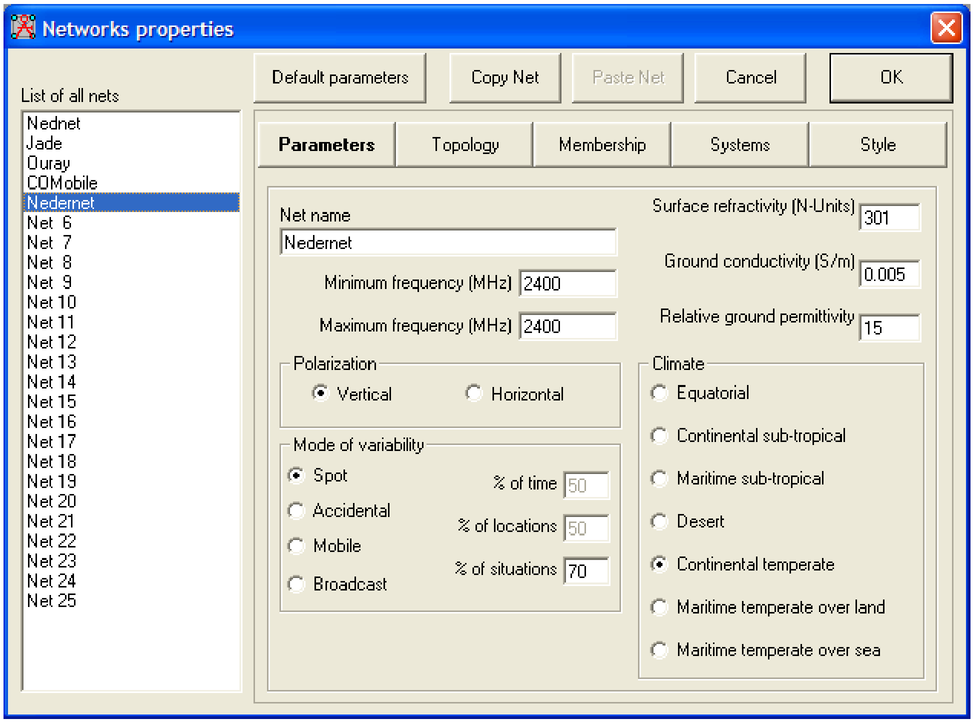
7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:



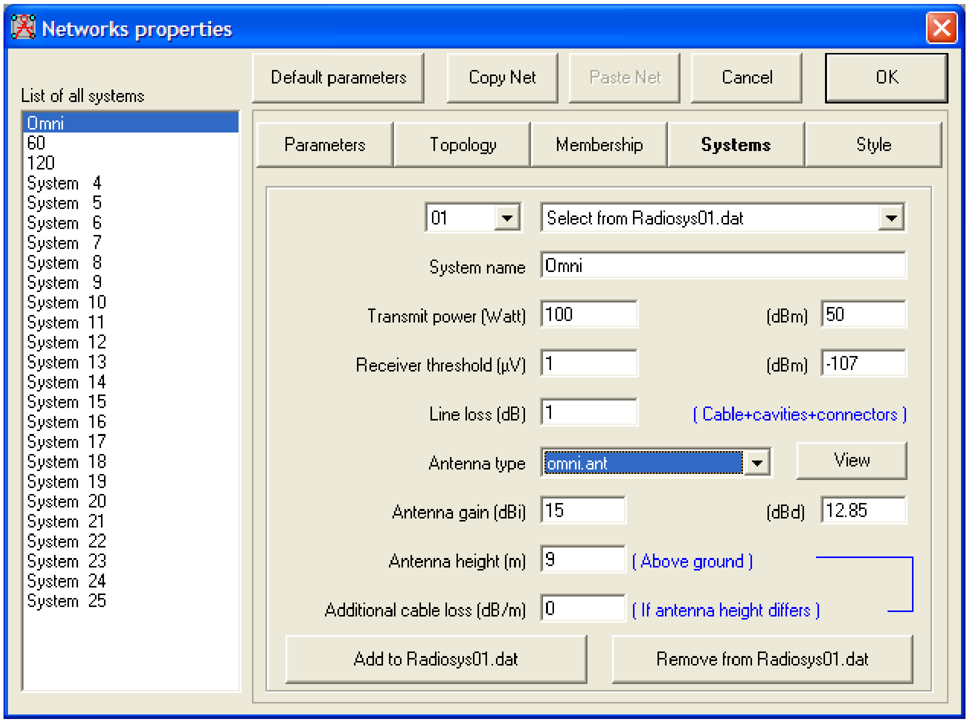
12) Hit Extract.
13) The elevation data is render as a hill shade, as seen below:



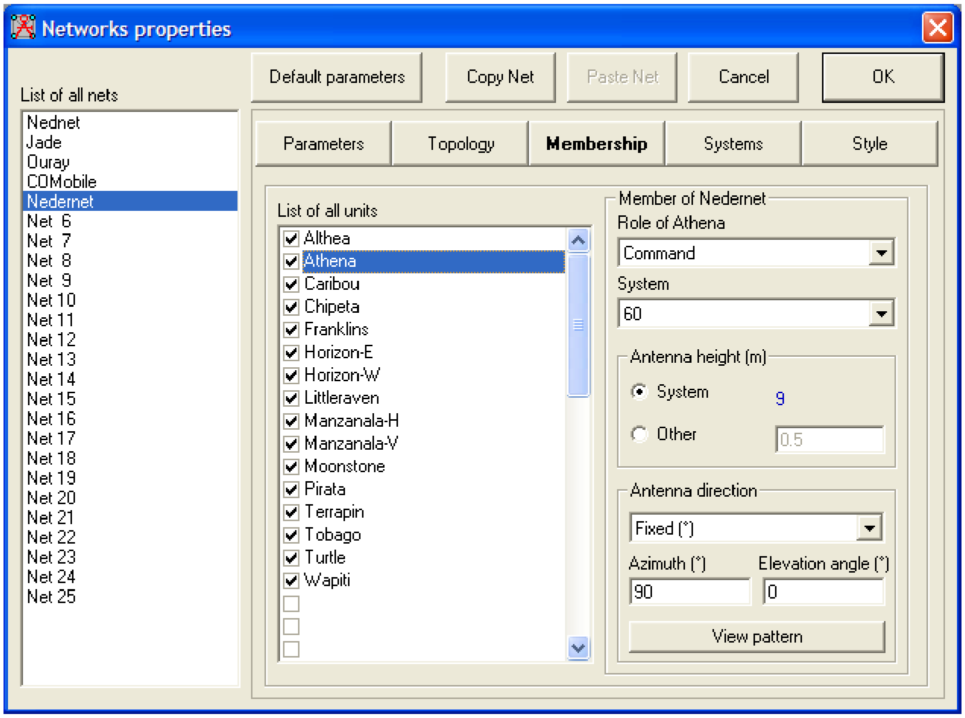
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



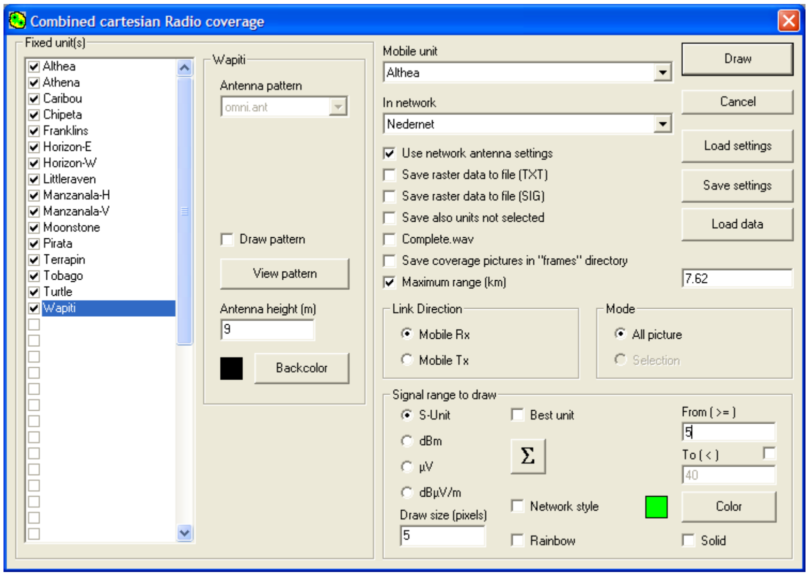
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



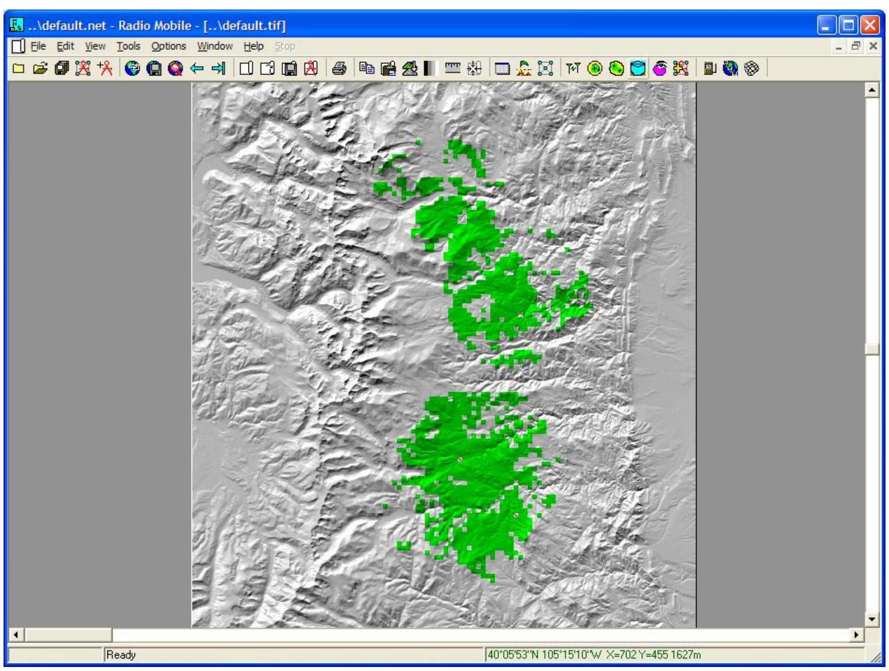
18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:



19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:

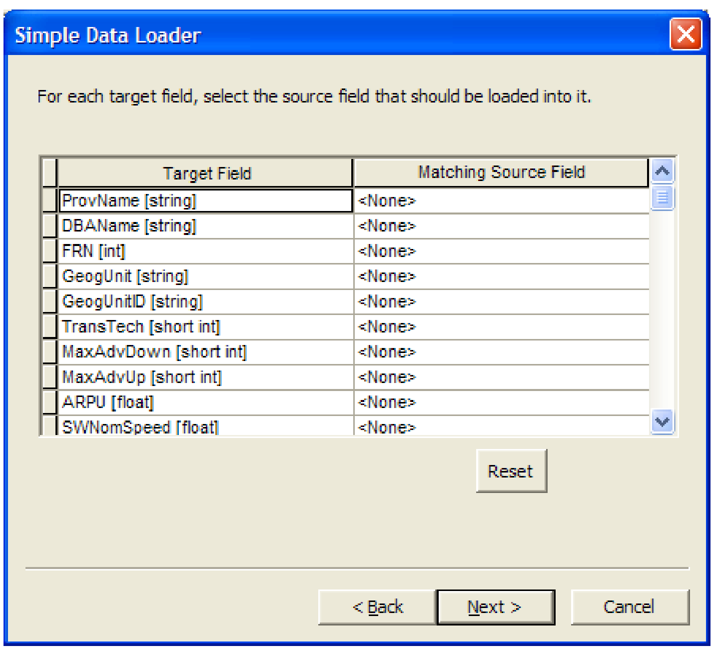


23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.
24) Press Draw.

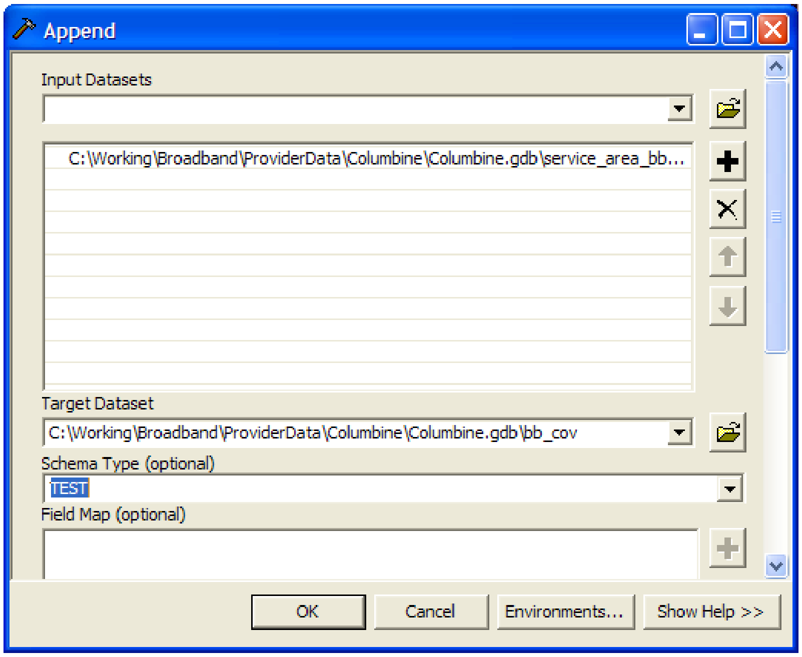


25) Save the resulting image as a TIF by selecting File>Save Picture as.
26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.

28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.
29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.
30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:
31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



    e. Press Next, then Next again, then Finish.
33) In ArcToolBox, go to Data Management Tools>General>Append
34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



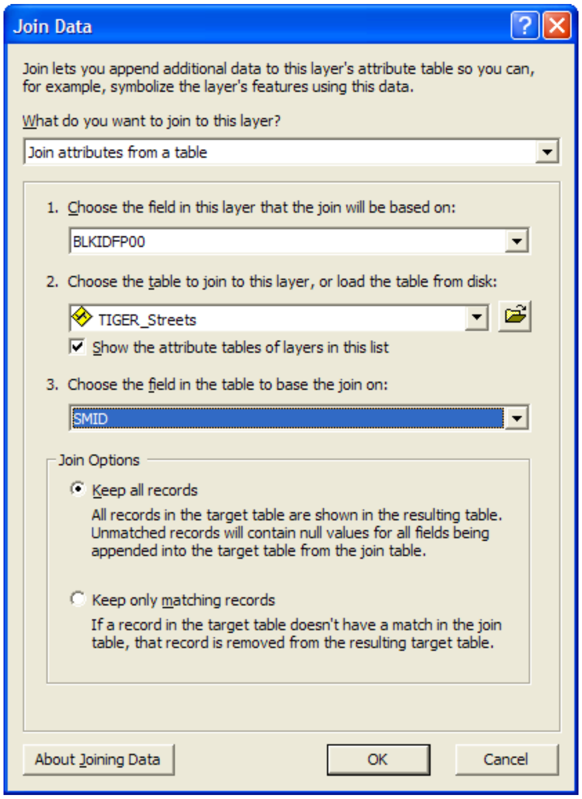
35) Leave the Schema Type as TEST
36) Press OK.
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
      i) Load both data sets into ArcMap
      ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
      iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:



iv) Press OK

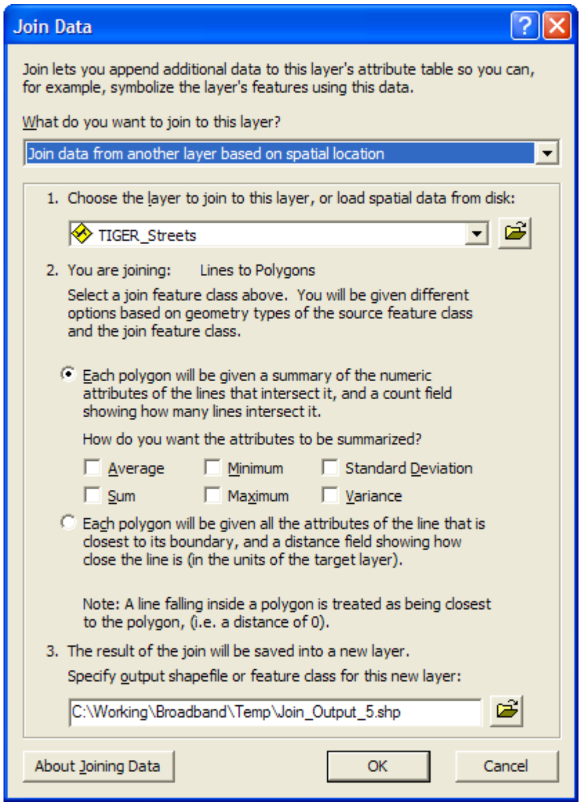
b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID

i) Load both data sets into ArcMap

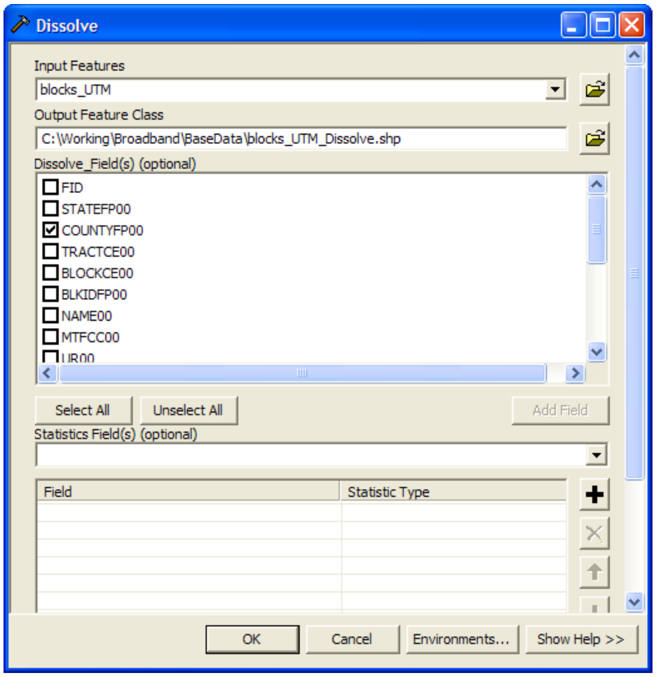
ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join

iii) Select “Join data from another layer based on spatial location” from the dropdown menu

iv) Complete the dialog box as seen below and press OK.



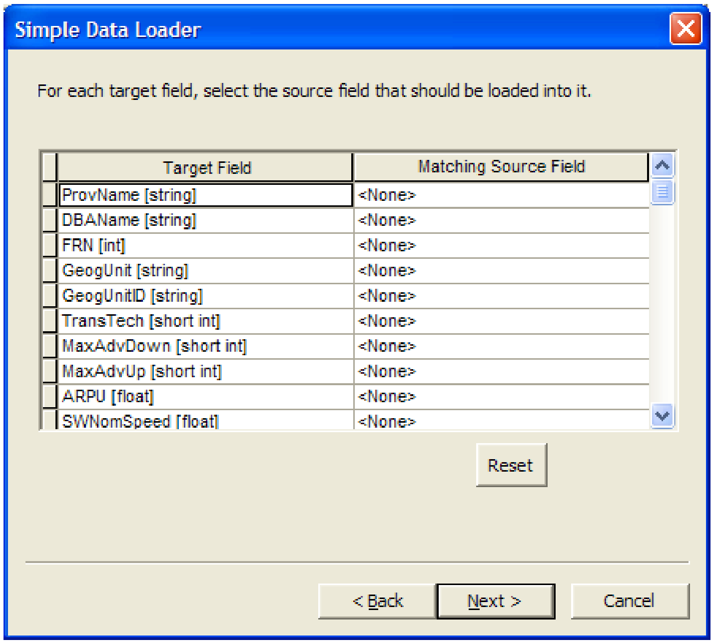
2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
   a) Use the County FIPS code to dissolve by county.
   b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
   c) Complete the Dissolve dialog box as seen below:



d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

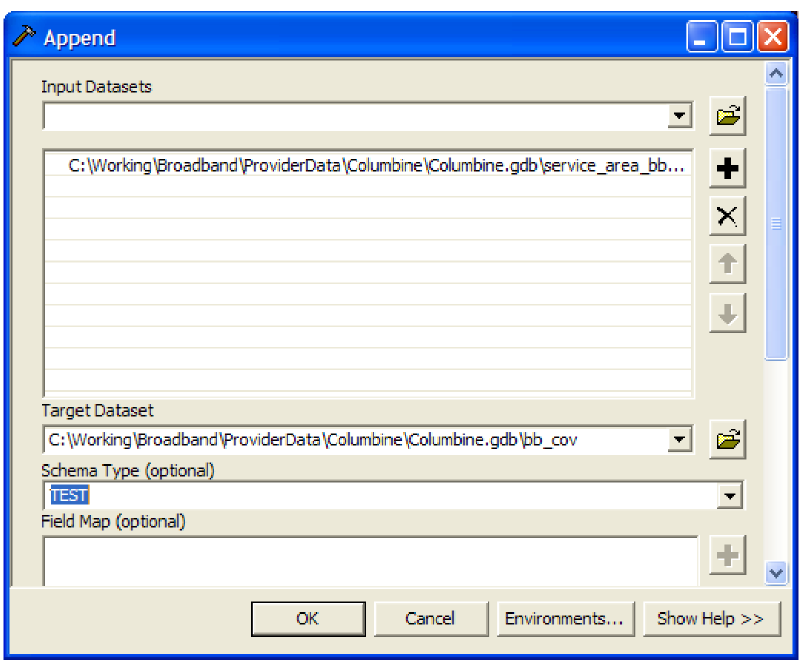
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



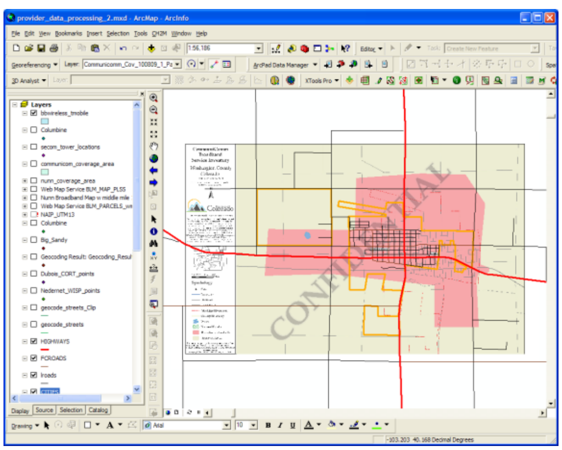
8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

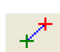
3.5.4 Polygonal Data

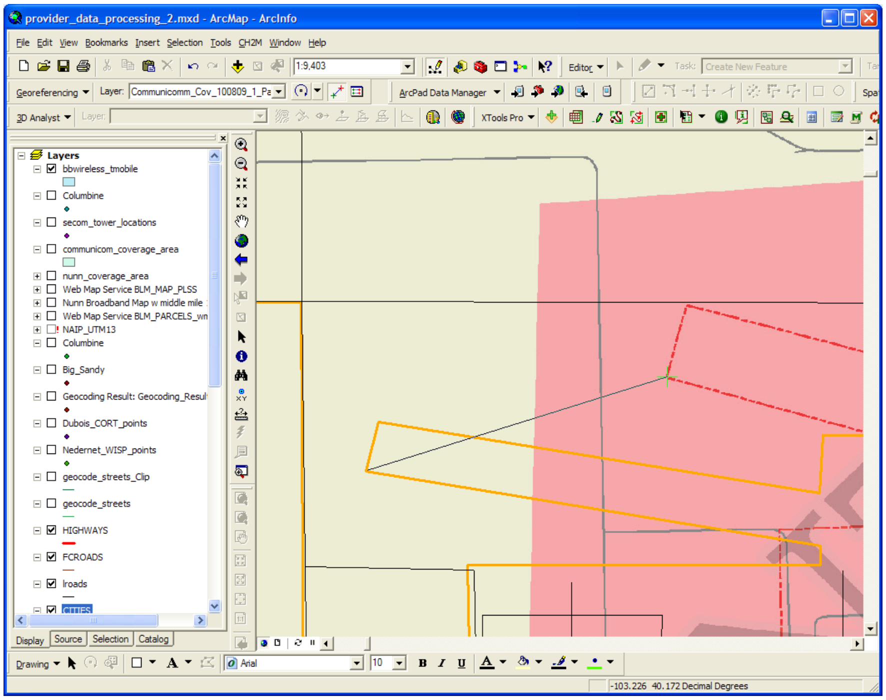
3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
   a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
   a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button  to add control points to the map
9) Use common points in the base data set and the JPG image
   a) For example, find major street intersections, county/city boundaries, etc.
   b) Try to distribute the points more or less in the four corners on the image for the best transformation
10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:

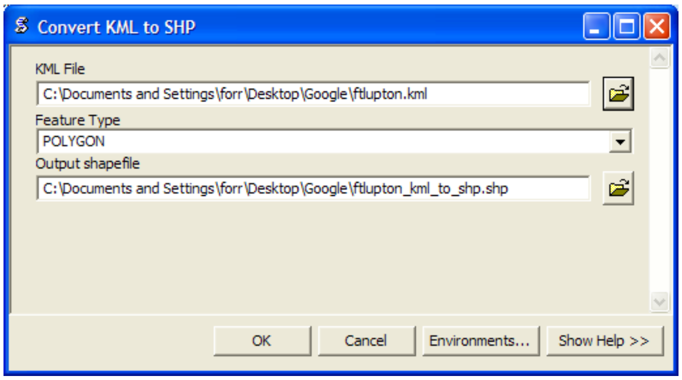


11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a “world” file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to “Create New Feature.”
17) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

1) Use a KML to SHP converter to translate file into an ESRI format
2) http://arcscripts.esri.com/details.asp?dbid=15603
3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

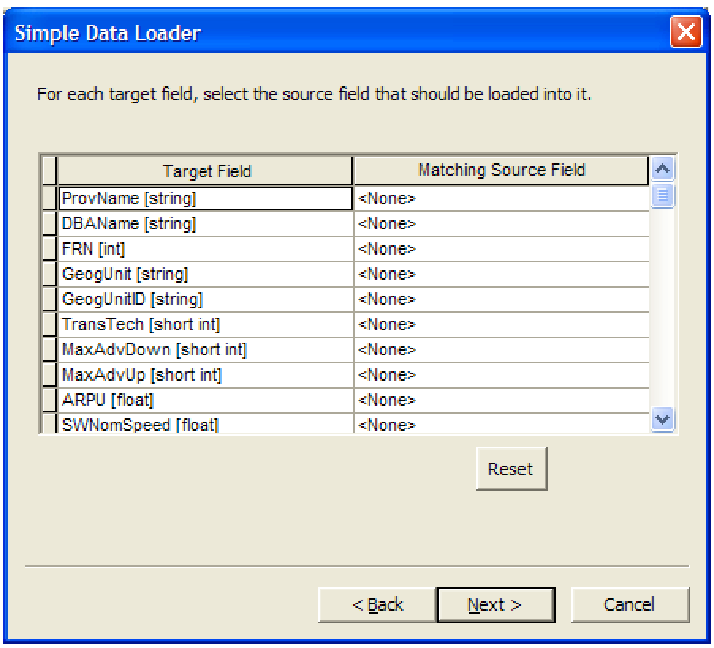
In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
   a) To do so, follow the instructions provided above in "Coverage Area – PDF/JPG/Other Image Format."
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
8) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

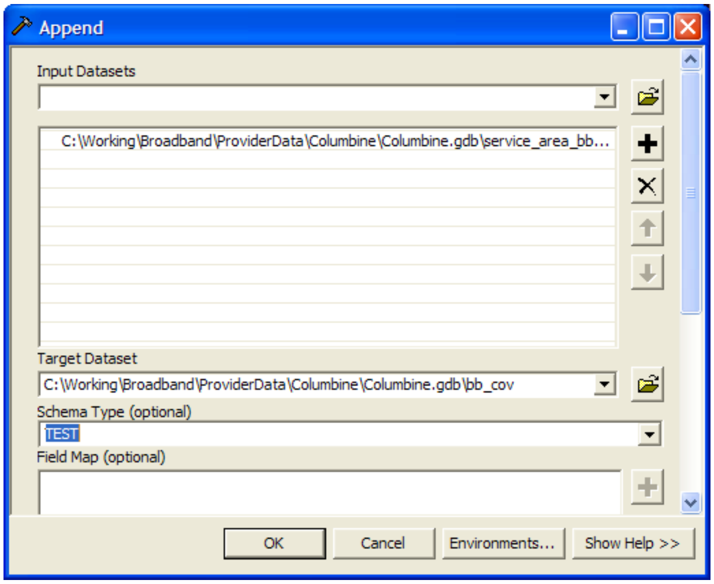
3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



    e) Press Next, then Next again, then Finish.
2) In ArcToolBox, go to Data Management Tools>General>Append
3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state "Composite Locator"

- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.

- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.

- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.

- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

- Un-join the county data from the geo-code subscribers list.

- Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

- Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

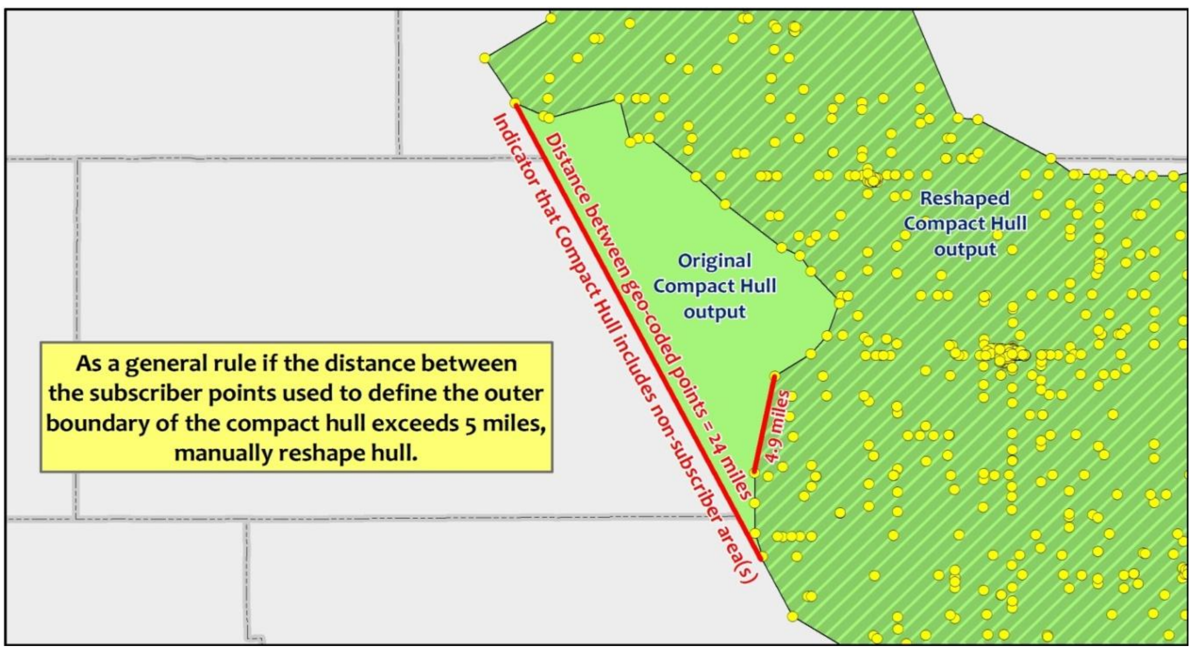


FIGURE 3a- Compact Hull: Manual Resolution Required

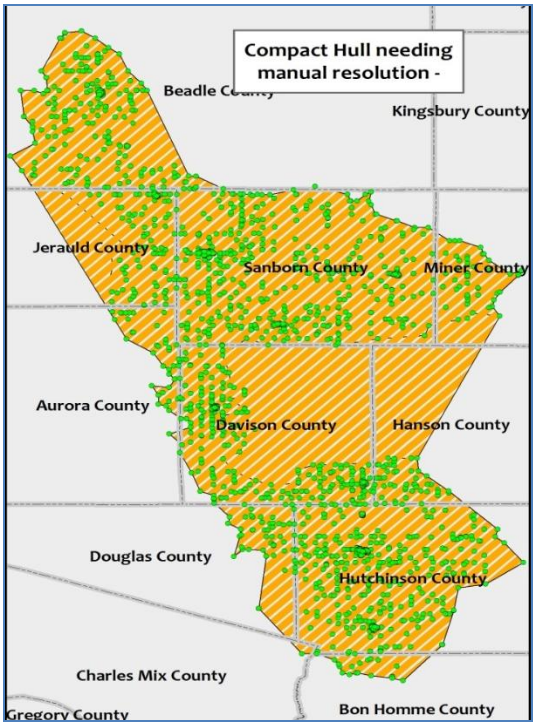
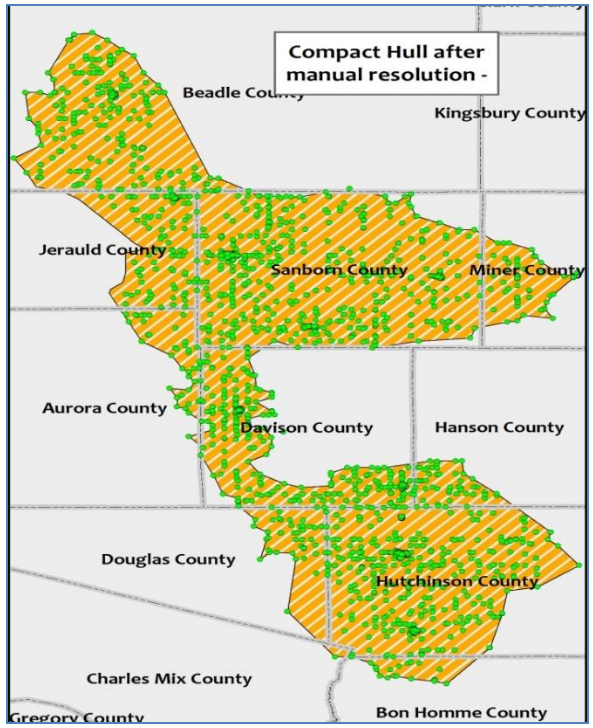


FIGURE 3b- Compact Hull: After Manual Resolution



- To attribute the compact polygon - Perform a “Spatial Join” where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate “stcty_fips” field. Also use the county name field to populate the “BBCov_Name” field.

    - Exceptions is where a provider’s coverage is distributed throughout more than one area of any given county where the “BBcov_Name” should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

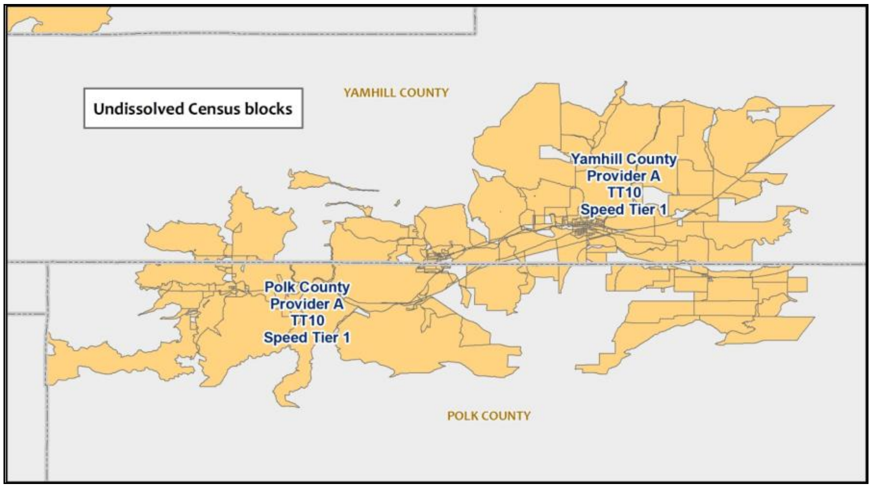


Figure 1: Undissolved census block polygons

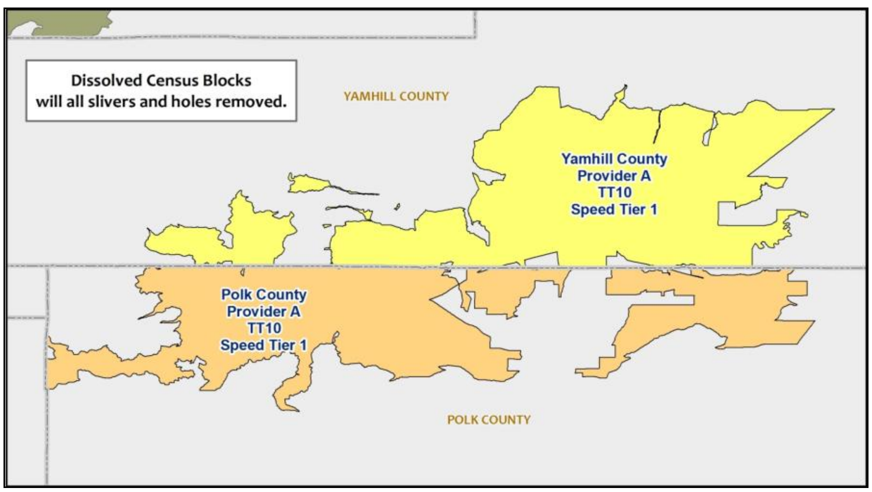


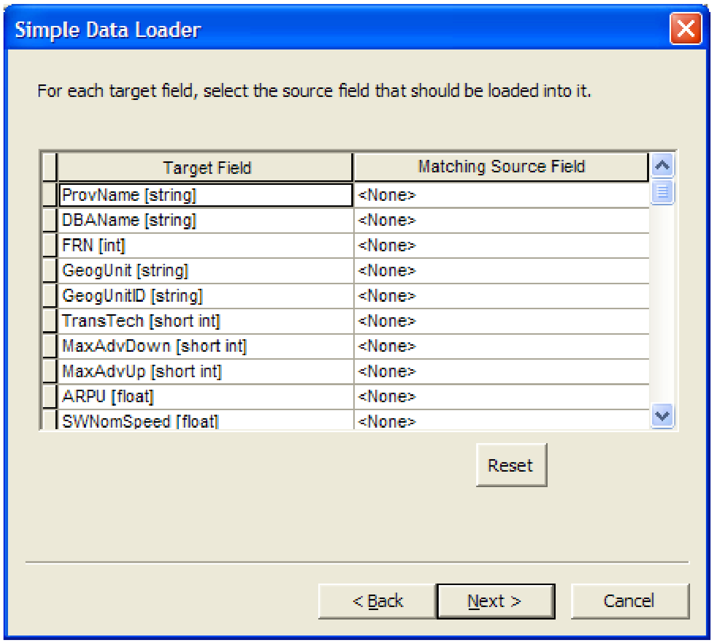
Figure 2: Census block polygons dissolved by county

2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b. Press the Add button, hit Next

c. Accept the defaults and hit Next

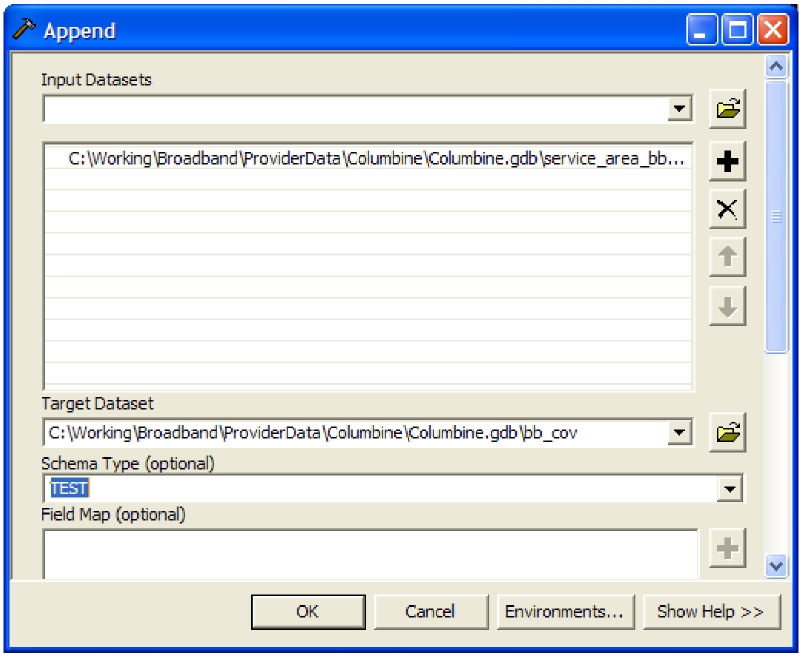
d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

    b. Example of command line:

<path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

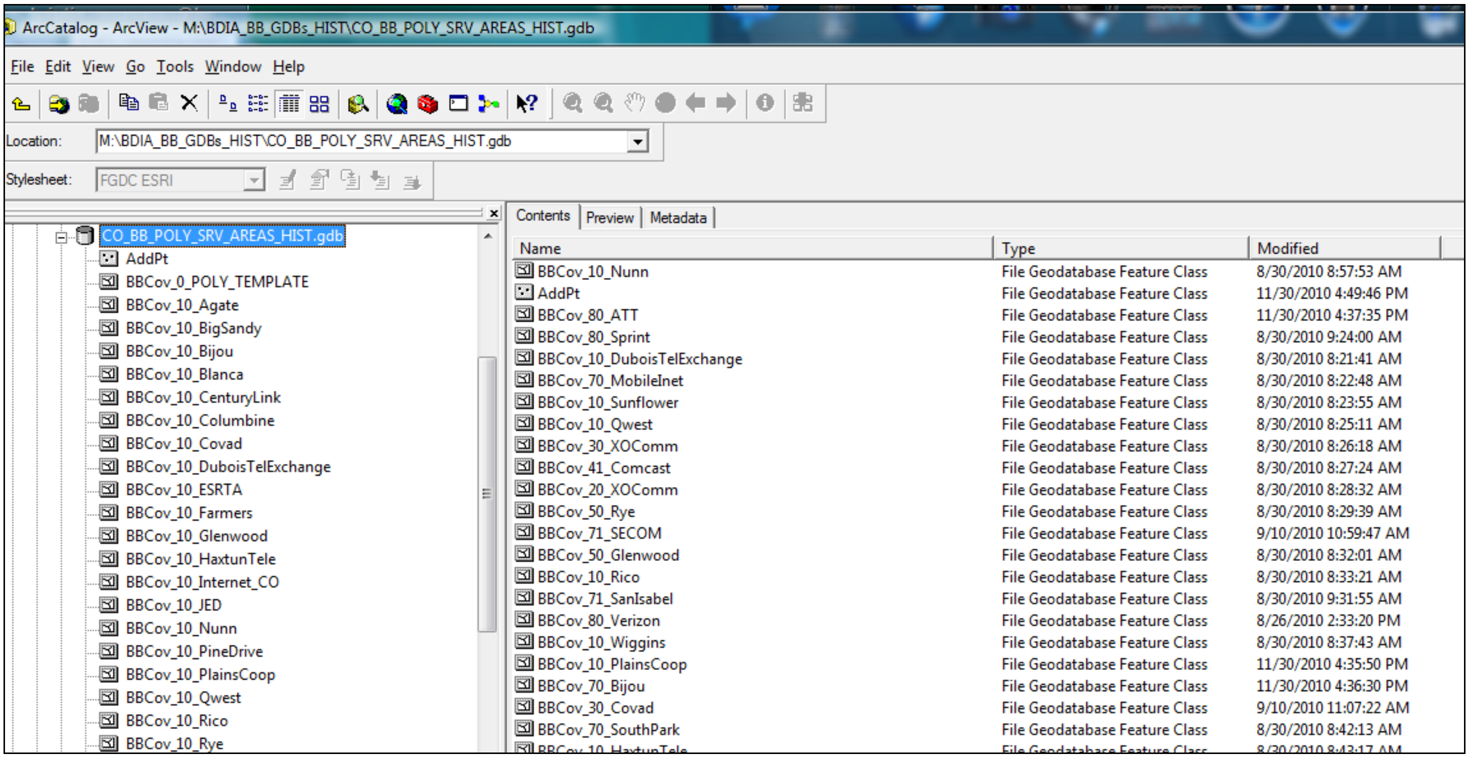
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
-------------
elapsed time = 2994.4 seconds
```

3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb
    a. The transactions scripts records changes at a feature level.
    b. Below is a screen shot supporting the directory structure of the historical fGDB.



c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:

i. Commit_by

1. Records the GIS-Analyst that committed the changes to the historical fGDB.

ii. Commit_date

1. Records the date and time stamp that the changes were committed.

iii. Trans_type

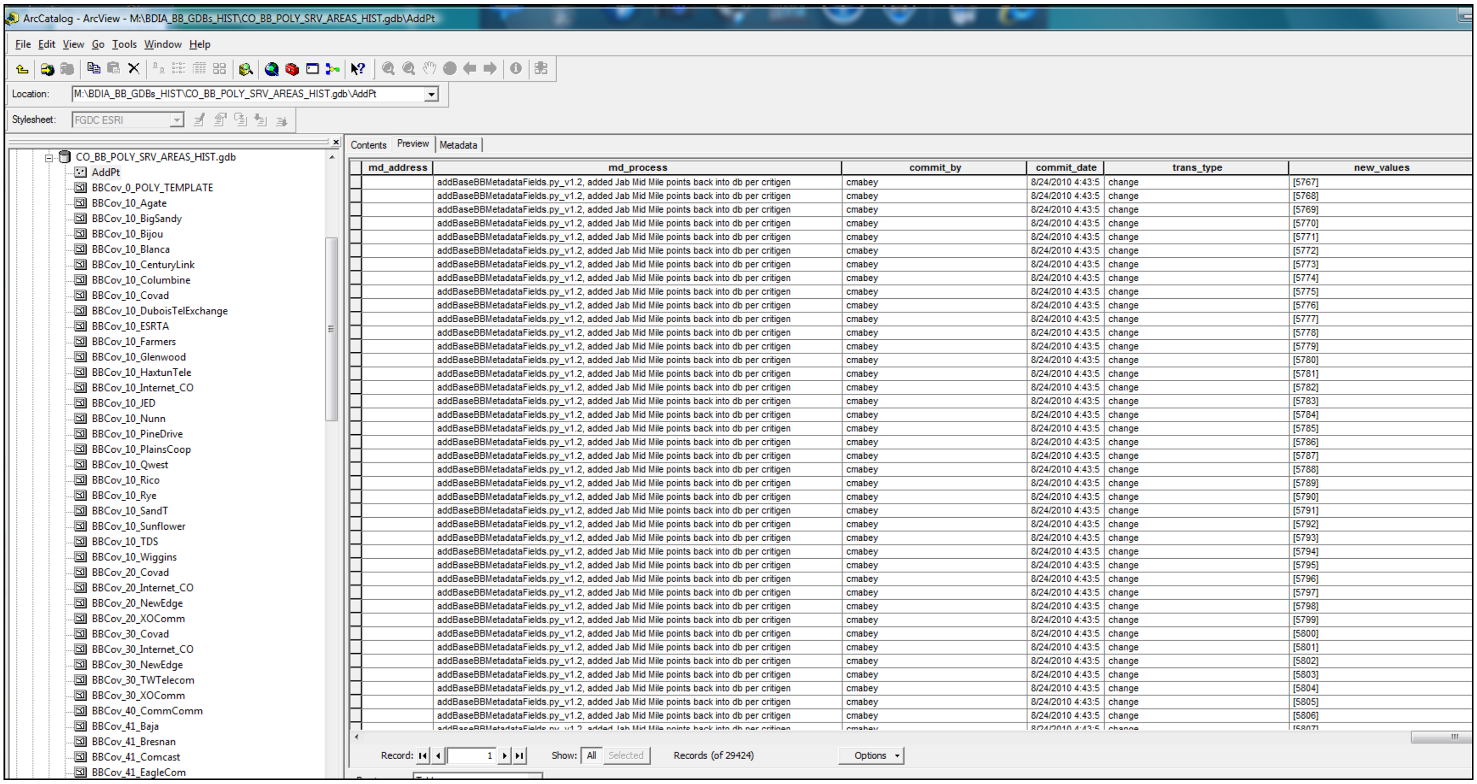
1. This field reflects the type of change recorded.
2. Categorized by:

a. Adds/Change/Deletes

iv. New_values

1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where we are supplied with subscriber speed information by the data provider, we use the following formula from the NOFA:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

When these values have been obtained or calculated, they are used to update the service overview layer. This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer you would like to join to and select Joins and Relates>Join… from the dropdown menu. Then navigate to the table you want to join and select the join fields from the drop down lists. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.

2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.
3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)

Name	Alias	Description
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the data is then validated by the provider to ensure the data aggregated is an accurate representation of their coverage area and supporting broadband information. This is completed through the Provider Portal web application, which is a secure interactive map displaying their coverage areas and allows the user to validate, submit feedback or request changes. If changes are requested, then the features on the portal are then updated and an automatic request is sent to the provider to complete the validation effort.

For some providers that did not use the Provider Portal, a PDF was sent displaying their coverage map and validation was then completed via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

Once the provider has validated their coverage areas, a 3rd party source comparison and analysis is then performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments applied so they can later be reviewed with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All efforts from the above-mentioned validation and verification activities, plus internal peer quality reviews are combined and tracked in a Validation table. Based on the results of this analysis, a confidence value is assigned for each provider and then each technology.

The confidence values are as follows:

0 = Coverage area has not been reviewed
10 = Extremely Low. Single Source QC.
20 = Very Low. Needs Additional Validation\Verification
30 = Low. Even with Validation\Verification, Coverage is still suspect.
40 = Acceptable, confirm with State prior to shipment.
50 = Meets requirements to be included in shipment.
60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
70 = High. Accurate representation of coverage based upon TT.
80 = Very High. Multiple validation\verification with most 3rd party sources
90 = Extremely High. Multiple validation\verification sources
100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is then maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs, address and broadband data.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:

a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.

b. Standardize the address format as defined in the staging CAI database

c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.

d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.

    i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.

2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.

3) Using ArcCatalog, load the new data into the staging CAI database.

4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.

The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories
    - 1: School: K through 12
    - 2: Library
    - 3: Medical/Healthcare

- 4: Public Safety
- 5: University/College
- 6: Other Government
- 7: Other Community non-government
- None: Unknown Category
    - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately

- Reports out the following counts
    - Total CAIs within that category
    - Total CAIs that contain partial BB coverage
        - Contains any of the following information for given CAI:
            - BB Subscriber, Transmission Technology, Speed Down Speed Up
    - Total CAIs that contain full BB coverage
        - Contains all of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
    - Correct names and format of data deliverables
        - BDIA_QC_SUITES (please see below for details)
    - Correct Projections/Datum
        - Manual interaction with product
    - Metadata Present and Correct
        - Manual interaction with product
- Table Structure
    - All required tables included
        - BDIA_QC_SUITES
    - Extraneous tables identified
        - BDIA_QC_SUITES
- Field Structure
    - All fields included
        - BDIA_QC_SUITES

- Extraneous fields identified
    - BDIA_QC_SUITES
- Correct field names, types and widths
    - BDIA_QC_SUITES

- Field Domains
  - Values in all tables are constrained to the specified values specified
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
  - Identify if all layers have the correct geometric representation
    - Manual review of the BB_ServiceOverview layer
    - Dependent on NTIA and client requirements
- Geographic Extent
  - Product includes the necessary Geography associated with Product?
    - Manual Review - ArcGIS
  - Is there extraneous geography included in Product?
    - Manual Review - ArcGIS
- Completeness
  - Products contain the expected amount of data?
    - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product
    - Provider Validation
    - Verification using 3rd Party Data
    - Verification against reality, where applicable
- Data Regression
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations
- Prior Issues Resolved
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes
  - Have agreed upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium
  - Has the product medium been verified?

- Manual review

- All files present
  - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size
- Correct location
  - Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries
- which_build – this determines the current build and passes information to the configuration scripts

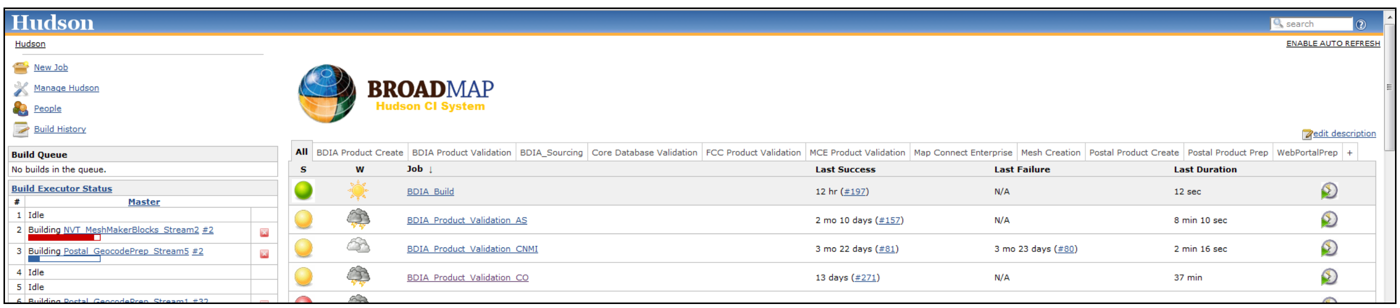
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

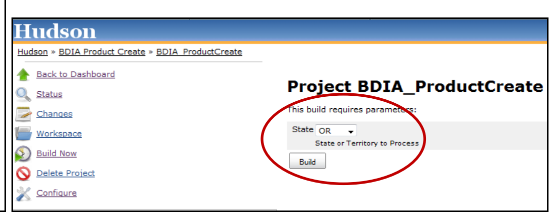
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

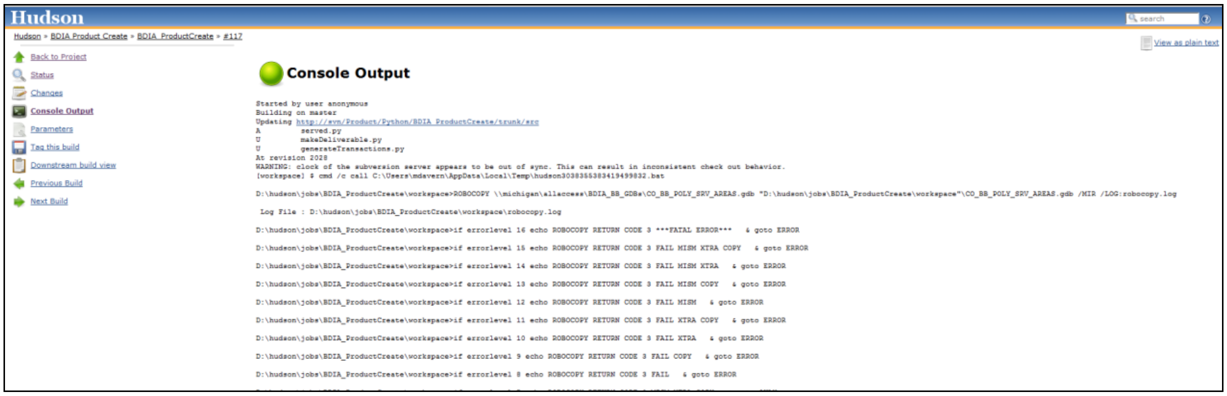
Below is an example of the main page where the type of product build can be selected.



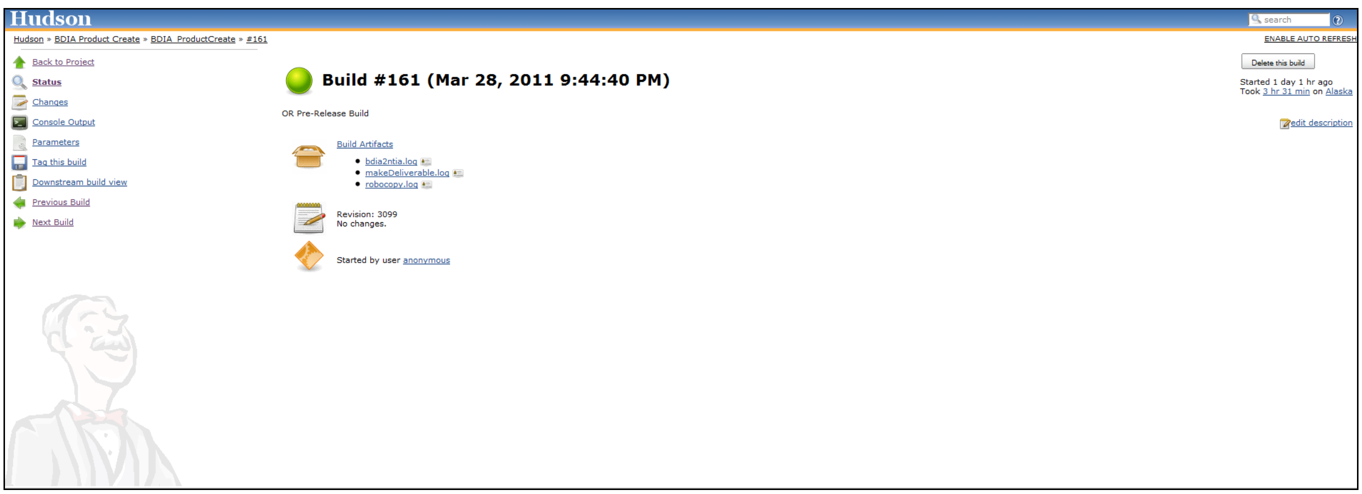
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



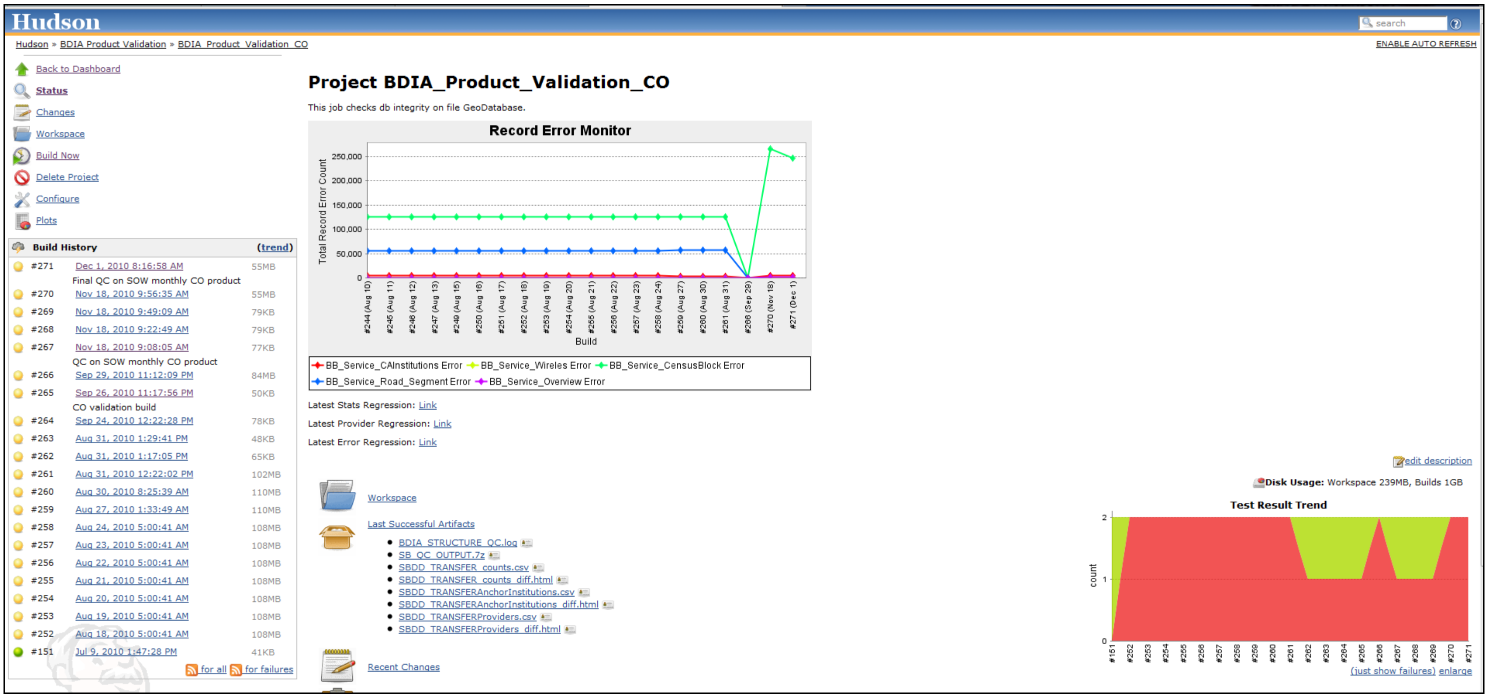
All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



3.10.2 Product Validation and Statistics

Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.
All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

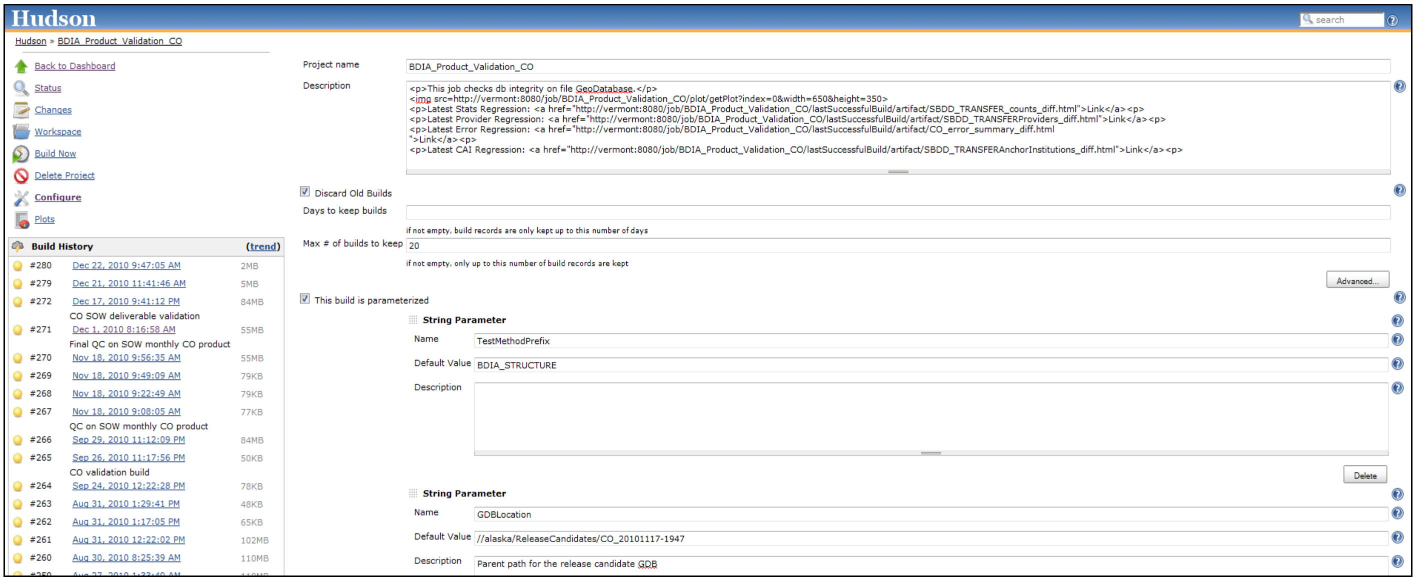
Below is an example of the report provided based on various control points running over a specified time period:



Similar to the Product Create process, all results from the process are maintained:

Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.

Further detail on the Hudson CI System environment can be found by navigating to the following link: http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



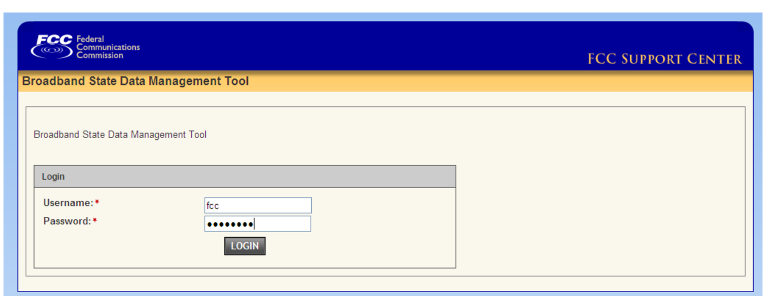
3.11 Product Extract Data Delivery

Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

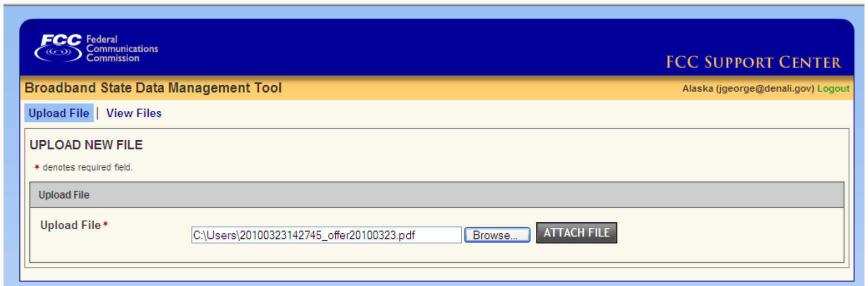
1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

2) NTIA Submittal

   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field
   e) Browse to local file for submission using the ‘Browse’ button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen

g) A receipt of submission is emailed to username e-mail address

Methodology Guidance

The white paper should:
1. Effectively describe the deliverable data;
2. Effectively describe the data collection process;
3. Effectively describe the verification process.

1. **Data Description** Provide a general description / summary of data submission including file names and a brief description of each dataset.

Contents of the data submission folder:

1. ***Final Geodatabase (HI_SBDD_2011_04_01.gdb)***
Description: This data submission follows FCC/NTIA guidelines including Metadata for the project.

The SBDD File Geodatabase contains the following layers:

BB_Service_Address	*12*	*Records*
BB_Service_Road_Segment	*25,539*	*Records*
BB_Service_CensusBlock	*14,980*	*Records*
BB_Service_CAInstitutions	*1,031*	*Records*
BB_Service_Wireless	*9*	*Records*
BB_Service_Overview	*0*	*Records*
BB_ConnectionPoint_LastMile	*110*	*Records*
BB_ConnectionPoint_MiddleMile	*1*	*Records*

2. ***Submission Receipt (HI_2011_3_29.txt)***
Description: This is the submission receipt from the NTIA receipt tool.

3. ***Technical Appendix (PDC_Deliverable_Notes_04012011.pdf)***
Description: This is a PDC document that delineates omissions from the data deliverable resulting from the application of NTIA business rules and any other errors encountered in the file geodatabase.

4. ***Data Package (HI_DataPackage_2011_04_01.xlsx)***
Description: This is the NTIA "datapackage.xls" spreadsheet that is used to document the data submission.

5. ***Whitepaper (HI_WhitePaper_2011_04_01.pdf)***
Description: This is the methodology guidance document requested by NTIA to document the data submission.

2. Provider Participation Provide a summary of provider cooperation (datapackage.xls).

The project team has been collecting and processing broadband data from ten (10) providers (Oceanic Time Warner Cable, Hawaiian Telcom Communications, Inc., Clearwire Corp., TW Telecom Holdings, Inc., Verizon Communications, Inc., Sprint Nextel, AT&T Inc., MOBI PCS, T-Mobile USA, Inc., and Sandwich Isles Communications, Inc.). These ten (10) providers account for the overwhelming majority of actual broadband subscribers in Hawaii. The project team has identified an 11th provider as Pacific Light Net, Inc. dba/Wavecom Solutions, but the team has not yet received any data from Pacific Light Net, Inc.

Hawaii Department of Commerce and Consumer Affairs ("DCCA") has encountered challenges in fully executing NDAs with providers and subcontracts under the grant. This has affected the signing of certain NDAs with data providers as well as subcontracts dealing with data processing and delivery. Subsequently, throughout this term, DCCA has experienced some delays in obtaining necessary information. However, to-date DCCA has been able to process data representing the overwhelming majority of broadband providers in the State of Hawaii. – DCCA continues to overcome these challenges through cooperation between the parties and improving process expediency. Seven (7) of the eleven (11) Providers identified have executed confidentiality agreements for data sharing.

Hawaiian Telcom Communications, Inc. and Oceanic Time Warner Cable: Last-mile and middle-mile facility capacity and more specifically backhaul from the facilities has been deemed proprietary. Further, providers maintain that they do not have information documented in a form that they would be able to easily provide. No information regarding this has been shared to-date by these providers. DCCA is working to compel these Providers to furnish more detailed information.

New Data from T-Mobile USA, Inc. did not arrive in time to include in the Spring 2011 data delivery package and will be included in the next data delivery. Hawaiian Telcom Communications, Inc., Oceanic Time Warner Cable, Clearwire Corp., and Sprint Nextel did not provide New Data updates for the Spring 2011 data delivery.

The project team continues to verify these coverage areas and broadband speed claims as well as to collect data from other providers as they are identified.

The most recent iteration of updated and verified mapping data was submitted to NTIA on April 1, 2011 in accordance with the latest FCC/NTIA broadband data model.

3. Data Collection and Integration

a. Primary Data Collection Describe the data collection process and list any surveys distributed to retrieve data.
Data was obtained by working with Providers (phone conference calls and email) to get the latest information at the most detailed level possible. The team furnished Providers with a data request including the latest table specifications via email that included the specific information needed for the project. Two (2) Providers submitted address level detail (TW Telecom Holdings, Inc. and MOBI PCS) and one Provider submitted Tax Map Key (TMK/Parcel) level detail (Sandwich Isles Communications, Inc.). All other terrestrial

broadband Providers maintained census block level detail. Wireless providers submitted RF propagation polygons illustrating coverage.

Broadband coverage data for Hawaiian Telcom Communications has been extrapolated as a three-mile buffer from each Central Office location. For every other provider, the DCCA has obtained census block level information and coverage footprints from the wireless providers. Since the data is being provided at the census block level or via a coverage footprint from wireless providers, exact levels of service provided within these boundaries has been limited to a single tier of service per census block or wireless footprint. TW Telecom has furnished customer addresses which have been geocoded and inserted into the FCC file geodatabase model as appropriate.

The project team is requesting TMK and address level detail from all Providers prior to the next data submission. For wireless providers, the project team is requesting more detailed RF propagation maps, tower locations, and greater detail on wireless service coverage and technology. Further, the project team will be analyzing and adjusting existing census block data to fit within TMK boundaries in an effort to increase the accuracy of the stated data coverage areas for use on the State's broadband website and for planning purposes.

b. Community Anchor Institutions Summarize Community Anchor Institutions by type, describe your data collection process, and list any surveys distributed to retrieve data.
The baseline Community Anchor Institutions database has been amended, updated and verified. The Community Anchor Institutions database is composed of 1031 points that include:

227 Schools – K through 12
56 Libraries
212 Medical/Healthcare
95 Public Safety
44 Universities, Colleges, other Post-Secondary
397 Other Community Support – Nongovernmental (Hotels)

The data was collected from various State databases (i.e. Schools, Libraries, Public Safety), and from InfoUSA data downloads. Data was verified by personal telephone calls and information collected from websites. No surveys were distributed. The project team plans to include restaurant lounges, malls and coffee shops with advertised free Wi-Fi in the next deliverable, as well as, continue with telephone verification to obtain more information from CAI's. Thus far, all CAI's contacted have been very cooperative in providing information.

4. Validation

a. Overview Provide a general summary of the validation process and methodology used. *– See Below.*
b. Business Logic Rules Define the business logic related to data validation including a clear structure or methodology used. *– See Technical Appendix.*

c. Feedback Loop Describe any outreach to Broadband Providers after you processed their data. *– Working with Providers on an ongoing basis to rectify data including the provision of coverage maps.*
d. Statistical Models List and describe any statistical models used to compile and analyze the data. *– None used to date.*
e. 3rd Party Publicly Available Data Identify all 3rd party datasets used and describe how they were used to validate the data. (3rd party datasets include American Roamer, Form 477, Form 325, etc. *– Info USA.*
f. Crowd Sourced Data Identify whether or not crowd sourced data was used and how the data was used for validation. *– Hawaii broadband website Ookla tools and FCC Ookla/MLabs speed test results are being collected on a monthly basis.*

The project team is implementing the following verification activities:

- *Coverage Verification via Website: DCCA launched a dedicated website (hibroadbandmap.org) that contains the latest information on the project as well as a speed and line test application and database for consumers to use. Additionally, consumers are able to report unserved areas on the website. – December 1, 2010.*
- *CAI Verification by Telephone: DCCA will independently verify access to broadband services by Community Anchor Institutions ("CAI") where no data currently exists via personal contact by telephone. – April 1, 2011.*
- *CAI Verification by External Data Source Comparison: The project team will be collecting data from InfoUSA to verify the completeness of the CAI inventory. – April 1, 2011.*
- *Provider Verification via Map Products: DCCA will present the data to the individual providers in the form of a map product, ask them to verify the results visually, and, if necessary, ask them to provide more accurate information if available. – April 1, 2011.*
- *Speed Test Verification via Website: DCCA will announce the speed and line test application and website for consumers via press releases and newspaper articles to encourage subscriber participation. The database will be maintained throughout the course of the project. – May 1, 2011.*
- *Speed Test Verification via FCC Ookla/MLabs: FCC databases are being collected on a monthly basis and integrated into a coverage verification layer that will also appear on the website. – April 1, 2011.*
- *Provider Verification via Website: Providers will also be able to access the maps of their data through a secure portal on the website. – June 1, 2011.*

The project team's status on implementing the following verification activities:

- *Coverage Verification via Website: The dedicated website (hibroadbandmap.org) was launched on December 1, 2010 and includes a customized Ookla speed test application and database for consumers to use, as well as, ESRI's BBStat application. – In Progress.*
- *CAI Verification by Telephone: DCCA has and will continue to verify Community Anchor Institution data via telephone. – In Progress.*

- *CAI Verification by External Data Source Comparison: InfoUSA data is being downloaded to augment and verify the completeness of the CAI inventory. – In Progress.*
- *Provider Verification via Map Products: Maps that illustrate coverage gaps are being prepared for provider review. – In Progress.*
- *Speed Test Verification via Website: The dedicated website (hibroadbandmap.org) launched on December 1, 2010 includes a customized Ookla speed test application and database for consumers to use, as well as, ESRI's BBStat application.– In Progress.*
- *Speed Test Verification via FCC Ookla/MLabs: FCC speed test data is also being integrated into an independent map layer. – In Progress.*
- *Provider Verification via Website: Providers will also be able to access the maps of their data through a secure portal on the website. – In Progress.*

Note: These verification activities and direct updates from providers are anticipated to continue through the next data delivery date.

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF IOWA

CONNECT IOWA®

April 1, 2011

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IOWA COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Iowa offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Iowa has played in creating such a powerful tool that will surely benefit not just Iowans, but consumers and businesses nationwide.

Therefore, Connected Nation as the State Broadband Designated Entity, in partnership with the Iowa Utilities Board, is pleased to present this submittal of the state of Iowa's State Broadband Data and Development (SBDD) Grant Program, known as Connect Iowa.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Iowa: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A:	1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A:	3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A:	4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A:	4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)		n/a	Accuracy and Verification Report
n/a		DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a		n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Iowa program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Iowa program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 94.66% of the Iowa provider community, or 195 of 206 total providers. Of the 195 participating providers, 50 supplied an update to their network or coverage area(s), while 142 have reported no change. The remaining 3 represent providers who previously supplied data but were non-responsive in the April 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 11 providers that are not represented in the attached datasets, 6 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect Iowa. The remaining 5 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Iowa principals that all commercially reasonable efforts were made to account for 100% of the known Iowa broadband provider community, pursuant to this semi-annual data update submission.

Connect Iowa has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Iowa conducts field validation efforts. To date, 59 (28.64%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Iowa launched a website to create awareness about the initiative. Connectiowa.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Iowa website encountered 3,366 unique visits during this reporting period (14,777 total to date for the life of the grant awarded on January 1, 2010). Additionally, this pronounced Web activity netted 59 broadband inquiries over this same reporting period (174 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Iowa website and the Connect Iowa Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Iowa mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Iowa has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Iowa Utilities Board, outreach was conducted during this data update reporting period by Connect Iowa to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Iowa website. Connect Iowa continues to work in close coordination with statewide associations such as the Iowa League of Cities, Iowa Association of Counties, and the State Library of Iowa to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Iowa will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Connect Iowa, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Iowa efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Iowa, Connected Nation has previously engaged the one federally recognized tribal land in the area covered by the Connect Iowa SBDD grant and reported the outreach to the Sac & Fox Tribe of the Mississippi as part of past submissions. Throughout the next reporting period Connect Iowa plans to engage directly with this tribal community and will also conduct affirmative outreach within the area. Connect Iowa understands the connectivity challenges facing this tribe, and we have identified a need to include its data as part of our upcoming submissions.

The Connect Iowa program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Iowa, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: IOWA COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Iowa, working in close coordination with the Iowa Utilities Board, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Iowa has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Iowa has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Iowa through ESRI ArcGIS software.

Connect Iowa continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Iowa website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Iowa will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectiowa.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_IA_3654

Connect Iowa and the Iowa Utilities Board have worked closely during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. Locating centralized connectivity data in the state remains a challenge but outreach continues to sources who may have possession of this data and Connect Iowa is seeing progress toward securing and reporting this data during the coming months.

In tandem with these efforts to identify existing data, Connect Iowa continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Survey response during this reporting period has been slow but increased coordination will be occurring in the coming months with associations throughout the state including the State Library of Iowa, Iowa Hospital Association, Iowa Department of Education, Iowa League of Cities, and the Iowa State Association of Counties. Connect Iowa is confident that survey results will increase over the coming months as updates surrounding the project are provided to these associations and their members.

Connect Iowa has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Iowa is developing a

CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Iowa, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Iowa will continue its ongoing work with the Iowa Utilities Board and key organization contacts in an effort to raise awareness of this project among CAI. An update on our current data will be provided to the Iowa Broadband Deployment Governance Board, and participation by its members to assist with promoting our survey will be encouraged. Leading up to the next reporting period, Connect Iowa will be specifically focusing on contacts in the education and healthcare sectors in an effort to increase data in these categories.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	1,865	1,865	1,865	122	122	124
Libraries	588	588	588	316	405	233
Healthcare	149	149	149	41	40	39
Public Safety	1,222	1,222	1,221	78	70	72
Higher Ed Institutions	77	77	77	30	30	30
Other Government	700	700	700	315	260	294
Other Non-Government	3	3	3	3	3	3
Total	**4,604**	**4,604**	**4,603**	**905**	**930**	**795**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Iowa.

Inventory of Deliverables, Connect Iowa: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Iowa have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Iowa Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;

- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Iowa on the following providers: AT&T Inc., Brooklyn Mutual Telecommunications Cooperative, Cable ONE Inc., Cedar Falls Utilities, Chat Mobility, Circle Computer Resources, Citizens Mutual Telephone Cooperative, Cloudburst_9, Community Cable Television Agency of O'Brien County, Cramer, IT, Danville Mutual Telephone Company, Dynamic Broadband, East Buchanan Telephone Cooperative, Evertek Enterprises, Farmers & Merchants Mutual Telephone Company, Farmers Cooperative Telephone Company-Dysart, Farmers Mutual Telephone Company-Jesup, Farmers Telephone Company-Essex, FiberComm LC, Frontier Communications Corporation, Grand River Mutual Telephone Corporation, Grundy Center Municipal Utilities, Heartland Net, Hot Spots, I-35 Telephone Company, Internet Consulting Services LLC, Iowa Telecom, Kalona Cooperative Telephone Company, KDSC Inc., LaPorte City Telephone Company, Lenox Municipal Utilities, Long Lines, Mahaska Communications Group, Mediacom Iowa LLC, Mediapolis Telephone Company, MidlandsNet LLC, Minburn Communications, Mutual Telephone Company, Mutual Telephone Company of Morning Sun Iowa, NetConx, Northern Iowa Telephone Company, Panora Communications Cooperative, Partner Communications Cooperative, Prairie iNet, Premier Communications, Qwest Corporations, Sharon Telephone Company, SpeedNet LLC, Sprint, T-Mobile USA, Traer Municipal Utilities, Van Buren Telephone Company Inc., Verizon Communications Inc., Villisca Farmers Telephone Company, Walnut Telephone Company, Wellman Cooperative Telephone Association, West Liberty Telephone Company, Western Iowa Telephone Association, and Woolstock Mutual Telephone.

During this reporting period, Connected Nation conducted 4 additional on-site validation tests with Citizens Mutual Telephone, Farmers Mutual Cooperative Telephone Company, Northern Iowa Telephone Company, and MidlandsNet LLC.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 59 companies (out of a universe of 206 viable providers) totaling 28.64% within the state of Iowa.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 3.17% of Iowa households do not have terrestrial fixed broadband service available, and approximately 0.04%[1] of Iowa households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 5.58% of rural Iowa households do not have terrestrial fixed broadband service available, and approximately 0.06%[3] of rural Iowa households have neither mobile nor fixed broadband service available.[4]

Wireless Methodology

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Iowa project has received a total of 59 inquiries (174 grant inception to date). As more inquiries are submitted to Connect Iowa, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumers to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Iowa project launched BroadbandStat on June 18, 2010, and has received a total of 5,200 visits to date, of which 1,002 occurred this reporting period.

Speed Test Methodology

The 784 speed tests that are represented in the Connect Iowa Speed Test Report during this reporting period (3,187 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Iowa speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Iowa project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Iowa with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Iowa.

Broadband Provider Log

Complete	337
Non-Responsive/Refused	10
In Progress	18
Count of Datasets by Viable Status	**365**
Total Unique Providers Represented	**206**

Provider Name	**Platform**	**Status**	**NDA Execution Date**	**Notes**
Ace Telephone Association	ILEC/CLEC	Data Added to Statewide Inventory	3/8/2010	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Ayrshire Farmers Mutual Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	2/17/2010	
Bernard Telephone Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	5/19/2010	
BitWind Communications, LLC	Fixed Wireless	Data Added to Statewide Inventory		
Brooklyn Mutual Telecommunications Cooperative	ILEC/CLEC	Data Added to Statewide Inventory	4/21/2010	
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Clear Lake Independent Telephone Company	Fiber	Data Added to Statewide Inventory	5/6/2020	
Colo Telephone Company	Fiber	Data Added to Statewide Inventory	1/28/2010	
Eastlight, LLC	Fixed Wireless	Data Added to Statewide Inventory		
Evertek Enterprises	Fixed Wireless	Data Added to Statewide Inventory	2/3/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	ILEC/CLEC	Data Added to Statewide Inventory	2/5/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	Fiber	Data Added to Statewide Inventory	2/5/2010	
Farmers Mutual Telephone Company - Nora Springs	Fiber	Data Added to Statewide Inventory	1/26/2010	
Farmers Mutual Telephone Company - Nora Springs	Cable	Data Added to Statewide Inventory	1/26/2010	
Goldfield Access Network, L.C.	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Grand River Mutual Telephone Corporation	ILEC/CLEC	Data Added to Statewide Inventory	2/5/2010	
Grand River Mutual Telephone Corporation	ILEC/CLEC	Data Added to Statewide Inventory	2/5/2010	
Grundy Center Municipal Utilities	Fixed Wireless	Data Added to Statewide Inventory		
Grundy Center Municipal Utilities	Cable	Data Added to Statewide Inventory		
I-35 Telephone Company	Fiber	Data Added to Statewide Inventory	2/2/2010	
Kalona Cooperative Telephone Company	Fiber	Data Added to Statewide Inventory	1/20/2010	
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
Lehigh Valley Cooperative Telephone Association	Fiber	Data Added to Statewide Inventory	4/16/2010	
Loganet	Fixed Wireless	Data Added to Statewide Inventory		
Martelle Cooperative Telephone Association	ILEC/CLEC	Data Added to Statewide Inventory	5/5/2010	
Massena Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	6/18/2010	
MidIowa Net	ILEC/CLEC	Data Added to Statewide Inventory		
MidIowa Net	Fixed Wireless	Data Added to Statewide Inventory		
Midwest Broadband LLC	Fixed Wireless	Data Added to Statewide Inventory	7/6/2010	
Minburn Communications	Fiber	Data Added to Statewide Inventory	4/7/2010	
Minburn Communications	ILEC/CLEC	Data Added to Statewide Inventory	4/7/2010	
Minburn Communications	ILEC/CLEC	Data Added to Statewide Inventory	4/7/2010	
Minburn Communications	Fiber	Data Added to Statewide Inventory	4/7/2010	
Monarc Technologies	Fiber	Data Added to Statewide Inventory	2/16/2011	
Mutual Telephone Company	Fiber	Data Added to Statewide Inventory	1/25/2010	
NetConx	Fixed Wireless	Data Added to Statewide Inventory	4/6/2010	
New Ulm Telecom, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/10/2010	
Northwest Telephone Cooperative Association	ILEC/CLEC	Data Added to Statewide Inventory	2/17/2010	
Preston Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	2/5/2010	
Qwest Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/4/2010	
South Slope Cooperative Telephone Company	Fiber	Data Added to Statewide Inventory	2/2/2010	
SpeedNet, LLC	Fixed Wireless	Data Added to Statewide Inventory		
Spencer Municipal Utilities	Cable	Data Added to Statewide Inventory	2/18/2010	
Spencer Municipal Utilities	Fiber	Data Added to Statewide Inventory	2/18/2010	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	
Van Horne Cooperative Telephone Company	Fiber	Data Added to Statewide Inventory	5/18/2010	
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
Walnut Telephone Company	Cable	Data Added to Statewide Inventory	4/14/2010	
Walnut Telephone Company	Fiber	Data Added to Statewide Inventory	4/14/2010	
Walnut Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	4/14/2010	
Webster-Calhoun Cooperative Telephone Association	Fiber	Data Added to Statewide Inventory	5/21/2010	
West Iowa Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
West Liberty Telephone Company	Fiber	Data Added to Statewide Inventory	1/25/2010	
Woolstock Mutual Telephone	Fixed Wireless	Data Added to Statewide Inventory	5/19/2010	
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Mediacom Iowa, LLC	Backhaul	Backhaul Provider Only Processing Complete	1/12/2010	
McLeodUSA Telecommunications Services, Inc.	ILEC/CLEC	Provider Approval Solicited		
Ace Telephone Association	Backhaul	Partial Data Received	3/8/2010	
Community Digital Wireless, LLC	Backhaul	Partial Data Received	5/6/2010	
Schaller Telephone Company	ILEC/CLEC	Partial Data Received		
East Buchanan Telephone Cooperative	Fixed Wireless	Provider Gathering Data	4/30/2010	
360networks	Backhaul	No Update to Provide	1/19/2010	
Algona Municipal Utilities	Cable	No Update to Provide	2/9/2010	
Algona Municipal Utilities	Fiber	No Update to Provide	2/9/2010	
Alliance Communications Cooperative, Inc	ILEC/CLEC	No Update to Provide	1/28/2010	
Alliance Communications Cooperative, Inc	Backhaul	No Update to Provide	1/28/2010	
Alliance Communications Cooperative, Inc	Fiber	No Update to Provide	1/28/2010	
Alpine Communications, LC	ILEC/CLEC	No Update to Provide	2/24/2010	
Alpine Communications, LC	Fiber	No Update to Provide	2/24/2010	
Alta Municipal Utilities	Cable	No Update to Provide	5/18/2010	
Andrew Telephone Company	ILEC/CLEC	No Update to Provide	1/19/2010	
Arcadia Telephone Cooperative	ILEC/CLEC	No Update to Provide	5/6/2010	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Aventure Communications	Fixed Wireless	No Update to Provide	4/8/2010	
Aventure Communications	Backhaul	No Update to Provide	4/8/2010	
Ayrshire Farmers Mutual Telephone Company	Fixed Wireless	No Update to Provide	2/17/2010	
Baldwin Nashville Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	2/3/2010	
Bellevue Municipal Utilities	Fiber	No Update to Provide	5/20/2010	
Bernard Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	5/19/2010	
Bernard Telephone Company, Inc.	Backhaul	No Update to Provide	5/19/2010	
BEVCOMM	ILEC/CLEC	No Update to Provide	6/16/2010	

Board of Water Electric & Communication Trustees of the City of Muscatine	ILEC/CLEC	No Update to Provide	5/14/2010	
Board of Water Electric & Communication Trustees of the City of Muscatine	Cable	No Update to Provide	5/14/2010	
Board of Water Electric & Communication Trustees of the City of Muscatine	Fiber	No Update to Provide	5/14/2010	
Butler-Bremer Communications	ILEC/CLEC	No Update to Provide	4/20/2010	
Butler-Bremer Communications	Cable	No Update to Provide	4/20/2010	
Butler-Bremer Communications	Fiber	No Update to Provide	4/20/2010	
Cascade Communications Company	ILEC/CLEC	No Update to Provide	1/23/2010	
Cascade Communications Company	Fiber	No Update to Provide	1/23/2010	
Casey Mutual Telephone Company	ILEC/CLEC	No Update to Provide	5/3/2010	
Casey Mutual Telephone Company	Backhaul	No Update to Provide	5/3/2010	
Cedar Falls Utilities	Fiber	No Update to Provide	6/16/2010	
Cedar Falls Utilities	Cable	No Update to Provide	6/16/2010	
Center Junction Telephone Company	ILEC/CLEC	No Update to Provide	3/12/2010	
Central Scott Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	4/22/2010	
Central Scott Telephone Company, Inc.	Fixed Wireless	No Update to Provide	4/22/2010	
Chat Mobility	Mobile Wireless	No Update to Provide	1/19/2010	
Circle Computer Resources	Fixed Wireless	No Update to Provide	7/6/2010	
Citizens Mutual Telephone Cooperative	ILEC/CLEC	No Update to Provide	2/26/2010	
Citizens Mutual Telephone Cooperative	Fiber	No Update to Provide	2/26/2010	
City of Hawarden	Cable	No Update to Provide	5/20/2010	
Clarence Telephone Company, Inc.	Fiber	No Update to Provide		
Clear Lake Independent Telephone Company	ILEC/CLEC	No Update to Provide	5/6/2020	
CML Telephone Cooperative, Association of Meriden, Iowa	Fiber	No Update to Provide	1/25/2010	
Comelec Services, Inc.	Fixed Wireless	No Update to Provide	5/7/2010	
Communications 1 Network, Inc.	Fiber	No Update to Provide	4/14/2010	
Community Cable Television Agency of O'Brien County	Cable	No Update to Provide	5/5/2010	
Community Cable Television Agency of O'Brien County	Fixed Wireless	No Update to Provide	5/5/2010	
Community Digital Wireless, LLC	Fixed Wireless	No Update to Provide	5/6/2010	
Complete Communication Services	Cable	No Update to Provide	6/17/2010	
Complete Communication Services	Fiber	No Update to Provide	6/17/2010	
Coon Rapids Municipal Utilities	Cable	No Update to Provide	4/22/2010	
Coon Valley Co-op Telephone Association, Inc.	ILEC/CLEC	No Update to Provide		
Coon Valley Co-op Telephone Association, Inc.	Fixed Wireless	No Update to Provide		
Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	2/2/2010	
Cooperative Telephone Company	Fixed Wireless	No Update to Provide	2/2/2010	
Cooperative Telephone Exchange	Fiber	No Update to Provide	2/2/2010	
Cooperative Telephone Exchange	Backhaul	No Update to Provide	2/2/2010	
Corn Belt Telephone Company	ILEC/CLEC	No Update to Provide	2/15/2010	
Corn Belt Telephone Company	Fiber	No Update to Provide	2/15/2010	
Corn Belt Telephone Company	Fixed Wireless	No Update to Provide	2/15/2010	
Cox Communications, Inc	Cable	No Update to Provide	1/29/2010	
Cramer IT Consulting, Inc	Fixed Wireless	No Update to Provide	1/20/2010	
Cumberland Telephone Company	ILEC/CLEC	No Update to Provide	4/27/2010	
Cumberland Telephone Company	Fixed Wireless	No Update to Provide	4/27/2010	
Danville Mutual Telephone Company	ILEC/CLEC	No Update to Provide		
Dixon Telephone Company	Cable	No Update to Provide	5/5/2010	
Dumont Telephone Company	ILEC/CLEC	No Update to Provide	2/25/2010	
Dumont Telephone Company	Fiber	No Update to Provide	2/25/2010	
Dunkerton Telephone Cooperative	ILEC/CLEC	No Update to Provide	4/15/2010	
East Buchanan Telephone Cooperative	ILEC/CLEC	No Update to Provide	4/30/2010	
Ellsworth Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	1/25/2010	
Evertek Enterprises	Cable	No Update to Provide	2/3/2010	
Evertek Enterprises	Fiber	No Update to Provide	2/3/2010	
F&B Communications, Inc.	ILEC/CLEC	No Update to Provide	2/19/2010	
F&B Communications, Inc.	Fixed Wireless	No Update to Provide	2/19/2010	
Farmers & Merchants Mutual Telephone Company	Fiber	No Update to Provide	5/7/2010	
Farmers & Merchants Mutual Telephone Company	Fixed Wireless	No Update to Provide	5/7/2010	
Farmers Cooperative Telephone Company-Dysart	ILEC/CLEC	No Update to Provide	3/12/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	Cable	No Update to Provide	2/5/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	Fixed Wireless	No Update to Provide	2/5/2010	
Farmers Mutual Cooperative Telephone Company-Moulton	Fiber	No Update to Provide	5/21/2010	
Farmers Mutual Telephone Company - Nora Springs	ILEC/CLEC	No Update to Provide	1/26/2010	
Farmers Mutual Telephone Company - Nora Springs	Fixed Wireless	No Update to Provide	1/26/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	ILEC/CLEC	No Update to Provide	4/9/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	Cable	No Update to Provide	4/9/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	Backhaul	No Update to Provide	4/9/2010	
Farmers Mutual Telephone Company-Jesup	ILEC/CLEC	No Update to Provide	4/20/2010	
Farmers Telephone Company-Essex	ILEC/CLEC	No Update to Provide	1/27/2010	
Farmers Telephone Company-Essex	Fixed Wireless	No Update to Provide	1/27/2010	
FiberComm L.C.	ILEC/CLEC	No Update to Provide	2/15/2010	
FiberComm L.C.	Fixed Wireless	No Update to Provide	2/15/2010	
FiberComm L.C.	Backhaul	No Update to Provide	2/15/2010	
Fibernet Communications, LLC	Backhaul	No Update to Provide	3/9/2010	
Frontier Communications Corporation	ILEC/CLEC	No Update to Provide	1/22/2010	
Frontier Communications Corporation	Backhaul	No Update to Provide	1/22/2010	
Goldfield Access Network, L.C.	ILEC/CLEC	No Update to Provide	1/22/2010	
Grand Mound Cooperative Telephone Association	ILEC/CLEC	No Update to Provide		
Grand Mound Cooperative Telephone Association	Fiber	No Update to Provide		
Grand Mound Cooperative Telephone Association	Fixed Wireless	No Update to Provide		
Grand River Mutual Telephone Corporation	Fixed Wireless	No Update to Provide	2/5/2010	
Griswold Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	4/21/2010	
Harlan Municipal Utilities	Cable	No Update to Provide	5/5/2010	
Harmony Telephone Company	Fiber	No Update to Provide	1/12/2010	
Hawkeye Telephone Company	ILEC/CLEC	No Update to Provide	2/12/2010	
Heart of Iowa Communications Cooperative	ILEC/CLEC	No Update to Provide	1/7/2010	
Heart of Iowa Communications Cooperative	Fiber	No Update to Provide	1/7/2010	
Heart of Iowa Communications Cooperative	Backhaul	No Update to Provide	1/7/2010	
Hickory Tech Corporation	ILEC/CLEC	No Update to Provide	2/2/2010	
Hospers Telephone Exchange, Inc.	ILEC/CLEC	No Update to Provide	1/11/2010	
Hospers Telephone Exchange, Inc.	Cable	No Update to Provide	1/11/2010	
Hubbard Cooperative Telephone Association and Cable	ILEC/CLEC	No Update to Provide	5/14/2010	
Huxley Communications Cooperative	Backhaul	No Update to Provide	1/25/2010	
Huxley Communications Cooperative	ILEC/CLEC	No Update to Provide	1/25/2010	
Huxley Communications Cooperative	Fiber	No Update to Provide	1/25/2010	
I-35 Telephone Company	ILEC/CLEC	No Update to Provide	2/2/2010	
I-35 Telephone Company	Fixed Wireless	No Update to Provide	2/2/2010	
IAMO Telephone Company	ILEC/CLEC	No Update to Provide	1/25/2010	
IAMO Telephone Company	Fixed Wireless	No Update to Provide	1/25/2010	
ImOn Communications, LLC	Backhaul	No Update to Provide		
ImOn Communications, LLC	Cable	No Update to Provide		
ImOn Communications, LLC	Fiber	No Update to Provide		
Independence Telecommunications Utility	Cable	No Update to Provide	4/9/2010	

Internet Consulting Services, LLC	Fixed Wireless	No Update to Provide	5/19/2010	
Iowa Connect, Inc.	Fixed Wireless	No Update to Provide	5/12/2010	
Iowa Network Services	Backhaul	No Update to Provide	3/5/2010	
Jefferson Telephone Company	Fiber	No Update to Provide	1/22/2010	
Jefferson Telephone Company	ILEC/CLEC	No Update to Provide	1/22/2010	
Kalnet	Fixed Wireless	No Update to Provide	5/21/2010	
Kalona Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	1/20/2010	
KDSC, Inc.	Fixed Wireless	No Update to Provide	5/18/2010	
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
KeyOn Communications, Inc.	ILEC/CLEC	No Update to Provide	10/15/2009	
Keystone Farmers Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	4/12/2010	
Killduff Telephone Company	ILEC/CLEC	No Update to Provide		
La Motte Telephone Company, Inc.	Fixed Wireless	No Update to Provide	2/16/2010	
La Motte Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	2/16/2010	
LaPorte City Telephone Co	ILEC/CLEC	No Update to Provide	2/22/2010	
Laurens Municipal Communications Utility	Cable	No Update to Provide	6/2/2010	
Lenox Municipal Utilities	Cable	No Update to Provide	4/20/2010	
LISCO Wireless	Fiber	No Update to Provide	1/28/2010	
LISCO Wireless	ILEC/CLEC	No Update to Provide	1/28/2010	
LISCO Wireless	Backhaul	No Update to Provide	1/28/2010	
Lone Rock Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	2/15/2010	
Long Lines	ILEC/CLEC	No Update to Provide	5/4/2010	
Long Lines	Cable	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Lost Nation-Elwood Telephone Company	Fiber	No Update to Provide	4/13/2010	
Lynnville Telephone Company, Inc.	ILEC/CLEC	No Update to Provide		
Mabel Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	4/8/2010	
Mahaska Communication Group	Fiber	No Update to Provide	5/10/2010	
Mahaska Communication Group	Fixed Wireless	No Update to Provide	5/10/2010	
Manning Municipal Communication & Television System Utility	Cable	No Update to Provide	4/22/2010	
Manning Municipal Communication & Television System Utility	Fixed Wireless	No Update to Provide	4/22/2010	
Marne & Elk Horn Telephone Company	ILEC/CLEC	No Update to Provide	2/11/2010	
Marne & Elk Horn Telephone Company	Fixed Wireless	No Update to Provide	2/11/2010	
Marne & Elk Horn Telephone Company	Backhaul	No Update to Provide	2/11/2010	
Martelle Cooperative Telephone Association	Cable	No Update to Provide	5/5/2010	
Massena Telephone Company	Backhaul	No Update to Provide	6/18/2010	
Mediacom Iowa, LLC	Cable	No Update to Provide	1/12/2010	
Mediapolis Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Miles Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	5/17/2010	
Milford Cable TV Inc.	Cable	No Update to Provide	4/21/2010	
Minerva Valley Telephone Cablevision, Inc.	ILEC/CLEC	No Update to Provide	4/7/2010	
Modern Cooperative Telephone Company Inc.	ILEC/CLEC	No Update to Provide		
Mutual Telephone Company	ILEC/CLEC	No Update to Provide	1/25/2010	
Mutual Telephone Company of Morning Sun, Iowa	ILEC/CLEC	No Update to Provide	5/5/2010	
Mutual Telephone Company of Morning Sun, Iowa	ILEC/CLEC	No Update to Provide	5/5/2010	
Nexgen Integrated Communications LLC	Fiber	No Update to Provide		
Nexgen Integrated Communications LLC	ILEC/CLEC	No Update to Provide		
North English Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	5/12/2010	
Northeast Iowa Telephone Company	Backhaul	No Update to Provide	4/13/2010	
Northeast Iowa Telephone Company	Fixed Wireless	No Update to Provide	4/13/2010	
Northeast Iowa Telephone Company	ILEC/CLEC	No Update to Provide	4/13/2010	
Northern Iowa Telephone Company	ILEC/CLEC	No Update to Provide	1/25/2010	
Northwest Telephone Cooperative Association	Backhaul	No Update to Provide	2/17/2010	
Northwest Telephone Cooperative Association	Fixed Wireless	No Update to Provide	2/17/2010	
Ogden Telephone Company	Backhaul	No Update to Provide	3/17/2010	
Ogden Telephone Company	ILEC/CLEC	No Update to Provide	3/17/2010	
Olin Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	2/23/2010	
Onslow Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	2/3/2010	
Oran Mutual Telephone Company	ILEC/CLEC	No Update to Provide	2/8/2010	
Osage Municipal Communications Utility	Fixed Wireless	No Update to Provide	5/18/2010	
Osage Municipal Communications Utility	Cable	No Update to Provide	5/18/2010	
Palmer Mutual Telephone Company	ILEC/CLEC	No Update to Provide	1/21/2010	
Palo Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	5/19/2010	
Panora Communications Cooperative	Cable	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Fiber	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Fixed Wireless	No Update to Provide	1/29/2010	
Panora Communications Cooperative	ILEC/CLEC	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Cable	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Fiber	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Fixed Wireless	No Update to Provide	1/29/2010	
Partner Communications Cooperative	ILEC/CLEC	No Update to Provide	5/15/2010	
Partner Communications Cooperative	Cable	No Update to Provide	5/15/2010	
Prairie iNet	Fixed Wireless	No Update to Provide	3/16/2010	
Prairieburg Telephone Company, Inc	ILEC/CLEC	No Update to Provide	3/25/2010	
Prairieburg Telephone Company, Inc	Fixed Wireless	No Update to Provide	3/25/2010	
Premier Communications	Cable	No Update to Provide	1/25/2010	
Qwest Corporation	Backhaul	No Update to Provide	1/4/2010	
Radcliffe Telephone Company, Inc.	Backhaul	No Update to Provide	4/26/2010	
Radcliffe Telephone Company, Inc.	Fiber	No Update to Provide	4/26/2010	
Readlyn Telephone Company	ILEC/CLEC	No Update to Provide	2/23/2010	
Readlyn Telephone Company	Fiber	No Update to Provide	2/23/2010	
Reasnor Telephone Company, LLC	ILEC/CLEC	No Update to Provide		
RingTel Communications	ILEC/CLEC	No Update to Provide	2/17/2010	
River Valley Telecommunications Coop	ILEC/CLEC	No Update to Provide	3/23/2010	
River Valley Telecommunications Coop	Fiber	No Update to Provide	3/23/2010	
River Valley Telecommunications Coop	Fixed Wireless	No Update to Provide	3/23/2010	
Rockwell Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	5/12/2010	
Rockwell Cooperative Telephone Association	Fiber	No Update to Provide	5/12/2010	
Rockwell Cooperative Telephone Association	Backhaul	No Update to Provide	5/12/2010	
Royal Telephone Company	Fiber	No Update to Provide	2/12/2010	
Sac County Mutual Telephone Co.	Backhaul	No Update to Provide	2/15/2010	
Sac County Mutual Telephone Co.	ILEC/CLEC	No Update to Provide	2/15/2010	
Scranton Telephone Company	ILEC/CLEC	No Update to Provide	2/1/2010	
Scranton Telephone Company	Backhaul	No Update to Provide	2/1/2010	
Searsboro Telephone Company	ILEC/CLEC	No Update to Provide		
Sharon Telephone Company	Backhaul	No Update to Provide	5/20/2010	
Sharon Telephone Company	Fiber	No Update to Provide	5/20/2010	
Sharon Telephone Company	Fixed Wireless	No Update to Provide	5/20/2010	
Sharon Telephone Company	ILEC/CLEC	No Update to Provide	5/20/2010	
Sioux Valley Wireless	Fixed Wireless	No Update to Provide	6/7/2010	

South Slope Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	2/2/2010	
Spencer Municipal Utilities	Backhaul	No Update to Provide	2/18/2010	
Spring Grove Cooperative Telephone Co	Fiber	No Update to Provide		
Springville Cooperative Telephone Association, Inc.	ILEC/CLEC	No Update to Provide	2/15/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Sully Telephone Association Inc	ILEC/CLEC	No Update to Provide	4/28/2010	
Sully Telephone Association Inc	Fiber	No Update to Provide	4/28/2010	
Superior Telephone Cooperative	ILEC/CLEC	No Update to Provide	5/24/2010	
Swisher Telephone Company	Fiber	No Update to Provide	2/2/2010	
Templeton Telephone Company	ILEC/CLEC	No Update to Provide	3/12/2010	
Templeton Telephone Company	Backhaul	No Update to Provide	3/12/2010	
Terril Telephone Cooperative	ILEC/CLEC	No Update to Provide	2/12/2010	
Titonka Telephone Company	Backhaul	No Update to Provide	5/4/2010	
Titonka Telephone Company	ILEC/CLEC	No Update to Provide	5/4/2010	
Traer Municipal Utilities	Fixed Wireless	No Update to Provide	4/14/2010	
USA Communications	ILEC/CLEC	No Update to Provide	1/27/2010	
USA Communications	Fiber	No Update to Provide	1/27/2010	
USA Communications	Cable	No Update to Provide	1/27/2010	
Van Buren Telephone Co Inc	ILEC/CLEC	No Update to Provide	1/26/2010	
Van Horne Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	5/18/2010	
Van Horne Cooperative Telephone Company	Backhaul	No Update to Provide	5/18/2010	
Villisca Farmers Telephone Company	ILEC/CLEC	No Update to Provide	5/20/2010	
Walnut Telephone Company	Backhaul	No Update to Provide	4/14/2010	
Walnut Telephone Company	Fixed Wireless	No Update to Provide	4/14/2010	
Webb-Dickens Telephone Corporation	Fiber	No Update to Provide	1/25/2010	
Wellman Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	5/19/2010	
Wellman Cooperative Telephone Association	Fixed Wireless	No Update to Provide	5/19/2010	
West Iowa Telephone Company	Cable	No Update to Provide	1/27/2010	
West Liberty Telephone Company	Backhaul	No Update to Provide	1/25/2010	
West Liberty Telephone Company	ILEC/CLEC	No Update to Provide	1/25/2010	
West Liberty Telephone Company	Fixed Wireless	No Update to Provide	1/25/2010	
Western Iowa Networks	ILEC/CLEC	No Update to Provide	2/22/2010	
Western Iowa Networks	Fiber	No Update to Provide	2/22/2010	
Western Iowa Networks	Fixed Wireless	No Update to Provide	2/22/2010	
Western Iowa Telephone Association	ILEC/CLEC	No Update to Provide	4/22/2010	
Winnebago Cooperative Telecom Association	Backhaul	No Update to Provide	1/22/2010	
Winnebago Cooperative Telecom Association	ILEC/CLEC	No Update to Provide	1/22/2010	
Winnebago Cooperative Telecom Association	Fiber	No Update to Provide	1/22/2010	
Winnebago Cooperative Telecom Association	Fixed Wireless	No Update to Provide	1/22/2010	
Woolstock Mutual Telephone	ILEC/CLEC	No Update to Provide	5/19/2010	
WTC Communications, Inc.	ILEC/CLEC	No Update to Provide	3/22/2010	
WTC Communications, Inc.	Cable	No Update to Provide	3/22/2010	
WTC Communications, Inc.	Fixed Wireless	No Update to Provide	3/22/2010	
Wyoming Mutual Telephone Company	ILEC/CLEC	No Update to Provide	2/19/2010	
Atkins Telephone Company	ILEC/CLEC	No Update Provided - Use Last Submission Data	5/14/2010	
Atkins Telephone Company	Fiber	No Update Provided - Use Last Submission Data	5/14/2010	
Fenton Co-Op Telephone Company	ILEC/CLEC	No Update Provided - Use Last Submission Data	4/16/2010	
Iowa Telecom	ILEC/CLEC	No Update Provided - Use Last Submission Data	6/18/2010	
Amberwave Communications	Fixed Wireless	Refused to Participate		[JAN-27-11 Jill Lindgren] Received e-mail from provider that they will not participate in this round due to a company re-organization
Eastlight, LLC	Fiber	Refused to Participate		[FEB-16-11 Jill Lindgren] Provider indicated they do not want to share info on fiber platform at this time.
Netconnect	Fixed Wireless	Refused to Participate		[JAN-25-11 Jill Lindgren] Received e-mail from provider that they refuse to participate in the mapping project.
Coon Creek Telecommunications Corp.	ILEC/CLEC	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 28, 2010 and August 31, 2010, six attempts were made during this submission period.
Knology of the Plains, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 18, 2009 and August 24, 2010, six attempts were made during this submission period.
Knology of the Plains, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 18, 2009 and August 24, 2010, six attempts were made during this submission period.
Mechanicsville Telephone Company	ILEC/CLEC	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 28, 2010 and August 5, 2010, two attempts were made during this submission period.
Mechanicsville Telephone Company	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 28, 2010 and August 5, 2010, two attempts were made during this submission period.
RuralWaves Wireless Internet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between February 19, 2010 and August 5, 2010, two attempts were made during this submission period.
RuralWaves Wireless Internet	ILEC/CLEC	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between February 19, 2010 and August 5, 2010, two attempts were made during this submission period.
Coon Creek Telecommunications Corp.	Fixed Wireless	Other		[MAR-08-11 Matthew Brunt] This provider offers SDSL and ADSL. They do not offer fixed wireless Internet access.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Matthew Brunt] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Farmers Mutual Telephone Company-Jesup	Cable	Other	4/20/2010	[FEB-02-11 Jill Lindgren] Provider stated there are no broadband services on cable platform.
Global Crossing Telecommunications, Inc.	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a provider representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.

Harlan Municipal Utilities	ILEC/CLEC	Other	5/5/2010	[MAR-09-11 Ashley Littell] Provider does not offer DSL service.
Harlan Municipal Utilities	Fiber	Other	5/5/2010	[MAR-09-11 Ashley Littell] Provider does not offer fiber service.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Matthew Brunt] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Long Lines	Fiber	Other	5/4/2010	[MAR-08-11 Matthew Brunt] Provider does not offer fiber service.
Marne & Elk Horn Telephone Company	Fiber	Other	2/11/2010	[FEB-02-11 Layne Wagner] I called the provider and confirmed that the company does not offer FTTH at this time.
SpeedNet, LLC	Backhaul	Other		[JAN-21-11 Layne Wagner] I spoke with the provider and he stated that they do not provide backhaul to anyone other than themselves.
USA Communications	Backhaul	Other	1/27/2010	[MAR-07-11 Matthew Brunt] Previously submitted middle mile data was not located within the state of Iowa.
Webster-Calhoun Cooperative Telephone Association	ILEC/CLEC	Other	5/21/2010	[JAN-14-11 Layne Wagner] Received notice from provider that the company is 100% FTTH in all exchanges.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Matthew Brunt] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Board of Water Electric & Communication Trustees of the City of Muscatine	Fixed Wireless	Offers Service but Below FCC Definition	5/14/2010	[MAR-08-11 Matthew Brunt] Speeds were too slow to qualify as broadband.
Sharon Telephone Company	Mobile Wireless	Offers Service but Below FCC Definition	5/20/2010	[FEB-16-11 Layne Wagner] I received the data from the provider and determined that the mobile wireless data does not meet the FCC definition of broadband.

State Broadband Data and Development Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised March 31, 2011

CostQuest Associates

LinkAMERICA Alliance

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Overview

The following documentation provides an overview of how the third required data set was collected and processed for the State Broadband Data and Development Program (SBDDP) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested modifications based upon NTIA guidance
    a. Inclusion of satellite, changes to service overview table, FRN verification process
4. Consumer Feedback, Crowd Sourcing and Social Media campaigns.
5. Development and posting of a Technical Standards document.

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods

As anticipated, the SBDD program continues to mature and evolve. Technical leadership and strong guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices.   Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the October 1, 2011 “Round 2” submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early January 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines associated with each round. Where necessary, we execute new NDAs with providers. In “Round 3”, this effort continued on a daily basis until we reached our final data submission deadline on February 18, 2011.   After February 18, we continued to work with providers who were not able to meet the deadline. In most cases were able to “crash” our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 3 only providers who

responded in the last two weeks of March were excluded from the final dataset. Data from those providers will be updated this summer and included in our Round 4 submission.

Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program's aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Three. We've also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in Round 1 or 2, they were giving an additional opportunity to do so in Round 3. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA's, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA's were individually negotiated to address specific provider concerns. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since two prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 3. This allowed us to provide two response options to providers. The first was for them to review PDF check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers like Megapath, New Edge Networks, American Fiber. These providers seem to resell and/or provision within their own network opportunistically. In this submission we begin to bring them into the analysis as a provider type "other". As the inclusion of this category isn't our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 3 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New Providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in Rounds 1 & 2, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning Providers: While many Broadband providers submitted datasets in Rounds 1 & 2, many of those submissions did not contain 100% of the requested data. To help identify gaps, and to make the Round 3 submission process as simple as possible, every Round 2 survey was reviewed for completeness, as well as accuracy and formatting compliance. Notes were made regarding gaps, and specific instructions were developed for providers in Round 3. These instructions not only explained what data was missing, but also provided directions on how to include that information in the Round 3 submission.

Check maps were also developed to show each provider how their service area would be displayed on the resulting interactive state map. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 3 survey in early January 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice by telephone or e-mail during the months of January and February. The initial data submission deadline was set for February 18, but, as previously noted, we continued to accept “straggler” submissions well into March.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of “known providers”. We believe the vast majority of those we were unable to reach were small wireless providers who have simply ceased to exist[2].

[2]The complete list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 3, given the data vintage of December 31, 2010, we began this process immediately after the New Year. The last submissions were accepted in mid-March, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBDD program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- GeoResults Telecom Research Data. This data was used to help estimate the Broadband services likely provided to certain classes of Community Anchor Institutions (CAI).

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBDD program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

a. Geographic Data Files
    i. US Census TIGER data[4]
b. Sources that helped isolate providers, identity management or provider service areas
    i. NECA Tariff 4
    ii. State produced exchange boundaries
    iii. Carrier produced wirecenter boundaries
    iv. FCC 477 provider filers
    v. FCC Coals reports (321/325)
    vi. FCC FRN API lookup tool
    vii. FCC/FAA Antenna Registration System
    viii. FCC FRN Lookup Tool (plain text search)
    ix. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
    i. USAC Grant lookup tool
    ii. USAC High-Cost FCC Filing Appendices
    iii. HRSA data warehouse
    iv. NCES data lookup
    v. State managed lists of schools (K-12), post-secondary institutions and libraries
    List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section below.

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[4] Census data were derived from < http://www2.census.gov/cgi-bin/shapefiles2009/state-files?state=01>, Census 2000 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas. Finally, licensed data from Georesults were used to derive estimates of Broadband connectivity for hospitals within the Anchor Institution category. The actual value from Georesults was not used, but our estimate is modeled from their input data. We also use the name and address as provided by the State data provider, not Georesults.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities, the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a fairly traditional telephone survey approach, focused on the consumer market. In addition, we are currently advancing our crowd sourcing process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are summarized below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBDDP grant was in place. Subsequent consumer surveys funded by the SBDDP grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming. These surveys will be repeated after two years to establish and evaluate trends. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for internet users and one for non-users. The telephone survey approach allows us to reach the non-internet user group as well as the current internet user. A secondary online approach is also used to augment input from current internet users. For non-users, the surveys help determine why they don't have or don't use Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their

daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the consumer survey in Wyoming was designed to produce results relevant to the state's seven Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBDDP's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBDDP program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific internet use in specific communities (i.e., regions).

The 2010 surveys were launched in July 2010 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. The surveys were closed on November 30, 2010. Telephone surveys were completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers (e.g., 80,000 random Wyoming residence telephone numbers were acquired as the foundation for the Wyoming survey). Mobile phones were not included in the initial surveys. Upon evaluation of the survey statistics, an auxiliary survey was executed to ensure younger groups (i.e., age 18 – 25) were adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market (age 18 – 25) was surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics point to the complexity of the telephone-based survey process. Survey volume achieved statistical validity ranging from a 95% confidence level and a $\pm$ 1.7% margin of error for the statewide data in Wisconsin to a 95% confidence level and a $\pm$ 3% margin of error for Wyoming's statewide data. Most regions in the 3 states have a 95% confidence level with a $\pm$ 5% margin of error.

Call volume and disposition is summarized in the chart below

BROADBAND MARKET RESEARCH - ID, WI, WY - FALL 2010

	TOTAL		IDAHO		WISCONSIN		WYOMING	
TOTAL RECORDS CALLED & % OF STUDY	106,592	100%	22,144	100%	57,445	100%	27,004	100%
NO ANSWER	53,507	50%	11,974	54%	25,886	45%	15,647	58%
TOTAL DEAD NUMBERS	23,962	22%	4,529	20%	14,611	25%	4,822	18%
HARD REFUSALS	9,304	9%	1,728	8%	6,048	11%	1,528	6%
QUALIFIED REFUSAL	643	1%	101	0%	403	1%	139	1%
BUSY	3,652	3%	754	3%	1,903	3%	995	4%
ANSWERING MACHINE	6,385	6%	1,314	6%	3,388	6%	1,683	6%
NON-WORKING NUMBER	5,072	5%	943	4%	2,983	5%	1,147	4%
CLAIMS PREVIOUS INTERVIEW	113	0%	16	0%	68	0%	29	0%
NON-RESIDENTIAL	454	0%	104	0%	239	0%	110	0%
LANGUAGE BARRIER	1,003	1%	223	1%	562	1%	218	1%
OTHER PHONE PROBLEMS - FAX/MODEM	907	1%	205	1%	500	1%	202	1%
PORTED NUMBER	272	0%	68	0%	149	0%	54	0%
BREAK OFF - SCREENER	556	1%	103	0%	301	1%	153	1%
TERM Q3 - UNDER 18	122	0%	22	0%	65	0%	36	0%
		99%		100%		99%		99%
TOTAL COMPLETES	5,758	5%	1,080	5%	3,420	6%	1,259	5%
AVG Completion Time (minutes)	**16**		**15.8**		**15.4**		**16.1**	

As noted above, the telephone survey process represented in the statistics above was augmented by providing online access to the survey. Participation in the online survey was promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, this was a long survey. As noted above, the survey averaged sixteen minutes across the three states. While this clearly contributed to the number of survey call attempts that were required to reach the level of statistical validity, it was not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBDDP efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use YouTube, LinkedIn, Facebook and Twitter to support our work. YouTube and LinkedIn postings are used to promote awareness. As noted above, we were able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we are currently engaged in two specific social media tests (in Alabama) to gauge how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising. For example, with a fairly limited 'following' a single Facebook post aimed at driving traffic to the online speed test, had 282 impressions (i.e., the number of times the post was viewed), which contributed to an increase in 71 more visits to the Facebook page generally, and a volume of 60 hits (over a three day

period) on the web site page that hosts the speed test. Our normal volume of speed test page hits is in the neighborhood of 7 or 8 per day (vs. the average of 20 per day experienced during this test). Preliminary data suggests that about half these page hits resulted in a speed test being executed.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and budgetary constraints allow. It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us take advantage of increasing specialization and proficiency with certain types of data and management responsibilities. In this submission, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

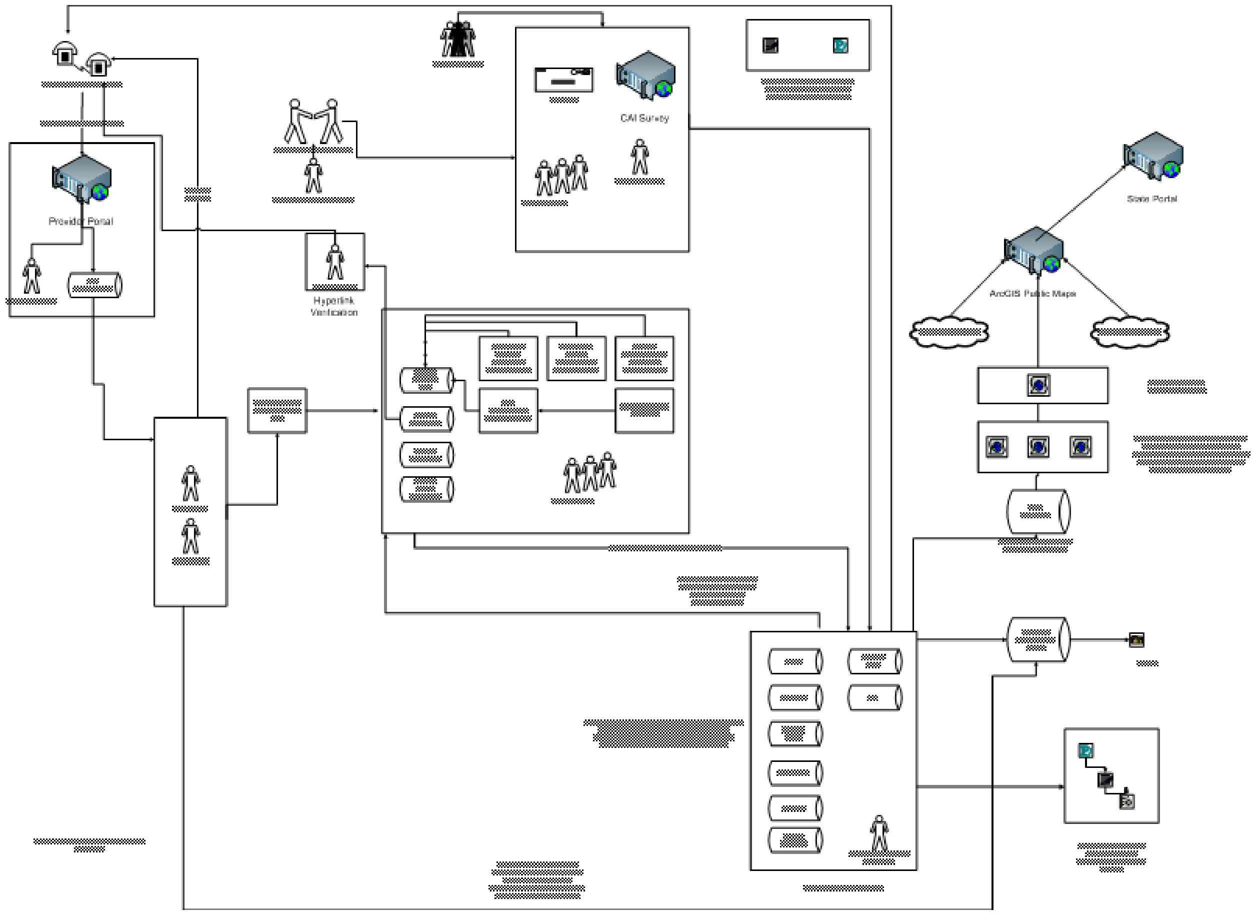

Figure 1--SBDD Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- Provider and network ownership certainty

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2000) of 2.00 or less square miles
2. Covered Street Segments (2000) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the georeferenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

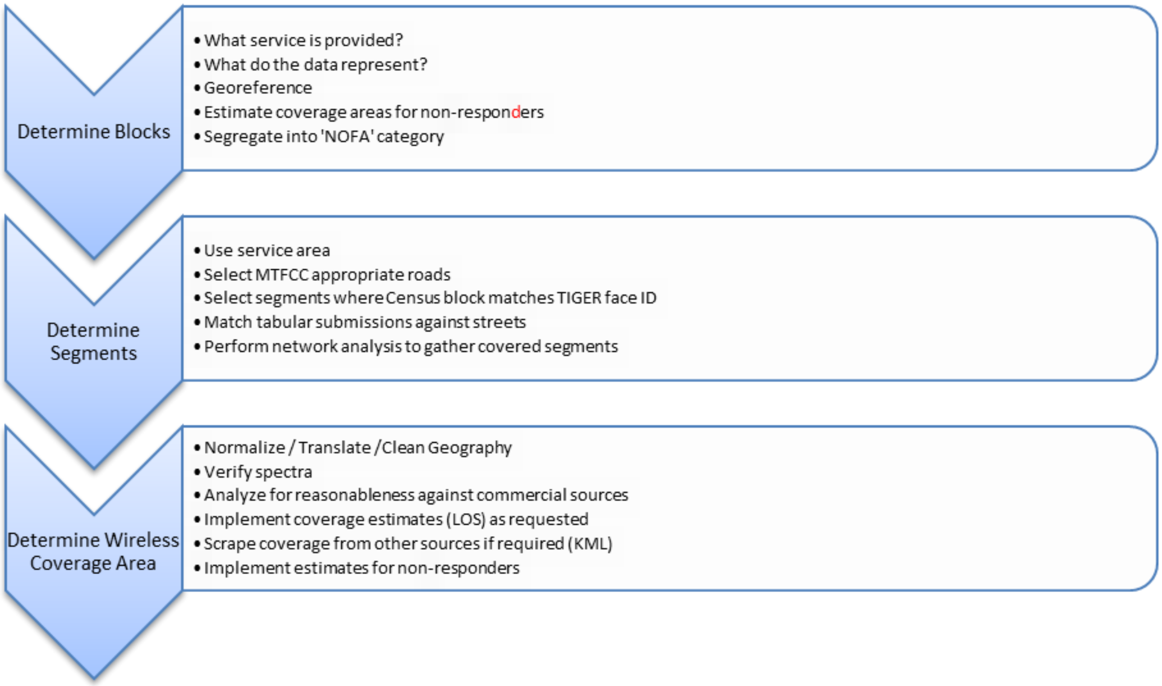

Figure 2-Broadband Coverage Process

Impact of Program Change

There were four important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 3.

The first was the development of a "provider match" submission metric whereby the grantee's complete list of known providers in the state is compared against lists from third party sources. The provider match specification was discussed on a webinar prior to the release of the national map. Although, to this date, there has been no clarification on how this metric is established or exactly how it will be used. We have invested significant resources to support an internal process to compare our provider lists with several additional sources. This has been manifest in at least three ways.

Within our provider verification process we work to derive a state level match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context.

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify,

or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to receiving Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as Provider Type "other". Our sense is Provider Type "other" will continue to expand in the fourth submission as we pull in more providers who are facilities-based and reseller.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this "other" provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or Microwave link despite the fact that the hospital next to them in the same Census block can get this service.

The final set of changes was a second verification check against reported FRNs. As NTIA is stressing the importance of this attribute, we increased its visibility in our Check Map process. FRN is now listed on both the tabular verification report and the provider PDF map. Beyond this increased visibility we had an analyst verify each FRN in our system against the FCC API[9], as well as FCC textual search[10]. Because the FRN is not an identity management tool, we are unsure if the FRNs we've included are those desired by NTIA, but we have at the very least, verified the existence of the FRN via the FCC system.

Trends in Provider Supplied Data

With this third submission we take note of three important trends.

First, with larger providers, we are seeing an increase in data stability relative to earlier submissions. In informal discussions, several providers have noted changes and stabilization in internal data processes. The firms have invested internal resources in stabilizing this data feed.

We see this reflected in very stable counts of Census Blocks and road segments. This does not mean that complex problems like segment identification or dispersion in data have been 'fixed'. It does mean that the format and methods to produce inputs for NTIA are increasingly stable.

Second we note that several providers have been particularly concerned with an appropriate identification of Maximum Advertised speeds. In some cases this involves identification of very small areas (sometimes below the level of a Census block) and appropriate assignment to technology of transmission and maximum advertised speed tiers. In other cases, questions arise regarding maximum advertised speeds that could be sold based upon network design, but that are not generally "advertised" or otherwise stated to the general public.

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[9] http://reboot.fcc.gov/developer/frn-conversions-api
[10] https://fjallfoss.fcc.gov/coresWeb/simpleSearch.do

Third when comparing submission three results relative to submission two it is important to recall the inclusion of much new data within the Provider Type “other” category. This change does not necessarily reflect a change in the size of the market, rather it reflects new data coming into the analysis and segregated into a distinct category..

Coverage Geoprocessing Methods

The next section discusses how data were geo-referenced and geoprocessed given a particular submission format.

In most cases, in Round 3 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[11]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to “belong” is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[11] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

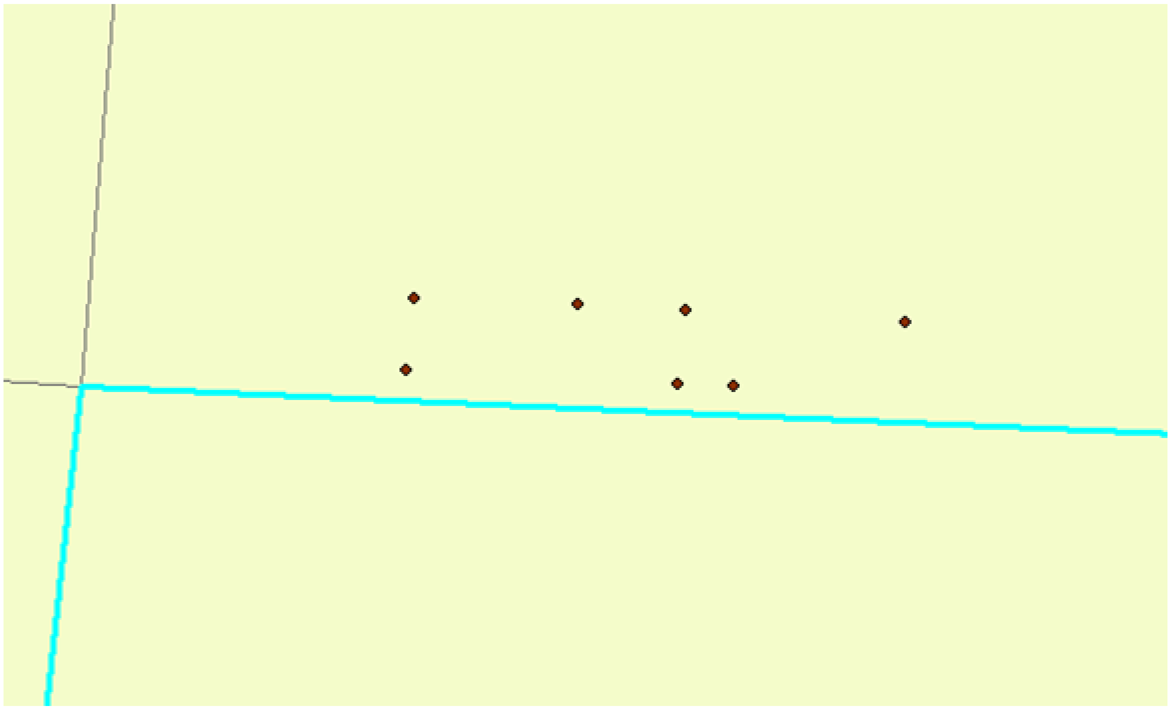


Figure 3-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

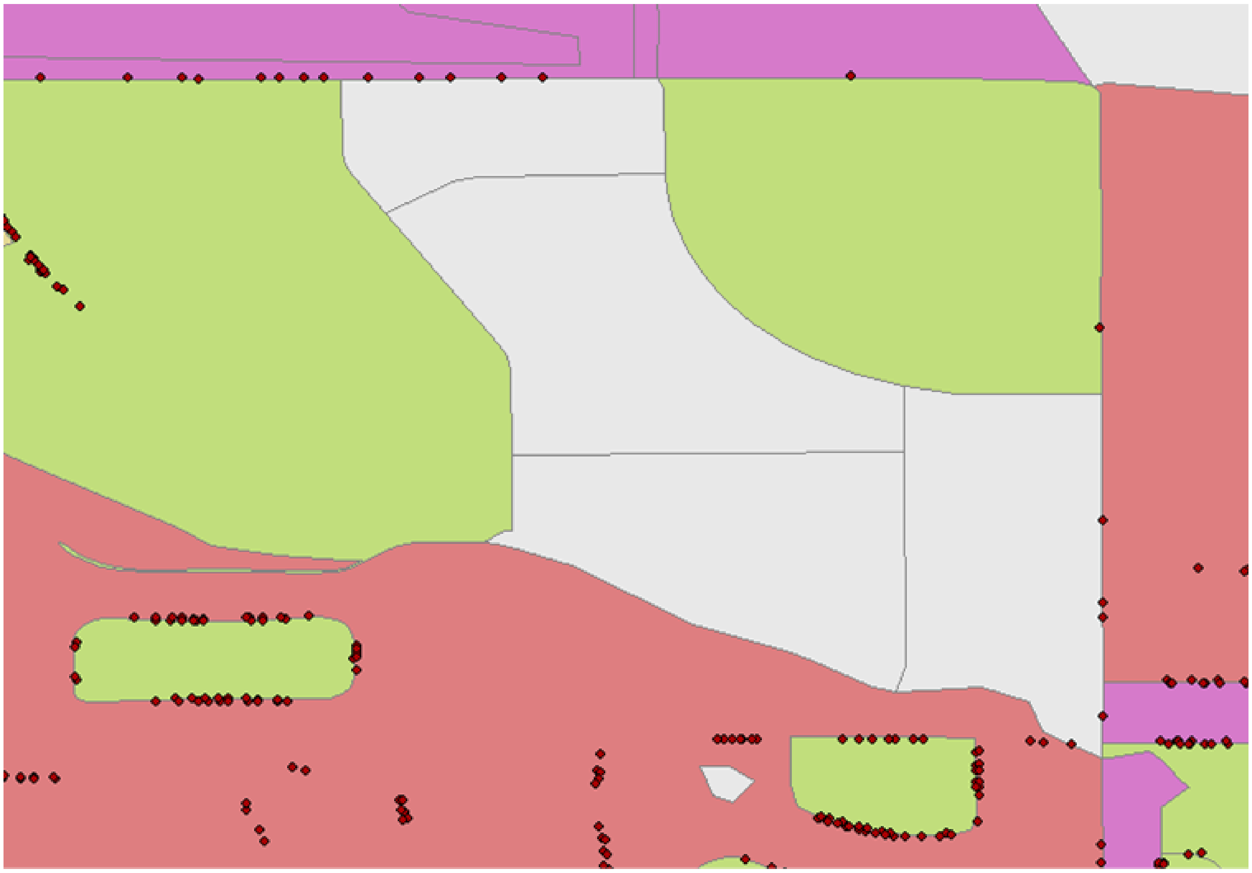


Figure 4-Block Coverage

For this reason, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas. Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate – specifically in areas where the coverage is attributed.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

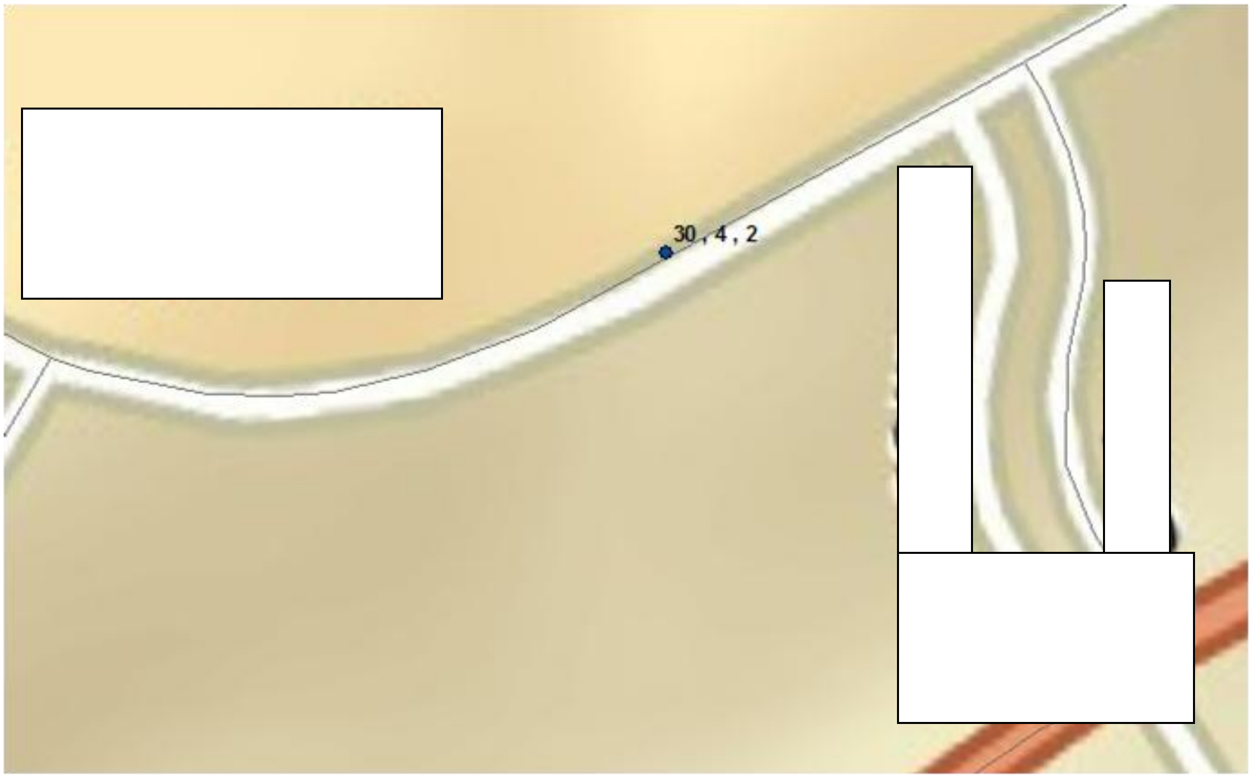


Figure 5-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a situation comparable to customer point level submission in that we have most of the network footprint captured.

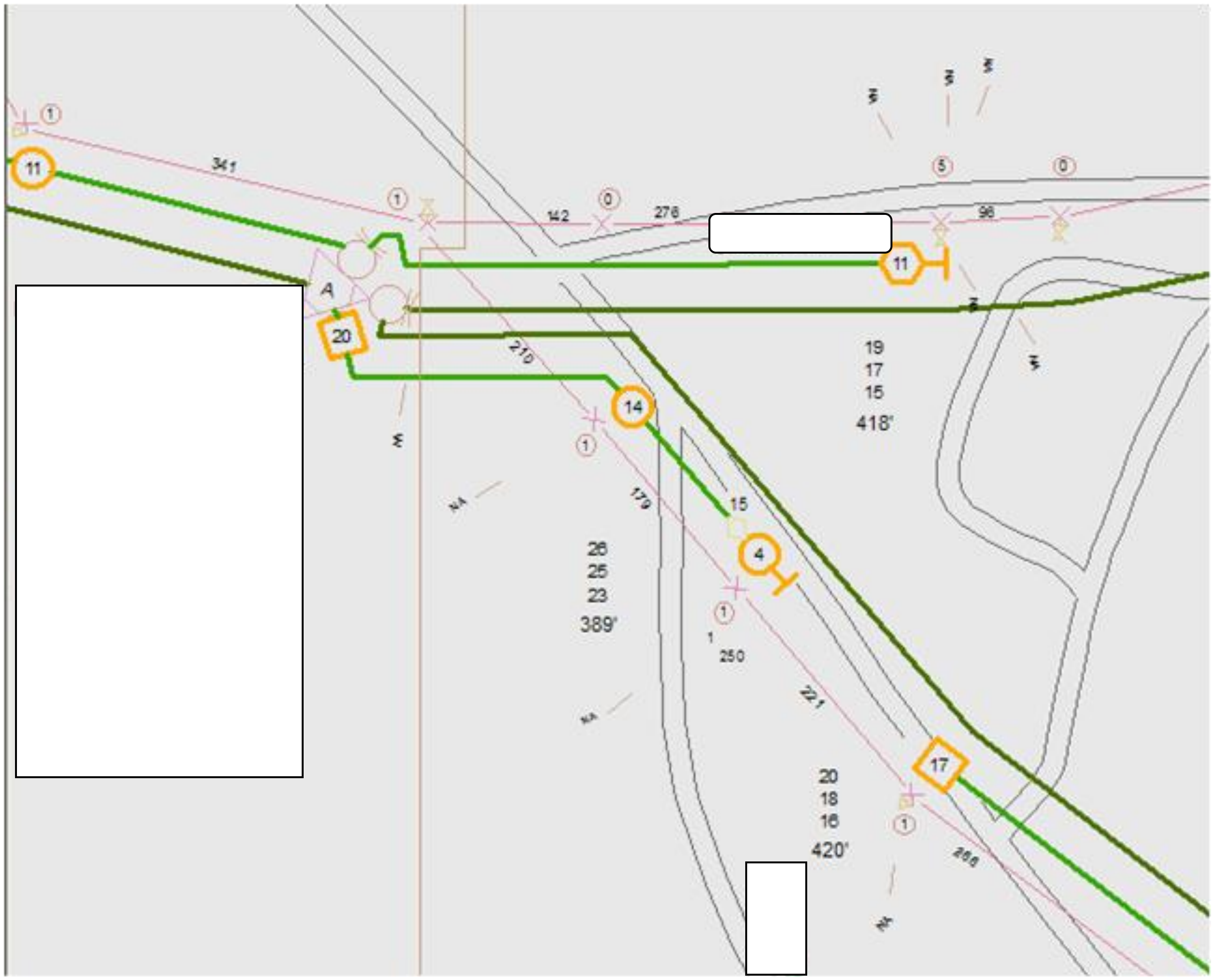


Figure 6-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our team had geo-registered the image into an approximate position. In this case, the boundary streets

were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

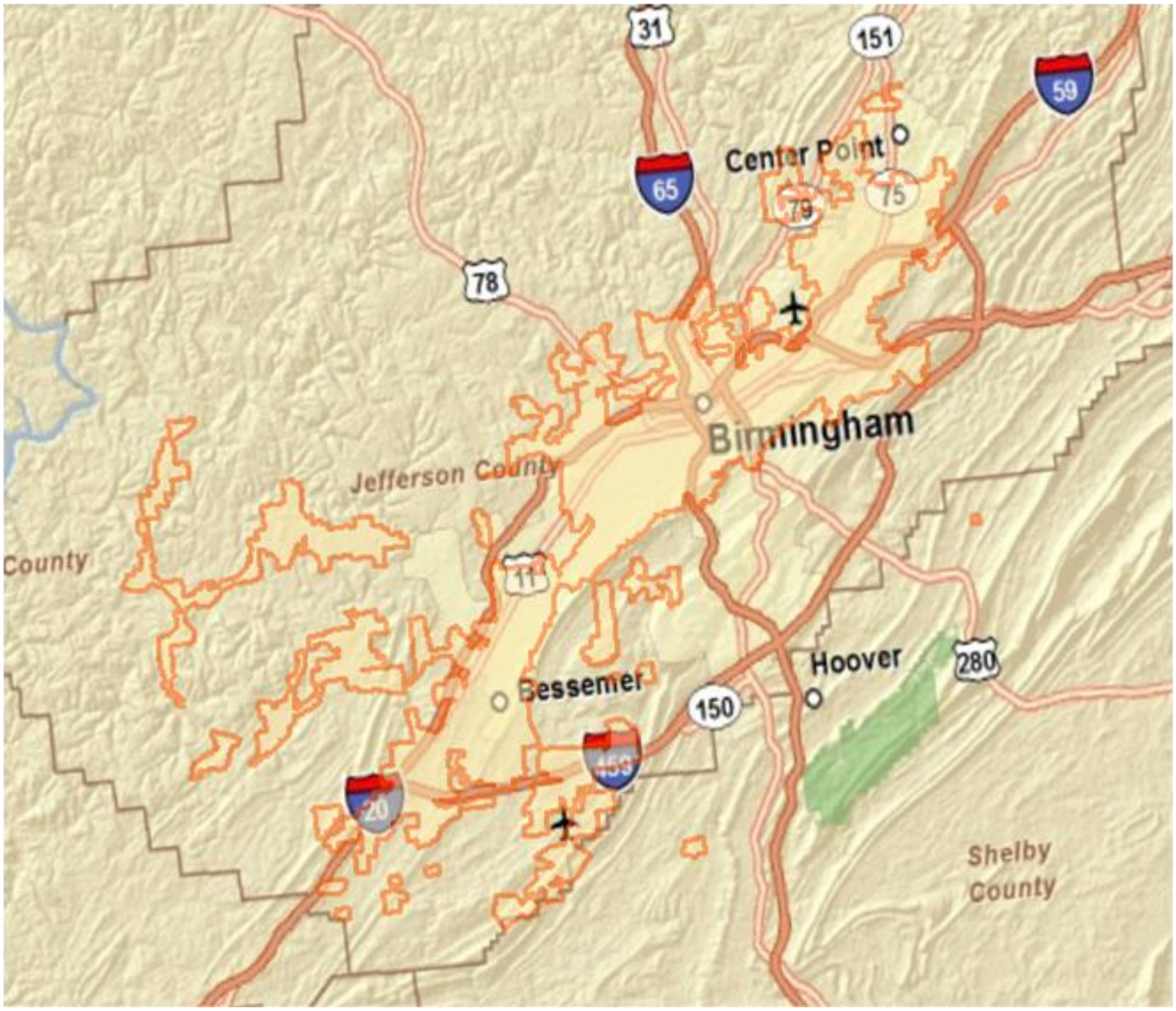


Figure 7-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with a provider to derive service areas based upon point plant data. In these cases we were given a primary serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

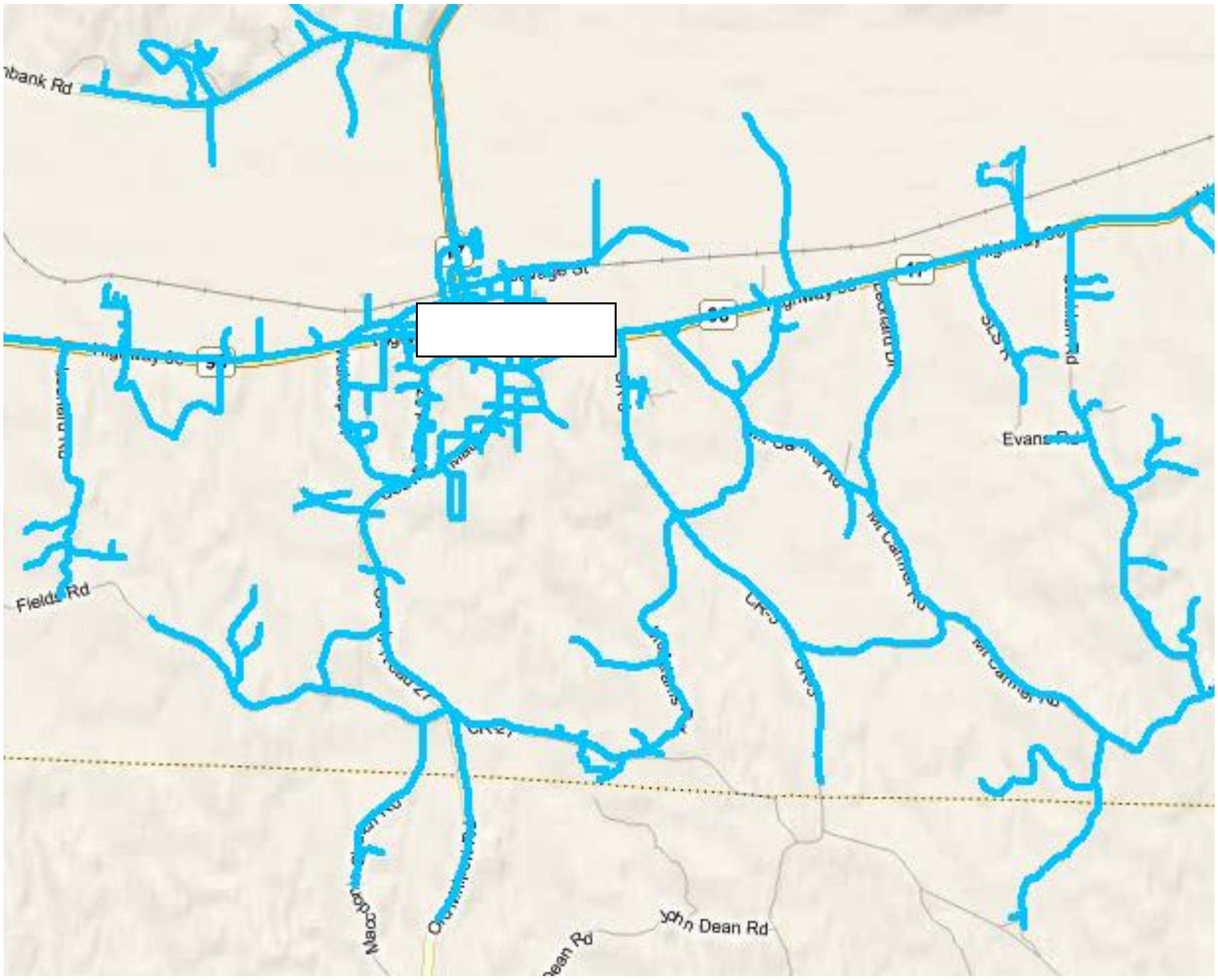
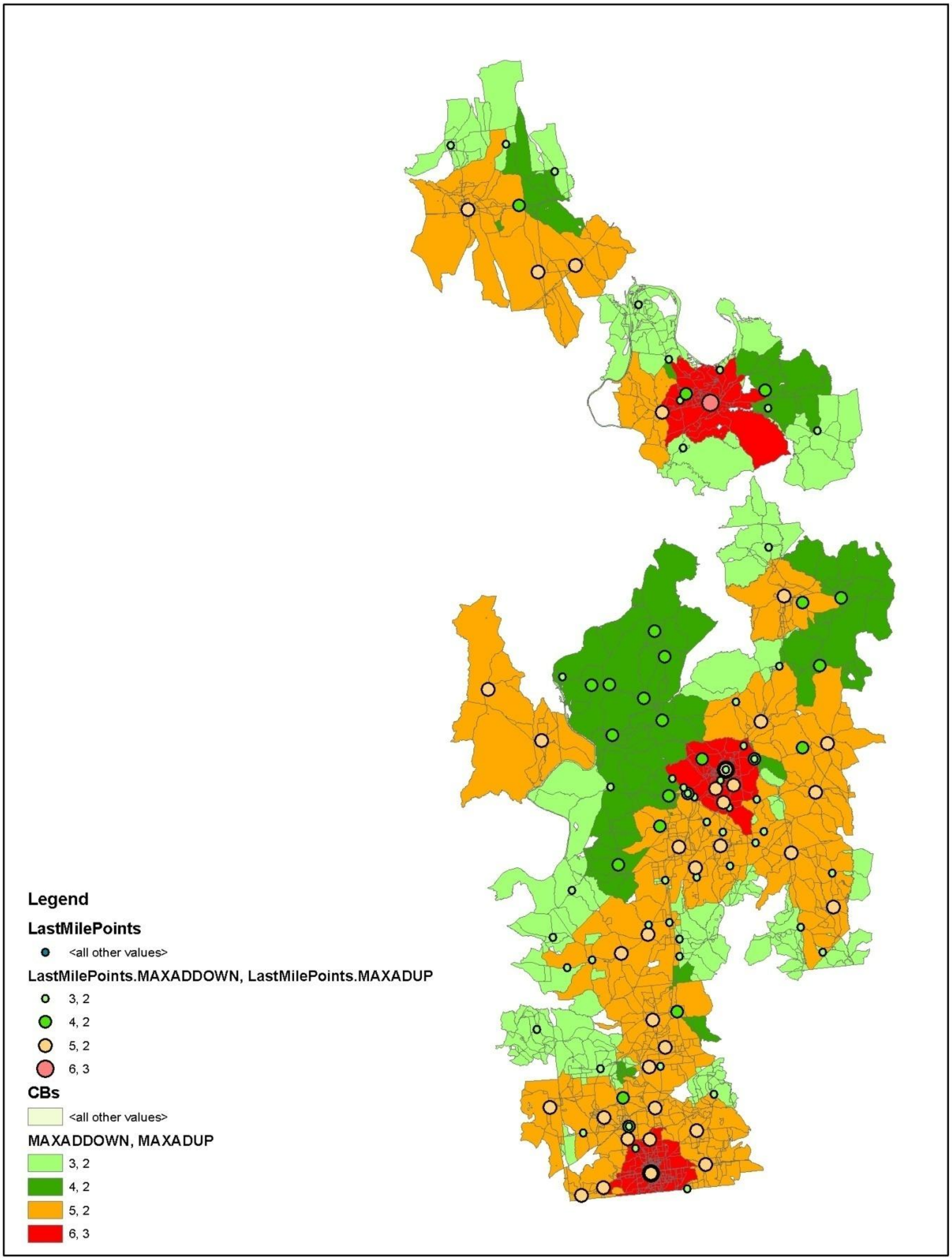


Figure 8-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In Rounds 2 and 3 -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[12]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[12]Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level below a Block and did not get picked up within a spatial query).

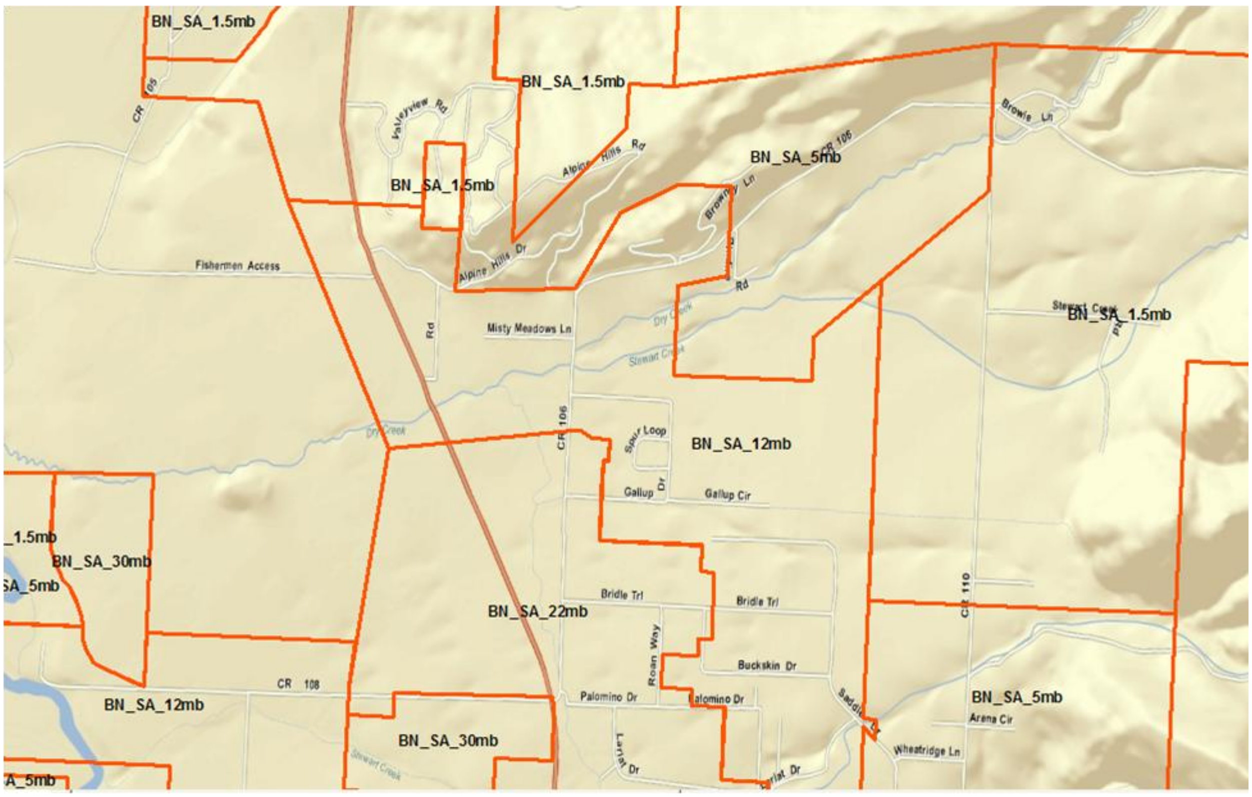


Figure 9-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without.
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[13]

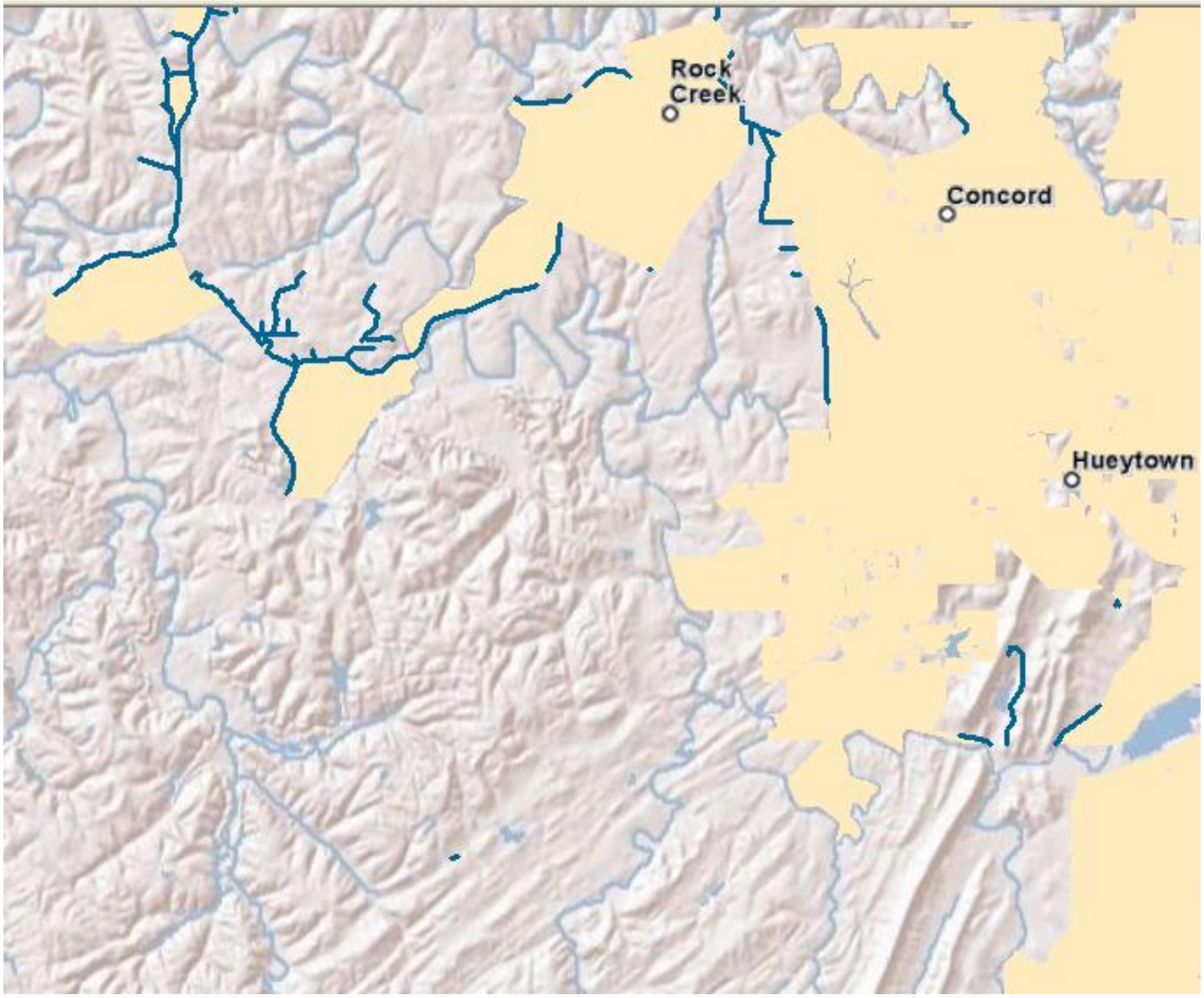


Figure 10-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2009 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[13] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

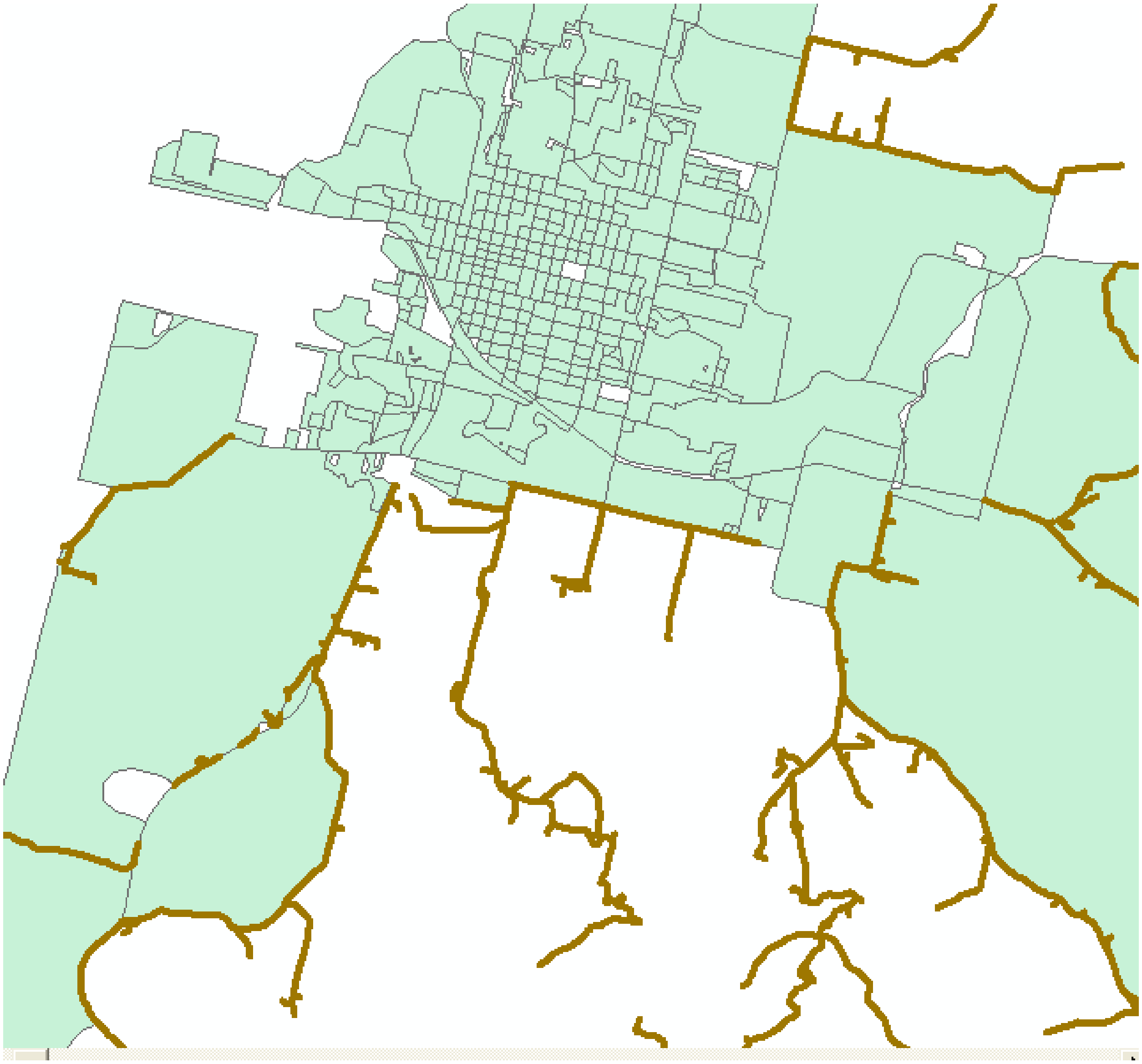


Figure 11-Provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

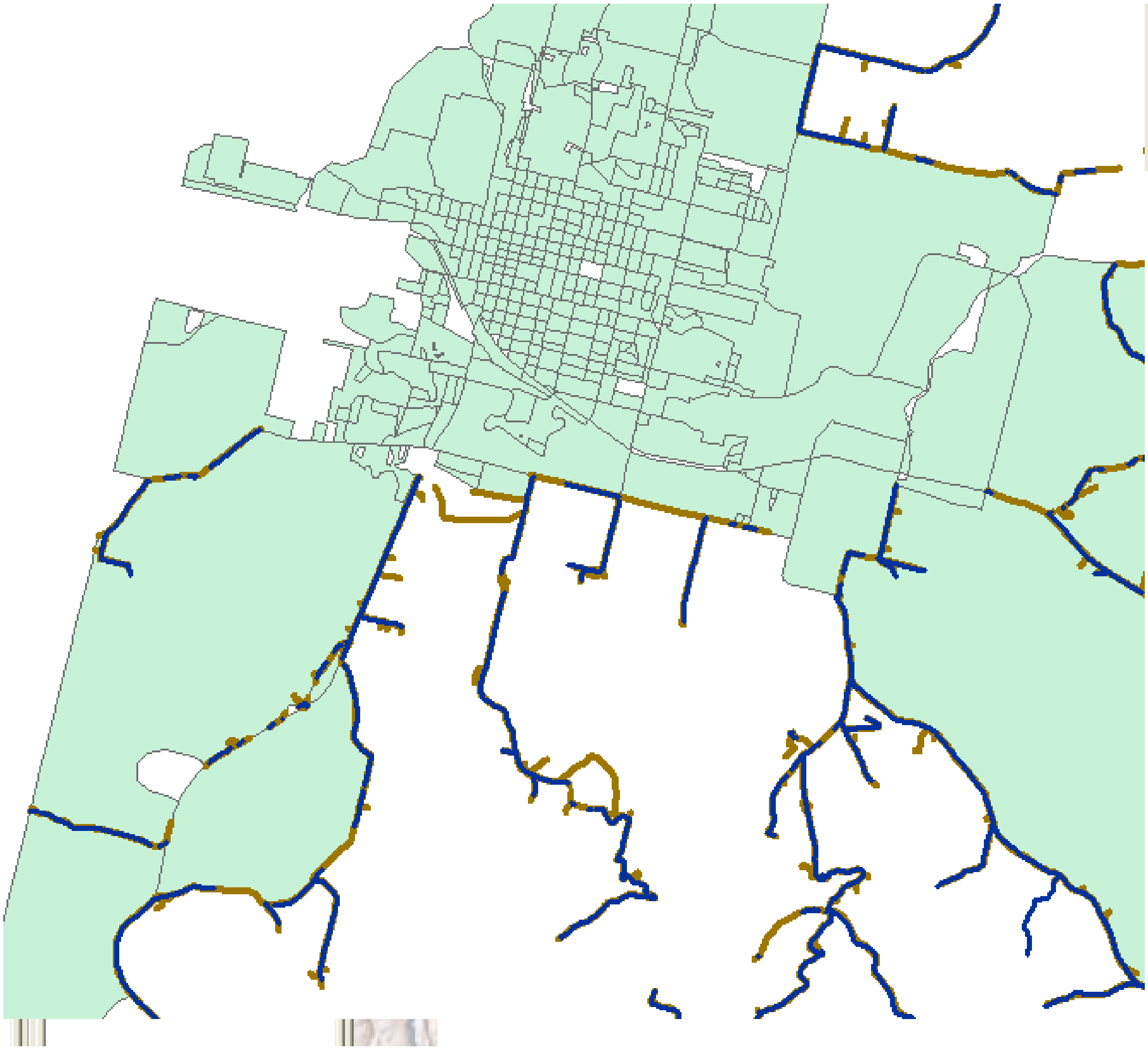


Figure 12-Provider submitted segments in gold, selected TIGER 2009 in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2009 road segments (MTFCC like 'S%') that face (CB = CBLeft2000 or CB = CBRight2000) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGERroads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by ProviderID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[14]

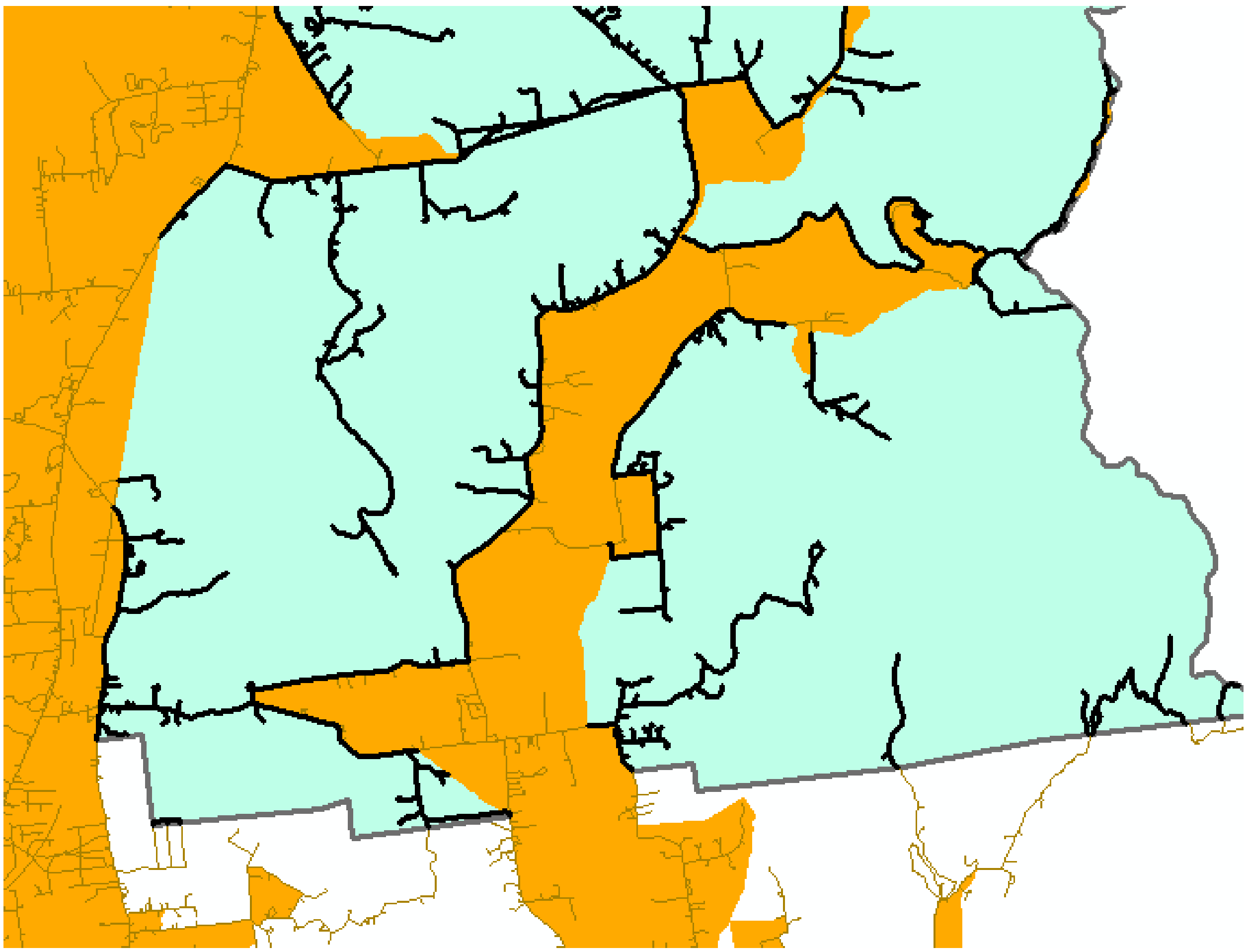


Figure 13-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[15]

[14] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

In this submission LinkAMERICA made an aggressive effort to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 3 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[15] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we have hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBDD formats. Some of our WISP submissions have taken over 12 hours to normalize into SBDD formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[16]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

[16] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information. From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned.

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[17] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[18]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to scrape coverage maps. When these maps were available, we georeferenced them and tried to use the outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[19]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't

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[17] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[18] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

[19] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[20]

In circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBDD planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we

[20] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations.

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that has strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBDD planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaging in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Further, the team continues to rely on the notion of Internet Intensity Zones. As the Broadband coverage information is developed, if we do not have definitive connectivity information from other sources (e.g. a phone survey, web survey, listing provided by a facility owner) in this study, those Anchor points that fall into an existing area of SBDD Broadband coverage will not be left out or submitted with NULL values. Rather, the adjacent coverage area will be the first estimate of Broadband coverage for

the facility. The use of an estimate allows the site to come into the analysis and learn a bit about the accessibility of that facility, but it also frees resources to examine those anchor points that are more dispersed and likely under/un-served. The team will conduct targeted surveys to discover connectivity and, more importantly, applications in use at prioritized CAIs.[21]

We close this section with a figure that we hope reinforces our CAI process.

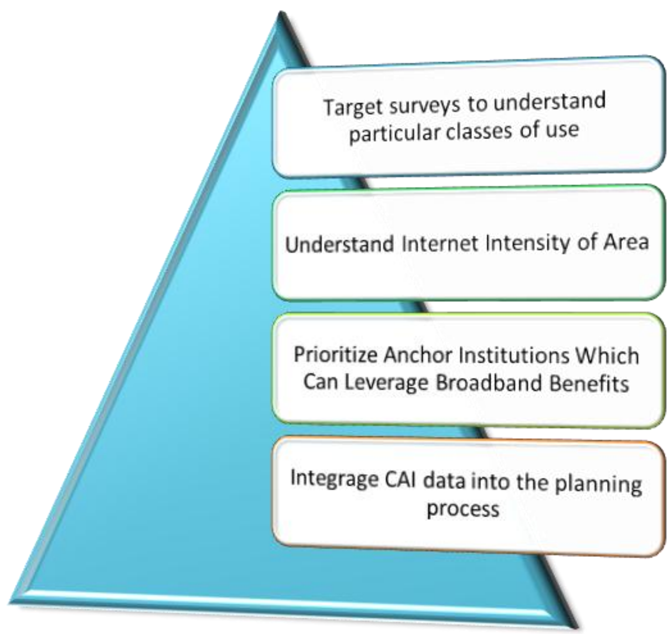

Figure 14-Anchor Institution Process

Recall from our first submission analysis, in most cases, CAI points are clustered and on average less than 1 ¾ miles away from one another. Relying on The First Law of Geography[22], this likely means that the Broadband accessibility is very comparable for CAIs that are close together. We believe this means Broadband accessibility may be less about connectivity than it is about the ability of a CAI to afford, successfully adopt and utilize Broadband to support its mission. Therefore, an important part of where SBDD mapping and planning come together understands what Broadband is used for, potential barriers to adoption, and how it is an essential component in a planning region's investment scenario.

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[21] We track internally those features with Broadband connectivity defined via an estimate but within the current transfer data model we lack a mechanism to propagate that information to NTIA. Appendix One expands upon our thoughts regarding a series of audit fields in the transfer database which would be helpful to inform downstream users regarding the source of data or use of estimates.

[22] http://en.wikipedia.org/wiki/Tobler's_first_law_of_geography. We are attaching connectivity based upon the highest speed wireline provider in that block. This provides a ceiling for what can be obtained, although the CAI may not be purchasing this level of service based upon needs, budget, mission, etc..

Anchor Institution Survey

During the third submission period we began a survey process to both verify received connectivity information and garner additional connectivity information from CAIs. As with WISPS we wanted to aggressively target and improve this data section.

The process began with the Round 2 CAI list. Again, we prioritized schools, libraries and healthcare institutions. A small team made outgoing phone calls to discover relevant contact names. In Wisconsin, we were able to gather about 150 email addresses based upon 440 calls. There were only 14 refusals.

While one team worked on improving the contact list, a second team designed and developed a simple online survey system called CAVS (Community Anchor Verification Survey).

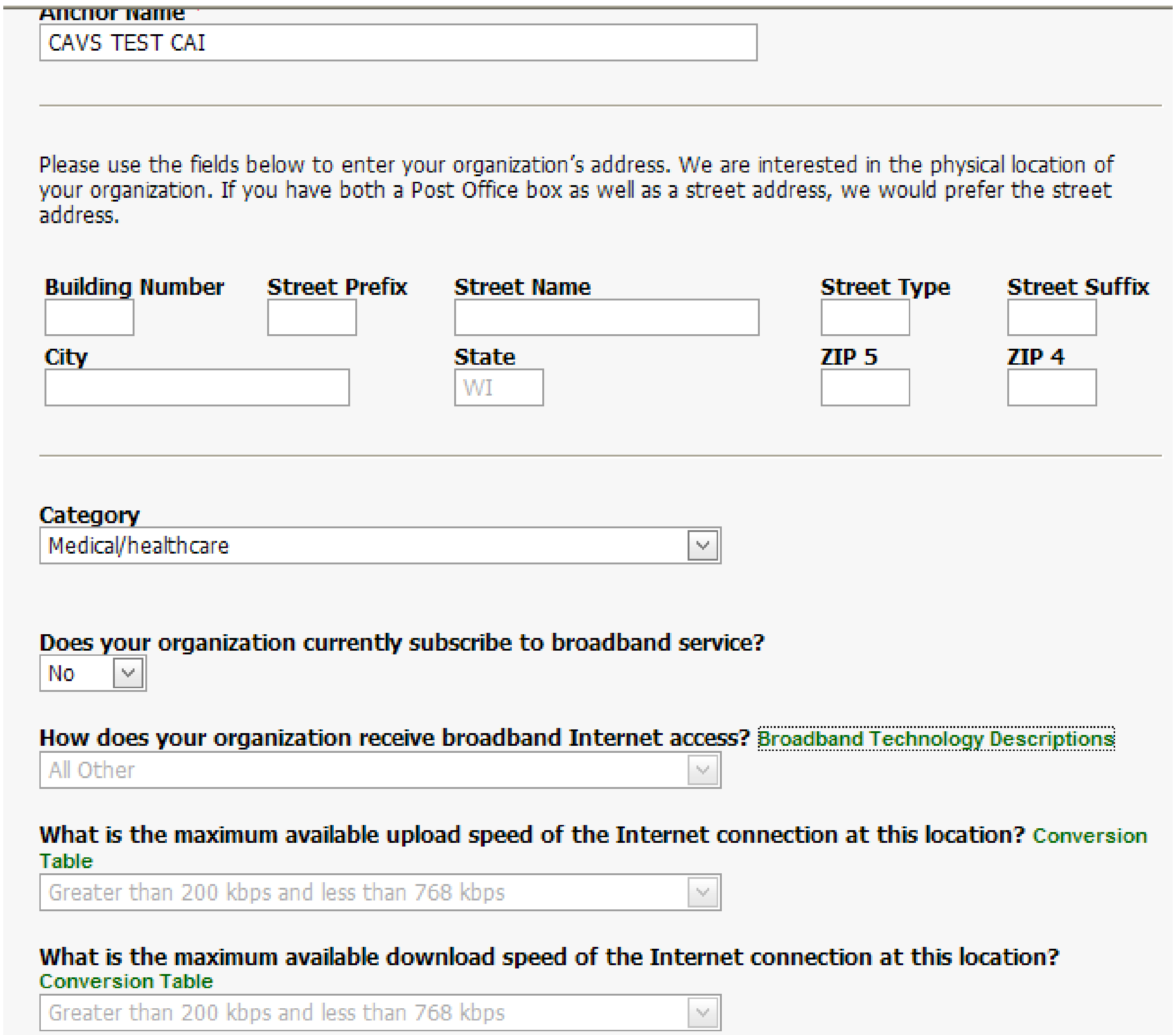

Figure 15--CAVS Screen

Users were invited into the CAVS system by the receipt of a postcard with an organization specific code printed on the mailing label. Beyond the questions shown above, there was a second page to the survey dealing with use of Broadband. Those results are directed to the planning teams.

The table below summarizes outgoing contact activities by state. This includes both a post card as well as for some organizations in which we had contact information a follow up phone call.

States	Post Card	Calls
WI*	2033	75
ID	1059	259
WY	345	30
AL	1640	14

As of 3/16, verification[23] statistics were as follows:

State	Verified / Total Records	Percent Verified
AL	72/2137	3.3%
ID	172/1596	10%
WI[24]	1187/3945	30%
WY	169/796	21%

We are keeping the survey open after the Round 3 submission to NTIA and will continue to collect data. In Alabama we have also begun to use resources from the planning teams to make outgoing calls and better target the surveys.

Clearly this survey was resource intensive but it did yield an increase in verified, rather than estimated, CAI data. We are unsure if we can sustain it in the next submission, but is has proven to yield new information.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

[23] We say a record is verified when it has been opened by the CAVS test user. It means at least one field was modified.

[24] In Wisconsin several large school districts supplied files with connectivity information; we performed a bulk update in these cases. We attribute it to the survey as the survey triggered this response.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submission, we are using public domain sources of information for public safety-category 4. The vast majority of these locations are estimated with respect to connectivity. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[25] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," but the bandwidth is estimated based upon the number of channels purchased. We also had difficulty obtaining both the upstream and downstream channel capacities. In large part, we made the speeds symmetrical, but this is an assumption on our part.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP code.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what it is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[26]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

[25] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

[26] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the question was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[27]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider_Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[28] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied

[27] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[28] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, Provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the Provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information. It also involves a validation with supplied speeds.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The

second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the "islands" of coverage isolated by significant distance from other covered areas. This is the opposite of the Internet Intensity Zone notion discussed in the Community Anchor Institution section. In other words, Broadband Internet likely doesn't exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

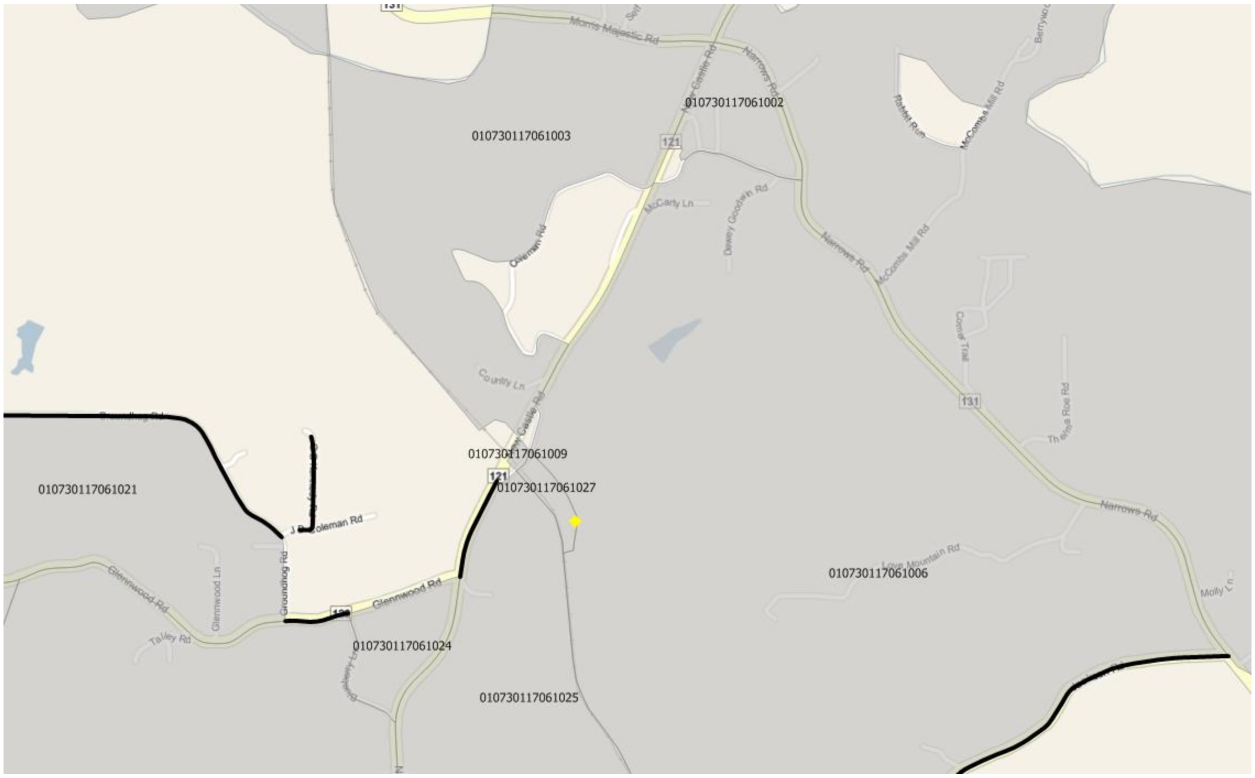

Figure 16--Sub block variation

Because the SBDD program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

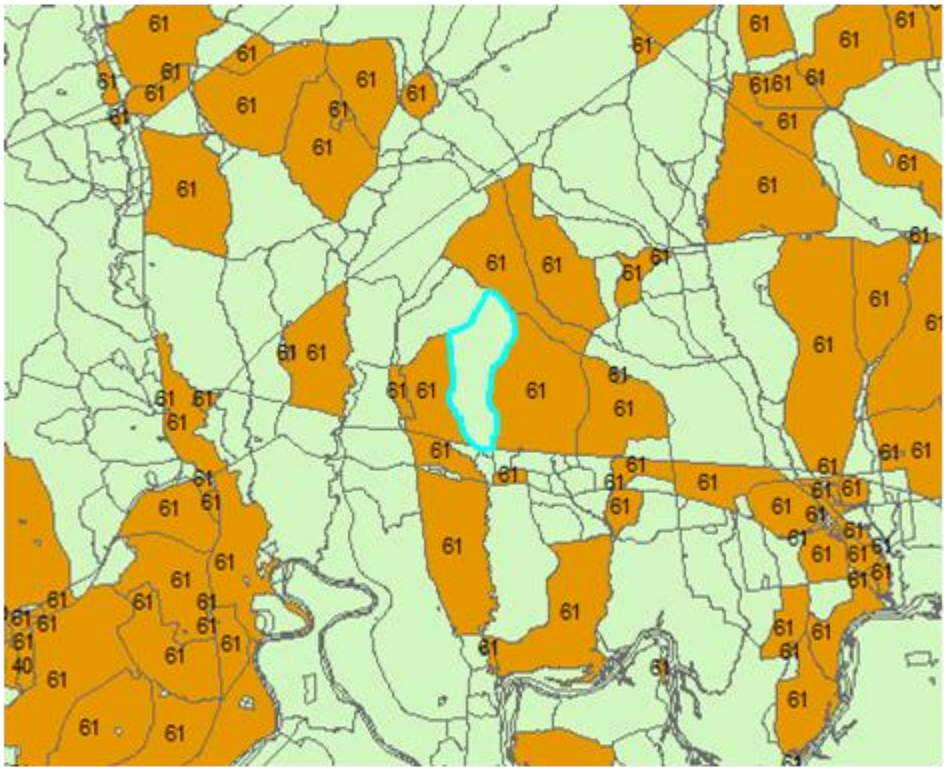

Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example, at a somewhat larger scale, shows where an interpolation process requires some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

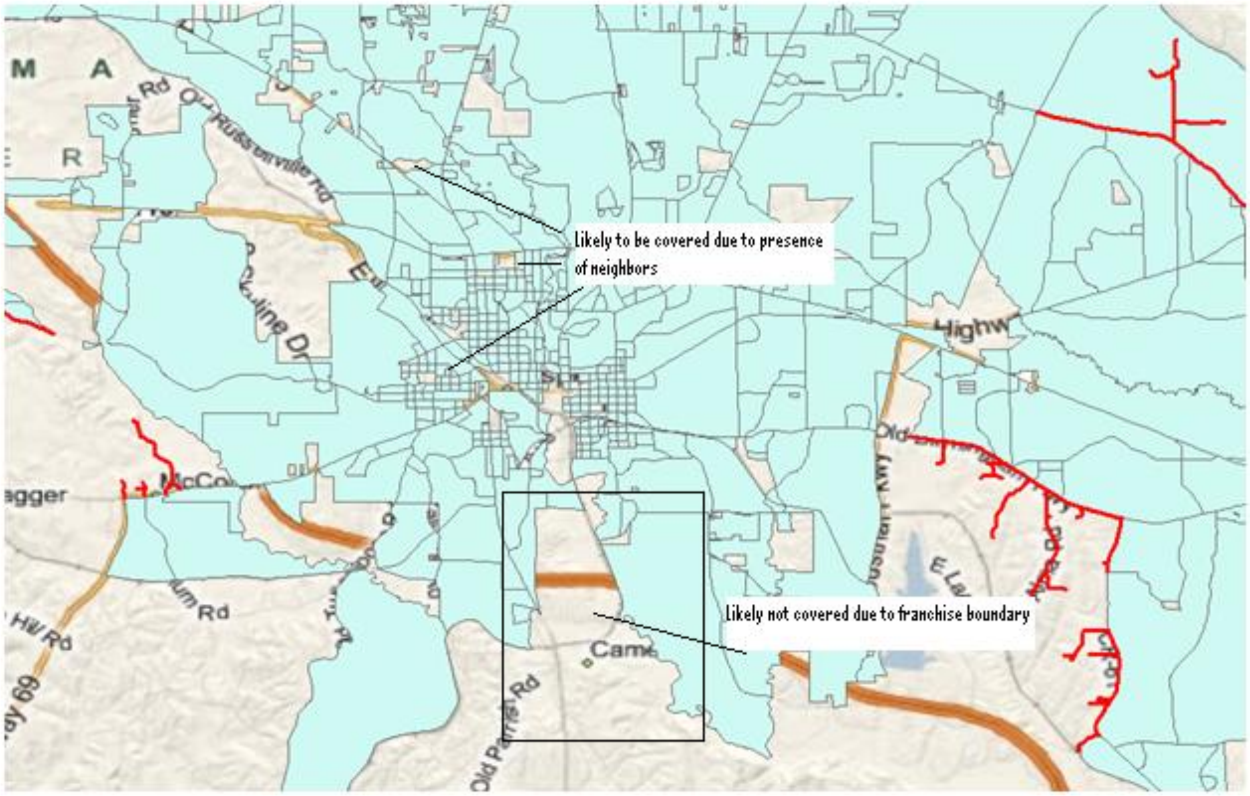

Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

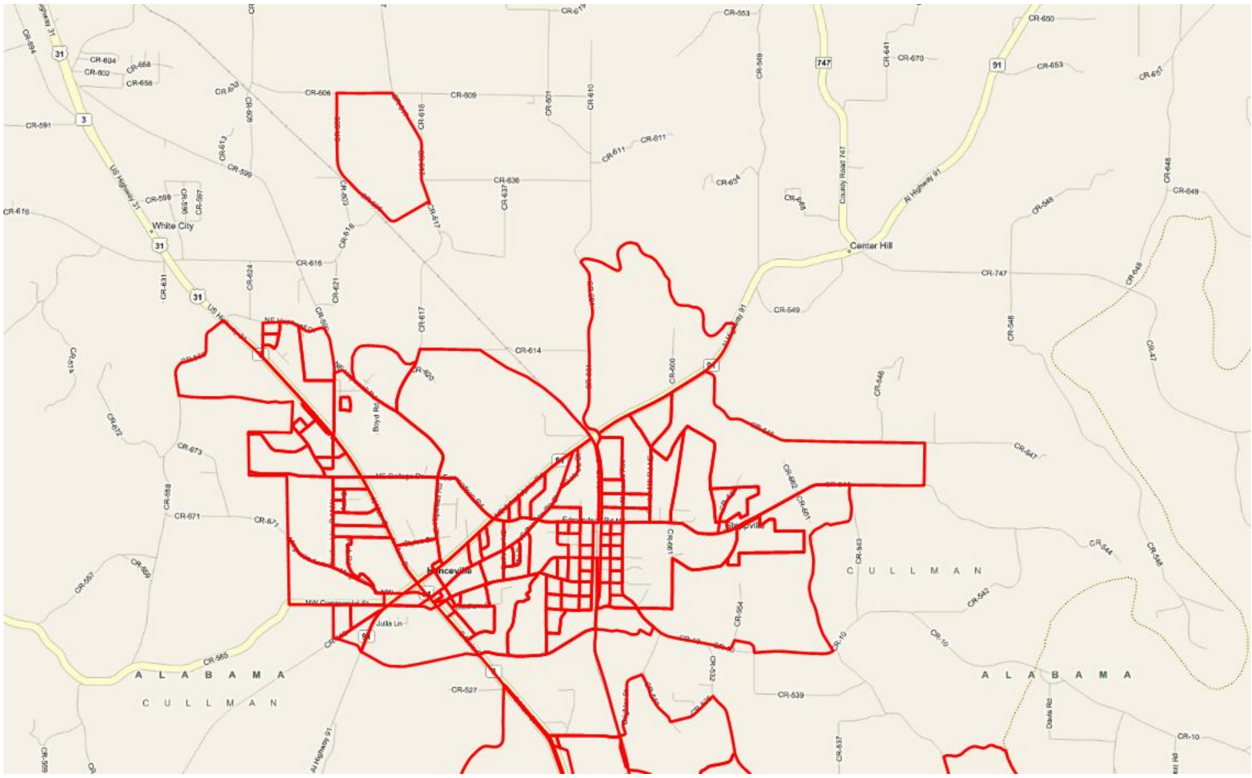

Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the second round, they received both a tabular data summary and a mapped output. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the April, 2011 Round 3 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from

this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

Now that our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBDD data model. As an example, consider the figure below.

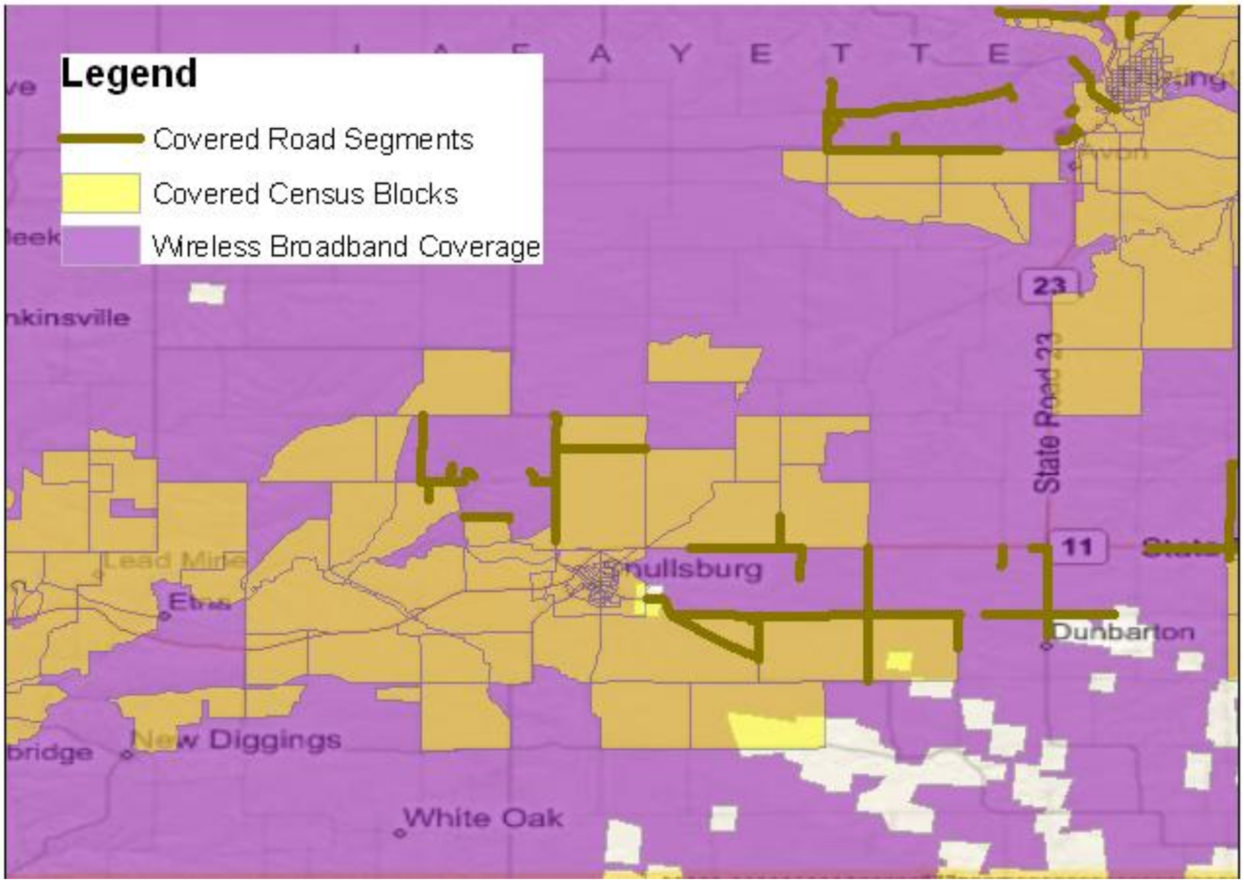

Figure 21--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of COLR Obligations

Wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300'. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

National Broadband Map Experiences

When the National Broadband Map launched, our phones began to ring.

Responding to a number of provider inquiries as well as emails from citizens provided some insights. It also illustrated that we now bear a second dimension of external verification. That is, we must be prepared to respond to people who are confused by apparent inconsistencies between the State and National Broadband Maps[29].

The case below, based upon a call we received, illustrates some interesting intersections between the State and NBM.

In this example a Citizen called inquiring about the difference in results between the National Broadband Map and our State of Alabama map. The issue in question was coverage at his home. The Alabama map showed he had coverage at his home, but the National Broadband Map said he did not.

In the image below, the green dot represents the geocoded location of his home. Based upon imagery, the geocode is quite accurate. The olive colored polygon represents a covered Census block less than or equal to 2.0 square miles. The Census block shows coverage by a number of wireline providers.

The geocoded point is about 170’ from this covered Census block.

[29] We have a similar concern regarding textual data extracts. We may translate our SBDD submission into covered Census Blocks in a way that is different from NTIA.

Figure 22-NBM Covered Census block example

In the next image, covered TIGER road segments are shown in green. It is important to note how far the TIGER road centerlines are from the actual roads in the subdivision. It appears the geocoded point is reflecting more recent and more accurate road centerlines, placing the green dot at the correct location. Since the SBDD data is submitted in terms of TIGER 2000 the road on our map shows up about 100-200 ft away from where that road is located today.

As mentioned previously, however, our online maps buffer road segments to 300 feet on either side of the road centerline. In this case then, our state map buffer is large enough to return valid service providers for this green dot. The NBM, on the other hand, does not appear to buffer segments or the edges of census Blocks and will not return providers for this location. Our intent in this example is not to criticize the national map; rather, it is to illustrate that we may inadvertently make trade-offs between false positives and false negatives, differently.

This case illustrates several important tensions between the data as we present it to NTIA, map it ourselves and because of how it may be viewed within NBM context. A lack of agreement on how to handle these inconsistencies in the source data and differences in mapping approaches may cause consumer confusion.

The issues seem to come down to this

a) How do you (or can you) handle the impact of time when roads move between TIGER versions or between TIGER and other road products? In this case, online map road traces will not show up in the right area.

b) Given the inconsistencies between TIGER geometry used in submission and underlying roadbases used for geocoding online, how do you (or should you) insulate the viewer from the inconsistencies. There appears to be a strong likelihood that TIGER judges a particular point to be in a larger than 2.00 sq mile Census block while that same location could be in a small block area in the online view.

c) How much tolerance should be introduced when returning a list of valid providers? Is it better to error on gathering too many providers or too few?

d) Since the NBM gathers feedback based upon its representation of coverage, how can/how should this crowd sourced feedback influence data presented in a different manner elsewhere?

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

Most carriers submitting Census level information provided 2000 Blocks. A few provided 2009 or alternative (TeleAtlas, possibly) Blocks. Especially with the need to derive segment geographies, we would prefer to message the providers a specific Census standard—but we'd like to be consistent with other Grantees so as to minimize work from the provider community. As of now, that standard is Census 2000. If NTIA anticipates using Census 2010 for Fall 2011 collection, it would be helpful to message that <u>as soon as possible.</u>

Also there seem to be several methods by which providers are calculating the area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband Providers not Meeting the NOFA "Provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband Provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[30]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how

[30] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the Provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband Provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[31]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn't forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn't a consistent method used to derive Broadband coverage. Some providers appear to be using a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data

[31] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the Provider_Type is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on Provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy of other base layers. Although we may be trading off absolute accuracy, our standard has been to conflate data to TIGER 2000 Blocks and TIGER 2009 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to December 31, 2010. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network

types (why is wireline down at the block when wireless is half the state, etc.). Finally we are also noting a significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to an anticipated geographic deliverable also increases the complexity of the effort.

Change Management Process

One thing that is becoming clear is that a change management process that is consistent between the data provider and NTIA is needed. In this light, publication of the current data transfer model beyond the PBWorks community would also be helpful. Many providers are designing their data extracts with the NOFA in mind and the NOFA structures have been supplemented in the current model.

Finally, it would be helpful, as early in the next cycle as possible, to know what Census Block vintage we are expected to deliver to NTIA. It would also be very helpful to maintain a stable geographic base for the next deliverable so that the basis of verification doesn't change.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.

5. In tables with mandatory Zip5 (Service Address), if the End_User_Zipcode was not available, we have inserted ‘00000’
6. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category.
7. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
8. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL).
9. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems.

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF ILLINOIS

Partnership for a Connected Illinois

broadbandillinois.org

April 2011

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COVER LETTER

April 2011

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1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

Please accept this submission from the Partnership for a Connected Illinois (PCI), the Designated Entity for Illinois.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications.

This cycle, PCI assumed full responsibility for the data-collection activities from broadband providers in the State. Assuming this role is vital to achieve the State's goals with regard to improving broadband access and adoption – and which are in turn central objectives of the Partnership for a Connected Illinois. All facets of this data-collection transition, and the activities that flowed from it, are included in the narrative that follows.

If you have any questions about this Data Narrative, please do not hesitate to contact me, at 217-816-4151.

Respectfully submitted,

Drew Clark
Executive Director
Partnership for a Connected Illinois, Inc.

THE TRANSITION IN ACTIVITIES FROM CONNECTED NATION TO PARTNERSHIP FOR A CONNECTED ILLINOIS

During the data submission cycle ending on April 1, 2011, the Partnership for a Connected Illinois (PCI) took major steps in its three-fold mission to collect and publish broadband data, to ensure broadband access throughout the State, and to maximize broadband's impact. This data narrative, of course, focuses on the data-collection and publication activities of PCI.

In these efforts, PCI assumed full responsibility for the data-collection activities from broadband providers in the State. Assuming this role is vital to achieve the State's goals with regard to improving broadband access and adoption – the other two core missions of PCI. In 2010, PCI had worked together with a subcontractor, Connected Nation, in performing this function for the data-collection cycles that ended on March 31, 2010, and on October 8, 2010. As part of the transition from Connected Nation to PCI, in 2011 PCI established its own Non-Disclosure Agreements (NDAs) with broadband providers for confidential information. PCI also collected updated information from providers throughout the State. The NDA used by PCI did not differ from the NDA used by Connected Nation. However, Connected Nation was not willing to provide PCI with the confidential information that Connected Nation collected on behalf of the Partnership for a Connected Illinois. Therefore, PCI had to obtain NDAs in its own name with providers.

However, our subcontractor Connected Nation did provide PCI with the non-confidential broadband provider information at the Census block level on November 30, 2010. As a result of obtaining this data, PCI undertook to re-build and re-launch the broadbandillinois.org web site. PCI did this in approximately six weeks' time, or on February 17, 2011. This consumer-friendly interface allows for residents of the State to intuitively access the information collected by PCI – and provides the ability to "crowdsource" the collection of price information, actual speed data, and to let consumers verify the data provided by broadband providers. Further information about the broadbandillinois.org web site will be discussed later in this data narrative.

PROVIDER OUTREACH BY PCI

Beginning on February 2, 2011, all providers were sent requests to reestablish a Non-Disclosure Agreement between PCI and the provider. Since PCI would now be collecting the data in-house without the assistance of Connected Nation, it was necessary to start this process from the beginning. Of the 164 providers included in the data package, PCI has managed to execute an NDA with 90 of these organizations during this two-month span. As part of the same request, every provider was asked whether or not they had new data, as of December 31, 2010, that they would be including in our April 1, 2011, submission. Similar requests were sent on February 16, March 2, and March 9. As providers responded, they were no longer included as part of these mass requests. Multiple phone calls were made to those providers who did not respond to the e-mail communications.

The entire process was tracked on Salesforce, PCI's project management tool. When an NDA was established with a provider, the date that NDA was established was recorded on Salesforce. A field in Salesforce was also populated as to whether or not the provider would be submitting new data for this Cycle 3 submission. If a provider responded with no change to the data, PCI removed priority from that provider and refocused attention on those providers who reported that there was a change to their data as of December 31, 2010. PCI wanted to establish the NDAs by focusing on those providers with new data to submit.

Of these 90 providers with whom PCI entered into an NDA , 33 also provided changes to their data in the form of new towers, speed changes, etc. Additionally, two new providers were added to the dataset: Cornbelt Communications and Wireless Data Net. Two other providers, Hughes Network Systems, LLC & WildBlue Communications, Inc. provided satellite data. That satellite information was not included as part of the geodatabase. A total of 37 providers established NDAs with Connected Nation for previous submissions and an additional 30 providers provided data to Connected Nation in a previous cycle of data submission. However, these providers were unresponsive to multiple attempts in February and March. These providers will receive much attention for the Cycle 4 submission by PCI. The table below summarizes the status of NDA's among providers included in this submission.

Total number of providers included in this submission	164
NDA executed with PCI in this cycle	90
NDA executed and data provided with Connected Nation in previous cycle, unresponsive in this cycle	37
Data acquired in previous cycles from Connected Nation without NDA, unresponsive in this cycle.	30
Provider reported no update to data, and no NDA was executed	5
New provider included for this submission	2

Throughout the month of March, the PCI data team formatted data as it was received. A cutoff date of March 21, 2011, was established for the acquisition of new data to include in this submission. A total of nine providers provided data after this date. That will be included in the next submission.

The table below summarizes the status of data among providers.

Total number of providers included in this submission	164
Data acquired in previous cycles from Connected Nation, unresponsive in this cycle.	67
Provider reported no update to coverage area.	53
Provider reported and provided an update to coverage area that was included in this cycle.	33
Provider reported and provided an update to coverage area after cutoff date for data included in this cycle.	9
Provider reported and provided satellite data. It was not submitted due to additional information being necessary to show where service is available in the State, rather than submitting the entire State boundary as serviceable area.	2

DATA ACQUISITION: ILLINOIS COMMUNITY ANCHOR INSTITUTIONS

PCI has established an ongoing procedure for gathering data on the physical location and broadband connectivity of Community Anchor Institutions (CAIs) in accordance with the data requirements of the SBDD NOFA Technical Appendix.

As with the October 8, 2010, submittal, PCI identified existing, centralized sources for CAI connectivity data. With the assistance of Southern Illinois University, PCI geocoded each submitted data point by using ESRI software and Google batch geocoding programs.

Both carrier and price information were requested, and the speed test became a required item for completion of the survey. For the CAI survey, we utilized the speed test(s) currently being administered on the Federal Communications Commission web site.

The total number of CAIs stands at 26,559. Notwithstanding this relatively high number, PCI has made an effort to refine the survey process to identify priority CAIs within each category, and to collect connectivity data for these locations.

As an example, of the 26,869 locations submitted in October, there were 14,000 Category 3 Healthcare locations which were geocoded, yet had no connectivity data. Many of these were for actual practitioners as opposed to clinics, or what might be considered institutions. PCI will reevaluate the necessity of including these in our Cycle 4 submission. While we have elected to include this larger number for the October filing, we have also identified 1,358 priority Healthcare locations, which include hospitals, clinics and other significant facilities.

Smaller adjustments in Categories 4 and 5 have resulted in a total of 12,051 CAI institutions within the PCI priority list.

Category 6 also requires some explanation. Data for the 1,449 Governmental locations had been submitted as a set of existing connectivity data with a 100% response rate. These numbers have been included again in the October filing. This data was provided by the Illinois Century Network in a previous round, and PCI has continued to include the ICN data in all subsequent submissions.

Category	Total Number of CAIs in March 2011	Connectivity Data Points in March 2011	% of CAIs with Connectivity Data in March 2011	Total Number of CAIs in October Submission	Connectivity Data Points in October 2010	% of CAIs with Connectivity Data in October 2010
School - K through 12	5,604	1,417	25.29%	5,651	1,165	20.62%
Library	1,444	713	49.38%	1,505	633	42.06%
Medical/healthcare	15,267	138	0.90%	15,358	96	0.63%
Public safety	2,339	433	18.12%	2,360	384	16.27%
University, college, other	266	111	29.47%	307	116	37.79%
Other community support - gov	1,449	1,449	100.00%	1,454	1,454	100.00%
Other community support - non-gov	230	27	11.74%	234	19	8.12%
Totals	26,599	4,288	16.12%	26,869	3,867	14.39%

Outreach for this submission included survey development, web site database research and teleconferences. Together with the Illinois Department of Commerce and Economic Opportunity (DCEO), we have engaged in a process of working with CAIs on an organized basis. Other state agencies and organizations have included the Illinois Commerce Commission, Illinois Board of Education, and the Illinois State Police. Additional Agencies and organizations have been referenced throughout this presentation.

PCI has worked with a number of organizations in gathering data for the October submission in addition to those already identified in the March filing. We are encouraged that relationships with these organizations will continue to develop and facilitate our electronic data collection efforts in future filings. These organizations are listed below:

K-12	Illinois Association of Regional School Superintendents, Illinois State Board of Education
Libraries	Illinois Library Association
Healthcare	Illinois Critical Access Hospital Network, Illinois Rural HealthNet, Illinois Healthcare Association
Public Safety	Existing Database
Colleges & Universities	Illinois Community Colleges Board
Other Government	Existing Database
Other Non-Government	Man-Tra-Con

For Category 1, K-12, we have been working with Gil Morrison of the Illinois Association of Regional School Superintendents. A cover letter and link was sent to each of the Regional Superintendents with instructions to disseminate to the Technical Director for each their respective School Districts. From there, the Technical Director distributed the survey to each school location. PCI also worked with Kathy Barnhart of the Illinois State Board of Education in distributing the survey. Kathy distributed the survey to the fifteen Learning Technology Centers in the State of Illinois who then distributed the survey to the various school districts.

PCI had an existing database of email contacts for Category 2, Libraries in Illinois. We worked with the Illinois Library Association and found that generally the libraries were receptive to taking the survey, given need for broadband in the library sciences.

In Category 3, Healthcare, PCI worked with Pat Schou of the Illinois Critical Access Hospital Network and Alan Kraus of the Illinois Rural Health Network. Both organizations were referenced in our cover letter, and the survey was sent from PCI's email database. David Voepel, of the Illinois Health Care Association, also assisted in distributing the survey to Category 3 institutions which included long-term care facilities, nursing homes, and rehab facilities. The data that has been acquired through these two methods have been added to the database of community anchor institution data included in this submission.

For Category 4, Public Safety, surveys were also sent via the PCI database. As with the Libraries, the response from this category was favorable.

PCI worked with Elaine Johnson at the Illinois Community Colleges Board for Category 5, Universities and Colleges. A cover letter and link was sent to over 40 Community Colleges, with a very positive response. The remaining Category 5 surveys we sent via email.

For Category 6, Community Support-Government, the survey was distributed electronically via PCI's existing database.

For Category 7, Community Support-Non Government, PCI worked with Kathy Lively at Man-Tra-Con to disseminate the survey to Illinois WorkNet Centers. The remaining surveys were sent via our exiting email database.

In addition to the web sites included in our March submission, PCI utilized the following web sites to assemble relevant datasets:

Illinois High School Association	Illinois State Police
Illinois Elementary School Association	911 Fire Police Medical Web
Illinois Sheriffs' Association	Illinois Workforce Partnership
National Public Safety Information Bureau	American Hospital Association
National Center for Education Statistics	United States Fires Administration

Working with both organizations and regional outreach initiatives, PCI considers its CAI electronic survey effort to be a process of continually improving our existing database, methodology, and results obtained. Our goal is to collect and display CAI broadband data most relevant to the needs of Illinois residents.

SBDD Data Transfer Model Methodology

The submission of the broadband dataset for April 1, 2011 is contained within the SBDD Data Transfer Model. PCI has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion.

Broadband service providers submitted coverage in terms of the areas that they served, either in direct geospatial formats, CAD files, or as paper maps. The submitted polygons were overlaid on the census block polygons and those blocks touching were selected and used. The proper speed tier categories were assigned as necessary. The carriers who submitted in this fashion has consistent speed categories over these blocks so further segmentation was not required.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Illinois.

Inventory of Deliverables, Partnership for a Connected Illinois: April 1, 2011:

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address

Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

The provider data collected by PCI on behalf of the State of Illinois have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments. Wireless availability is contained as polygons of coverage areas. Middle-mile connections and community anchor institutions are contained as point data. The subscriber weighted nominal speed (if available) is contained within the overview feature class. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

All carrier coverage data that was unchanged since the October 8, 2010, submission was validated by Connected Nation using the validation methods below.

ILLINOIS FIELD VALIDATION NARRATIVE (CONNECTED NATION)

John Determan (Sr. WiMAX Engineering Consultant), Layne Wagner (Technical Engineering Analyst) and Chip Spann (Director of Engineering and Technical Services) were tasked with field verification and data validation for some of the 166 viable broadband providers that contributed data to the Partnership for a Connected Illinois broadband inventory map. After analyzing the mix (40 ILECs, 20 cable modem providers, 12 FTTx providers, 97 fixed wireless operators, 32 backhaul providers and 6 mobile wireless companies), 13 broadband providers were randomly selected for field validation activities. Upon the conclusion of testing at 28 test locations, the current data validation completion rate of 7.83% was achieved through July 28, 2010.

The results of the testing techniques affirmed that (i) 100% spectrum frequencies (as tested by an Avcom PSA-37XP spectrum analyzer) were accurate; (ii) 96.4% of the physical coordinates (tested using either a GPS enabled version of Microsoft Streets & Trips or a Garmin eTrex Summit GPS unit) were correct and, in cases where a discrepancy was discovered, they were presented to the appropriate provider and further verified/validated by the provider; and (iii) 100% of the mobile broadband speeds tested achieved the criteria as established for broadband (minimum of 768 kbps X 200 kbps). Mobile testing was conducted using a 3G smart phone and/or a 3G aircard.

As part of its verification testing, Connected Nation regularly completes random spectrum analysis studies throughout the state, cross-references antenna structure registration numbers and federal registration numbers against Federal Communications Commission databases, and strives not only to personally meet with participating broadband providers but to encourage them (whenever possible) to accompany Connected Nation engineers on these randomly selected test locations.

To date, these tests have included in-field validation for AT&T Mobility, Illinois Valley Cellular, XO – Nextlink, Clearwire, KeyOn Wireless, Heartland, Egyptian Telephone, Banicon, Comcast, Geneseo, Volo Broadband, SparkPlug Wireless and Cellular Properties. The compilation of tests on these companies covers fixed and mobile wireless, WiMAX, backhaul, DSL, and cable modem technologies representing a cross-cut from all applicable technology platforms (excluding satellite and broadband over power line).

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION (CONNECTED NATION)

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated to a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

WIRELESS METHODOLOGY

In addition to the wireless approach deployed in 2010, for this cycle, many fixed wireless providers allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive coverage areas. With the provided tower information, professionally prepared radio frequency coverage studies were conducted and converted to shape file format. These studies have proven to be very accurate and represent service areas where the maximum advertised speeds can be delivered. These studies take in to account full consideration for terrain and tree clutter data.

We do note two interesting trends in the wireless data. First, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services and still be able to deliver the maximum advertised speeds.

METADATA

Metadata, which literally means data about data, represent PCI's attempt to document procedures, coding, and overall methodology used in managing broadband supply data. Both short and long terms goals of developing PCI's metadata are to improve communication on Geographic Information Systems (GIS) data management issues for both internal and external partners. PCI's metadata is organized and structured around Federal Geographic Data Committee (FGDC) standards associated with key information impacting the following issues:

- What GIS data layers are managed by an organization?
- How is data coded or classified in assisting outside partners or organization use the GIS data developed?
- When was the data developed and how often is it updated?
- Who developed the data layers and who should be contacted if anyone has questions?

The net result of developing PCI's metadata connects to the idea of communication and standards. When applied correctly over time PCI's metadata will assist in educating other users on essential questions needed when applying GIS data. In addition, it will assist PCI internally as metadata will help the organization identify and document critical developing issues shaping data development. Any new employee or organization will be pointed to metadata files when asking questions relating to methodology, attribute codes, dates of data edits or updates, and follow-up contact information within PCI's data team.

METHODOLOGY FOR THE BROADBANDILLINOIS.ORG WEB SITE

As mentioned above, on February 17, 2011, the Partnership for a Connected Illinois launched its new web site, featuring an easy graphical interface for accessing PCI data about broadband providers with a single mouse click or touch on a smart phone. In this first, initial version, the web site offers a broadband location finder with detailed service provider information and assessments of internet speeds, as well as locations of community broadband providers.

Clicking on the home page map opens a side panel with broadband providers. Expanded results also show the libraries, schools, and public building in the area with broadband. As the State-designated entity under the NTIA's State Broadband Data and Development, PCI provides, on http://broadbandillinois.org, the same data that it submits to the NTIA for inclusion in the national broadband map. Additionally, PCI has begun to collect actual speed and price information, using the new web site.

PCI built the web site is built around open and transparent data-sharing tools. As with the national broadband map, PCI aims to encourages user feedback as a means of helping to improve and promote broadband in Illinois. For example, the site's "Get It" section encourages citizens to get involved with Broadband Illinois eTeams. These community leadership groups are working to help connect rural residents and others throughout Illinois. The site's "Use It" is beginning to assemble materials that pertain to broadband adoption.

THE APPLICATION PROGRAMMING INTERFACE FOR BROADBAND ILLINOIS DATA

PCI's web site is built around an open source Application Program Interface. This free tool allows software developers to build upon, and add to, the data on http://broadbandillinois.org. Below is the documentation for the PCI's API, which is available at http://developer.broadbandillinois.org.

Using Your API Key
http://developer.broadbandillinois.org/providers.xml?api_key=XXX&param1=value1…

Download documentation as XML file:
http://developer.broadbandillinois.org/docs.xml

API Query: Provider Query

Input
URL: http://developer.broadbandillinois.org/providers.xml

Input Parameters

Parameter Name	Parameter Type	Description
api_key	string	The API key of the user requesting the data. Must match an existing API key of an approved, active user.
area_key	string	For a known area search, the specific area being searched. This must be used in conjunction with an area_kind parameter. Each area_kind has a different requirement for specification.

Parameter Name	Parameter Type	Description
		• congressional_district The two digit district number (include leading zero, like "07") • county The three digit county FIPS number (with leading zeroes, ie Cook County is "031") • county_subdivision The five digit COUSUBFP number (Chicago is 14000) • tract The four or six digit tract number • block_group Two digit state code + three digit county code + four or six digit tract code + one digit block group number • zip_code The 5 digit zip code
area_kind	string	For a known area search, the type of area being searched. Must be used in conjunction with the area_key parameter. • congressional_district A congressional district (2000 boundaries) • county County • county_subdivision A subdivision of a county • tract A US census tract • block_group A US census block group • zip_code A Postal Service Zip Code
lat	float	Latitude of the query. Must be used in conjunction with lon.
lon	float	Longitude of the query. Must be used in conjunction with lat.
radius	float	Radius of the area being searched, in meters. This parameter is optional, if not set, the value 0.1 will be used. This parameter is only valid in a lat/lon query.
wkt	string	A WKT (Well Known Text) Polygon or Multipolygon in projection 4326 that will act as the boundary for the search.

Response

<providers>
<provider>
.....
</provider>
</providers>

Field Name	Field Type	Source	Description
blockid	integer	Broadband	Identifier for the census block containing the search point. The 2000 census data is used.
blocksubgr	integer	Broadband	Identifier for the census block subgroup containing the search point. If there is no subgroup, the value will be "nil".
county_name	string	Broadband	The name of the county containing the search point.
countyfips	integer	Broadband	The FIPS identifier for the county containing the search point.
dbaname	string	Broadband, Wireless	The provider's Doing Business As (DBA) legal designation.
frn	string	Broadband, Wireless	FCC Registration Number of the provider.
fullfipsid	integer	Broadband	The full FIPS id containing the searchpoint, containing the state, county, tract, and block ids, in that order, for example: 170010001001007, made up of statefips: 17, countyfips: 001, tract: 000100, and block: 007.
max_speed_down	string	Broadband, Wireless	The text value corresponding to maxadown.
max_speed_up	string	Broadband, Wireless	The text value corresponding to the maxadup code.
maxaddown	integer	Broadband, Wireless	A code representing the maximum download speed of the connection. • 1 Less than or equal to 200 kbps. • 2 Greater than 200 kbps and less than 768 kbps.

Field Name	Field Type	Source	Description
			• 3 Greater than or equal to 768 kbps and less than 1.5 mbps. • 4 Greater than or equal to 1.5 mbps and less than 3 mbps. • 5 Greater than or equal to 3 mbps and less than 6 mbps • 6 Greater than or equal to 6 mbps and less than 10 mbps. • 7 Greater than or equal to 10 mbps and less than 25 mbps. • 8 Greater than or equal to 25 mbps and less than 50 mbps. • 9 Greater than or equal to 50 mbps and less than 100 mbps. • 10 Greater than or equal to 100 mbps and less than 1 gbps. • 11 Greater than or equal to 1 gbps.
maxadup	integer	Broadband, Wireless	A code representing the maximum upload speed of the connection. See "maxadown" for the list of possible values.
provname	string	Broadband, Wireless	The name of the provider.
reseller	boolean	Broadband	Field value is 1 if the provider is a reseller, 0 if it is not.
spectrum	integer	Wireless	A code for the wireless spectrum used by the provider. • 1 Cellular spectrum (824-849 MHz; 869-894) used

Field Name	Field Type	Source	Description
			to provide service • 2 700 MHz spectrum (698-758 MHz; 775-788 MHz; 775-788 MHz) used to provide service • 3 Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995) used to provide service • 4 Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service • 5 Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service • 6 Unlicensed (including broadcast television \"white spaces\") spectrum used to provide service • 7 Specialized Mobile Radio Service (SMR) (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz) • 8 Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz), 3650-3700 MHz • 9 Satellite (L-band, Big LEO, Little LEO, 2 GHz) • -9 Unknown
spectrum_name	string	Wireless	The text description of the spectrum code for this provider.

Field Name	Field Type	Source	Description
state_abbr	string	Broadband, Wireless	The postal abbreviation of the state containing the search point.
state_name	string	Broadband, Wireless	The name of the state containing the search point.
statefips	integer	Broadband, Wireless	FIPS identifier for the state containing the search point.
the_geom	WKT String	Broadband	The geomentric data for this provider, in WKT string format.
tract	integer	Broadband	Identifier for the census tract containing the search point. The 2000 census data is used.
transmission_technology_type	string	Broadband, Wireless	The text description corresponding to the transtech value.
transtech	integer	Broadband, Wireless	Enumerated type defining the type of technology used by the provider. • 0 All Other • 10 Asymmetric xDSL • 20 Symmetric xDSL • 30 Other Copper Wireline • 40 Cable Modem - DOCSIS 3.0 • 41 Cable Modem - Other • 50 Optical Carrier / Fiber to the End User • 60 Satellite • 70 Terrestrial Fixed Wireless - Licensed • 80 Terrestrial Mobile Wireless • 90 Electric Power Line • -9999 Unknown / Did Not Provide
typical_speed_down	string	Broadband, Wireless	The text value corresponding to the typicdown code.

Field Name	Field Type	Source	Description
typical_speed_up	string	Broadband, Wireless	The text value corresponding to the typicdown code.
typicdown	integer	Broadband, Wireless	A code representing the typical download speed of the connection. See "maxadown" for the list of possible values.
typicup	integer	Broadband, Wireless	A code representing the typical upload speed of the connection. See "maxadown" for the list of possible values.

API Query: Report Query

Input
URL: http://developer.broadbandillinois.org/report.xml

Input Parameters

Parameter Name	Parameter Type	Description
api_key	string	The API key of the user requesting the data. Must match an existing API key of an approved, active user.
area_key	string	For a known area search, the specific area being searched. This must be used in conjunction with an area_kind parameter. Each area_kind has a different requirement for specification. • congressional_district The two digit district number (include leading zero, like "07") • county The three digit county FIPS number (with leading zeroes, ie Cook County is "031") • county_subdivision The five digit COUSUBFP number (Chicago is 14000) • tract The four or six digit tract number • block_group Two digit state code + three digit county code + four or six digit tract code + one digit block group number • zip_code The 5 digit zip code

Parameter Name	Parameter Type	Description
area_kind	string	For a known area search, the type of area being searched. Must be used in conjunction with the area_key parameter. • congressional_district A congressional district (2000 boundaries) • county County • county_subdivision A subdivision of a county • tract A US census tract • block_group A US census block group • zip_code A Postal Service Zip Code
lat	float	Latitude of the query. Must be used in conjunction with lon.
lon	float	Longitude of the query. Must be used in conjunction with lat.
radius	float	Radius of the area being searched, in meters. This parameter is optional, if not set, the value 0.1 will be used. This parameter is only valid in a lat/lon query.
wkt	string	A WKT (Well Known Text) Polygon or Multipolygon in projection 4326 that will act as the boundary for the search.

Response

<providers>
<provider or anchors (for CAI aggregation)>
.....
</provider or anchors (for CAI aggregation)>
</providers>

Field Name	Field Type	Source	Description
dbaname	string	provider only	The provider's Doing Business As (DBA) legal designation.
download_speed	nested field	CAI only	Measured download speed for CAI sources. Nested fields as in max_upload_speed.
frn	String	provider only	FCC Registration Number of the provider.

<table>
<tr><th>Field Name</th><th>Field Type</th><th>Source</th><th>Description</th></tr>
<tr><td>jitter</td><td>nested field</td><td>CAI only</td><td>Measured jitter for CAI sources. Nested fields as in max_upload_speed.</td></tr>
<tr><td>latency</td><td>nested field</td><td>CAI only</td><td>Measured latency for CAI sources. Nested fields as in max_upload_speed.</td></tr>
<tr><td>max_download_speed</td><td>nested field</td><td>provider and CAI</td><td>The maximum download bandwidth. Nested fields as in max_upload_speed.</td></tr>
<tr><td>max_upload_speed</td><td>nested field</td><td>provider and CAI</td><td>The maximum upload bandwidth
<table>
<tr><td>high</td><td>integer</td><td>The code corresponding to the highest record for this carrier. Codes are as in maxadown</td></tr>
<tr><td>high_text</td><td>string</td><td>The text description of the code for high.</td></tr>
<tr><td>low</td><td>integer</td><td>The code corresponding to the lowest record for this carrier. Codes are as in maxadown</td></tr>
<tr><td>low_text</td><td>string</td><td>The text description of the code for low.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Field Name</th><th>Field Type</th><th>Source</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><td>median</td><td>integer</td><td>The code corresponding to the median record for this carrier. Codes are as in maxadown</td></tr><tr><td>median_text</td><td>string</td><td>The text description of the code for median.</td></tr></table></td></tr>
<tr><td>record_count</td><td>integer</td><td>provider and CAI</td><td>The number of individual records making up the aggregate data. Note that the data for broadband providers has been pre-split into census block sized chunks, which results in high number of individual records for large areas.</td></tr>
<tr><td>spectrum</td><td>integer</td><td>provider only</td><td>A code for the wireless spectrum used by the provider.
1 Cellular spectrum (824-849 MHz; 869-894) used to provide service
2 700 MHz spectrum (698-758 MHz; 775-788 MHz; 775-788 MHz) used to provide service
3 Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995) used to provide service
4 Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service
5 Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service
6 Unlicensed (including broadcast</td></tr>
</table>

Field Name	Field Type	Source	Description
			television \"white spaces\") spectrum used to provide service • 7 Specialized Mobile Radio Service (SMR) (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz) • 8 Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz), 3650-3700 MHz • 9 Satellite (L-band, Big LEO, Little LEO, 2 GHz) • -9 Unknown
spectrum_text	string	provider only	The text description of the spectrum code for this provider.
transmission_technology_type	string	provider only	The text description corresponding to the transtech value.
transtech	integer	provider only	Enumerated type defining the type of technology used by the provider. • 0 All Other • 10 Asymmetric xDSL • 20 Symmetric xDSL • 30 Other Copper Wireline • 40 Cable Modem - DOCSIS 3.0 • 41 Cable Modem - Other • 50 Optical Carrier / Fiber to the End User • 60 Satellite • 70 Terrestrial Fixed Wireless - Licensed • 80 Terrestrial Mobile Wireless • 90 Electric Power Line • -9999 Unknown / Did Not Provide
typical_download_speed	nested field	provider only	The typical download bandwidth. Nested fields as in max_upload_speed.
typical_upload_speed	nested field	provider only	The typical upload bandwidth. Nested fields as in max_upload_speed.

Field Name	Field Type	Source	Description
upload_speed	neste d field	CAI only	Measured upload speed for CAI sources. Nested fields as in max_upload_speed.

API Query: Community Anchor Institutions

Input
URL: http://developer.broadbandillinois.org//community_anchors

Input Parameters

Parameter Name	Parameter Type	Description
api_key	string	The API key of the user requesting the data. Must match an existing API key of an approved, active user.
area_key	string	For a known area search, the specific area being searched. This must be used in conjunction with an area_kind parameter. Each area_kind has a different requirement for specification. • congressional_district The two digit district number (include leading zero, like "07") • county The three digit county FIPS number (with leading zeroes, ie Cook County is "031") • county_subdivision The five digit COUSUBFP number (Chicago is 14000) • tract The four or six digit tract number • block_group Two digit state code + three digit county code + four or six digit tract code + one digit block group number • zip_code The 5 digit zip code
area_kind	string	For a known area search, the type of area being searched. Must be used in conjunction with the area_key parameter. • congressional_district A congressional district (2000 boundaries) • county County • county_subdivision A subdivision of a county • tract A US census tract • block_group A US census block group

Parameter Name	Parameter Type	Description
		• zip_code A Postal Service Zip Code
lat	float	Latitude of the query. Must be used in conjunction with lon.
lon	float	Longitude of the query. Must be used in conjunction with lat.
max_responses	integer	If this value is an integer greater than zero, the number of responses will be limited to that value. There is no guarantee that a particular potential response will be in that group.
priority_only	string	If this value is a truthy string ("1", "t", "true", "yes", "y"), then the output will be limited to CAI institutions labelled priority only
radius	float	Radius of the area being searched, in meters. This parameter is optional, if not set, the value 0.1 will be used. This parameter is only valid in a lat/lon query.
wkt	string	A WKT (Well Known Text) Polygon or Multipolygon in projection 4326 that will act as the boundary for the search.

Response

<community_anchor_institutions>
<community_anchor_institution>
.....
</community_anchor_institution>
</community_anchor_institutions>

Field Name	Field Type	Description
ad_down	integer	Synonym for maxaddown
ad_down_text	string	Synonym for max_speed_down
ad_up	integer	Synonym for maxadup
ad_up_text	string	Synonym for max_speed_up
additional_bandwidth	boolean	If true, the user was dissatisfied with their service, and desires additional bandwidth

Field Name	Field Type	Description
additional_connections	boolean	If true, the user was dissatisfied with their service, and desires additional connections
affordable_rates	boolean	If true, the user was dissatisfied with their service and wants more affordable rates
alternative_carrier	boolean	If true, the user was dissatisfied with their service, and wants to use a different carrier
alternative_technology	boolean	If true, the user was dissatisfied with their service, and desires a different technology
broadband_adoption	boolean	If true, the internet speed of the CAI has met the NTIA's definition of broadband.
carrier_derived	boolean	If true, the carrier name has been derived from the IP address
city	string	City where institution is located
contact_email	string	Email address of contact at the anchor institution
contact_name	string	Name of contact at the anchor institution
county	string	The county where the institution is located
district	string	For K-12 schools, the school district name, otherwise blank.
download_speed	integer	Actual download speed derived from user tests
e_team	boolean	If true, the institution is interested in becoming an E-Team member.
email	string	General email address of the institution
improved_service	boolean	If true, the user was dissatisfied with their service, and wants better customer service
institution_type	integer	The type of institution
institution_type_text	string	The text value corresponding to the institution type

Field Name	Field Type	Description
ip_address	string	The ip address of the CAI
jitter	integer	Jitter measurement for user tests
last_mile	string	The provider of the last mile of infrastructure
latency	integer	Latency time from user tests
latlon	wkt string	The geographic location of the institution
max_speed_down	string	Text description corresponding to maxaddown
max_speed_up	text	Text description corresponding to maxadup
maxaddown	integer	A code representing the maximum download speed of the advertised connection. • 1 Less than or equal to 200 kbps. • 2 Greater than 200 kbps and less than 768 kbps. • 3 Greater than or equal to 768 kbps and less than 1.5 mbps. • 4 Greater than or equal to 1.5 mbps and less than 3 mbps. • 5 Greater than or equal to 3 mbps and less than 6 mbps • 6 Greater than or equal to 6 mbps and less than 10 mbps. • 7 Greater than or equal to 10 mbps and less than 25 mbps. • 8 Greater than or equal to 25 mbps and less than 50 mbps. • 9 Greater than or equal to 50 mbps and less than 100 mbps. • 10 Greater than or equal to 100 mbps and less than 1 gbps. • 11 Greater than or equal to 1 gbps.
maxadup	string	A code representing the maximum download speed of the advertised connection. Keys as in maxaddown
organization	string	Community Anchor Institution names

Field Name	Field Type	Description
priority_institution	boolean	If true, the institution is a priority to contact
provider	string	The name of the institution's broadband provider
rate	float	Monthly charge from the carrier
response_date	date	The date the institution's record was added to the system.
response_method	string	The survey site used for the institution's response.
service_comments	string	Any additional comments from the user about their service
service_satisfactory	boolean	If true, the user finds their current service satisfactory
short_time_frame	boolean	If true, the user was dissatisfied with their service, and wants a shorter time frame to extend their service
speed_derived	boolean	If true, speed was derived from the IP address
state	string	State where institution is located
street_address	string	Street address of institution
technology_comments	string	Additional comments, if any
transmission_technology_type	string	Text value corresponding to transtech
transtech	integer	Enumerated type defining the type of technology used by the provider. • 0 All Other • 10 Asymmetric xDSL • 20 Symmetric xDSL • 30 Other Copper Wireline • 40 Cable Modem - DOCSIS 3.0 • 41 Cable Modem - Other • 50 Optical Carrier / Fiber to the End User • 60 Satellite • 70 Terrestrial Fixed Wireless - Licensed

Field Name	Field Type	Description
		• 80 Terrestrial Mobile Wireless • 90 Electric Power Line • -9999 Unknown / Did Not Provide
upload_speed	integer	Actual upload speed derived from user tests
zip	string	Zip code where institution is located

API Query: Geometries Query

Input

URL: http://developer.broadbandillinois.org/geometries/(area_kind)/(area_key).xml

Input Parameters

Parameter Name	Parameter Type	Description
api_key	string	The API key of the user requesting the data. Must match an existing API key of an approved, active user.
area_key	string	The specific area being requested. This must be used in conjunction with an area_kind parameter. Each area_kind has a different requirement for specification. • congressional_district The two digit district number (include leading zero, like "07") • county The three digit county FIPS number (with leading zeroes, ie Cook County is "031") • county_subdivision The five digit COUSUBFP number (Chicago is 14000) • tract The four or six digit tract number • block_group Two digit state code + three digit county code + four or six digit tract code + one digit block group number • zip_code The 5 digit zip code • census_block The full FIPS id for the census block
area_kind	string	The type of area being requested. Must be used in conjunction with the area_key parameter. • congressional_district A congressional district (2000

Parameter Name	Parameter Type	Description
		boundaries) • county County • county_subdivision A subdivision of a county • tract A US census tract • block_group A US census block group • zip_code A Postal Service Zip Code • census_block A US census block

Response

<named_area>
.....
</named_area>

Field Name	Field Type	Description
area_key	string	The specific area.
area_kind	string	The type of area.
kml	string	The KML representation of the area geometry.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband. Connected Nation launched BroadbandStat at http://connectillinois.org on February 24, 2010. The Partnership for a Connected Illinois is in the process of re-launching BroadbandStat on http://broadbandillinois.org.

Conclusion

The transition from the data-submission process by Connected Nation to the work engaged in by the Partnership for a Connected Illinois for the data-submission cycle ending April 1, 2011, occasioned a large degree of work on the data-collection mission of PCI. Building upon the strong foundation established in this data cycle, PCI's efforts will increasingly incorporate "best practices" for data-submission in future cycles.

INDIANA

Round 3 (Spring 2011)
Data Submission to NTIA
April 1, 2011

Data Description

File Name	Contents	Description
IN_SBDD_20110401.ZIP	This Delivery Package	A zip file containing all of the files described below
IN_SBDD_2011_04_01.gdb	Data Transfer Model	Current NTIA approved data model with the assembled data properly loaded into the data transfer model
IN_DataPackage.2010_10_01.xls	Data Package	A formatted file containing associated documentation about Indiana's submission
IN_2011_04_01.txt	Data Submission Receipt	File containing the results of the submission check tool
IN_ Methodology _2011_04_01.pdf	Methodology White Paper	Documentation about our process
IN_ Readme_2011_04_01.pdf	Readme Doc	A document that contains added notes about the delivery

Provider Participation

107 Internet Providers

- 68 Wireless Providers
- 39 Wireline Providers

47 Data Sets Received

- 22 Wireline Providers
- 25 Wireless Providers

Indiana Utility Regulatory Commission (IURC) Data

- 61 Data Sets (with FRN)

Data Collection

We continue to collect data from these sources, including:

- The Indiana Utility Regulatory Commission (broadband data)
- Office of Utility Consumer Counselor (broadband data)
- The Indiana Business Research Center (demographic data)
- Indiana Department of Local Government Finance (residential versus commercial status by address)
- Indiana Counties (point addresses, land parcels, road centerlines with address ranges, and administrative boundaries, aggregated and integrated into the IndianaMap)
- Indiana Department of Natural Resources (state forests and parks)
- Indiana Department of Homeland Security (locations of emergency medical service (EMS) stations, fire stations, and hospitals)
- Department of Education (school locations)
- Indiana Libraries (point of connectivity for low income/unemployed consumers—provide vital speed information for respective geographical locations)
- Commission for Higher Education (locations of colleges and universities)
- Broadband service providers, and others

This information is processed according to the current data submission model offered by the National States Geographic Information Council and to be able to perform spatial comparisons, logic rules and other checks.

We also add emphasis to the collection of speed information using the "crowd sourcing" web-based application already implemented.

Indiana Broadband Service Questionnaire

http://www.in.gov/iot/BroadbandQuestionnaire.htm
http://in-polis-app21.ads.iu.edu/BroadbandService/default.aspx

We also support small service providers (and those with smaller information technology teams) in the area of data submission. We recognize the challenge that some providers have in submitting data in the formats and specifications required. We have successfully contacted all of the wireless service providers and hosted their annual meeting in January of this year.

Data Integration

When data is received from a service provider, it is loaded into either Excel or Access depending on the number of records and file size. This table is then joined with a copy of the Census block *.dbf file from our census block shapefile. After the data has been joined, it is exported as a new*.dbf. The original Census block *.dbf is renamed to preserve the original integrity and the newly exported *.dbf is renamed to the same name as the shapefile. The shapefile is then loaded into ArcMap and a Feature Class is generated. The number of records is then validated against the number of records that were originally imported into either Excel or Access.

Data Loading

A final integration check occurs when the data is loaded into the data model. This includes the logic checks for values.

Validation

We validate the collected data for completeness, currency, and accuracy using a variety of methods that include:

- **"Boots on the ground" inspection.** We visually inspect the existence of physical features, where feasible, to verify that service could exist in a specific location.
- **Inspection of high-resolution orthophotography.** High-resolution orthophotography is used to verify the existence and location of wireless towers. Where recent six-inch resolution orthophotography exists (cities and counties), it can also be used to verify the existence of residence connection boxes.
- **Comparing source documents that duplicate geographies or content.** We recognize that within the above list of data sources, some information is duplicated. In these cases, discrepancies will be noted for follow-up using other verification methods listed here.
- **Collecting end-user data.** We work with The Polis Center at Indiana University Purdue University Indianapolis to create a Google Map-based, user-friendly web application hosted on the IndianaMap portal to collect information from end-users about their location, broadband service provider, and speed (as captured from a speed test).
    - **Indiana Broadband Service Questionnaire**
        - http://www.in.gov/iot/BroadbandQuestionnaire.htm
        - http://in-polis-app21.ads.iu.edu/BroadbandService/default.aspx
            - The information collected from this website is valuable for data verification. The Polis Center works with communities in Indiana and beyond to develop and apply knowledge, to build collaborations and to find innovative solutions to common problems. The center excels in community-based research and advanced information technologies, especially geographic information systems (GIS).
- **Using service providers' websites**, especially those that contain service area information. Many service providers have websites that give service area information (often address by address) to assist consumers. We use these websites in conjunction with "boots on the ground" and the other methods listed here to verify the data.

Data Display

We are currently displaying the mapping results as additional geospatial layers added to the 220-plus layers already on the IndianaMap (www.indianamap.org), through the Indiana State Library, and the Indiana Business Research Center (IBRC). We are expanding the availability of the data by adding a new web-based information tool that will provide information about broadband service availability at a user-specified location. In addition, we propose to further integrate the broadband map data with economic data available from IBRC (www.stats.indiana.edu).

Address Level Data Collection

We continue to collect address level data. Indeed, as described above, Indiana is well on the way to creating address level reference data to facilitate the collection of address level broadband service availability, not just in census blocks larger than two square miles, but statewide. These data will be invaluable as the lowest common denominator to allow the construction of any geography in support of broadband map display and analysis. This expands the options for how to depict speed across multiple geographies, and facilitates the inquiry of service data at a given x,y.

We have committed to the acquisition of new orthophotography imagery to serve as the foundation for all other geospatial data, including centerlines and address level data. We currently have about $1.5 million committed by partners that include USGS, Indiana Department of Homeland Security, Indiana Department of Transportation, Indiana Department of Environmental Management, and others. We anticipate contributions from most of the Metropolitan Planning Organizations in Indiana and from many Indiana cities and counties.

Efforts in Process

- Community Anchor Institutions. We identified community anchor institutions by cross referencing a statewide land parcel dataset with a data set from the Indiana Local Government Finance office containing, among other information, institution name, location by address, and use category. The results of this analysis are included in this delivery for all records containing name, location, and category at a minimum. These data, however, do not have sufficient broadband service information. Therefore, we are currently working with a third party to survey the institutions to complete the attributes defined in the NOFA for these institutions. We anticipate that this additional data will be included in the fall 2011 submission.
- IURC data replacement. Per our approved project methodology, we began this project by taking advantage of public data that existing in Indiana about broadband service. While we recognized that these data were not granular enough geographically to satisfy the long term goals of this project, they were nonetheless informative and could provide value until more granular data was obtained from the service providers and verified. We still have some of this original data in our submission because we have not received

data from all of those service providers originally identified. It is a high priority objective over the next 6 months to replace all original data with new more granular data or to verify that we can delete whatever original data remains.

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF KANSAS

CONNECT KANSAS®

April 1, 2011

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KANSAS COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Kansas offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Kansas has played in creating such a powerful tool that will surely benefit not just Kansans, but consumers and businesses nationwide.

Therefore, Connected Nation as the State Broadband Designated Entity, in partnership with the Kansas Department of Commerce (KDOC), is pleased to present this submittal of the state of Kansas State Broadband Data and Development (SBDD) Grant Program, known as Connect Kansas.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Kansas: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A:	1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A:	3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A:	4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A:	4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)		n/a	Accuracy and Verification Report
n/a		DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a		n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Kansas program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Kansas program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of 86% of the Kansas provider community, or 86 of 100 total providers. Of the 86 participating providers, 47 supplied an update to their network or coverage area(s), while 38 have reported no change. The remaining provider previously supplied data but was non-responsive in the April 2011 update effort; therefore its previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 14 providers that are not represented in the attached datasets, 9 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect Kansas. The remaining 5 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Kansas principals that all commercially reasonable efforts were made to account for 100% of the known Kansas broadband provider community, pursuant to this semi-annual data update submission.

Connect Kansas has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Kansas conducts field validation efforts; between the October 2010 and this April 2011 data submission, 53 (53%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Kansas launched a website to create awareness about the initiative. Connectkansas.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Kansas website encountered 5,236 unique visits during this reporting period and 11,499 total to date for the life of the grant (awarded on November 1, 2009). Additionally, this pronounced Web activity netted 39 broadband inquiries over this same reporting period (393 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Kansas website and the Connect Kansas Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Kansas mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Kansas has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the state of Kansas, outreach was conducted during this data update reporting period by Connect Kansas to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect

Kansas website. Connect Kansas continues to work diligently in the state to identify statewide associations and to work closely with organizations such as the Kansas State Library, Kansas Department of Education, and the State Office of the Adjutant General to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Kansas will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. Additionally, Connect Kansas will continue to work collaboratively with the Kansas Broadband Advisory Task Force to identify opportunities to gather and promote CAI data. From our work in Kansas, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Kansas efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Kansas, Connected Nation has previously engaged all federally recognized tribal lands in the area covered by the Connect Kansas SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period Connect Kansas plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connect Kansas understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Kansas program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Kansas, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: KANSAS COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Kansas, working in close coordination with the Kansas Department of Commerce, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Kansas has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Kansas has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Kansas through ESRI ArcGIS software.

Connect Kansas continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Kansas website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Kansas will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link (no password required):
http://www.connectkansas.org/mapping/Community_Anchor_Institution_Data_Collection.php

Connect Kansas and the Kansas Department of Commerce have worked closely during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. The Kansas State Library is currently compiling data from its own internal sources on hundreds of libraries in the state. Connect Kansas will be submitting this data in the next reporting period.

In tandem with these efforts to identify existing data, Connect Kansas continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Connect Kansas continues to utilize the extensive database of contact information that was provided by the Kansas Department of Education (KanEd) to distribute surveys to schools and hospitals throughout the state. Additionally, Connect Kansas will once again be working with the Kansas Adjutant General to distribute surveys to key public safety contacts throughout the state in the coming months. Connect Kansas expects another increase in this data for the upcoming reporting period.

Connect Kansas has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Kansas is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a

CAI in Kansas, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Kansas will continue its ongoing work with the Kansas Department of Commerce and key organization contacts in an effort to raise awareness of this project among CAI. An update on our current data will be provided to the Kansas Broadband Advisory Task Force and participation by its members to assist with promoting our survey will be encouraged. Leading up to the next reporting period, Connect Kansas will be specifically focusing on leveraging our relationship with the Kansas Adjutant General's office to secure additional public safety data, continuing to utilize data from the Kansas Department of Education, and focusing on securing data from governmental entities.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	2,175	2,174	2,175	885	1,998	1,999
Libraries	438	438	438	220	330	261
Healthcare	245	245	244	132	197	196
Public Safety	1,698	1,684	1,696	302	112	107
Higher Ed Institutions	103	103	102	76	101	100
Other Government	520	519	520	265	267	266
Other Non-Government	3	3	3	3	3	3
Total	**5,182**	**5,166**	**5,178**	**1,883**	**3,008**	**2,932**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Kansas.

Inventory of Deliverables, Connect Kansas: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Kansas have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Kansas Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider-submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation has conducted field validation on 53 (53%) of the viable providers in Kansas. Field validation tests have been conducted on Allegiance Communications, AT&T, Benson Telephone Service, BroadBand Wireless Internet (BBWI), Cable ONE Inc., CenturyLink, Clearwire Corporation, Columbus Telephone Company, Cox Communications Inc., Craw-Kan Telephone Cooperative Inc., CTC Wireless Internet, Cyber Lodge Wireless, Eagle Communications Inc., Elkhart Telephone Company Inc., Fairpoint Communications Inc., Golden Belt Telephone Association Inc., H&B Cable Service Inc., Haviland Telephone Company, IdeaTek Systems Inc., J.B.N. Telephone Company, Kanokla Telephone, Kansas Broadband Internet Inc., LaHarpe Telephone Company Inc., Madison Telephone Company LLC, Mediacom Communications Corporations, Mercury Wireless, Mid-Kansas Cable Services, Midwest Connections Inc., Mobil1.net, Moundridge Telephone Company Inc., Pioneer Telephone Association, Pixius Communications LLC, Rainbow Telecommunications Associations Inc., Rural Telephone Service Company Inc., S&A Telephone Company Inc., S&T Telephone Cooperative Association, SKT Inc., South Central Telephone Association, Sprint, St. Joe Wireless, Sumner Communications, Sunflower Broadband (Knology), The Computer Generation, Totah Communications Inc., Tri-County Telephone Association Inc., Tri-Rivers, United Telephone Association, U.S. Cellular, Valnet LLC, Verizon Communications Inc., Wamego Telecommunications Company Inc., Wave Wireless, Wheat State Telephone Inc., and Wheatland Electric Cooperative Inc.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated to a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.29% of Kansas households do not have terrestrial fixed broadband service available, and approximately 0.12%[1] of Kansas households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 4.85% of rural Kansas households do not have terrestrial fixed broadband service

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

available, and approximately 0.28%[3] of rural Kansas households have neither mobile nor fixed broadband service available.[4]

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)

[3] See footnote 1.
[4] See footnote 2.

22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Kansas project has received a total of 39 inquiries (393 grant inception to date). As more inquiries are submitted to Connect Kansas, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBAND INVENTORY MAPS

The Broadband Inventory Maps are printer-friendly maps that include broadband coverage, cities, and towns, county boundaries, and detailed road information across the state of Kansas. The accuracy of these maps is critical to the future of broadband infrastructure planning in Kansas. The purpose of the maps is two-fold:

- **Data Verification** – Broadband providers and the public should use the map to ensure the current service area is accurately reflected.
- **Broadband Expansion Plans** – Broadband providers can use the inventory maps and unserved household density maps to learn where there are currently unserved areas that are densely populated. These maps can aid providers in identifying potential areas of expansion that could yield a high return on investment.

To date, the Connect Kansas Broadband Inventory Maps have received a total of 9,358 downloads. Of those 9,358 downloads, the Statewide Broadband Inventory Maps received 902 downloads, the County Broadband Inventory Maps received 6,116 downloads, and the census block level data received 1,907downloads.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumers to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Kansas project launched BroadbandStat on September 23, 2010, and has received a total of 950 visits to date, of which 932 occurred this reporting period.

Speed Test Methodology

The 909 speed tests that are represented in the Connect Kansas Speed Test Report during this reporting period (2,014 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Kansas speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Kansas project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Kansas with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Kansas.

Broadband Provider Log

Complete	142
Non-Responsive/Refused	12
In Progress	17
Count of Datasets by Viable Status	**171**
Total Unique Providers Represented	**100**

Provider Name	Platform	Status	NDA Execution Date	Notes
Allegiance Communications	Cable	Data Added to Statewide Inventory	2/4/2010	
AT&T Communications of Texas, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
AT&T Communications of Texas, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
Atwood Cable Systems, Inc.	Cable	Data Added to Statewide Inventory		
Benkelman Telephone Company	Fiber	Data Added to Statewide Inventory	1/12/2010	
Blue Valley Tele-Communications, Inc.	Cable	Data Added to Statewide Inventory	11/17/2009	
Blue Valley Tele-Communications, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	11/17/2009	
Blue Valley Tele-Communications, Inc.	Fiber	Data Added to Statewide Inventory	11/17/2009	
Cable ONE, Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Cequel Communications, LLC	Cable	Data Added to Statewide Inventory	12/15/2009	
City of Chanute	Fiber	Data Added to Statewide Inventory		
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory		
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
Craw-Kan Telephone Cooperative, Inc.	Fixed Wireless	Data Added to Statewide Inventory	12/7/2009	
Craw-Kan Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	12/7/2009	
Cunningham Communications, Inc.	Fiber	Data Added to Statewide Inventory	9/8/2009	
Eagle Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
Eagle Communications, Inc.	Cable	Data Added to Statewide Inventory		
Eagle Communications, Inc.	Fiber	Data Added to Statewide Inventory		
Golden Belt Telephone Association, Inc.	Fiber	Data Added to Statewide Inventory		
Golden Belt Telephone Association, Inc.	Cable	Data Added to Statewide Inventory		
H & B Cable Service, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	10/13/2009	
H & B Cable Service, Inc.	Fiber	Data Added to Statewide Inventory	10/13/2009	
H & B Cable Service, Inc.	Fixed Wireless	Data Added to Statewide Inventory	10/13/2009	
Home Communications, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	11/5/2009	
Home Communications, Inc.	Fiber	Data Added to Statewide Inventory	11/5/2009	
KanOkla Telephone Association, Inc.	Fixed Wireless	Data Added to Statewide Inventory	12/18/2009	
Knology of Kansas	Cable	Data Added to Statewide Inventory		
Knology of Kansas	Fixed Wireless	Data Added to Statewide Inventory		
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
Mercury Wireless	Fixed Wireless	Data Added to Statewide Inventory	3/25/2010	
Moundridge Telephone Company, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	10/7/2009	
Mutual Telephone Company	Fixed Wireless	Data Added to Statewide Inventory	12/9/2009	
North Central Kansas Community Network	Fixed Wireless	Data Added to Statewide Inventory		
Peoples Telecommunications, LLC	ILEC/CLEC	Data Added to Statewide Inventory	12/1/2009	
Pioneer Telephone Association, Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	
Rural Telephone Service Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	11/16/2009	
Rural Telephone Service Company, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	11/16/2009	
Rural Telephone Service Company, Inc.	Fiber	Data Added to Statewide Inventory	11/16/2009	
South Central Telephone Association	ILEC/CLEC	Data Added to Statewide Inventory	12/17/2009	
South Central Telephone Association	Fiber	Data Added to Statewide Inventory	12/17/2009	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
St. Joe Wireless	Fixed Wireless	Data Added to Statewide Inventory		
Stelera Wireless, LLC	Mobile Wireless	Data Added to Statewide Inventory		
Sumner Cable TV, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
Sumner Cable TV, Inc.	Cable	Data Added to Statewide Inventory		
SWKO, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/18/2011	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
Time Warner Cable LLC.	Cable	Data Added to Statewide Inventory	12/21/2009	
Tri-County Telephone Association, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/1/2009	
Tri-County Telephone Association, Inc.	Fiber	Data Added to Statewide Inventory	12/1/2009	
Tri-County Telephone Association, Inc.	Fixed Wireless	Data Added to Statewide Inventory	12/1/2009	
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	
Valnet Telecommunications, LLC	Fixed Wireless	Data Added to Statewide Inventory		
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
Wamego Telecommunications Company, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	9/29/2009	
Wheatland Broadband Services	Fixed Wireless	Data Added to Statewide Inventory	6/17/2010	
Wilson Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	9/29/2009	
Zito Midwest, LLC	Cable	Data Added to Statewide Inventory	2/17/2011	[JAN-19-11 Daryl Coffey] Zito Midwest purchased Galaxy Cable.
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
City of Chanute	Backhaul	Backhaul Provider Only Processing Complete		
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
MCC Missouri LLC	Backhaul	Backhaul Provider Only Processing Complete	1/12/2010	
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
McLeodUSA Telecommunications Services, Inc.	ILEC/CLEC	Provider Approval Solicited		
Ace Computers	Fixed Wireless	Provider Gathering Data		
City of Coffeyville	Fixed Wireless	Provider Gathering Data		
JMZ CORPORATION	Fixed Wireless	Provider Gathering Data		
Knology of Kansas	Fiber	Provider Gathering Data		
Midwest Connections, Inc.	Fixed Wireless	Provider Gathering Data		
Benkelman Telephone Company	ILEC/CLEC	No Update to Provide	1/12/2010	
Benson Tel Service Inc.	Fixed Wireless	No Update to Provide	12/15/2009	
Blue Valley Tele-Communications, Inc.	Fixed Wireless	No Update to Provide	11/17/2009	

Cequel Communications, LLC	Backhaul	No Update to Provide	12/15/2009	
Columbus Telephone Company	Fiber	No Update to Provide	10/2/2009	
CoxComm Inc.	Cable	No Update to Provide	1/29/2010	
CoxComm Inc.	Backhaul	No Update to Provide	1/29/2010	
Craw-Kan Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	12/7/2009	
CTC Wireless Internet	Backhaul	No Update to Provide	11/20/2009	
Cunningham Communications, Inc.	Cable	No Update to Provide	9/8/2009	
Cunningham Communications, Inc.	ILEC/CLEC	No Update to Provide	9/8/2009	
Cyber Lodge Internet Services, Inc.	Fixed Wireless	No Update to Provide	1/6/2010	
Diller Telephone Company	ILEC/CLEC	No Update to Provide		
Eagle Communications, Inc.	Backhaul	No Update to Provide		
Elkhart Telephone Company, Inc.	Fiber	No Update to Provide	3/23/2010	
Elkhart Telephone Company, Inc.	Fixed Wireless	No Update to Provide	3/23/2010	
Elkhart Telephone Company, Inc.	Backhaul	No Update to Provide	3/23/2010	
Fairpoint Communications, Inc.	ILEC/CLEC	No Update to Provide	1/22/2010	
Fairpoint Communications, Inc.	Fixed Wireless	No Update to Provide	1/22/2010	
Golden Belt Telephone Association, Inc.	ILEC/CLEC	No Update to Provide		
Golden Belt Telephone Association, Inc.	Fixed Wireless	No Update to Provide		
Gorham Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	9/30/2009	
Gorham Telephone Company, Inc.	Fiber	No Update to Provide	9/30/2009	
H & B Cable Service, Inc.	Cable	No Update to Provide	10/13/2009	
Haviland Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	12/3/2009	
Haviland Telephone Company, Inc.	Fixed Wireless	No Update to Provide	12/3/2009	
Home Communications, Inc.	Cable	No Update to Provide	11/5/2009	
IdeaTek Systems, Inc.	Fiber	No Update to Provide	3/4/2010	
JBN Telephone Company, Inc.	Fixed Wireless	No Update to Provide	12/14/2009	
JBN Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	12/14/2009	
KanOkla Telephone Association, Inc.	ILEC/CLEC	No Update to Provide	12/18/2009	
Kansas Broadband Internet, Inc.	Fixed Wireless	No Update to Provide	1/15/2010	
Kansas Data Internet, Inc.	Fixed Wireless	No Update to Provide		
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
LaHarpe Telephone Company, Inc.	Fiber	No Update to Provide	9/28/2009	
Lawrence Freenet	Fixed Wireless	No Update to Provide	10/5/2009	
Madison Telephone Company, LLC	ILEC/CLEC	No Update to Provide	11/17/2009	
MCC Missouri LLC	Cable	No Update to Provide	1/12/2010	
Mokan Dial, Inc.	ILEC/CLEC	No Update to Provide	12/2/2009	
Mutual Telephone Company	Fiber	No Update to Provide	12/9/2009	
Mutual Telephone Company	Backhaul	No Update to Provide	12/9/2009	
Nautilus Net	Fixed Wireless	No Update to Provide		
Pioneer Telephone Association, Inc.	ILEC/CLEC	No Update to Provide	12/7/2009	
Pixius Communications LLC	Fixed Wireless	No Update to Provide		
Rainbow Telecommunications Association, Inc.	ILEC/CLEC	No Update to Provide	12/9/2009	
Rainbow Telecommunications Association, Inc.	Cable	No Update to Provide	12/9/2009	
Rainbow Telecommunications Association, Inc.	Fiber	No Update to Provide	12/9/2009	
Rainbow Telecommunications Association, Inc.	Fixed Wireless	No Update to Provide	12/9/2009	
Rebeltec Communications LLC	Fixed Wireless	No Update to Provide		
S & A Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	11/20/2009	
S&T Telephone Cooperative Association	ILEC/CLEC	No Update to Provide	8/28/2009	
S&T Telephone Cooperative Association	Fiber	No Update to Provide	8/28/2009	
S&T Telephone Cooperative Association	Fixed Wireless	No Update to Provide	8/28/2009	
South Central Telephone Association	Backhaul	No Update to Provide	12/17/2009	
Southern Kansas Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	12/31/2009	
Southern Kansas Telephone Company, Inc.	Cable	No Update to Provide	12/31/2009	
Southern Kansas Telephone Company, Inc.	Fiber	No Update to Provide	12/31/2009	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Superior iNET	Fixed Wireless	No Update to Provide	1/29/2010	
The Computer Generation, Inc.	Fixed Wireless	No Update to Provide	1/8/2010	
Totah Communications, Inc.	ILEC/CLEC	No Update to Provide	9/8/2009	
Tri-Rivers Internet	Fixed Wireless	No Update to Provide		
Twin Valley Telephone, Inc.	ILEC/CLEC	No Update to Provide	10/12/2009	
Twin Valley Telephone, Inc.	Fiber	No Update to Provide	10/12/2009	
Twin Valley Telephone, Inc.	Fixed Wireless	No Update to Provide	10/12/2009	
TwinMounds	Fixed Wireless	No Update to Provide		
United Communications Association, Inc.	ILEC/CLEC	No Update to Provide	11/23/2009	
United Communications Association, Inc.	Cable	No Update to Provide	11/23/2009	
United Communications Association, Inc.	Fixed Wireless	No Update to Provide	11/23/2009	
United Communications Association, Inc.	Mobile Wireless	No Update to Provide	11/23/2009	
Wamego Telecommunications Company, Inc.	Fiber	No Update to Provide	9/29/2009	
Wave Wireless	Fixed Wireless	No Update to Provide	2/19/2010	
Wheat State Telephone, Inc.	Fiber	No Update to Provide	12/7/2009	
Wheat State Telephone, Inc.	ILEC/CLEC	No Update to Provide	12/7/2009	
Wilson Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	9/29/2009	
Haug Communications, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	12/4/2009	
arcplasma.com	Fixed Wireless	Refused to Participate		[JAN-18-11 James Tull] While attempting to solicit data in accordance with the NOFA, a company representative stated that they had no interest in participating and preferred that we not contact them anymore.
Southeast Nebraska Communications	ILEC/CLEC	Refused to Participate		[FEB-15-11 J Determan] While soliciting data in accordance with the NOFA, provider representative stated that there are still only five lines available in Kansas. They see no benefit in involvement.
Davin Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts between July 30, 2009 and March 24, 2010, nine attempts were made during this submission period.

Granby Telephone Co.	ILEC/CLEC	Non-Responsive to Multiple Attempts		Identified provider on October 26, 2010. Since then, five contact attempts were made.
SCI Cable, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 7, 2010 and August 5, 2010, four attempts were made during this submission period.
SureWest Communications	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 8, 2009 and March 25, 2010, five attempts were made during this submission period.
SureWest Communications	Fiber	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 8, 2009 and March 25, 2010, five attempts were made during this submission period.
SureWest Communications	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 8, 2009 and March 25, 2010, five attempts were made during this submission period.
SureWest Communications	ILEC/CLEC	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 8, 2009 and March 25, 2010, four attempts were made during this submission period.
SwiftLink Communications	Fixed Wireless	Non-Responsive to Multiple Attempts		Provider was identified on October 28, 2010. Since then, five contact attempts were made.
Windjammer Communications, LLC	Cable	Non-Responsive to Multiple Attempts	11/16/2009	Provider was identified on October 28, 2010. Since then, five contact attempts were made.
WISP-Router, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 30, 2009 and August 17, 2010, four attempts were made during this submission period.
Columbus Telephone Company	ILEC/CLEC	Other	10/2/2009	[JAN-21-11 James Tull] In collecting data in accordance with the NOFA, a company representative advised that Columbus Telephone is strictly a FTTH provider and that they offer no DSL services (and have not for many years).
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Elkhart Telephone Company, Inc.	ILEC/CLEC	Other	3/23/2010	[FEB-24-11 John Determan] Entire exchange FTTH. Provider is an ILEC, not a DSL provider.
Elkhart Telephone Company, Inc.	Cable	Other	3/23/2010	[FEB-24-11 John Determan] No cable modem operation. Cable delivers cable TV service only.
Fairpoint Communications, Inc.	Fiber	Other	1/22/2010	[MAR-08-11 Wes Kerr] This provider doesn't offer fiber service and never has provided any fiber data.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Madison Telephone Company, LLC	Fiber	Other	11/17/2009	[MAR-23-11 Dawn Clark] Provider will not offer fiber until summer 2011.
Rebeltec Communications LLC	Cable	Other		[MAR-02-11 Brian Dudek] Provider offers cable service in Colorado only.
S & A Telephone Company, Inc.	Fiber	Other	11/20/2009	[MAR-02-11 Brian Dudek] They currently do not offer fiber, but plans are in place to replace their copper network soon.
Southern Kansas Telephone Company, Inc.	Mobile Wireless	Other	12/31/2009	[FEB-18-11 Brian Dudek] Changed status as provider does not offer any mobile wireless services.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Elkhart Telephone Company, Inc.	Mobile Wireless	Offers Service but Below FCC Definition	3/23/2010	

DATA DEVELOPMENT & VALIDATION METHODOLOGIES
WHITE PAPER

Commonwealth of Kentucky
State Broadband Data and Development (SBDD)
Broadband Mapping Project

Commonwealth
Office of Technology

NTIA Data Submittal
March 31, 2011

Baker

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Introduction

The following sections of this document provide an overview of the process used for the SBDD Broadband Mapping data development for the Commonwealth of Kentucky. The following narrative is depicted in Appendix A, Commonwealth of Kentucky SBDD Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach

The following outreach procedure provides the framework for communicating with Broadband Service Providers (Providers). The primary goals of the outreach approach documented herein are to:

- Promote Provider understanding and acceptance of the Broadband Mapping process, results and benefits
- Clarify NTIA Broadband Mapping requirements
- Facilitate data confidentiality agreements as required
- Minimize the submittal of invalid data
- Enhance provider understanding of the semi-annual update process
- Work with Providers to evaluate submittal options to facilitate data submittals

Data Submission Guidelines

Guidelines for the Providers submission of of Broadband Mapping Data are documented in the “Data Submission Guidelines”. These Guidelines define technical requirements, submission, specifications, and coordination and documentation activities.

Kentucky Broadband Providers Website

A URL was deployed (http://www.bakergis.com/kyBroadbandProvider/) to communicate and distribute NTIA NOFA requirements to providers along with outreach and data submittal materials including:

- NTIA NOFA and subsequent clarification
- Outreach letters to providers
- Non-Disclosure Agreement
- Quick Start Guides
- Data Submission Guidelines
- Data Transmittal Letter
- Broadband Data Submittal Templates
- TIGER Data
- Data Submittal Assistance Contact Information

Outreach Delivery Vehicles

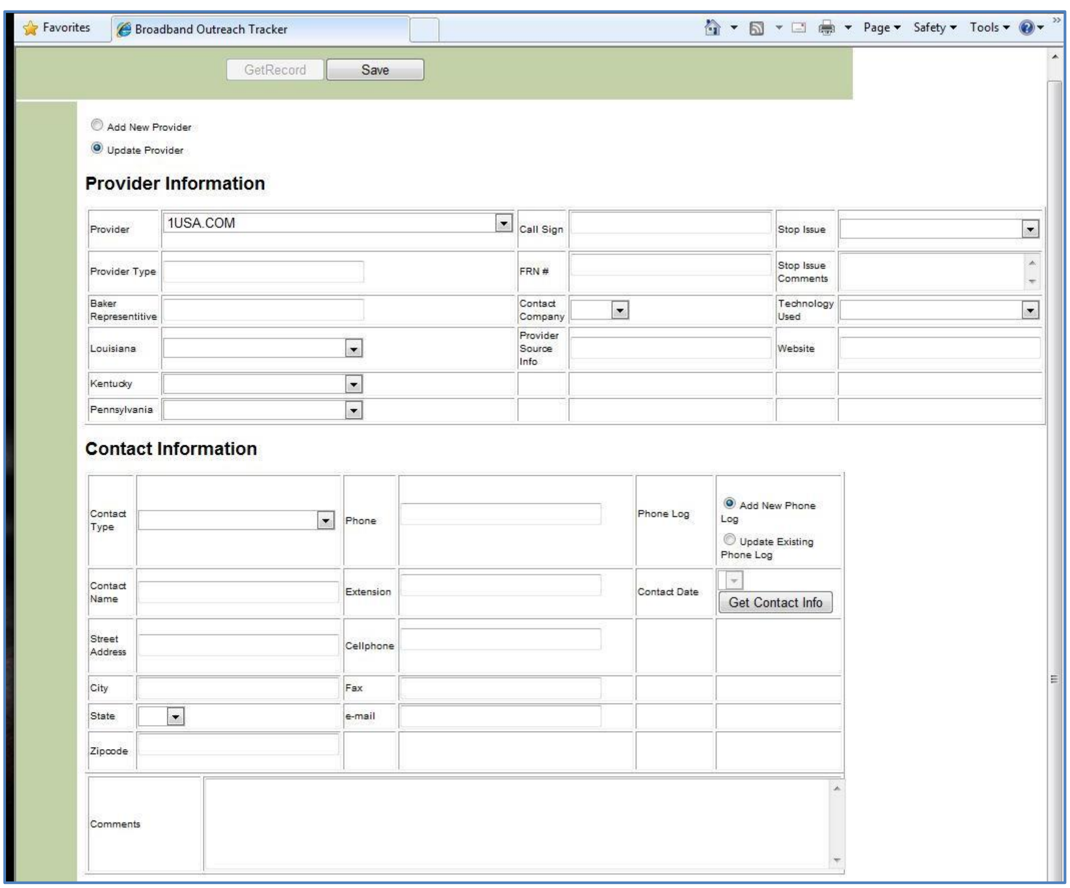
- A State Broadband Mapping Initiative Call for Data letter from the Kentucky Commonwealth Office of Technology (COT) was emailed to all Broadband Service Providers in the Commonwealth. This initial provider contact letter described the program and the role of Michael baker Jr., Inc. (Baker) acting on behalf of the COT for Broadband Data Collection and Mapping.

- Baker distributed a follow-up letter to all Providers describing the data submittal requirements and material and help available to aid with the data submittals.
- Submittal assistance was provided to providers that needed help with data submittals.
- Presentations were conducted with various broadband provider associations to present the data submittal requirements and answer questions.
- Email communication and electronic transfer of data was encouraged to facilitate a faster delivery of data and information.
- A URL was deployed and promoted to distribute outreach material and information concerning the Broadband Mapping Project.
- A secure FTP URL was provided for submittal of broadband data by providers.

Broadband Outreach Tracker Application

The Tracker application (Figure 1) was utilized to collect all correspondence with Providers and feedback on the effectiveness of the outreach activities by tracking items such as:

- The number and content of incoming e-mails and letters submitted from the Providers
- The number and source of comments, questions, and suggestions made by Providers
- The number and source of comments, questions, and suggestions made by attendees at Provider meetings and conference calls
- Provider contact information and data submittal status.



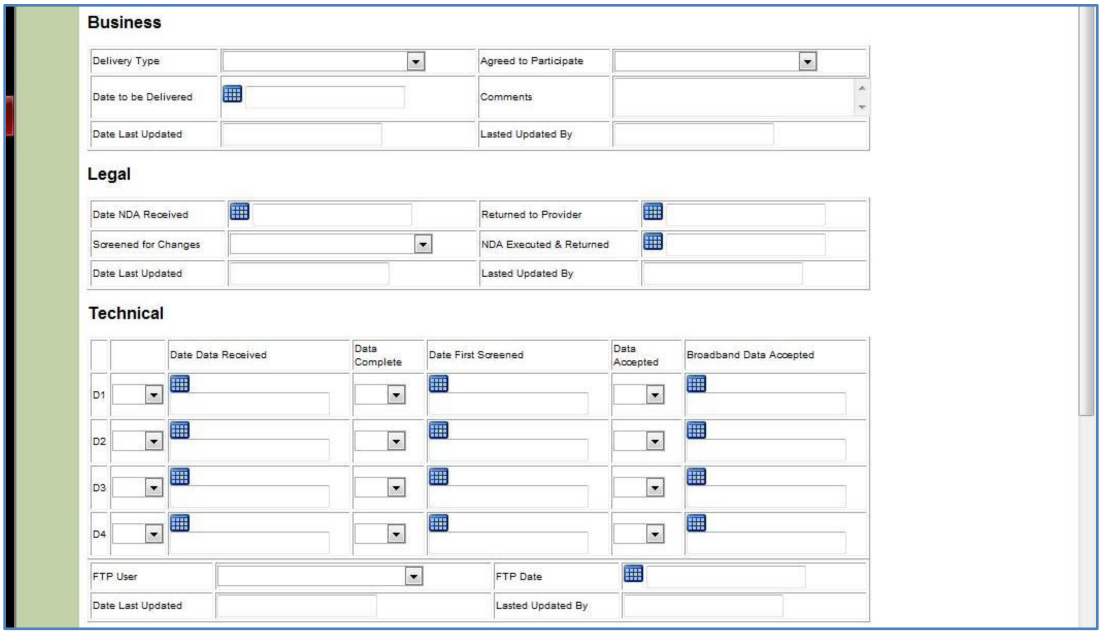


Figure 1 Broadband Outreach Tracker

Provider Submittal Validation

When a data submittal is received from a broadband service provider it is updated in the Broadband Outreach Tracker and run through an initial validation process to assure that it meets the submittal guidelines.

Validation Checklist

The following items are part of this initial data validation process:

- Verify the provider Transmittal Letter is complete and matches submitted data
- Verify the file naming conventions
- Verify each file is machine readable
- Verify data is in the correct GIS or Tabular format/file type
- Verify there are no duplicate records
- Verify each field is populated and no empty or NULL values are present for mandatory fields
- Verify all ID (record number points) are unique within the submittal
- Verify all attribute data is formatted according to the submittal guidelines
- Verify topology for all geospatial submissions
- Verify Metadata for all submissions
- Verify the required contact information is included
- Verify adherence to Data Submittal Guidelines (see http://www.bakergis.com/kyBroadbandProvider/ to access Data Submittal Guidelines)

  Broadband Service Availability (at least one)

  - Individual Street Addresses (Sec 3.1 & 4.1)
  - Census Blocks < 2 sq mi (3.3 & 4.3)
  - Street Segments for Census Blocks > 2 sq mi (3.2 & 4.2)
  - Service Overview (Sec 3.4 & 4.4)
  - Polygonal Boundary Area(s) (Sec 3.8 & 4.8)

Middle-mile Points (Sec 3.5 & 4.5)
Community Anchor Institutions (Sec 3.7 & 4.7)
Last Mile Connection Points (Sec 3.6 & 4.6)
WISP Antennas (Sec 4.9)

Data Usability Determination

The validation results are evaluated by the outreach and aggregation persons to determine the usability of the data. If the data meets the submission specifications, it is forwarded on for data aggregation. If it is determined to be unusable, it is returned to the Broadband Service Provider for resolution. If the data can be manipulated to get it into a usable format, it is manipulated as required, and then forwarded on for data aggregation.

SBDD Data Development

Data from the Broadband Service Providers may be submitted in various formats as defined in the Data Submittal Guidelines, or in some cases unspecified formats may be accepted to help facilitate provider participation. Depending on the format of the submitted data, it is processed through one of the following processes to upgrade it to the NTIA SDBB data standards.

Spatial Data

After validation and any required manipulation of any spatial data submitted by the Broadband Service Providers, it is georeferenced and simply loaded into the appropriate NTIA geodatabase feature class.

Address Data Geocoding

If not already in the standard address point template, the provider tabular address data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. ArcGIS geocoding tools are then utilized geospatially locate the address points for the tabular records. Interactive address rematching is performed against two additional street centerline datasets as needed to increase geocoding matching results. The NTIA deliverable is the geocoded address point geodatabase table. The geocoded address points are also subsequently aggregated to the census block or road segment feature class for public web map display.

Census Block Aggregation

If not already in the standard census block template, the provider tabular census block data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider tabular census block records are then joined to the geodatabase 2000 U.S. Census Block. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination. The NTIA deliverable is the census block geodatabase table.

If the list of census blocks contains blocks > 2 sq. miles then these blocks are used to select all the 2000 U.S. Census TIGER centerlines that intersect those blocks. The Census Block record data is aggregated to each Road Segment within the Census Block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination.

Road Segment Aggregation

If not already in the standard road segment template, the provider road segment data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. If the provider submittal included graphic centerline segments, these are migrated into the delivery geodatabase along with the linked attribute records. If the provider submittal was tabular road segment records only, they are then joined to the geodatabase 2000 U.S. Census TIGER centerline feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

If the provider road segment data lie within census blocks <= 2 sq. miles then the road segment data is aggregated to the census block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

Overview Data Aggregation

Provider Service Availability Areas submitted for entire county areas are loaded into the NTIA geodatabase Overview table. If not already in the standard template, the provider data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider Overview records are then joined to the geodatabase 2000 U.S. Census County feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination.

Polygonal Boundary Aggregation/Integration

Broadband Service Providers submitting polygonal service area data is handled in two ways. Wireline Provider data is aggregated to the census block feature class for areas where census blocks <= 2 sq. mi., or road segment feature class for areas where census blocks > 2 sq. mi. Wireless Provider Service Availability Areas submitted by polygonal area are simply loaded into the NTIA geodatabase Poly_Bndry feature class.

Wireline Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Depending on the area, census blocks < or => 2 sq. mi., a selection set of either census blocks or road segments that intersect the polygon boundary is created. The attributed polygon boundary is then joined with census blocks or road segments table to attribute accordingly. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination. The NTIA deliverable is the census block or road segment geodatabase table.

Wireless Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Multiple Poly_Bndry records are created for multiple Trans Tech values for each Provider. The NTIA deliverable is the polygon boundary geodatabase table.

Middle/Last Mile Data Integration

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. The NTIA deliverable is the middle or last mile geodatabase table.

Community Anchor Institution Integration

Broadband Service Providers provided some Community Anchor Institution (CAI) data with the data submittals. But the majority of the data was collected from existing GIS Layers maintained by the COT on their KYGEONET public website. Some of the data was collected by outreaching to CAIs through state agencies and their contacts, and having CAIs complete an online survey at http://www.bakerbb.com/ky_institution_survey/.

Provider CAIs

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. Address data is used to geocode locations only when Lat/Long data is not provided.

Commonwealth CAIs

CAI shapefiles were downloaded from the KYGEONET website. The shapefiles were then exported to the NTIA geodatabase CAI feature class. Various sources for obtaining broadband information for the CAIs were utilized. Various state agencies provided some of the information, i.e.; Council on Post Secondary Education (CPE) provided tabular broadband information for schools and libraries, COT provided tabular broadband information for health departments. A CAI data survey website was also deployed and the URL distributed by various state agencies to the CAI contacts. Data from all of these sources were then aggregated into the CAI geodatabase table for the NTIA deliverable.

Provider Validation

After data development, service availability maps are generated and submitted to the providers to validate their mapping results. This provides a “sign off” on the interpretation of the submitted data and extends the outreach efforts by providing a visual representation of the data to be delivered to the State and the NTIA.

Types of Provider Maps

Provider maps (Figure 2) generally consist of the following types.

Outreach Maps

Often time’s providers will send data which does not contain all the information needed for a NTIA compliant dataset. In such cases, as an aid to the outreach communication, it may be necessary to produce a map to help the provider locate their service area or verify data they have provided. These maps may take many forms, but generally are of two types:

- General Location Maps – these maps are often produced when the provider does not have a list of address or other standard submittal data and needs help defining their service area. A typical map will show counties, major roads, and towns of the general area the provider has stated as their service area. The intent of the map is to give the provider a way to markup or delineate their service area. If a provider has not provided required attribute information such as Technology of Transmission, Speed Data, etc. then it may be necessary to add a visual clue to this data like an information stamp on the map that they can easily fill out. If the provider sends the map back with a service area boundary, this can then be digitized and sent back to the provider for verification.

- Verification of Provider Supplied Boundaries – these maps are produced when the provider has sent service area boundary information which is confusing or otherwise unclear. Often these are produced when providers send CAD maps, hand drawn maps that need digitization, or lists of zip codes or counties served. A typical map will place the interpreted boundary over a location map so the provider can verify the service area. As with the General Location Map, information stamps or other visual clues may be placed on the map.

Initial Verification Maps

Once the provider data has been processed and the census block and road segment feature classes created, an Initial Verification Map is produced to give the provider a visual representation of their service area by census block. These maps enable the provider to verify their service area and make changes if necessary. Initial Verification Maps are produced using a set of standards and produced at the highest resolution necessary to convey the map information to the provider. Initial Verification Maps are also produced for Wireless Polygon areas.

Detailed Verification Maps

Providers who have questions about their service areas may request additional information to help clarify issues. In these cases it may be necessary to create a Detailed Verification Map to highlight the areas in question. Detailed Verification Maps provide the same information as Initial Verification Maps only at a higher resolution. Several maps may be needed to accurately portray an area in question.

Revised Maps

Revised maps take two forms:

- Initial or Detailed Verification Maps which have been annotated or marked-up by the provider
- Outreach produced Initial or Detailed Verification Maps incorporating provider changes

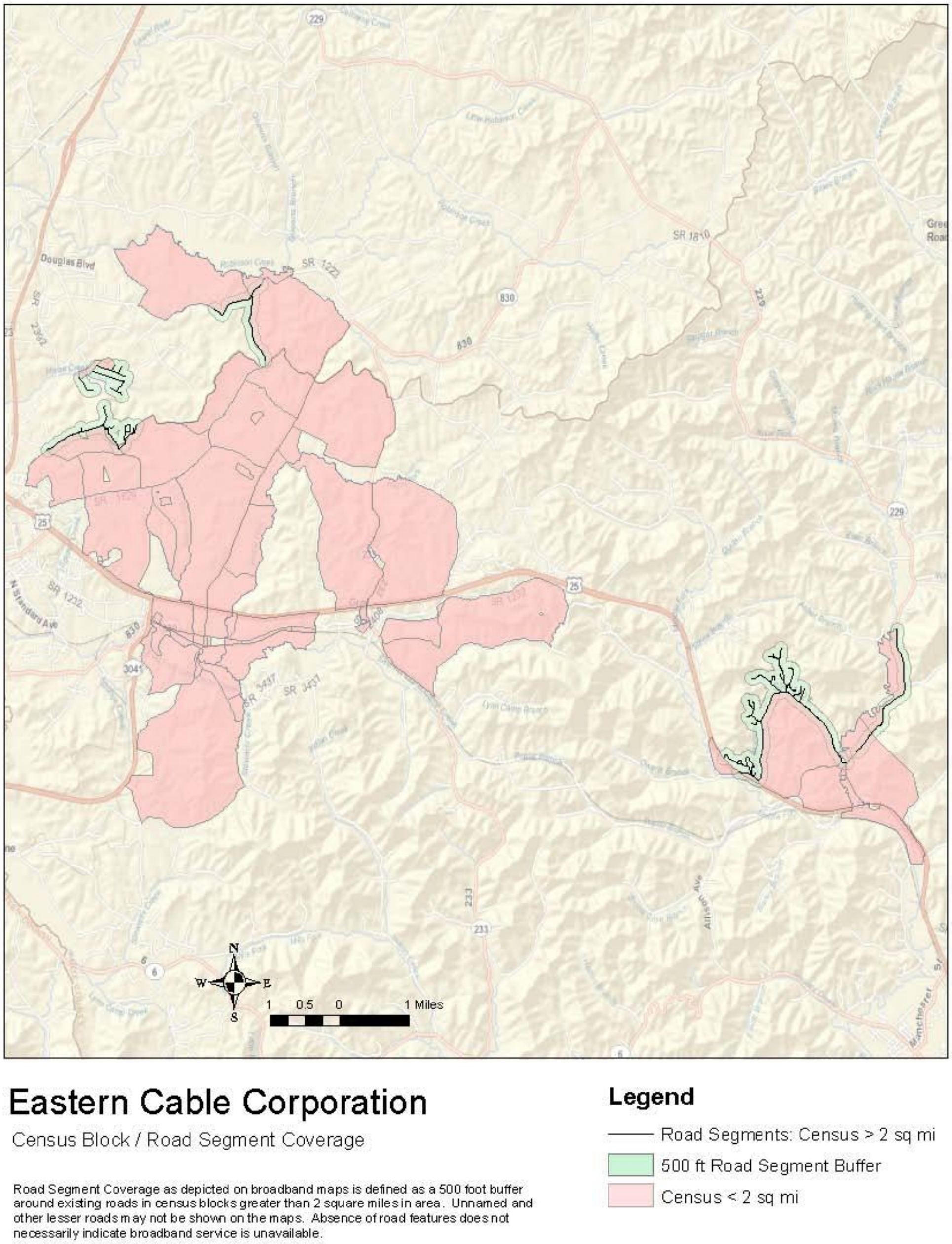


Figure 2 Provider Map

Data Validation

A critical component of the project is the validation of the data submitted by the broadband service providers. Data from various sources, as described in more detail in the following sections, is utilized to develop a level of confidence in the data received from the broadband providers.

Validation Data Set Collection and Development

This validation process employs data sets developed or acquired from different sources as described in the following sections.

Provider Feedback Loop: Maps of completed Provider service areas and data are furnished back to the Providers for confirmation of the processed/aggregated information. Feedback is integrated into the each Provider's dataset.

Strategic Networks Group (SNG) Wireline Market Intelligence Data: Data is extracted from internal and commercial databases defining geographic service areas of telephone and cable companies and locations of central office (CO) switches and areas upgraded with fiber. The geographic areas are overlaid with Census demographic data on housing unit counts and density. The areas are then modified based on standard business practices for conducting service build-out and offering broadband service relative to housing density and other variables, such as distance from CO and other infrastructure elements, type of cable franchise (e.g., Census Place vs. Unincorporated County) This represents the first pass conservative estimate of coverage.

The above methods and data sources are supplemented by other data sources and methodologies, including: 1) connectivity data points acquired from InfoUSA that include ISP and type of connection (e.g., DSL, cable modem, dial-up, wireless, fiber) providing Internet service to specific geo-coded (i.e., by Latitude and Longitude) residential addresses; 2) web-based and telephone research, including address-level service-availability queries of web sites operated by service providers and independent entities. This multi-sourced SNG dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

American Roamer Wireless Market Intelligence Data: Commercially available dataset used as an independent source to verify information submitted by Providers of wireless broadband service. This dataset is used as a validation source for provider service area coverage.

Strategic Networks Group (SNG) Targeted Online Surveys: Questionnaires (e-mail/web based) have been sent directly to businesses and households, including over-sampling in rural area and those where the above conservative estimate indicates are "unserved" and "underserved" areas. In addition to collecting broadband supply data on type of access, speeds, price, etc. questionnaires gather broadband service demand and usage data from businesses, organizations, and households. Survey responses include geographic coordinates that allow mapping and cross-reference to census blocks or street segments. This dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

Online Public Survey and Speed Test: A Broadband Mapping Public Survey Site is deployed. Site visitors are requested to provide data on broadband availability, technology, service type (e.g., speed tier) service provider name; monthly prices paid and measured downstream and upstream speeds. In addition to State promotion via press releases to the general public, the State Council on Post Secondary Education (CPE) also promoting participation on this survey to the faculty and student population. This dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

Prior Broadband Mapping: Statewide coverage areas for Cable, DSL, and Fixed Wireless providers that were aggregated as part of a previous broadband mapping effort for the Commonwealth of Kentucky are used to validate against Provider submitted data. In addition to the service areas, the DSL and Fixed Wireless layers contain general speed information that can be compared against Provider submitted data.

FCC Speed Test: The FCC speed test data includes the IP addresses for each specific speed test conducted. This IP address is queried against a web search engine to determine the Provider assigned to that address and is used as a validation source for provider service coverage and typical speeds.

Field Data Acquisition: Broadband technicians visited a sampling of census block locations to gather broadband data to be used for validation. The following criteria were taken into account when developing the census block sampling dataset:

- urban vs. rural census block characteristic
- censes block grouping
- land vs. water census block characteristic

The overarching mission of the Federal broadband stimulus program is to expand Broadband service to areas that are currently unserved and underserved. Also, the market intelligence validation sources typically represent some rural, but more urban areas. Thus, our field data collection efforts were targeted more towards the rural areas; split 90% rural, 10% urban.

Additionally, a study by Penn State University (Glasmeier 2002) notes that a large number of census block groups typically fit within any given cable or telephone company service areas. Therefore, our field sample was also based on selection of one census block per block group. The selected census block also had greater than 50% land area, versus water. There are a total of 3, 158 census block groups statewide. Using a statistical sample size calculator based upon the number of block groups in the state and +/- 4% margin of error at a 95% confidence level, the sample size is 529 census block locations (Figure 3).

For the 529 census blocks that were visited, 2455 individual wired/wireless data elements were recorded and 3024 pictures were taken at those locations. This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

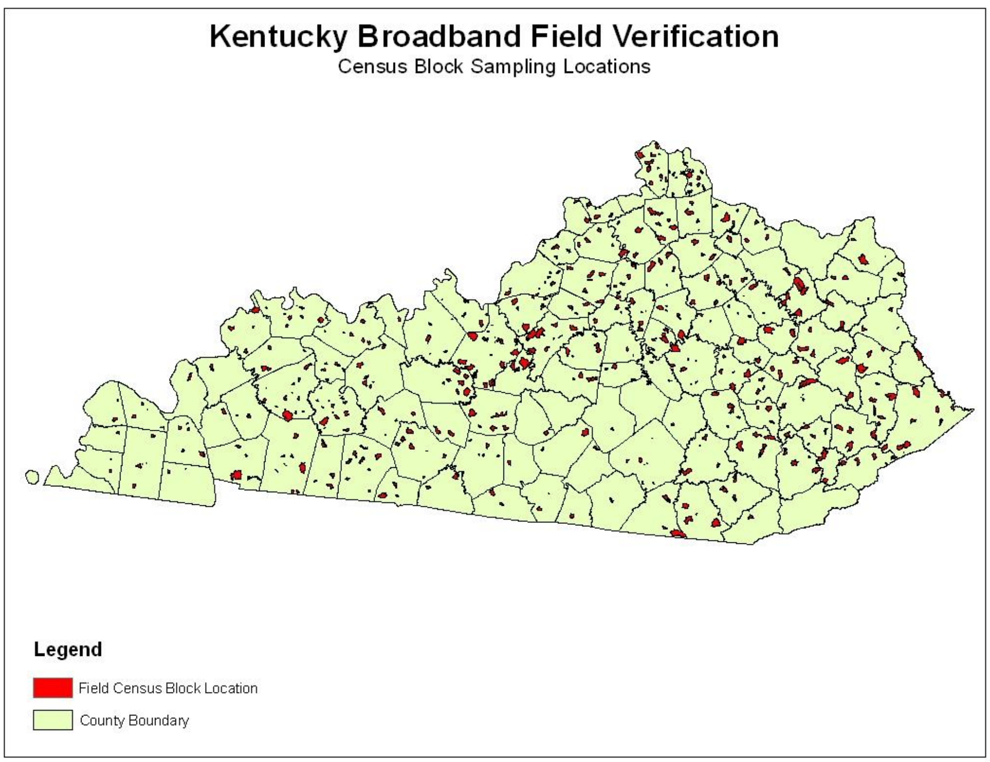


Figure 3 Field Verification Sampling Locations

For each census block in the sample set, broadband technicians collected data using Panasonic Toughbook computers, loaded with MapPoint mapping software, and a customized Microsoft Access data collection form with the ability to automatically import GPS coordinates. The sample census blocks were pre-loaded and directly accessible from MapPoint. Two types of data collection were conducted; infrastructure observation and wireless speed testing; and the results were recorded and linked to the corresponding field location coordinates within the designated sample census block. The information collected by the field broadband technicians includes:

Wireline:

- GPS coordinates
- circuit infrastructure feeding the area (copper, fiber, cable)
- collect site pictures

Wireless:

- GPS coordinates
- internet speed test

This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

Independent 3rd Party Validation: Murray State University coordinated the efforts of resources at the University of Louisville and the Kentucky Community and Technical College System (validation team) to validate the collection methods and collected data associated with the collection of broadband availability data. This validation data developed from this effort was subsequently integrated into the Statistical Evaluation and Assessment System (SEAS) to verify the data submitted by the broadband providers.

The validation team review included:

a. Validating the list of providers being used by the mapping vendor to make sure all providers are included.
b. Validating the list of state-provided and Census Tiger Data to identify the location of health facilities, schools, libraries, hospitals, universities, public buildings, etc.
c. Reviewing provider outreach methodology being used by the mapping vendor.
d. Reviewing submission options, the Non-Disclosure Agreement and the timeframe for submission.
e. Identifying Business Intelligence data sources to validate provider information.
f. Reviewing mapping vendor’s website used to collect comment/survey forms from visitors to validate the broadband coverage in their area.
g. Observing the data collection and data entry process and the ongoing steps in the development of the final products.

Once data was collected, the validation team provided a review that included:

a. Cross checking of data for accuracy
b. Statistically representative and significant samples to validate data, especially in rural and potentially underserved.

Limited field census and telephone surveys were also used to validate data in situations where the data cross checks and statistical samples are not able to validate data provided by the mapping vendor. Faculty and students from campuses of the Kentucky Community and Technical and College System (KCTCS) conducted the field census work to validate local adoption rates. KCTCS has 16 colleges and over 60 campuses to provide state-wide coverage for field census work.

The work performed, and being performed by the validation team can be summarized in four areas: (1) Audit, (2) Selective Surveys, (3) Reconcile Survey and Provider Data, and (4) Field Test to Resolve Discrepancies.

Audit – At the beginning of the project it was decided that the best way to obtain quality data was to make sure that the initial data collection was of the highest quality that it could be. The validation team concentration its initial efforts in working with the mapping vendor to get the best quality data and also the largest quantity of data that could be obtained. Mapping vendor processes were reviewed and suggested improvements provided. Web sites and documents that were to be used for data collection were evaluated and improvements suggested. Provider lists were reviewed and additional vendors or potential vendors were identified by the validation team. Once data collection began, the validation team also worked with the mapping team to increase the amount of data collected. KCTCS provided web survey sites to students and faculty across the state to increase participation. Once the data was collected the validation team worked to identify data anomalies and locations where additional data collection was required.

Selective Surveys – The data audits identified locations where there was insufficient data to make valid conclusions about broadband availability. The validation team used a call center to place selective surveys in the targeted areas within the state. In many cases the insufficient data was the result of the failure of vendors to provide data to the mapping vendor. The selective surveys provide validation of the availability of broadband or the absence of broadband within a specific area. This information allows the mapping vendor to concentrate their efforts to obtain the required data from the appropriate vendor. The call center efforts reached almost 10,000 new households that had not been sampled by other methods. The data indicated that 68.8% had computers, 64.7% has access to the Internet, and 56.7% has broadband access. The new data points were located in rural areas of the state and were focused on areas that had been underrepresented in prior data collection efforts.

Reconcile Survey and Provider Data – The mapping vendor survey data (from web surveys), the provider data, and the selective surveys done by the validation team provide an additional reconciliation of the data. While the importance of knowing where broadband is available is critical, it is just as important to know where broadband is not available. The comparison of the various data sources allow for a high confidence in identifying where broadband is available. Additionally, the data reported on the web surveys and the phone surveys identify pockets of citizens of the Commonwealth that don't have access to broadband. The validation team used the data reported by the providers, the data collected by the mapping vendor, and the validation survey data to identify areas of interest for the field data collection efforts. The focus of the field data collection efforts are areas with no reported service, areas where individuals report no availability, and areas where only mobile wireless has been reported as being available for broadband service.

Field Test to Resolve Discrepancies – The reported territory covered by wired broadband infrastructure is reliable. However, the reported territory covered by wireless broadband infrastructure (especially mobile wireless) is less reliable. Many factors can impact the availability of the wireless signal. We simply have to think about our cell phone usage and the frequency of dropped calls or no service availability. It is relatively easy for a vendor to say they provide service to an entire geographic area. The validation team developed software to check on the level of mobile wireless availability and to make sure it is at broadband speeds. The validation team drove mobile devices around the state collecting signal strength and doing periodic speed test to validate the availability of broadband. The initial focus was on areas reported to have no service and areas that only have mobile broadband reported. Test data was collected to validate the data collection process and identify required equipment.

Provider Data Validation Process

Provider Feedback Loop: Feedback received from the providers is visually inspected and integrated directly into the mapping GIS database.

Service Area Validation Data: The SNG wireline service area data is tabular and contains a separate record for each provider/technology of transmission combination with an associated census block or TIGER road segment, depending on the whether the size of the census block area (=/< or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer and Prior Mapping service area data is already in and ArcGIS data format. The validation data is then joined to the Provider service area data by census block or TIGER road segment ID. Any database records in the Provider or Validation tables that cannot be joined are output to a separate layer that indicates the areas of discrepancy between the two datasets. The joined tables are then queried to detect any speed discrepancies which are also output to a separate discrepancy layer.

Online Surveys, Field and Independent 3rd Party Validation Data: The Public and Targeted Business/Household survey, field and independent 3rd party validation data are also collected in tabular database format, and represent a specific lat/long spatial location for each record. This data is exported into ArcGIS data format, joined to the provider data, queried to validate pertinent attribution. Again, records not joined and or with detected attribution discrepancies are output to separate GIS layers.

Topology: The ArcGIS Validate Topology Tool is used to flag any topology issues in the broadband data. Flagged issues are reviewed to identify false positives and update true errors as required.

SBDD Check Submission: The NTIA-provided SBDD Check Submission tool is utilized to validate that the deliverable broadband data is consistent with the business logic rules set forth by the NTIA and a passing receipt is provided with the data submittal to NTIA.

Stakeholder Feedback: The state broadband mapping website includes a feedback function. Comments received from stakeholders are reviewed and used to validate provider data submissions.

Validation and Confidence Level Reporting

To facilitate validation and confidence level reporting, Baker deployed a validation application called Statistical Evaluation and Assessment System (SEAS) which automatically compares the multiple independent validation datasets against the broadband service provider supplied information. The SEAS uses statistical methodologies to report the confidence level in the spatial and attribute accuracy of the information. Appendix B shows the validation workflow.

The SEAS comparison is a three-part validation process:

1. Comparison of the collected validation source against the aggregated broadband provider data.
2. Match percentage calculation for each provider reported in the DataPackage.xls, “Provider Table” tab, “Comments” column.
3. Confidence score calculation displayed on the state broadband website.

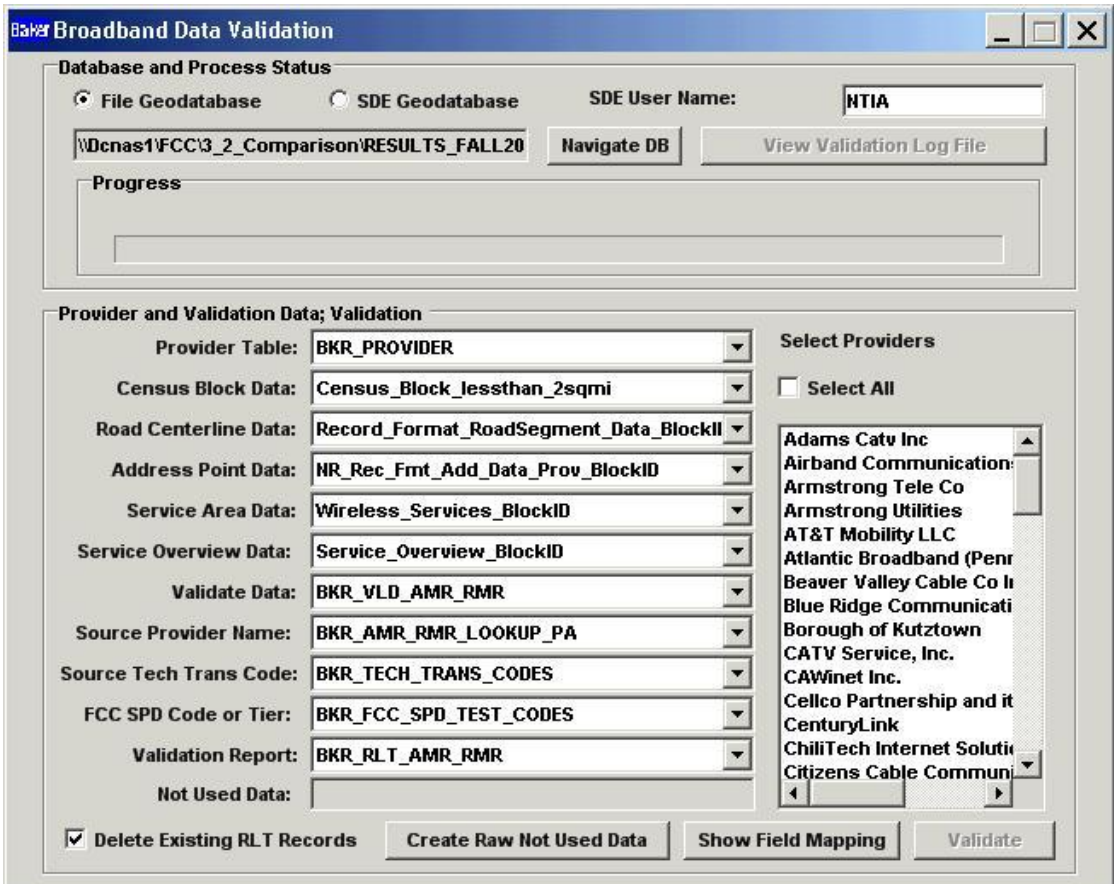


Figure 4 Statistical Evaluation and Assessment System (SEAS)

After completing all validation data source collections, SEAS is used to automatically compare the multiple validation datasets against the aggregated broadband data which came from the providers. Through the SEAS accumulation table, it produces a match percentage per broadband service record based upon the number of matches that record has against each validation source. The matched percentage for each record is the result of the total count of the matched validations for the record divided by the total validation source being compared against the record. A validation confidence rating/score is then assigned on a scale of 1 to 5 based upon the percentage of validation source matches as per the following score results:

- 1 Star = 0% - 19% Match
- 2 Stars = 20% - 39% Match
- 3 Stars = 40% - 59% Match
- 4 Stars = 60% = 79% Match
- 5 Stars = 80% - 100% Match
- "No Analytics" = No validation source available for that provider

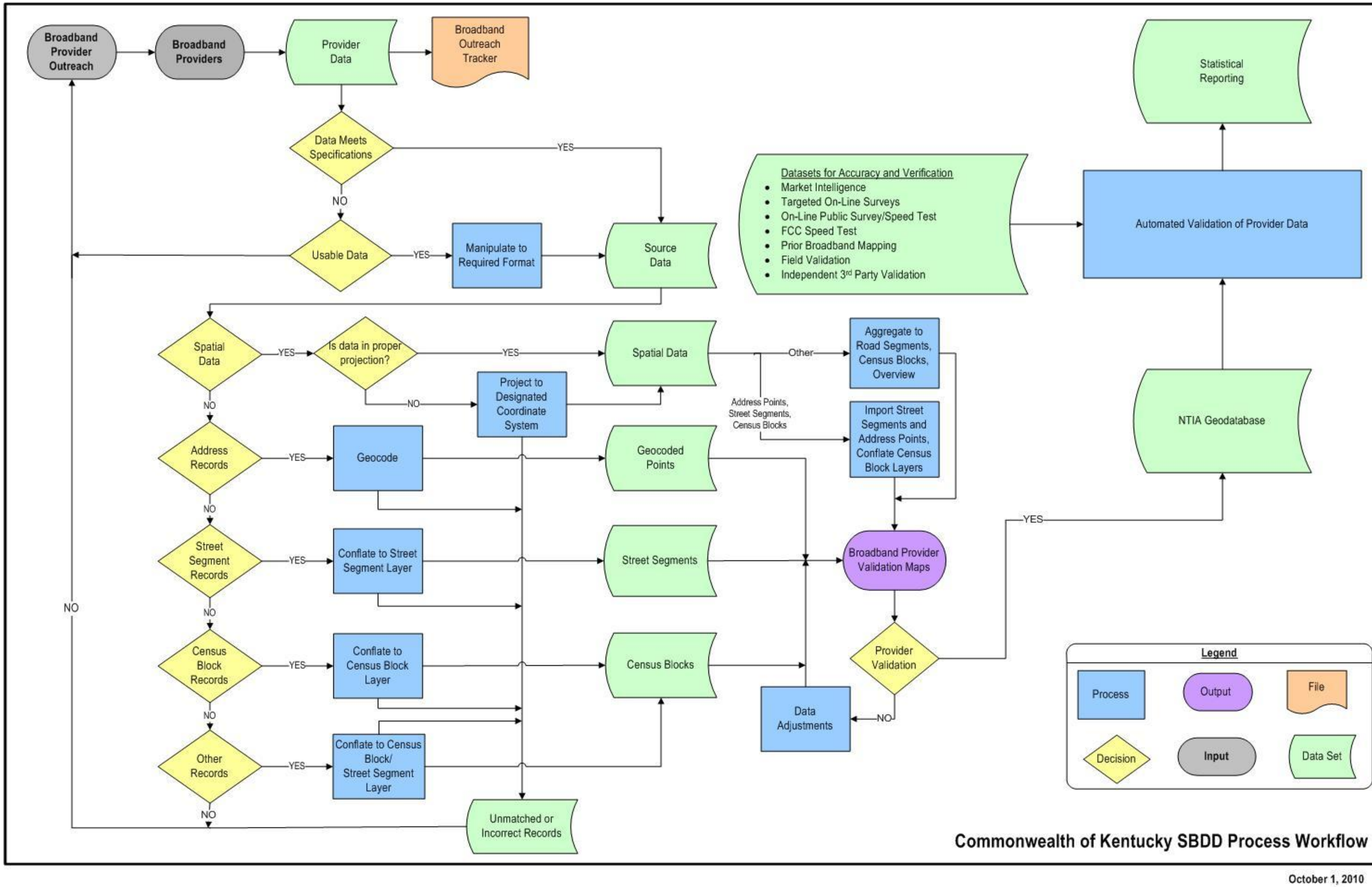
The Commonwealth's public broadband mapping website (www.bakerbb.com/kybroadbandmapping/) is updated with the confidence level results at the record level based upon the queried geographic location and the following is an example of this representation.

Provider Name	Transmission Technology	Max Download Speed	Max Upload Speed	Confidence Score
AT&T Mobility	Mobile Wireless	Greater than or e…	Greater than or e…	
Verizon	Asymmetric xDSL	Greater than or e…	Greater than or e…	NO ANALYTICS
Comcast	Cable Modem – Other	Greater than or e…	Greater than or e…	

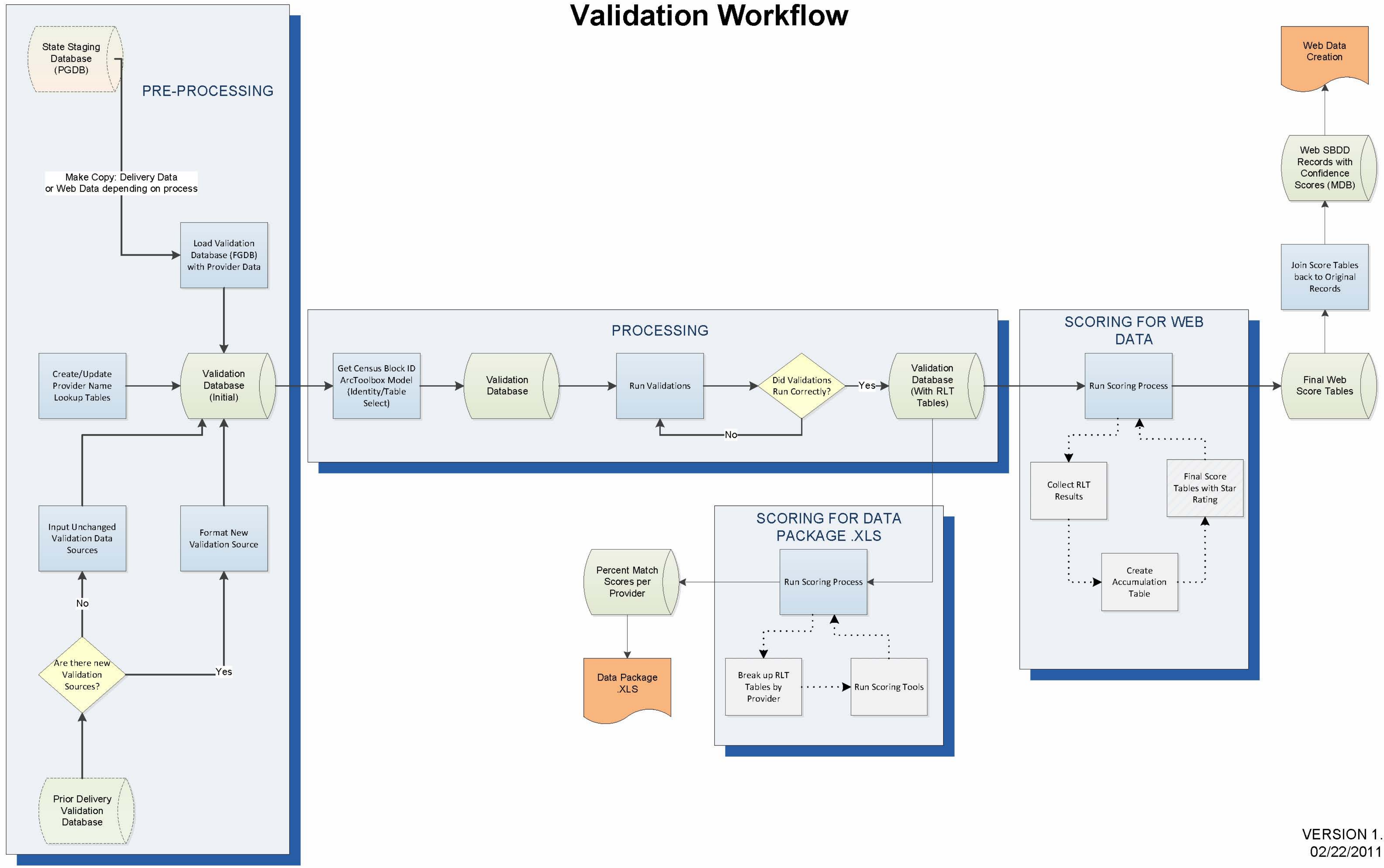
The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.

Future Validation

Audit of Wireless Broadband Availability Reporting: Wireless coverage will be evaluated using a contour calculation tool, with key inputs being transmitter location and, where available, data on spectrum power levels and other relevant transmission factors provided by carriers and/or supplemented by data available from public web sites and other sources. Data will then be input to a contour calculation tool to provide estimates of fixed wireless broadband coverage areas. This dataset is used as a source to determine gaps in provider wireless service area coverage. The Prior Mapping data is also used as a validation source for gap analysis.


Broadband Provider Outreach
Broadband Providers
Provider Data
Broadband Outreach Tracker
Data Meets Specifications
YES
NO
Usable Data
YES
Manipulate to Required Format
Source Data
Datasets for Accuracy and Verification
Market Intelligence
Targeted On-Line Surveys
On-Line Public Survey/Speed Test
FCC Speed Test
Prior Broadband Mapping
Field Validation
Independent 3rd Party Validation
Automated Validation of Provider Data
Statistical Reporting
Spatial Data
YES
Is data in proper projection?
YES
NO
Project to Designated Coordinate System
Spatial Data
Other
Aggregate to Road Segments, Census Blocks, Overview
Address Points, Street Segments, Census Blocks
Import Street Segments and Address Points, Conflate Census Block Layers
NTIA Geodatabase
Address Records
Geocode
Geocoded Points
Street Segment Records
Conflate to Street Segment Layer
Street Segments
Broadband Provider Validation Maps
Census Block Records
Conflate to Census Block Layer
Census Blocks
Provider Validation
Data Adjustments
Other Records
Conflate to Census Block/ Street Segment Layer
Unmatched or Incorrect Records
Legend
Process
Output
File
Decision
Input
Data Set
Commonwealth of Kentucky SBDD Process Workflow
October 1, 2010

State Broadband Data Validation Workflow



VERSION 1.1
02/22/2011

DATA DEVELOPMENT & VALIDATION METHODOLOGIES WHITE PAPER

State of Louisiana
State Broadband Data and Development (SBDD)
Broadband Mapping Project

NTIA Data Submittal
March 31, 2011

Baker

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Introduction

The following sections of this document provide an overview of the process used for the SBDD Broadband Mapping data development for the State of Louisiana. The following narrative is depicted in Appendix A, State of Louisiana SBDD Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach

The following outreach provides the framework for communicating with Broadband Service Providers (Providers). The primary goals of the outreach approach documented herein are to:

- Promote Provider understanding and acceptance of the Broadband Mapping process, results and benefits
- Clarify NTIA Broadband Mapping requirements
- Facilitate data confidentiality agreements as required
- Minimize the submittal of invalid data
- Enhance provider understanding of the semi-annual update process
- Work with Providers to evaluate submittal options to facilitate data submittals

Data Submission Guidelines

Guidelines for the Providers submission of of Broadband Mapping Data are documented in the "Data Submission Guidelines". These Guidelines define technical requirements, submission, specifications, and coordination and documentation activities.

Louisiana Broadband Providers Website

A URL was deployed (http://broadband.louisiana.gov/providers.asp) to communicate and distribute NTIA NOFA requirements to providers along with outreach and data submittal materials including:

- NTIA NOFA and subsequent clarification
- Outreach letters to providers
- Non-Disclosure Agreement
- Quick Start Guides
- Data Submission Guidelines
- Data Transmittal Letter
- Broadband Data Submittal Templates
- TIGER Data
- Data Submittal Assistance Contact Information

Outreach Delivery Vehicles

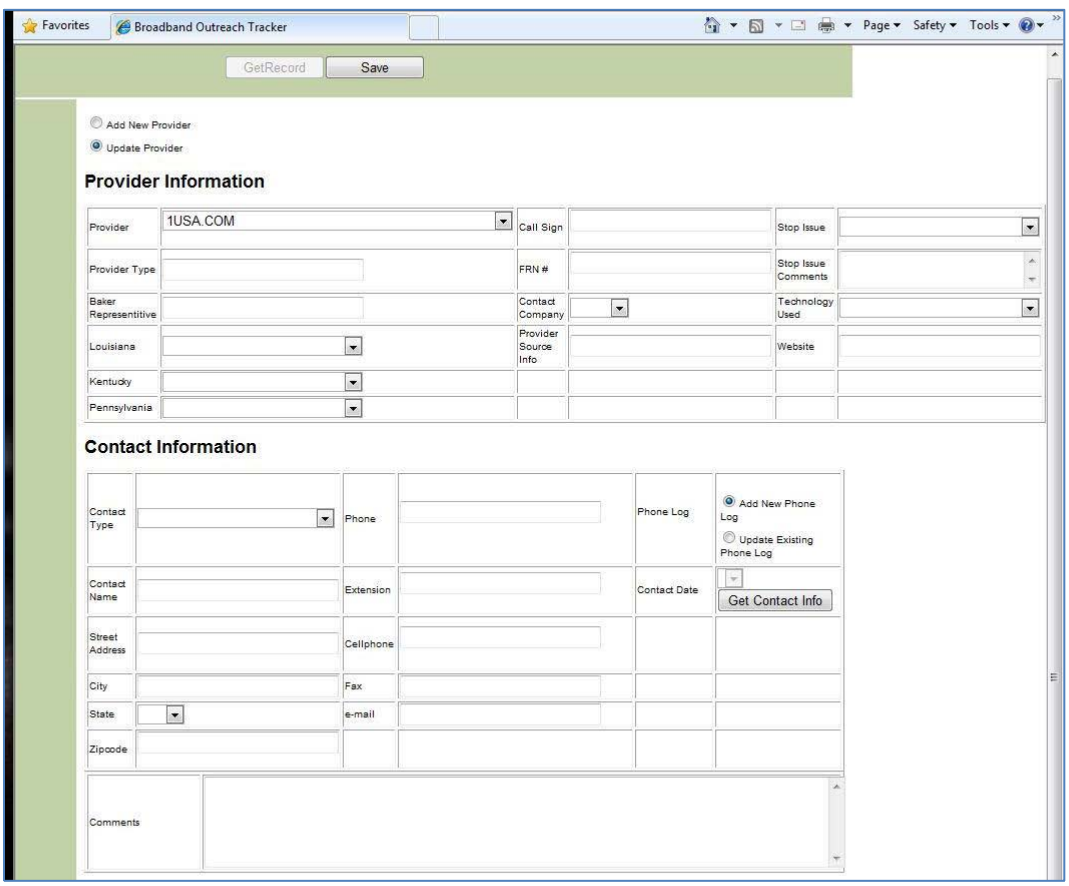
- A State Broadband Mapping Initiative Call for Data letter from the State Office of Information Technology (OIT) was emailed to all Broadband Service Providers in the State. This initial provider contact letter described the program and the role of Michael baker Jr., Inc. (Baker) acting on behalf of the OIT for Broadband Data Collection and Mapping.

- Baker distributed a follow-up letter to all Providers describing the data submittal requirements and material and help available to aid with the data submittals.
- Submittal assistance was provided to providers that needed help with data submittals.
- Presentations were conducted with various broadband provider associations to present the data submittal requirements and answer questions.
- Email communication and electronic transfer of data was encouraged to facilitate a faster delivery of data and information.
- A URL was deployed and promoted to distribute outreach material and information concerning the Broadband Mapping Project.
- A secure FTP URL was provided for submittal of broadband data by providers.

Broadband Outreach Tracker Application

The Tracker application (Figure 1) was utilized to collect all correspondence with Providers and feedback on the effectiveness of the outreach activities by tracking items such as:

- The number and content of incoming e-mails and letters submitted from the Providers
- The number and source of comments, questions, and suggestions made by Providers
- The number and source of comments, questions, and suggestions made by attendees at Provider meetings and conference calls
- Provider contact information and data submittal status.



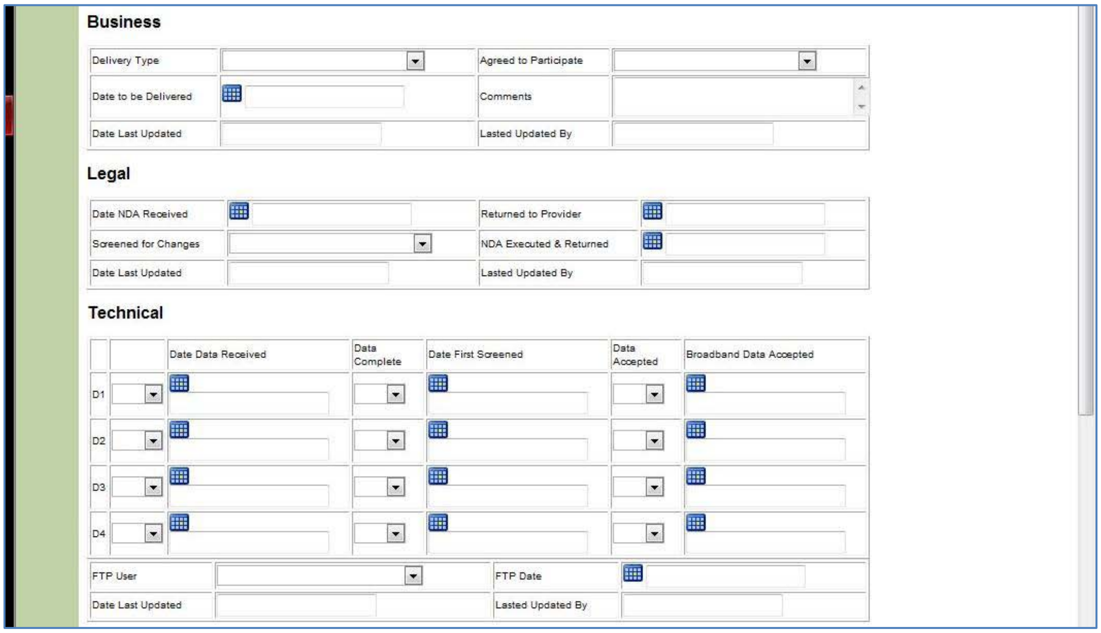


Figure 1 Broadband Outreach Tracker

Provider Submittal Validation

When a data submittal is received from a broadband service provider it is updated in the Broadband Outreach Tracker and run through an initial validation process to assure that it meets the submittal guidelines.

Validation Checklist

The following items are part of this initial data validation process:

- Verify the provider Transmittal Letter is complete and matches submitted data
- Verify the file naming conventions
- Verify each file is machine readable
- Verify data is in the correct GIS or Tabular format/file type
- Verify there are no duplicate records
- Verify each field is populated and no empty or NULL values are present for mandatory fields
- Verify all ID (record number points) are unique within the submittal
- Verify all attribute data is formatted according to the submittal guidelines
- Verify topology for all geospatial submissions
- Verify Metadata for all submissions
- Verify the required contact information is included
- Verify adherence to Data Submittal Guidelines (see http://broadband.louisiana.gov/providers.asp to access Data Submittal Guidelines)

  Broadband Service Availability (at least one)
  - Individual Street Addresses (Sec 3.1 & 4.1)
  - Census Blocks < 2 sq mi (3.3 & 4.3)
  - Street Segments for Census Blocks > 2 sq mi (3.2 & 4.2)
  - Service Overview (Sec 3.4 & 4.4)
  - Polygonal Boundary Area(s) (Sec 3.8 & 4.8)

Middle-mile Points (Sec 3.5 & 4.5)
Community Anchor Institutions (Sec 3.7 & 4.7)
Last Mile Connection Points (Sec 3.6 & 4.6)
WISP Antennas (Sec 4.9)

Data Usability Determination

The validation results are evaluated by the outreach and aggregation persons to determine the usability of the data. If the data meets the submission specifications, it is forwarded on for data aggregation. If it is determined to be unusable, it is returned to the Broadband Service Provider for resolution. If the data can be manipulated to get it into a usable format, it is manipulated as required, and then forwarded on for data aggregation.

SBDD Data Development

Data from the Broadband Service Providers may be submitted in various formats as defined in the Data Submittal Guidelines, or in some cases unspecified formats may be accepted to help facilitate provider participation. Depending on the format of the submitted data, it is processed through one of the following processes to upgrade it to the NTIA SDBB data standards.

Spatial Data

After validation and any required manipulation of any spatial data submitted by the Broadband Service Providers, it is georeferenced and simply loaded into the appropriate NTIA geodatabase feature class.

Address Data Geocoding

If not already in the standard address point template, the provider tabular address data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. ArcGIS geocoding tools are then utilized geospatially locate the address points for the tabular records. Interactive address rematching is performed against two additional street centerline datasets as needed to increase geocoding matching results. The NTIA deliverable is the geocoded address point geodatabase table. The geocoded address points are also subsequently aggregated to the census block or road segment feature class for public web map display.

Census Block Aggregation

If not already in the standard census block template, the provider tabular census block data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider tabular census block records are then joined to the geodatabase 2000 U.S. Census Block. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination. The NTIA deliverable is the census block geodatabase table.

If the list of census blocks contains blocks > 2 sq. miles then these blocks are used to select all the 2000 U.S. Census TIGER centerlines that intersect those blocks. The Census Block record data is aggregated to each Road Segment within the Census Block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination.

Road Segment Aggregation

If not already in the standard road segment template, the provider road segment data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. If the provider submittal included graphic centerline segments, these are migrated into the delivery geodatabase along with the linked attribute records. If the provider submittal was tabular road segment records only, they are then joined to the geodatabase 2000 U.S. Census TIGER centerline feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

If the provider road segment data lie within census blocks <= 2 sq. miles then the road segment data is aggregated to the census block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

Overview Data Aggregation

Provider Service Availability Areas submitted for entire county areas are loaded into the NTIA geodatabase Overview table. If not already in the standard template, the provider data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider Overview records are then joined to the geodatabase 2000 U.S. Census County feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination.

Polygonal Boundary Aggregation/Integration

Broadband Service Providers submitting polygonal service area data is handled in two ways. Wireline Provider data is aggregated to the census block feature class for areas where census blocks <= 2 sq. mi., or road segment feature class for areas where census blocks > 2 sq. mi. Wireless Provider Service Availability Areas submitted by polygonal area are simply loaded into the NTIA geodatabase Poly_Bndry feature class.

Wireline Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Depending on the area, census blocks < or => 2 sq. mi., a selection set of either census blocks or road segments that intersect the polygon boundary is created. The attributed polygon boundary is then joined with census blocks or road segments table to attribute accordingly. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination. The NTIA deliverable is the census block or road segment geodatabase table.

Wireless Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Multiple Poly_Bndry records are created for multiple Trans Tech values for each Provider. The NTIA deliverable is the polygon boundary geodatabase table.

Middle/Last Mile Data Integration

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. The NTIA deliverable is the middle or last mile geodatabase table.

Community Anchor Institution Integration

Broadband Service Providers provided some Community Anchor Institution (CAI) data with the data submittals. But the majority of the data was collected from existing GIS Layers from previous studies and commercial data packages.

Provider CAIs

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. Address data is used to geocode locations only when Lat/Long data is not provided.

State CAIs

CAI shapefiles were downloaded from the commercial data packages. The shapefiles were then exported to the NTIA geodatabase CAI feature class. Various sources for obtaining broadband information for the CAIs were utilized including previous broadband studies.

Provider Validation

After data development, service availability maps are generated and submitted to the providers to validate their mapping results. This provides a “sign off” on the interpretation of the submitted data and extends the outreach efforts by providing a visual representation of the data to be delivered to the State and the NTIA.

Types of Provider Maps

Provider maps (Figure 2) generally consist of the following types.

Outreach Maps

Often time’s providers will send data which does not contain all the information needed for a NTIA compliant dataset. In such cases, as an aid to the outreach communication, it may be necessary to produce a map to help the provider locate their service area or verify data they have provided. These maps may take many forms, but generally are of two types:

- General Location Maps – these maps are often produced when the provider does not have a list of address or other standard submittal data and needs help defining their service area. A typical map will show counties, major roads, and towns of the general area the provider has stated as their service area. The intent of the map is to give the provider a way to markup or delineate their service area. If a provider has not provided required attribute information such as Technology of Transmission, Speed Data, etc. then it may be necessary to add a visual clue to this data like an information stamp on the map that they can easily fill out. If the provider sends the map back with a service area boundary, this can then be digitized and sent back to the provider for verification.
- Verification of Provider Supplied Boundaries – these maps are produced when the provider has sent service area boundary information which is confusing or otherwise unclear. Often these are produced when

providers send CAD maps, hand drawn maps that need digitization, or lists of zip codes or counties served. A typical map will place the interpreted boundary over a location map so the provider can verify the service area. As with the General Location Map, information stamps or other visual clues may be placed on the map.

Initial Verification Maps

Once the provider data has been processed and the census block and road segment feature classes created, an Initial Verification Map is produced to give the provider a visual representation of their service area by census block. These maps enable the provider to verify their service area and make changes if necessary. Initial Verification Maps are produced using a set of standards and produced at the highest resolution necessary to convey the map information to the provider. Initial Verification Maps are also produced for Wireless Polygon areas.

Detailed Verification Maps

Providers who have questions about their service areas may request additional information to help clarify issues. In these cases it may be necessary to create a Detailed Verification Map to highlight the areas in question. Detailed Verification Maps provide the same information as Initial Verification Maps only at a higher resolution. Several maps may be needed to accurately portray an area in question.

Revised Maps

Revised maps take two forms:

- Initial or Detailed Verification Maps which have been annotated or marked-up by the provider
- Outreach produced Initial or Detailed Verification Maps incorporating provider changes

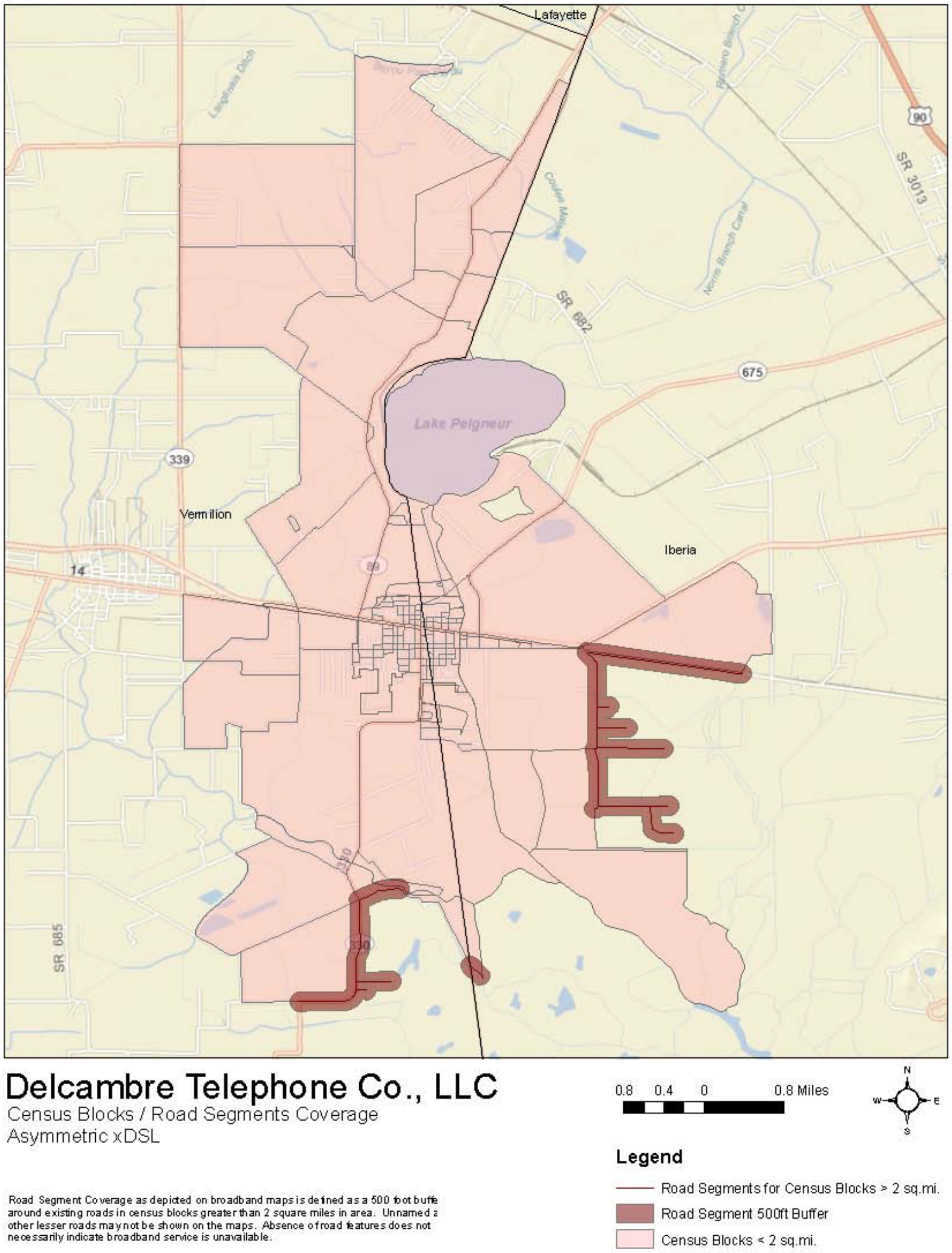


Figure 2 Provider Map

Data Validation

A critical component of the project is the validation of the data submitted by the broadband service providers. Data from various sources, as described in more detail in the following sections, is utilized to develop a level of confidence in the data received from the broadband providers.

Validation Data Set Collection and Development

This validation process employs data sets developed or acquired from different sources as described in the following sections.

Provider Feedback Loop: Maps of completed Provider service areas and data are furnished back to the Providers for confirmation of the processed/aggregated information. Feedback is integrated into the each Provider's dataset.

Strategic Networks Group (SNG) Wireline Market Intelligence Data: Data is extracted from internal and commercial databases defining geographic service areas of telephone and cable companies and locations of central office (CO) switches and areas upgraded with fiber. The geographic areas are overlaid with Census demographic data on housing unit counts and density. The areas are then modified based on standard business practices for conducting service build-out and offering broadband service relative to housing density and other variables, such as distance from CO and other infrastructure elements, type of cable franchise (e.g., Census Place vs. Unincorporated County) This represents the first pass conservative estimate of coverage.

The above methods and data sources are supplemented by other data sources and methodologies, including: 1) connectivity data points acquired from InfoUSA that include ISP and type of connection (e.g., DSL, cable modem, dial-up, wireless, fiber) providing Internet service to specific geo-coded (i.e., by Latitude and Longitude) residential addresses; 2) web-based and telephone research, including address-level service-availability queries of web sites operated by service providers and independent entities. This multi-sourced SNG dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

American Roamer Wireless Market Intelligence Data: Commercially available dataset used as an independent source to verify information submitted by Providers of wireless broadband service. This dataset is used as a validation source for provider service area coverage.

Strategic Networks Group (SNG) Targeted Online Surveys: Questionnaires (e-mail/web based) have been sent directly to businesses and households, including over-sampling in rural area and those where the above conservative estimate indicates are "unserved" and "underserved" areas. In addition to collecting broadband supply data on type of access, speeds, price, etc. questionnaires gather broadband service demand and usage data from businesses, organizations, and households. Survey responses include geographic coordinates that allow mapping and cross-reference to census blocks or street segments. This dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

Online Public Survey and Speed Test: A Broadband Mapping Public Survey Site is deployed. Site visitors are requested to provide data on broadband availability, technology, service type (e.g., speed tier) service provider name; monthly prices paid and measured downstream and upstream speeds.

Prior Broadband Mapping: Statewide coverage areas for Cable, DSL, and Fixed Wireless providers that were aggregated as part of a previous broadband mapping effort for the State of Louisiana are used to validate against Provider submitted data. In addition to the service areas, the DSL and Fixed Wireless layers contain general speed information that can be compared against Provider submitted data.

FCC Speed Test: The FCC speed test data includes the IP addresses for each specific speed test conducted. This IP address is queried against a web search engine to determine the Provider assigned to that address and is used as a validation source for provider service coverage and typical speeds.

Field Data Acquisition: Broadband technicians visited a sampling of census block locations to gather broadband data to be used for validation. The following criteria were taken into account when developing the census block sampling dataset:

- urban vs. rural census block characteristic
- censes block grouping
- land vs. water census block characteristic

The overarching mission of the Federal broadband stimulus program is to expand Broadband service to areas that are currently unserved and underserved. Also, the market intelligence validation sources typically represent some rural, but more urban areas. Thus, our field data collection efforts were targeted more towards the rural areas; split 90% rural, 10% urban.

Additionally, a study by Penn State University (Glasmeier 2002) notes that a large number of census block groups typically fit within any given cable or telephone company service areas. Therefore, our field sample was also based on selection of one census block per block group. The selected census block also had greater than 50% land area, versus water. There are a total of 3, 512 census block groups statewide. Using a statistical sample size calculator based upon the number of block groups in the state and +/- 4% margin of error at a 95% confidence level, the sample size is 557 census block locations (Figure 3).

For the 557 census blocks that were visited, 3257 individual wired/wireless data elements were recorded and 3410 pictures were taken at those locations. This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

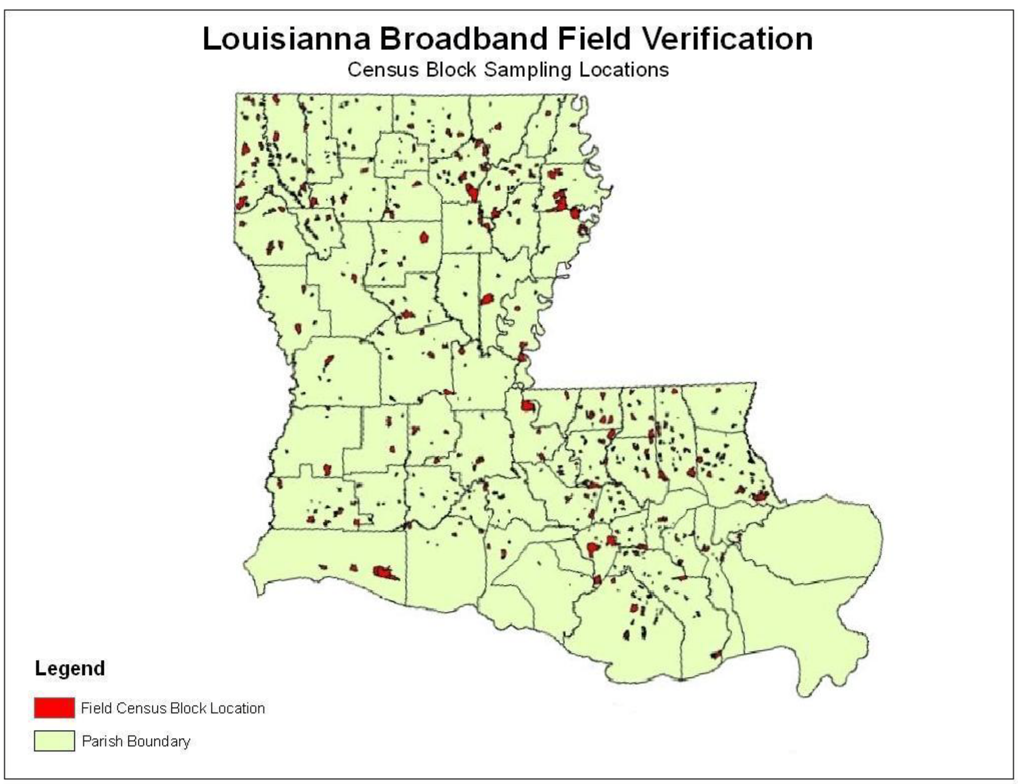


Figure 3 Field Verification Sampling Locations

For each census block in the sample set, broadband technicians collected data using Panasonic Toughbook computers, loaded with MapPoint mapping software, and a customized Microsoft Access data collection form with the ability to automatically import GPS coordinates. The sample census blocks were pre-loaded and directly accessible from MapPoint. Two types of data collection were conducted; infrastructure observation and wireless speed testing; and the results were recorded and linked to the corresponding field location coordinates within the designated sample census block. The information collected by the field broadband technicians includes:

Wireline:

- GPS coordinates
- circuit infrastructure feeding the area (copper, fiber, cable)
- collect site pictures

Wireless:

- GPS coordinates
- internet speed test

This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

Provider Data Validation Process

Provider Feedback Loop: Feedback received from the providers is visually inspected and integrated directly into the mapping GIS database.

Service Area Validation Data: The SNG wireline service area data is tabular and contains a separate record for each provider/technology of transmission combination with an associated census block or TIGER road segment, depending on the whether the size of the census block area (=/< or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer and Prior Mapping service area data is already in and ArcGIS data format. The validation data is then joined to the Provider service area data by census block or TIGER road segment ID. Any database records in the Provider or Validation tables that cannot be joined are output to a separate layer that indicates the areas of discrepancy between the two datasets. The joined tables are then queried to detect any speed discrepancies which are also output to a separate discrepancy layer.

Online Surveys and Field Validation Data: The Public and Targeted Business/Household survey and field validation data are also collected in tabular database format, and represent a specific lat/long spatial location for each record. This data is exported into ArcGIS data format, joined to the provider data, queried to validate pertinent attribution. Again, records not joined and or with detected attribution discrepancies are output to separate GIS layers.

Topology: The ArcGIS Validate Topology Tool is used to flag any topology issues in the broadband data. Flagged issues are reviewed to identify false positives and update true errors as required.

SBDD Check Submission: The NTIA-provided SBDD Check Submission tool is utilized to validate that the deliverable broadband data is consistent with the business logic rules set forth by the NTIA and a passing receipt is provided with the data submittal to NTIA.

Stakeholder Feedback: The state broadband mapping website includes a feedback function. Comments received from stakeholders are reviewed and used to validate provider data submissions.

Validation and Confidence Level Reporting

To facilitate validation and confidence level reporting, Baker deployed a validation application called Statistical Evaluation and Assessment System (SEAS) which automatically compares the multiple independent validation datasets against the broadband service provider supplied information. The SEAS uses statistical methodologies to report the confidence level in the spatial and attribute accuracy of the information. Appendix B shows the validation workflow.

The SEAS comparison is a three-part validation process:

1. Comparison of the collected validation source against the aggregated broadband provider data.
2. Match percentage calculation for each provider reported in the DataPackage.xls, “Provider Table” tab, “Comments” column.
3. Confidence score calculation displayed on the state broadband website.

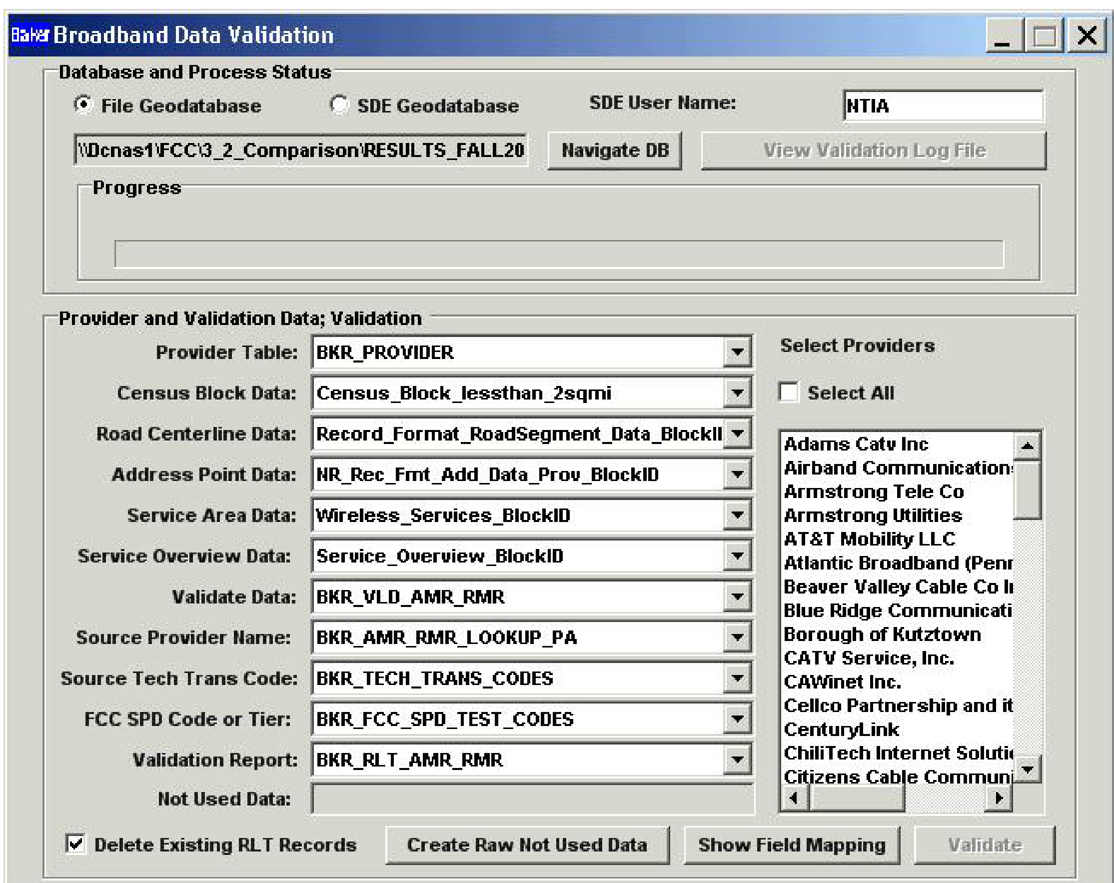


Figure 4 Statistical Evaluation and Assessment System (SEAS)

After completing all validation data source collections, SEAS is used to automatically compare the multiple validation datasets against the aggregated broadband data which came from the providers. Through the SEAS accumulation table, it produces a match percentage per broadband service record based upon the number of matches that record has against each validation source. The matched percentage for each record is the result of the total count of the matched validations for the record divided by the total validation source being compared against the record. A validation confidence rating/score is then assigned on a scale of 1 to 5 based upon the percentage of validation source matches as per the following score results:

- 1 Star = 0% - 19% Match
- 2 Stars = 20% - 39% Match
- 3 Stars = 40% - 59% Match
- 4 Stars = 60% = 79% Match
- 5 Stars = 80% - 100% Match
- "No Analytics" = No validation source available for that provider

The State's public broadband mapping website (http://broadband.louisiana.gov/providers.asp) is updated with the confidence level results at the record level based upon the queried geographic location and the following is an example of this representation.

Provider Name	Transmission Technology	Max Download Speed	Max Upload Speed	Confidence Score
AT&T Mobility	Mobile Wireless	Greater than or e…	Greater than or e…	★★★☆☆
Verizon	Asymmetric xDSL	Greater than or e…	Greater than or e…	NO ANALYTICS
Comcast	Cable Modem – Other	Greater than or e…	Greater than or e…	★★★★☆

The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.

Future Validation

Audit of Wireless Broadband Availability Reporting: Wireless coverage will be evaluated using a contour calculation tool, with key inputs being transmitter location and, where available, data on spectrum power levels and other relevant transmission factors provided by carriers and/or supplemented by data available from public web sites and other sources. Data will then be input to a contour calculation tool to provide estimates of fixed wireless broadband coverage areas. This dataset is used as a source to determine gaps in provider wireless service area coverage. The Prior Mapping data is also used as a validation source for gap analysis.

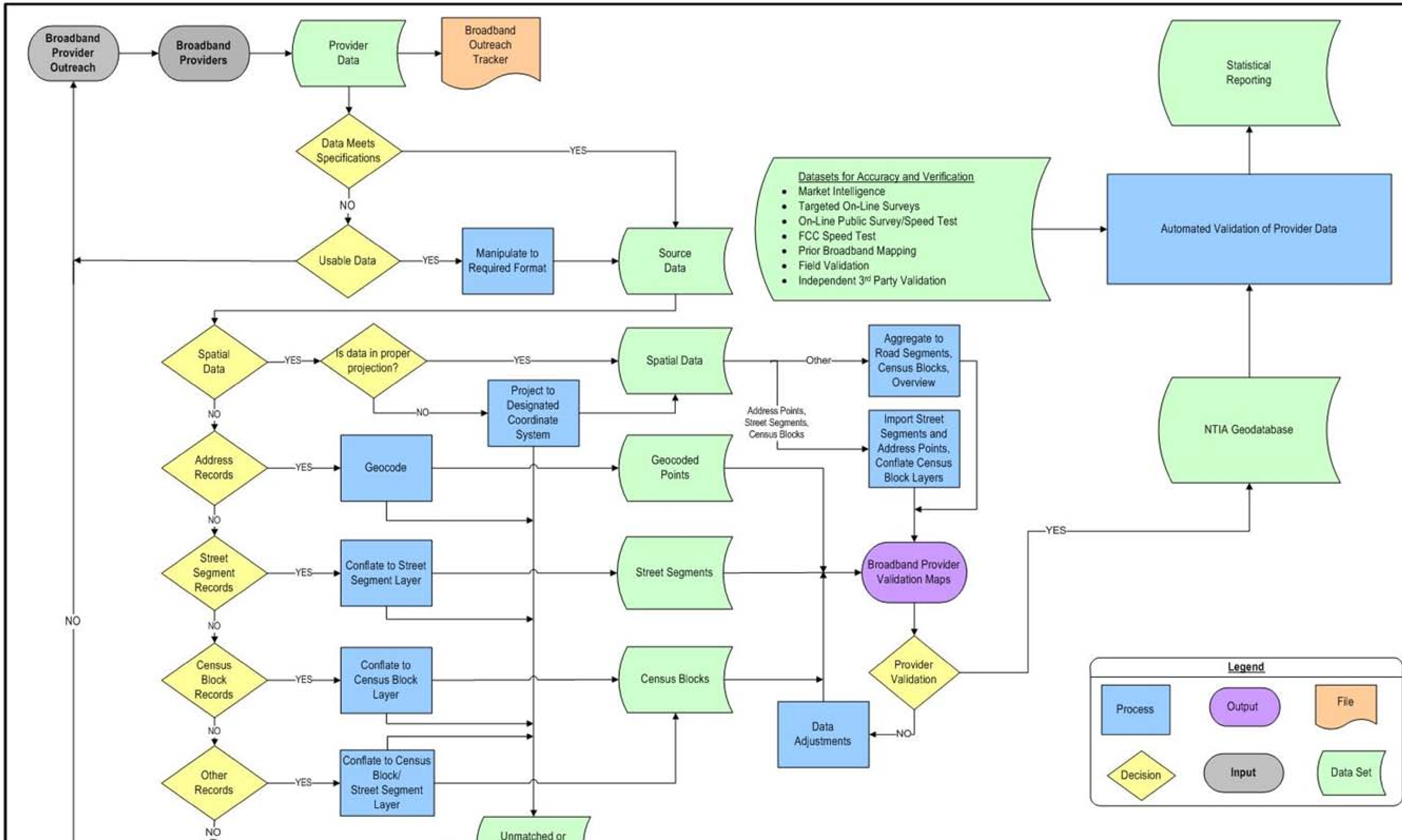
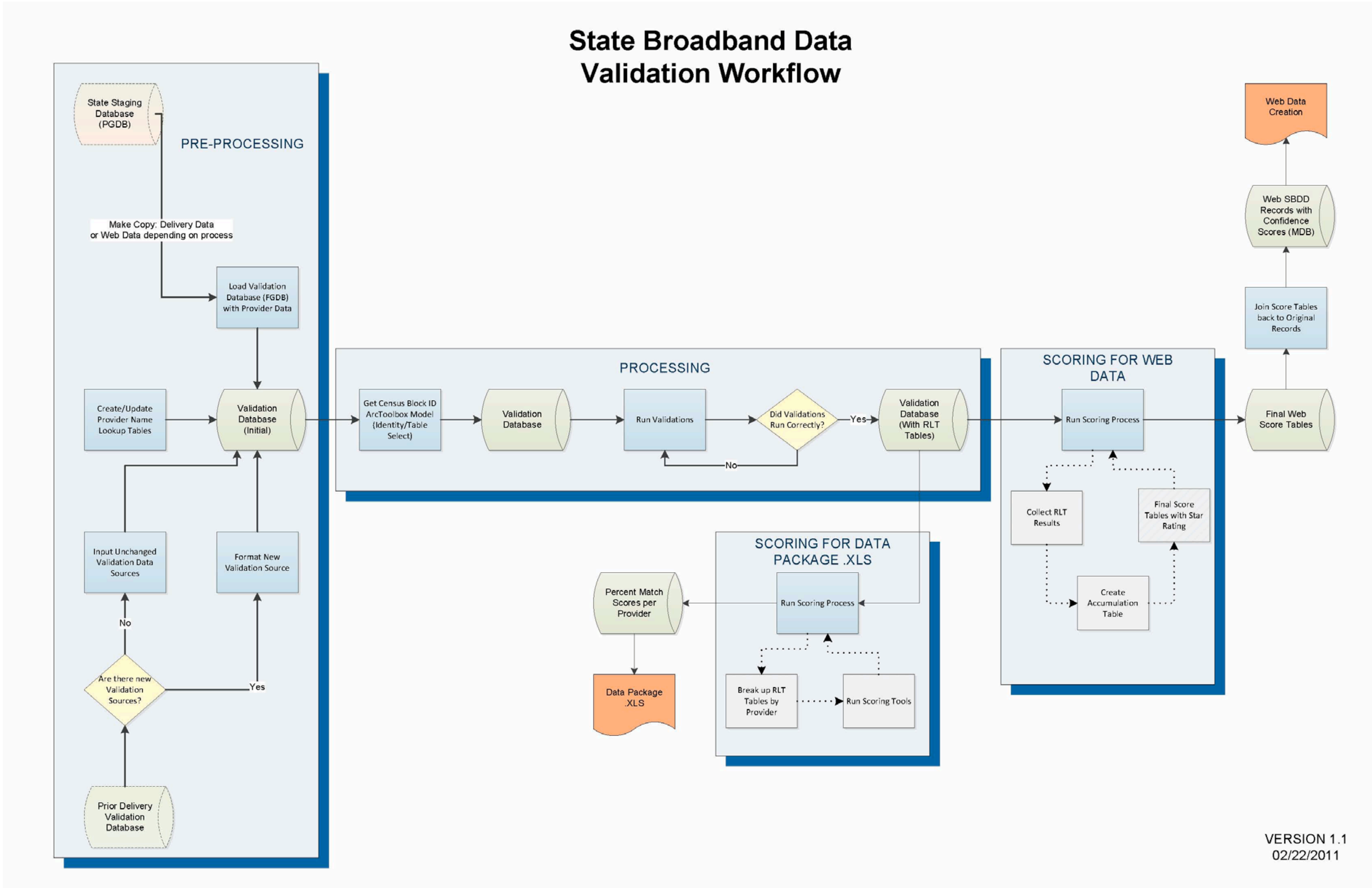


Figure 4: State of Louisiana SBDD Process Workflow

October 1, 2010


State Broadband Data
Validation Workflow
PRE-PROCESSING
State Staging Database (PGDB)
Make Copy: Delivery Data or Web Data depending on process
Load Validation Database (FGDB) with Provider Data
Create/Update Provider Name Lookup Tables
Validation Database (Initial)
Input Unchanged Validation Data Sources
Format New Validation Source
No
Are there new Validation Sources?
Yes
Prior Delivery Validation Database
PROCESSING
Get Census Block ID ArcToolbox Model (Identity/Table Select)
Validation Database
Run Validations
Did Validations Run Correctly?
Yes
No
Validation Database (With RLT Tables)
SCORING FOR WEB DATA
Run Scoring Process
Collect RLT Results
Final Score Tables with Star Rating
Create Accumulation Table
Final Web Score Tables
Join Score Tables back to Original Records
Web SBDD Records with Confidence Scores (MDB)
Web Data Creation
SCORING FOR DATA PACKAGE .XLS
Run Scoring Process
Percent Match Scores per Provider
Data Package .XLS
Break up RLT Tables by Provider
Run Scoring Tools
VERSION 1.1
02/22/2011

Methodologies Used to Create and Validate Broadband Datasets For the April 1, 2011 SBDD Submission

EXECUTIVE SUMMARY

Broadband data for Massachusetts was collected, integrated and verified by the Massachusetts Broadband Institute (MBI), a division of the Massachusetts Technology Collaborative (MTC). This data was prepared for the National Telecommunications and Information Administration (NTIA) as part of the State Broadband Data and Development (SBDD) grant program and will be displayed the National Broadband Map. This data will continue to be verified and updated to improve the quality and accuracy of the information to support MBI activities including adoption studies and last mile deployment planning.

About the MBI

The MBI is the central broadband entity for the Commonwealth of Massachusetts, created on August 4, 2008 when Governor Deval Patrick signed Chapter 231 of the Acts of 2008, *An Act Establishing and Funding the Massachusetts Broadband Institute* (the "Broadband Act"). The mission of the MBI is to extend affordable, robust high-speed Internet access to all homes, businesses, schools, libraries, medical facilities, government offices and other public places across our state.

The Broadband Act gives the MBI the authority to invest up to $40 million of state bond funds into broadband infrastructure. This bonding authority is structured as an "incentive fund" intended to stimulate private industry investments that will complement the MBI's public investments. The MBI is investing its funds in long-lived infrastructure assets, such as conduit, fiber-optic cable, and wireless towers, which will lower the cost of entry for broadband providers and make it economically feasible for such firms to provide broadband access service to currently unserved residential, business and institutional customers. For more information about the MBI and its programs and activities, visit the web site at www.massbroadband.org.

Data Summary

Data was acquired from 30 providers of residential and business broadband services in Massachusetts. Data transmission technologies in the datasets include asymmetric and symmetric DSL, other copper wireline, DOCSIS 3.0 and other cable, fiber optic, unlicensed fixed wireless, 3G and 4G mobile wireless and satellite technologies. This information was integrated and submitted to the NTIA in the following four datasets.

Dataset	# Providers	# Records
BB_Service_CensusBlock	17	269,170
BB_Service_RoadSegment	10	10,917
BB_Service_Wireless	12	20
BB_ConnectionPoint_MiddleMile	15	546

Information on broadband services at community anchor institutions (CAIs) were collected by phone, email and web surveys. Approximately 25% of the CAIs participated in the survey, of which 63% subscribe to broadband services.

Dataset	# Institutions	# Records
BB_Service_CAInstitution	4,291	4,382

DATA DEVELOPMENT – GENERAL

Data development was performed using ESRI ArcGIS 9.3 software.

Data Integration
Data were received from broadband service providers in varying formats and levels of detail. No two datasets were alike, which required a significant amount of manual review and editing to integrate the information into a common format. Although Excel and Shapefile templates were provided, very few datasets were received in the template formats and attributes were not always provided using the standardized coded values requested. In addition, attribute field names were inconsistent between datasets, contained spaces and special characters or were missing altogether. These differences prevented the use of automated data integration models to format and import data into standardized feature class templates.

All attributes were standardized so that the provider name, doing-business-as name and FCC registration numbers were consistent throughout the datasets and that attributes complied with valid value list (e.g., for technology of transmission, spectrums used, maximum advertised and typical speeds, etc.).

Geocoding
Unless otherwise specified, address data was geocoded using street addresses and zip codes from NAVTEQ 2008 Q4 streets data, which was developed though a partnership between NAVTEQ and the Massachusetts Office of Geographic Information (MassGIS) for increased geocoding accuracy and success rates for State 911 data.

Data transfer model loading
The final datasets for each provider were appended and loaded into the SBDD transfer schema. Geometry and topology checks were performed a final time and the data were checked for conformance with SBDD business rules.

DATA DEVELOPMENT – WIRELINE AVAILABILITY

This section describes the methods used to create the following datasets representing wireline broadband availability (e.g., cable, xDSL, other copper wireline, fiber optic and other unclassified wireline services) by census block and/or road segment:

- BB_Service_CensusBlock and
- BB_Service_RoadSegment

The various wireline broadband availability data formats received include:

1. Non-geographically referenced CAD files containing cable or fiber strands;
2. Geographically referenced Shapefiles containing census block polygons or road segments;
3. Excel spreadsheets or delimited text files containing census block IDs
4. Excel spreadsheets or delimited text files containing individual street addresses;
5. Excel spreadsheets or delimited text files containing street address ranges
6. Written or verbal narratives of service areas; and
7. Excel spreadsheets containing maximum advertised speeds by US Census Bureau core based statistical area (CBSA) and rural statistical area (RSA).

For areas where census blocks are less than or equal to 2 square miles in area, a template containing polygon geography for the appropriate census block vintage was used (2009 was the default census block vintage for data not tied to a census block ID). Otherwise, a template containing line geography from 2009 TIGER/Line roads that intersect 2000 vintage census blocks greater than 2 square miles in area. Associated attribute information included provider identification, technology of transmission and upload and download speeds.

The integration methods used, and described below, varied according to the source data format.

1. <u>Integrating CAD strands</u>: Cable strands submitted in CAD format were georeferenced to street centerlines and a 200 foot buffer was created from the strands. 2009 census blocks and 2009 TIGER/Line road segments (in census blocks greater than 2 square miles in area) that intersected the 200 foot buffer were classified as served and associated attribute information from tabular datasets or narratives were populated accordingly.

2. <u>Integrating census block and road segment polygons</u>: Data provided in Shapefile format required minor formatting of attribute field names and values to match the common schema.

   (a) The census block vintage was determined by reviewing ID values and attributes were imported into the census block template.

   (b) If vector data was provided from a source other than TIGER/Line roads, a spatial intersection with a 200 foot buffer was performed to transfer attributes to the corresponding TIGER/Line road segments.

3. <u>Integrating tabular data containing census block IDs</u>: Tabular information relating to census blocks referenced three different versions (or vintages) of census block data from 2000, 2008 and 2009 and were joined to the corresponding polygon geometry using the 15 or 16 character FIPS IDs. Prior to integrating the individual provider information into a single combined dataset, the 2008 and 2009 census block data were summarized and joined to the 2000 census block polygons using the first 15 characters of the FIPS ID for each unique

transmission technology type while retaining the maximum advertised and typical speeds and other associated validation and data processing attributes.

4. Integrating tabular data containing individual street addresses: Tabular data containing individual street addresses, generally representing subscriber addresses, were geocoded using NAVTEQ 2008 Q4 streets data to generate point locations. 2009 census blocks and 2009 TIGER/Line road segments (in census blocks greater than 2 square miles in area) that intersect a 200 foot buffer of the points were classified as served. Associated attributes were also imported.

5. Integrating tabular data containing street address ranges: (a) If tabular data was based on 2009 TIGER/Line roads and included a TIGER line ID, the TIGER line ID was concatenated with the address fields to create a unique ID and linked to corresponding TIGER/Line geography. Associated attributes were also imported.

   (b) If tabular data was not based on TIGER/Line roads or did not have a means for creating a unique ID to link to the TIGER/Line data, the minimum, mean and maximum left and right street addresses were geocoded using NAVTEQ 2008 Q4 streets data to generate point locations. As with the individual street address methodology above, 2009 census blocks and 2009 TIGER/Line road segments (in census blocks greater than 2 square miles in area) that intersect a 200 foot buffer of the points were classified as served. Associated attributes were also imported.

6. Integrating narrative data: (a) Location information provided in narrative form, such as the names of streets served or unserved, were incorporated by classifying the qualifying road segments as served. A spatial intersection was then performed to classify any census blocks with area less than 2 square miles as served.

   (b) Attribute information provided in narrative form generally applied to all records or an easily identifiable subset of records in a dataset and the standardized values were assigned to the appropriate field in batch.

7. Integrating spreadsheets containing speed by CBSA/RSA: The tabular data was joined to corresponding CBSA/RSA polygon geometry using the CBSA/RSA ID. Maximum advertised download and upload speed values were transferred to census block and road segment availability records from the CBSA/RSA polygon they are located within.

Data standardization

For the many datasets based on census blocks from 2008 or 2009, the attributes were summarized by the 15 digit 2000 census block ID. Maximum advertised and typical speed information were retained for each unique provider and technology combination for each 2000 census block ID and imported into a template containing 2000 vintage census block geography. Records with download speeds below 768 kbps (i.e., that don't qualify as broadband service) were removed from the final dataset.

DATA DEVELOPMENT – WIRELESS AVAILABILITY

This section describes the methods used to create the following dataset representing wireless broadband availability (e.g., fixed and mobile wireless and satellite services) by service area:

- BB_Service_Wireless

The various wireless broadband availability data formats received include:

1. Geographically referenced Shapefiles or MapInfo files containing service area polygons;
2. Geographically referenced KML raster files depicting service areas;
3. Non-geographically referenced PDF files depicting service area polygons;
4. Hard copy maps with hand-drawn service areas;
5. Excel spreadsheets containing street addresses; and
6. Emails and technical documents containing tower and signal specifications.

Associated attribute information included provider identification, technology of transmission, wireless spectrums used and upload and download speeds. In some cases, attributes were provided in a separate tabular or narrative form or had to be acquired from the provider's web site. If providers offered more than one spectrum, a separate polygon was created for each unique provider and spectrum combination.

Data integration methods used, and described below, varied according to the source data format.

1. Integrating service area polygons: Data provided in vector format required minor processing to fix geometry errors and create separate polygons for unique provider and spectrum combinations. Attribute field names and values were created, formatted and/or populated from tabular or narrative form to match the standardized template format.

2. Integrating service area raster images: Propagation model outputs provided as KML raster images were imported into the GIS system; however, the geographic reference information was not able to be preserved. The imported raster images were georeferenced in the GIS by matching the intersections of propagation area boundaries and roads in Google Earth. Once georeferenced, the raster images were converted to polygons, then tagged with and aggregated by the associated tower ID and spectrum information to create service areas polygons for each propagation model. Additional associated attribute values were populated from information provided in narrative form.

3. Integrating static PDF maps: The PDF maps containing wireless access points and service area buffers were georeferenced using known locations, such as road intersections. Point data were created from the georeferenced map and service area buffers were recreated. Individual service areas were tagged with spectrum information and aggregated into a single service area for the provider and spectrum combination. Additional associated attribute values were populated from information provided in narrative form and the resulting service area boundaries received confidence score of 1.

4. Integrating hard copy maps: Hard copy maps containing shaded service areas were reproduced by digitizing boundaries based on known map locations, such as road intersections. Associated attribute values were populated from information provided in narrative form and the resulting service area boundaries received confidence score of 1.

5. Using tabular data containing street addresses: Tabular data containing individual street addresses, representing subscriber addresses or addresses where service was determine not to be available, were geocoded using NAVTEQ 2008 Q4 streets data to generate point locations. These locations were compared to service areas and propagation models to verify boundaries.

6. Modeling with tower and signal specifications: Wireless tower and signal specifications (e.g., latitude, longitude, cell site height, cell site frequency and effective radiated power) were used as input parameters in SPLAT! radio frequency signal propagation, loss, and terrain analysis software. Service area boundaries were derived from the received power contours in the resulting propagation models. Additional associated attribute values were populated from information provided in narrative form.

Data standardization
Service area datasets for each provider were clipped to the state boundary and self-intersecting lines were fixed prior to loading into the SBDD transfer schema.

DATA VERIFICATION – WIRELINE AND WIRELESS AVAILABILITY

This section describes the methods used to verify the following datasets representing wireline broadband availability (e.g., cable, xDSL, other copper wireline, fiber optic and other unclassified wireline services) by census block and/or road segment and wireless broadband availability (e.g., fixed and mobile wireless and satellite services) by service area:

- BB_Service_CensusBlock,
- BB_Service_RoadSegment and
- BB_Service_Wireless

Verification of availability data received from providers is essential to determining the accuracy and completeness of the resulting broadband availability maps and is an ongoing process. Methodologies continue to be developed and implemented for data verification and are incorporated into a confidence ranking process. The data verification and confidence ranking methods are described below.

The data verification process employs, or will employ (designated by an asterisk *), the following methods, which supply input for the confidence ranking methodology.

1. Cable service area modeling: Cable strand data for incumbent cable providers were acquired as georeferenced MapInfo files from the MA Department of Telecommunications and Cable (DTC) in 93% of the 305 cable-served towns. The strands were imported and a 200 foot buffer was created to approximate the distance from the cable that a structure can receive service without excessive cost or delay. The 200 foot distance was selected based on observed distances between poles and the acceptable distances of structures from cable as defined in cable license agreements. Census blocks and road segments acquired from providers that intersected the resulting service area buffers for that provider were given an increased confidence score.

2. DSL service area modeling: DSL service areas were modeled from known DSL-equipped central office locations, which were geocoded using NAVTEQ 2008 Q4 streets data and refined using aerial photography, street views and bird's-eye views from Google Maps and Bing Maps. A linear network was developed, using a comprehensive roads dataset maintained by the MA Department of Transportation (MassDOT), that encompassed all roadways within 17,800 linear feet of the central office location. A 200 foot buffer of the network was created to define a maximum service distance of 18,000 feet from the central office to the service location, based on input from industry experts, with the same 200 foot distance from pole to structure that was used in the cable model. The resulting service area buffers were cropped at town boundaries except where central offices were known to serve neighboring towns. Census blocks and road segments acquired from providers that intersected the estimated service areas for that provider were given an increased confidence score.

3. Infrastructure field surveys: Targeted field work has been performed to located broadband infrastructure, such as DSL-equipped remote terminals (RTs). As with the central offices, locations were mapped using address and landmark information acquired in the field by geocoding with NAVTEQ 2008 Q4 streets data and refining with aerial photography, street views and bird's-eye views from Google Maps and Bing Maps. Although many DSL-equipped RTs have been located in the field, they have not yet been incorporated into the DSL service area model yet due to the difficulty of predicting the directional nature of services provided from those locations. However, the locations are valuable for visual review areas of DSL coverage claimed by providers that fall outside of modeled service areas to evaluate the likelihood of service from a given RT location. These visual reviews are performed by team consisting of a GIS expert and a DSL technology expert and confidence scores modified accordingly.

4. Public surveys: Broadband subscription information is collected through web-based broadband surveys from the public and from community anchor institutions (see www.massbroadband.org/mapping/survey.html). The surveys are publicized through targeted events and publications and MBI email notifications. Information collected includes location, provider name, transmission technology, price, and speed for homes, businesses, and institutions throughout the state. At this time, the survey data is only used to verify availability by provider name and transmission technology. Census blocks and road segments acquired from providers that are within 200 feet of survey locations are given an

increased confidence score. As with the service area models, the 200 foot distance represents the distance at which service can be provided without excessive cost or delay. In the future, speed test results will be summarized by census block to verify typical speed information received from providers as well.

Responses to the public survey are geocoded through Google Maps and visually refined by the user if desired. Responses to the community anchor institution surveys are linked to existing point locations maintained by the Massachusetts Office of Geographic Information (MassGIS) or affiliated agency. Community anchor institutions that have changed addresses or are not already in the MassGIS datasets are geocoded using NAVTEQ 2008 Q4 streets data and refined using a combination of institution web sites and aerial photography, street views and bird's-eye views from Google Maps and Bing Maps.

At this time, responses from the FCC's consumer broadband test are not used for data verification, but will be evaluated for inclusion in future data verification phases.

5. Provider web site information: If information acquired by providers – including availability and speed – appeared to be questionable, a search was performed on the provider's web site to confirm it. This was type of verification was only performed when uncertainties arose during visual review of the data. In the future, this type of review may be incorporated into a more structured approach to validate locations that are geographically dispersed throughout a provider's service area.

6. * Community cable and DSL feedback: In collaboration with Regional Planning Agencies (RPAs), availability maps will be generated and distributed to carefully selected community representatives, such as local broadband committee members or town officials, with local knowledge of cable and/or DSL services in their town. The community representatives will review and mark-up hard copy maps to identify services areas that extend too far or not far enough and to provide the location or address of the last known service location along a road. This will initially be implemented through a pilot project for the member communities of two Regional Planning Agencies. The pilot project will allow evaluation and refinement of the process before being rolled out statewide, with a focus on low confidence areas. Confidence scores will be modified based on feedback from the community representatives.

7. * Wireless drive studies: In coordination with local colleges, teams of student volunteers will be trained by an experienced field engineer to perform wireless drive studies. The students will drive pre-defined routes with intermittent stops to collect wireless signal location and quality information using Android phones operating QoS Solutions' QMapper and QPerf software (see www.qos-solutions.com). An initial pilot study will be performed, in the same two RPA regions as the community cable and DSL feedback projects, to test and refine the survey methodologies before they are rolled out statewide. Confidence scores will be modified based on results of the wireless drive studies.

Confidence Ranking

As availability data is verified, the verification status is documented in each individual census block or road segment record or subdivision of a wireless service area. The records are also assigned numeric values from 1 to 5 that represent the level of confidence in the likelihood that service is available at that location. When service availability for a given provider and technology is verified by an alternate source, the confidence value for that location is increased by one, up to a maximum score of 5. A value of 1 represents the lowest confidence in provider data and no corroborating information from alternate sources. A value of 5 represents 3 or more corroborating sources or confirmation through field work. Data of all confidence levels are included in the availability datasets; however, locations that are deemed to be inaccurate as a result of the data verification process may have their confidence value reduced and may be tagged as not part of the service area.

General guidelines of the confidence ranking process are as follows:

- Initial rankings: Data records submitted by providers are given an initial confidence ranking of "1" or "2" depending on the level of ambiguity in the submission method. For example, availability information provided by census block ID, street address or spatial object is given a confidence ranking of 2. Whereas, availability information provided as hand-drawn or narrative estimates may be given a confidence ranking of 1.

- Verification from alternate datasets: If availability at a given location is corroborated by an alternate dataset (such as the cable or DSL models, broadband survey responses, cable or DSL service area feedback from community representatives, or wireless drive study data interpolation), the verified location receives a 1 point increase in the confidence score for each corroborating dataset, with a minimum score of 3 and a maximum score of 5.

- Field confirmation: If availability at a given location is confirmed by known service locations identified through field work, it is given a confidence score of 5. Confirmed field locations include known infrastructure, such as DSL-equipped remote terminals, or known service availability acquired in wireless drive studies.

Provider Feedback Loop

All providers that submitted data received a written data submission report that described the format and completeness of the datasets they provided. This report included requests for additional information or alternate formats in the next submission and other data clarifications or corrections needed. Additional feedback was provided by phone or email conversations as needed. In certain cases, hard copy or PDF maps of estimated services were provided for verification and/or modification. In the future, all providers will receive maps and/or vector data for review and verification of census blocks, street segments or wireless service areas. Information on conflicting alternate data sources may also be provided for comment or challenge. This process will be standardized and formalized through the development of a web-based provider data portal.

DATA DEVELOPMENT – MIDDLE MILE INTERCONNECTION FACILITIES

This section describes the methods used to create the following dataset representing the location, technology and capacity of facilities that connect a service provider's network to another provider's network or the Internet:

- BB_ConnectionPoint_MiddleMile

Tabular data – including provider identification and facility ownership, capacity and type – were received from providers by street address or latitude and longitude. Latitude and longitude values were used to create point geometry when possible. Otherwise, street address data was geocoded using NAVTEQ 2008 Q4 streets data.

The MBI did not have alternate data sources for the verification of these datasets.

Data standardization
Facility ownership, capacity and type values were standardized to comply with valid value lists. Due to the field type of double used to store latitude and longitude, values with trailing 0's did not meet the 6 digit business rule. However, to preserve the accuracy of the data, these values were not modified to contain 6 digits. Latitude and longitude values received from providers with less than 6 digits were also not modified to prevent misrepresenting the data as more accurate than it really was.

DATA DEVELOPMENT – COMMUNITY ANCHOR INSTITUTION SERVICE SUBSCRIPTIONS

This section describes the methods used to create the following dataset representing the location and broadband service subscription of community anchor institutions throughout the state:

- BB_Service_CAInstitutions

The community anchor institution datasets deemed most relevant to broadband issues in Massachusetts were:

- K-12 schools
- Colleges and universities
- Public libraries
- Hospitals
- Community health centers
- Police and sheriffs
- Career centers
- Town halls

Existing spatial datasets containing community anchor institution names and locations were acquired from state and regional agencies. The attributes were standardized and imported into a template dataset. Missing attributes (e.g., zip codes) were acquired through web searches (e.g., on institution web sites or from the US Postal Service).

Initial data requests were made to state and regional agencies and/or associations to acquire any existing compilations of information on broadband service information at affiliated anchor institutions. Complete or almost complete datasets for career centers, state police and county sheriffs were acquired from the MA Executive Office of Labor and Workforce Development (EOLWD) and MA Executive Office of Public Safety and Security (EOPSS).

For the remainder of the anchor institutions, a campaign was implemented to acquire information through phone, email and web-based surveys from individuals associated with individual anchor institutions that were knowledgeable about its broadband services. Requests were also made through targeted outreach at events and in publications targeted at anchor institutions to increase awareness of broadband issues and participation the broadband survey. Agencies and organizations that assisted in this effort included the MA Department of Secondary and Elementary Education (ESE), MA Board of Library Commissioners (MBLC), MA Chiefs of Police Association (MCOPA), Massachusetts Municipal Association (MMA) and MA Department of Revenue (DOR), Mass League of Community Health Centers (MLCHC) and a CIO group for public and community colleges.

Data standardization

Survey questions were developed to request information that easily understood and acquired by anchor institution staff. As a result, survey results required additional formatting to standardize the information in accordance with SBDD valid values. This information included broadband subscription status, transmission technology and maximum advertised speeds were collected and standardized to comply with valid value lists. In addition, street addresses for new anchor institutions that were not in the original GIS datasets were geocoded using NAVTEQ 2008 Q4 streets data and refined using visual references such as Google satellite photography and street view imagery.

In some cases, standardized transmission technology attribute values were used by the MBI to track uncertain technology categories. These were converted in the final datasets, as shown below, to comply with SBDD valid values.

MBI Technology Values	SBDD Technology Values
1: Unknown	0: Other
42: Cable - DOCSIS Unknown	41: Cable - DOCSIS Other
72: Fixed Wireless - Unknown	70: Fixed Wireless - Unlicensed

In some cases, transmission technology was corrected to reflect the service known to be offered by the specified provider. Advertised speeds lower than the NTIA's definition of broadband were removed from the dataset. For anchor institutions that did not provide broadband information, the broadband service field was set to unknown (BBSERVICE = U).

BROADBAND CHALLENGES IN MASSACHUSETTS

Broadband access differs significantly between the eastern, central and western parts of the state as well as the cape and islands. The majority of "unserved" and "underserved" communities are in western Massachusetts, which represents approximately 1/3 of the land mass in the state. Barriers to broadband access and deployment in this region are primarily due to topography, vegetation and population density. Western Massachusetts, as well as Cape Cod, currently lacks the middle mile infrastructure needed to encourage private sector development of last mile service.

Wireline broadband availability in Massachusetts, particularly in western Massachusetts, is overstated in the current broadband datasets. This is due, in part, to generalizations resulting from census block size and population distribution in rural areas. The MBI is also working with communities to incorporate local knowledge of service availability in our feedback to broadband service providers and flagging census blocks and road segments requiring additional verification.

Wireless broadband availability in Massachusetts is also overstated. The reliability of propagation modeling has been identified as a concern in establishing wireless broadband availability. Although topography is factored into propagation models, vegetation is also a significant barrier to wireless in Massachusetts and makes it difficult to determine if service is really available at a location. In addition, at least one fixed wireless provider is not able to accept new customers within its service area due to limited capacity. Responses to the MBI survey also indicate that typical mobile wireless speeds do not always qualify as broadband.

Information provided by the community anchor institutions also requires additional review and modification. Respondents had difficulty selecting the correct transmission technology (e.g., the provider name frequently did not correspond to the technology) and often did not know the advertised speed of their service.

Maryland Broadband Mapping Initiative Spring Broadband Availability Map Data Submission Summary

April 1, 2011

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Submission Summary

The staff of the Eastern Shore Regional GIS Cooperative (ESRGC) at Salisbury University in Salisbury, Maryland, in its role as primary technical lead for the Maryland Broadband Mapping Initiative, contacted 96 facilities-based broadband service providers (BSPs), received data from 47 providers which represent 47 different companies. An overall summary of the data submission can be described as:

96 potential facilities-based broadband service providers were contacted
37 BSPs did not respond
9 BSPs responded but did not provide data
47 BSPs responded and provided data
3 BSPs responded and agreed to provide data but have not as of April 1, 2011

Of those that provided data,

22 provided only addresses
4 provided only census block information
8 provided census blocks and road segments
13 provided wireless coverage areas

In addition, 9 of the 47 responsive BSPs provided middle mile infrastructure points

Since our last submission, we lost two participants as Cavalier Telephone LLC was acquired by PAETEC Communications, Inc. and Cequel III Communications (dba SuddenLink) divested itself of broadband infrastructure, which was purchased by Shenandoah Telecommunications (dba Shentel Coverged Services). On the other hand, we have eight newly-participating providers since Fall 2010: Allied Telecom Group, LLC, Atlantech Online, Inc., Atlantic Broadband (Penn), LLC, Believe Wireless, LLC., Bloosurf, LLC, PAETEC Communications, Inc, One Communications, and Zayo Bandwidth, LLC.

Data Processing

For a specific discussion of the data processing steps for any particular BSP, please see the individual dataset report for each BSP below. In general, the data processing used to create the Spring 2011 data submission depended on the type of data provided by the BSP.

Census Blocks

To process the served census blocks, one first geocodes the provider-submitted address table (if applicable) to an address locator based upon the Maryland PropertyView dataset. Second, any unmatched addresses are geocoded to the Maryland iMap street centerline address locator. The matched addresses are then merged. Fourth, the address points are spatially joined to the Year 2000 census blocks. Then, divide the address points into the different technologies of transmission. Sixth, select those address points that are within the census blocks that are greater than 2 mi^2, exporting them as a separate feature class. Seventh, switch the selected set (thus creating all the address points in blocks that are less than 2 mi^2), and select those blocks. Eighth, import the provider-submitted table of served census blocks and merge with the address-created blocks (if applicable). Finally, export the results.

Road Segments

To process the served road segments that are within census blocks that are greater than 2 mi^2, we import the table of road segment address ranges provided by the BSP. We then take the TO address values and the FROM address values on both the left and the right side of the segment and concatenate those address numbers with the street name, type, and direction, thus creating a maximum of 4 point addresses per road segment. Those point addresses are then address matched against both the TIGER line file and the Maryland iMap geocoding service. We can then find the street segments in TIGER that are adjacent to the located points. Finally, we select those TIGER lines that intersect the census blocks that are greater than 2 mi^2. The result can be loaded into the SBDD Transfer data model.

Service Addresses

The process for creating the service addresses is the same as the census blocks (above), except that the addresses that fall within the census blocks that are greater than 2 mi^2 are kept as the key feature class.

Middle Mile Infrastructure

Processing the middle mile infrastructure is relatively trivial, in that the providers submit geographic coordinates with the middle mile attributes.

Community Anchor Institutions

The Community Anchor Institution points submitted for the Spring 2011 data collection effort are the result of a combination of three distinct strategies: municipal-level data collection efforts, state-level data collection efforts and data purchase. First, municipal-level data collection efforts involved e-mails and telephone calls to each of the 24 county GIS and/or IT departments. An email was created and sent detailing out the project and the request for broadband information for specific facilities. Many counties did not have this information readily compiled or available but were willing to assemble a GIS dataset or spreadsheet for the initiative. Other counties were only able to provide a list of community anchor institutions without the broadband information. Several counties were not able to provide any data. Several counties did not have a list of facilities so we provided them a spreadsheet with the community anchor facilities and drop-down lists for easy compilation of the broadband data. For counties that were unresponsive to the email or could not provide the information, IT managers or directors were contacted. Data was received from 14 counties with a response rate of 58% (see table below).

Jurisdiction	Data Provided?
Allegany County	Yes
Anne Arundel County	Yes
Baltimore County	Yes
Baltimore City	Yes
Calvert County	No
Caroline County	No
Carroll County	Yes
Cecil County	Yes
Charles County	No
Dorchester County	Yes
Frederick County	No
Garrett County	Yes
Harford County	Yes
Howard County	Yes
Kent County	No
Montgomery County	Yes
Prince George's County	No
Queen Anne's County	Yes
St. Mary's County	Yes
Somerset County	Yes
Talbot County	No
Washington County	Yes
Wicomico County	No
Worcester County	No

Second, a spreadsheet of State agencies from the State of Maryland website was created. Individual spreadsheets were created for each agency facilities. Emails were then sent to IT managers or directors with the spreadsheet attached. Follow-up emails and phone calls were placed. A positive response was received from the Maryland State Department of Education (MSDE), which collected broadband information from each school as one part of the agency's own survey, and the Maryland State Highway Administration. In total, 4,963 CAIs were collected from local and state sources.

In the November 2010 broadband data submission, facilities without broadband information were not included because the data model did not allow a nullable or unknown attribute for the BBService field. The updated data model now allows an attribute of unknown for the BBService field. Our efforts for the current submission involved combining and/or making facilities spatial that were previously obtained from municipal and state entities but not submitted to the NTIA because they did not have the associated broadband information.

Our third and final strategy for collecting CAI data is via purchase. In order to support the NTIA's and FCC's increased focus of telemedicine and medical uses of broadband service, we felt it was appropriate to significantly enhance our knowledge of medical-related community anchor institutions. Thus, we purchased healthcare data from DirectMail.com. They provided us a list of all companies in Maryland with SIC codes beginning with 80 (medical). The list contained 22,839 records and the cost for this data was $1,544.84. After removing duplicates, we entered a total of 21,996 healthcare facilities into the data model.

Overall, we submitted 923% more data than our previous submission, increasing the total number of records in the Maryland Community Anchor database from 2,636 to 26,959 records.

Data Verification

The ESRGC, in partnership with the Center for GIS at Towson University and as a subcontract to the SBDD grantee in Maryland, the Maryland Broadband Cooperative, conducted a number of verification and validation tests on the provider-submitted broadband availability data. In the event that inconsistencies or errors were found, no changes were made to the provider-submitted data during this data delivery round. We had expected to have the confidence to begin modifying provider-submitted data as a result of our testing/research during this round of data submissions. However, upon further deliberation, we are hesitant to make changes to the data submissions of providers without the specific guidance/direction of the NTIA as to the validity and appropriateness of our verification regime.

A maximum of fourteen data checks were conducted on each of the provider-submitted broadband availability data, listed below. Different versions of data verification tests were conducted on submissions from wireline broadband providers versus wireless providers, because of the differing submission geometry. Each check will be explained in detail below

1) Maximum down/upload speeds reported by provider
2) Typical down/upload speeds reported by provider
3) Typical down/upload speed from 2010 speed test
4) Speed tests match reported typical speeds or are within 1 speed tier
5) Census blocks/coverage areas verified by 2010 FCC and MBBMI speed tests
6) Census blocks/coverage area reported to project, but no tract reported directly to FCC

7) Tracts reported directly to FCC, but no census blocks/coverage area reported to project
8) Census blocks/coverage areas versus unserved area locations reported
9) Total number of unserved area locations reported per provider
10) Of census blocks reported as served, how many have zero population based on 2000 census data?
11) Web search verification
12) Census blocks that are outside Cable Franchise Boundary
13) Census blocks that are outside DSL boundary
14) Wireless broadband presence and speed systematic field sampling

Maximum down/upload speeds reported by provider

Facilities-based BSPs are required to provide the maximum downstream and upstream speeds by the NTIA and the NoFA of August 2009. These speeds are dependent upon the technology of transmission the BSP uses to deliver broadband service. Speeds are reported in ordinal categories, or tiers, as defined by the NoFA. They are:

Downstream Speed Tier	Upstream Speed Tier	Corresponding Speed
--	1	Less than or equal to 200 kbps
--	2	Greater than 200 kbps and less than 768 kbps
3	3	Greater than or equal to 768 kbps and less than 1.5 mbps
4	4	Greater than or equal to 1.5 mbps and less than 3 mbps
5	5	Greater than or equal to 3 mbps and less than 6 mbps
6	6	Greater than or equal to 6 mbps and less than 10 mbps
7	7	Greater than or equal to 10 mbps and less than 25 mbps
8	8	Greater than or equal to 25 mbps and less than 50 mbps
9	9	Greater than or equal to 50 mbps and less than 100 mbps
10	10	Greater than or equal to 100 mbps and less than 1 gbps
11	11	Greater than or equal to 1 gbps

For this data check, the maximum downstream/upstream speeds reported from each provider are summarized in a table. These speeds are summarized for census blocks, wireless coverage areas, road segments, and service address points

For the data submission, 47 providers (100%) reported maximum downstream/upstream speeds for census blocks, although 3 providers' reporting of maximum downstream/upstream speeds is incomplete. The lowest maximum downstream speed Greater than or equal to 768 kbps and less than 1.5 mbps, reported by 9 providers. The highest maximum downstream speed was greater than or equal to 1 gbps, reported by 4 providers. The most frequent maximum downstream speed was greater than or equal to 50 mbps and less than 100 mbps, reported by 4 providers.

Typical down/upload speeds reported by provider

BSPs are required to provide the typical downstream and upstream speeds by the NTIA and the NoFA of August 2009. Typical speeds are, per the NoFA, intended to be “the data transfer throughput rate that most subscribers to service at the maximum advertised downstream speed can achieve consistently during expected periods of heavy network usage.” These speeds are dependent upon the technology of transmission the BSP uses to deliver broadband service. Speeds are reported in ordinal categories, or tiers, as defined by the NoFA (see table above).

For this data check, the typical downstream/upstream speeds reported from each provider are summarized in a table. These speeds are summarized for census blocks, wireless coverage areas, road segments, and service address points

For the data submission, 20 providers (43%) reported typical downstream/upstream speeds. The lowest typical downstream speed was greater than 200 kbps and less than 768 kbps, reported by 1 provider. The highest typical downstream speed was greater than or equal to 1 gbps, reported by 1 provider, Level 3 Communications, LLC. The most frequent typical downstream speed of the census blocks was Greater than or equal to 3 mbps and less than 6 mbps, reported by 4 providers.

Typical down/upload speed from 2010 speed test

Beginning in April 2010, the MBBMI team and the FCC (nearly simultaneously) began collecting speed test information from broadband consumers in the state of Maryland. This speed test information included the downstream and upstream speed in kbps, the signal latency, the street address of the tester, the type of connection location (home, work, etc), the connection technology (cable/DSL, fiber optic, satellite/dial-up, or unknown – MBBMI test only), the IP address of the test machine, and the corresponding BSP. The MBBMI contracted with a company named Ookla to create their test; the FCC used both Ookla and an alternative method developed by a company named MLab.

From mid-April 2010 until December 31, 2010, 6,820 speed tests were collected by MBBMI and 10,584 PC-based speed tests were collected by the FCC (the FCC also collected mobile speed tests, see below). Of these, 1,057 MLab-based FCC speed tests were eliminated (to insure consistent speed test results and 686 were removed because they did not include a valid address. The FCC and the MBBMI speed tests were then combined and geocoded using their street address. A total of 12,540 of speed tests were used in verification processing.

The speed tests associated with each reporting BSP were extracted from the geocoded set. The downstream and upstream speeds were classified according to the NTIA's speed tiers (see table above) and the number of tests in each tier were counted. A table of those results in included in each data validation/verification report.

For the state of Maryland as a whole, the speed test results are:

Speed Tier	Number of Downstream Tests	Number of Upstream Tests
1	211	780
2	799	2,658
3	987	778
4	1,396	1,994
5	1,132	4,206
6	1,481	996
7	4,975	1,185
8	1,279	71
9	252	--
10	35	--

Speed tests match reported typical speeds or are within 1 speed tier

For the 20 providers that submitted typical speeds for their data, a comparison was conducted between the mode (the most frequent value) of the typical download speed tier from the provider area and the FCC/Ookla speed tests. In instances where the most frequent download speed tier from the speed tests matched, or was within one tier of, the typical download speed tier from the provider, the response to this statement is affirmative (7 providers). When the response to this statement is negative (10 providers), there is question about the typical download speeds that have been submitted by the provider.

Census blocks/coverage areas verified by 2010 FCC and MBBMI speed tests

Using the location of speed tests submitted through the FCC or the MBBMI speed test tools, the team sought to compare the location of broadband availability submitted by BSPs and the location of actual broadband service reported by speed test takers.

For this verification test on wireline provider census block submissions, the following statistics are reported:

1) Confirmation of census block served

The number of census blocks reported by the BSP as served that also contains a corresponding speed test

2) Census blocks served, not reported by provider
   The number of census blocks that contain a BSP-related speed test that were not reported by the BSP as served
3) Total number of served census blocks reported by provider
   The total number of unique census blocks reported as served by the BSP
4) % of served census blocks confirmed by speed test
   The number of confirmed served census blocks divided by the total number of served census blocks

For the state of Maryland, the maximum number of census blocks shown to be served by speed test data but not reported by a BSP is 62 (for Comcast Cable Communications, LLC , 0.13% of their total reported blocks). The minimum percentage of served census blocks confirmed by speed test was 0% (3 providers). The maximum percentage was 100% (Hotwire Communications, Ltd and Tata Communications (America) Inc.). On average, 1.18% of served census blocks were verified using speed tests.

For this verification test on wireless provider coverage area submissions, the following statistics are reported:

1) Confirmation of coverage area served
   - The number/percentage of computer-based speed tests that fall within the BSP's reported coverage area(s).
   - The number/percentage of mobile speed tests that fall within the BSP's reported coverage area(s).
2) Area served, not reported by provider
   - The number/percentage of computer-based speed tests that fall outside the BSP's reported coverage area(s).
   - The number/percentage of mobile speed tests that fall outside the BSP's reported coverage area(s).

For the wireless providers in the state of Maryland, one-half (7 of 14) had computer-based speed tests submitted by users. The maximum number of computer-based speed tests shown to fall within the reported coverage area of a BSP is 88 (for Verizon Wireless, 100% of their computer-based speed tests). Other BSPs that has 100% of their computer-based speed tests fall within their reported coverage area were Believe Wireless, Cricket Communications, HughesNet, and Freedom Wireless. The minimum percentage of computer-based speed tests shown to fall within the reported coverage area of a BSP was 70.7% (Sprint Nextel, 41 of 58 tests fell inside). On average, 95.5% of computer-based speed tests fell within the BSP's reported coverage area.

Regarding the number of mobile speed tests that fall within the reported coverage area of a BSP, 50% (7 of 14) of the wireless BSPs had tests and the maximum number came from Sprint

Nextel customers, with 3,316 tests within their reported coverage area. Three wireless BSPs had 100% of their mobile speed tests fall within their reported coverage area: Believe Wireless, Clearwire, and Cricket Communications. Sprint Nextel was also the BSP with the smallest percentage of tests falling within their reported coverage area – 93.9%. On average, 98.3% of mobile speed tests fell within the BSPs reported coverage areas.

Census blocks/coverage area reported to project, but no census tract directly reported to FCC
Census tracts directly reported to FCC, but no census blocks/coverage areas reported to project

Another source of data validation was the FCC's Form 477 data as of December 2009. This dataset is collected semi-annually by the FCC from BSPs, both facility-based and not facility-based. The BSPs report the number of residential and business subscribers to their broadband service per census tract. For comparison, the average census tract in Maryland contains 67 census blocks. While the Form 477 data is much coarser than the SBDD-reported data, it still should align spatially.

Therefore, as another verification check, we test the number of census blocks that are reported by wireline BSPs that have no corresponding reported census tract in the BSP's Form 477 data. Similarly, we test the number of tracts from the wireline BSP's Form 477 data that do not have corresponded census blocks reported in this initiative.

For the state of Maryland, the maximum number of census blocks that were reported as served but had no corresponding Form 477 census tract was 47,949 from Atlantech Online, Inc. On average, 2,423 census blocks (from 23 providers) had no corresponding census tract. The maximum number of census tracts that had no corresponded reported census blocks was 187 from DSLnet Communications, LLC. On average, 22 census tracts (from 23 providers) had no corresponding census blocks.

For wireless BSPs, we tested the number of census tracts that either intersect or do not intersect each reported coverage area. Because it is not possible to tell what portion of the Form 477 reported census tract may receive the wireless service, a simple intersect between served tracts and coverage areas is the only test available from these data sources. For those wireless BSPs reporting to the FCC on Form 477 (8 of 14), 100% of the served census tracts intersected the reported coverage areas.

Census blocks/coverage areas versus unserved area locations reported
Total number of unserved area locations reported per provider

At the MBBMI website (www.mdbroadbandmap.org) and at the FCC website (www.broadband.gov), residents and business owners have the opportunity to report unserved areas. These are locations, specifically addresses, at which the potential broadband customer cannot access broadband service. Those unserved area reports are taken in by the MBBMI team, geocoded according to their address, and are examined for their spatial coincidence with BSP availability coverages. For each wireline provider, the number of census blocks reported as served that contain a unserved area report are calculated, as well as the total number of unserved area reports within a BSPs availability area. For each wireless BSP, the number/percentage of unserved area reports from both the FCC and the MBBMI that fall within and outside the reported coverage area are calculated.

It is important to note that, at the present time, these unserved area reports are unverified. It is possible that broadband service may be available either at the address (but the person reporting the unserved area location was unaware of service availability), or not available at the address because of some unique configuration problem at that address specifically. It is also entirely possible that portions of a census block may be served but other portions may not.

For the state of Maryland, the maximum number of a wireline BSP's available census blocks that contain an unserved area location report is 91 (Verizon Communications, Inc.). The minimum number is 0 (17 providers). The maximum number of unserved area location reports in a wireline BSP's available area is 136 (Atlantech Online, Inc.) The following wireline providers have only 1 unserved area location report in their areas: Antietam Cable Television, Inc and Atlantic Broadband (Penn), LLC.

For the state of Maryland, the maximum percentage of unserved area locations reported from the FCC within a wireless BSP's reported coverage area is 100% (202 of 202), true for each of the satellite wireless providers (HughesNet, StarBand, and Wildblue). The maximum percentage of unserved area locations reported from the FCC within a non-satellite wireless BSP's reported coverage area is AT&T Wireless at 95.5% (193 of 202). The average percentage of unserved area locations (reported from the FCC) that fall within a wireless BSP's reported coverage area is 46.2% (93 of 202). For those unserved area locations reported by the MBBMI, the maximum percentage of unserved area locations within a wireless BSP's reported coverage area is 100% (58 of 58), true for each of the satellite wireless providers (HughesNet, StarBand, and Wildblue). The maximum percentage of unserved area locations reported from the MBBMI within a non-satellite wireless BSP's reported coverage area is AT&T Wireless at 94.8% (55 of 58). The average percentage of unserved area locations (reported from the MBBMI) that fall within a wireless BSP's reported coverage area is 41.9% (24 of 58).

Of census blocks reported as served, how many have zero population based on 2000 census data?

One expectation of the broadband availability data is that there should not be broadband available within census blocks that have no people to purchase broadband. Therefore, for each

BSP, the number of served census blocks that have 0 population as reported in the 2000 census were tallied and compared to the total number of the provider's served census blocks.

This is a particularly weak verification test for several reasons. First, the population data is not current and has likely changed significantly in the last 10 years. Second, areas that are completely commercial with no residents may still need and want broadband availability. Finally, BSPs may be anticipating future development and making service available where there are not yet any residents.

For the state of Maryland, the maximum number of zero population census blocks that were reported as served was 10,740 (Atlantech Online, Inc.). The minimum number was 1 (Tata Communications (America) Inc and Shenandoah Telecommunications). The average number of zero population census blocks that were reported as served was 1246. As a percentage, the maximum percentage of zero population census blocks reported as served was 100% (Tata Communications (America) Inc, Cogent Communications Group, and Shenandoah Telecommunications). The minimum percentage of zero population census blocks was 0 (Hotwire Communications, Ltd., Neon Optica, Inc, and Zayo Bandwidth LLC). The average percentage was 29%.

Web search verification

Some broadband service providers publish service availability query tools on their corporate websites. The MBBMI team took the opportunity to test the broadband availability areas submitted by the BSPs against the BSP's web-based service availability tools. A systematic sampling grid was created for the entire state of Maryland. A sample point was placed every 4000 meters, then the nearest property address (within at most 1000 m) was chosen. This yielded a grid of 1,472 sample points. In Baltimore City, an additional 24 sample points were added (approximately every 2000 meters) in order to have reasonable sampling density within the small area of the City. This brought the total sample points to 1,496.

For each BSP that had a web-based service availability query tool (13 providers), the sample point grid addresses were used to verify the availability of service (or lack thereof) compared to both the reported service area, the area just outside the stated service area, and a random selection of grid points across the state. The following combinations of reported service vs. queried service were tallied:

1) A census block/coverage area was reported as served and the sample was returned as served
2) A census block/coverage area was reported as served but the sample was returned as unserved
3) A census block was not reported as served (or the location was outside the wireless coverage area) and the sample was returned as not served

4) A census block was not reported as served (or the location was outside the wireless coverage area) but the sample was returned as served

The total number of sample points in categories 2 and 4 are reported as error (of commission and of omission, respectively).

For Comcast and Verizon, all 1,496 sample points were used as those two BSPs offer broadband service in all areas of the state.

For the nine wireline BSPs in the state of Maryland that have a Internet-based availability tool, the maximum omission error rate was 24.1% reported by Armstrong Cable The minimum omission error rate was 0% and was reported by Charter Communications and Starpower. The average omission error rate was 9.3%. The maximum commission error rate was 35.7% reported by Verizon Maryland. The minimum commission error rate was 0% and was reported by 3 providers. The average commission error rate was 5.8%. The maximum total error rate was 38.5% reported by Verizon Maryland The minimum total error rate was 0% reported by Starpower Communications, LLC. The average total error rate was 15.1%.

For wireless BSPs in the state of Maryland, only two offer Internet-based service availability search tools, Clearwire and Cricket Communications. Of those, Clearwire had the highest rate of omission error (5.4%; 19 of the 354 addresses tested were not reported to the MBBMI as within the coverage area, but were reported by the provider's website as served) and commission error (0.6%; 2 of 354 addresses tested were reported as served, but the website reported as not served).

Census blocks that are outside Cable Franchise Boundary

For those BSPs that provide broadband service via cable modem technology, they are (supposedly) constrained to a service area defined by a local (or several local) cable franchise boundar(ies). The MBBMI team obtained the spatial extent of the cable franchise boundaries within the state of Maryland from the Maryland Broadband Cooperative. With these cable franchise boundary areas, a test can be performed to count the number of census blocks that fall outside of a cable franchise boundary area. This may indicate an error, although it is possible that a) the cable franchise boundaries are not up-to-date or b) the BSP offers broadband service beyond the area in which they offer cable television service.

In Maryland, 11 providers are eligible for this test. The maximum number of blocks that fall outside the cable franchise boundaries is 5,755 reported by Comcast Cable Communications, LLC. This represents 11.9% of their total number of served blocks. The minimum number of "outside" blocks is 0 reported by Hotwire. The average number of blocks that fall outside the cable franchise boundary is 792.

Census blocks that are outside DSL boundary

For those BSPs that provide broadband service via digital subscriber line (DSL) technology, the general area of DSL availability is tracked by several industry groups. The MBBMI team obtained the spatial extent of the DSL availability areas within the state of Maryland from the Maryland Broadband Cooperative. With these DSL availability areas, a test can be performed to count the number of census blocks that fall outside of the DSL availability area. This may indicate an error, although it is possible that the DSL availability boundaries are not up-to-date or correct. There was no metadata concerning currentness or quality included in the DSL availability areas.

In Maryland, 8 providers are eligible for this test. The maximum number of blocks that fall outside the DSL availability areas is 9,939 reported by Verizon Maryland Inc. This represents 17.4% of their total number of served blocks. The minimum number of "outside" blocks is 3 reported by MegaPath. The average number of blocks that fall outside the DSL availability area is 3,030.

Wireless broadband presence and speed systematic field sampling

For the wireless coverage areas, many of the other data checks and tests are not appropriate to use. In the summer of 2010, the MBBMI embarked on a wireless coverage area verification project. For each of the 1,472 systematic sampling grid points (see above), a research team visited the sample address with four phones, one each for Sprint, Verizon Wireless, AT&T, and T-Mobile. A software package developed by QOS was purchased and used to test a) broadband availability, b) downstream and upstream speeds, and c) the GPS location of the test. If the QOS software malfunctioned, the FCC's mobile speed test was used to record the availability and speed with the location being recorded manually.

After the field sampling was completed, 1,466 grid points with valid samples were used to conduct this test; 6 of the original sample locations were located within large, secure facilities (ie. military bases) and were thus inaccessible. Of those, the following combinations of reported service vs. sampled service were tallied:

1) A sample point was in an area reported as served and the sample was returned as served
2) A sample point was in an area reported as served but the sample was returned as unserved
3) A sample point was not in an area reported as served and the sample was returned as not served
4) A sample point was not in an area reported as served but the sample was returned as served

The total number of sample points in categories 2 and 4 are reported as error (of commission and of omission, respectively).

For the state of Maryland, T-Mobile had the maximum number of samples that were reported as omitted (sampled as served but not within the coverage area) was 278 and the error rate was 61.5% (278 of 452 samples that had registered service). AT&T Wireless had the minimum number of samples that were reported as omitted (14 or 1.3%). The average omission error rate was 22.0%. AT&T Wireless had the maximum number of samples that were reported as committed (sampled as not served but within the coverage area) at 364. The commission error rate was 24.8% (1,466 were tested). Verizon Wireless had the minimum number of samples that were reported as committed (153 or 10.4%). The average commission error rate was 14.7%. The average total error rate was 24.5%.

Individual Provider Data Summaries

Allied Telecom Group, LLC

DBA: **Allied Telecom Group, LLC**

Data Characteristics

Date of Original Submission:	3/7/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0002154367
Type of data submitted:	Census Block Table
Census Block Count:	44834
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Join the census block table to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Speed Domains:

- Maximum Advertized and Typical Speeds changed
    - Technology of Transmission 20 – all speeds changed to tier 8 to fit domain
    - Technology of Transmission 30 - all speeds changed to tier 8 to fit domain

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
6	44834	33%
8	89668	

Max Upload Category	Count	% of Blocks
5	44834	33%
8	89668	67%

Typical down/upload speeds reported by provider:
Census Blocks

Typical Download Category	Count	% of Blocks
5	44834	33%
8	89668	67%

Typical Upload Category	Count	% of Blocks
5	44834	33%
8	89668	67%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 7
Total number of unserved areas reported per provider via broadband.maryland.gov: 12

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 18
Total number of unserved areas reported per provider via mdbroadbandmap.org: 25

Of census blocks reported as served, how many have zero population based on 2000 census data? 8907/44834 (20%)

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 11293/44834 (25%)

Antietam Cable Television, Inc.

DBA Name: Antietam Cable Television, Inc

Data Characteristics

Date of Original Submission:	7/29/2010
Date of Update Submission:	2/21/2010
Currency of Data:	December 2010
FRN:	0002154367
Type of data submitted:	Address Table
Census Block Count:	1805
Total Matched Address Points Count:	574
Unmatched Address Points:	99
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 21083
  - Number unmatched: 801
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 702
  - Number unmatched: 99
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model

- Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
8	1805	100%

Max Upload Category	Count	% of Blocks
2	1805	100%

Addresses

Max Download Category	Count	% of Points
8	574	100%

Max Upload Category	Count	% of Points
2	574	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	1%
3	3	3%
4	16	17%
5	53	56%
6	1	1%
7	3	3%
8	1	1%
9	6	6%
10	10	11%

Speed Test Upload Tier	Count	% of Tests
1	3	3%
2	17	18%
3	60	64%
4	12	13%
5	1	1%
6	1	1%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	52
Census blocks served, not reported by provider	4
Total number of served census blocks reported by provider	1805
% of served census blocks confirmed by speed test	0.0288%

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 1
Number of tracts reported to FCC, but no census blocks reported to project: 0

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 102/1805 (6%)

Web Search Verification: 41/1805 (2%) of census blocks were confirmed using online search feature of given provider.

Antietam Web Search Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	123	8%
Result is yes and census block is in served area	41	33%
Result is yes but not in a census block reported as served	21	17%
Result is no and census block is in served area	5	4%
Result is no and census block not served area	56	46%

Armstrong Holdings, Inc.
DBA Name: Armstrong Utilities, Inc.

Data Characteristics

Date of Original Submission:	3/31/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0003765617
Type of data submitted:	Census Block Table
Census Block Count:	1191
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the provided census block table to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	1191	100%

Max Upload Category	Count	% of Blocks
5	1191	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	5	14%
3	1	3%
5	4	11%
6	18	50%

Speed Test Upload Tier	Count	% of Tests
1	1	3%
2	6	17%
3	2	6%
4	26	72%

7	8	22%		6	1	3%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	52
Census blocks served, not reported by provider	4
Total number of served census blocks reported by provider	1191
% of served census blocks confirmed by speed test	4.37%

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 43
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 5
Total number of unserved areas reported per provider via broadband.maryland.gov: 5

Number or census blocks with unserved areas reported via mdbroadbandmap.org: 2
Total number of unserved areas reported per provider via mdbroadbandmap.org: 2

Of census blocks reported as served, how many have zero population based on 2000 census data? 182/1191 (15.3%)

Web Search Verification: 46/1191 (3.9%) of census blocks were confirmed using online search feature of given provider

Armstrong WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	166	11%
Result is yes and census block is in served area	46	28%
Result is yes but not in a census block reported as served	40	24%
Result is no and census block is in served area	0	0%
Result is no and census block not served area	80	48%

Census blocks that are outside Cable Franchise Boundary: 638/1191 (54%)

AT&T Mobility LLC

DBA Name: **AT&T Mobility LLC**

Data Characteristics

Date of Original Submission:	3/9/2010
Date of Update Submission:	2/1/2011
Currency of Data:	December 2010
FRN:	0004979233
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
4	2	100%

Max Upload Category	Count	% of Area
3	2	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests

Speed Test Upload Tier	Count	% of Tests

0	161	29%
3	181	32%
4	192	34%
5	27	5%

1	327	58%
2	164	29%
3	50	9%
4	17	3%
7	2	0%
8	1	0%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 560/561 (99.8%)
Number of mobile speed tests reported outside coverage area: 1/561 (0.2%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 342/342 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
193/202 (95.5%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
55/58 (94.8%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification:

ATT Wireless Verification Table	Count	Percentage
Total # of sample points	1466	
Number of sample points with results	1079	73.6%
Verified served AND BSP says served (yes,yes)	1065	98.7%
Verified served AND BSP says unserved (yes,no)	14	1.3%
Verified unserved AND BSP says served (no,yes)	364	24.8%
Verified unserved AND BSP says unserved (no,no)	24	1.6%

Atlantech Online, Inc.

DBA: **Atlantech Online, Inc.**

Data Characteristics

Date of Original Submission:	3/7/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0018854935
Type of data submitted:	LATA/Zip Codes
Census Block Count:	53222
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Select the 2000 census blocks that intersect LATA boundary and zip codes
- Add fields and load results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
10	2308	4%
4	53222	96%

Max Upload Category	Count	% of Blocks
10	2308	4%
4	53222	96%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
9	1	100%

Speed Test Upload Tier	Count	% of Tests
2	1	100%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	1
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	53222
% of served census blocks confirmed by speed test	0.00%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 47949
Number of tracts reported to FCC, but no census blocks reported to project: 5

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 84
Total number of unserved areas reported per provider via broadband.maryland.gov: 136

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 23
Total number of unserved areas reported per provider via mdbroadbandmap.org: 30

Of census blocks reported as served, how many have zero population based on 2000 census data? 10740/53222 (20%)

Web Search Verification: N/A

Atlantic Broadband (Penn), LLC

DBA Name: Atlantic BroadBand

Data Characteristics

Date of Original Submission:	3/26/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0009596883
Type of data submitted:	Address Table
Census Block Count:	3098
Total Matched Address Points Count:	63284
Unmatched Address Points:	4664
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 60669
  - Number unmatched: 7279
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 2615
  - Number unmatched: 4664
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
7	3098	100%

Max Upload Category	Count	% of Blocks
3	2925	94%
4	173	6%

Addresses

Max Download Category	Count	% of Points
7	3704	100%

Max Upload Category	Count	% of Points
3	3501	95%
4	203	5%

Typical down/upload speeds reported by provider:
Census Blocks

Typical Download Category	Count	% of Blocks
7	3098	100%

Typical Upload Category	Count	% of Blocks
3	3098	100%

Addresses

Typical Download Category	Count	% of Points
7	3704	100%

Typical Upload Category	Count	% of Points
3	3704	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	3	4%
3	4	5%
4	9	12%
5	42	55%
6	18	23%
7	1	1%

Speed Test Upload Tier	Count	% of Tests
1	1	1%
2	75	97%
3	1	1%

Speed tests match reported typical download speeds or are within 1 speed tier: No

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	48
Census blocks served, not reported by provider	7
Total number of served census blocks reported by provider	3098
% of served census blocks confirmed by speed test	1.55%

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 138
Number of tracts reported to FCC, but no census blocks reported to project: 0

Unserved areas:

Number of census blocks with unserved areas reported via broadband.maryland.gov: 1
Total number of unserved areas reported per provider via broadband.maryland.gov: 1

Number or census blocks with unserved areas reported via mdbroadbandmap.org: 2
Total number of unserved areas reported per provider via mdbroadbandmap.org: 2

Of census blocks reported as served, how many have zero population based on 2000 census data? 277/3098 (8.9%)

Web Search Verification: 87/3098 (3%) of census blocks were confirmed using online search feature of given provider

Atlantic WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	1496	100%
Result is yes and census block is in served area	87	6%
Result is yes but not in a census block reported as served	116	8%
Result is no and census block is in served area	2	0%
Result is no and census block not served area	1289	86%

Census blocks that are outside Cable Franchise Boundary: 842/3098 (27%)

Bay Country Communications, Inc.

DBA Name: Bay Country Communications, Inc.

Data Characteristics

Date of Original Submission:	8/9/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0020136552
Type of data submitted:	Census Block Table
Census Block Count:	846
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Join the provided census block table to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	846	100%

Max Upload Category	Count	% of Blocks
7	846	100%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
4	846	100%

Typical Upload Category	Count	% of Blocks
2	846	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	1	50%
4	1	50%

Speed Test Upload Tier	Count	% of Tests
2	1	50%
3	1	50%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	2
Total number of served census blocks reported by provider	846
% of served census blocks confirmed by speed test	0.00%

Form 477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 243/846 (29%)

Web Search Verification: N/A

Census blocks that are outside Cable Franchise Boundary: 144/846 (17%)

Believe Wireless, LLC.
DBA: Believe Wireless Broadband

Data Characteristics

Date of Original Submission:	3/1/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	9999
Type of data submitted:	Map
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Technology of transmission and spectrum not provided
  - Technology of transmission selected by comparing similar providers and choosing the most likely option
  - Spectrum selected by comparing similar providers providers and choosing the most likely option
- Use raster analysis to extract coverage area from map
- Repair Geometry on coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
  - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area

Max Upload Category	Count	% of Area

11	1	100%		11	1	100%

Typical down/upload speeds reported by provider:
Coverage Area

Typical Download Category	Count	% of Area
6	1	100%

Typical Upload Category	Count	% of Area
6	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	3	75%
3	1	25%

Speed Test Upload Tier	Count	% of Tests
1	2	50%
2	2	50%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 4/4 (100%)
Number of mobile speed tests reported outside coverage area: 0/4 (0%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	2	13%
4	2	13%
5	11	73%

Speed Test Upload Tier	Count	% of Tests
2	12	80%
3	2	13%
4	1	7%

Speed tests match reported typical speeds or are within 1 speed tier: Yes

#/% of computer based speed tests verifying coverage area
Number of computer based speed tests reported inside coverage area: 15/15 (100.00%)
Number of computer based speed tests reported outside coverage area: 0/15 (0.00%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
14/202 (6.9%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
2/58 (3.5%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Bloosurf

DBA: Bloosurf

Data Characteristics

Date of Original Submission:	2/28/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0019496462
Type of data submitted:	Map
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Digitize coverage area from map
- Repair Geometry on coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	28	88%
3	3	9%
4	1	3%

Speed Test Upload Tier	Count	% of Tests
1	4	13%
2	27	84%
4	1	3%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
3/202 (1.5%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
0/58 (0.0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Broadstripe, LLC

DBA Name: Broadstripe, LLC

<u>Data Characteristics</u>

Date of Original Submission:	4/14/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0003773843
Type of data submitted:	Address Table
Census Block Count:	2717
Total Matched Address Points Count:	104258
Unmatched Address Points:	231
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

<u>Data Processing</u>

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 103428
  - Number unmatched: 1061
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 830
  - Number unmatched: 231
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	2717	100%

Max Upload Category	Count	% of Blocks
4	2717	100%

Address Points

Max Download Category	Count	% of Points
7	1183	100%

Max Upload Category	Count	% of Points
4	1183	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3.00	3	7%
4.00	1	2%
5.00	8	19%
6.00	13	30%
7.00	18	42%

Speed Test Upload Tier	Count	% of Tests
1.00	3	7%
2.00	4	9%
3.00	5	12%
4.00	31	72%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	27
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	2717
% of served census blocks confirmed by speed test	0.9937%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 13
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 187/2721 (7%)

Web Search Verification: 17/2721 (1%) of census blocks were confirmed using online search feature of given provider

Broadstripe Web Search Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	85	6%
Result is yes and census block is in served area	17	20%
Result is yes but not in a census block reported as served	15	18%
Result is no and census block is in served area	0	0%
Result is no and census block not served area	53	62%

Census blocks that are outside Cable Franchise Boundary: 151/2721 (6%)

Broadview Networks Holdings, Inc.

DBA Name: Broadview Networks Holdings, Inc.

Data Characteristics

Date of Original Submission:	2/24/2010
Date of Update Submission:	7/27/2010
Currency of Data:	December 2010
FRN:	0010296853
Type of data submitted:	Address Table
Census Block Count:	590
Total Matched Address Points Count:	797
Unmatched Address Points:	14
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Incomplete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
    - Number matched: 789
    - Number unmatched: 22
- Unmatched address are geocoded to Maryland street centerline address locator
    - Number matched: 8
    - Number unmatched: 14
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
    - Export as address points to be loaded into the NTIA data model
        - Result: BB_Service_Address
    - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission

- Load exported results into the NTIA data model
  - Result: BB_Service_CensusBlock

Speed Domains:

- 9 Symmetric DSL blocks with Maximum Advertised Upstream < tier 3
  - Maximum Advertised Upstream calculated to 3
- 3 Other Copper Wireline with Maximum Advertised Downstream < tier 3
  - Maximum Advertised Downstream calculated to 3
- 2 Other Copper Wireline with Maximum Advertised Upstream < tier 2
  - Maximum Advertised Upstream calculated to 2

Data Verification

Maximum down/upload speeds reported by provider:

Census blocks

Max Download Category	Count	% of Blocks
2	3	1%
3	7	1%
4	470	83%
5	75	13%
6	9	2%

Max Upload Category	Count	% of Blocks
1	4	1%
2	84	14%
3	19	3%
4	439	71%
5	63	10%
6	8	1%

Address Points

Max Download Category	Count	% of Points
4	4	67%
5	2	33%

Max Upload Category	Count	% of Points
3	1	14%
4	4	57%
5	2	29%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	1	100%

Speed Test Upload Tier	Count	% of Tests
3	1	100%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	1
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	590
% of served census blocks confirmed by speed test	0.17%

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 65
Number of tracts reported to FCC, but no census blocks reported to project: 71

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 2
Total number of unserved areas reported per provider via broadband.maryland.gov: 2

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 2
Total number of unserved areas reported per provider via mdbroadbandmap.org: 2

Of census blocks reported as served, how many have zero population based on 2000 census data? 204/590 (35%)

Web Search Verification: N/A

Brookwood Ventures LLC

DBA Name: **Brookwood Ventures LLC**

Data Characteristics

Date of Original Submission:	3/12/2010
Date of Update Submission:	N/A
Currency of Data:	March 2010
FRN:	0010296853
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 2/2
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/2

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
0/202 (0%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
0/58 (0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Cellco Partnership and its Affiliated Entities

DBA Name: Verizon Wireless

Data Characteristics

Date of Original Submission:	3/8/2010
Date of Update Submission:	1/31/2011
Currency of Data:	December 2010
FRN:	0003290673
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
  - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
5	3	100%
6	1	100%

Max Upload Category	Count	% of Area
4	3	100%
5	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
2	3	100%
6	1	100%

Typical Upload Category	Count	% of Area
2	3	100%
5	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	1078	50%
3	600	28%
4	459	21%
5	3	0%
6	1	0%
7	2	0%

Speed Test Upload Tier	Count	% of Tests
1	442	21%
2	1382	64%
3	273	13%
4	21	1%
5	2	0%
6	2	0%
7	6	0%
8	15	1%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 2055/2143 (95.9%)
Number of mobile speed tests reported outside coverage area: 88/2143 (4.1%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	47	53%
3	29	33%
4	12	14%

Speed Test Upload Tier	Count	% of Tests
1	19	22%
2	67	76%
3	1	1%
4	1	1%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 88/88 (100.00%)
Number of computer based speed tests reported outside coverage area: 0/88 (0.00%)

Form 477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
173/202 (85.6%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
51/58 (87.9%)

Web Search Verification: N/A

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Wireless Verification:

Verizon Wireless Verification Table	**Count**	**Percentage**
Total # of sample points	1466	
Number of sample points with results	1152	78.6%
Verified served AND BSP says served (yes,yes)	1058	91.8%
Verified served AND BSP says unserved (yes,no)	94	8.2%
Verified unserved AND BSP says served (no,yes)	153	10.4%
Verified unserved AND BSP says unserved (no,no)	161	11.0%

Charter Communications Inc

DBA Name: Charter Communications Inc

Data Characteristics

Date of Original Submission:	3/31/2010
Date of Update Submission:	2/17/2011
Currency of Data:	January 2011
FRN:	0017179383
Type of data submitted:	Census Block Table
Census Block Count:	268
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
6	268	100%

Max Upload Category	Count	% of Blocks
3	268	100%

Road Segments

Max Download Category	Count	% of Road Segments
6	280	100%

Max Upload Category	Count	% of Road Segments
3	280	100%

Typical down/upload speeds reported by provider:

Road Segments

Typical Download Category	Count	% of Road Segments
6	280	100%

Typical Upload Category	Count	% of Road Segments
3	280	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
7	4	100%

Speed Test Upload Tier	Count	% of Tests
3	4	100%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	1
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	268
% of served census blocks confirmed by speed test	0.3731%

Form477 Verification:

Number of census blocks reported to project, but no tract reported to FCC: 0

Number of tracts reported to FCC, but no census blocks reported to project: 0

Unserved areas:

Number of census blocks with unserved areas reported via broadband.maryland.gov: 0

Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0

Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 100/268(37%)

Web Search Verification: 2/268 (0.8%) of census blocks were confirmed using online search feature of given provider

Charter Web Search Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	55	4%
Result is yes and census block is in served area	2	4%
Result is yes but not in a census block reported as served	0	0%
Result is no and census block is in served area	3	5%
Result is no and census block not served area	50	91%

Census blocks that are outside Cable Franchise Boundary: 110/268 (41%)

Clearwire Corporation

DBA Name: Clearwire Corporation

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	2/24/2011
Currency of Data:	December 2010
FRN:	0017775628
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
6	1	100%

Max Upload Category	Count	% of Area
4	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
6	1	100%

Typical Upload Category	Count	% of Area
4	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
3	2	67%
4	1	33%

Speed Test Upload Tier	Count	% of Tests
2	1	33%
3	2	67%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 3/3 (100.0%)
Number of mobile speed tests reported outside coverage area: 0/3 (0.0%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	3	6%
3	10	20%
4	5	10%
5	24	47%
6	8	16%
7	1	2%

Speed Test Upload Tier	Count	% of Tests
2	17	33%
3	34	67%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 50/51 (98.04%)
Number of computer based speed tests reported outside coverage area: 1/51 (1.96%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
28/202 (13.9%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
3/58 (5.2%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification:

Clearwire Web Search Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	354	24%
Result is yes and coverage area is in served area	128	36%
Result is yes but not in a coverage area reported as served	19	5%
Result is no and coverage area is in served area	2	1%
Result is no and coverage area is not in served area	205	58%

Wireless Verification: N/A

Cogent Communications Group

DBA Name: Cogent Communications Group

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	N/A
Currency of Data:	January 2011
FRN:	0019066034
Type of data submitted:	Address Table
Census Block Count:	3
Total Matched Address Points Count:	3
Unmatched Address Points:	3
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 3
  - Number unmatched: 3
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be joined to census blocks

Census Block Process:

- Join the address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks

Max Upload Category	Count	% of Blocks

11	3	100%	11	3	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 0
Number of tracts reported to FCC, but no census blocks reported to project: 3

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 3/3 (100%)

Web Search Verification: N/A

Comcast Corporation

DBA Name: Comcast Cable Communications, LLC

Data Characteristics

Date of Original Submission:	1/19/2010
Date of Update Submission:	3/7/2011
Currency of Data:	December 2010
FRN:	0004441663
Type of data submitted:	Census Block Table
Census Block Count:	48360
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Partial
Provided Max Typical Upload Speed:	Partial
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census blocks

Max Download Category	Count	% of Blocks
9	48360	100%

Max Upload Category	Count	% of Blocks
7	48360	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Blocks
6	48183	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	36	1%
3	66	2%
4	76	2%
5	236	7%
6	405	13%
7	2210	68%
8	185	6%
9	17	1%
10	4	0%

Speed Test Upload Tier	Count	% of Tests
1	23	1%
2	95	3%
3	172	5%
4	663	20%
5	2169	67%
6	105	3%
7	8	0%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	1612
Census blocks served, not reported by provider	62
Total number of served census blocks reported by provider	48360
% of served census blocks confirmed by speed test	3.33%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 46
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 75
Total number of unserved areas reported per provider via broadband.maryland.gov: 115

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 17
Total number of unserved areas reported per provider via mdbroadbandmap.org: 23

Of census blocks reported as served, how many have zero population based on 2000 census data? 4019/48360 (8%)

Web Search Verification:
440/48360 (1%) of census blocks were confirmed using online search feature of given provider

Comcast WebSearch Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	835	56%
Result is yes and census block is in served area	440	53%
Result is yes but not in a census block reported as served	63	8%

Result is no and census block is in served area	137	16%
Result is no and census block not served area	194	23%

Census blocks that are outside Cable Franchise Boundary: 5755/48360 (12%)

DIECA Communications, Inc.

DBA: **Covad Communication Company**

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	3/11/2011
Currency of Data:	December 2010
FRN:	0003753753
Type of data submitted:	Census Block Table
Census Block Count:	42147
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	6513	7%
4	17323	18%
5	43778	44%
6	19125	19%
7	11949	12%

Max Upload Category	Count	% of Blocks
7	48360	49%

Road Segments

Max Download Category	Count	% of Road Segments
3	52	2%
4	218	6%
5	2850	83%
6	236	7%
7	91	3%

Max Upload Category	Count	% of Road Segments
2	154	4%
3	385	11%
4	83	2%
5	2786	81%
7	39	1%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
3	11541	12%
4	14278	14%
5	60920	62%
7	11949	12%

Typical Upload Category	Count	% of Blocks
2	27629	28%
3	8181	8%
4	12295	12%
5	41795	42%
7	8788	9%

Road Segments

Typical Download Category	Count	% of Road Segments
3	187	5%
4	147	4%
5	3022	88%
7	91	3%

Typical Upload Category	Count	% of Road Segments
2	487	14%
3	52	2%
4	83	2%
5	2786	81%
7	39	1%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	5	8%
3	11	18%
4	8	13%
5	4	7%
6	2	3%

Speed Test Upload Tier	Count	% of Tests
1	11	18%
2	18	30%
4	1	2%

Speed tests match reported typical speeds or are within 1 speed tier: No

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	16
Census blocks served, not reported by provider	0

Total number of served census blocks reported by provider	42147
% of served census blocks confirmed by speed test	0.04%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 3803
Number of tracts reported to FCC, but no census blocks reported to project: 0

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 44
Total number of unserved areas reported per provider via broadband.maryland.gov: 52

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 5
Total number of unserved areas reported per provider via mdbroadbandmap.org: 6

Of census blocks reported as served, how many have zero population based on 2000 census data? 7908/42147 (19%)

Web Search Verification: N/A

DSLnet Communications, LLC

DBA Name: DSLnet Communications, LLC

Data Characteristics

Date of Original Submission:	3/11/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0004324857
Type of data submitted:	Address Table
Census Block Count:	422
Total Matched Address Points Count:	855
Unmatched Address Points:	28
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 826
  - Number unmatched: 57
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 29
  - Number unmatched: 28
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results for each technology of transmission

- Load exported results into the NTIA data model
  - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census blocks

Max Download Category	Count	% of Blocks
3	102	24%
4	315	75%
5	4	1%
8	1	0%

Max Upload Category	Count	% of Blocks
2	1	0%
3	102	24%
4	315	75%
5	3	1%
8	1	0%

Address points

Max Download Category	Count	% of Points
3	2	12%
5	15	88%

Max Upload Category	Count	% of Points
1	2	12%
2	15	88%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 137/422 (32.5%)

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 20/422 (5%)

DSLnet, Inc

DBA: **DSLnet, Inc**

Data Characteristics

Date of Original Submission:	3/11/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0015321136
Type of data submitted:	Census Blocks Table
Census Block Count:	32
Total Matched Address Points Count:	64
Unmatched Address Points:	1
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
    - Number matched: 63
    - Number unmatched: 2
- Unmatched address are geocoded to Maryland street centerline address locator
    - Number matched: 1
    - Number unmatched: 1
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
    - Export as address points to be loaded into the NTIA data model
        - Result: BB_Service_Address
    - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address)address points to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission

- Load exported results into the NTIA data model
  - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
3	14	44%
4	17	53%
8	1	3%

Max Upload Category	Count	% of Blocks
2	1	3%
3	13	41%
4	17	53%
8	1	3%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 1
Number of tracts reported to FCC, but no census blocks reported to project: 197

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 13/32 (41%)

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 5/32 (16%)

Easton Utilities Commission

DBA Name: Easton Utilities Commission

Data Characteristics

Date of Original Submission:	2/5/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0003793726
Type of data submitted:	Address Table
Census Block Count:	373
Total Matched Address Points Count:	4688
Unmatched Address Points:	3
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
    - Number matched: 4554
    - Number unmatched: 137
- Unmatched address are geocoded to Maryland street centerline address locator
    - Number matched: 134
    - Number unmatched: 3
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
    - Export as address points to be loaded into the NTIA data model
        - Result: BB_Service_Address
    - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
3	199	53%
5	174	47%

Max Upload Category	Count	% of Blocks
2	350	94%
3	20	5%
4	3	1%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	4	8%
3	8	15%
4	7	13%
5	30	58%
6	1	2%
8	1	2%
10	1	2%

Speed Test Upload Tier	Count	% of Tests
1	10	19%
2	38	73%
3	3	6%
5	1	2%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	13
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	373
% of served census blocks confirmed by speed test	3.49%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 7
Number of tracts reported to FCC, but no census blocks reported to project: 0

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 34/373 (9%)

Web Search Verification: N/A

Census blocks that are outside Cable Franchise Boundary: 3/373 (1%)

FiberLight LLC

DBA Name: FiberLight LLC

Data Characteristics

Date of Original Submission:	March 2010
Date of Update Submission:	N/A
Currency of Data:	March 2010
FRN:	0014117139
Type of data submitted:	Census Block Table
Census Block Count:	574
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Join census block table to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
10	574	100%

Max Upload Category	Count	% of Blocks
10	574	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 323/574 (56%)

Web Search Verification: N/A

Freedom Wireless Broadband, LLC

DBA Name: Freedom Wireless Broadband, LLC

Data Characteristics

Date of Original Submission:	1/28/2010
Date of Update Submission:	2/25/2011
Currency of Data:	December 2010
FRN:	0018643155
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
4	1	100%

Max Upload Category	Count	% of Blocks
4	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
4	2	100%

Speed Test Upload Tier	Count	% of Tests
4	2	100%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 2/2 (100.00%)
Number of computer based speed tests reported outside coverage area: 0

Form 477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 13/13
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/13

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
3/202 (1.49%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
0/58 (0.0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Gans Communications, LP

DBA: **MetroCast Communications**

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0016642761
Type of data submitted:	Census Block Table
Census Block Count:	1821
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2000 census blocks based on the BLK2000 field
  - Export results (for each technology of transmission)
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census blocks

Max Download Category	Count	% of Area
7	1821	100%

Max Upload Category	Count	% of Area
4	1821	100%

Road Segments

Max Download Category	Count	% of Area
7	1567	100%

Max Upload Category	Count	% of Area
4	1567	100%

Typical down/upload speeds reported by provider:
Census blocks

Typical Download Category	Count	% of Area
6	1821	100%

Typical Upload Category	Count	% of Area
2	1821	100%

Road segments

Typical Download Category	Count	% of Area
7	1567	100%

Typical Upload Category	Count	% of Area
2	1567	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	8	13%
4	2	3%
5	7	12%
6	40	67%
7	2	3%
8	1	2%

Speed Test Upload Tier	Count	% of Tests
1	1	2%
2	54	90%
3	3	5%
4	1	2%
5	1	2%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	27
Census blocks served, not reported by provider	9
Total number of served census blocks reported by provider	1821
% of served census blocks confirmed by speed test	1.4827%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 2
Total number of unserved areas reported per provider via broadband.maryland.gov: 2

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 3
Total number of unserved areas reported per provider via mdbroadbandmap.org: 3

Of census blocks reported as served, how many have zero population based on 2000 census data? 469/1821 (26%)

Web Search Verification: 36/1821 (2%) of census blocks were confirmed using online search feature of given provider

MetroCast Web Search Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	107	7%
Result is yes and census block is in served area	36	34%
Result is yes but not in a census block reported as served	20	19%
Result is no and census block is in served area	1	1%
Result is no and census block not served area	50	47%

Census blocks that are outside Cable Franchise Boundary: 1041/1821 (57%)

HNS License Sub, LLC
DBA: Hughes Communications, Inc.

Data Characteristics

Date of Original Submission:	2/2/2010
Date of Update Submission:	N/A
Currency of Data:	July 2010
FRN:	0018483073
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	9	15%
3	32	53%
6	6	10%
7	9	15%
8	3	5%
9	1	2%

Speed Test Upload Tier	Count
1	18
2	24
3	2
4	3
5	4
6	6
7	3

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 60/60 (100.00%)
Number of computer based speed tests reported outside coverage area: 0

Form477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 295/295
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/295

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
202/202 (100.0%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
295/295 (100.0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Hotwire Communications, Ltd

DBA Name: Hotwire Communications, Ltd

Data Characteristics

Date of Original Submission:	2/19/2010
Date of Update Submission:	7/15/2010
Currency of Data:	December 2010
FRN:	0009846494
Type of data submitted:	Addresses
Census Block Count:	1
Total Matched Address Points Count:	1
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 1
  - Number unmatched: 0
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
5	1	100%

Max Upload Category	Count	% of Blocks
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	2	100%

Speed Test Upload Tier	Count	% of Tests
2	2	100%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	1
% of served census blocks confirmed by speed test	0.0000%

Form477 Verification:

Number of census blocks reported to project, but no tract reported to FCC: 1

Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:

Number of census blocks with unserved areas reported via broadband.maryland.gov: 0

Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0

Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 0/1 (0%)

Web Search Verification: N/A

Census blocks that are outside Cable Franchise Boundary: 0/1 (0%)

Leap Wireless International, Inc
DBA: **Cricket Communications**

Data Characteristics

Date of Original Submission:	3/17/2010
Date of Update Submission:	3/5/2011
Currency of Data:	December 2010
FRN:	0002963528
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
  - Result: BB_Service_Wireless

Speed Domains:

- Typical Download Speed was < speed tier 3
  - Calculated speed to speed tier 3

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
3	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	121	99%
3	1	1%

Speed Test Upload Tier	Count	% of Tests
1	23	19%
2	77	63%
3	22	18%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 122/122 (100.0%)
Number of mobile speed tests reported outside coverage area: 0/122 (0.0%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	14	78%
3	3	17%
4	1	6%

Speed Test Upload Tier	Count	% of Tests
1	2	11%
2	15	83%
4	1	6%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of computer based speed tests verifying coverage area
Number of computer based speed tests reported inside coverage area: 18/18 (100.00%)
Number of computer based speed tests reported outside coverage area: 0/18 (0.00%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
71/202 (35.2%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
11/58 (19%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification:

Cricket WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	635	42%
Result is yes and coverage area is in served area	449	71%
Result is yes but not in a coverage area reported as served	9	1%
Result is no and coverage area is in served area	1	0%
Result is no and coverage area is not in served area	176	28%

Wireless Verification: N/A

Level 3 Communications, LLC

DBA Name: Level 3 Communications, LLC

Data Characteristics

Date of Original Submission:	1/18/2010
Date of Update Submission:	1/25/2011
Currency of Data:	January 2011
FRN:	0003723822
Type of data submitted:	Address Table
Census Block Count:	129
Total Matched Address Points Count:	174
Unmatched Address Points:	5
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 172
  - Number unmatched: 7
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 2
  - Number unmatched: 5
- Merge matched addresses
- Spatially join address points to 2000 census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
11	129	100%

Max Upload Category	Count	% of Blocks
11	129	100%

Typical down/upload speeds reported by provider:
Census Blocks

Typical Download Category	Count	% of Blocks
11	129	100%

Typical Upload Category	Count	% of Blocks
11	129	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	25%
3	1	25%
8	2	50%

Speed Test Upload Tier	Count	% of Tests
2	1	25%
3	1	25%
4	1	25%
5	1	25%

Speed tests match reported typical download speeds or are within 1 speed tier: No

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	1
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	129
% of served census blocks confirmed by speed test	0.7752%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 62
Number of tracts reported to FCC, but no census blocks reported to project: 57

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 1
Total number of unserved areas reported per provider via broadband.maryland.gov: 2

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 59/129 (46%)

Web Search Verification: N/A

MegaPath, Inc.

DBA Name: MegaPath

Data Characteristics

Date of Original Submission:	3/11/2010
Date of Update Submission:	N/A
Currency of Data:	March 2011
FRN:	0018105601
Type of data submitted:	Address Table
Census Block Count:	88
Total Matched Address Points Count:	93
Unmatched Address Points:	6
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Incomplete
Provided Max Advertised Upload Speed:	Incomplete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 90
  - Number unmatched: 9
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 3
  - Number unmatched: 6
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results for each technology of transmission

- Load exported results into the NTIA data model
  - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Area
3	68	82%
4	14	17%
5	1	1%

Max Upload Category	Count	% of Area
2	59	77%
3	16	21%
4	2	3%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
1	1	50%
10	1	50%

Speed Test Upload Tier	Count	% of Tests
2	1	50%
5	1	50%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	2
Total number of served census blocks reported by provider	88
% of served census blocks confirmed by speed test	0.00%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 1
Total number of unserved areas reported per provider via broadband.maryland.gov: 2

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 26/88 (30%)

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 3/88 (3%)

Mountain Communications, LLC

DBA: ProCom

Data Characteristics

Date of Original Submission:	May 2010
Date of Update Submission:	N/A
Currency of Data:	May 2010
FRN:	0008039323
Type of data submitted:	Census Block Table
Census Block Count:	148
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Incomplete
Provided Max Advertised Upload Speed:	Incomplete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2000 census blocks based on the BLK2000 field
  - Export results (for each technology of transmission)
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
10	3	100%

Max Upload Category	Count	% of Blocks
10	3	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:

Number of census blocks reported to project, but no tract reported to FCC: N/A

Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 46/148 (31%)

Web Search Verification: N/A

Wireless Verification: N/A

Neon Connect, Inc

DBA: **Sidera Networks**

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	3/1/2011
Currency of Data:	December 2010
FRN:	0005052741
Type of data submitted:	Address Table
Census Block Count:	1
Total Matched Address Points Count:	2
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 2
  - Number unmatched: 0
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
7	1	100%

Max Upload Category	Count	% of Blocks
7	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Blocks
7	1	100%

Typical Upload Category	Count	% of Blocks
7	1	100%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 0/1 (0%)

Web Search Verification: N/A

New Edge Holding Company

DBA Name: New Edge Network, Inc

Data Characteristics

Date of Original Submission:	1/22/2010
Date of Update Submission:	3/2/2011
Currency of Data:	January 2011
FRN:	0003720471
Type of data submitted:	Address Table
Census Block Count:	219
Total Matched Address Points Count:	371
Unmatched Address Points:	3
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 335
  - Number unmatched: 19
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 16
  - Number unmatched: 3
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results (for each technology of transmission)
  - Load exported results into the NTIA data model

- Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
3	90	28%
4	205	65%
5	17	5%
6	4	1%
7	1	0%

Max Upload Category	Count	% of Blocks
2	198	62%
3	75	24%
4	43	14%
7	1	0%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Blocks
3	90	28%
4	205	65%
5	17	5%
6	4	1%
7	1	0%

Typical Upload Category	Count	% of Blocks
2	198	62%
3	75	24%
4	43	14%
7	1	0%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 106
Number of tracts reported to FCC, but no census blocks reported to project: 48

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 96/219 (44%)

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 51/219 (23%)

One Communications

DBA: One Communications

Data Characteristics

Date of Original Submission:	3/8/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0015337702
Type of data submitted:	Address Table
Census Block Count:	119
Total Matched Address Points Count:	131
Unmatched Address Points:	3
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 128
  - Number unmatched: 6
- Unmatched addresses are geocoded to Maryland street centerline address locator
  - Number matched: 3
  - Number unmatched: 3
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
4	81	68%
5	31	26%
6	6	5%
7	1	1%

Max Upload Category	Count	% of Blocks
4	81	68%
5	31	26%
6	6	5%
7	1	1%

Addresses

Max Download Category	Count	% of Addresses
5	2	100%

Max Upload Category	Count	% of Addresses
5	2	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	100%

Speed Test Upload Tier	Count	% of Tests
3	1	100%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	119
% of served census blocks confirmed by speed test	0.00%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 44/119 (37%)

Web Search Verification: N/A

PAETEC Communications, Inc.
DBA Name: PAETEC Communications, Inc.

Data Characteristics

Date of Original Submission:	2/28/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0011017795
Type of data submitted:	Address Table
Census Block Count:	284
Total Matched Address Points Count:	371
Unmatched Address Points:	6
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:
- Geocode address table to Maryland Property View address locator
  - Number matched: 360
  - Number unmatched: 17
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 11
  - Number unmatched: 6
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:
- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model

- Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
11	250	83%
9	53	17%

Max Upload Category	Count	% of Blocks
11	250	83%
9	53	17%

Typical down/upload speeds reported by provider:
Census Blocks

Typical Download Category	Count	% of Blocks
3	89	29%
4	214	71%

Typical Upload Category	Count	% of Blocks
3	89	29%
4	214	71%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	15	75%
3	3	15%
5	2	10%

Speed Test Upload Tier	Count	% of Tests
1	15	75%
3	3	15%
4	1	5%
5	1	5%

Speed tests match reported typical download speeds or are within 1 speed tier: No

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	2
Census blocks served, not reported by provider	4
Total number of served census blocks reported by provider	284
% of served census blocks confirmed by speed test	0.70%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 22
Number of tracts reported to FCC, but no census blocks reported to project: 99

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 2
Total number of unserved areas reported per provider via broadband.maryland.gov: 2

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 106/284 (37%)

Web Search Verification: N/A

QCOL, Inc.

DBA Name: QCOL

Data Characteristics

Date of Original Submission:	May 2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0019663095
Type of data submitted:	Census Block Table
Census Block Count:	248
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
10	28	13%
6	193	87%

Max Upload Category	Count	% of Blocks
10	275	59%
6	192	41%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
2	1	100%

Speed Test Upload Tier	Count	% of Tests
3	1	100%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	248
% of served census blocks confirmed by speed test	0.00%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 4
Total number of unserved areas reported per provider via broadband.maryland.gov: 5

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 70/248 (28%)

Web Search Verification: N/A

Census blocks that are outside Cable Franchise Boundary: 28/248 (11%)

Shenandoah Telecommunications

DBA: **Shentel Converged Services, Inc**

Data Characteristics

Date of Original Submission:	May 2010
Date of Update Submission:	N/A
Currency of Data:	May 2010
FRN:	0013962170
Type of data submitted:	Addresses
Census Block Count:	1
Total Matched Address Points Count:	1
Unmatched Address Points:	1
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 1
  - Number unmatched: 1
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 0
  - Number unmatched: 1
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
5	1	100%

Max Upload Category	Count	% of Blocks
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 1
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 1/1 (100%)

Web Search Verification: N/A

Sprint Nextel Corporation

DBA Name: **Sprint Nextel Corporation**

Data Characteristics

Date of Original Submission:	2/18/2010
Date of Update Submission:	2/16/2011
Currency of Data:	December 2010
FRN:	0003774593
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
  - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
3	1	100%
5	1	100%

Max Upload Category	Count	% of Area
2	1	100%
3	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
3	1	100%
5	1	100%

Typical Upload Category	Count	% of Area
2	1	100%
3	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	1437	41%
3	644	18%
4	664	19%
5	756	21%
6	31	1%

Speed Test Upload Tier	Count	% of Tests
1	842	24%
2	1622	46%
3	1029	29%
4	15	0%
5	7	0%
6	3	0%
7	4	0%
8	10	0%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 3316/3532 (93.9%)
Number of mobile speed tests reported outside coverage area: 216/3532 (6.1%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	37	64%
3	12	21%
4	6	10%
5	1	2%
7	2	3%

Speed Test Upload Tier	Count	% of Tests
1	16	28%
2	34	59%
3	4	7%
4	1	2%
5	2	3%
6	1	2%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 41/58 (70.69%)
Number of computer based speed tests reported outside coverage area: 17/58 (29.31%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 71/71
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/71

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
159/202 (78.7%)

Number of unserved areas reported within coverage area via mdbroadbandmap.org: 41/58 (70.7%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification:

Sprint Wireless Verification Table	**Count**	**Percentage**
Total # of sample points	1466	
Number of sample points with results	1122	76.5%
Verified served AND BSP says served (yes,yes)	932	83.1%
Verified served AND BSP says unserved (yes,no)	190	16.9%
Verified unserved AND BSP says served (no,yes)	166	11.3%
Verified unserved AND BSP says unserved (no,no)	178	12.1%

StarBand Communications Inc.

DBA Name: StarBand Communications Inc.

Data Characteristics

Date of Original Submission:	1/26/2010
Date of Update Submission:	N/A
Currency of Data:	January 2011
FRN:	0005087457
Type of data submitted:	Coverage
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Speed Domains:

- Typical Upstream speed < 2
  - Calculated Typical Upstream speed to 2

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
3	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

# of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 34/34 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov: 202/202 (100.0%)
Number of unserved areas reported within coverage area via broadband.maryland.gov: 58/58 (100.0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Starpower Communications, LLC

DBA Name: RCN & RCN Business Solutions

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	3/1/2011
Currency of Data:	December 2010
FRN:	0003735016
Type of data submitted:	Address Table
Census Block Count:	1291
Total Matched Address Points Count:	7774
Unmatched Address Points:	57
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 7750
  - Number unmatched: 81
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 24
  - Number unmatched: 57
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model

- Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
4	135	10%
5	243	19%
6	5	0%
7	908	70%

Max Upload Category	Count	% of Blocks
2	378	29%
3	553	43%
4	360	28%

Typical down/upload speeds reported by provider:
Census Blocks

Typical Download Category	Count	% of Blocks
4	135	10%
5	243	19%
6	5	0%
7	908	70%

Typical Upload Category	Count	% of Blocks
2	378	29%
3	553	43%
4	360	28%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
4	8	7%
5	29	25%
6	42	36%
7	38	32%
10	1	1%

Speed Test Upload Tier	Count	% of Tests
2	81	69%
3	3	3%
4	34	29%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	62
Census blocks served, not reported by provider	2
Total number of served census blocks reported by provider	1291
% of served census blocks confirmed by speed test	4.8025%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 2
Number of tracts reported to FCC, but no census blocks reported to project: 5

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 1
Total number of unserved areas reported per provider via broadband.maryland.gov: 2

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 38/1291 (3%)

Web Search Verification: 4/1291 (0.3%) of census blocks were confirmed using online search feature of given provider

Starpower WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	55	4%
Result is yes and census block is in served area	4	7%
Result is yes but not in a census block reported as served	0	0%
Result is no and census block is in served area	0	0%
Result is no and census block not served area	51	93%

Census blocks that are outside Cable Franchise Boundary: 1/1291 (0.01%)

Tata Communications (America) Inc.

DBA Name: Tata Communications (America) Inc.

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	8/26/2010
Currency of Data:	August 2010
FRN:	0009480302
Type of data submitted:	Address Table
Census Block Count:	1
Total Matched Address Points Count:	1
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 1
  - Number unmatched: 0
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
4	1	100%

Max Upload Category	Count	% of Blocks
4	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	100%

Speed Test Upload Tier	Count	% of Tests
2	1	100%

Speed tests match reported typical downloaded speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	1
% of served census blocks confirmed by speed test	0.00%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 1
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 1/1 (100%)

Web Search Verification: N/A

T-Mobile USA, Inc.

DBA Name: **T-Mobile USA, Inc.**

Data Characteristics

Date of Original Submission:	2/25/2010
Date of Update Submission:	3/11/2011
Currency of Data:	December 2010
FRN:	0006945950
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
4	1	100%
6	1	100%

Max Upload Category	Count	% of Area
2	1	100%
4	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	1933	59%

Speed Test Upload Tier	Count	% of Tests
1	302	9%

3	770	23%
5	548	17%
6	49	1%

2	1559	47%
3	1341	41%
4	83	3%
5	5	0%
6	1	0%
7	5	0%
8	4	0%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

#/% of computer based speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 3258/3300 (98.7%)
Number of mobile speed tests reported outside coverage area: 42/3300 (1.3%)

Form477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
52/202 (25.7%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
3/58 (5.2%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification:

TMobile Wireless Verification Table	**Count**	**Percentage**
Total # of sample points	1466	
Number of sample points with results	452	30.8%
Verified served AND BSP says served (yes,yes)	174	38.5%
Verified served AND BSP says unserved (yes,no)	278	61.5%
Verified unserved AND BSP says served (no,yes)	180	12.3%
Verified unserved AND BSP says unserved (no,no)	834	56.9%

TWTelecom of Maryland, LLC

DBA Name: TWTelecom of Maryland, LLC

Data Characteristics

Date of Original Submission:	1/30/2010
Date of Update Submission:	3/10/2011
Currency of Data:	March 2011
FRN:	0017348202
Type of data submitted:	Address table
Census Block Count:	52
Total Matched Address Points Count:	78
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 78
  - Number unmatched: 1
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 1
  - Number unmatched: 0
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results for each technology of transmission

- Load exported results into the NTIA data model
  - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
3	13	23%
4	16	29%
5	5	9%
6	3	5%
7	9	16%
8	3	5%
9	2	4%
10	2	4%
11	3	5%

Max Upload Category	Count	% of Blocks
3	13	23%
4	16	29%
5	5	9%
6	3	5%
7	9	16%
8	3	5%
9	2	4%
10	2	4%
11	3	5%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 15
Number of tracts reported to FCC, but no census blocks reported to project: 13

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 28/52 (54%)

Web Search Verification: N/A

Vector Data Systems LLC

DBA Name: Vector Data Systems LLC

Data Characteristics

Date of Original Submission:	February 2010
Date of Update Submission:	2/28/2011
Currency of Data:	December 2010
FRN:	0017306663
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
5	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
6	1	100%

Typical Upload Category	Count	% of Area
4	1	100%

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 5/5 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov:
4/202 (2.0%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org:
0/58 (0.0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

Verizon Communications Inc
DBA: Verizon Maryland Inc

Data Characteristics

Date of Original Submission:	2/15/2010
Date of Update Submission:	2/10/2011
Currency of Data:	December 2010
FRN:	0002166825
Type of data submitted:	Census Block Table
Census Block Count:	57200
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census blocks

Max Download Category	Count	% of Blocks
5	742	1%
6	11515	16%
9	59229	83%

Max Upload Category	Count	% of Blocks
3	12256	17%
7	59229	83%

Road segments

Max Download Category	Count	% of Segments
5	173	3%
6	1553	30%
9	3464	67%

Max Upload Category	Count	% of Segments
3	1726	33%
7	3464	67%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	414	8%
3	565	11%
4	958	19%
5	283	6%
6	545	11%
7	1902	37%
8	420	8%
9	24	0.5%
10	12	0.2%

Speed Test Upload Tier	Count	% of Tests
1	449	9%
2	1590	31%
3	53	1%
4	717	14%
5	1126	22%
6	524	10%
7	646	13%
8	18	0.4%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	1924
Census blocks served, not reported by provider	49
Total number of served census blocks reported by provider	57200
% of served census blocks confirmed by speed test	3.7%

Form 477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 3382
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 91
Total number of unserved areas reported per provider via broadband.maryland.gov: 111

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 26
Total number of unserved areas reported per provider via mdbroadbandmap.org: 28

Of census blocks reported as served, how many have zero population based on 2000 census data? 6572/57200 (12%)

Web Search Verification: 479/57200 (1%) of census blocks were confirmed using online search feature of given provider

VerizonMD Web Search Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	1435	96%

Result is yes and census block is in served area	479	33%
Result is yes but not in a census block reported as served	39	3%
Result is no and census block is in served area	513	36%
Result is no and census block not served area	402	28%

Census blocks that are outside DSL boundary: 15088/57200 (26.4%)

Wildblue Communications, Inc

DBA Name: Wildblue Communications, Inc

Data Characteristics

Date of Original Submission:	4/21/2010
Date of Update Submission:	7/22/2010
Currency of Data:	December 2010
FRN:	0007843766
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Speed Domains:

- Typical Downstream Speed < 3
  - Calculated Typical Downstream Speed to 3
- Typical Upstream Speed < 2
  - Calculated Typical Upstream Speed to 2

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Area
4	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 214/14 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0

Unserved areas:
Number of unserved areas reported within coverage area via broadband.maryland.gov: 202/202 (100.0%)
Number of unserved areas reported within coverage area via mdbroadbandmap.org: 58/58 (100.0%)

Of census blocks reported as served, how many have zero population based on 2000 census data? N/A

Web Search Verification: N/A

Wireless Verification: N/A

XO Holdings, Inc

DBA Name: XO Communications, LLC

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0006275945
Type of data submitted:	Addresses
Census Block Count:	344
Total Matched Address Points Count:	363
Unmatched Address Points:	136
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 346
  - Number unmatched: 144
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 17
  - Number unmatched: 136
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results for each technology of transmission

- Load exported results into the NTIA data model
  - Result: BB_Service_CensusBlock

Speed Domains:

- Symmetric Maximum Downstream Speed < 2
  - Calculated Symmetric Maximum Downstream to 2
- Symmetric Maximum Upstream Speed < 2
  - Calculated Symmetric Maximum Upstream to 2

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
3	60	17%
4	191	56%
5	44	13%
6	13	4%
7	29	8%
8	7	2%

Max Upload Category	Count	% of Blocks
2	7	2%
3	58	17%
4	186	54%
5	44	13%
6	13	4%
7	29	8%
8	7	2%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	1	33%
4	1	33%
5	1	33%

Speed Test Upload Tier	Count	% of Tests
3	1	33%
4	1	33%
5	1	33%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	3
Total number of served census blocks reported by provider	344
% of served census blocks confirmed by speed test	0.00%

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 34
Number of tracts reported to FCC, but no census blocks reported to project: 19

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 4
Total number of unserved areas reported per provider via broadband.maryland.gov: 4

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 1
Total number of unserved areas reported per provider via mdbroadbandmap.org: 1

Of census blocks reported as served, how many have zero population based on 2000 census data? 132/344 (38%)

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 1/344 (0.3%)

Zayo Bandwidth LLC

DBA Name: Zayo Bandwidth LLC

Data Characteristics

Date of Original Submission:	1/13/2011
Date of Update Submission:	N/A
Currency of Data:	December 2010
FRN:	0019133826
Type of data submitted:	Address Table
Census Block Count:	2
Total Matched Address Points Count:	2
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to Maryland Property View address locator
  - Number matched: 2
  - Number unmatched: 0
- Spatially join address points to 2000 census blocks

Census Block Process:

- Join the address points to the 2000 census blocks based on the BLK2000 field
  - Export results Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
7	1	50%
8	1	50%

Max Upload Category	Count	% of Blocks
7	1	50%
8	1	50%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Blocks

Typical Upload Category	Count	% of Blocks

7	1	50%
8	1	50%

7	1	50%
8	1	50%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 2
Number of tracts reported to FCC, but no census blocks reported to project: 1

Unserved areas:
Number of census blocks with unserved areas reported via broadband.maryland.gov: 0
Total number of unserved areas reported per provider via broadband.maryland.gov: 0

Number of census blocks with unserved areas reported via mdbroadbandmap.org: 0
Total number of unserved areas reported per provider via mdbroadbandmap.org: 0

Of census blocks reported as served, how many have zero population based on 2000 census data? 0/2 (0%)

Web Search Verification: N/A

Maine SBDD Data Submittal to NTIA

Technical Whitepaper

3rd Data Delivery

April 1, 2011

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1 Introduction

As an NTIA State Broadband Data and Development (SBDD) grant recipient, the State of Maine is undertaking a statewide project to inventory and map broadband services for inclusion in both national and state broadband maps. The SBDD grantee project team for Maine consists of the ConnectME Authority (ConnectME), the Maine Office of GIS (MEGIS), and the James W. Sewall Company (Sewall). The team is collecting broadband service availability data, including speeds and types of technology, as well as information on Community Anchor Institution (CAI) locations across the entire state. The collected service data undergoes geospatial processing and verification steps before it is loaded into Maine's broadband geodatabase. This geodatabase is used to satisfy NTIA's bi-annual submission requirements as well as support the ConnectME Authority's statewide initiatives and programs.

This whitepaper describes the deliverable datasets, the data collection process and the verification process.

2 Data Description

The Maine team is providing spatial data representing provider coverage in the state as well as information on validation and verification processes. Files provided are as follows:

Filename	Description
ME_SBDD_2011_04_01.gdb	Folder containing SBDD transfer file geodatabase
ME_DataPackage_2011_04_01.xls	DataPackage.xls file
ME_2011_04_01.txt	Data Submission Receipt file
ME_Methodology_2011_04_01.pdf	Methodology Paper file
ReadMe_ME_2011_04_01.txt	ReadMe file

3 Provider Participation

There were fifty-three potential providers identified in Maine, of which three were later found not to serve any addresses in Maine and were therefore not included in this analysis.

The Maine team has utilized data from 62% of the companies operating in the state and will receive data from another 18% in the future for a combined total of 80% cooperation. One firm (2%) would not provide data, and another 18% were simply not responsive to our attempts to communicate.

Company Response	*Number*	*% of Total Companies*
Will provide data	9	18%
Will not provide data	1	2%
Provided data	31	62%
Non-responsive	9	18%
TOTAL	50	100%

The fifty companies are those providing internet services to residential and business customers (78%), reselling internet service (16%), both providing directly and reselling (2%), and providing middle mile and internet backhaul services only (4%).

Of the service providers, 72% have provided data, 13% were non-responsive, 13% will provide data in the future, and 2% refused to provide data without compensation.

No resellers have provided data as of April 2011, except for the company that resells as well as offering its own service. 50% of the resellers have stated that they will provide data in the future, and the other 50% were non-responsive.

Information on the providers is included on the 'ProviderTable' spreadsheet in the file **datapackage.xls** included with this delivery.

4 Data Collection and Integration

4.1 Provider Outreach and Data Gathering

Mapping broadband coverages across the State begins by identifying potential providers and contacting them to determine service capabilities and level of participation. If a provider offers broadband level Internet service in Maine, the provider will be invited to participate in the project. After executing a non-disclosure agreement (NDA), the provider submits data showing where services are offered, technology of transmission used, and maximum advertised downstream and upstream speeds. The project team has developed a step by step process that has been captured by the high-level workflow shown in ***Figure 1***. Starting with contacting a service provider, the workflow allows a user to determine whether a provider should be included and if so what types of service are offered.

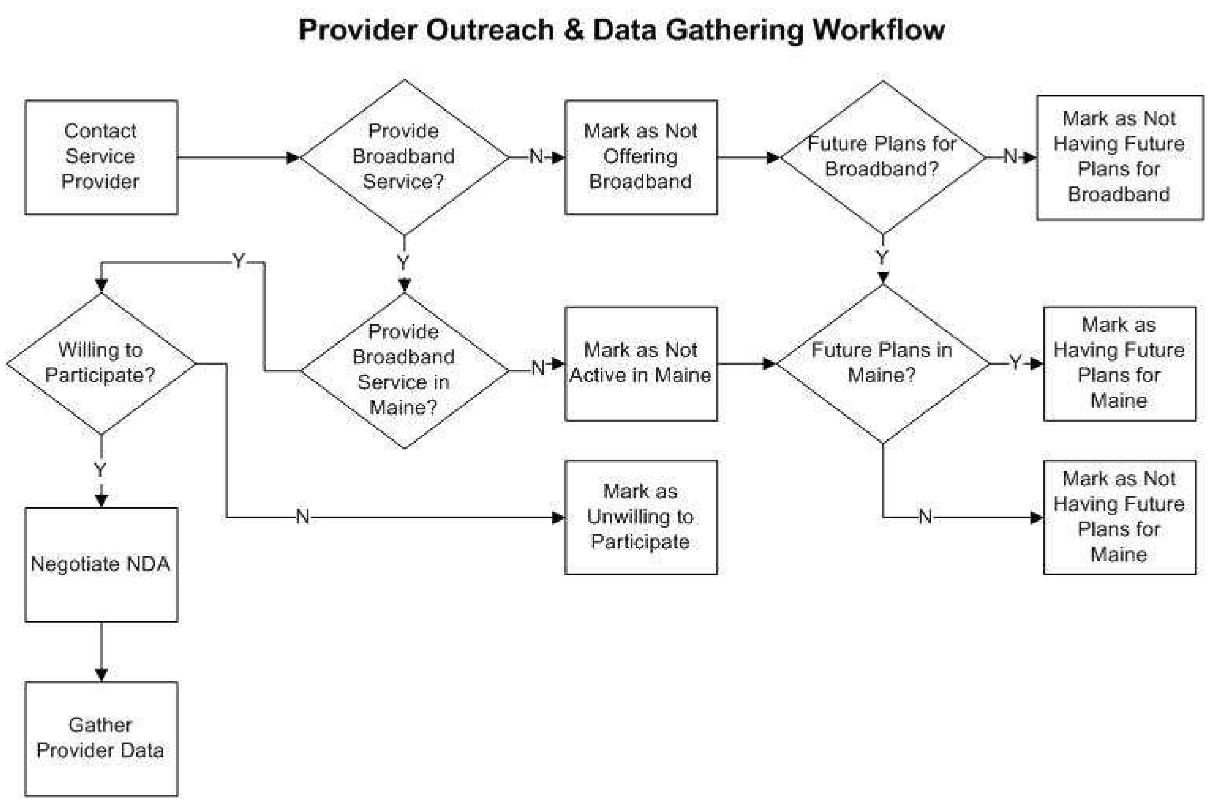


Figure 1 - Provider Outreach and Data Gathering Workflow

The task of reaching out to the provider community and gathering service data has five main tasks: Research Service Providers, Execute NDA, Gather Provider Data, Assess Provider Data, and Categorize Data for Production.

4.1.1 Research Service Providers

The Maine project team has established a service provider contact database, which contains contact information for all of the potential broadband service providers in the state. The initial set of providers was obtained from state and industry lists as well as Internet research. Ongoing management of the list is required because new providers begin offering services that qualify as broadband and changes occur to existing provider companies through mergers or acquisitions.

Sewall initially contacts each provider by phone and introduces the project. One purpose for the initial contact is to identify the individual at the provider company with whom the team should be working. In some instances, especially for larger companies it may take multiple attempts before the appropriate person is reached.

Another purpose is to determine if the company's services meet the requirements for inclusion in the project. If a company offers broadband level service in Maine then the next step is to determine the type(s) of service being offered, whether the service offerings are as an end-user provider or as a middle mile/back haul provider, and whether the company owns facilities or re-sells services using another carrier's network. Data from back haul carriers and resellers are included in the project.

A third purpose behind the initial contact is to confirm that the provider wants to participate in project and is willing to submit data that represents its service offerings and coverages. Provider companies who elect to participate are invited to execute an NDA to protect those data items considered to be confidential or proprietary. If a provider company does not want to participate, Sewall may look for assistance from the ConnectME Authority and the NTIA SBDD project team to encourage participation.

4.1.2 Execute Non-Disclosure Agreement (NDA)

The process of executing an NDA starts with sending a letter of introduction along with an NDA template and a copy of a ConnectME Protective Order. **Appendix A** contains a sample letter. The NDA template was drafted by the Maine law firm, Rudman & Winchell, based on confidentiality guidelines presented by NTIA and can be found in **Appendix B**. A copy of the ConnectME Protective Order signed on 21 December 2009 at the request of many of the service providers is in **Appendix C**.

Changes to the NDA template are negotiated with individual companies as needed. Once finalized, the NDA is signed by the provider company, Sewall, and the ConnectME Authority before the data gathering process begins.

4.1.3 Gather Provider Data

More often than not after an NDA has been executed, a different individual at a provider company is identified as the primary contact for data submittals. Once the contact is confirmed, a data submittal information sheet prepared by the project team is sent to the contact. The data submittal sheet identifies the data items desired and has definitions from the SBDD NOFA. The items requested include:

- FRN or provider FCC Registration Number
- Location and extents of service coverage
- Technology of service

- Speeds of service including maximum advertised downstream & upstream speeds and typical downstream & upstream speeds
- Tower and transmitter locations and transmission attributes (for fixed wireless service)
- Middle mile and back haul connection points
- Customer service locations (for wired and fixed wireless service)
- Failed service locations (for wired and fixed wireless service)
- Service to Community Anchor Institutions

After sending the data submittal information Sewall follows up with the provider contact to review the requested data items and discuss potential formats for submitting data. The team is cognizant of the wide range of environments operated by the provider companies and recognizes the need to accommodate submissions in many different formats including tabular (CSV, Excel, DBF), GIS (ESRI shapefile, ESRI geodatabase, MapInfo, Google KML/KMZ, CAD (AutoCAD, Microstation), and hardcopy. The team also understands that many of the smaller providers in Maine are handicapped by a lack of resources in trying to comply with the project's data submission requirements. Some of the issues facing these providers include small staff sizes, lack of mapping technical expertise, and proprietary digital systems. Sewall lends technical assistance and expertise as needed.

A file transfer site is currently used for providers to submit data. The site utilizes HyperText Transmission Protocol, Secure (https), with password protected user accounts and separate folders for each provider.

4.1.4 Assess Provider Data

After data has been submitted by a provider, Sewall catalogues it and assesses the data files to see if all of the requested items were provided and what data types were received. Sewall also verifies the locations and spatial definitions for the data items and checks for missing attribute information. Any questions generated are sent to the provider for clarification. It is common for the initial submission to need multiple iterations of data exchanges and feedback before the submission is completed.

Once an initial set of broadband service data is in place, follow-up rounds of data gathering will incorporate modifications to existing service coverages, service types, or service speeds. Later submittals by a provider could consist of an entire set of data records or may only contain updates since the previous submission. Sewall's integration processes are equipped with GIS and database tools to fold newer versions of provider records into the existing baseline. The team anticipates that further development and refinement of these processes and tools will be made as more update submissions are received.

4.1.5 Categorize Data for Production

When data from a provider has been received and assessed, production processes are needed to integrate the data into the project database. **Section 4** of this paper describes the various workflows to turn the submitted data into the SBDD data transfer model features and attributes.

4.2 Community Anchor Outreach and Data Gathering

Community Anchor Institutions (CAI), as defined by NTIA NOFA category codes, consist of the following:

Category 1: School – K through 12
Category 2: Library
Category 3: Medical/Healthcare
Category 4: Public Safety
Category 5: University, College, Other post secondary
Category 6: Other community support – government
Category 7: Other community support – non-governmental

The three primary steps with the CAI are data gathering, data processing and attribution.

4.2.1 Data Gathering

Several data sources were utilized to represent all CAI categories across the state.

State of Maine, Office of Geographic Information Systems (MEGIS)

ARMORIES
CEMA (County Emergency Management Agency)
COLLEGES
FIRE
HOSPITAL
HAS (Hospital Service Areas)
MEAIR (Airports)
POLICE
REDCROSS
RESCUE
SCHLIB (Schools & Libraries)

NAVTEQ-NAVSTREETS (Points of Interest)

NAVTEQ-COMMSVC
NAVTEQ-EDUINSTS
NAVTEQ-HOSPITAL
NAVTEQ-TRANSHUBS

State of Maine – State Facilities

State Facilities File

Maine Department of Health & Human Services (DHHS) – Maine Care Services

Hospitals
Clinics/Rehab/Nursing
Schools
Pharmacies
Home Care

Counseling/Psychologists
Shared Living
Mental Health
School Departments
Health related businesses

Maine School and Library Network (MSLN)

K-12 schools
Public libraries

Maine's Research & Education Network (MaineREN)

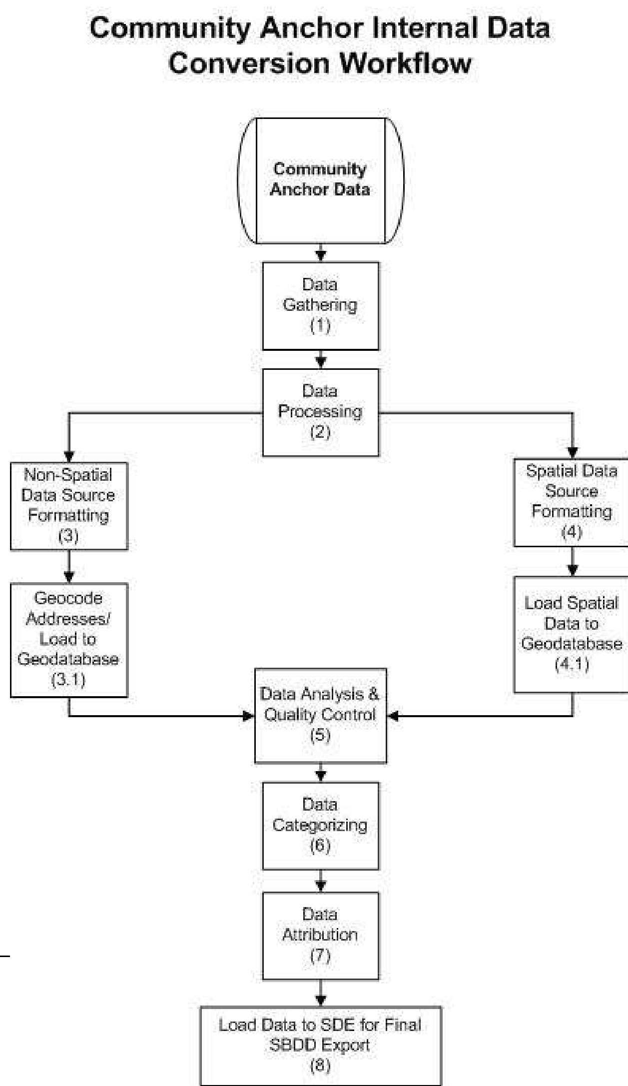
Universities & colleges

Service Provider Data

CAI data submitted by provider companies

4.2.2 Data Processing

The data processing task involved an in-depth cleaning and sorting of all CAI source records. Data is initially sorted as spatial (e.g., GIS layer) and non-spatial (e.g., table) data. The spatial data consisted of points and generally needed minimal formatting before loading into a personal geodatabase. The non-spatial data required some initial format revisions to prepare the data for geocoding to generate spatial geometry. The following descriptions



associated with ***Figure 2*** below outline the overall workflow and processes involved.

Figure 2 - Community Anchor Internal Workflow

(1) Data Gathering

Data gathering involves acquiring source data involving the seven categories defined by NTIA NOFA. Data may originate from several sources including state, county, town, outreach programs, service providers and more. Records are documented for metadata and given a level of confidence reflecting the data source, spatial accuracy and processing enhancements.

(2) Data Processing

The data processing phase separates the data sources into two types: flat file (non-spatial) and spatial. A flat file refers to data or a table that contains 1 record per line, generally in the format of an .xls spreadsheet or .dbf table. Without spatial coordinate values to translate to points, this type of data must be geocoded in ArcGIS. Spatial data contains pre-defined coordinate values or is already in a format containing spatial geometry with a defined projection and can be imported directly.

(3) Non-Spatial Data Source Formatting

Non-spatial data files are scrubbed to ensure that all necessary fields are present and are formatted to run through the geocoding process.

(3.1) Geocode Addresses/Load to Geodatabase

Using the geocoding tool in ArcGIS, an address locator file must first be setup. The address locator file maps out the ConnectME street centerline fields and is used as a reference for the non-spatial data during the geocoding process. The non-spatial data is saved as a .csv file. Shown below is a typical record formatted to geocode.

Name	Address1	City	State	Zip
Healthworks	10 Bangor	Bangor	ME	04401

In this example, the geocoding process will reference or match this address record to the ConnectME street address locator and place a point at this location in the map layer. All records in the source file are processed at once. Points are generated, based on how matching parameters or set. Points are then loaded into personal geodatabase for final scrubbing and quality acceptance.

Name	Address1	City	State	Latitude	Longitude
Healthworks	10 Bangor St	Bangor	ME	46.1252	-67.8422

(4) Spatial Data Source Formatting

Spatial data sources are received as flat files with spatial coordinate values or reside in a GIS layer as points. Each source type is processed differently.

Flat files with coordinate values:

- Prepare field name formats
- Prepare coordinate values in decimal degrees

- Add X,Y data into ArcGIS, generating the point locations on the fly
- Output to personal geodatabase for final scrubbing and quality acceptance

Point files:

- Export file to shapefile format if necessary
- Project file to state coordinate system (UTM NAD83 Zone19 Meters) for compatibility with other data layers
- Output to personal geodatabase for final scrubbing and quality acceptance

(4.1) Load Spatial Data to Geodatabase
All spatial data types (point files) are loaded into a personal geodatabase for final scrubbing and quality acceptance.

(5) Data Analysis and Quality Control
A final analysis is completed on all points loaded in the personal geodatabase to identify any issues. The table below indicates the primary types of issues, the means to detect them, and the resulting solution.

Issue ⇒	***Identification*** ⇒	***Result***
Duplicate Points	Selection by location/imagery review	Delete incorrect record
Unmatched geocoded records	Google Maps review	Matched record
Inaccurate CAI locations	Imagery review	Modify point location
Unsuitable CAI	-	Delete record

(6) Data Categorizing
Once the CAI records have gone through the data analysis and quality control, the records are given a category value of 1 to 7, as discussed in the introduction.

(7) Data Attribution
CAI attributes are the most difficult to acquire at the data gathering stage and are typically acquired through additional steps, including contacting each CAI. The required attributes are:

- Broadband Service
- Technology of Transmission
- Advertised Downstream and Upstream Speeds

The project team has completed the initial round of contacting each CAI to collect the above information. The task was completed by assembling a call center group assigned to contacting each CAI to establish a primary contact and address verification followed by exercising an on-line survey aimed to provide feedback to the items listed above. Completed surveys were compiled through the use of SurveyMonkey.com and final survey output (.csv) was prepped and values were loaded into the CAI database to populate attributes.

Additional sources and surveys have been utilized to populate the database including MSLN (Maine School and Library Network), NCES (National Center for Education Statistics), the

Maine Fiber Company as part of its Three-Ring Binder project, and state agency listings provided by the chief technical officer. The project team will continue to compile CAI data utilizing all the above resources and research additional data sources and methodologies to populate these attributes.

(8) Load Data to SDE for Final SBDD Export
CAI data is loaded from the personal geodatabase to the SDE environment for final export to SBDD format.

4.3 Data Analysis and Conversion

Data is analyzed and converted with different processes, depending on its type and characteristics.

4.3.1 Fixed Wired Transmission

Fixed wired service provider companies in the state of Maine range from small to large businesses and utilize several distinct types of technology to deploy broadband service. In order to accommodate the varied inputs, Sewall has developed a flexible and comprehensive workflow to incorporate provider information into a state broadband map developed by Sewall in conjunction with the ConnectME Authority.

The ConnectME model depicts broadband service provider coverage at the street segment level. The model uses a street centerline as the spatial component of the coverage, and a related table stores provider specific information for street segments. Sewall developed production tools to accommodate the incorporation of service provider data into this ConnectME model and instill quality control into the process.

The steps in the process for analyzing and converting Fixed Wired Transmission data are outlined in ***Figure 3*** and described below.

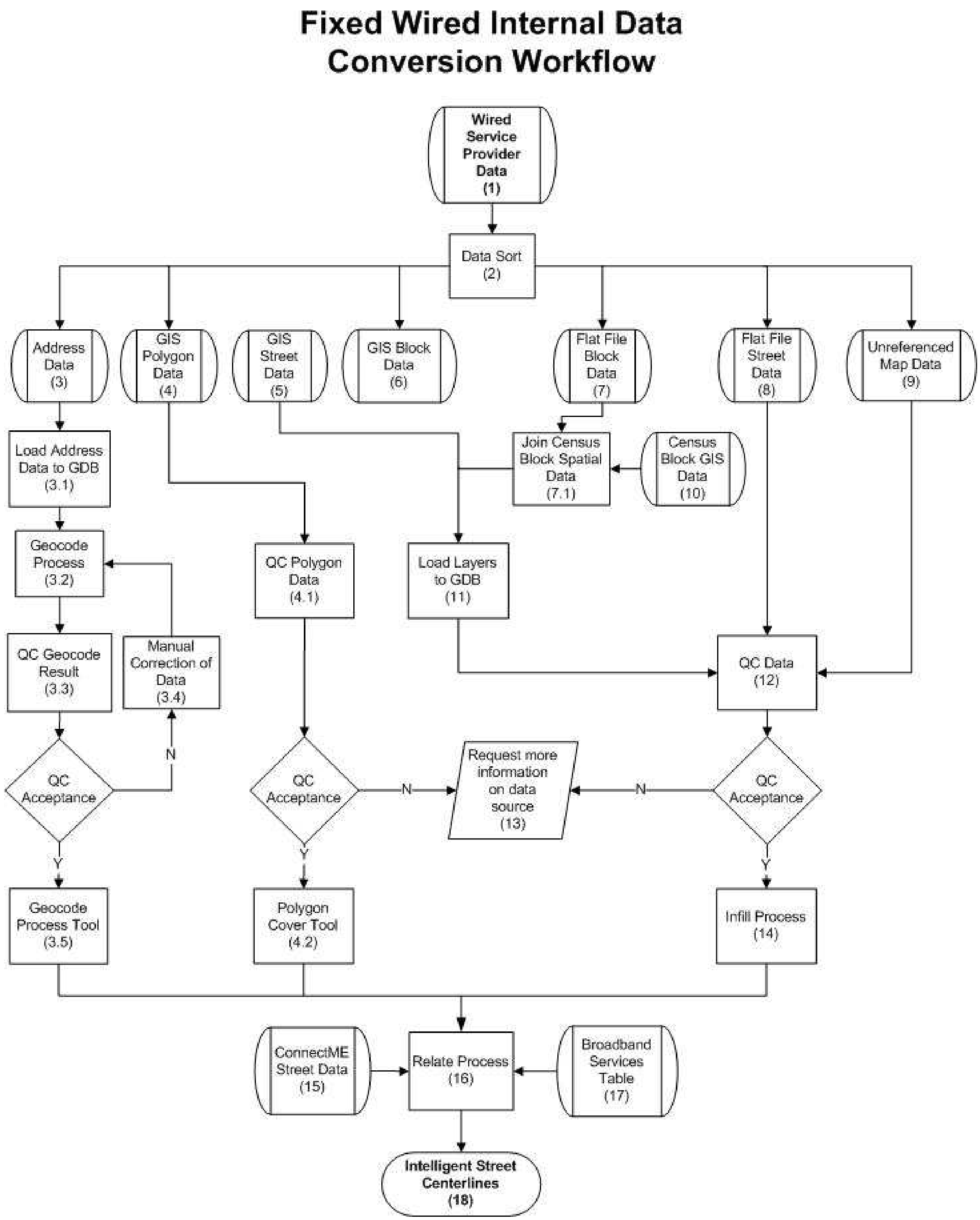


Figure 3 - Data Flow for Fixed Wired Transmission Providers

(1) Wired Service Provider Data

The data bin is the storage location for wired broadband service provider data gathered by Sewall.

(2) Data Sort
The data sort phase immediately follows the data collection process. Analysts sort the wired data by provider and by data characteristics. The wired data can consist of address data, predefined coverage data, flat file coverage data and unreferenced maps. Individual workflows have been developed by Sewall for the various data formats.

(3) Address Data
The address data bin is reserved for service provider data that is at the address level. Examples of address data formats received are spreadsheet and text file format.

(3.1) Load Address Data to Geodatabase
Address data is formatted to meet the ArcGIS geocoder standards and loaded into the geodatabase for processing. The formatting of the address data will include ensuring fields with the full street address and town name are populated in the dataset.

(3.2) Geocode Process
Formatted address data is geocoded using the ConnectME street centerline dataset. The address locator style used in this process is the ArcGIS US Streets with Zone. For this process, the city fields of the ConnectME street dataset are utilized in the zone component of the locator.

(3.3) QC Geocode Result
Analysts review the address data geocode result for the following:

- Overall geocode hit rate
- Town geocode hit rates
- Data anomalies

If address data fails any of these checks the data will not pass QC acceptance.

(3.4) Manual Correction of Data
Address data that has not passed the QC acceptance is evaluated for corrections necessary for the data to pass QC acceptance. Corrections to town names and updates to street names are commonly required to match the naming conventions in the ConnectME roads dataset.

(3.5) Geocode Process Tool
Sewall has developed an ArcGIS tool named Geocode Process Tool that translates the accepted geocoded address data into tabular address range records related to the accompanying ConnectME street centerlines. This tool is shown in ***Figure 4*** below.

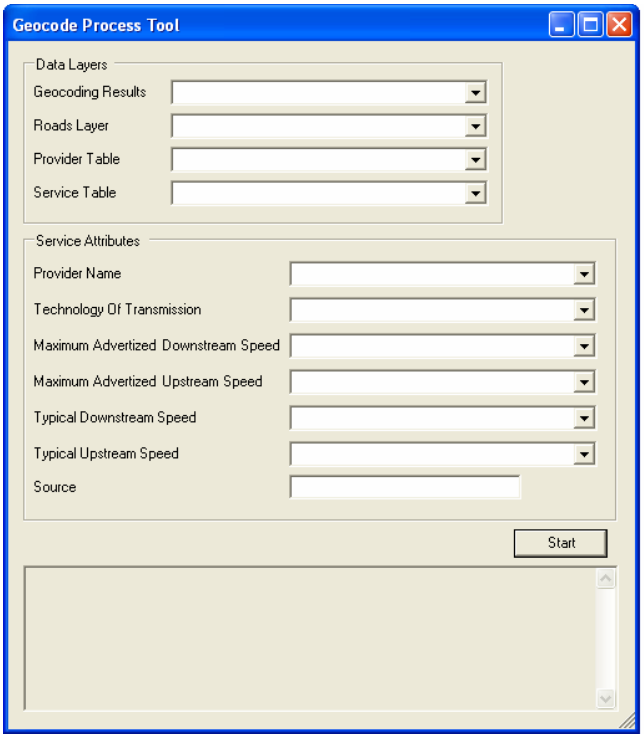


Figure 4 - Geocode Process Tool
Data Layers:(1) Geocoding Results - geocoded layer of address data (2) Roads Layer - ConnectME roads data layer (3) Provider Table - table of provider specific information (4) Service Table - broadband service output table where the service provider street address ranges are stored.
Service Attributes: The first six values are necessary to populate fields in the deliverable. Source is used to designate that the records created are from the Geocode Process Tool.

In ArcMap the user specifies which layers in the map correspond with the data layer inputs for the tool as well as the service provider service attributes that correspond with the geocode address point layer. Once the information is set the user clicks ‘Start’ and the process begins.

Each geocoded address point within the geocode layer has as an attribute the street segment that the address was geocoded to. Using this street link, the tool can locate all of the geocoded address points assigned to a given street segment and build a modified street range of broadband service for the street segment. The tool then creates a record in the Broadband Service table that contains a link to the street segment in the ConnectME street feature class and populates the record with the derived broadband service street segment range and specified service provider information. This process is repeated for each unique street segment listed in the geocoded address point layer.

(4) GIS Polygon Data
The GIS polygon data bin is for service provider data that represents a coverage area of broadband availability and is delivered in a GIS format.

(4.1) QC Polygon Data

Datasets from the GIS polygon data bin are reviewed by an analyst. The QC routine ensures that the data has spatial integrity and includes the necessary attribution for inclusion to the state broadband project.

(4.2) Polygon Cover Tool

Sewall has developed an ArcGIS tool named Polygon Cover that converts service provider coverage area polygons into street segment related tabular records. Each tabular record created by the tool incorporates the service provider broadband specification information as well as modified street ranges representing provider street coverage.

This tool was initially created by Sewall for use on the fixed wireless viewshed datasets but was incorporated into the wired workflow for service providers that provided polygon regions of service coverage.

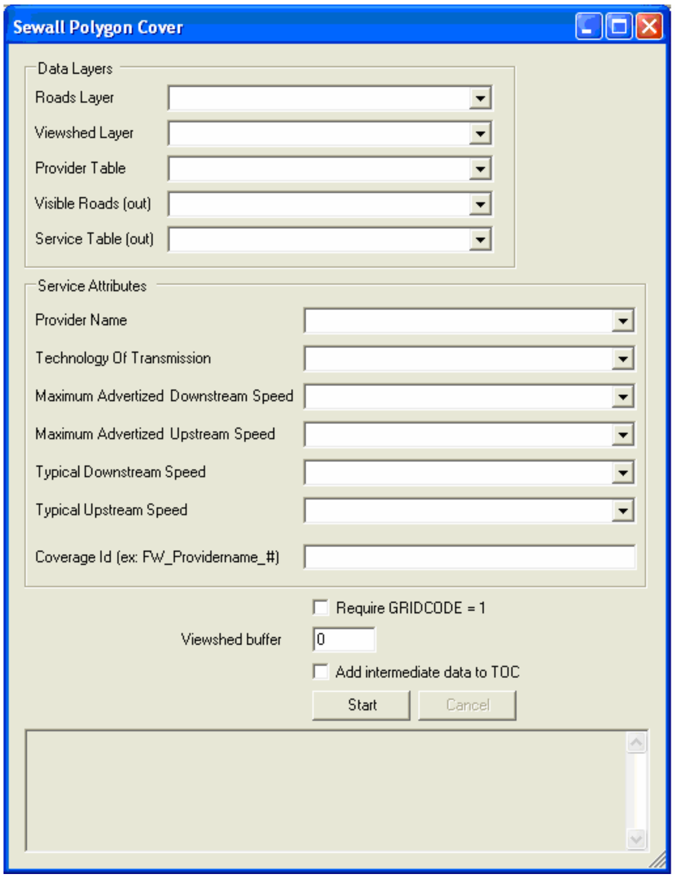


Figure 5 - Polygon Cover Tool

Data Layers: (1) Roads Layer - ConnectME street centerline data layer with address ranges (2) Viewshed Layer - viewshed layer used in delineating visible polygons for clipping road segments. For wired providers this would be the polygon layer that depicts a provider's coverage area. (3) Provider Table - internal processing flag (4) Visible Roads (out) - output feature class that stores the clipped road segment geometry (5) Service Table (out) - output table that the extracted address ranges populate.
Service Attributes: The first seven values are necessary to populate fields in the deliverable.
Require GRIDCODE = 1: Toggle is unchecked when running a wired broadband provider dataset that is represented as a coverage area.

In ArcMap the user specifies which layers in the map correspond with the data layer inputs for the tool as well as setting the service attributes for the service provider polygon layer. While running the Polygon Cover tool for fixed wired service regions analysts ensure the Require GRIDCODE = 1 toggle is unchecked. Since this tool was initially created for use with a viewshed polygon output, the tool will not run on a non-viewshed layer unless this toggle is unchecked. Once the information is set the user clicks 'Start' and the process begins.

The tool selects street segments from the input Roads layer that intersect the input polygon coverage and exports the street segments to a separate working file. These streets are then clipped to the polygon coverage. Next the tool runs a length ratio process that assigns each street segment a fractional value based on the clipped and original lengths. The tool then populates modified street range attributes based on the length ratio of a segment and the original street range of a segment. These modified street range values represent the broadband service street range of the provider. For each street segment the tool also creates a record in the Broadband Service table that contains a link to the original street segment in the ConnectME street feature class and populates the record with the modified broadband service street segment range and specified service provider information.

(5) GIS Street Data
The GIS street data bin is for wired broadband provider data at the street segment level that is delivered in a GIS format.

(6) GIS Block Data
The GIS block data bin is for provider data that is delivered at the census block level in a GIS format.

(7) Flat File Block Data
Census block service data delivered in a flat file format is stored in the flat file block data bin. Examples of flat file data are spreadsheets, text files and database files.

(7.1) Join Census Block Spatial Data
Flat file block provider coverage information is joined to a spatial census block layer using the full census block id value. Blocks with provider information joined are exported creating a spatial representation of the provider's census block broadband coverage.

(8) Flat File Street Data
The flat file street data bin is where provider data is stored when Sewall receives street level information in a format that cannot be associated spatially. Examples of files types delivered in a flat file format are spreadsheet, database and text file.

(9) Unreferenced Map Data
Provider data that cannot be referenced in ArcGIS are stored in the unreferenced map data bin. Examples of this type include paper maps and PDF documents.

(10) Census Block GIS Data
This data is Census 2000 block data in GIS format for the state of Maine that has been downloaded from the US Census website.

(11) Load Layers to GDB
Provider GIS data is loaded into the Sewall SDE geodatabase. A feature class is created for each provider's dataset. Sewall workflow tracking attributes are added to the feature classes.

(12) QC Data
Datasets are sent to a Sewall analyst for QC. The QC routine is to ensure that the data includes the necessary information for inclusion to the state broadband project. Provider data is cross-referenced with information on broadband availability that has been gathered from other sources. The QC of datasets with spatial data includes additional QC routines to ensure spatial integrity.

(13) Request more information on data source
Broadband provider data that does not meet the QC acceptance criteria Sewall initiates a request order to the provider for additional information. This request includes a detailed listing of the deficiencies found in the data as well as inquiries regarding spatial inaccuracies and anomalies discovered in the analysis.

(14) Infill Process
Sewall developed a tool named Infill to interact with the ConnectME street segments and populate related tabular records for fixed wired service provider availability. The Infill Tool allows a user to configure a specific set of service provider parameters, select ConnectME street segments, and then view and edit the related broadband availability information in the Broadband Services table that corresponds with the configured attributes. This tool is used to input fixed wired broadband availability data that Sewall received as census block, street or unreferenced map data. The majority of fixed wired service provider datasets utilize the Infill Tool for processing. A screenshot of the configuration dialog box is shown as Figure 6 below.

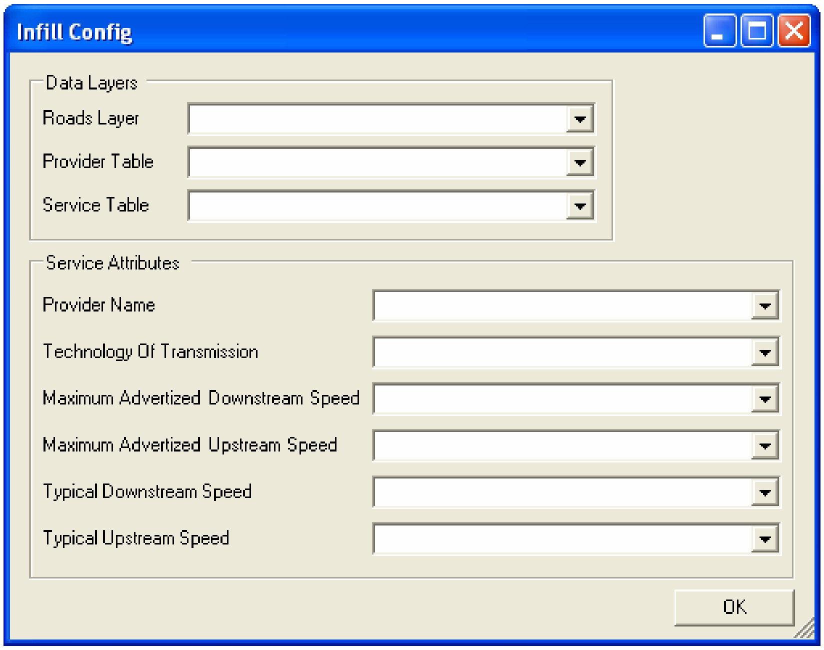


Figure 6 - Infill Tool Configuration
Data Layers: (1) Roads Layer: ConnectME roads data layer (2) Provider Table: Internal processing flag (3) Service Table: Broadband Service output table where the service provider street address ranges are stored. Service Attributes: These fields are necessary to populate fields in the deliverable.

The first time a user uses the Infill tool in an ArcMap session, the 'Infill Config' screen appears. The user enters the input data layers and the attributes for the service provider dataset that the tool will utilize during processing.

Once the Infill Config screen has been set a user selects one or more ConnectME road segments. Using the unique primary key values of the selected streets and the specified provider name and technology of transmission the tool searches the Broadband Services table for existing matching tabular records. If matches are found from this search, the tool reports the information in the Infill window. For selected street segments where no match was found in the Broadband Services table, the tool populates the Infill window with street segment road name and street range attributes representing potential broadband service ranges for the provider on the selected streets. These street range attributes can be updated in the Infill window based on provider sources. This Infill tool window is shown as ***Figure 7***.

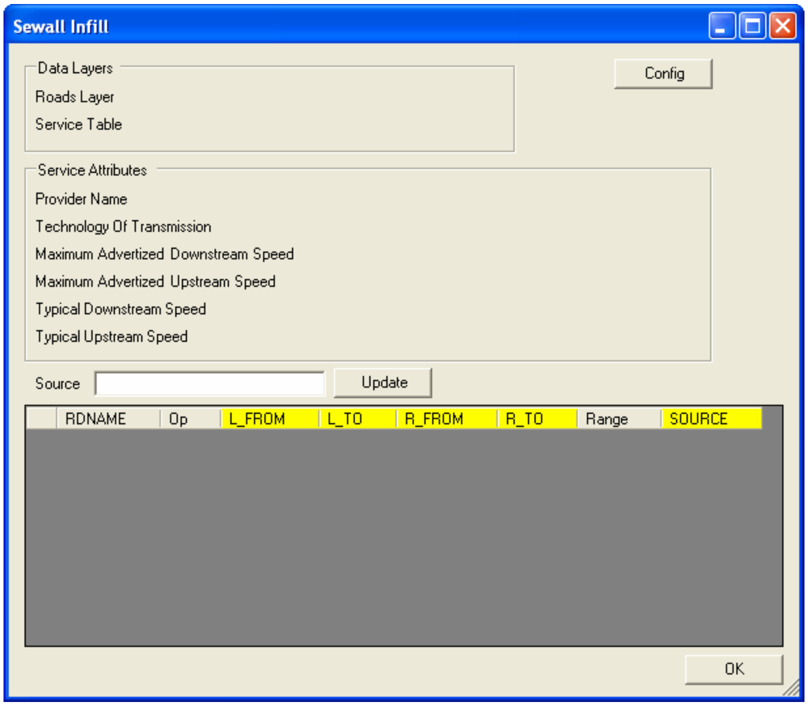


Figure 7 - Infill Tool
Data Layers: (1) Roads Layer: ConnectME roads data layer (2) Service Table: Broadband Service output table where the service provider street address ranges are stored
*Config: Opens the Infill Config window (**Figure 6**)*
Service Attributes: These fields are necessary to populate fields in the deliverable.
Source: Internal flag for source of service availability
Update: Updates selected tabular records SOURCE field to the value entered in the Source field
Tabular Record Attributes: (1) RDNAME: Name of ConnectME road segment (2) Op: Operation being performed {INSERT-new tabular record, UPDATE-update existing tabular record, DELETE-delete tabular record} (3) L_FROM: "Left from" broadband address range of ConnectME road segment (4) L_TO: "Left to" broadband address value of ConnectME road segment (5) R_FROM: "Right from" broadband address value of ConnectME road segment (6) R_TO: "Right to" broadband address value of ConnectME road segment (7) Range: Reports either "full" or "partial" and is a comparison for each tabular record of the broadband provider street range to the accompanying ConnectME street range (8) SOURCE: Internal process flag.

Once the user has reviewed the values, pressing 'OK' will perform the operations listed in the Op field.

(15) ConnectME Street Data

The ConnectME street data bin contains the street centerline dataset used in the geocode and street relate processes. The Maine Office of GIS E-911 street centerline file was used to create the base street segments and gives the project the most accurate street centerline file for the State of Maine. The NAVTEQ street centerline dataset NAVSTREETS was utilized to infill street segments in areas where gaps were assessed in the MEGIS E-911 file.

(16) Relate Process

Through the use of Sewall developed tools the data gathered for fixed wired broadband service providers gets stored in the Broadband Services table as availability street ranges associated with street centerline segments. Each record in the Broadband Services table is associated by a foreign key/primary key relationship with a street segment in the ConnectME street centerline dataset. This relationship allows for clean and easy access to street level availability of service providers.

(17) Broadband Services Table
The Broadband Services geodatabase table was developed by Sewall to store broadband service provider information and street range coverage. NTIA requirements and formats were utilized when creating the fields to ensure the records stored in the Broadband Service table are compatible with the SBDD data model.

(18) Intelligent Street Centerlines
The output from the fixed wired workflow is a comprehensive intelligent street centerline network comprised of street centerlines and related service availability tabular records.

4.3.2 Fixed Wireless Transmission

The initial stage of mapping terrestrial fixed wireless service territories depends on the quality of the data received. To process any service footprint of a particular transmitter, the initial resources acquired during the data collection phase of the project are critical.

Terrestrial Fixed Wireless technology is clouded by many variables that determine the overall performance of each transmitter signal. Inaccurate data pertaining to location, height of a transmitter, horizontal and vertical limitations, signal range and many more factors present potential obstacles to producing an accurate representation of any transmitter's service footprint. Some of these factors have not been considered during the mapping process due to lack of data needed for modeling them. For example, while a 10-meter DEM is used to represent the surface terrain, we have not incorporated obstructions on the surface such as trees and other man-made obstacles that could influence a transmitter's propagation model.

The data collection process and subsequent conversion workflow is designed to accommodate a variety of data sources received from the service providers and production tools have been developed to build efficiencies and quality control into the workflow. When received by the service providers, supplemental data is used throughout the conversion workflow to help verify the mapping results. However, a larger scale verification process is described in **Section 5**.

The data conversion process for fixed wireless transmission is represented by ***Figure 8*** and described below.

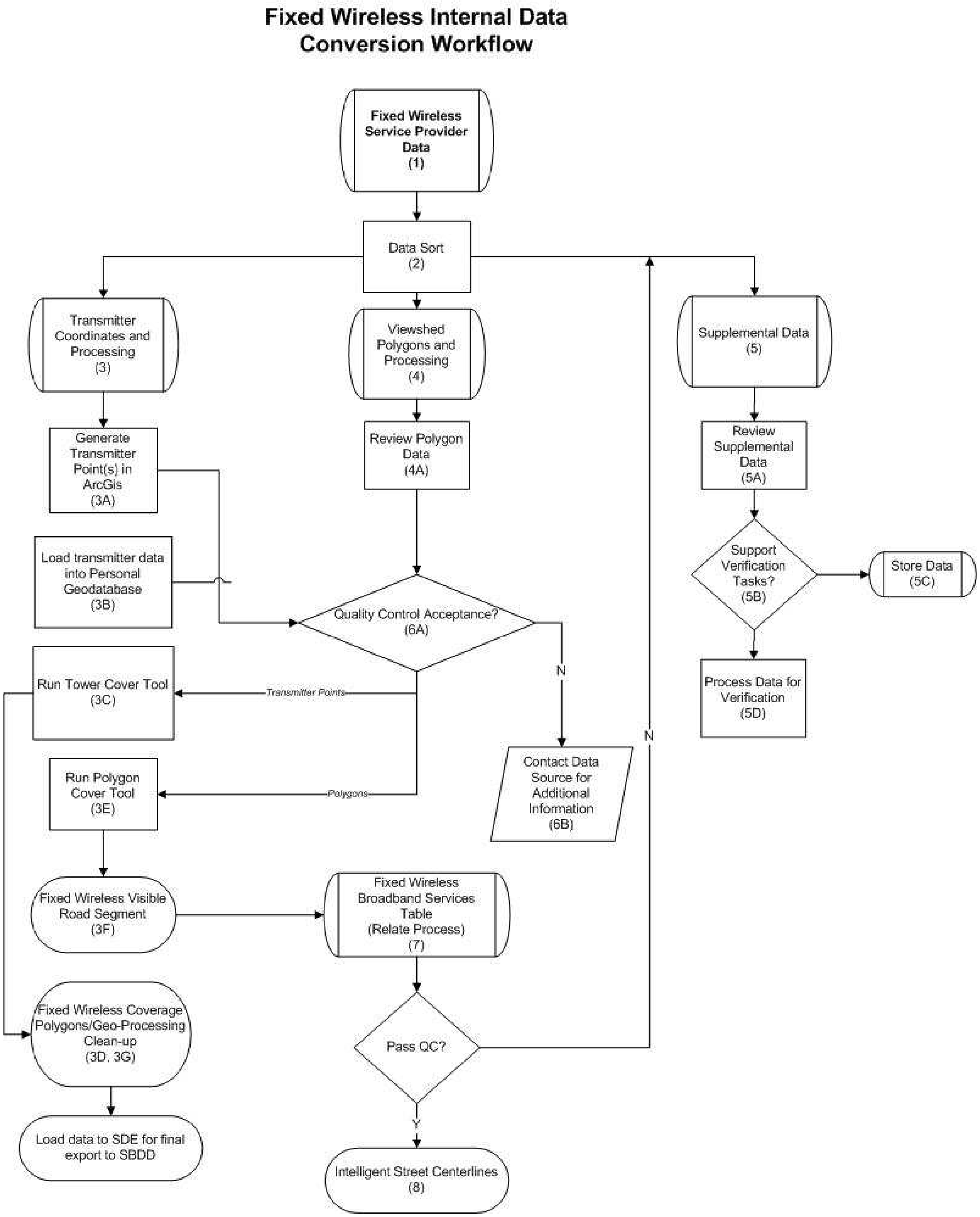


Figure 8 - Fixed Wireless Internal Conversion Workflow

(1) Fixed Wireless Service Provider Data

Service provider data gathered during the data collection phase. Data is cataloged in separate folders by provider and managed according to task and technology of transmission.

(2) Data Sort
The data sort phase of production immediately follows the data collection process. During this task, a thorough review of the service provider data determines the type of data received. Fixed wireless data generally consists of three types: transmitter coordinates and attributes, pre-defined polygons and attributes, and supplemental data. Each type of data follows unique internal processing steps.

(3) Transmitter Coordinates and Processing
Transmitter coordinate data is essentially the raw data necessary to generate a viewshed for each transmitter. In order to be processed, the transmitter source data must have certain required fields such as latitude and longitude, spot (ground elevation), equipment height at the transmitting and receiving ends, horizontal and vertical limitations, and range of transmission. The content of the transmitter data is carefully reviewed for completeness and overall consistency prior to the next step. Once completed, the data is imported into ArcGIS for continued processing and quality control.

(3B) Load Transmitter Data into Personal Geodatabase
Using the newly scrubbed .csv file, transmitter points are created in ArcGIS and the transmitter location points are displayed. A final comparison against supplemental data is performed to ensure the transmitter locations are in the correct locations. Supplemental data includes such layers as imagery, political boundaries, and road centerlines.

(3C) Run Tower Cover Tool
This tool was designed and developed by Sewall to batch process 1 or more transmitter point viewsheds. A screenshot of the tool is shown below as ***Figure 9***.

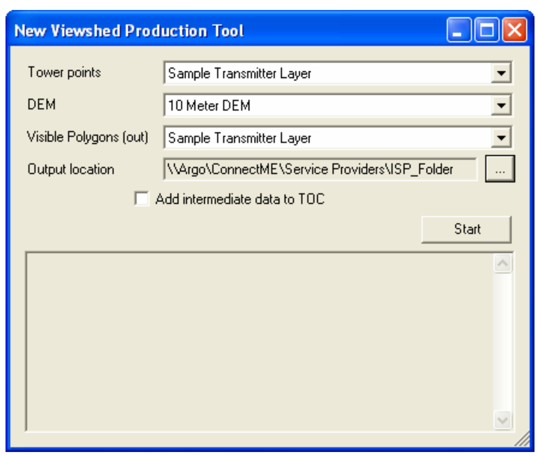


Figure 9 - Tower Cover Tool (Viewshed Production)

Tower Points: The data layer containing records of all transmitters that need a viewshed generated. Originally received from ISP and pre-processed by Sewall for format compatibility.
DEM: 10-meter digital elevation model obtained from MEGIS as the primary surface model for generating the viewshed
Visible Polygons (out): Visible polygons (only) output to an SDE layer

Output location: Location of output to personal geodatabase workspace to be used for additional processing.

(3D) Fixed Wireless Coverage Polygons

The Tower Cover Tool generates raster data sets depicting the visible and non-visible surfaces representing each transmitter. As a final output, the tool extracts the visible components of the raster data and outputs to polygon vector layers stored in the SDE environment as supplemental reference data.

(3E) Run Sewall Polygon Cover Tool

This tool was designed and developed by Sewall to facilitate several production steps.

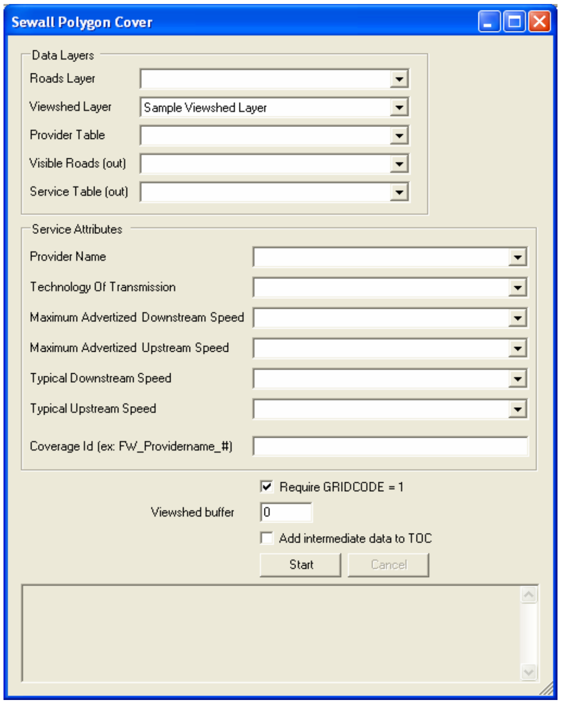


Figure 10 - Polygon Cover Tool

Data Layers: (1) Roads Layer - ConnectME Street data layer with address ranges (2)Viewshed Layer - viewshed layer used toe delineate visible polygons for clipping road segments (3)Provider Table - internal processing flag (4) Visible Roads (out) - output feature class that stores the clipped road segment geometry (5) Service Table (out) - output table that the extracted address ranges populate.

Service Attributes: These fields are populated, if data is available, to meet NTIA NOFA requirements.

(3F) Fixed Wireless Visible Road Segments

The Polygon Cover Tool clips road segments that are within visible polygon viewsheds and writes them out to a polyline vector layer stored in the SDE environment as supplemental reference data.

(3G) Fixed Wireless Geo-Processing Clean-up
The fixed wireless polygons or propagation models generated for each provider step through several geo-processing routines to check for and eliminate the following conditions:

- Single pixels less than 0.125 square miles
- Holes inside the polygons less than 0.125 square miles

In each case, all identified polygons are removed and dissolved to create multipart polygons by provider, technology, speed and spectrum. Each provider's propagation model differs in size and complexity due to the number of transmitters and their individual parameters that determine each view shed. Because the geometries are manipulated through many geo-processing procedures, multiple cycles of validation are run to ensure the geometries are in tact and repair routines are run if necessary. Once all propagation models meet internal quality control standards, the geometry is loaded to SDE and stored for final export to the SBDD deliverable format.

(4) Viewshed Polygons and Processing
Although not as common, another source of data received from the service providers is a polygon dataset that has already been generated to represent visible service territory of transmitters. Service providers or third party vendors will frequently run their own propagation models to be used for broadband mapping. Polygon formats include ESRI shapefiles, MapInfo files, Google .kml files, and raster files. Each format requires a thorough review to determine the subsequent processing steps.

(4A) Review Polygon Data
Although each format listed is unique, the data eventually runs through the Polygon Cover tool so that the address ranges within the polygons can be clipped out. Each format is carefully inspected for content, spatial characteristics and accuracy. The general workflow for each format is as follows:

- Shapefile: Review content > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool
- MapInfo: Review content > Translate to ESRI shapefile > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool
- Google .kml: Review content > Translate to ESRI shapefile > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool
- Raster: Review content > Translate raster to polygon > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool

(5) Supplemental Data
Supplemental data received by service providers is generally used for verification to support internal processing results. It is not used as a data source to generate transmitter locations or viewsheds. Supplementary data includes, but is not limited to, failed service locations, customer service locations, hard copy plots, PDF files, and other digital reference files. In most circumstances, the data can be used for cross-referencing.

(5A) Review Supplemental Data
Each format is unique and so are the processing steps that are necessary to prepare the data for use.

- Failed Service Locations: Provides an excellent source for cross-referencing to viewshed polygons (visible and non-visible) but must have complete address in order to geocode location of address.
- Customer Service Locations: Provides an excellent source for cross-referencing to the viewshed polygons (visible and non-visible) but must have a complete address in order to geocode location of address.
- Hard copy plots: May be used for verification purposes if the content of the material is applicable.
- PDF files: May be used for verification purposes if the data content is applicable.
- Other data sources: All sources are reviewed for potential use.

(5B) Support Verification Tasks
Supplemental data sources are reviewed to determine if they hold any value to the project workflow. Value added data will be stored and utilized as needed to support internal processing.

(5C) Store Data
Data received from service providers that does not have any given value to the project is organized and stored under the service provider folder.

(5D) Process Data for Verification Tasks
Supplemental data sources are scrubbed for compatibility and processed.

(6) Quality Control Acceptance
Quality control procedures are implemented at each of the three production stages depending on the data (transmitter coordinates, viewshed polygons, or supplemental data). Because the service provider data is received in numerous formats, styles, and content, much of the initial QC is completed during the data collection stage. When data is received from a service provider, an initial review is done to determine what is received and what is outstanding. This cycle of communication with the providers continues until all the necessary data is either received or clearly understood that it will not be received. Throughout the data collection process, Sewall keeps an inventory of receivables.

(6A) Contact Data Source for Additional Information
During the data collection phase of the project, questions or clarifications may have been overlooked, or items may present road blocks at some point later during the processing. If an internal quality review does not resolve an issue, the service provider is contacted for additional information or clarification.

(7) Fixed Wireless Broadband Services Table (Relate Process)

The Polygon Cover Tool has two outputs; both generated using the visible polygons created by the Tower Cover Tool: (1) road segments, and (2) calculated address ranges. While the visible road segments are not part of the NTIA deliverable, they are stored as a reference file named CONNECTME.FW_VISIBLE_ROAD_SEGMENTS.

(8) Intelligent Street Centerlines
The output from the fixed wireless workflow is a comprehensive intelligent street centerline network comprised of street centerlines and related service availability tabular records.

4.3.3 Mobile/Satellite Transmission

Wireless broadband technology consists of all facilities-based providers of wireless broadband service that is not address specific. For the State of Maine, this includes terrestrial mobile wireless and satellite broadband service. Mapping mobile wireless and satellite coverage requires less processing than other technologies that are address-based, such as wired and fixed wireless service. Data consists of polygons generated by the providers or third party vendors, representing areas where broadband service is offered. As shown in the workflow below, the data received from providers is sorted, processed and loaded into a geodatabase. Minimal steps are required to process this data, but established internal workflows are taken to ensure that proper protocols and quality assurance are met. The primary steps of the internal workflow are shown in ***Figure 11*** and described below.

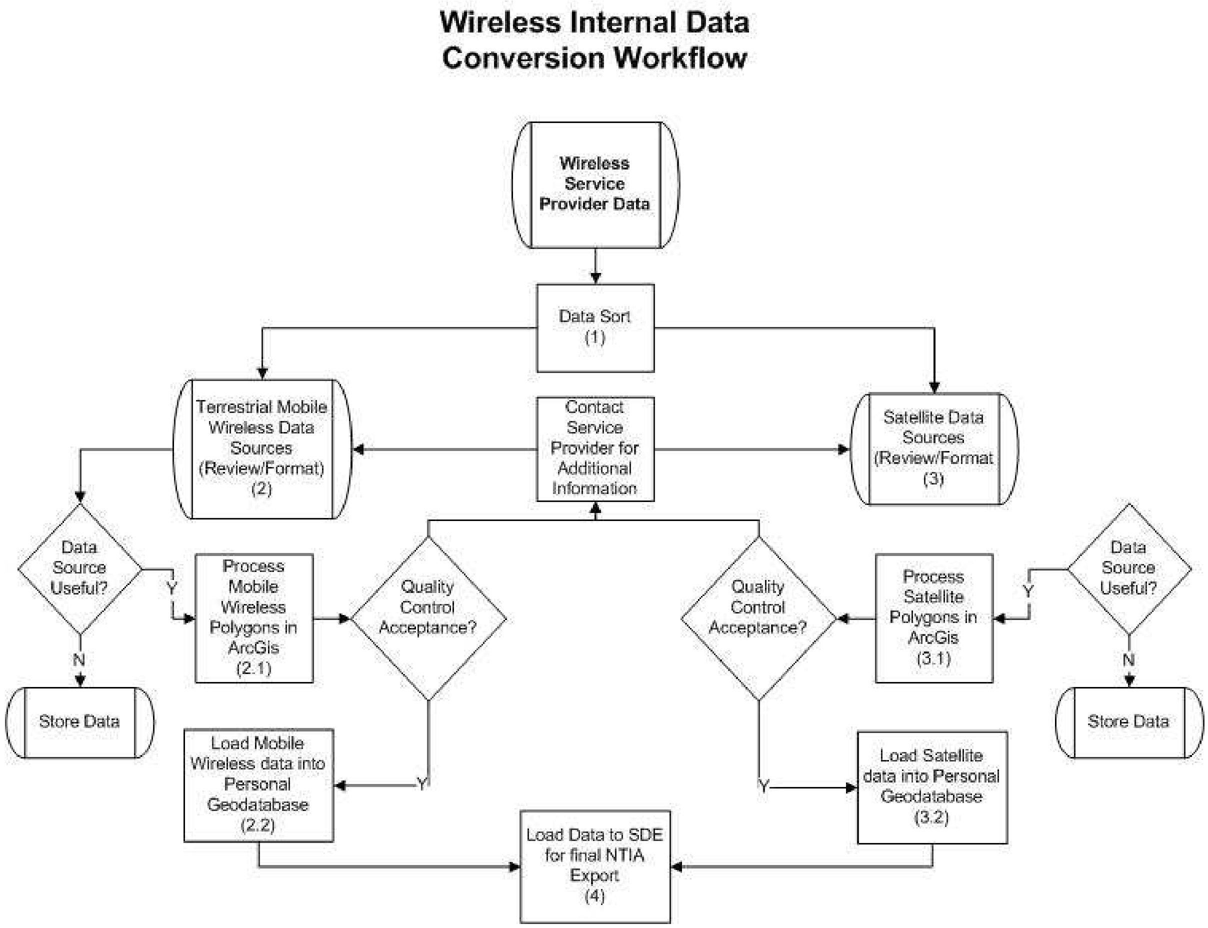


Figure 11 - Wireless Internal Conversion Data Workflow

(1) Data Sort
Upon receiving data from a mobile or satellite service provider, Sewall initially sorts and stores the data by technology - terrestrial or satellite.

(2) Terrestrial Mobile Wireless Data Sources (Review)
After the data is sorted, an initial data analysis is performed to determine if the data received appears to be intact spatially and is accompanied by the proper attribution required for adherence to the SBDD data model. Follow-up with the service provider continues until all necessary information is acquired.

(2.1) Process Mobile Wireless Polygons in ArcGIS
After determining that the data has value, the polygons are projected into the proper coordinate system to complement the internal workflow. Depending on the source data, additional data processing routines may be necessary before loading the data into the geodatabase.

(2.2) Load Mobile Wireless data into Personal Geodatabase

Although the primary quality control procedures are completed during the verification process, initial acceptance testing to ensure the data is spatially valid is performed by cross-referencing to additional data sources such as aerial imagery or information taken from the service provider website. Discrepancies are documented for use in subsequent verification processes. Once quality checks are complete, the data is loaded into a personal geodatabase

(3) Satellite Data Sources (Review)
When all the spatial and attribute information is received, the satellite data follows the same internal workflow as mobile wireless data (Steps 2, 2.1 and 2.2).

(4) Load Data to SDE for final SBDD Export
Mobile wireless and satellite data is loaded to SDE environment for final export to SBDD format.

4.3.4 Middle Mile Locations

Middle Mile and Internet Backhaul Connection Points are defined by NTIA as "interconnection points that typically enable relatively fast data rates, are built to handle substantial capacities, and may be service-quality assured." At this stage of the mapping, middle mile data has been the most difficult to obtain from service providers during the data collection process. Service provider networks can include as little as one middle mile location such as a backhaul connection point or as many as dozens, operating as interconnection points within a fixed wireless network reaching out to end users. Furthermore, some service providers may offer middle mile connection points only as a service, such as a splice into a fiber line to support a lateral to a central office or business.

Regardless of the technical framework, all middle mile locations that meet the NTIA definition are captured in a point feature class with additional attribution including the ownership of the facility, serving facility capacity and serving facility type.

The outline of workflow is shown as ***Figure 12***. The description of each step follows.

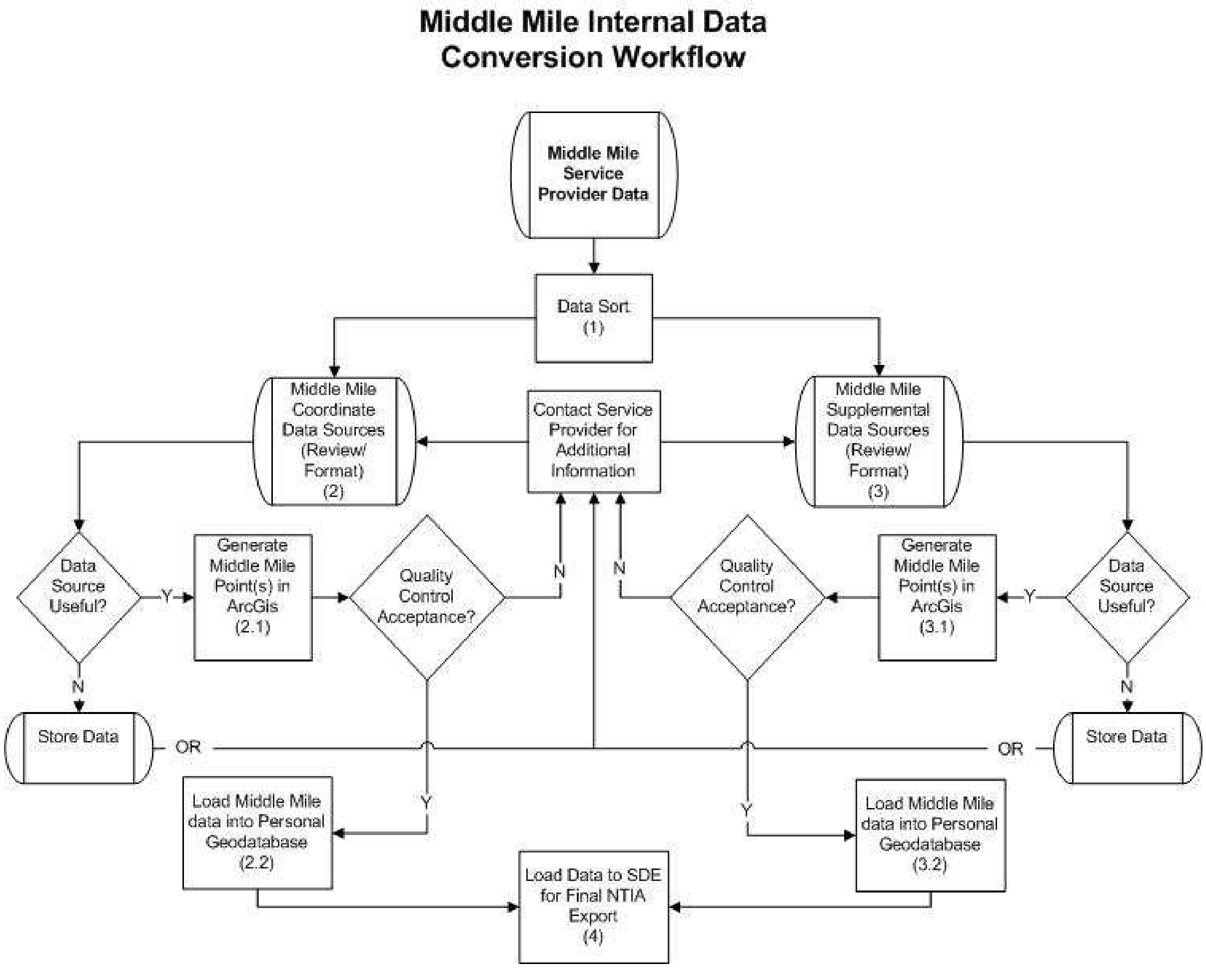


Figure 12 - Middle Mile Internal Data Conversion Workflow

(1) Data Sort

The initial data sort separates the data and distinguishes formats more compatible to the database model, such as middle-mile coordinate values listed in a spreadsheet or ESRI shapefiles. Data received in compatible formats require minimal processing steps. Supplemental data sources generally require additional processing steps. Examples may include the conversion of .kml files to ESRI shapefiles or polyline files that require points to be added at splice or lateral connections.

(2) Middle Mile Coordinate Data Sources Review

Sewall reviews the data to ensure that the information is a valid input. If so, the data is reformatted and loaded into in ArcGIS. Sources deemed as invalid are stored, or the service provider is contacted for additional information if necessary.

(2.1) Generate Middle Mile Points in ArcGIS

Points are loaded into ArcGIS. Sewall analysts run acceptance procedures to verify data translation to ArcGIS and spatial accuracy and completeness using supplemental data sources provided such as addresses, imagery or descriptive information about the point locations. In addition to the point geometry, all attribution carried over in the translation is confirmed.

Conflicts or questions are referred back to the service provider for further clarification if necessary.

(2.2) Load Middle Mile Data into Personal Geodatabase
Middle-Mile data is loaded to a personal geodatabase. Additional data received by the service providers or revisions will cycle through the same process and be stored in the personal geodatabase prior to loading to the SDE environment for final export.

(3) Middle-Mile Supplemental Data Sources (Review)
Supplemental data sources may involve additional processing during this step in order to proceed. Some of the more common supplemental data sources include, but are not limited to, the following:

- Google .kml files
- .jpg images showing middle-mile locations
- AutoCAD point or polyline files
- e-mails with descriptions of locations
- Other miscellaneous information

Once the data has been fully reviewed and normalized, the remaining steps follow the same internal workflow as coordinate data sources (Steps 2.1 and 2.2).

(4) Load Data to SDE for final SBDD Export
Middle mile data is loaded from the personal geodatabase to the SDE environment for final export to SBDD format.

4.3.5 Service Overview

Broadband service providers that participate in the state broadband mapping project have been asked to provide broadband service territory footprints at the address, street, census block or county level. The service overview dataset contains the information that has been delivered at the county level.

The workflow developed by Sewall integrates the gathered data from broadband service providers into a consistent spatial format that is stored in a geodatabase designed to be compatible with the SBDD deliverable.

The service overview workflow is described below and depicted in ***Figure 13***.

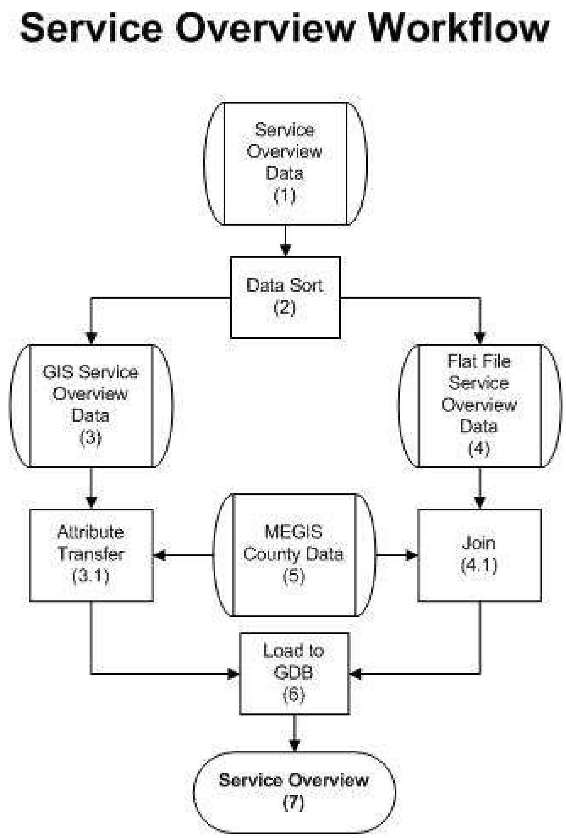


Figure 13 - Service Overview Workflow

(1) Service Overview Data
The Service overview data bin is the storage location for service overview specific broadband service provider data gathered by Sewall. Sewall specifies what information is necessary for this deliverable and what formats are acceptable when contacting each provider during the data gathering phase of the project.

(2) Data Sort
The service overview data is sorted into categories by data type.

(3) GIS Service Overview Data
The GIS data bin is used to store provider data that has been delivered to Sewall with service overview attribution and is in the requested GIS format.

(3.1) Attribute Transfer
Attributes contained in the GIS data are sent through an attribute transfer process that populates county data from the MEGIS County data. This step ensures that there is one consistent spatial dataset utilized as a basemap in the service overview.

(4) Flat File Service Overview Data
The flat file data bin is used to store provider data that has been delivered to Sewall with service overview information in a flat file format.

(4.1) Join
Using county name information provided in the flat files the MEGIS county data is joined to the flat files. The joined dataset is exported and stored in the GIS service Overview data bin.

(5) MEGIS County Data
The shapefile cnty24p.shp was downloaded from the MEGIS website (megis.maine.gov) and utilized for county spatial representation of the service overview dataset during the workflow.

(6) Load to Geodatabase
Once the service overview data has been processed, the data is reviewed for content and accuracy and then loaded to the ConnectME production database.

(7) Service Overview
The output of the service overview workflow is a polygon dataset that is compatible with the SBDD data model.

5 Validation

The verification process is used to ensure that the data delivered is in fact valid and current. Methods used by the Maine teams to validate coverage areas include field tests of mobile devices, responses to surveys sent to residents and businesses, comparison with third-party datasets both private and governmental, and results compiled from a speed test website established specifically for this purpose.

Once the data has been collected, processed and verified, the results are statistically analyzed and plotted atop the original provider data coverages in GIS. Any 'holes' or inconsistencies in the data from the service provider are reported to the provider in a feedback loop to ensure all parties involved are aware of the potential issues with the broadband service in an area.

5.1 Field Tests for Mobile Coverage

Mobile coverage consists of data from providers who offer mobile broadband services to consumers through devices such as smartphones or mobile laptop aircards. Common providers of this type of broadband service in Maine are AT&T, Verizon Wireless, and Sprint.

In order to verify the existence of wired and fixed wireless coverage in an area, direct access to the provider's service is needed. Logistically this would be difficult because transmission receivers, accounts and other equipment would have been required for each of the providers. Instead, the project team opted to gather information through other means, so field tests were only conducted to validate mobile coverage.

Mobile coverage data is received by Sewall from the service providers in the form of GIS polygon files. After these files have been reviewed and properly projected (see **Section 4.3** for details), they can be analyzed in the verification process. The mobile coverage file is compared against the State of Maine boundary file in a GIS application in order to assess the size and location of the coverage area with respect to the State.

5.1.1 Methodology

The methodology developed by the ConnectME Authority to verify mobile coverage in Maine is to select a series of points throughout a provider's coverage and have field crews run tests at these predetermined locations. A minimum of 37 points per coverage area are needed in order for the statistical analysis on the field data to be valid.

To select the points for field verification, a 28-square-mile grid was created in GIS and layered with the provider's coverage area, the E911 road layer and the state boundaries. One point was placed per grid block within the provider's coverage network. Each point was placed on a road, usually at road intersections for ease of access by the field crew. Once all the points were placed, the points were divided into groups for distribution to field crew personnel.

The points were assigned attributes of point ID, latitude and longitude. The attribute table was then exported to an Excel file for further editing. The columns: field connect, upload speed, download speed and notes were added to the spreadsheet. The field connect column holds values to describe whether the field crew was able to log on to the provider's network., speeds collected from the state website at that location are stored in the upload speed and download speed columns. The spreadsheet was loaded onto the field laptops for data entry.

Crews utilized Microsoft Streets & Trips to assist in navigating to each of the field points across the state. The software, which was loaded on each of the field laptops, has a GPS component that could track and direct field crews. The spreadsheet used for data entry was also loaded into the software so the points could be plotted based on given coordinates. The field crews could properly identify each of the points based on the Point Name attribute.

The program turned each of the points into a "stop." The start and ending points of the trip were also added, allowing the software to calculate an optimized route to reduce driving time and mileage. After optimization, the software also provided driving directions, which were saved and loaded onto the field laptops.

Mobile broadband aircards from each of the mobile service providers were purchased outright directly from the providers. This eliminated the need for a service contract so that the aircards can be deactivated after the verification process without a contract cancellation fee. Service providers activated the mobile aircards with a month-to-month data package of 5GB.

Aircards from each of the providers were then loaded onto the field crew laptops. The software from the aircards was installed, aircard functionality was checked, and any updates were installed prior to crews leaving the office.

Each time verification tasks are performed, the points are visited by a field crews who are equipped with a field laptop enabled with the mobile broadband aircard of the corresponding service provider and proper navigation information. The field crews drive to each of the points, log onto the service provider's network and navigate via Internet Explorer to an internet speed test website created by the James W. Sewall Company specifically for the ConnectME Broadband Mapping Project.

For each test point, the point number, service provider and date are entered into the internet speed test website (e.g., Test_745_verizon_20100521) and a test is executed. Results are recorded both in the speed test database (automatically) and in the spreadsheet. Once all of the points are completed, crews return to the office and spreadsheets are combined. Data columns are filled in with corresponding broadband upload and download speeds for sites with connectivity.

Data points are then plotted on maps to view where broadband coverage is full strength or where it is lacking. If there are large 'holes' in the coverage areas, the points are revisited to ensure that readings were accurate and not subject to user or equipment error.

The merged field spreadsheets are then handed off to a statistician for the statistical analysis of the data.

5.1.2 Statistical Analysis

Large data sets are often expressed best in terms of summary statistics. It is often easier to look at commonly defined statistics (stats) to get a quick overview of what the data describes, than to look at all the raw data.

In analyzing this data, we chose statistics using the following criteria:

- Commonly used and understood
- Fit the data (data type) in question
- Had practical application to the reader in understanding what the data was describing

We believe that the statistics presented can be beneficial in several ways:

- Description/Summary: they consolidate many data observations into a few summary stats that can be quickly compared
- Quantification: they describe which portion of the data falls within or outside of the limits of acceptable criteria
- Reliability/Prediction: in some cases, they attest to the reliability of the data collection

The following statistics were used:

- Number of samples (n): number of data points in the sample
- Average (xbar): arithmetic mean or the mean value of a set of integers, terms, or quantities, expressed as their sum divided by their number.
- Standard Deviation (sd): used as a measure of the dispersion or variation in a distribution, equal to the square root of the arithmetic mean of the squares of the deviations from the arithmetic mean.
- Percentages (%): a proportion or share in relation to a whole; a part; a fraction or ratio with 100 understood as the denominator (e.g., 0.98 equals a percentage of 98).
- Hypothesis testing: statistical process used when trying to determine if it is reasonable to conclude that the entire population possesses a certain characteristic by the analysis of a sample.

Explanation of choices made:

- Quantitative statistics were only applied on sample data that fell within the published service area of the provider in question. This was possible because the area was “bounded” by the geographic area described in the “service area.” Outside the service area there is no bound (limit), so these same statistics would not be reliable as used with our methodology.

- Assumed a normal distribution because this is the most common and typical distribution type for this type of data, and we had no evidence to counter this assumption.
- Chose sample statistics because we were not dealing with the whole population (almost unlimited sample points possible).
- Chose hypothesis testing because we wanted to have the most valid predictor of the population parameters given the variability of our sample data.
- Chose student's T-distribution when sample size was equal to or less than 30 (n=<30) and Z-test when populations were above 30 (n>30).
- Used one-tailed tests because we were interested in the area above the curve from a single lower parameter (criteria of minimum speed).

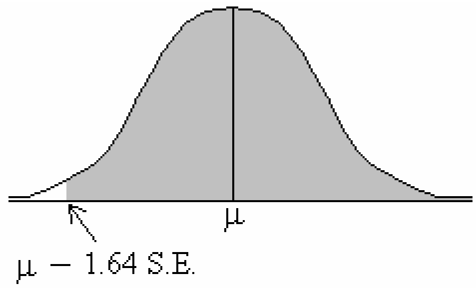
Data was sorted to yield only those sample points that fell within the published service area of the provider in question.

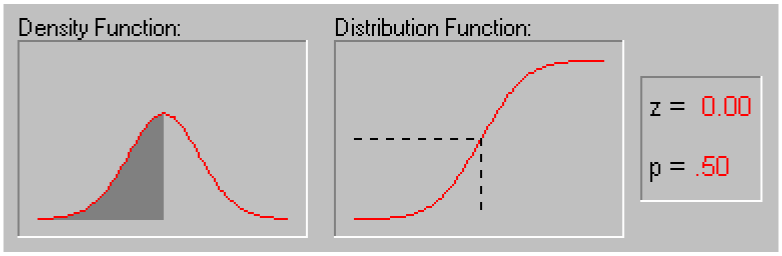
Then the following information was calculated:

- n = number of total sample points
- Degrees of Freedom (df) = n-1
- Selection of t-distribution (df < 30) or standard normal curve (df >= 30)
- Percent of points where connection was established
- Percent of points where both tested upload and download speeds were equal to or greater than (=>) broadband speeds (200 and 768 kb/sec respectively).
- Percent of points where either the upload or download speed was equal to or greater than (=>) broadband speed, but not both.
- Percent of points where neither the tested upload or download speeds was equal to or greater than (=>) broadband speeds.

Using all data points within the designated service provider coverage that registered an upload speed during the test, the following were calculated:

- Average # of points where a connection was made that had an upload speed equal or greater than broadband minimums.
- Average upload speed (xbar/upload)
- Standard deviation of the sample (SD/upload)
- Statistical prediction of percent of points that would meet minimum 3G upload speed in subsequent samplings (using one-tailed t-test or z-score, depending on df) – see schematic below





Using all data points within the designated service provider coverage that registered a download speed during the test, the following were calculated:

- Average # of points where a connection was made that had a download speed equal or greater than broadband minimums.
- Average download speed (xbar/download)
- Standard deviation of the sample (SD/download)
- Statistical prediction of percent of points that would meet minimum 3G upload speed in subsequent samplings (using one-tailed t-test or z-score, depending on df) – see schematic above.

5.2 Surveys

The project team is surveying residents and businesses in Maine utilizing a questionnaire about their current internet connections. The ConnectME Authority has opted begin the verification of residential broadband service with a pilot survey.

5.2.1 Pilot Residential Survey

According to the 2000 Census, there are approximately 518,000 households in Maine, of which 10,000 were included with the pilot survey. Residential addresses were purchased from InfoUSA for the mailing as 2,500 addresses in each of four geographic areas: Maine North, Maine South, Maine East, and Maine West. Addresses were selected at random by InfoUSA from the provided GIS polygons constituting adjacent census blocks in each area containing approximately 5000 households.

The survey questionnaire is comprised of 10 questions and takes about two minutes to complete. A copy is included in **Appendix E**.

The survey identifies the consumer by the physical address, which is geocoded against a street centerline file in GIS to create a point file. The data associated with each address (e.g., transmission type and provider) is analyzed by layering the consumer information with the coverage data provided by the service provider. Sewall can analyze the layers to verify if each service provider does cover the areas represented by the data it submitted. In addition, if an area shown to have no service by a provider appears in the consumer survey, the provider in question can be contacted to confirm and provide updated coverage information.

There is also an online version of the survey that people can access by navigating to a link indicated on the delivered hardcopy of the questionnaire. The electronic version, once completed, directs the person to the ConnectME internet speed test website, which reports the upload and download speeds of the user's internet connection. The speeds are recorded in a database that tracks entered physical address and speed test results for future analysis (see Section 5.4.1 for further details).

The logistics for a statewide survey are being addressed. Sewall expects to begin implementation by July 2011.

5.3 Third Party Data

The Maine team has acquired data from American Roamer and from the FCC. These datasets will be used to validate the mapped coverage for each provider through spatial analysis.

5.3.1 American Roamer data

Maine acquired the American Roamer data, which includes coverages for Sprint, Verizon Wireless, AT&T and T-Mobile. The data consists of polygon shapefiles, which Sewall could overlay with the coverages received from the providers. For each provider, the area in common and the area covered only by one dataset were determined from geospatial analysis. Differences will be forwarded to each provider for analysis and refinement of the service territory.

5.3.2 FCC Form 477 aggregate data

The FCC has provided SBDD grantees and their teams access to the FCC Form 477 aggregate data. This data contains information on service providers in Maine at an aggregate or granularity higher than the SBDD data, but is useful for checking the list of providers and their locations at Census Track level.

The project team has recently developed a tool that compares the records in the Form 477 aggregate data to the provider data in the SBDD project database. The tool lists out by Census Track each provider that includes the tract in the Form 477 filing. Each provider that has service data that falls within the tract is considered a match. Using this data, the team has been able to find potential providers that were not previously included in the study, as well using the tract locations as a cross-reference to where each provider has service. The team has plans to further enhance the tool to provide a set of results centric to each provider.

5.4 Crowd Sourced Data

5.4.1 Speed test results

For the SBDD project, the ConnectME Authority has implemented an online speed test tool. The website was developed by Ookla Net Metrics and was brought online on January 13, 2010. To date, over 12,200 tests have been recorded. The speed test stores downstream and upstream speeds as well as the user's address and ISP. The results from the speed test tool are scrubbed and geocoded. The information will be used to help verify service coverages and service speeds for wired, fixed wireless, and satellite providers.

5.4.2 FCC Consumer Broadband Test (CBT) data

The Consumer Broadband Test data provided by the FCC consists of three datasets: Speed Test records, Mobile Broadband Speed Test records, and Broadband Dead Zone Report records. The project team plans to incorporate the FCC speed test records along with those records captured by the ConnectME speed test tool. However, the name of the service provider is not included with data, so a method for mapping the IP address in these records to the appropriate provider must be developed.

The dead zone reports are used to identify locations reported to be without coverage. The addresses from these records are geocoded and then are cross-referenced with service provider coverages in the areas.

5.5 Service Locations / Failed Service Locations

Service providers are encouraged to submit service locations and/or failed service locations to help validate extents of service coverage. The service addresses and failed service addresses are geocoded and the data is analyzed with the coverage data submitted by the service provider. This validation step will continue throughout the project as the team continues to receive these locations as part of the providers' data submittals.

5.6 Feedback Loop

Once broadband service territories are mapped, Sewall generates maps for each provider company representing the status of data at the time of the mapping. This gives each service provider the opportunity to validate its broadband service footprint and provide feedback to the Sewall project team. ***Figure 14*** below represents a fixed wired validation map where a provider company's broadband service (DSL) foot print is symbolized in red. Depending on the size of a service footprint and map density, additional information, such as road names, may be represented.

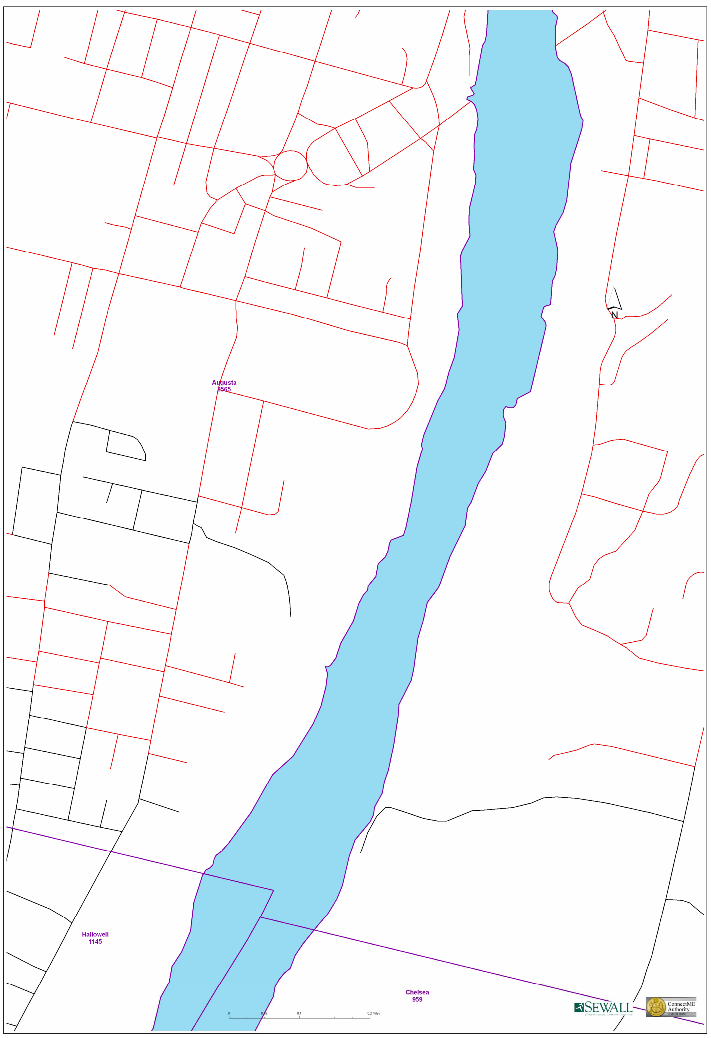


Figure 14 - Fixed Wired Validation Map

Sewall forwards the maps of the service territory, along with any anomalies noted from the third-party and crowd-sourced data analysis to each service provider. Sewall communicates regularly with each provider to ensure that the mapping is as comprehensive and correct as possible.

6 Data Delivery

Service provider data that has been processed to the Sewall production model needs to be transferred to the SBDD data model for delivery. In order to accomplish this Sewall has developed a process by which the Sewall production datasets are exported to the current SBDD data model structure.

The Sewall production model was designed with the NTIA delivery model in mind and, in as many cases as possible, the production model utilizes the NTIA delivery defined attribute definitions and domain values. Through the use of this design philosophy, Sewall has mitigated the pitfalls for exporting to the SBDD data model.

To facilitate the transfer of data stored in the Sewall production model to the SBDD model for delivery Sewall has developed an ArcCatalog tool named State Broadband Data Export. This tool reads a source geodatabase set of features and writes to a destination geodatabase set of features. A screenshot of the tool dialog box is shown in ***Figure 15***.

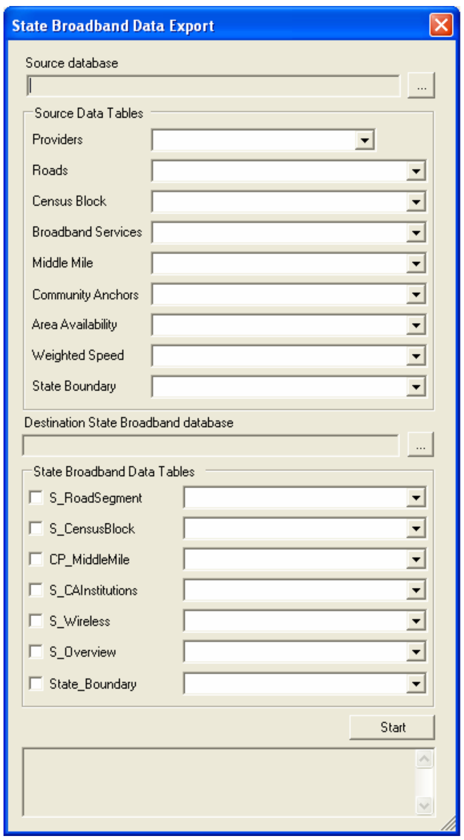


Figure 15 - State Broadband Data Export Tool
Source database: Sewall production geodatabase location.
Source Data Tables: (1) Providers - Geodatabase table with list of provider specific information (2) Roads - ConnectME street centerline feature class (3) Census Block - Census 2000 block geodatabase feature class (4) Broadband Services - Geodatabase table containing broadband provider characteristics and street ranges linked to ConnectME street centerline segments (5) Middle Mile - Geodatabase point feature class containing broadband service provider middle mile locations (6) Community Anchors - Geodatabase point feature class

containing community anchor institution locations (7) Area Availability - Geodatabase polygon feature class containing mobile wireless and satellite broadband provider coverage (8)Weighted Speed - Geodatabase polygon feature class service overview data (9) State Boundary - Geodatabase polygon feature class portraying the Maine state boundary.
Destination State Broadband database: SBDD geodatabase location.
State Broadband Data Tables: These are the required SBDD deliverables.

On launching the ArcCatalog tool, the user selects the source and destination geodatabases for the transfer process. The source geodatabase is the Sewall internal production model, and the destination geodatabase is the empty SBDD model. Next the user matches the items listed in the Source Data Tables section to the production model features. Once complete, the user checks which deliverables the tool will export in the State Broadband Data Tables section. Clicking 'Start' will begin the export process.

The road segment and census block exports are performed simultaneously in the State Broadband Data Export Tool with road segments being reported in census blocks greater than 2 square miles and census blocks being reported in areas up to 2 square miles. The tool reads the service provider data stored in the Sewall production geodatabase and performs an analysis through which the deliverables are extracted. The analysis process by which the tool extracts the road segments and census block data is outlined in the whitepaper entitled "Misalignment between 2000 Census Blocks & Maine E911 Streets: Technical Whitepaper," dated 1 September 2010. This paper is included in **Appendix D**.

Middle mile and community anchor institution data are stored as point features in the Sewall production model and are extracted utilizing a standard export routine. The datasets are reprojected from the production UTM projection to the SBDD WGS84 projection and LAT/LON attributes are populated. Once complete, the points are loaded into the destination feature classes of the SBDD geodatabase.

Wireless, service overview and state boundary data are stored as polygon features in the Sewall production model and a standard export routine extracts these to the SBDD features. The datasets are reprojected from the production UTM projection to the SBDD WGS84 projection as features are loaded.

During the export process features with front-end business rule violations get reported. The report is than reviewed by a Sewall analyst, and necessary corrections are made to the base datasets. This reporting mechanism ensures the data delivered in the SBDD geodatabase is as complete and accurate as the provided data sources allow.

Once the SBDD transfer file geodatabase has been created and its content validated, the geodatabase files are included in the data submittal zip file along with the other submittal files including 'datapackage.xls,' schema modifications report, data verification summaries, and this technical whitepaper.

Appendix A - Sample Letter to Service Providers

[date]

Sewall
P.O. Box 433
136 Center St.
Old Town, ME 04468
207-827-4456

[address]
[address]
[address]
[address]

Dear Mr. [name]:

The National Telecommunications and Information Administration (NTIA) of the U. S. Department of Commerce has been charged by Congress under the American Recovery and Reinvestment Act of 2009 and the Broadband Data Improvement Act (BDIA) to develop and maintain a comprehensive, interactive, and searchable nationwide inventory map of existing broadband service capability and availability in the United States that depicts the geographic extent to which broadband service is deployed and available from a commercial or public provider throughout each state (the Program).

The ConnectME Authority (the Authority) is responsible for developing and maintaining these data for the State of Maine and for serving as the conduit for this information to the NTIA. The Authority has contracted with James W. Sewall Company of Old Town, Maine, to undertake the initial mapping and to consult with the Authority on how best to update and maintain these data going forward.

We are writing to insure that you are familiar with this Program and to invite your collaboration in teaming with us in this important, statewide initiative. (See the URL's provided at the end of this letter for further information.) Indeed, your organization's collaboration is essential to the Program's success, and we thank you in advance for your participation.

To comply with the Program, the NTIA requires each state to provide structured data that includes:

- the availability of broadband service at the address level;
- advertised and "expected actual" speeds of broadband service;
- the technology used to deliver broadband service;
- location and capability of critical broadband related infrastructure (this data will not be publicly displayed on the national broadband map);
- the spectrum used by wireless broadband service providers.

We expect that the publicly searchable national broadband map and database will contain:

- geographic areas in which broadband service is available;
- the technologies used to provide broadband service in such areas;
- the speed at which broadband service is available in such areas;
- broadband service availability at public schools, libraries, hospitals, colleges, and all public buildings used by the state or municipalities.
- other economic or demographic data that may enable Federal efforts to provide usable and searchable data on a variety of issues pertinent to the public interest.

We recognize that some of the data we will ask you to provide is proprietary. Consequently, we include a Protective Order authorized by the ConnectME Authority and an accompanying non-disclosure agreement (NDA) for your review and execution. Please note, however, that the NTIA requires that this NDA may not restrict the Authority from providing all data collected to the NTIA or restrict the NTIA's use of such data as contemplated under this Program, including sharing such data with the FCC or other federal agencies. Furthermore, the NTIA prohibits the Authority or Sewall from agreeing to a more restrictive definition of Confidential Information than that adopted by the NTIA. Currently, as required under the BDIA, the NTIA identifies Confidential Information as any information, including trade secrets, or commercial or financial information, submitted under the Program that:

- identifies the location, type and technical specification of infrastructure owned, leased or used by a specific broadband service provider; or
- explicitly identifies a broadband service provider in relation to its specific service area or at a specific service location.

Confidential Information will not be made publicly available pursuant to the limits set forth in the BDIA except as required by applicable law or judicial or administrative action or proceeding, including Freedom of Information Act requirements. From the BDIA (§ 106(h)): "Notwithstanding any provision of Federal or State law to the contrary, an eligible entity shall treat any matter that is a trade secret, commercial or financial information, or privileged or confidential, as a record not subject to public disclosure except as otherwise mutually agreed to by the broadband service provider and the eligible entity." Sewall was chosen to lead this task in part because of its long history of handling confidential information for a variety of industries. Finally, should your organization apply for a Broadband Technology Opportunities Program (BTOP) grant to support the deployment of broadband infrastructure in unserved and underserved areas, enhance broadband capacity at public computer centers or to encourage sustainable adoption of broadband service, the NTIA requires that you participate in this mapping Program.

The NTIA has set a very aggressive Program schedule, with many deliverables due by November 2009 and all initial deliverables due in March 2010. Consequently, a representative from the Sewall team will be contacting you soon to discuss any questions you may have and to facilitate completion of the NDA and your participation. If we should be in communication with others in your organization concerning either the NDA or the data transfers, please inform the Sewall representative as soon as possible. Thank you again and we look forward to working with you.

Sincerely,

Phillip W. Lindley, Executive Director	James H. Page, CEO
ConnectME Authority	James W. Sewall Company

URLs for:

www.maine.gov/connectme www.ntia.doc.gov/press/2009/BTOP_mappingtotals_090909.html
www.sewall.com

Appendix B - ConnectME Authority Protective Order

STATE OF MAINE December 21, 2009

CONNECTME AUTHORITY PROTECTIVE ORDER
(Proprietary Business Information)

Pursuant to 35-A M.R.S.A. § 9207(1) and Rule Chapter 101, § 4, the ConnectME Authority (Authority) may designate information as confidential to protect the legitimate competitive or proprietary interests of communications service providers and mobile communications service providers. The Authority may designate information as confidential only to the minimum extent necessary to protect such legitimate competitive or proprietary interests. Information designated as confidential is not a public record under 1 M.R.S.A. § 402(3).

The Authority is currently conducting a Broadband Mapping and Inventory Project with the services of a private contractor, James Sewall Company (Sewall). Sewall is required to obtain data from service providers (Provider) by the Authority and the National Telecommunications and Information Administration (NTIA) pursuant to the Broadband Data Improvement Act (BDIA) and the NTIA Notice of Funds Availability (NOFA). The NTIA requires that the Authority agree to comply with confidentiality requirements in section 106(h)(2) of the BDIA.

It is anticipated that providers submitting data to Sewall or the Authority may have a need to provide information considered to be confidential, in that the information provided may involve commercially sensitive and/or proprietary information regarding information that identifies (i) the location, type, and technical specifications of infrastructure owned, leased, or used by providers or (ii) explicitly identifies providers in relation to their specific service area or at a specific service location (collectively, the “Confidential Information”). The Authority has determined that such Confidential Information is generally not disclosed publicly, and that the public disclosure of such Confidential Information without restriction would cause competitive harm to the applicant or provider.

Accordingly, the following terms shall apply unless and until modified by the Authority or a court of competent jurisdiction:

1. Data submitted to Sewall or the Authority falling within the above definition of Confidential Information, as well as any data submitted to Sewall or the Authority pursuant to the Non-Disclosure Agreement set forth in Attachment A , (collectively, “Designated Confidential Information”) shall be deemed to be competitively sensitive and/or proprietary in nature and such Designated Confidential Information shall be and remain exempt from public disclosure pursuant to the terms of this Protective Order and the articles referenced therein.

2. All Designated Confidential Information shall be and remain exempt from public disclosure pursuant to the terms of this Protective Order, unless removed from the coverage of this Protective Order as provided below or otherwise by a court of competent jurisdiction. No persons provided access to any Designated Confidential Information by reason of this Protective Order shall use such information for any purpose other than the purposes designated by the Authority. Every person provided access to Designated Confidential Information shall use his or her best efforts to keep the Designated Confidential Information secure and shall not publicly disclose it or accord public access to it to any person not authorized by the terms of this Protective Order.

3. Any person or the Authority may challenge the designation of any document or other information as Designated Confidential Information. The Authority will provide reasonable prior notice to the applicant or provider and an opportunity for hearing prior to ruling on any such challenge. In considering any such challenge, the usual burdens of proof and production shall apply and no additional presumption shall be given as a result of the prior acceptance by the Authority of material as Designated Confidential Information. In the event the Authority should rule over the objections of the person providing the Designated Confidential Information that any information should no longer be subject to the terms of this Protective Order, such information shall not be publicly disclosed until the later of five (5) business days after the Authority so orders

or, if the person files within such five day period an appeal or request for stay of such order, the date upon which such appeal or request for stay is decided; provided, however, that said periods may be extended in accordance with any stay ordered by the Authority or a reviewing court. Upon the entry of a final unappealed decision by the Authority or a reviewing court granting public disclosure, the terms of this Protective Order shall cease to bind any person with respect to the information that the order granting disclosure shall have expressly and clearly removed from the coverage of this Protective Order.

4. Any person provided access to Designated Confidential Information shall review and be bound by the terms of this Protective Order. Prior to obtaining access to any Designated Confidential Information, such person shall sign an acknowledgment of his or her obligation to abide by the terms of this Protective Order in the Non-Disclosure Agreement (NDA) attached hereto as Attachment A.

5. Unless modified by the Authority or a court of competent jurisdiction, access to Designated Confidential Information shall be limited to Authority Staff, Sewall, any independent consultants or experts retained by the Authority, the National Telecommunications and Information Administration, and those designated persons, who have signed the NDA.

6. No copies of Designated Confidential Information shall be circulated to persons other than those authorized under paragraph 5 of this Protective Order. Persons authorized under paragraph 5 hereof also may take such notes as may be necessary. Such notes shall be treated as Designated Confidential Information.

7. The restrictions upon, and obligations accruing to, persons who become subject to the terms of this Protective Order shall not apply to any Designated Confidential Information submitted in accordance with this Protective Order if the Authority rules, after reasonable notice to the applicant or provider and an opportunity for hearing, that such Designated Confidential Information was publicly known at the time it was furnished or has since become publicly known.

8. Where reference to Designated Confidential Information is required in any Authority document, such reference shall be by citation of title or attachment number only or by some other non-confidential description to the extent possible.

9. Designated Confidential Information furnished to the Authority pursuant to this Protective Order shall remain in the possession of the Authority, under seal, and subject to the terms of this Protective Order, until the Authority or a court of competent jurisdiction shall otherwise order.

10. The terms of this Protective Order may be modified on motion of any person or on the Authority's own motion upon reasonable prior notice to the applicant or provider and an opportunity for hearing.

BY ORDER OF THE CONNECTME AUTHORITY

Phillip Lindley, Executive Director

ATTACHMENT A [Non-Disclosure Agreement]

Appendix C - Template for Non-Disclosure Agreement

NON-DISCLOSURE AGREEMENT

THIS AGREEMENT is made this ________ day of _________________, 20___, by and between ____, a _________________________________ having a principal place of business at ____ ("PROVIDER") and ConnectME Authority, a body corporate and politic and a public instrumentality of the State of Maine established pursuant to 35-A M.R.S.A. § 9203 (the "AUTHORITY") and James W. Sewall Company, a corporation organized under the laws of the State of Maine and having a principal place of business at 136 Center Street, Old Town, Maine 04419 ("SEWALL") (AUTHORITY and SEWALL individually or collectively referred to as "RECIPIENTS") (PROVIDER AND RECIPIENTS collectively referred to as the "Parties").

Recitals

WHEREAS, the National Telecommunications and Information Administration (the "NTIA") of the United States Department of Commerce has been charged by Congress under the America Recovery and Reinvestment Act of 2009 (the "ARRA") and the Broadband Data Improvement Act (the "BDIA") to develop and maintain a comprehensive, interactive, and searchable nationwide inventory map of existing broadband service capability and availability in the United States that depicts the geographic extent to which broadband service is deployed and available from a commercial or public provider throughout each state (the "Data"); and

WHEREAS, the AUTHORITY is responsible for developing and maintaining the Data for the State of Maine and for serving as a conduit for the Data to the NTIA; and

WHEREAS, SEWALL is contracted by the AUTHORITY to undertake the initial mapping and to consult with the AUTHORITY on how best to update and maintain the Data going forward; and

WHEREAS, the PROVIDER has trade secrets and commercial or financial information relating to the location, type, and technical specifications of infrastructure owned, leased, or used by PROVIDER, which is included in the Data (the "PROVIDER Information"); and

WHEREAS, the PROVIDER has agreed to provide PROVIDER Information to SEWALL and/or the AUTHORITY pursuant to the requirements of the ARRA and the BDIA for use by the NTIA.

NOW THEREFORE, for and in consideration of the mutual promises and covenants contained herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. As requested in writing by PROVIDER, RECIPIENTS agree to hold in absolute and strict confidence and shall not disclose or reveal in any manner or form to any entity other than the NTIA any PROVIDER Information identified as confidential that identifies (i) the location, type, and technical specifications of infrastructure owned, leased, or used by PROVIDER or (ii) explicitly identifies PROVIDER in relation to its specific service area or at a specific service location (collectively, the "Confidential Information"), whether such disclosure was made orally, in writing, or in any other form, without prior written permission from PROVIDER.

Notwithstanding the foregoing, Confidential Information shall not include the following:

(a) information that now is or hereinafter becomes publicly known or available otherwise than through unauthorized disclosure by RECIPIENTS;
(b) information that was in RECIPIENTS' possession at the time of disclosure and was not acquired, directly or indirectly, from PROVIDER;
(c) information that RECIPIENTS received in good faith from a third party who is not under a similar restriction of confidentiality and having a right to disclose the Confidential Information; or
(d) information that is required to be disclosed pursuant to applicable law or judicial or administrative action or proceeding, including the Freedom of Information Act requirements.

2. RECIPIENTS agree not to use for any purpose the Confidential Information except as provided for under the ARRA and the BDIA, without prior written permission from PROVIDER.

3. This Agreement shall be governed by the laws of the State of Maine and applicable federal law, except for the State of Maine's conflict-of-laws provisions, as applicable. The Parties to this Agreement each specifically consent to jurisdiction in Maine in connection with any dispute between the Parties arising out of this Agreement or pertaining to the subject matter hereof, with venue being in a court of competent jurisdiction located in Penobscot or Kennebec County, Maine, United States of America.

4. This Agreement shall inure to the benefit of and be binding on the Parties and their respective successors and assigns.

5. This Agreement constitutes the complete and exclusive agreement of the Parties hereto with respect to the matters set forth herein. The terms of this Agreement may not be modified or amended except by an instrument in writing signed by each of the Parties hereto.

6. This Agreement shall be construed without regard to any presumption or other rule requiring construction against the drafting Party.

7. This Agreement may be executed in counterparts and each Party hereto may execute each such counterpart, each of which when executed and delivered shall be deemed to be an original and both of which counterparts taken together shall constitute but one and

the same instrument. This Agreement shall become binding when all counterparts taken together shall have been executed and delivered by all Parties. Execution and delivery of this Agreement may be made by facsimile transmission, and each Party agrees that the delivery of the Agreement by facsimile shall have the same force and effect as delivery of original signatures and that each Party may use such facsimile signatures as evidence of the execution and delivery of the Agreement by all Parties to the same extent that an original signature could be used.

IN WITNESS WHEREOF, the Parties have executed this Agreement the day and year first above written.

WITNESSED BY:	PROVIDER
______________________________	By: ______________________________
	Title: ______________________________
	ConnectME Authority
______________________________	By: ______________________________
	Title: ______________________________
	James W. Sewall Company
______________________________	By: ______________________________
	Title: ______________________________

Appendix D - White Paper: Maine-SBDD Census Block-Street Segment Misalignment

Misalignment between 2000 Census Blocks & Maine E911 Streets

Technical Whitepaper

1 September 2010

Introduction

Importing broadband service provider data into the State Broadband Data Development (SBDD) Map Data Transfer Model at the census block versus street segment level has created challenges for the grantees. For the State of Maine one of the challenges involves the spatial misalignment between the 2000 Census Block polygon geometries and Maine's street centerline dataset.

In order to better understand the challenge that Maine is encountering it is necessary to review how the State is collecting and maintaining broadband service provider data.

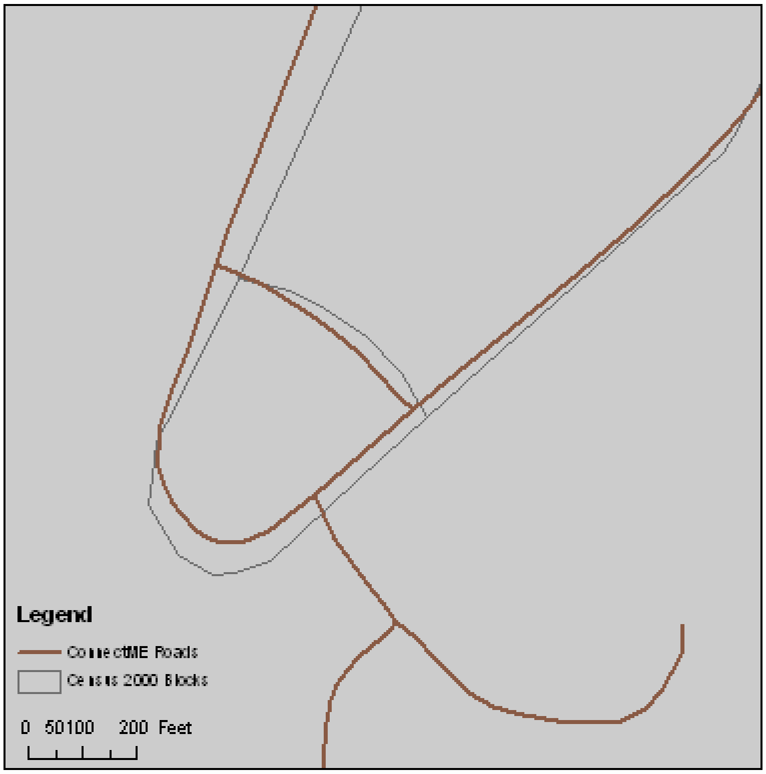
As a result of Maine's geographic population distribution, mapping broadband service at a census block level does not satisfy the State's requirements for statewide broadband tracking and development. Instead of utilizing the hybrid census block-street centerline model outlined in the SBDD NOFA, the State is collecting service provider coverages at a street level for wired and fixed wired technologies. The State has developed a relational model to best represent the one-to-many relationship between a street segment and its broadband service provider coverages.

The street segment data that the State is utilizing is based primarily on the State's E911 street centerline GIS layer with additional street coverage added from a 3rd party dataset for those towns not yet participating in the E911 project. For information on the broadband service providers, a database table was developed based on the required attribution descriptions outlined in the NOFA.

Now that the existing data structure has been presented the challenge of importing this data into the transfer model can be discussed along with the State's proposed solution for addressing misalignment and helping minimize its impact on the broadband data processing.

The Challenge

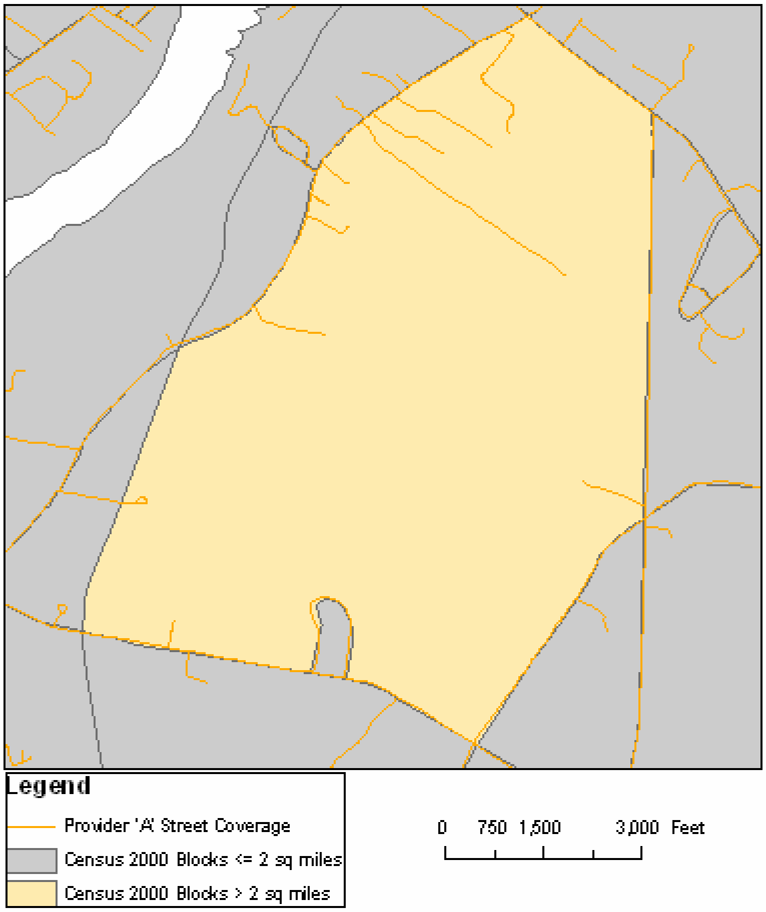
Year 2000 Census Block geometry is spatially misaligned with the Maine's street centerlines.



As shown in the above screen capture the typical misalignment between these two datasets is between 50 and 100 feet.

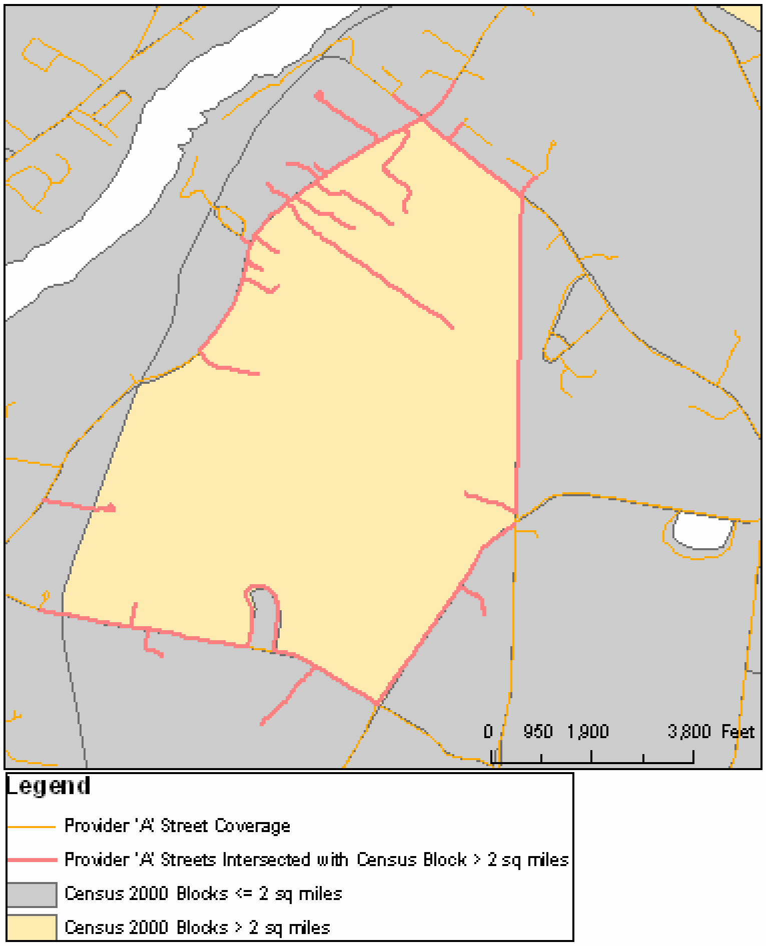
Since Maine is storing all broadband service providers' information as records associated with street centerlines this misalignment causes considerable challenges when trying to accurately export this information into the new SBDD data transfer model. The misalignment is great enough that utilizing basic intersect methodology is not enough to provide NTIA with a highly accurate representation of broadband coverage in Maine.

Example: Basic Intersect



The above screen capture shows an example of a 2000 Census Block that is greater than 2 square miles and Provider ‘A’ street coverage data that is to be reported.

Performing an intersect between the greater than 2 square mile census block and the street network for Provider 'A' results in the highlighted streets being reported.

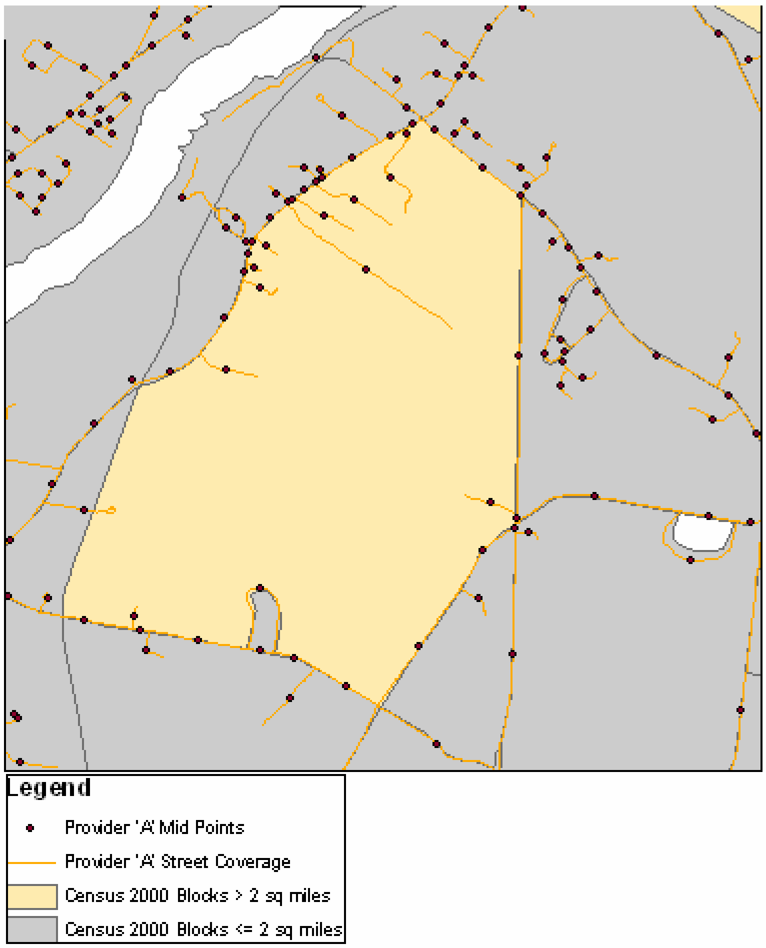


It is clear from the screen capture that several extra streets where selected and a few streets were missed by using the intersection method.

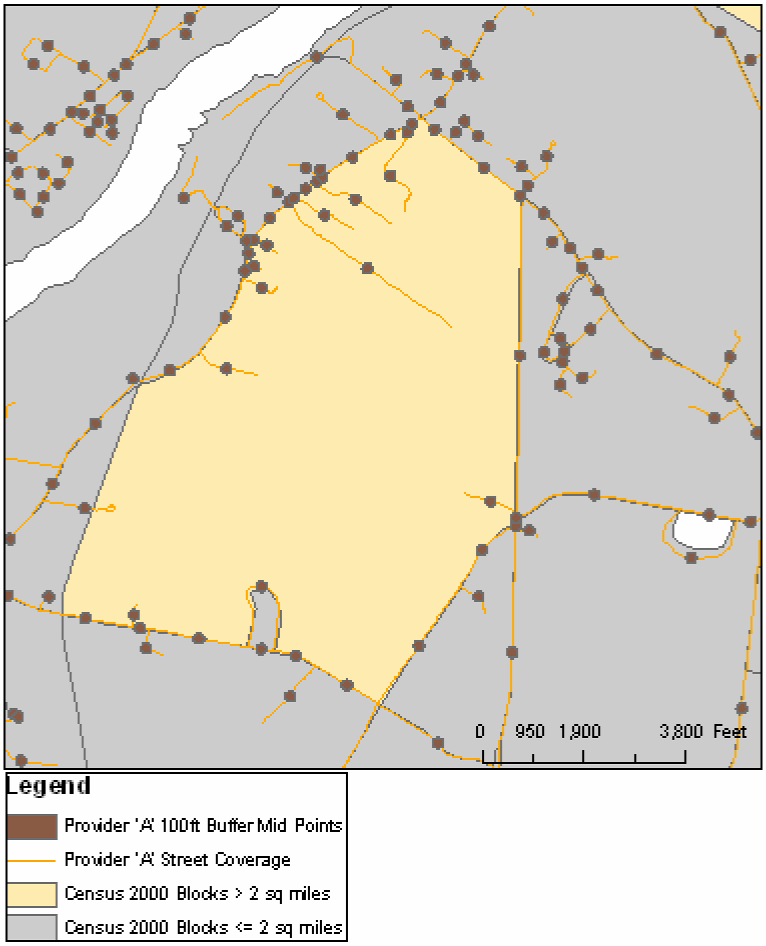
Proposed Technical Solution

The solution to this challenge is a multi-step process that needs to be run on each street segment with intelligent analysis employed to minimize errant representation of broadband service in census blocks greater that 2 square miles.

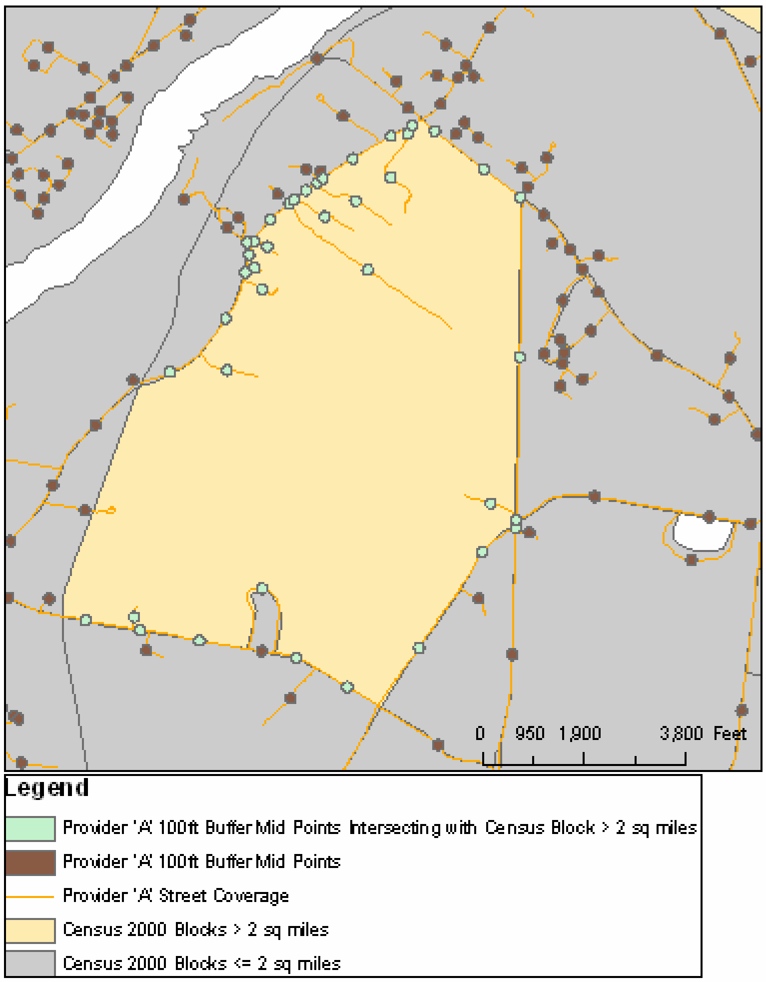
The first step is to create mid points of the street centerlines for Provider 'A'.



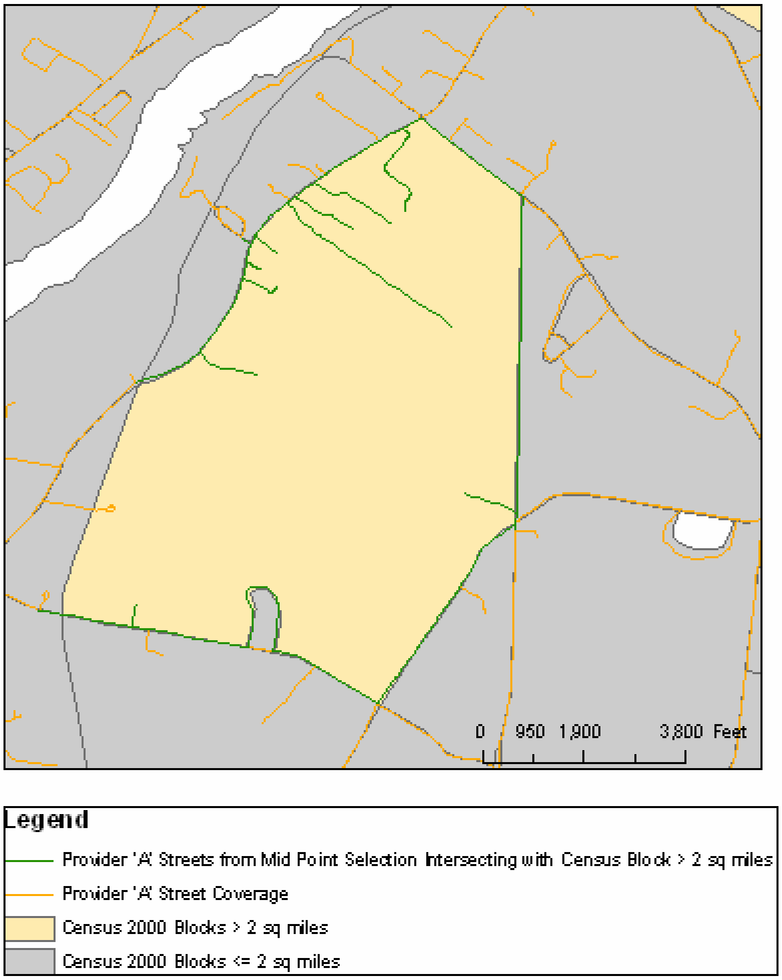
The next step is to create a buffer around the mid points using a distance to compensate for the misalignment in the census blocks. The distance found to have the best return for this process was determined to be 100 feet.



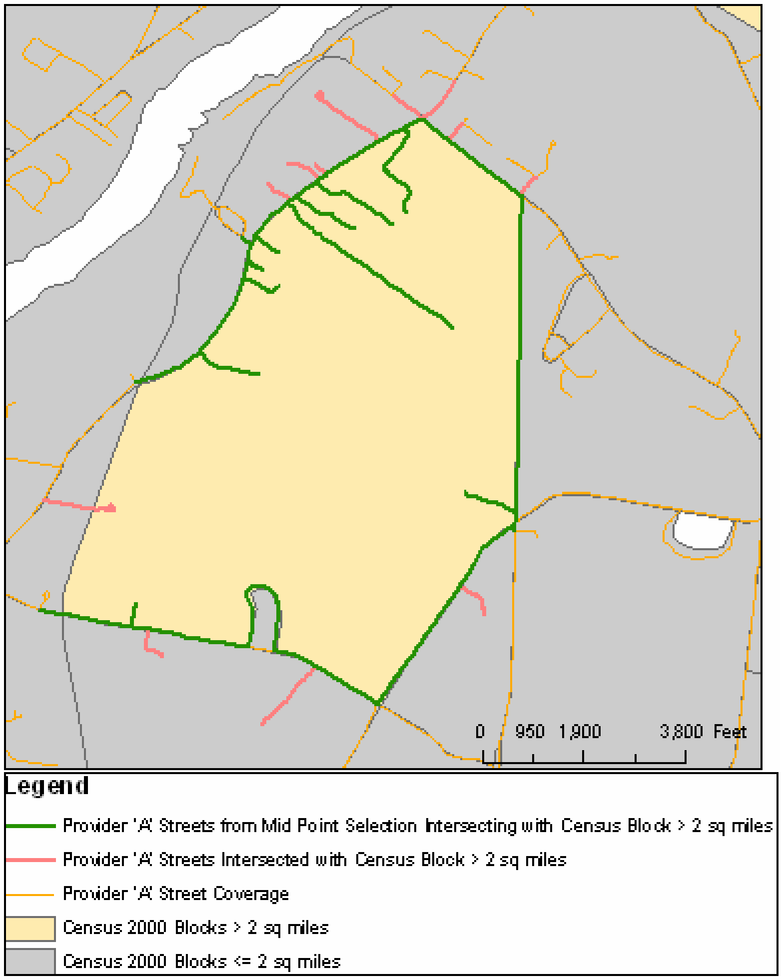
Selecting the buffered mid points that intersect the greater than 2 square miles census block returns the following results:



The selected buffered mid points relate back to the following street selection:

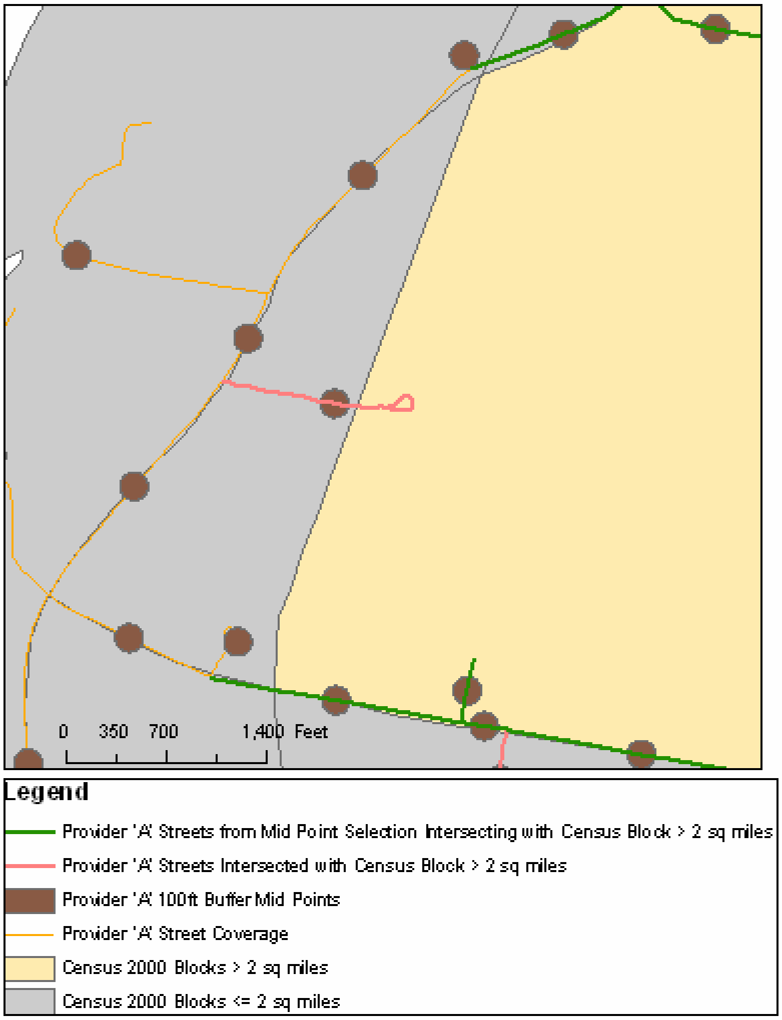


Compare this selection to the original intersection process selection:



The result of the mid point buffering process is a much better representation of streets contained within the greater than 2 square miles census block. A large number of the erroneous streets initially marked as included in the census block have been dropped providing a much improved report.

Taking a look at the left hand side of the map there is a street that intersects the census block but is not reported in the mid point buffering process. A closer look reveals why.

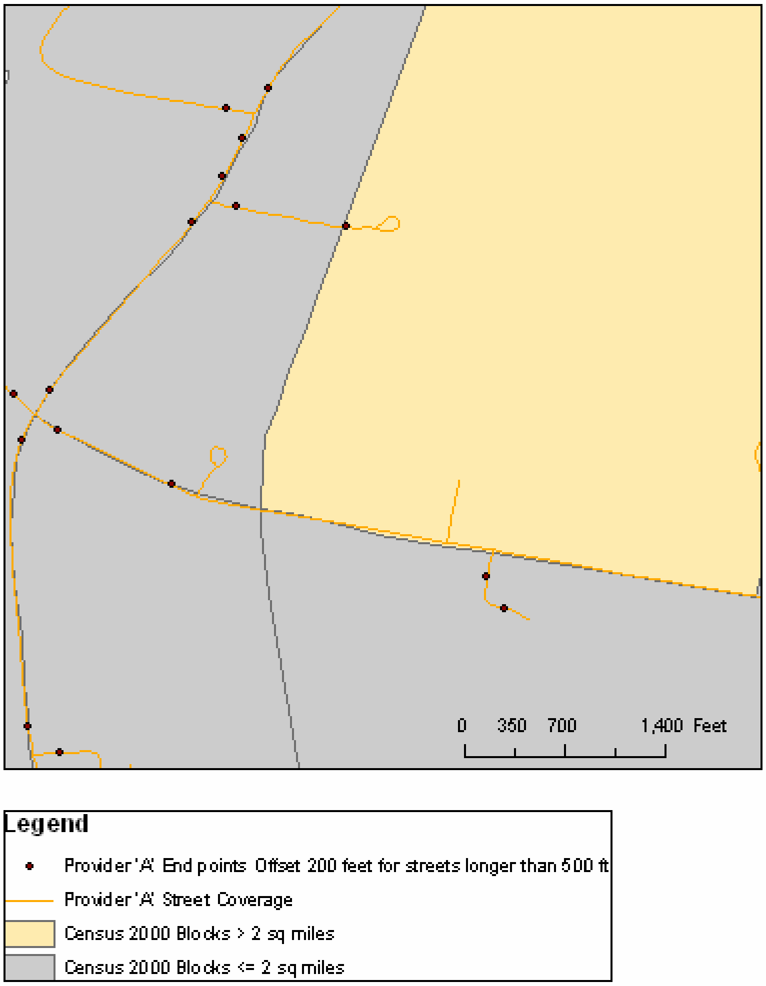


The street in question is relatively long in length and has a midpoint that is located outside of the greater than 2 square miles census block resulting in it not being reported.

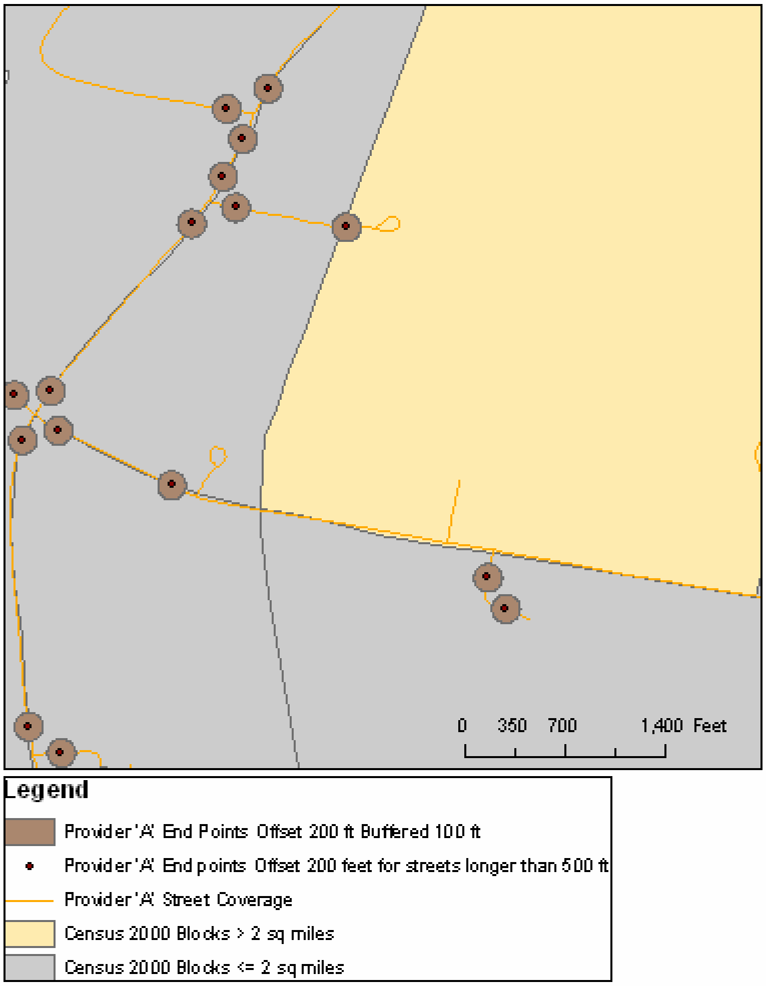
Building onto what has been performed already an additional automation check can locate and incorporate these long streets into the dataset.

The Proposed Solution: Additional Intelligence

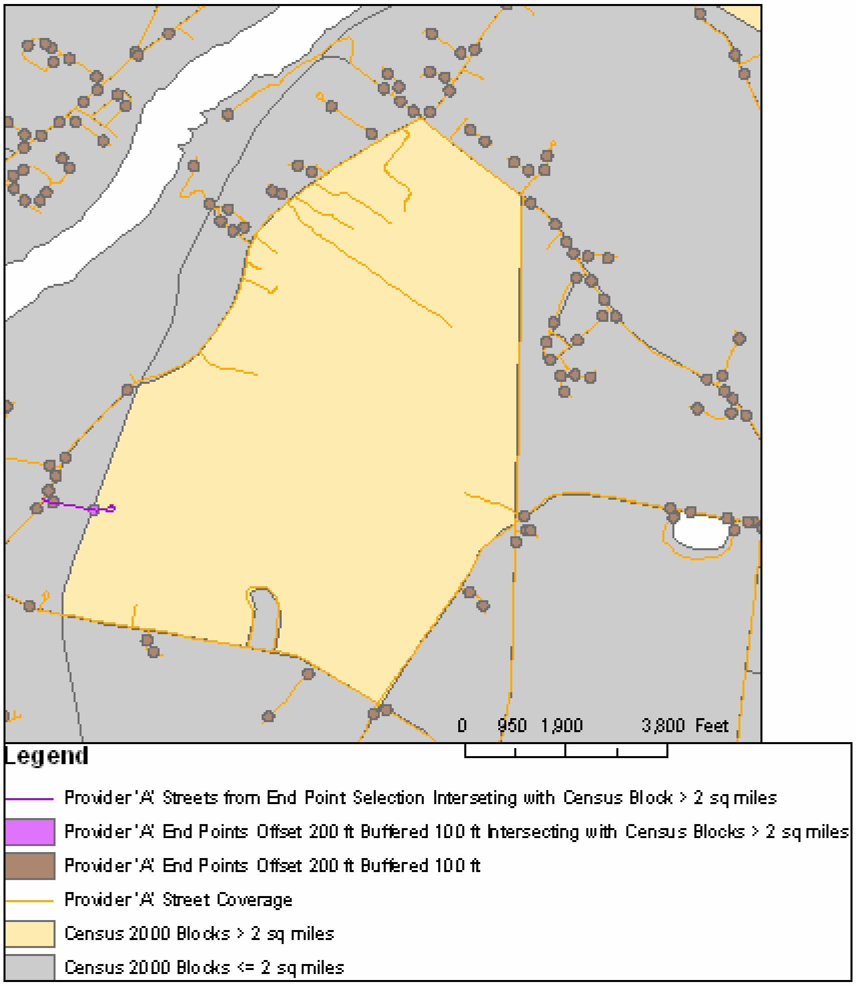
The first step in this additional iteration is to select streets that have not been flagged as being contained within a census block greater than 2 square miles and are longer than 500 feet. Then create points that are offset 200 feet from each end of the selected streets.



Next these 200 feet offset points are buffered 100 feet:

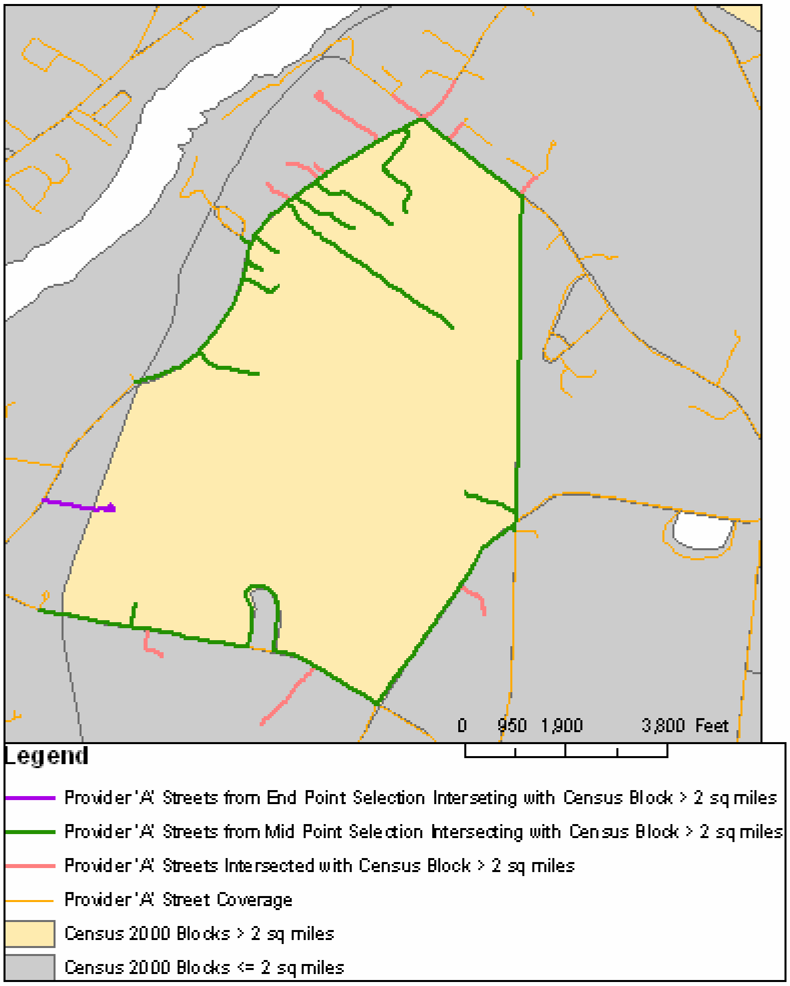


Then by selecting the buffers that intersect the greater than 2 square miles census block and selecting the associated streets, the process results in the following:



The Results

The screen capture below shows the streets reported using the two step process in comparison to the basic intersect method of reporting street segments.



The following table shows the results of the processes for Provider 'A' for this particular census block:

Method	Missed Streets	Extra Streets	%Error
Basic Intersect Process	2	11	35.14
MID Point Process	1	2	8.11
MID and END Point Process	0	2	5.41

The proposed solution gives a much better representation of the data set and minimizes the errors induced by using a basic intersection process.

Summary

The SBDD data submission requirements involving census blocks and street segments have created a challenge for the grantees to accurately represent broadband service provider information. In particular the State of Maine has a significant offset between the 2000 Census Block geometries and the corresponding street centerlines that the State is utilizing to map broadband availability data. A basic spatial intersect method has proven to be highly inaccurate in identifying street centerline data in census blocks greater than 2 square miles.

Through it analysis, the State has found that using a two step process using mid-point and offset end point buffering provides improved results for street centerlines in the greater than 2 square mile census blocks. The State expects this methodology to improve the accuracy of street segment determination by approximately 50% for these regions. Unless instructed otherwise by the NTIA project team, the State intends to utilize this two step process to develop the SBDD deliverables for street centerlines in census blocks greater than 2 square miles.

In addition, it is the hope of Maine's project team that the spatial misalignment between census block geometries and the E911 street centerlines will be remedied by the 2010 Census data as a result of the work done under the Boundary and Annexation Survey (BAS). Maine is one of the states that participated in the 2010 BAS with the Census Bureau to better align the census boundary data with the State's E911 street data.

Appendix E – Residential Survey Letter

ConnectME Authority

State of Maine Internet Service Questionnaire

This survey is PREPAID to return to the State of Maine! It is only 10 questions long and will take less than 2 minutes to complete. The information is confidential. The data will only be used for the purpose of verifying where high speed internet is and is not offered across the State of Maine. More information about this initiative is provided at the end of the survey.

Thank you in advance for you participation.

If you have access to the internet and wish to complete this survey electronically, you may do so at:
http://www.surveymonkey.com/s/JBLNRHX

1. Please enter your physical home address if it is different than your mailing address:
   Street Address ______________________________
   City ____________________ State ________ Zip Code ____________
2. Do you currently subscribe to internet service? Yes No
   If No, please proceed to Question 7, otherwise continue to question 3.
3. What form of internet service do you purchase?
   a. Dialup Service b. DSL or Higher Wired Service c. High Speed Cable
   d. Satellite e. Fixed Antennae Wireless
   f. Mobile Wireless (Mobile Laptop Card, Smartphone, or similar device)
4. Who is your internet service provider?______________________________
5. Does this provider meet the level of advertised internet speed for the plan you subscribe?
   Yes No I Don't Know
6. Have you ever purchased internet service from a different provider at this address? Yes No
   If YES, please list the name of the previous provider(s)?__________________________
7. If you do not currently have internet service, have you attempted, in the past, to acquire service at this address but were unable to locate a providing company? Yes No N/A
8. In the past, has an internet provider tested access to the internet at this address? Yes No I Don't Know
   If YES, please list the name of the service provider?__________________________
9. Was the internet connection test successful? Yes No I Don't Know N/A
10. If you do not subscribe to high speed internet, but it IS available, what is the reason you do not subscribe?
    a. No interest b. Price of service c. Limitations of the service
    d. Need a different option to fit my internet hardware needs e. N/A
    f. Other ______________________

Thank you for taking the time to help shape the future development of broadband service in Maine!

Please fold the survey so the prepaid return label is on the outside and drop it into the nearest mailbox.

More Information about this initiative…
In 2007, the Maine State Legislature created the ConnectME Authority with the mission to promote the development of high speed internet communications systems in the un-served and underserved regions of the state. To fulfill this mission we are seeking your assistance in providing valuable information about the availability and use of high speed internet, otherwise known as broadband, at your location.

The ConnectME Authority has established a website where you can perform a test of internet speed for your location. If you are interested in running a test of your internet speed, please visit http://connectmespeedtest.maine.gov and follow the instructions provided. Access to this site does require a device capable of running flash applications such as a laptop or desktop computer. The test tool is not currently supported by smart phone devices.

To learn more about this project please visit our websites:
http://www.maine.gov/connectme/mapping/BroadbandMappingProject.htm
http://www.sewall.com/projects/project_connectme.php

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF MICHIGAN

CONNECT Michigan®

April 1, 2011

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MICHIGAN COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Michigan offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, Federal Communications Commission (FCC), state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Michigan has played in creating such a powerful tool that will surely benefit not just Michiganders but consumers and businesses nationwide.

Therefore, as the State Broadband Designated Entity, in partnership with the Michigan Public Service Commission, we are pleased to present this submittal of the state of Michigan's State Broadband Data and Development (SBDD) Grant Program, known as Connect Michigan.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Michigan: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A:	1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A:	3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A:	4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A:	4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)		n/a	Accuracy and Verification Report
n/a		DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a		n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Michigan program. Specifically, these new requirements are:

> **SBDD Data Transfer Model**
> The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.
>
> **Additional Submission Guidance**
> This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Michigan program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 85.48% of the Michigan provider community, or 106 of 124 total providers. Of the 106 participating providers, 49 supplied an update to their network or coverage area(s), while 47 have reported no change. The remaining 10 represent providers who previously supplied data but were non-responsive in the April 2011 update effort or could not verify coverage areas at the time of this submission; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 18 providers that are not represented in the attached datasets, 5 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect Michigan. The remaining 13 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Michigan principals that all commercially reasonable efforts were made to account for 100% of the known Michigan broadband provider community, pursuant to this semi-annual data update submission.

Connect Michigan has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Michigan conducts field validation efforts. To date, 43 (34.68%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Michigan launched a website to create awareness about the initiative. Connectmi.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Michigan website encountered 4,804 unique visits during this reporting period (15,523 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 257 broadband inquiries over this same reporting period (1,021 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Michigan website and the Connect Michigan Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Michigan mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connect Michigan to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Michigan has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI) in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Michigan Public Service Commission, research and outreach was conducted during this data update reporting period by Connect Michigan to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Michigan website. Connect Michigan continues to work in close coordination with statewide associations such as the Michigan State Police, Michigan Townships Association, and Michigan Municipal League to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Michigan will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning with our state partner to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Connect Michigan, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Michigan efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Michigan, Connect Michigan has previously engaged all federally recognized tribal lands in the area covered by the Connect Michigan SBDD grant and reported that outreach as part of past submissions. Following the last submission, Connect Michigan met with the Native American Institute, which facilitated an opportunity for outreach and awareness at a United Tribes of Michigan Meeting. Throughout the next reporting period Connect Michigan plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connect Michigan understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Michigan program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Michigan, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: MICHIGAN COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Michigan, working in close coordination with Michigan Public Service Commission, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Michigan has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Michigan has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Michigan through ESRI ArcGIS software.

Connect Michigan continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Michigan website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Michigan will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectmi.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_MI_9124

Connect Michigan and the Michigan Public Service Commission have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. Locating centralized data sources in Michigan continues to be a challenge, but efforts continue to be made to ensure all potential sources are being explored in the state.

In tandem with these efforts to identify existing data, Connect Michigan continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Survey results during this reporting period have been slow, therefore targeted planning will occur during the coming months with key institution contacts to ensure that CAI throughout the state are aware of the importance of participating in this process and reporting data for their institutions.

Connect Michigan has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Michigan is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Michigan, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Michigan will continue its ongoing work with the Michigan Public Service Commission and key organization contacts in an effort to raise awareness of this project among CAI. Coordination with statewide contacts such as the Michigan Department of Education, Michigan State Police, and State Library of Michigan will be key in the coming months to increase survey results. These institutions have been very helpful with past outreach attempts, and Connect Michigan will continue to rely upon them to assist with our efforts in the state.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	4,553	4,553	4,553	229	218	218
Libraries	2,286	2,286	2,285	830	851	31
Healthcare	262	262	262	2	2	2
Public Safety	959	959	958	18	17	17
Higher Ed Institutions	148	148	148	27	26	26
Other Government	85	85	85	21	18	18
Other Non-Government	515	515	515	49	2	2
Total	**8,808**	**8,808**	**8,806**	**1,176**	**1,134**	**314**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Michigan.

Inventory of Deliverables, Connect Michigan: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Michigan have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Michigan Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Michigan on the following providers: 2125 Cable Company LLC, ACD Net, Ace Telephone Company of Michigan Inc., Agri-Valley Communications Inc., Allendale Telephone Company, AT&T, Azulstar Inc., Bloomingdale Communications Inc., Boardman River Communications LLC., CenturyLink, Charter Communications, Cherry Capital Connection LLC, Clearwire Corporation, COLI Inc., Comcast Cable Communications LLC, Custom Software Inc., D&P Communications Inc., Frontier Communications Corporation, Hidden Lake Wireless Inc., I-2000 Inc., KEPS Technologies Inc., Leap Wireless International Inc., Merit Network, MetaLINK Technologies Inc., Michwave Technologies Inc., Microtech Services Inc., Mutual Data Services, Ogden Communications Inc., Parish Communications, Pasty.Net Inc., Peninsula Telephone Company, Pigeon Telephone, Sister Lakes Cable TV, SpeedNet LLC, Sprint, Talk America Inc., TDS Telecommunications Corporation, T-Mobile, Town & Country CATV, Verizon North Inc., Waldron Telephone Company, Winn Telephone Company, and Wyandotte Municipal Services.

During this reporting period, Connected Nation conducted 29 additional on-site validation tests with Merit Network, Clearwire, MicroTech Services, Mutual Data Services, AT&T, Charter, Chain of Lakes Internet Inc. (COLI), Leap Wireless, SpeedNet, Sprint, T-Mobile, and Verizon.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 43 companies (out of a universe of 124 viable providers) totaling 34.68% within the state of Michigan.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.32% of Michigan households do not have terrestrial fixed broadband service available, and approximately 0.22%[1] of Michigan households have neither mobile nor fixed broadband service available.[2]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block

Within rural areas of the state, results derived from provider-validated data indicate that approximately 4.71% of rural Michigan households do not have terrestrial fixed broadband service available, and approximately 0.45%[3] of rural Michigan households have neither mobile nor fixed broadband service available.[4]

Wireless Methodology

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)

whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Michigan project has received a total of 257 inquiries (1,021 grant inception to date). As more inquiries are submitted to Connect Michigan, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Michigan project launched BroadbandStat on May 20, 2010, and has received a total of 4,791 visits to date, of which 1,598 occurred this reporting period.

SPEED TEST METHODOLOGY

The 1,764 speed tests that are represented in the Connect Michigan Speed Test Report during this reporting period (4,055 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Michigan speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Michigan project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Michigan with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Michigan.

Broadband Provider Log

Complete	151
Non-Responsive/Refused	5
In Progress	23
Count of Datasets by Viable Status	**179**
Total Unique Providers Represented	**124**

Provider Name	Platform	Status	NDA Execution Date	Notes
Ace Telephone Company of Michigan Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/12/2010	
Agri-Valley Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/22/2010	
Air Advantage, LLC	Fixed Wireless	Data Added to Statewide Inventory	3/15/2010	
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Baraga Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	1/14/2010	
Barry County Telephone Company	Fixed Wireless	Data Added to Statewide Inventory		
Bright House Networks, LLC	Cable	Data Added to Statewide Inventory	4/26/2010	
Buckeye Cablevision, Inc.	Cable	Data Added to Statewide Inventory	4/12/2010	
Camp Communication Services, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Charter Communications	Cable	Data Added to Statewide Inventory	12/15/2009	
Cherry Capital Connection, LLC	Fixed Wireless	Data Added to Statewide Inventory	12/28/2009	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory		
CMS Inter.net LLC	Fixed Wireless	Data Added to Statewide Inventory	3/11/2010	
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
Crystal Automation Systems, Inc	Fixed Wireless	Data Added to Statewide Inventory	6/25/2010	
DMCI Broadband, LLC	Fixed Wireless	Data Added to Statewide Inventory	2/3/2010	
Drenthe Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	2/4/2010	
Endless Journey, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
FNW, LLC	Fixed Wireless	Data Added to Statewide Inventory	2/12/2010	
Frontier Communications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Hiawatha Communications, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	2/2/2010	
Hiawatha Communications, Inc.	Fiber	Data Added to Statewide Inventory	2/2/2010	
Hiawatha Communications, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	2/2/2010	
I-2000, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/7/2011	
Iron Bay Computer & Design	Fixed Wireless	Data Added to Statewide Inventory	1/14/2010	
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/5/2010	
Lighthouse Computers, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	
Michwave Technologies, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/12/2010	
Ogden Communications Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/19/2010	
Parish Communications	Cable	Data Added to Statewide Inventory	7/1/2010	
Pasty.Net, Inc.	Fixed Wireless	Data Added to Statewide Inventory	1/6/2010	
Sand Creek Communications Company	ILEC/CLEC	Data Added to Statewide Inventory	3/2/2010	
Sister Lakes Cable TV	Cable	Data Added to Statewide Inventory		
Small Business Solutions Group L.L.C.	Fixed Wireless	Data Added to Statewide Inventory	7/20/2010	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
Summit Digital Holdings, Inc.	Cable	Data Added to Statewide Inventory		
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
TDS Telecommunications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
The Computer Care Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/8/2011	
Time Warner Cable LLC.	Cable	Data Added to Statewide Inventory	12/21/2009	
Tucker Communications, Inc	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	
Verizon North Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
Westphalia Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	1/20/2010	
DIECA Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Great Lakes Comnet, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Peninsula Fiber Network, LLC	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
TDS Telecommunications Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/27/2010	
US Signal	Backhaul	Backhaul Provider Only Processing Complete	2/25/2010	
Zayo Bandwidth, LLC	Backhaul	Backhaul Provider Only Processing Complete		
I-2000, Inc.	Fixed Wireless	Approval for Update Not Received - Use Last Submission Data	3/7/2011	
McLeodUSA Telecommunications Services, Inc.	ILEC/CLEC	Provider Approval Solicited		
2125 Cable Company, LLC	Cable	No Update to Provide	3/22/2010	
Agri-Valley Communications, Inc.	ILEC/CLEC	No Update to Provide	1/22/2010	
Agri-Valley Communications, Inc.	Fixed Wireless	No Update to Provide	1/22/2010	
Agri-Valley Communications, Inc.	Backhaul	No Update to Provide	1/22/2010	
Allband Communications Cooperative	Fiber	No Update to Provide	2/2/2010	
Allendale Telephone Company	Fiber	No Update to Provide	2/4/2010	
Allendale Telephone Company	ILEC/CLEC	No Update to Provide	2/4/2010	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Azulstar, Inc.	Fixed Wireless	No Update to Provide	1/27/2010	
Baraga Telephone Company	Fiber	No Update to Provide	1/14/2010	
Barry County Telephone Company	ILEC/CLEC	No Update to Provide		
Barry County Telephone Company	Fiber	No Update to Provide		
BigTube Wireless	Fixed Wireless	No Update to Provide	6/17/2010	
Blanchard Telephone Association, Inc.	ILEC/CLEC	No Update to Provide	6/17/2010	
Blanchard Telephone Association, Inc.	Backhaul	No Update to Provide	6/17/2010	
Bloomingdale Communications, Inc.,	Fixed Wireless	No Update to Provide	1/25/2010	
Bloomingdale Communications, Inc.,	ILEC/CLEC	No Update to Provide	1/25/2010	
Bloomingdale Communications, Inc.,	Fiber	No Update to Provide	1/25/2010	
Borderland Communications, LLC	ILEC/CLEC	No Update to Provide	1/22/2010	
Borderland Communications, LLC	Backhaul	No Update to Provide	1/22/2010	
Broadstripe LLC	Cable	No Update to Provide	3/5/2010	
Cable America Michigan, LLC	Cable	No Update to Provide	3/9/2011	
Carr Telephone Company	ILEC/CLEC	No Update to Provide	1/15/2010	
CCI Systems	Cable	No Update to Provide	6/29/2010	

CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Charter Communications	Backhaul	No Update to Provide	12/15/2009	
City of Norway	Cable	No Update to Provide		
Climax Telephone Company	Backhaul	No Update to Provide	1/14/2010	
Climax Telephone Company	ILEC/CLEC	No Update to Provide	1/14/2010	
Cogent Communications, Inc.	Backhaul	No Update to Provide		
Coldwater Board of Public Utilities	Cable	No Update to Provide	3/1/2010	
Crystal Automation Systems, Inc	Backhaul	No Update to Provide	6/25/2010	
D & P Communications, Inc.	Cable	No Update to Provide	3/8/2011	
D & P Communications, Inc.	Fiber	No Update to Provide	3/8/2011	
Farmers Mutual Telephone Company	ILEC/CLEC	No Update to Provide	10/26/2010	
Fourway Computer Products, Inc.	Fixed Wireless	No Update to Provide		
Frontier Communications Corporation	Backhaul	No Update to Provide	1/22/2010	
Hiawatha Communications, Inc.	ILEC/CLEC	No Update to Provide	2/2/2010	
Hiawatha Communications, Inc.	ILEC/CLEC	No Update to Provide	2/2/2010	
Hidden Lake Wireless, Inc.	Fixed Wireless	No Update to Provide	3/12/2010	
Interlink Computers Technology, Inc.	Fixed Wireless	No Update to Provide	3/12/2010	
Iron River Cooperative TV Antenna Corp	Cable	No Update to Provide	7/27/2010	
ISP Management, Inc.	Fixed Wireless	No Update to Provide	3/22/2010	
Kaltelco, LLC	ILEC/CLEC	No Update to Provide	3/5/2010	
LigTel Communications	Fixed Wireless	No Update to Provide	3/31/2010	
Mercury Network Corporation	Fixed Wireless	No Update to Provide	3/9/2011	
Mercury Network Corporation	Backhaul	No Update to Provide	3/9/2011	
Merit Network, Inc	Backhaul	No Update to Provide	6/21/2010	
MetaLINK Technologies, Inc.	Fixed Wireless	No Update to Provide	3/22/2010	
Michigan Cable Partners Inc.	Cable	No Update to Provide	6/18/2010	
Michigan Online Group, Inc.	ILEC/CLEC	No Update to Provide		
Michigan Online Group, Inc.	Backhaul	No Update to Provide		
Michigan Online Group, Inc.	Fiber	No Update to Provide		
Newaygo County Advanced Technology Services	Fixed Wireless	No Update to Provide		
Northside TV Corporation	Cable	No Update to Provide		
Ogden Communications Inc.	Fixed Wireless	No Update to Provide	1/19/2010	
One Communications Corporation	Backhaul	No Update to Provide	3/18/2010	
Sand Creek Communications Company	Backhaul	No Update to Provide	3/2/2010	
SpeedNet, LLC	Fixed Wireless	No Update to Provide	1/7/2010	
SpeedNet, LLC	Backhaul	No Update to Provide	1/7/2010	
Springcom Inc.	Cable	No Update to Provide	2/25/2010	
Springcom Inc.	ILEC/CLEC	No Update to Provide	2/25/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Summit Digital Holdings, Inc.	Fixed Wireless	No Update to Provide		
T2 Communications, LLC	Fiber	No Update to Provide	3/10/2010	
T2 Communications, LLC	Backhaul	No Update to Provide	3/10/2010	
Talk America Inc.	ILEC/CLEC	No Update to Provide		
Talk America Inc.	Backhaul	No Update to Provide		
The Computer Care Company, Inc.	ILEC/CLEC	No Update to Provide	3/8/2011	
The Computer Care Company, Inc.	Backhaul	No Update to Provide	3/8/2011	
The Iserv Company, LLC	ILEC/CLEC	No Update to Provide	6/21/2010	
The Iserv Company, LLC	Fiber	No Update to Provide	6/21/2010	
The Iserv Company, LLC	ILEC/CLEC	No Update to Provide	6/21/2010	
The Iserv Company, LLC	Backhaul	No Update to Provide	6/21/2010	
Town & Country Cable and Telecommunications, LLC	Cable	No Update to Provide	6/18/2010	
Upper Peninsula Telephone Company	ILEC/CLEC	No Update to Provide	1/11/2010	
Verizon North Inc.	Backhaul	No Update to Provide	12/14/2009	
Waldron Telephone Company	Fixed Wireless	No Update to Provide	1/12/2010	
Waldron Telephone Company	ILEC/CLEC	No Update to Provide	1/12/2010	
Winn Telephone Company	ILEC/CLEC	No Update to Provide	6/28/2010	
Winn Telephone Company	Fiber	No Update to Provide	6/28/2010	
Winn Telephone Company	Fixed Wireless	No Update to Provide	6/28/2010	
Wyandotte Municipal Services	Cable	No Update to Provide	3/23/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Boardman River Communications, LLC	Cable	No Update Provided - Use Last Submission Data	2/10/2010	
COLI, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
CSInet Internet Access Corp.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/31/2010	
Custom Software Inc.	ILEC/CLEC	No Update Provided - Use Last Submission Data	2/3/2010	
Great Lakes Internet, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/11/2010	
Ideal Wireless, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
Invisalink Wireless Enterprises LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	4/13/2010	
KEPS Technologies, Inc.	ILEC/CLEC	No Update Provided - Use Last Submission Data		
KEPS Technologies, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
Lennon Telephone Company	ILEC/CLEC	No Update Provided - Use Last Submission Data	1/25/2010	
Lennon Telephone Company	Cable	No Update Provided - Use Last Submission Data	1/25/2010	
Nodin Communications, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	4/22/2010	
Arialink Telecom LLC	Fiber	Solicited Initial Data		
Arialink Telecom LLC	Fixed Wireless	Solicited Initial Data		
Arialink Telecom LLC	ILEC/CLEC	Solicited Initial Data		
Banyan OnLine Services, LLC.	Fixed Wireless	Solicited Initial Data		
Boardman River Communications, LLC	Fixed Wireless	Solicited Initial Data	2/10/2010	
Endless Journey, Inc.	ILEC/CLEC	Solicited Initial Data		
Great Lakes Satellite Group	Fixed Wireless	Solicited Initial Data		
Lewiston Communications	Cable	Solicited Initial Data		
M55 WiFi Wireless Internet Service	Fixed Wireless	Solicited Initial Data		
Microtech Services, Inc.	Fixed Wireless	Solicited Initial Data		
Mutual Data Servics, Inc.	Fixed Wireless	Solicited Initial Data		
Sky Web Network, Inc	Fixed Wireless	Solicited Initial Data		
SkyWay USA, LLC	Satellite	Solicited Initial Data		
Tri-County Wireless, Inc.	Fixed Wireless	Solicited Initial Data		

West Michigan Broadband	Fixed Wireless	Solicited Initial Data		
M3 Wireless	Fixed Wireless	Refused to Participate		[JAN-10-11 Terry Holmes] Spoke with company representative who advised that they do not want to participate in the mapping program.
WideOpenWest Michigan, LLC	Cable	Refused to Participate		[MAR-11-10 Terry Holmes] Received voice message from company executive stating, "I spoke with my counterparts and we will not share information as requested by CN, so you will not be receiving information from WOW." Subsequent attempts to contact this provider have resulted in no response.
Reliable Internet, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		[JAN-14-10 Terry Holmes] Left voicemail messages and sent e-mails to this provider multiple times over the past year and have not received one response. They have an active website and the owner's name is identified on the voicemail leading me to believe the company is active, though I have never been able to talk with anyone at this company.
Rural Communications, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 26, 2010 and September 8, 2010, seven attempts have been made during this submission period.
Wireless Technology Solutions	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between December 30, 2009 and July 28, 2010, seven attempts have been made during this submission period.
DIECA Communications, Inc.	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Sarah Finne] Provider does not offer residential DSL. They submitted business data, so we will only submit their backhaul data to NTIA.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Sarah Finne] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Global Crossing Telecommunications, Inc.	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a provider representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Sarah Finne] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Michigan Online Group, Inc.	Fiber	Other		[MAR-10-11 Dawn Clark] Per Sarah Finne they don't offer fiber under Michigan Online Group.
Time Warner Cable LLC.	Backhaul	Other	12/21/2009	[MAR-24-11 Dawn Clark] Provider does not offer backhaul in the state.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Sarah Finne] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF MINNESOTA

CONNECT Minnesota®

April 1, 2011

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MINNESOTA COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Minnesota offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Minnesota has played in creating such a powerful tool that will surely benefit not just Minnesotans, but consumers and businesses nationwide.

Therefore, Connected Nation as the State Broadband Designated Entity, in partnership with the Minnesota Department of Commerce, is pleased to present this submittal of the state of Minnesota's State Broadband Data and Development (SBDD) Grant Program, known as Connect Minnesota.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Minnesota: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address

Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Minnesota program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Minnesota program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 89.92% of the Minnesota provider community, or 107 of 119 total providers. Of the 107 participating providers, 50 supplied an update to their network or coverage area(s), while 54 have reported no change. The remaining 3 represent providers who previously supplied data but were non-responsive in the April 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 12 providers that are not represented in the attached datasets, 8 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect Minnesota. The remaining 4 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Minnesota principals that all commercially reasonable efforts were made to account for 100% of the known Minnesota broadband provider community, pursuant to this semi-annual data update submission.

Connect Minnesota has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Minnesota conducts field validation efforts. To date, 52 (43.70%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Minnesota launched a website to create awareness about the initiative. Connectmn.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Minnesota website encountered 4,098 unique visits during this reporting period (10,841total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 39 broadband inquiries over this same reporting period (102 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Minnesota website and the Connect Minnesota Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Minnesota mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Minnesota has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Minnesota Department of Commerce, outreach was conducted during this data update reporting period by Connect Minnesota to continue identification of existing, centralized sources for CAI connectivity data. Connect Minnesota worked closely with the Minnesota Office of Enterprise Technology to gain access to data from its state network for inclusion during this reporting submission. Additionally, outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Minnesota website. During this reporting period Connect Minnesota has developed a number of new relationships with statewide associations such as the Minnesota League of Cities, Minnesota Private College Council, and Minnesota Department of Education to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Minnesota will continue to build upon these new relationships over the coming months and utilize their contacts throughout the state to collect data and raise awareness of this project.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Minnesota will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increased industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Minnesota, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Minnesota efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Minnesota, Connected Nation has previously engaged all of the eleven (11) federally recognized tribal lands in the area covered by the Connect Minnesota SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period Connect Minnesota plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connect Minnesota understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Minnesota program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Minnesota, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: MINNESOTA COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Minnesota, working in close coordination with the Minnesota Department of Commerce, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Minnesota has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Minnesota has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Minnesota through ESRI ArcGIS software.

Connect Minnesota continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Minnesota website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Minnesota will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectmn.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_MN_7611

Connect Minnesota and the Minnesota Department of Commerce have worked closely during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. The Minnesota Office of Enterprise Technology (OET) has provided Connect Minnesota a file of approximately 1,000 CAI that utilize its state-owned network. These CAI include education, healthcare, public safety, higher education, and government sectors and provide full connectivity data for each institution. Additional information on the names and addresses of these institutions is still being extracted from the OET database, and Connect Minnesota should be reporting this data in the next reporting submission.

In tandem with these efforts to identify existing data, Connect Minnesota continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

During this last reporting period outreach has occurred to introduce the CAI project to key contacts at the Minnesota Department of Education, Minnesota Library Association, Minnesota Hospital Association, Minnesota Department of Public Safety, Minnesota Private College Council, Association of Minnesota Counties, and the League of Minnesota Cities. This outreach has resulted in many new contacts in the state and Connect Minnesota is encouraged that survey results will increase in all sectors within the coming months.

Connect Minnesota has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Minnesota is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Minnesota, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Minnesota will continue its ongoing work with the Minnesota Department of Commerce and key organization contacts in an effort to raise awareness of this project among CAI. Additionally, the Minnesota Broadband Advisory Task Force will be briefed at an upcoming meeting on the CAI project and will be made aware of the challenges we have faced in the state with collecting this data. The Task Force members will be provided information regarding how they can assist with outreach and promotion over the coming months.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	3,624	3,624	3,624	0	0	0
Libraries	1,708	1,708	1,706	10	10	10
Healthcare	180	180	180	58	57	57
Public Safety	1,544	1,544	1,544	4	4	4
Higher Ed Institutions	138	138	138	0	0	0
Other Government	117	117	116	26	26	26
Other Non-Government	1	1	1	0	0	0
Total	**7,312**	**7,312**	**7,309**	**98**	**97**	**97**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Minnesota.

Inventory of Deliverables, Connect Minnesota: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Minnesota have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Minnesota Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;

- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Minnesota on the following providers: Albany Mutual Telephone Association, Alliance Communications, Arvig Communications Systems, AT&T, Barnesville Municipal Telephone, Bradco-WISP Inc., CenturyLink, Charter Communications, Chaska Net, CitiScape Communications, Clear Choice, Clearwire Corporation, Comcast Cable Communications LLC, CTC Telecom, diversiCOM, Enterpoint, Evertek Enterprises LLC., Farmers Mutual Telephone, Frontier Communications Corporation, Garden Valley Telephone Company, Gardonville Cooperative Telephone Association, Genesis Wireless, Halsted Telephone, Harmony Telephone Company, Info Link Wireless Inc., Invisimax, Jaguar Communications, Lakedale LINK, Loretel Systems Inc., Mabel Cooperative Telephone Company, Maple Leaf Networks, Midcontinent Communications, Min-Kota Wireless, Minnesota Valley Telephone Company, Minnesota Valley TV Improvement Corporation, Otter tail Telecom, Polar Telcom Inc., Qwest Corporation, Red River Telephone Association, Ridge Runner Internet Services Inc., River Valley Telecommunications Cooperative, Scott Rice Telecommunications Cooperative, Sioux Valley Wireless, Sleepy Eye Telephone Company, Spring Grove Cooperative Telephone Company, T-Mobile USA, U.S. Internet Corporation, US Cable Corporation, VAL-ED Joint Venture, Verizon Communications, and Winnebago Cooperative Telephone Association.

During this reporting period, Connected Nation conducted 21 additional on-site validation tests with Alliance Communications, AT&T, Clear Choice, CTC Telecom, Enterpoint, Farmers Mutual Telephone, Halsted Telephone, Invisimax, and Sprint.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 52 companies (out of a universe of 119 viable providers) totaling 43.70% within the state of Minnesota.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 3.02% of Minnesota households do not have terrestrial fixed broadband service available, and approximately 0.27%[1] of Minnesota households have neither mobile nor fixed broadband service available.[2]

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[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block

Within rural areas of the state, results derived from provider-validated data indicate that approximately 6.58% of rural Minnesota households do not have terrestrial fixed broadband service available, and approximately 0.53%[3] of rural Minnesota households have neither mobile nor fixed broadband service available.[4]

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site

whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Minnesota project has received a total of 39 inquiries (102 grant inception to date). As more inquiries are submitted to Connect Minnesota, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Minnesota project launched BroadbandStat on May 21, 2010, and has received a total of 2,332 visits to date, of which 923 occurred this reporting period.

Speed Test Methodology

The 2,846 speed tests that are represented in the Connect Minnesota Speed Test Report during this reporting period (5,920 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Minnesota speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Minnesota project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Minnesota with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Minnesota.

CONNECT Minnesota®

Broadband Provider Log

Complete	166
Non-Responsive/Refused	9
In Progress	14
Count of Datasets by Viable Status	**189**
Total Unique Providers Represented	**119**

Provider Name	Platform	Status	NDA Execution Date	Notes
Ace Telephone Association	ILEC/CLEC	Data Added to Statewide Inventory	8/3/2010	
Alliance Communications	ILEC/CLEC	Data Added to Statewide Inventory		
Alliance Communications	Fiber	Data Added to Statewide Inventory		
Arvig Communications Systems	Fixed Wireless	Data Added to Statewide Inventory	2/2/2011	
Arvig Communications Systems	Fiber	Data Added to Statewide Inventory	2/2/2011	
Arvig Communications Systems	ILEC/CLEC	Data Added to Statewide Inventory	2/2/2011	
AT&T Corp, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Barnesville Municipal Telephone	ILEC/CLEC	Data Added to Statewide Inventory	3/4/2010	
Blue Earth Valley Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	6/16/2010	
Bradco-Wisp, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	
Christensen Communications Company	ILEC/CLEC	Data Added to Statewide Inventory	2/2/2010	
CitEscape Wireless Internet, LLC	Fixed Wireless	Data Added to Statewide Inventory	1/25/2010	
Clear Choice Communications	Fixed Wireless	Data Added to Statewide Inventory		
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
Consolidated Telephone Company	Fiber	Data Added to Statewide Inventory		
Consolidated Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory		
diversiCOM	Fiber	Data Added to Statewide Inventory	4/20/2010	
diversiCOM	ILEC/CLEC	Data Added to Statewide Inventory	4/20/2010	
Frontier Communications of Minnesota, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
FTTH Communications	Fiber	Data Added to Statewide Inventory		
Hiawatha Broadband Comunications, Inc.	Fiber	Data Added to Statewide Inventory	3/8/2010	
Info Link Wireless, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/19/2010	
Interstate Telecommunications Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	2/10/2010	
Interstate Telecommunications Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	2/10/2010	
InvisiMax, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
Lonsdale Telephone Co., Inc.	Fiber	Data Added to Statewide Inventory		
Manchester-Hartland Telephone Company	Fiber	Data Added to Statewide Inventory	4/14/2010	
Minnesota Valley TV Improvement Corporation	Fixed Wireless	Data Added to Statewide Inventory	4/13/2010	
New Ulm Telecom Inc.	ILEC/CLEC	Data Added to Statewide Inventory	2/25/2010	
NorthfieldWiFi LLC	Fixed Wireless	Data Added to Statewide Inventory	2/4/2011	
Park Region Mutual Telephone Company	Fiber	Data Added to Statewide Inventory	3/18/2010	
Park Region Mutual Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	3/18/2010	
Paul Bunyan Rural Telephone Cooperative	Fiber	Data Added to Statewide Inventory	6/24/2010	
Paul Bunyan Rural Telephone Cooperative	ILEC/CLEC	Data Added to Statewide Inventory	6/24/2010	
Polar Telcom, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	2/11/2010	
Qwest Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/4/2010	
Red River Rural Telephone Association	Fiber	Data Added to Statewide Inventory	3/17/2010	
Red River Rural Telephone Association	ILEC/CLEC	Data Added to Statewide Inventory	3/17/2010	
Red River Rural Telephone Association	Fixed Wireless	Data Added to Statewide Inventory	3/17/2010	
Savage Communications Inc.	Cable	Data Added to Statewide Inventory	2/19/2010	
Scott Rice Telephone Co.	Fiber	Data Added to Statewide Inventory	2/15/2010	
Scott Rice Telephone Co.	ILEC/CLEC	Data Added to Statewide Inventory	2/15/2010	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
Starpoint Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/18/2011	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
TDS Telecommunications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
TDS Telecommunications Corporation	Fiber	Data Added to Statewide Inventory	1/27/2010	
Upsala Cooperative Telephone Association	ILEC/CLEC	Data Added to Statewide Inventory		
Upsala Cooperative Telephone Association	Fiber	Data Added to Statewide Inventory		
US Internet of Minnetoka	Fixed Wireless	Data Added to Statewide Inventory		
VAL-ED Joint Venture, LLP	Fixed Wireless	Data Added to Statewide Inventory	4/21/2010	
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
Western Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	4/14/2010	
Wolverton Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	6/22/2010	
Woodstock Telephone Company	ILEC/CLEC	Data Added to Statewide Inventory	2/18/2010	
Woodstock Telephone Company	Fiber	Data Added to Statewide Inventory	2/18/2010	
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Mediacom Minnesota LLC	Backhaul	Backhaul Provider Only Processing Complete	1/12/2010	
Savage Communications Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/19/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
McLeodUSA Telecommunications Services, Inc.	ILEC/CLEC	Provider Approval Solicited		

360networks	Backhaul	No Update to Provide	1/19/2010	
Ace Telephone Association	Backhaul	No Update to Provide	8/3/2010	
Albany Mutual Telephone Association	ILEC/CLEC	No Update to Provide	3/4/2010	
Albany Mutual Telephone Association	Fiber	No Update to Provide	3/4/2010	
Alliance Communications	Backhaul	No Update to Provide		
Arrowhead Communications	ILEC/CLEC	No Update to Provide	4/14/2010	
AT&T Corp, Inc.	Backhaul	No Update to Provide	12/16/2009	
Benton Cooperative Telephone Company	Cable	No Update to Provide	6/16/2010	
Benton Cooperative Telephone Company	Fiber	No Update to Provide	6/16/2010	
Benton Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	6/16/2010	
Benton Cooperative Telephone Company	Mobile Wireless	No Update to Provide	6/16/2010	
Blue Earth Valley Telephone Company	Cable	No Update to Provide	6/16/2010	
Blue Earth Valley Telephone Company	Fiber	No Update to Provide	6/16/2010	
Broadband Corp	Fixed Wireless	No Update to Provide	5/11/2010	
Christensen Communications Company	Backhaul	No Update to Provide	2/2/2010	
City of Windom	Fiber	No Update to Provide		
Clara City Telephone Company	ILEC/CLEC	No Update to Provide	2/5/2010	
Consolidated Telephone Company	Fixed Wireless	No Update to Provide		
Crosslake Telephone Company	Fiber	No Update to Provide	6/16/2010	
Crosslake Telephone Company	ILEC/CLEC	No Update to Provide	6/16/2010	
Crosslake Telephone Company	Cable	No Update to Provide	6/16/2010	
DIECA Communications, Inc.	Backhaul	No Update to Provide	1/19/2010	
diversiCOM	Fixed Wireless	No Update to Provide	4/20/2010	
diversiCOM	Cable	No Update to Provide	4/20/2010	
Eagle Valley Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Emily Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	6/24/2010	
Emily Cooperative Telephone Company	Fiber	No Update to Provide	6/24/2010	
Enterpoint Wireless	Fixed Wireless	No Update to Provide		
Evertek Enterprises, Inc.	Fixed Wireless	No Update to Provide	6/17/2010	
Farmers Mutual Telephone Company	Fixed Wireless	No Update to Provide	4/1/2010	
Farmers Mutual Telephone Company	Fiber	No Update to Provide	4/1/2010	
Federated Telephone Cooperative	Fixed Wireless	No Update to Provide	4/1/2010	
Federated Telephone Cooperative	Fiber	No Update to Provide	4/1/2010	
Felton Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Frontier Communications of Minnesota, Inc.	Backhaul	No Update to Provide	1/22/2010	
Garden Valley Telephone Company	Fiber	No Update to Provide	2/17/2010	
Garden Valley Telephone Company	ILEC/CLEC	No Update to Provide	2/17/2010	
Gardonville Cooperative Telephone Association	ILEC/CLEC	No Update to Provide	2/23/2010	
Gardonville Cooperative Telephone Association	Fixed Wireless	No Update to Provide	2/23/2010	
Gardonville Cooperative Telephone Association	Fiber	No Update to Provide	2/23/2010	
Genesis Wireless	Fixed Wireless	No Update to Provide		
Granada Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Halstad Telephone Company	ILEC/CLEC	No Update to Provide	6/16/2010	
Halstad Telephone Company	Fixed Wireless	No Update to Provide	6/16/2010	
Harmony Telephone Company	Fiber	No Update to Provide	1/12/2010	
Hiawatha Broadband Comunications, Inc.	Cable	No Update to Provide	3/8/2010	
Hickory Tech Corporation	ILEC/CLEC	No Update to Provide		
HomeTown Solutions LLC	Fiber	No Update to Provide	4/1/2010	
Hutchinson Telecommunications, Inc.	ILEC/CLEC	No Update to Provide	4/14/2010	
Hutchinson Telecommunications, Inc.	Fixed Wireless	No Update to Provide	4/14/2010	
Jaguar Communications	Cable	No Update to Provide	4/12/2010	
Jaguar Communications	Fiber	No Update to Provide	4/12/2010	
Jaguar Communications	Fixed Wireless	No Update to Provide	4/12/2010	
Jaguar Communications	ILEC/CLEC	No Update to Provide	4/12/2010	
Johnson Telephone Company	ILEC/CLEC	No Update to Provide		
Kasson & Mantorville Telephone Company	ILEC/CLEC	No Update to Provide	6/30/2010	
Lonsdale Telephone Co., Inc.	ILEC/CLEC	No Update to Provide		
Loretel Systems, Inc.	ILEC/CLEC	No Update to Provide	4/14/2010	
Mabel Cooperative Telephone Company	ILEC/CLEC	No Update to Provide	4/7/2010	
Manchester-Hartland Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Mediacom Minnesota LLC	Cable	No Update to Provide	1/12/2010	
Midcontinent Communications	Cable	No Update to Provide	12/9/2009	
Midcontinent Communications	Backhaul	No Update to Provide	12/9/2009	
Minnesota Valley Telephone Company	ILEC/CLEC	No Update to Provide	4/29/2010	
Pine Island Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Qwest Corporation	Backhaul	No Update to Provide	1/4/2010	
River Valley Telecommunications Coop	Fixed Wireless	No Update to Provide	4/28/2010	
Rothsay Telephone Company Inc.	ILEC/CLEC	No Update to Provide	2/18/2010	
Runestone Telecom Association	Fiber	No Update to Provide	4/14/2010	
Runestone Telecom Association	ILEC/CLEC	No Update to Provide	4/14/2010	
Sacred Heart Telephone Company	ILEC/CLEC	No Update to Provide	2/5/2010	
Sheehan Gas	Fixed Wireless	No Update to Provide		
Sioux Valley Wireless	Fixed Wireless	No Update to Provide	4/21/2010	
Sjoberg's Inc.	Cable	No Update to Provide	12/21/2009	
Sleepy Eye Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
Southern Cablevision, Inc.	Cable	No Update to Provide	3/30/2010	
Spring Grove Cooperative Telephone Co.	Fiber	No Update to Provide	1/12/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Starbuck Telephone Company	ILEC/CLEC	No Update to Provide	2/5/2010	
TDS Telecommunications Corporation	Backhaul	No Update to Provide	1/27/2010	
tw telecom of minnesota llc	Backhaul	No Update to Provide	4/20/2010	
US Cable Corporation	Cable	No Update to Provide	5/20/2010	
VAL-ED Joint Venture, LLP	ILEC/CLEC	No Update to Provide	4/21/2010	
Verizon Communications, Inc.	Backhaul	No Update to Provide	12/14/2009	
West Central Telephone Association	ILEC/CLEC	No Update to Provide	2/18/2010	

West Central Telephone Association	Fiber	No Update to Provide	2/18/2010	
Wikstrom Telephone Company	ILEC/CLEC	No Update to Provide	4/12/2010	
Wikstrom Telephone Company	Fixed Wireless	No Update to Provide	4/12/2010	
Winnebago Cooperative Telecom Association	Backhaul	No Update to Provide	6/17/2010	
Winnebago Cooperative Telecom Association	Fiber	No Update to Provide	6/17/2010	
Winnebago Cooperative Telecom Association	Fixed Wireless	No Update to Provide	6/17/2010	
Winnebago Cooperative Telecom Association	ILEC/CLEC	No Update to Provide	6/17/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Zumbrota Telephone Company	ILEC/CLEC	No Update to Provide	2/5/2010	
EN-TEL Communications, LLC	ILEC/CLEC	No Update Provided - Use Last Submission Data		
Lakedale LINK	ILEC/CLEC	No Update Provided - Use Last Submission Data		
Lakedale LINK	Fixed Wireless	No Update Provided - Use Last Submission Data		
Lakedale Telephone	ILEC/CLEC	No Update Provided - Use Last Submission Data		
Knology of the Plains, Inc.	Cable	Solicited Initial Data		
Knology of the Plains, Inc.	Backhaul	Solicited Initial Data		
Reliance Globalcom Services, Inc.	Backhaul	Solicited Initial Data		
A Better Wireless, NISP, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		[FEB-16-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification, A Better Wireless has not responded to our multiple inquiries. We have completed validation work in the area, provided results from interactive map, asked for input and still no response. We will continue to attempt to gain A Better Wireless's participation in Minnesota's broadband mapping project.
Chaska Net	Fixed Wireless	Non-Responsive to Multiple Attempts		[FEB-16-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification, ChaskaNet has not responded our multiple inquiries. We have created the dataset during validation work in the area, provided it for approval, and still have received no response. We will continue to attempt to gain Chaska Net's participation in Minnesota's broadband mapping project.
City of Detroit Lakes	Fixed Wireless	Non-Responsive to Multiple Attempts	5/10/2010	In addition to multiple contact attempts made between April 7, 2010 and August 4, 2010, nine attempts have been made during this submission period.
Fibernet Monticello	Fiber	Non-Responsive to Multiple Attempts		[FEB-24-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification Fibernet Monticello has not responded our multiple inquiries. We have created the dataset during validation work in the area, provided it for approval and still received no response. We will continue to attempt to gain Fibernet Monticello's participation in Minnesota's broadband mapping project.
Ideaone Telecom Group, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		[FEB-16-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification, Ideaone has not responded to our multiple inquiries. We will continue to attempt to gain Ideaone's participation in Minnesota's broadband mapping project.
Ideaone Telecom Group, LLC	ILEC/CLEC	Non-Responsive to Multiple Attempts		[FEB-16-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification, Ideaone has not responded our multiple inquiries. We will continue to attempt to gain Ideaone's participation in Minnesota's broadband mapping project.

Maple Leaf Networks	Fixed Wireless	Non-Responsive to Multiple Attempts		[JAN-14-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification, Maple Leaf Networks has not responded our multiple inquiries. We have created 90% of dataset during validation work in the area, provided for approval, but still no response. We will continue to attempt to gain Maple Leaf Networks' participation in Minnesota's broadband mapping project.
Nextera Communications	ILEC/CLEC	Non-Responsive to Multiple Attempts		[FEB-18-11 John Determan] While attempting to solicit data in accordance with the NOFA, Ridge Runner has not responded to our multiple inquiries by USPS, e-mail, or telephone.
Ridge Runner Internet Services Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		[FEB-15-11 John Determan] While attempting to solicit data in accordance with the NOFA and the Clarification, Ridge Runner has not responded to our multiple inquiries by USPS, e-mail or telephone.
Ace Telephone Association	Fiber	Other	8/3/2010	[JAN-20-11 John Determan] Provider clairified corrections and the entire coverage is Fiber to the Node and DSL to subscribers. Was previously displayed as FTTH.
Arvig Communications Systems	Cable	Other	2/2/2011	[JAN-21-11 John Determan] Cable properties are reported under Arvig Communications' Subsidiary Company Home Telephone, dba Southern Cablevision.
Christensen Communications Company	Fiber	Other	2/2/2010	[FEB-15-11 John Determan] Fiber is B2B and backhaul only. Created Backhaul DCU.
DIECA Communications, Inc.	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Wes Kerr] Provider doesn't offer residential DSL, and the last mile data will not be included in the data submission.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-9-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Farmers Mutual Telephone Company	ILEC/CLEC	Other	4/1/2010	[JAN-27-11 John Determan] There is no DSL currently in coverage. All has been transferred to fiber.
Global Crossing Telecommunications, Inc.	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a provider representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-9-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
West Central Telephone Association	Fixed Wireless	Other	2/18/2010	[FEB-22-11 John Determan] Created new provider entry as Clear Choice Communications (a partnership between West Central Telephone and CTC Telcom) is a separate company.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Brian Dudek] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

Hiawatha Broadband Comunications, Inc.	Mobile Wireless	Offers Service but Below FCC Definition	3/8/2010	
Park Region Mutual Telephone Company	Fixed Wireless	Offers Service but Below FCC Definition	3/18/2010	
Starpoint Communications, Inc.	ILEC/CLEC	Inactive - No Longer in Business	2/18/2011	
Interstate Telecommunications Cooperative, Inc.	Satellite	Not a Broadband Provider	2/10/2010	

Submitted to:

National Telecommunications and Information Administration

Data Collection and Processing

Missouri
Broadband Data and Development

Submitted by:

April 1, 2011

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1 Introduction

This document provides background for the data collection and processing phases of the Missouri Broadband Data and Development Project. It covers the initial processing of data to meet specific requirements defined by the National Telecommunications and Information Administration (NTIA), governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, at page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, at page 40569 of the Federal Register. It also covers the quality control aspects of the project, including both back lab and field verification.

2 Non-Disclosure Agreement Development Process

The parties to the NDA process include the State of Missouri, the University of Missouri, GeoDecisions, and CBG Communications. Each of the above parties, along with the individual broadband service provider, was a signatory of each NDA.

A standard NDA was developed using an initial template provided by CBG which then adjusted based on previously signed agreements provided by AT&T. This template was then reviewed and standardized for Missouri state contracting language as edited with inputs from all state parties. This NDA was then vetted with representatives from the Missouri broadband provider community in order to develop a data sharing document that reflected the concerns of both the state and industry.

The state drafted, signed, and distributed an initial letter to providers; including data collection guidelines and a draft of the standard NDA (see Attachment A). This letter was initially sent to 129 providers initially in late March 2010. Mailing of this agreement has now been sent to 237 different entities within the state. Eighty-three of these entities were found to be resellers. Currently we have 91 providers cooperating with the mapping program.

3 Identifying Providers

The state parties used multiple methodologies to: a) identify broadband providers potentially offering service in the State of Missouri, and b) to acquire / build contact information for each of the providers.

Identification of providers began by accessing the FCC's Form 477 publically available data. This data provides the Holding Company Name, the FCC Registration number (FRN), and the filing company name of all broadband providers in the state that completed the Form 477. We began with this information and performed research tasks, including internet research of each of the companies to obtain a high level contact within the company, as well as their phone and e-mail contact information. If some of this information was not obtainable via Internet research, CBG made initial contact with the company, primarily through phone, to further explore the most pertinent contact.

In addition, we performed research of various websites to determine if there are providers that had not filed a Form 477 with the FCC that should be included in the data collection process. We researched these companies again for the best contact information through various public records including, but not limited to, Missouri Public Service Commission databases, State Telecommunications Industry Association memberships, FCC Cable TV Community Unit and Physical System ID databases, FCC telephone company databases, business licenses, state and local tax records, etc., as well as various state, local and other departments and agencies, including Division of Corporations, Division of Revenue, Local Franchise Authorities, Chambers of Commerce, etc.

We also continue to identify additional potential providers during our verification processes which include: internet searches, field discoveries (i.e. comprised of business names advertised (signage/trucks etc.), labeled infrastructure observed), CAI calling, and residential surveys/interviews.

As new providers were identified, the contact information was given to MU for delivery of initial contact letters to identified providers. These documents were mailed out by MU via e-mail, in order to expedite the process, and through the USPS as a formal notification. Based on input from providers in other states, these documents were sent by the State in order to show the importance that the State places on the project. All correspondence with the providers, including clarification on the NDA or Data Request, data formatting issues, and data submission by the providers, was then handled by GeoDecisions and CBG personnel unless the provider required interaction with state personnel (ie. Negotiation of NDA).

Due to the initial timeframe for completion (May 31, 2010) for Missouri's first version of the statewide map of broadband provision, the providers were requested to return the signed NDAs within five (5) business days of receipt and submit their data, in as usable a format as possible, by April 15, 2010.

Currently the state parties continue to perform follow-up with providers on an as-needed basis. This includes making contact with a provider if we did not hear from them after sending out the NDA or a new Data Request, following up to receive initial data sets, clarification regarding data sets, etc. Contact with the providers included phone calls, voicemail, and e-mail. In the case where a provider did not respond after numerous attempts, we also followed up with USPS mail.

A spreadsheet was utilized to keep track of all contact information that was developed and contacts that were made to ensure the accuracy of each provider's pertinent contacts for the statewide project. These contacts continue to be updated and maintained.

4 Requested Data Format

The overarching goal of the data collection was to satisfy the requirements of the State Broadband Data and Development (SBDD) grant program, which is governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, at page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, at page 40569 of the Federal Register. Both the NOFA and subsequent discussions with the NTIA have indicated that time is of the essence, and strict deadlines are in place for the delivery of data to the NTIA. As such, timely, accurate data collection was of primary concern. GeoDecisions and CBG requested that broadband providers submit data in a timely manner in whatever format the information was currently available to eliminate the lag that can be expected with the providers attempting to meet NOFA formatting compliance themselves; however, it was determined that many national providers, having gone through this process in other states, could deliver NOFA compliant data as part of their data submittal.

To assist in the NDA execution process and to further facilitate the timely delivery of data from the providers, GeoDecisions and CBG reviewed the State's NOFA cover letter that provides background on the project and provides the contacts to project team members from the State, GeoDecisions, and CBG. The cover letter stressed the incredibly short project timelines and specified the need to collect this data on an ongoing basis.

In addition to the cover letter, GeoDecisions and CBG developed a separate attachment to the NDAs. The *Data Collection Guidelines* was reviewed by the State, which provided further background and project goals associated with the State Broadband Data and Development project. The document also specified the guidelines to which the project would abide. The *Data Collection Guidelines* educated providers of the intended use of the data that they would be submitting. The intended uses included delivery of NOFA-compliant data to the NTIA, data dictionary, the intention of GeoDecisions and the State to generate static maps, as well as the creation of a Missouri-specific interactive mapping website. Finally, the *Data Collection Guidelines* specified the data and format required by the NOFA that was required of the State for delivery to the NTIA.

GeoDecisions also developed a provider data request spreadsheet template document that was distributed upon request and allowed the providers to enter NOFA compliant data as they chose to do so. It included sample data as reference for data entry. GeoDecisions, under the guidance of the State, also developed a preliminary Missouri-centric web site that displayed census blocks, census tracts, counties, and major roads in order to assist providers in correlating their service areas to census blocks. Providers could access this site and zoom, pan and print census block maps as needed. This capability is to be subsequently followed up with the development of web-applications wherein Providers can log-in and update their data via a web interface if they choose to do so. These web sites will also be the forum for their review of service extents, types, etc prior to submission of the Missouri map in the future.

Spatial data was requested from the providers in the following hierarchy of data format preferences. Those preferences were:

1) Shapefiles or Geodatabase (personal or file)
2) CAD files with embedded attributes included
3) Text-based data (MS Access, spreadsheets, comma-delimited files, etc.)
4) Paper maps
5) Any method in which the provider could readily submit the required data

5 Data Processing

Because of the variety of ways providers could submit their data, one of the major challenges of this project was to consolidate and integrate this data into a common model. For each provider, the work was divided into three main steps:

1. Capture the supplied data into a provider-specific staging geodatabase

2. Process and QA features in the provider's staging geodatabase
3. Move the data from the provider's staging geodatabase into the final deliverable geodatabase model.

The first step was the most involved and time consuming. A number of different processes were developed for loading the staging geodatabase, depending on how the data was supplied (2000 or 2009 census blocks; 2000 or 2009 TIGER roads). Regardless of the type of data provided, the base-level data - the census blocks, the TIGER street segments, and the county boundaries - all came from a single source, so were therefore consistent across all providers. Multiple processes were developed depending on the type of submitted data. Each process was extensively defined on a process checklist to ensure accuracy and consistency. A description of the different processes used to load data into the provider specific staging geodatabase follows:

<u>Availability Area</u>
If a provider supplied their availability area as a boundary or multiple boundaries drawn on a paper map or image file, those area(s) were geo-referenced and digitized into a shape file. If the boundary was provided as a CAD drawing or arose from another GIS system, it was converted to a shape file format. Some wireless providers defined their area of availability as their wireless coverage area. This may be a supplied boundary, but it may also have been defined using the location of the wireless tower, the angle of coverage, and the coverage distance. This would result in a sector of a circle, which was used as the availability area.

Once a shape file of the boundary was created, interpreted, and available, all census blocks intersecting that boundary were collected. Those census blocks less than two square miles were assembled into one feature class. For census blocks greater than two square miles, all street segments that overlapped both the census blocks and the availability area were collected into another feature class. Along with the availability area, the providers also supplied the technology of transmission and the speed information. These attributes were assigned to the census blocks and street segments, as well as information on the provider itself: Name, DBA, and FRN.

<u>Census Blocks</u>
Some providers submitted a list of census blocks for their area of availability, along with technology of transmission and speed information specified for each census block. In these cases, the census block boundaries were selected for each specified census block. If the census block was less than two square miles, it was added to the census block feature class and the technology of transmission and speed information were assigned from the provided list. If the census block was greater than two square miles, all street segments that overlapped it were added to the street segment feature class and the technology of transmission and speed information were assigned from the census block in the list.

The 2000 census block dataset was used for our data processing, however a few providers submitted lists using other vintage census blocks. The newer vintage (2009) census blocks were derived from 2000 census blocks, however in areas that experienced significant population growth, a census block may have been split, possibly multiple times, and each resulting piece has the same census block id as the original but a unique alphabetic suffix appended to the end. When a provider specified a 2009 census block that had subsequently been split from the 2000 version, all of the associated census blocks were coded for that provider. Thus the true coverage of the census blocks were maintained and consistent with the provider's list but represented in the 2000 block structure. We are now processing all of the older (2000 and 2009 vintage census blocks) into a 2010 representation so that the mapping on the Missouri Broadband mapping web portal will be a single version of geography.

Address Information

If a list of addresses was provided as the availability area, the first step was to geocode, or obtain the coordinates of these addresses. When successful, this resulted in a point for each address located. The census blocks intersecting all the points were collected. If the block was greater than two square miles it was treated separately. If a census block contained address locations with different technologies of transmission, the census block was duplicated, and a distinct technology of transmission assigned to each copy of the census block. For different locations in a census block with the same technology of transmission, the maximum value for each speed was obtained and that maximum assigned to the census block.

If the geocoded point lay within a census block greater than two square miles, the nearest street segment was located and the technology of transmission and speed assigned to that segment. As with census blocks, if there were several locations with different technologies of transmission along the same street segment, the street segment was duplicated and each segment assigned a different technology of transmission. The speed assigned to that segment was the maximum speed for all locations along the segment sharing that segment's technology of transmission.

Wireless Boundary

In most cases, wireless providers supplied a boundary, either in electronic format or as paper maps. These were converted to a shape file either by digitizing or by performing a data conversion as appropriate. Other providers supplied tower locations, the angle of coverage, and the distance. The wireless boundary was constructed from this. Finally, some providers defined their wireless boundary using an exchange boundary or as an aggregate of their customers. Although these boundaries may not accurately represent the wireless availability area, they were initially included in the dataset in order for the providers to submit feedback and more accurately specify boundaries of availability for future iterations.

Middle Mile Points

If middle mile points were supplied on a hardcopy or image file map, the point was digitized. Usually these points were provided with latitude and longitude, so it was a simple matter to add them to the feature class. The elevation data was not always supplied due to the provider not having this information available, but when it was, it was often given as feet above sea level. The model requires elevation to be feet above (or below) grade. In these cases, a digital terrain model was used to obtain the ground elevation at the middle mile structure location, which was subtracted from the height above sea level to obtain the height above grade.

The above processes were used to capture the provider-supplied data into provider specific individual staging geodatabases using a common NSGIC data model. Once this was completed, the data could be updated or modified and Quality Checked using the same processes regardless of how it was originally submitted. One such process was the creation of the overview areas. The census blocks and street segments for a provider were collected and grouped by technology of transmission. County boundaries that overlapped each of these groups were then collected. The technology of transmission of all census blocks and street segments for the group was assigned to the county. Discontinued per NTIA's request is assignment of maximum speed within the group to the county.

At this point the dataset for a particular provider was complete. An extensive Quality Check (QC) checklist was used to examine the dataset, verify consistency, and that it matched the data submitted by the provider. Once the dataset was successfully checked for quality, the features were appended into final database model along with all data from other completed providers. Both the Validate Topology and Validate Features ESRI tools were run, any corrections were made, and if necessary rerun. As individual provider data sets were appended into the master database and again when all data sets were appended, the NTIA supplied 'SBDD Check Submission' tool was run against the data. Any errors detected were corrected and the tool re-run. A final manual QC review was performed to ensure the all provider data is present and consistent followed by a final run of the SBDD Check Submission tool against the master data model if any corrections / changes were made.

Public Data Sources

This process obtained and compiled cable strand maps, as well as maps of service / coverage areas obtained from the service provider's public offices directly or from their Web sites and advertising materials if no other authoritative source was available for the provider. Websites were initially collected and inventoried through the use of a 'surveymonkey' instrument. This has now moved to the use of an Excel spreadsheet to standardize and assemble the database from webcrawling activities. All files and maps discovered through webcrawling were either screen-captured or imported (from CAD) to create a digital representation or image of the service / coverage area(s). These digital representations were then georeferenced to a base map of the state of Missouri. The spatial transformation methodology used was determined by the image type, confidence in a real representation, and scale of source materials. In addition maps of telephone company exchange areas and cable franchise areas from their respective associations were digitized and attributed to provide reference as well. These files are held as elements of independent validation to be compared with GeoDecisions / CGB that are created from provider sources.

Community Anchor Institutions

The University of Missouri (UM) was lead on the development of the Community Anchor Institution database. Many elements of the Community Anchor Points were initially compiled by the UM in coordination with the Department of Public Safety (SEMA and OHS) providing a starting point for this data collection. The list of Anchor Institutions inventoried and monitored in this project include: Police, Fire, Hospitals, EOC, PSAPs, Municipal Courthouses, Libraries, K-12, Higher Education, Extension Offices, Correctional Facilities, Government Buildings, Community Centers, County Courthouses, and Armories.

The community anchor attribute information was gathered by the University through phone calling, site visits by UM students and staff, and data requests to respective state agencies / associations. In this way these efforts were coordinated with and through state agencies / associations with jurisdiction over these sites. For example, the State Fire Marshall's Office sent out a memo under their letterhead informing their constituency of the inventory and assessment so that the student callers and those conducting site visits would be received positively. We also contacted the State Health Department, ITSD, and MOREnet and requested broadband information for their facilities. UM also used their ongoing local data review, validation, and verification processes in partnership with Regional Planning Councils, Regional Homeland Security Oversight Committees, and associated local governments to assemble and verify data for some counties within Missouri. This process of data development had already been deployed in some areas of Missouri in association with the development and review of public safety structure-based information and has proven to work well.

The data received from these agencies was cross-checked with our CAI geodatabase and the information was added or updated. The information that they were able to provide included facility name, if they had broadband service, technology used, and speeds.

Website information for the CAIs was collected by calling and asking if they had a website or by searching the internet. Public WiFi for the CAIs were collected by calling and asking if it was available or not.

Unique ID's (CAI ID) of certain types of CAIs, including K-12 schools, libraries, and higher education schools, were collected and added to the database. The National Center for Education Statistics (NCES) provided the codes for the schools and higher education facilities through a website provided by the PO office, http://nces.ed.gov/ccd/bat & http://nces.ed.gov/ipeds/datacenter. The library ID's were found at http://harvester.census.gov/imls/data/pls/index.asp.

6 Data Accuracy – Back Lab Verification Methods

Throughout the project, GeoDecisions and CBG performed numerous verification tasks to determine the level of accuracy of the information gathered from the broadband providers in the State. The initial verification methods were called back lab verification tasks by the NTIA. Unlike the field verification processes (described below), these tasks were performed in a lab or office setting. Each of the following GeoDecisions/CBG back lab processes was utilized to validate the data collected from some or all of the providers:

After the data from a given provider was captured into the geodatabase, the mapped data was then compared against information gleaned from various sources. The FCC had documentation that was used such as the Form 320 (Basic Signal Leakage Performance Report), which is filled out by cable television providers on an annual basis, and Cable TV Community Unit and Physical System databases. These information databases provided high-level information of geographic areas served by cable TV and other broadband providers. This information alerted our team to areas not included in gathered data from a broadband provider.

Additional sources of information utilized during the back lab verification process included franchise and exchange boundaries, cable strand maps, media prints, as well as business and taxation licenses. These sources varied in value to the project, depending on the level of information gathered and maintained by local franchising authorities and state agencies such as the PSC. Telecommunications associations were also queried for information regarding providers and system boundaries or areas of the state where specific providers offer service.

The above processes primarily relate to wireline broadband providers. For wireless broadband providers, we compared information gathered from the providers against FCC and FAA tower databases and private tower databases, as needed.

Independent Validation and Assessment: The UM also performed similar verification tasks as listed above to determine the level of accuracy and confidence in the information delivered by GeoDecisions/CBG as assembled from the broadband providers in the State. Again, these verification methods were called back lab verification tasks by the NTIA as these tasks were performed in a lab or office setting.

In addition to the above, the UM back lab processes took the assembled public sourced data for all providers (where this type of information could be found) and intersected it with the supplied GeoDecisions / CBG provider service areas. As well, Ookla site data, survey data, and presence/absence data assembled were also used to assess these data. From these data, additional analyses were performed to create measures of agreement, confidence indexes, spatial confidence indexes, and to visualize patterns of service and gaps in service.

These gaps and patterns of service are currently being examined to determine common threads for the State of Missouri across socio-economic, demographic, land cover, density of CAI, and other measurable elements of this mapping. We hope to use these data to inform the Regional Technology Planning Teams of opportunities and impediments.

The results of the independent assessment and validation were then combined with findings from GeoDecisions/CBG to form a report that then was delivered back to the provider to initiate the 'provider feedback' element (Section 19) of the assessment and to validate/verify the assessments of these data and their extents by both UM and GeoDecisions/CBG with the respective provider.

7 Development/Implementation of a field verification guide and checklist

Prior to beginning field verification activities, CBG Communications, Inc. (CBG) developed a field verification guide for use by each member of the field verification team. The guide included systematic instructions and a checklist related to verification of each broadband system and service type. The guide and checklist were drafted, reviewed and finalized prior to the beginning of field verification activities.

8 Field verification team training

To ensure uniformity of the team's approach to field verification, field team training was held immediately prior to the beginning of field verification activities. Training was conducted for CBG, GeoDecisions, and University students and staff. The training covered all field verification activities, including:

- Use of the guide, instructions and checklist
- Understanding of each system and service types
- Understanding of coverage characteristics

- Understanding of service attributes, including system technology type, upstream and downstream connection speeds, and other attributes required (by the NTIA) to be documented and verified
- Use of the equipment needed for field verification activities
- Proper documentation of field verification activities

The office tutorial lasted ½ day. An additional field-based ½ day session was utilized for actual demonstration of field verification activities.

9 Team Assignments

Two person teams were utilized the next 2 days after office and field training in order to work together and become more comfortable with the process. Eventually, field verification team members were expected to perform field verification activities on their own, with the exception of University student teams, who continued to participate in pairs of two for safety and security reasons. The State was divided into five (5) large areas encompassing Northwest, Northeast, Southwest, Southeast and Central Missouri. The contractor assembled ten (10) team members, and assigned two for each area. The UM team assembled eight (8) team members to form four (4) teams, and assigned them to certain counties and particular census blocks within those counties. As well, two (2) of these teams conducted the surveys and interaction at the Missouri State Fair discussed in Section 13.

Each team member was provided an official-looking ID card and a letter of certification on Missouri State letterhead in order to mitigate findings early-on that residents were suspicious of individuals asking them unsolicited questions. These two items proved very effective in minimizing these concerns.

10 Verifying Coverage

Broadband system coverage was verified by sampling whether services were available at various locations shown on the providers' system coverage maps randomly chosen from all of the census blocks that are at the ends of the providers' systems. The random sample was developed separately by the UM and contractor teams.

The contractor team verified by looking for a mixture of large and small providers across the state, being sure to hit each of the 19 Regions which would form the basis for the Regional Planning Technology Teams. Efforts were made to locate and verify all providers that had submitted data. Verifying the large providers, especially, in each of these regions was a priority. Each contractor team member collected field gathered data in an MS Access database. The data included: Lat/Lon of verification point, provider name, technology type, speed test results if available, customer comments and notes from team member. All data was compiled and used to not only validate provider submitted data as mapped, but for providing feedback to the providers.

As a cross check, the UM team sampled a selection of counties, looking for more detailed coverage in a subset of the state's counties.

11 Ookla Speed Test Web Site

As part of the field verification process, State residents and businesses were given a card briefly explaining the project and directed them to the State's designed speed test website. This project specific Ookla speed test web site was set up to collect information on providers, users, as well as the upstream and downstream speeds associated with their broadband connection.

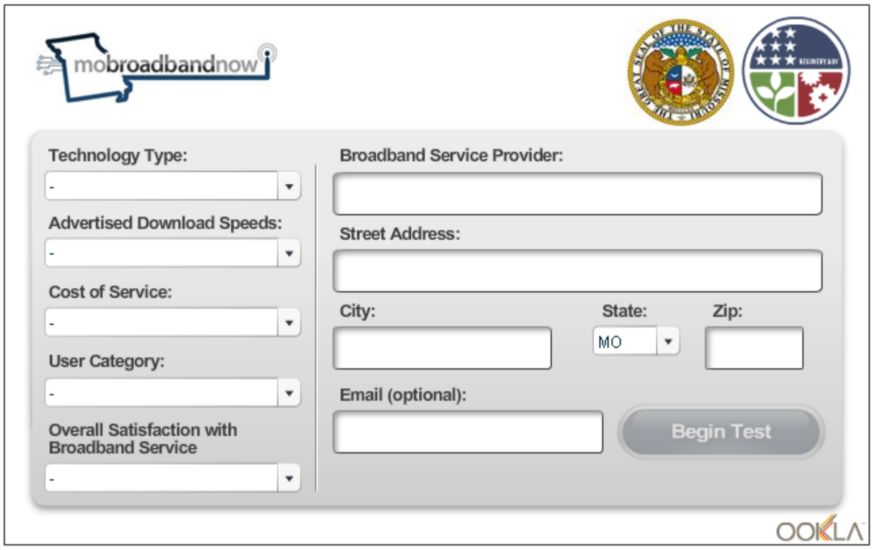

Figure 1: Depiction of Ookla Speed Test Site

12 Equipment Utilized for Field Verification Activities

Each team member carried the following equipment in order to perform field verification activities for the various types of services:

a. Laptop with Wi-Fi capability and provider GIS data installed
b. Cellular 3G/4G and WiMAX aircards (independent card for each provider) for use with laptop
c. Binoculars
d. GPS for verifying and documenting exact locations
e. Hardcopy forms and electronic database for documenting verification data
f. Cell phone with 3G or 4G used in lieu of laptop for certain types of wireless broadband services
g. Digital recorder for aural field notes, as needed
h. Identification documents (business cards, State or other ID badges, letter from the State acknowledging that the team member is part of the verification team, for those with questions)
i. Car chargers and/or DC to AC Inverters for equipment chargers
j. Census block maps (boundary details shown) and other maps as needed

k. Postcards advertising the Ookla web site for distribution, as shown below

Figure 2: Postcards Distributed to Residents

13 Other Verification Methods

In addition to utilizing the above mentioned equipment and the methodologies listed below for verifying coverage and characteristics, team members entered into discussions with residents in the various areas. Residents were asked questions such as: Do they currently have broadband service, who their provider is, if they know what speeds they could achieve and if they know of other provider's service available in the area. This information was confirmed by multiple residents before being considered accurate. Residents often times did not know what their service level and speeds are. Questions such as how much were they paying for the service led to a better understanding of their service level. Residents are encouraged to visit the Ookla speed test site to assist in gathering actual speed data.

Missouri State Fair: In order to collect a large amount of information from Missouri residents for the Broadband Project, the Broadband Mapping Team decided to visit the Missouri State Fair in Sedalia, Missouri. The 2010 Missouri State Fair had an estimated attendance of over 330,000 people, therefore with such a high attendance this event would be useful for data collecting. The Broadband Mapping Team (BB Team) had two locations at the fair; one was in the Mizzou Central Building in the MO-AG Theater organized by the College of Agriculture, Food and Natural Resources. Inside the MO-AG Theater was the main location for the BB Team where an informational slide show continuously played and signage was displayed throughout the booth area. This was the survey location where Missouri residents would be asked to fill out a form about their internet service. A total of 582 surveys were completed and able to be geocoded to be used as verification and validation for UMs independent assessments.

The other location was on the lawn outside of the MO-AG Theater, where a Mizzou Tent was assembled daily and tables were set displaying a large Missouri map divided into four quadrants. Each of the four quadrants represented different regions of Missouri, northwest, northeast, southwest and southeast. At this station, Missouri residents were able to physically place a colored pin on their home location. The color would vary depending on if the person had broadband availability in their area. A total of 880 pins were placed denoting presence or absence of broadband.

At both areas, the broadband speed test cards for the Missouri Ookla site were handed out to residents after filling out a survey or placing a pin on one of the four maps. We also distributed drinking cups, refrigerator magnets, and pens with the State Broadband speedtest site on them. Thus far, over 1050 speed tests have been performed on the site.

14 Verifying Wireline Broadband Coverage Characteristics

Using the specified random sampling technique, field team members searched for the physical endpoints of cable systems, telephone/DSL and fiber optic infrastructure and noted when additional infrastructure was not seen moving outward from the core either in an aerial (overhead) or underground manner. These areas were targeted for discussions with residents and to perform speed tests. Observations and findings were documented accordingly.

15 Wireless Broadband Coverage

Verification team members reviewed the provider's information and looked for network availability near the antenna site or in the middle of the provider's service area to confirm network and test equipment compatibility. Using the specified random sampling technique, the team member tested with pertinent gear to determine when service could and couldn't be achieved by the laptop, cell phone, or other wireless broadband-enabled device. These locations were documented accordingly.

From the University of Missouri, an aircard team was sent out into the field to verify wireless broadband coverage by the top five wireless providers. These providers are AT&T, Sprint, T-Mobile, Verizon and US Cellular. Wireless broadband USB devices were purchased from each provider to test signal strength, upload and download speeds in different locations.

Boone County was the pilot county the team visited to conduct a more intense test of the submitted wireless broadband coverage for these providers. The process we used is still developing as it is a new aspect of the project and will continue to be refined as we continue to analyze wireless coverage. The current process to test aircards is as follows:

- Randomly select a road that preferably branches off a primary road that we are confident has wireless broadband coverage.
- Choose a starting point on the road selected and test each aircard from every provider at ½ mile increments to see how signal strength and speeds vary.

- At the same time, aerial imagery is used to place a point exactly where the team is located in the field to collect the information for each provider into ArcMap.

For each point collected the team collects, signal strength, upload and download speeds, location (road intersections or home address if the team is parked in front of residence), lat/long, and notes describing any technical difficulties the team may run into.

16 Upstream and Downstream Connection Speeds for Wireline Providers

The field verification team member:

a. *For cable modem* – Upstream and downstream connection speeds were verified using the Ookla speed test at locations within the providers' coverage area using the specified random sampling technique. An already installed cable modem connection was utilized, as available. These included both preselected points with arrangements made for testing (such as at local libraries or at public facilities utilizing cable modem service) and at randomly chosen business and homeowner locations where the business or homeowner consented to test the service. Findings were documented accordingly on electronic or paper forms. In addition, the speed test was documented via the Ookla site.

b. *For DSL connection speed testing* –The same procedures were used as for cable modem testing. Findings were documented accordingly on paper or electronic forms.

c. *For fiber optic connection speeds* – For services to homes and small businesses the same procedures were used as above for cable modem and DSL. For higher speed services to larger businesses, institutional network connections, enterprise/wide area network connections, etc., the team member worked with the business or institutions' IT group to perform connection speed testing. If actual testing could not be performed, team members attempted to gain existing end user documentation tests and performance documentation related to speeds of the network. Findings were documented accordingly on paper or electronic reports.

17 Wireless Broadband Service Connection Speed Testing

For cellular broadband 3G and 4G testing – A provider specific air card was needed in order to enable the laptop to access the Ookla speed test to determine the speed of connection. Some service providers provided air cards to conduct this testing. All teams also used both personal and corporate cards to assist in the testing. The speed of connection was tested at randomly selected points beginning close to the providers' tower/antenna infrastructure, at a mid-point and then at the ends of the verified coverage area. Findings were documented accordingly on paper or electronic reports. Documentation was uploaded daily by the team members to ensure timely and uniform oversight and modifications of the processes.

18 Coordination of Contractor and State Parties' Field Verification

The state and contractor utilized the process in the diagrams below to coordinate field verification activities:

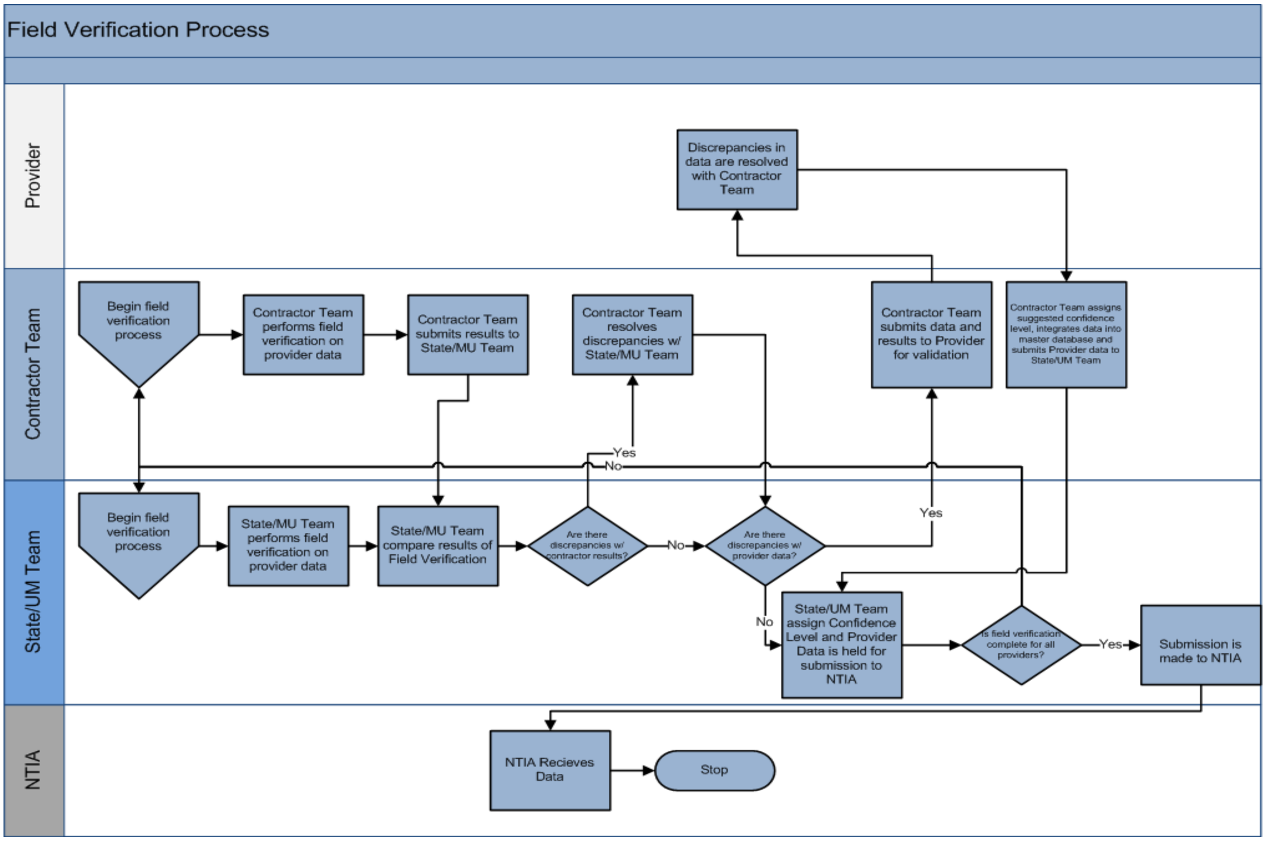

Figure 3: Field Verification Coordination Process

19 Provider Feedback Reporting

Upon completion of the provider submitted data, feedback information was supplied to each of the 91 providers that had submitted data. This feedback was presented in the form of a detailed Data Review Report in MS Word format, all provider attribute data exported into MS Excel format and multiple Overview, Wired and Wireless GIS exported image files in pdf format. This information would allow each provider to review our feedback and findings, as well as their submitted data as depicted in the GIS data model, both in a graphical and tabular form.

The Data Review Report detailed the usability and completeness of their submitted data as well as an estimate of our confidence in their submitted data based on field verification efforts and back lab verification steps as detailed above. The report also requested feedback on the accuracy of how we characterized their availability areas, technologies, speeds etc. Based on the provider's feedback, the data was adjusted and refined accordingly.

Field verification and back lab verification processes and procedures were utilized, as available and as needed, to ensure the highest level of confidence that the information gleaned from the providers was as accurate as possible. During this process, GeoDecisions and CBG contacted providers when we found instances that appeared to conflict with the information they initially provided and worked with the providers to adjust the maps accordingly.

20 Statistics

File Type	Number of Records
Total Records in all Files	**485,303**
Census Block < 2 sq. miles	326,023
Address-Level	Not Required
Street Segment	151,121
Wireless Shape File	35
BB Service Overview	521
Community Anchor Institution	6,928
Middle Mile	674
State Boundary	1
Metadata Provided for Geospatial Data	YES
Number of ISP's Provided in Submission	91

Providers Completed	91
Pending Additional Data	10
Non-Responsive/Refused	28
Researching	21
Non-Facilities Based	83
Out of Business	4
TOTAL	237

Provider Name	Status	FRN	NDA Execution Date	Notes/Comments
Adams Networks	Data Included in Missouri State Submission	11616356	5/18/2010	No updates submitted in third data call response.
Alma Communications Company	Data Included in Missouri State Submission	7196207	5/18/2010	No updates submitted in third data call response.
Holway Telephone Company	Data Included in Missouri State Submission	4746863	4/5/2010	No updates submitted in third data call response.
KLM Telephone Company	Data Included in Missouri State Submission	3772274	4/5/2010	No updates submitted in third data call response.
N. W. Communications	Data Included in Missouri State Submission	3772290	4/5/2010	No updates submitted in third data call response.
American Fiber Systems, Inc.	Data Included in Missouri State Submission	6651202	4/27/2010	No response to third data call.
AT&T Corp.	Data Included in Missouri State Submission	4496774	4/7/2010	No updates submitted in third data call response.
AT&T Mobility, LLC.	Data Included in Missouri State Submission	4979233	4/7/2010	Third data call updates included.
AT&T Southwest	Data Included in Missouri State Submission	16657918	4/7/2010	Third data call updates included.
Bay's Internet	Data Included in Missouri State Submission	18912576	Not Req'd by Provider	Third data call updates included.
Big River Telephone, LLC	Data Included in Missouri State Submission	18520320	Not Req'd by Provider	No updates submitted in third data call response.
Cable One, Inc.	Data Included in Missouri State Submission	3474327	4/5/2010	Third data call updates included.
Cable America Missouri, LLC	Data Included in Missouri State Submission	15466766	6/10/2010	Third data call updates included.
Carthage Water & Electric	Data Included in Missouri State Submission	7147143	Not Req'd by Provider	No response to third data call.
Suddenlink Communications - Cebridge	Data Included in Missouri State Submission	14367650	6/12/2010	Third data call updates included.
Suddenlink Communications - Friendship Cable	Data Included in Missouri State Submission	4999025	6/12/2010	Third data call updates included.
Suddenlink Communications - Cequel III Communications II	Data Included in Missouri State Submission	9725870	6/12/2010	Third data call updates included.
CenturyLink	Data Included in Missouri State Submission	18626853	4/20/2010	Third data call updates included.
Chariton Valley Telephone Corporation	Data Included in Missouri State Submission	2549392	5/26/2010	Third data call updates included.
Chariton Valley Telecom Corporation	Data Included in Missouri State Submission	8437147	5/26/2010	Third data call updates included.
Charter Communications	Data Included in Missouri State Submission	17179383	6/10/2010	Third data call updates included.
Citizens Telephone Company of Higginsville Missouri	Data Included in Missouri State Submission	2504298	4/5/2010	No updates submitted in third data call response.
LiNKCity	Data Included in Missouri State Submission	16051450	Not Req'd by Provider	No updates submitted in third data call response.
City Utilities Springfield (SpringNet)	Data Included in Missouri State Submission	4759411	3/23/2011	Third data call updates included.
Cogent Communications, Inc.	Data Included in Missouri State Submission	19898303	Not Req'd by Provider	No updates submitted in third data call response.
Comcast	Data Included in Missouri State Submission	4441663	5/27/2010	No response to third data call.
Covad Communications Company	Data Included in Missouri State Submission	3753753	5/18/2010	Third data call updates included.
Craw-Kan Telephone	Data Included in Missouri State Submission	2334225	4/5/2010	No response to third data call.
T-Mobile	Data Included in Missouri State Submission	6945950	5/4/2010	Third data call updates included.
Ellington Telephone Company	Data Included in Missouri State Submission	3741956	4/5/2010	Third data call updates included.
FairPoint Communications Missouri, Inc.	Data Included in Missouri State Submission	14710388	9/1/2010	Third data call updates included.
Farber Telephone Company	Data Included in Missouri State Submission	3748043	4/5/2010	Third data call updates included.
BPS Telephone Company	Data Included in Missouri State Submission	3730835	4/5/2010	Third data call updates included.
BPS Networks	Data Included in Missouri State Submission	16026965	4/5/2010	Third data call updates included.
Fidelity Cablevision, Inc	Data Included in Missouri State Submission	13326	4/5/2010	Third data call updates included.
Fidelity Communications Services I, Inc.	Data Included in Missouri State Submission	4351722	4/5/2010	No updates submitted in third data call response.
Fidelity Telephone Company	Data Included in Missouri State Submission	2550309	4/5/2010	Third data call updates included.
Granby Telephone Company	Data Included in Missouri State Submission	5061189	4/5/2010	No response to third data call.
Grand River Mutual Telephone Corp.	Data Included in Missouri State Submission	2505519	4/7/2010	No response to third data call.
Green Hills Technologies	Data Included in Missouri State Submission	3736246	4/5/2010	Third data call updates included.
Green Hills Telephone ILEC	Data Included in Missouri State Submission	3736238	4/5/2010	Third data call updates included.
Green Hills Telecommunications Services	Data Included in Missouri State Submission	3736253	4/5/2010	Third data call updates included.
Hughes Network Systems, LLC	Data Included in Missouri State Submission	17434911	Not Req'd by Provider	No updates submitted in third data call response.
KTIS (Kingdom Telephone Company)	Data Included in Missouri State Submission	2212314	4/5/2010	No updates submitted in third data call response.
Cricket Communications, Inc. (Leap Wireless International)	Data Included in Missouri State Submission	2963528	4/20/2010	Third data call updates included.
Le-Ru Telephone Co.	Data Included in Missouri State Submission	2490472	4/7/2010	No response to third data call.
Level 3 Communications, LLC	Data Included in Missouri State Submission	3723822	4/27/2010	Third data call updates included.
LTO Communications, LLC	Data Included in Missouri State Submission	19008036	Not Req'd by Provider	No response to third data call.
Mark Twain Communications Company	Data Included in Missouri State Submission	2531879	4/5/2010	No updates submitted in third data call response.
Mark Twain Rural Telephone Co	Data Included in Missouri State Submission	2549228	4/5/2010	No updates submitted in third data call response.
McDonald County Telephone Co	Data Included in Missouri State Submission	2504058	4/5/2010	Third data call updates included.
MCC Missouri LLC (Mediacom)	Data Included in Missouri State Submission	5184247	9/1/2010	No updates submitted in third data call response.
Mid States Services, LLC.	Data Included in Missouri State Submission	18511303	5/26/2010	No response to third data call.
New Florence Telephone Company, Inc.	Data Included in Missouri State Submission	4374047	4/5/2010	No response to third data call.
Northeast Missouri Rural Telephone Company	Data Included in Missouri State Submission	4337044	4/20/2010	No response to third data call.
Northwest Missouri Cellular	Data Included in Missouri State Submission	2534618	Not Req'd by Provider	No response to third data call.
Oregon Farmers Mutual Telephone Company	Data Included in Missouri State Submission	3733847	4/5/2010	No response to third data call.
New Wave Communications	Data Included in Missouri State Submission	1202938	Not Req'd by Provider	Third data call updates included.
Iland Internet Services	Data Included in Missouri State Submission	17606898	Not Req'd by Provider	No response to third data call.
Mid Missouri Telephone Co.	Data Included in Missouri State Submission	2509040	4/5/2010	No response to third data call.
Ozark Computers	Data Included in Missouri State Submission	18658179	Not Req'd by Provider	No response to third data call.
Peace Valley Telephone Co., Inc.	Data Included in Missouri State Submission	18539742	4/5/2010	No updates submitted in third data call response.
Poplar Bluff, City of	Data Included in Missouri State Submission	2514529	Not Req'd by Provider	No response to third data call.
Radio Wire, Inc.	Data Included in Missouri State Submission	18912626	Not Req'd by Provider	Third data call updates included.
Midwest Data Center & Rock Port	Data Included in Missouri State Submission	4362505	4/7/2010	No updates submitted in third data call response.
Goodman Telephone Company, Inc.	Data Included in Missouri State Submission	4269775	4/12/2010	No updates submitted in third data call response.
Ozark Telephone Company	Data Included in Missouri State Submission	4269817	4/12/2010	No updates submitted in third data call response.
Seneca Telephone Company	Data Included in Missouri State Submission	4269809	4/12/2010	No updates submitted in third data call response.
Sho-Me Technologies, LLC	Data Included in Missouri State Submission	8875890	Not Req'd by Provider	Third data call updates included.
Sprint Nextel Corporation	Data Included in Missouri State Submission	3774593	6/11/2010	Third data call updates included.
StarBand Communications Inc.	Data Included in Missouri State Submission	5087457	4/5/2010	No updates submitted in third data call response.
Steelville Telephone Exchange Inc	Data Included in Missouri State Submission	2549665	4/5/2010	No response to third data call.
Miller Telephone Company	Data Included in Missouri State Submission	4269528	4/5/2010	No response to third data call.
TDS Telecommunications Corporation - Stoutland	Data Included in Missouri State Submission	2502243	4/26/2010	Third data call updates included.
TDS Telecommunications Corporation - New London	Data Included in Missouri State Submission	2529733	4/26/2010	Third data call updates included.

TDS Telecommunications Corporation – Orchard Farm	Data Included in Missouri State Submission	3767340	4/26/2010	Third data call updates included.
Time Warner Cable	Data Included in Missouri State Submission	13430244	6/21/2010	No response to third data call.
Total Wireless Communications	Data Included in Missouri State Submission	18726729	Not Req'd by Provider	No response to third data call.
Townes Tele-Comm, Inc. - Choctaw Telephone Company	Data Included in Missouri State Submission	4928792	Not Req'd by Provider	Third data call updates included.
Townes Tele-Comm, Inc. - MoKan Dial, Inc.	Data Included in Missouri State Submission	4928750	Not Req'd by Provider	Third data call updates included.
tw telecom	Data Included in Missouri State Submission	17348061	4/27/2010	Third data call updates included.
United Services, Inc. (United Sky Wireless)	Data Included in Missouri State Submission	16087876	4/5/2010	No updates submitted in third data call response.
Verizon Wireless - Cellco Partnership	Data Included in Missouri State Submission	3290673	5/26/2010	Third data call updates included.
WildBlue Communications, Inc.	Data Included in Missouri State Submission	7843766	5/4/2010	No updates submitted in third data call response.
Windjammer Communications LLC	Data Included in Missouri State Submission	17915182	Not Req'd by Provider	No response to third data call.
Windstream Corporation	Data Included in Missouri State Submission	14400220	6/10/2010	Third data call updates included.
YHTI	Data Included in Missouri State Submission	14205504	4/5/2010	Third data call updates included.
Lathrop Telephone Company	Data Included in Missouri State Submission	3737376	4/7/2010	No response to third data call.
Missouri Network Alliance, LLC	Data Included in Missouri State Submission	15540669	Not Req'd by Provider	No updates submitted in third data call response.
NPG Cable, Inc. (St. Joseph Cablevision)	Data Included in Missouri State Submission	2508687	Not Req'd by Provider	Third data call updates included.
United States Cellular Corporation	Data Included in Missouri State Submission	4372322	8/21/2010	No response to third data call.
Ritter Cable Corporation	NDA Fully Executed	14054449	4/20/2010	No source data received to date.
ExOp of Missouri Inc.	NDA Fully Executed	4969697	9/1/2010	No source data received to date.
IAMO Telephone Company	NDA Fully Executed	14067565	4/7/2010	No source data received to date.
SureWest Kansas, LLC - Everest Midwest LLC	NDA Fully Executed	4069035	4/12/2010	No source data received to date.
KEI Internet Service	Data Not Submitted By Provider		Not Req'd by Provider	No source data received to date.
Tower Internet	Data Not Submitted By Provider		Not Req'd by Provider	No source data received to date.
US Cable of Coastal-Texas, L.P.	Data Not Submitted By Provider		Not Req'd by Provider	No source data received to date.
Wisper ISP, INC	Provider Too Busy w/ Other Projects to Submit	16278970	Not Req'd by Provider	No source data received to date.
AccuBak Data Systems, Inc.	Data Compiled But Not Submitted By Provider	18543744	Not Req'd by Provider	Provider having trouble seeing the benefit to submitting data.
Socket Telecom, LLC	Working Toward Signed NDA	8515595	NA	Reseller. Becoming facilities based provider (in the next 6 mo's.)
Telecommunications Management, LLC, - New Wave Comm	Non-Responsive	9232554		NDA Sent
True Broadband Networks	Non-Responsive			No answer at phone numbers and e-mails kick-back
Mo-Ark Communications – (Wasp Wireless)	Non-Responsive	4376919		NDA Sent
CorpraNet	Non-Responsive			NDA Sent
Cox Communications	Non-Responsive			NDA Sent
HAUG Communications, Inc.	Non-Responsive	4711735		NDA Sent
Enventis Telecom Inc.	Non-Responsive	8394322		NDA Sent
Dexter Broadband	Non-Responsive		NA	Phones disconnected and e-mails are unanswered
St Joe Wireless	Non-Responsive	2545929		Attempting to make initial contact.
ProTronics Technologies, Inc.	Non-Responsive	10790061		
KC Web Wireless	Non-Responsive		NA	Attempting to make initial contact.
Crystal Broadband	Non-Responsive			
First Cable of MO (Mississippi Valley)	Non-Responsive			
Galactic Broadband	Non-Responsive			No contact information found
SES Americom	Non-Responsive			Attempting to make initial contact.
Verizon Business Global LLC dba Verizon Business	Non-Responsive	10856284		Submitted data with wireless company only.
Access US	Non-Responsive			
Aero-Surf Wireless Internet	Non-Responsive			
Boycom Cablevision, Inc.	Non-Responsive	7630791		
Momentum	Non-Responsive			
Mid Missouri Broadband & Cable LLC	Non-Responsive			
TA Highspeed	Non-Responsive			
NuVox, Inc.	Researching - Purchased By Windstream	4319414	6/10/2010	No source data received to date.
Stouffer Communications	Researching - Included as Granby Telephone	5061189		
CenturyTel Fiber Co. II, LLC dba LightCore, a CenturyTel Co	Included in other CenturyLink submission	8612293	4/20/2010	
Falcon Cablevision	Researching – Purchased By Charter Comm		NA	Data included in Charter submission.
New Cingular Wireless Services, Inc.	Researching – Purchased by AT&T	3766532	4/7/2010	Included in AT&T submissions
Fidelity Communication Services II, Inc.	Researching To Determine If Broadband Provider	5918503	4/5/2010	Researching inclusion with other Fidelity Provider submissions.
Fidelity Networks, Inc.	Researching To Determine If Broadband Provider	4312963	4/5/2010	Researching inclusion with other Fidelity Provider submissions.
Excel Telecommunications – SureWest	Researching To Determine If Broadband Provider		4/12/2010	
TDS Metrocom	Researching To Determine If Broadband Provider		4/26/2010	Researching inclusion with other TDS Provider submissions.
TDS Missouri	Researching To Determine If Broadband Provider		4/26/2010	Researching inclusion with other TDS Provider submissions.
Telephone and Data Systems	Researching To Determine If Broadband Provider		4/26/2010	Researching inclusion with other TDS Provider submissions.
Aurora Communications, Inc.	Researching To Determine If Broadband Provider	15696180	4/5/2010	Researching inclusion with other YHTI Provider submissions.
Almega Cable	Researching To Determine If Broadband Provider		Not Req'd by Provider	
Broadview Networks Holdings, Inc.	Researching To Determine If Broadband Provider	10296853		
Longview Cable and Data LLC	Researching To Determine If Broadband Provider	13948609		Sold systems off
Iowa Telecommunications Services, Inc.	Researching To Determine If Broadband Provider	3911385		
Broadwing Communications, LLC	Researching To Determine If Broadband Provider	8599706	4/27/2010	Researching inclusion with other Level 3 Provider submission
WilTel Communications, LLC.	Researching To Determine If Broadband Provider	3716511	4/27/2010	Researching inclusion with other Level 3 Provider submission
AT&T Services, Inc.	Researching To Determine If Broadband Provider	8644056	4/7/2010	Researching inclusion with other AT&T Provider submission.
Suddenlink Communications - Cequel Communications	Researching To Determine If Broadband Provider	15784663	6/12/2010	
Vaughn's Computer Central	Researching To Determine If Broadband Provider	19846674		
St Louis Broadband	Refused to participate at this time			
Birch Telecom of Missouri, Inc.	Refused to Participate	3732294	NA	Refuse to sign NDA or participate
Ionex Communications, Inc.	Refused to Participate	5027453	NA	Refuse to sign NDA or participate - Birch Communications
Pixius Communications	Refused to Participate	10480176	NA	Refuse to sign NDA or participate at this time
Poplar Bluff Internet, Inc (SEMO)	Refused to Participate	13662408	NA	Refuse to sign NDA or participate at this time
Semo Communications Inc.	Refused to Participate	3788775	NA	Poplar Bluff Internet - refuse to sign NDA or participate at this time
Board of Municipal Utilities	Not Facilities Based	16073389		Discontinued offering service
McLeodUSA Telecommunications Services, Inc. (PaeTec)	Not Facilities Based	3716073	NA	
XO Communications, LLC	Not Facilities Based	6275945	NA	
Telnet Worldwide	Not Facilities Based		NA	

Terre Star	Not Facilities Based		NA	
TMC Communications	Not Facilities Based		NA	
TracFone	Not Facilities Based		NA	
Sofnet	Not Facilities Based		NA	
Clear Communications, Inc.	Not Facilities Based			Equipment seller
Superfone Inc.	Not Facilities Based	8402202		
Tritel	Not Facilities Based		NA	
Missouri Broadband	Not Facilities Based		NA	
Mobilcom Pittsburg, Inc.	Not Facilities Based	2324465	NA	
PneumaTek	Not Facilities Based		NA	
City of Newburg	Not Facilities Based		NA	
Qwest Communications Company, LLC	Not Facilities Based	3605953	NA	
South Holt Cablevision	Not Facilities Based		NA	Offer Internet through Oregon Farmers Mutual Telephone Co
ADC	Not Facilities Based		NA	
Adva Optical Networking North America, Inc.	Not Facilities Based		NA	
AFL Communications	Not Facilities Based		NA	
Aircell	Not Facilities Based		NA	
Airdis Telecom	Not Facilities Based		NA	
Airespring, Inc.	Not Facilities Based	6875322	NA	
ANPI	Not Facilities Based		NA	
Arch Communications	Not Facilities Based		NA	
Atlantis Holdings LLC	Not Facilities Based	18587402	NA	
Bluegrass Cellular	Not Facilities Based		NA	
Boost Mobile	Not Facilities Based		NA	
Broadband National	Not Facilities Based		NA	
BullsEye Telecom, Inc.	Not Facilities Based	4350930	NA	
Cellular one	Not Facilities Based		NA	
CHR Solutions	Not Facilities Based		NA	
Charles Industries	Not Facilities Based		NA	
Chillicothe Municipal Utilities	Not Facilities Based	4192225	NA	
City of Newburg	Not Facilities Based		NA	
Cooperative Communications, Inc.	Not Facilities Based		NA	
Curt's Custom Cable	Not Facilities Based		NA	
DeSoto ISP	Not Facilities Based		NA	
Digital Landing	Not Facilities Based		NA	
DirecTV	Not Facilities Based		NA	
DSL,net, Inc. (Megapath)	Not Facilities Based	4324851	NA	
Earthlink	Not Facilities Based		NA	
Extel	Not Facilities Based		NA	
Freedom Communications	Not Facilities Based		NA	
GlobalNet	Not Facilities Based		NA	
Golden State Cellular	Not Facilities Based		NA	
Granite Telecommunications	Not Facilities Based		NA	
Illinois Valley Cellular	Not Facilities Based		NA	
Innovative Systems	Not Facilities Based		NA	
Interglobe Communications, Inc.	Not Facilities Based	5156229	NA	
Inter-Linc	Not Facilities Based		NA	
Jitterbug	Not Facilities Based		NA	
LightEdge Solutions, Inc.	Not Facilities Based	15546443	NA	
Logix Communications	Not Facilities Based		NA	
Metropolitan Telecommunications Holding Company	Not Facilities Based	9806019	NA	
Mid America Computer Corporation	Not Facilities Based		NA	
Mohave Wireless	Not Facilities Based		NA	
Netlogic, Inc.	Not Facilities Based	6825954	NA	
New Edge Holding Company	Not Facilities Based	3720471	NA	
Nex-Tech Wireless	Not Facilities Based		NA	
Nortel Solutions	Not Facilities Based		NA	
Open Range	Not Facilities Based		NA	
OFS	Not Facilities Based		NA	
Pacific Wireless	Not Facilities Based		NA	
Preferred Long Distance	Not Facilities Based		NA	
Protel	Not Facilities Based		NA	
Ralls Technologies, LLC	Not Facilities Based	18539916	NA	Becoming facilities based in the near future
SkyTerra Communications	Not Facilities Based		NA	
SkyWay USA	Not Facilities Based		NA	
Spirit Telecom	Not Facilities Based		NA	
Stutler Technologies Corp	Not Facilities Based		NA	
Tablerock Net	Not Facilities Based		NA	
TCO Network, Inc.	Not Facilities Based		NA	
TCS Telecom, Inc.	Not Facilities Based		NA	
Telefonica Data Corp SA	Not Facilities Based	18547828	NA	
Tellabs	Not Facilities Based		NA	
Toast.Net	Not Facilities Based		NA	
Tranquility Internet	Not Facilities Based		NA	
Video Direct	Not Facilities Based		NA	
Vonage	Not Facilities Based		NA	
Zayo Group, LLC	Not Facilities Based	15331689	NA	
Zone Telecom, Inc.	Not Facilities Based		NA	
WestLink	Not Facilities Based		NA	

Longview Cable and Data, LLC.	Out of Business	13948609	NA	Sold off Assets
Worldcom Broadband Solutions	Out of Business		NA	
Global Crossing Telecommunications, Inc.	Out of Business	2850519	NA	
Sikeston Board of Municipal Utilities	Out of Business	16073389	NA	

Attachment A

NONDISCLOSURE AGREEMENT

THIS NONDISCLOSURE AGREEMENT ("Agreement"), dated and effective as of _________________, 2010, is made by and among the Parties to this Agreement, which are ___________________________________including its affiliates (collectively referred to hereinafter as "the Company"), and the State of Missouri, Office of Administration ("OA"), The Curators of the University of Missouri on behalf of the University of Missouri - Columbia ("MU"), GeoDecisions, a Division of Gannett Fleming, Inc. ("GeoDecisions"), and CBG Communications, Inc. ("CBG") (collectively referred to hereinafter as "the State Parties," except where otherwise indicated.)

WHEREAS:

I. The National Telecommunications and Information Administration (NTIA) has made available a grant program to fund broadband mapping known as the State Broadband Data and Development (SBDD) grant program, which is governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, at page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, at page 40569 of the Federal Register, both of which are incorporated fully herein; and

II. Both OA and MU have partnered with the mapping entities, GeoDecisions and CBG, to implement the SBDD grant program; and

III. The Company possesses confidential and proprietary information necessary to such implementation and acknowledges that it desires to share certain of that information with the State Parties and with the NTIA; and

IV. When the Company shares that information with the State Parties, the confidential and limited use conditions of this Agreement shall apply; and

V. Missouri law allows governmental entities to close records that: 1) relate to scientific and technological innovations in which the owner has a proprietary interest pursuant to §610.021(15); and 2) fall within the definition of "trade secret" pursuant to the Uniform Trade Secrets Act, §417.450, RSMo.; and 3) have been submitted to an institution of higher education in connection with a proposal to license intellectual property or perform sponsored research and which contains sales projections or other business plan information the disclosure of which may endanger the competitiveness of a business, §610.021(22) ; and

NOW THEREFORE, the Parties agree as follows:

TERMS:

a) "Confidential Information" shall be defined in identical terms to the SBDD NOFA and any subsequent SBDD NOFA Clarification(s).

b) All Confidential Information received by the State Parties from the Company may be used as follows:

i) The State Parties may use the Company's information to derive maps, interactive websites and tabular data representations of the Company's broadband coverage area, network information, coverage attributes, and such other uses as may be required to implement the SBDD, referred to as the State Parties' Work Product; and

ii) The State Parties may, at a given location, estimate broadband coverage and identify broadband providers within the associated census block or estimated area, including Company, if applicable; and

iii) That State Parties may provide the NTIA with any such State Works as may be reasonably required by the terms and conditions as outlined in any applicable NOFA. The Company acknowledges that such provision may likely result in the disclosure of Confidential Information to governmental authorities and that, once such disclosures are made by the State Parties as required by a Project, the State Parties

1

Figure 4: Standard NDA pg 1

are fully released from any liability for the actions of the third party governmental authority regarding the disclosure, sharing or use of such Confidential Information; and,

iv) The State Parties may use the Confidential Information in any other way to the extent such use is consistent with this Agreement and the SBDD program, that does not result in disclosing it, and

v) The Company waives any claims of ownership to the State Parties' Work Products.

c) Per the terms of this Agreement, the State Parties will protect Confidential Information provided to it from any use, distribution or disclosure pursuant to §610.021 (14), (15) and (22) and §417.450, RSMo, except as permitted herein.

d) Confidential Information provided to Recipient in written or other tangible or electronic form shall be marked by Company with a confidential and proprietary notice prior to receipt by the State Parties.

e) Parties acknowledge that any discrepancy between the SBDD NOFA and the terms provided for herein shall be resolved in favor of the SBDD NOFA. Nothing contained herein shall be construed to limit the State Parties' reporting and data sharing obligations under the SBDD NOFA, including sharing of Company's Confidential Information with NTIA pursuant to the terms of the SBDD NOFA and Clarification.

f) The State Parties may provide Confidential Information only to those employees, consultants, independent contractors and agents who:

i) Have a substantive need to know such Confidential Information in connection with the State Parties' Work Product;

ii) Have been advised of the confidential and proprietary nature of such Confidential Information; and

iii) Have agreed in writing prior to disclosure to protect from unauthorized disclosure all confidential and proprietary information to which they have access in the course of their participation in the creation of the State Parties' Work Product in accordance with all the terms of this Agreement.

g) Confidential Information does not include information the State Parties lawfully obtain from any source other than Company, provided that such source lawfully disclosed such information.

h) If the State Parties are required to provide Confidential Information to any court, government agency or third party pursuant to written court order, subpoena, Missouri Sunshine Law request, or other process of law, they must provide the Company with prompt written notice of such requirement or request and cooperate with the Company to protect against or limit the scope of the disclosure.

i) All Confidential Information remains at all times the Company's property. Any State Party Recipient may make tangible or electronic copies and notes of Confidential Information only as necessary for use as authorized herein. All such copies or notes must be marked with the same confidential and proprietary notice as appears on the original. All such copies will be destroyed when the State Parties' Work Product is fully completed and finally approved, and all originals shall be either destroyed or returned to the Company, at the Company's option.

j) The State Parties may publicly identify the Company as a contributing broadband service provider, provided no information covered by this Agreement is revealed. No license for use, beyond that provided for herein, under any trademark, patent, copyright, trade secret or other intellectual property right is either granted or implied by disclosure of Confidential Information to the State Parties.

k) If and to the extent any provision of this Agreement is held invalid or unenforceable, all other provisions of this Agreement shall remain in full force and effect to the fullest extent permitted by law.

2

Figure 5: Standard NDA pg 2

l) This Agreement is binding upon and inures to the benefit of the Parties and their heirs, executors, legal and personal representatives, successors and assigns, as the case may be.

m) This Agreement is the entire agreement between the Parties hereunder and may not be modified or amended except by a written instrument signed by all Parties. Each Party has read this Agreement, understands it and agrees to be bound by its terms and conditions. There are no understandings or representations with respect to the subject matter hereof, express or implied, that are not stated herein. This Agreement may be executed in counterparts, and signatures exchanged by facsimile or other electronic means are effective for all purposes hereunder to the same extent as original signatures.

n) This Agreement shall be governed, construed, and enforced in accordance with the laws of the State of Missouri, without regard to its principles of conflict of law.

IN WITNESS WHEREOF, the Parties have read and agreed to this Nondisclosure Agreement as evidenced by the signatures of the Parties' authorized representatives below:

Company:

By: ______________________
(Authorized Signature)

Name: ______________________

Title: ______________________

GeoDecisions, a Division of Gannett Fleming, Inc.:

By: ______________________
(Authorized Signature)

Name: ______________________

Title: ______________________

State of Missouri, Office of Administration, Information Technology and Services Division:

By: ______________________
(Authorized Signature)

Name: ______________________

Title: ______________________

The Curators of the University of Missouri:

By: ______________________
(Authorized Signature)

Name: ______________________

Title: ______________________

CBG Communications, Inc:

By: ______________________
(Authorized Signature)

Name: ______________________

Title: ______________________

3

Figure 6: Standard NDA pg 3

Commonwealth of the Northern Mariana Islands
Broadband Mapping Project

Product Release White Paper

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Product Specification: Spring 2011 NTIA Data Model
Product/Process: NTIA – April 1st, 2011 Data Deliverable
Dataset Submission QC: NTIA – SBDD_CheckSubmission.py

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.
- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is accurate and comprehensive, a holistic approach has been developed to further validate and verify the data. Following the initial mapping of providers' coverage area and serviceability claims, the project team uses the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers were trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality reviews are tracked by provider and then by technology type, which is then stored and maintained within a "Validation" table. A confidence value is assigned based on the collected information to highlight provider coverage areas that require further investigation and enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
    - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

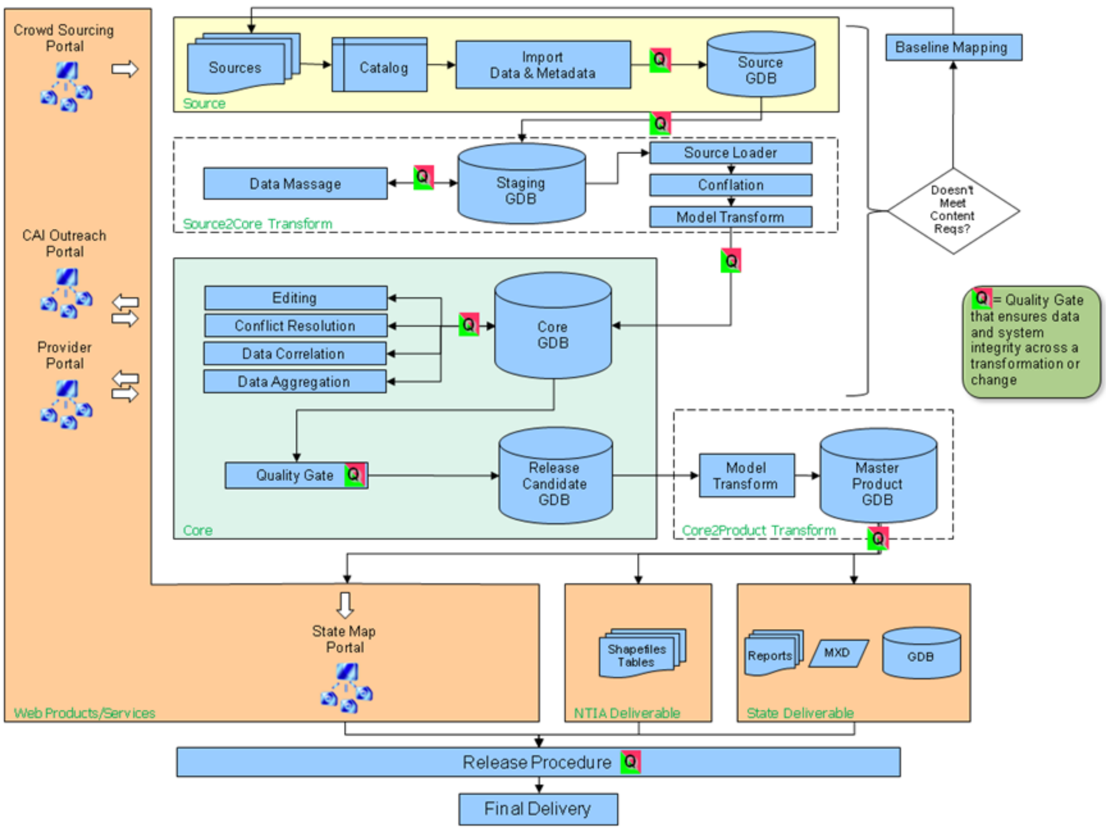
Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link:
https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

- Longitude values for States outside the lower 48 (any table)
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is ‘No’ or ‘Unknown’
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.
8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application
2) Regular email
3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email
    a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:
Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

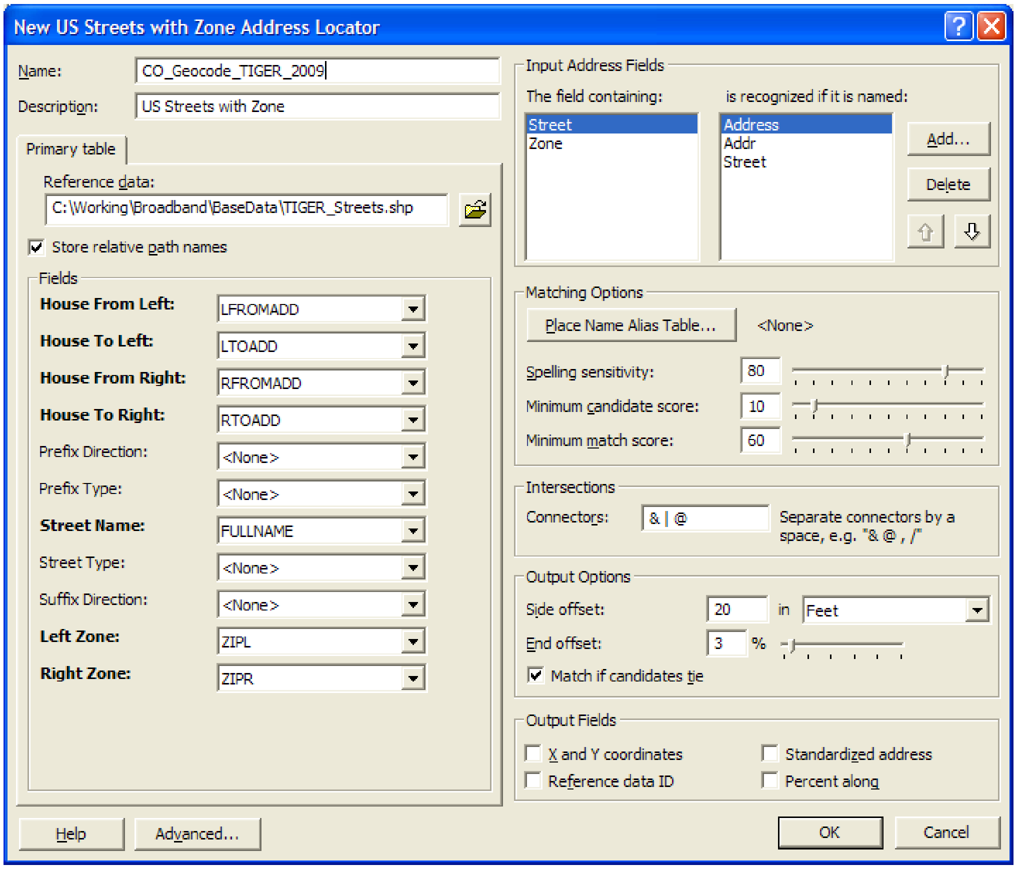
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

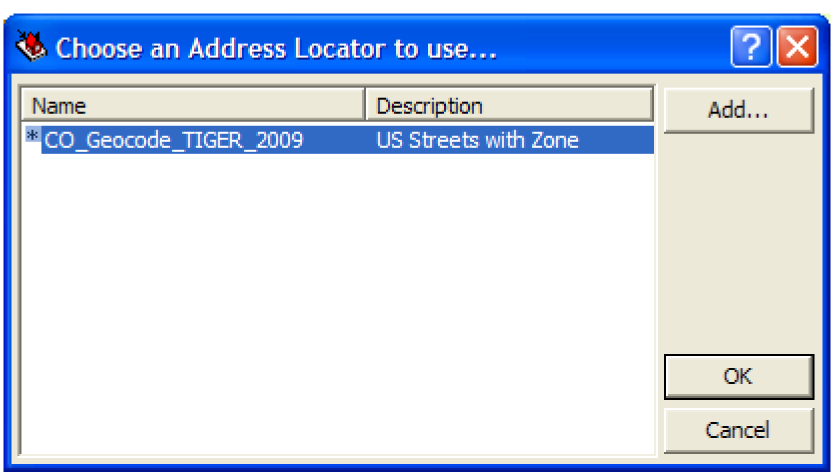
In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
    a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
    b) Select "US Streets with Zone" and press OK.
        i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
    c) Navigate to the TIGER Streets 2009 file and press OK.
    d) Fill in the dialog box as seen below:

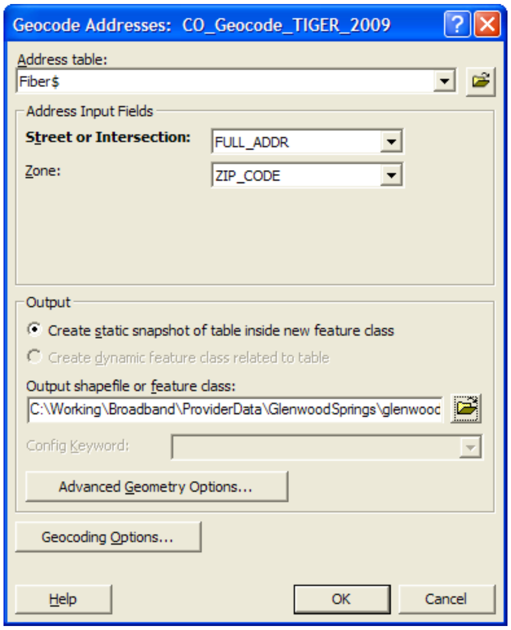


e) Click OK.

3) Open up ArcMap, and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.
5) Select the appropriate address locator by clicking Add…. then OK.

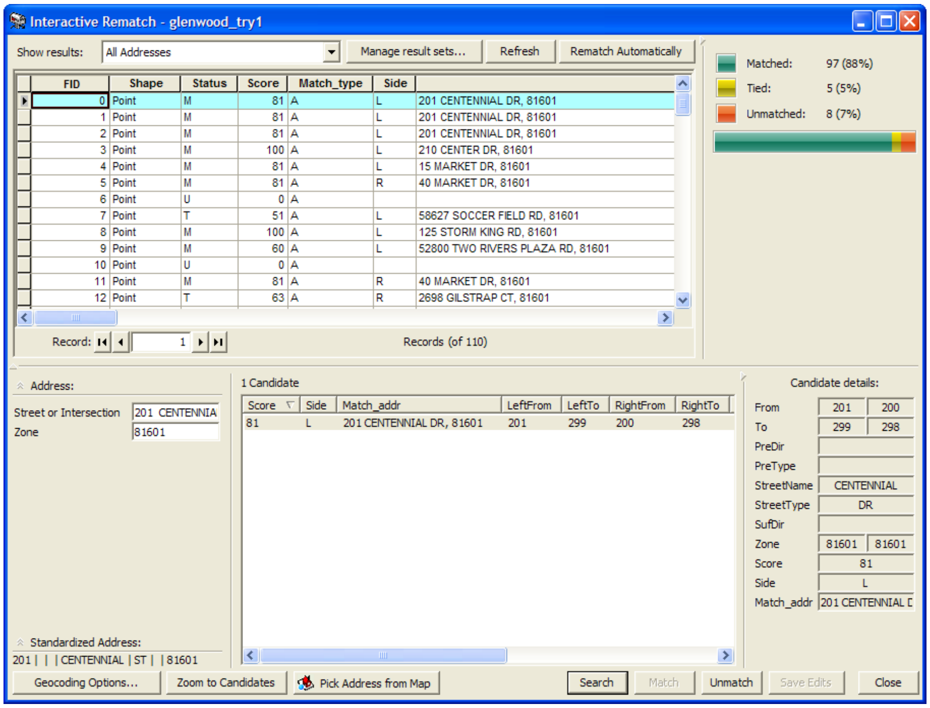


6) Fill out the Geocode Addresses dialog box as shown below:

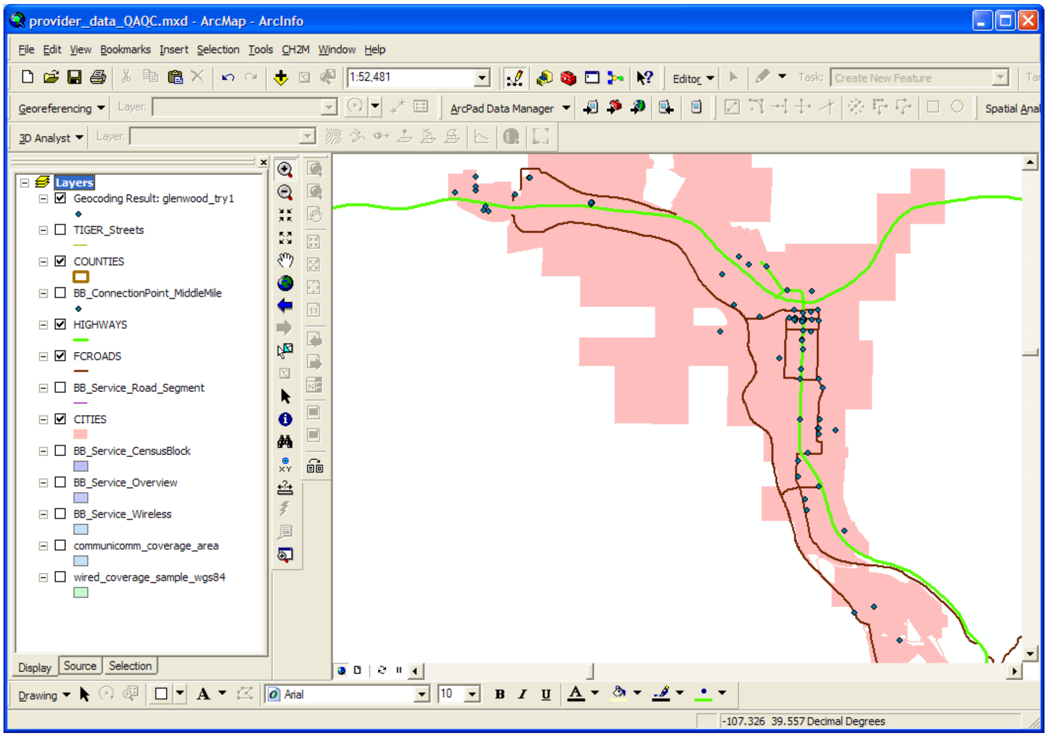


7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.

8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:

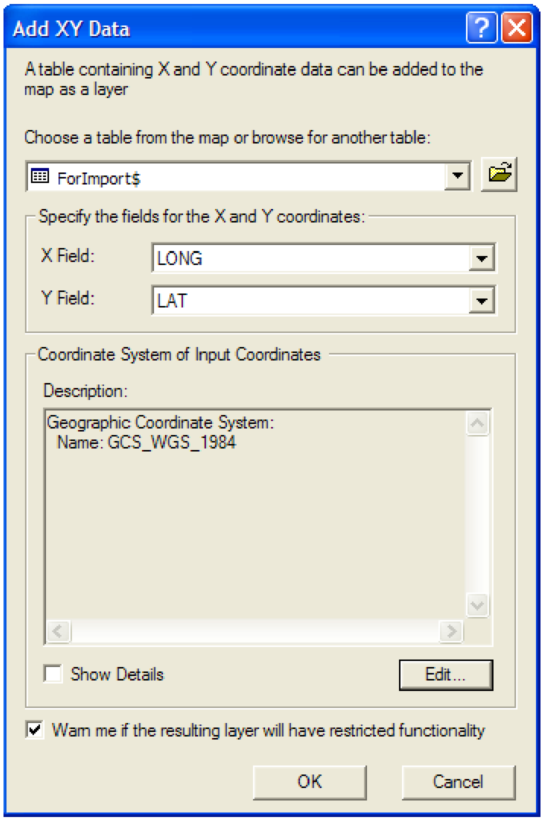


12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.
   b. Make sure that XY locations are in decimal degrees.
      i. To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).
      ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.
2) Open up the Excel worksheet in ArcMap.
3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

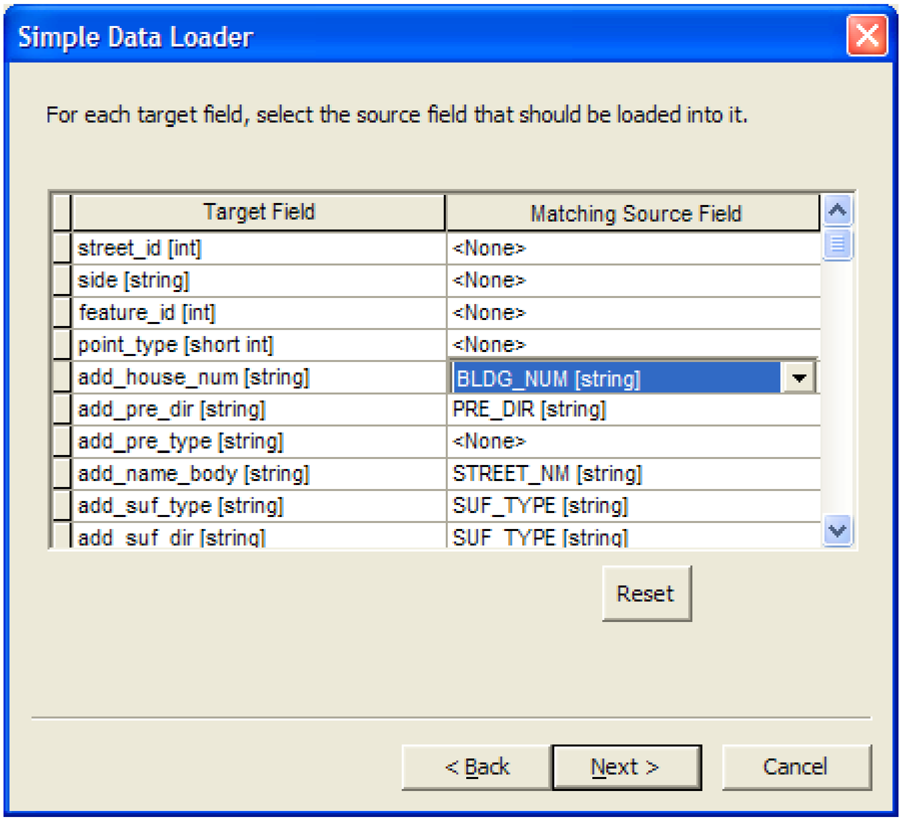
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

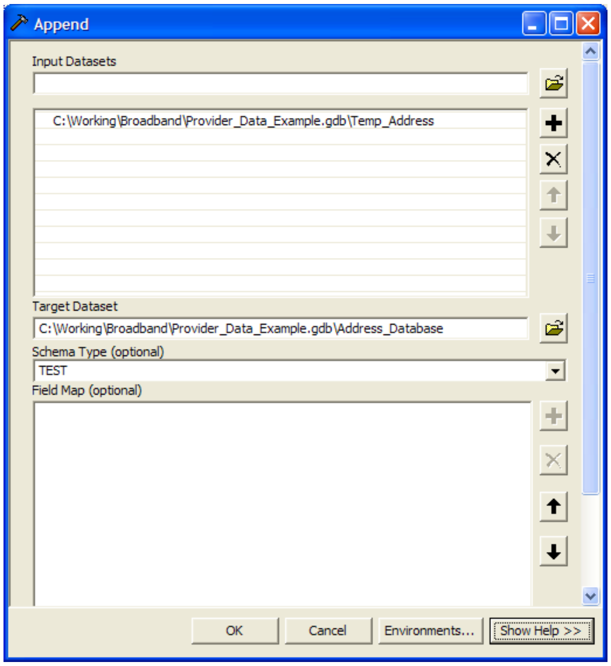
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

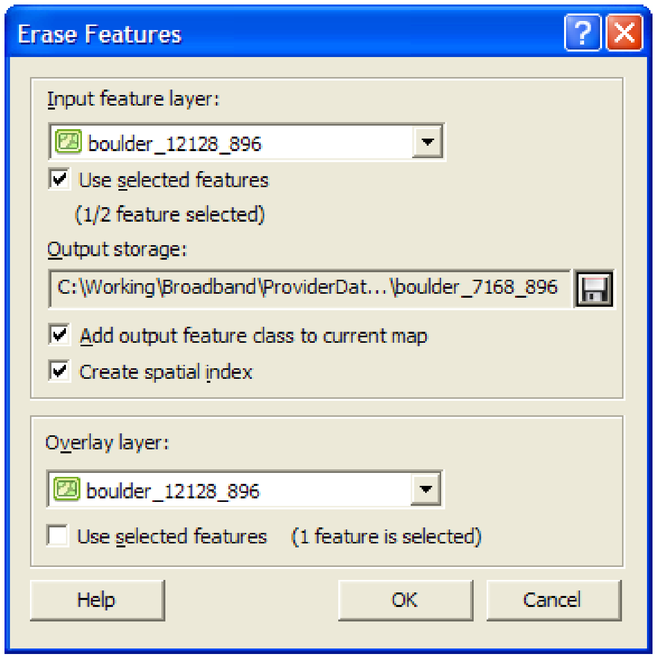


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. <u>Within ArcGIS</u>
      i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
         1. This will save as a DBF table. Keep track of location for future reference.
      ii. Buffer county address point featureclass to 150'.
         1. During buffer command, dissolve on "ad_down"; "ad_up"; "provider"; "dba"; "frn"; "tt"; 'all metadata fields'; "stctyfips". Save as…. county_fastestdown_fastestup.
         2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
         3. Note: these attribute fields are specific to the Point Address database.
      iii. Select the features that represent the lowest speeds
   b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
      i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
      ii. Use the same feature class for Input and Overlay
      iii. Check Use selected features on the Input feature, as seen below.

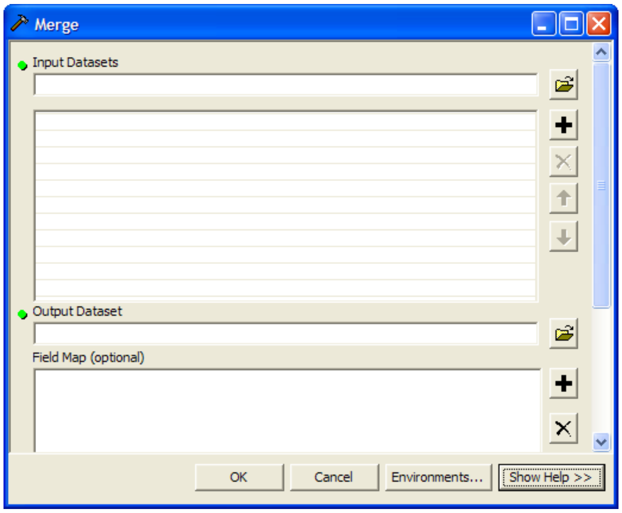
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. <u>Within ArcGIS</u>

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).

iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.

v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

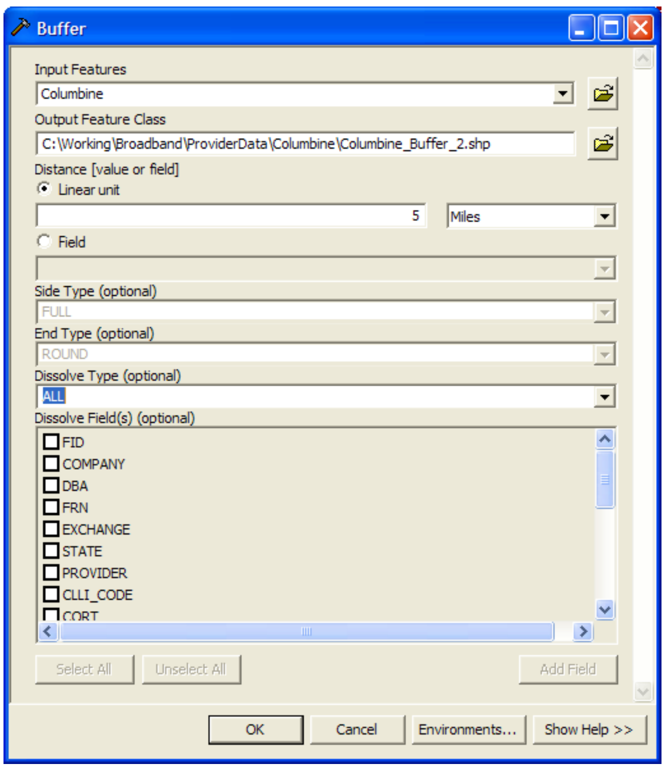
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

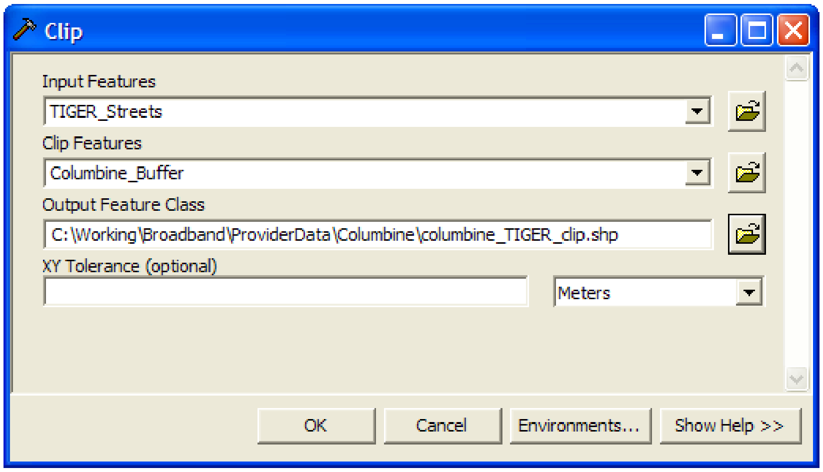
3.5.2.6 DSLAM or Central Office Location – GIS Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

1) Buffer the DSLAM/Central Office points feature class
   a) Add the point feature class to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
   c) Set the buffer distance to 5 miles
   d) Set the dissolve type to ALL
   e) Name the output feature class
   f) Typical Buffer tool is seen below:

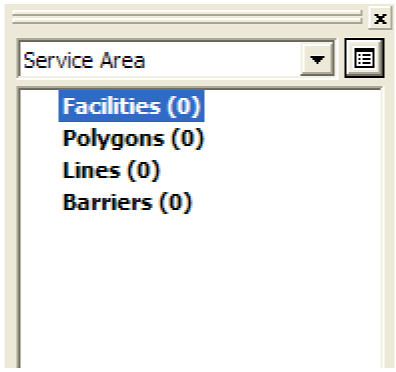


   g) Press OK
2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
   a) Add TIGER street layer to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
   c) Complete the dialog box as seen below:

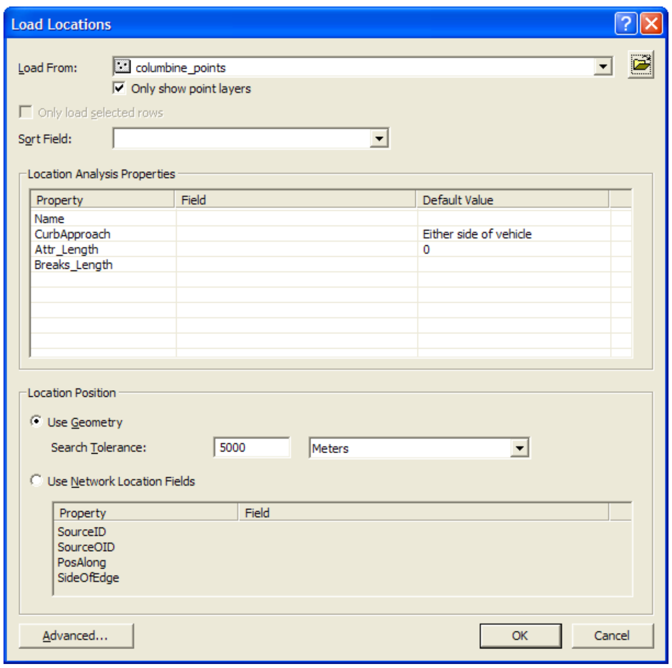


d) Press OK.

3) Using ArcCatalog and within the file geodatabase:
 a) Right Click and create a new Feature Dataset
  i) For the Feature Dataset settings:
   (1) Name the feature dataset accordingly
   (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
   (3) No vertical coordinate system needed
   (4) Leave all x,y,z,m values at default.
   (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
  a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create "New Service Area"
9) Open up the Network Analyst Window by selecting the button.



10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.

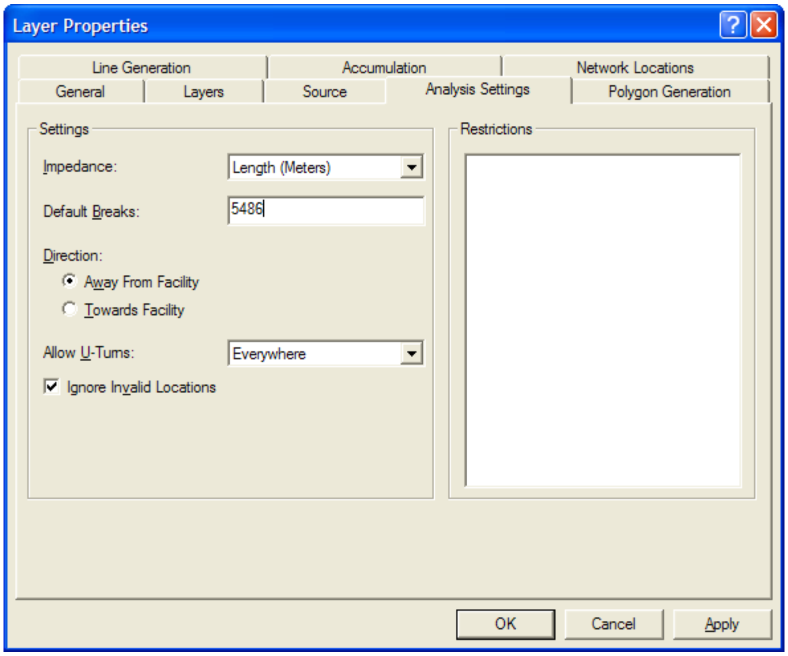


11) Press OK.

12) Click the Service Area Properties button

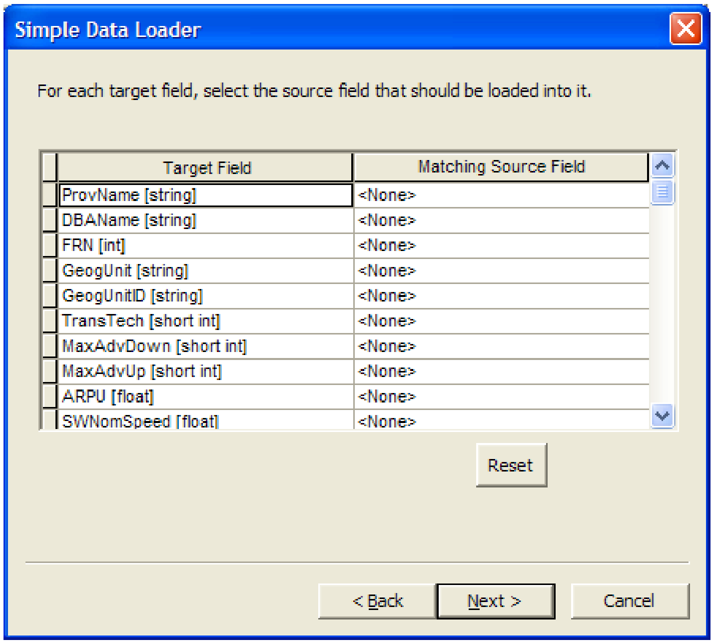
13) For the following tabs change the following properties:
    a) "Polygon Generation" tab
        i) Select "Merge by break value"
        ii) Also disable the Trim Polygons option
    b) "Analysis Settings" tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the "Default Breaks" location

i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

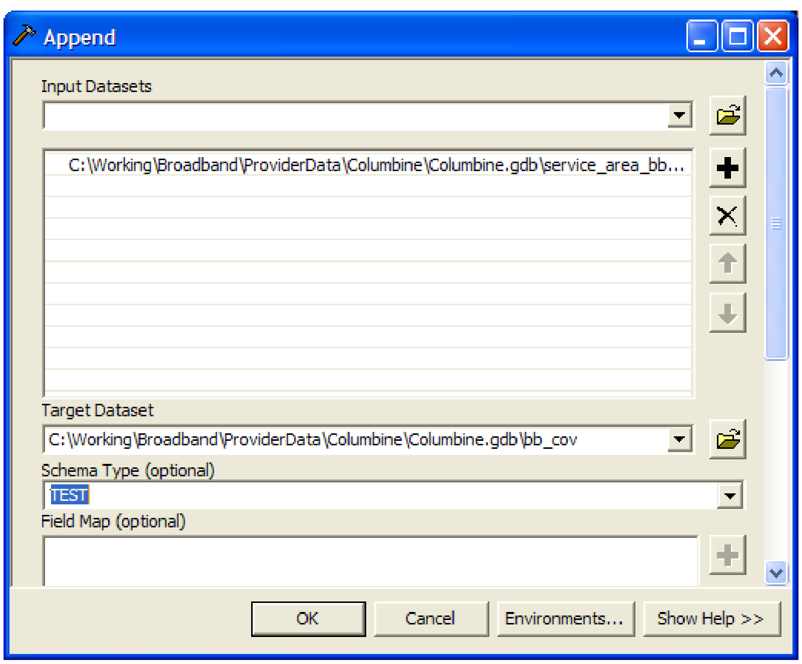
14) On the Network Analyst Toolbar click the "Solve" button to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
    a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST

21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

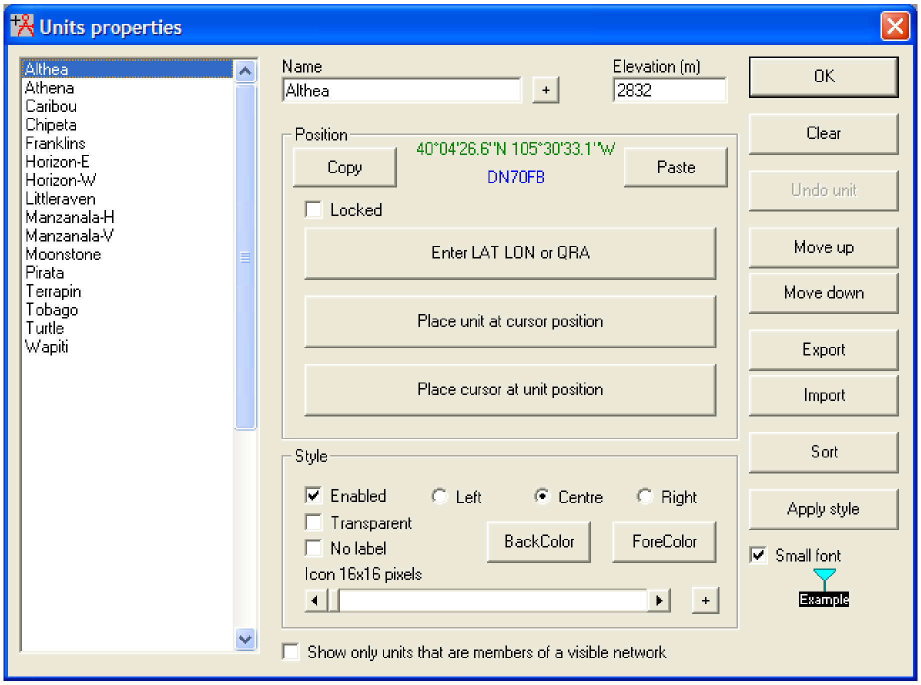
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

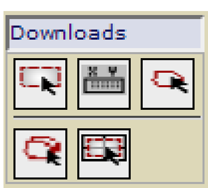
3.5.2.8.1 Broadcast Tower Location – GIS Data

In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

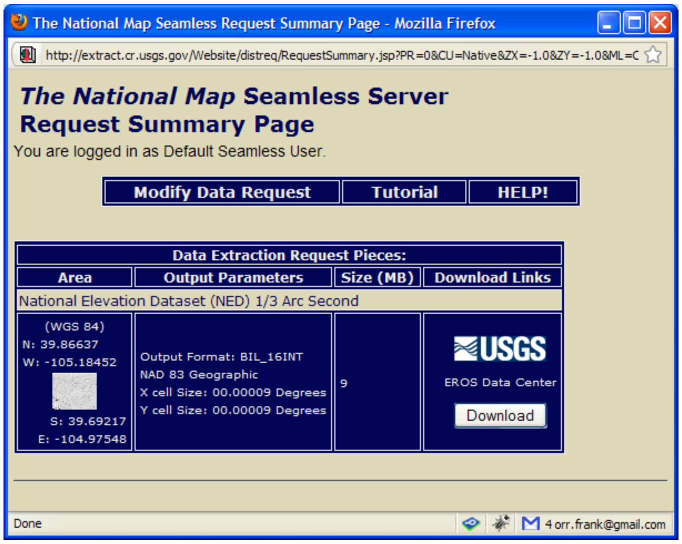
1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
   a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
   b. Zoom to the area of interest and use the Download tools:

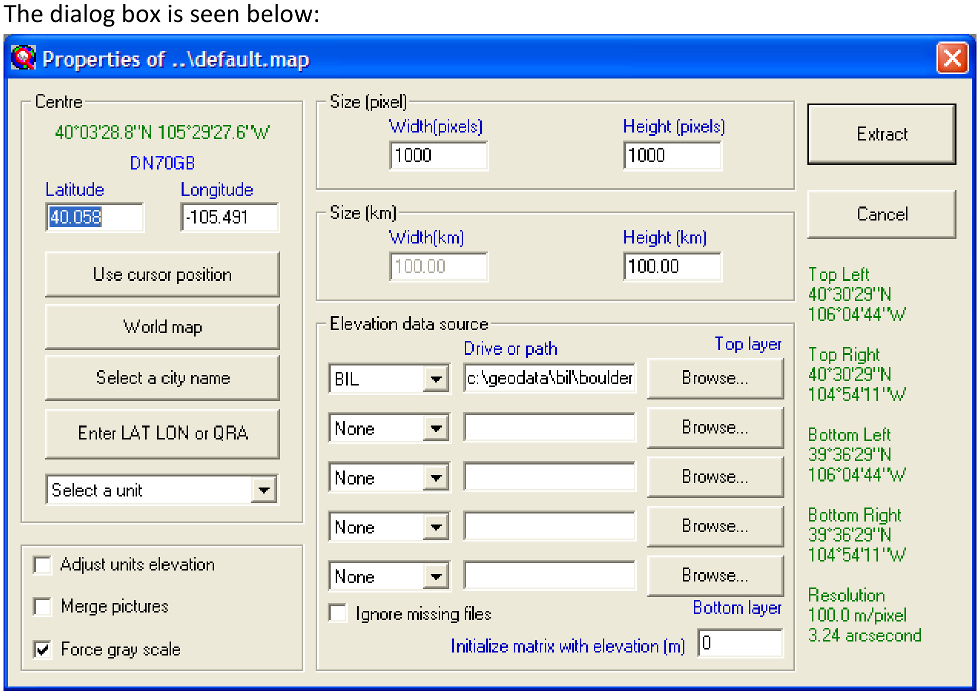


   to define the area to download.
   c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:



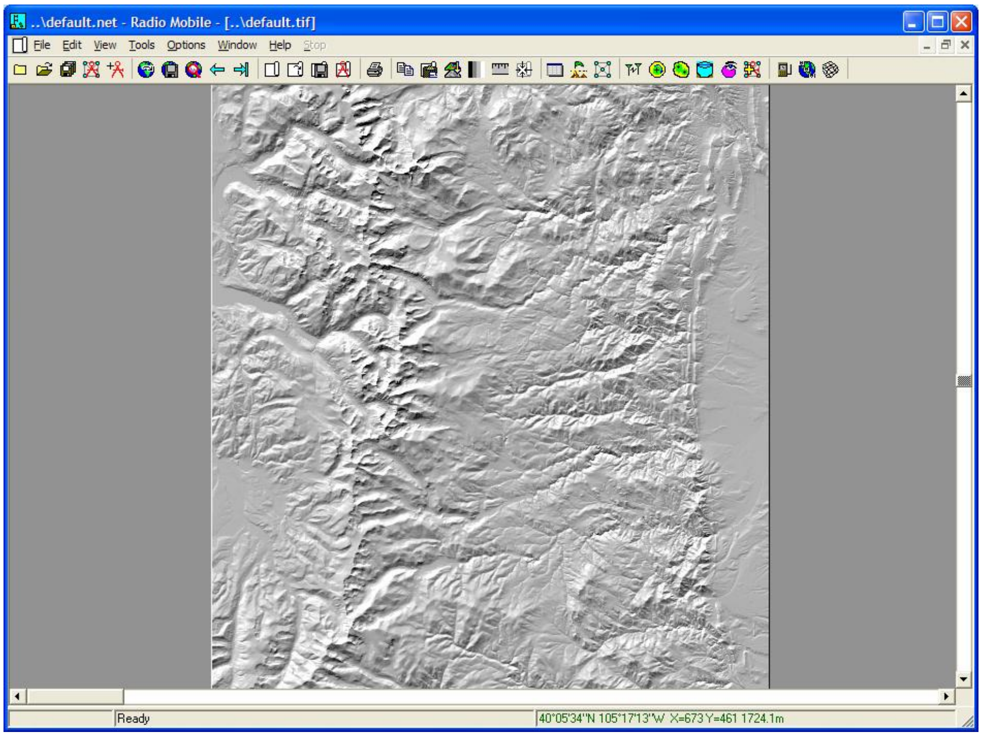
d. Download the data and unzip it.

7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:

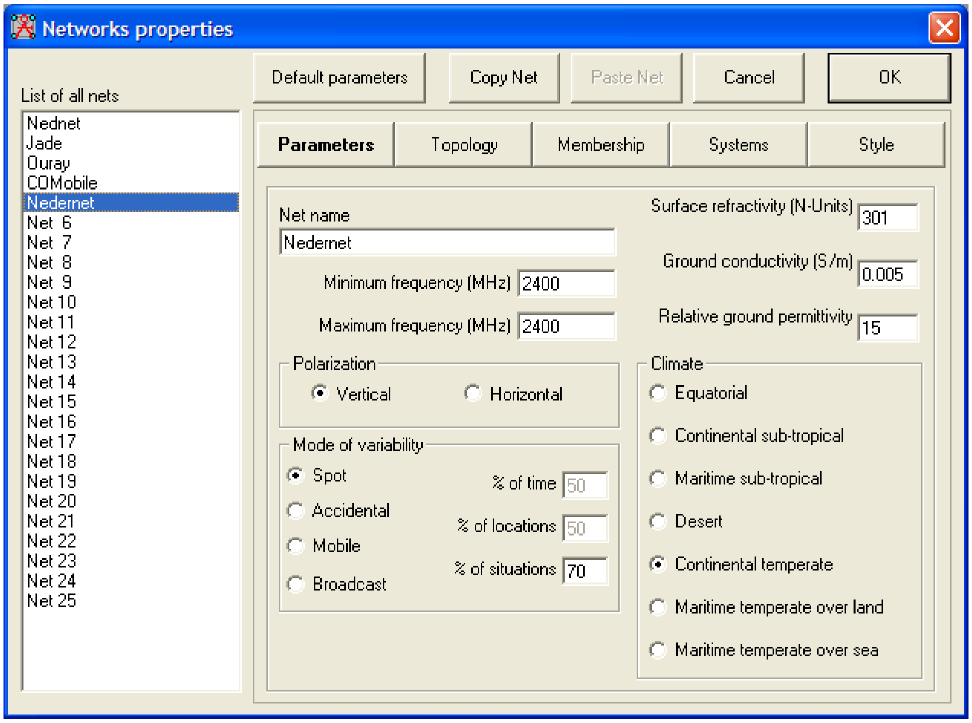


12) Hit Extract.

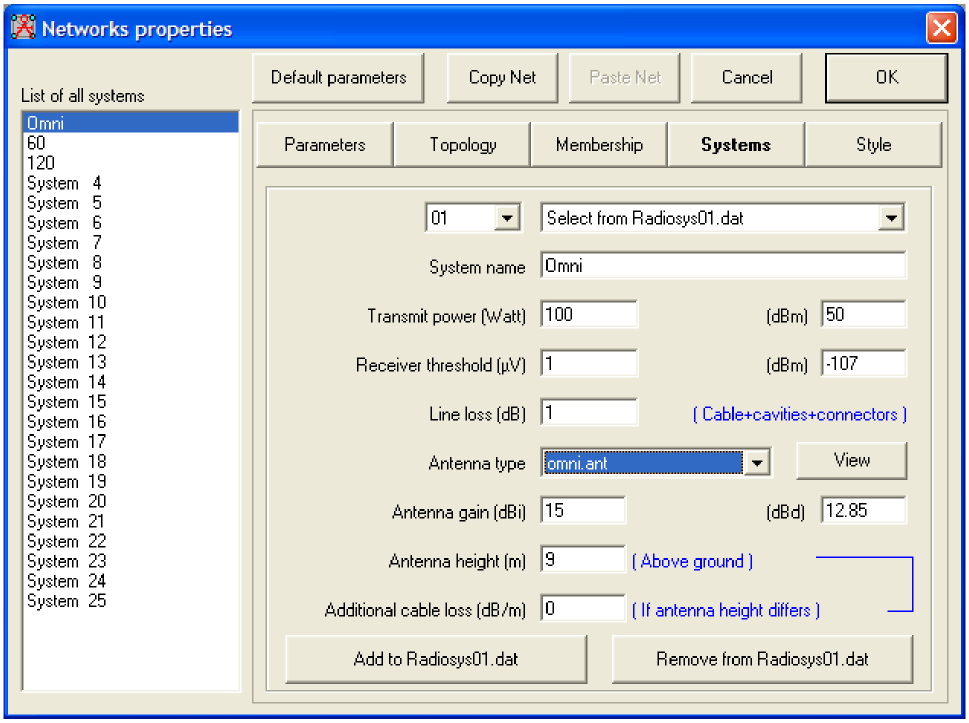
13) The elevation data is render as a hill shade, as seen below:



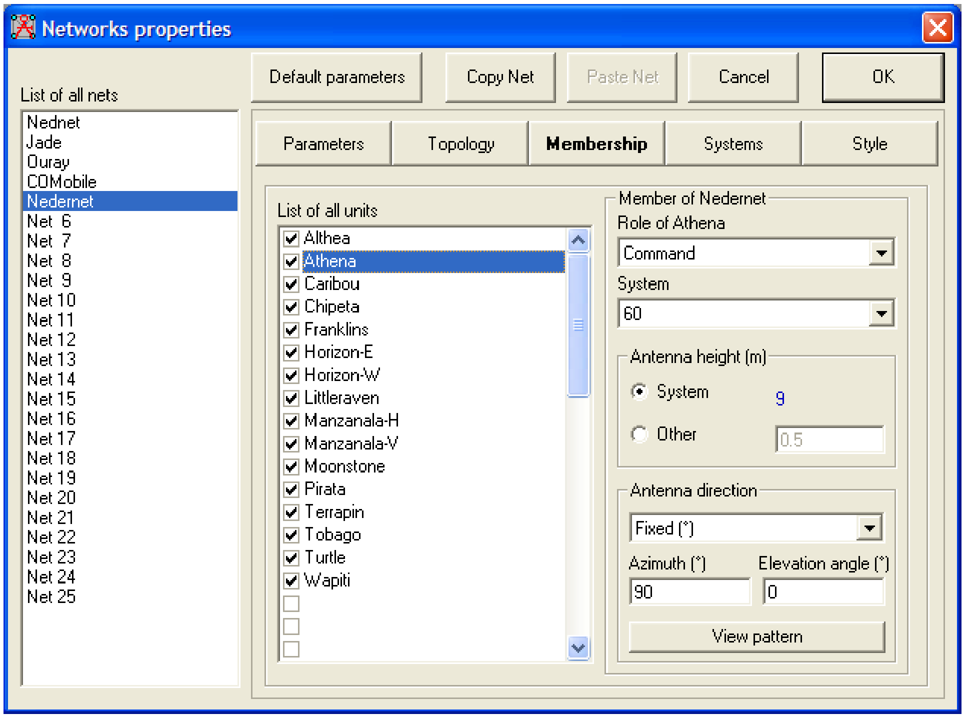
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



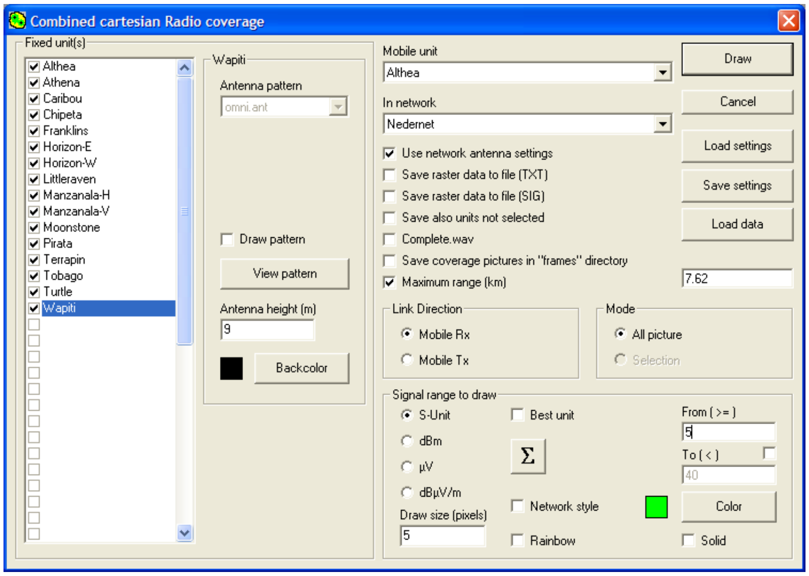
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



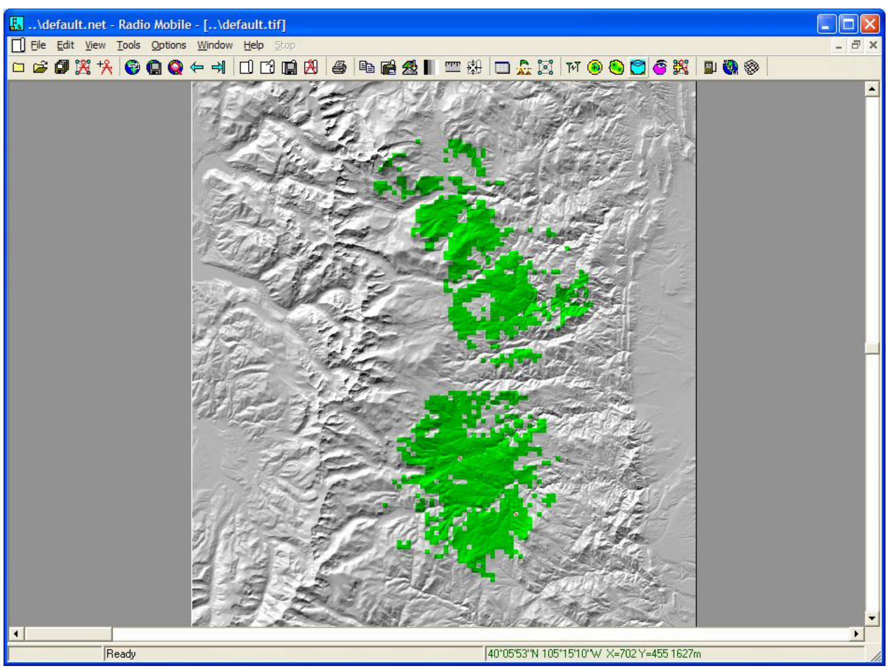
18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:



19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:



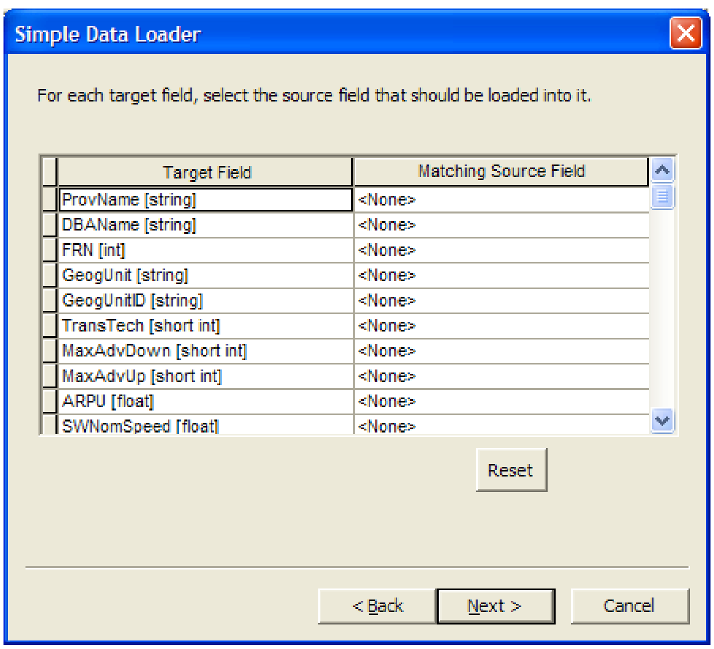
23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.
24) Press Draw.



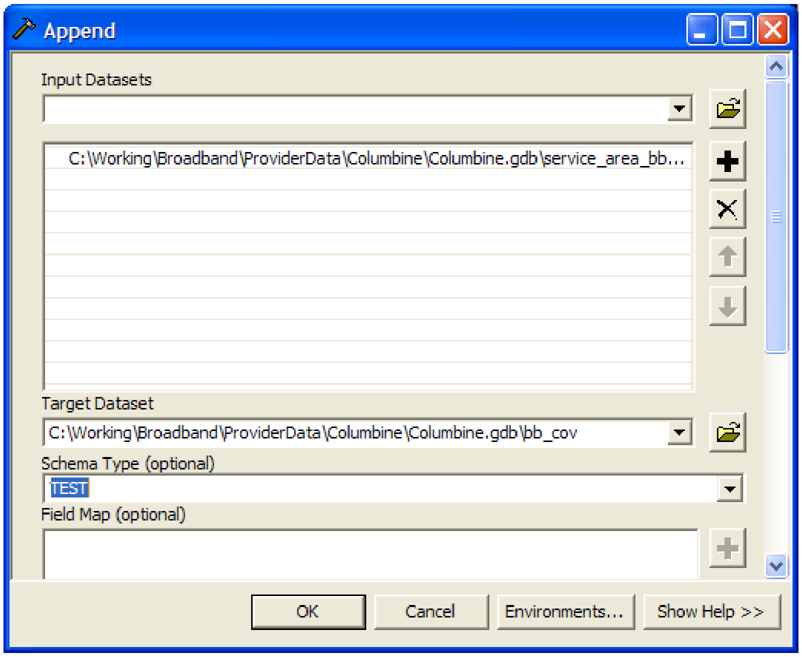
25) Save the resulting image as a TIF by selecting File>Save Picture as.
26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.

28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.
29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.
30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:

31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



    e. Press Next, then Next again, then Finish.
33) In ArcToolBox, go to Data Management Tools>General>Append
34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



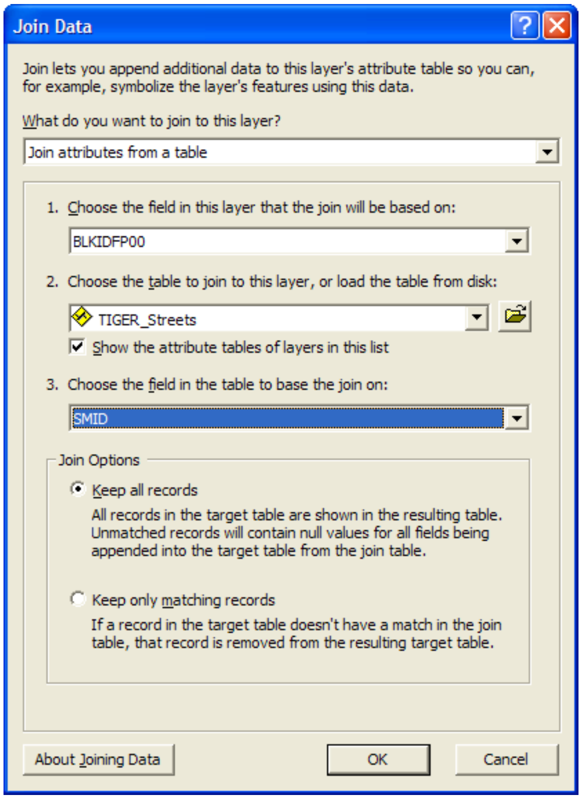
35) Leave the Schema Type as TEST
36) Press OK.
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
      i) Load both data sets into ArcMap
      ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
      iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:



iv) Press OK

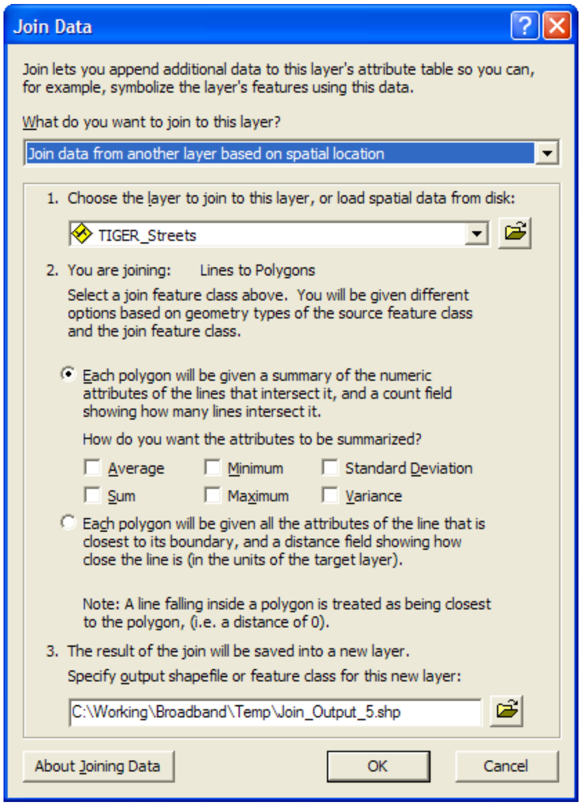
b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID

i) Load both data sets into ArcMap

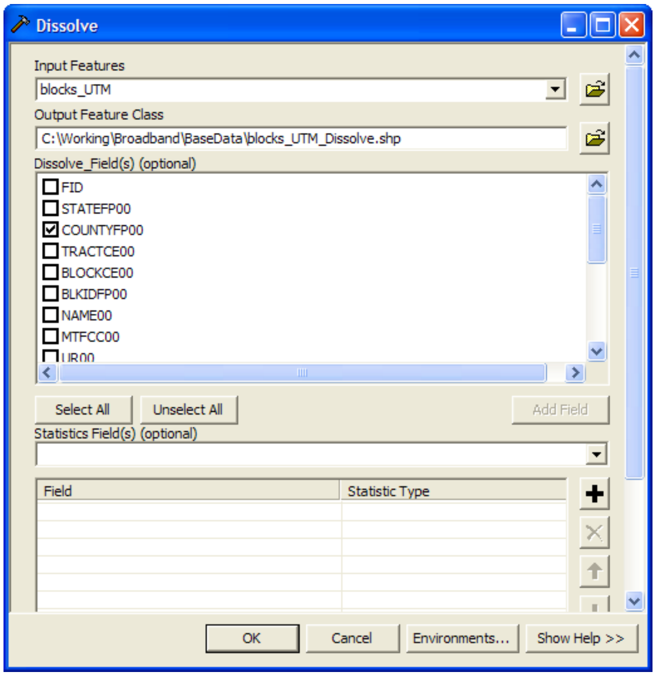
ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join

iii) Select “Join data from another layer based on spatial location” from the dropdown menu

iv) Complete the dialog box as seen below and press OK.



2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
   a) Use the County FIPS code to dissolve by county.
   b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
   c) Complete the Dissolve dialog box as seen below:



d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

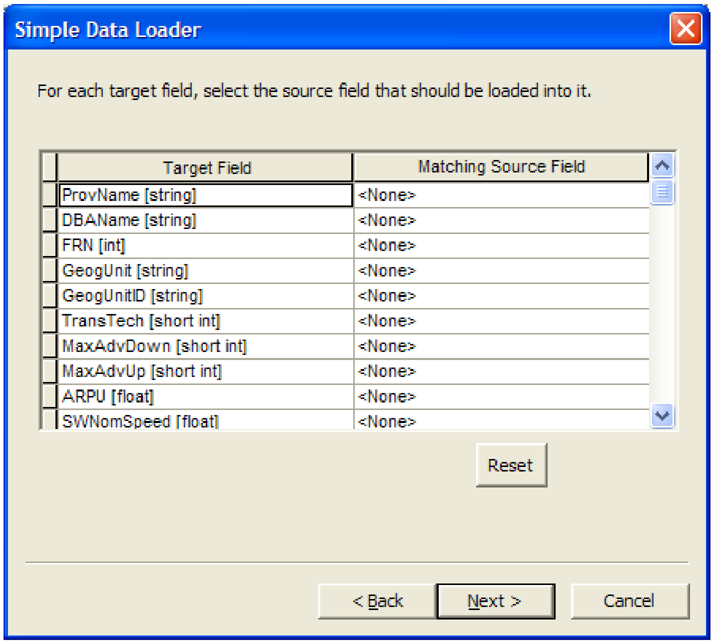
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class

   b) Press the Add button, hit Next

   c) Accept the defaults and hit Next

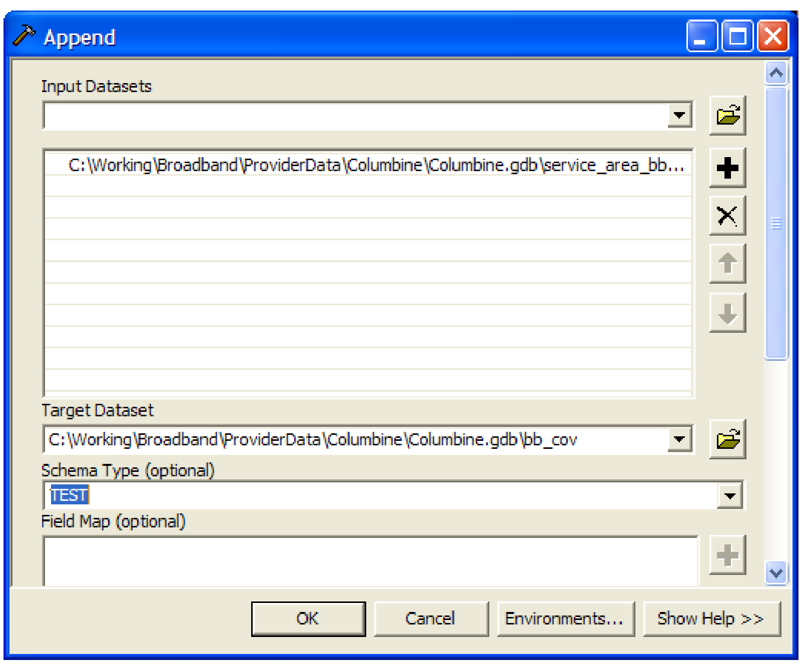
   d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST

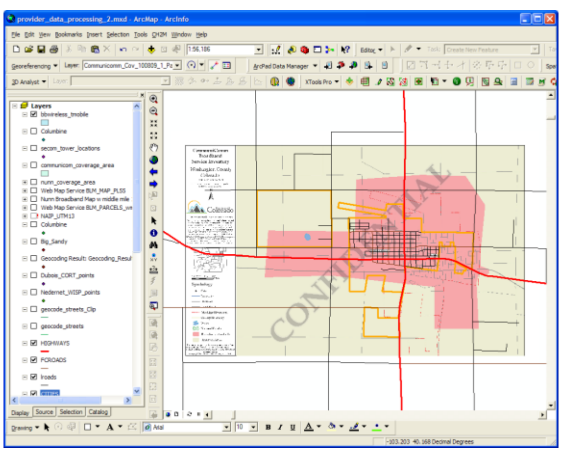
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

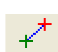
3.5.4 Polygonal Data

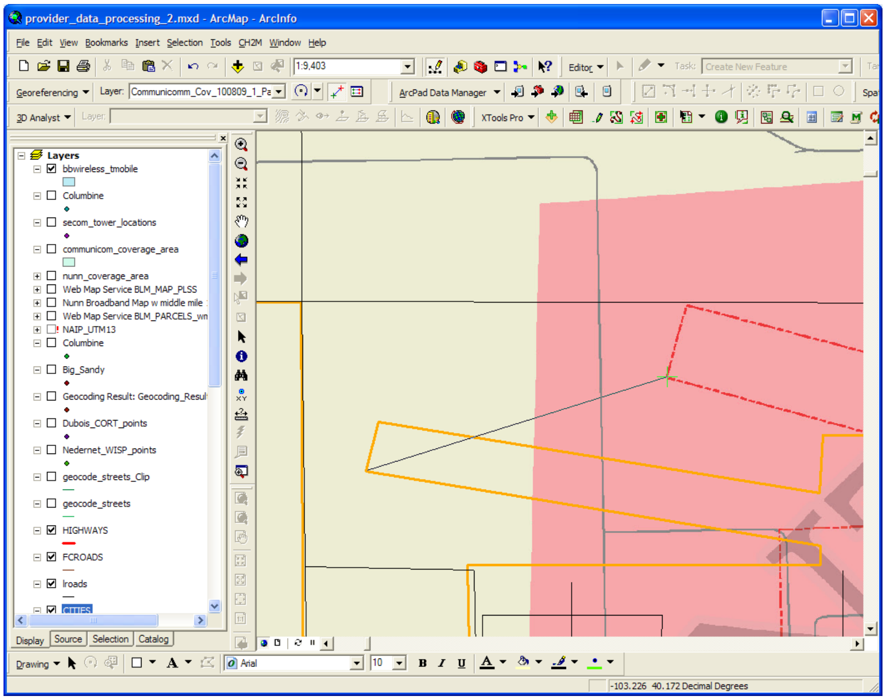
3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
    a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
    a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button  to add control points to the map
9) Use common points in the base data set and the JPG image
    a) For example, find major street intersections, county/city boundaries, etc.
    b) Try to distribute the points more or less in the four corners on the image for the best transformation
10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:



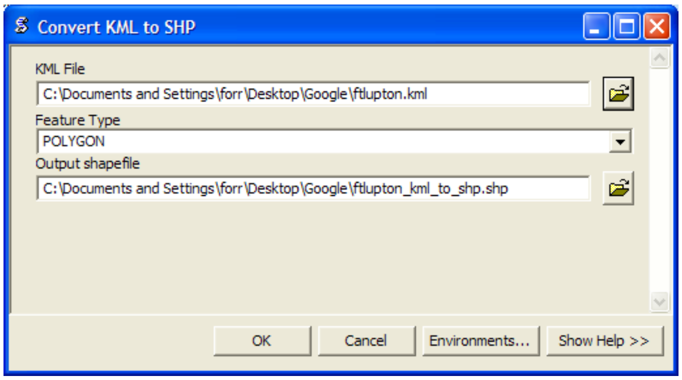
11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a “world” file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to “Create New Feature.”
17) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

1) Use a KML to SHP converter to translate file into an ESRI format

2) http://arcscripts.esri.com/details.asp?dbid=15603
3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
   a) To do so, follow the instructions provided above in “Coverage Area – PDF/JPG/Other Image Format.”
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to “Create New Feature.”
8) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

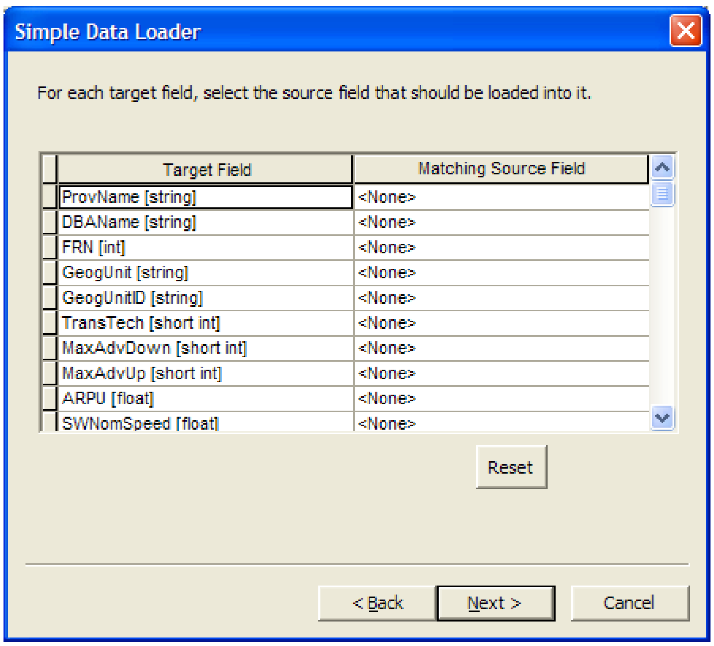
1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.

a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b) Press the Add button, hit Next

c) Accept the defaults and hit Next

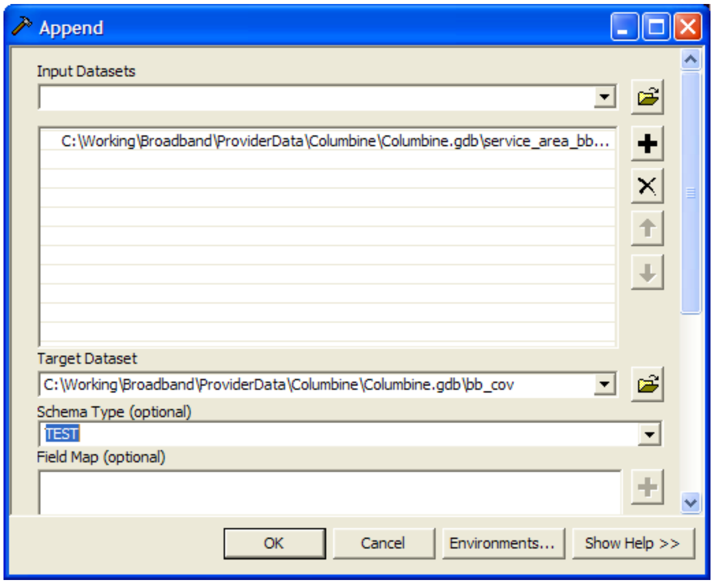
d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

2) In ArcToolBox, go to Data Management Tools>General>Append

3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state "Composite Locator"

- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.

- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.

- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.

- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

* Un-join the county data from the geo-code subscribers list.

* Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

* Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

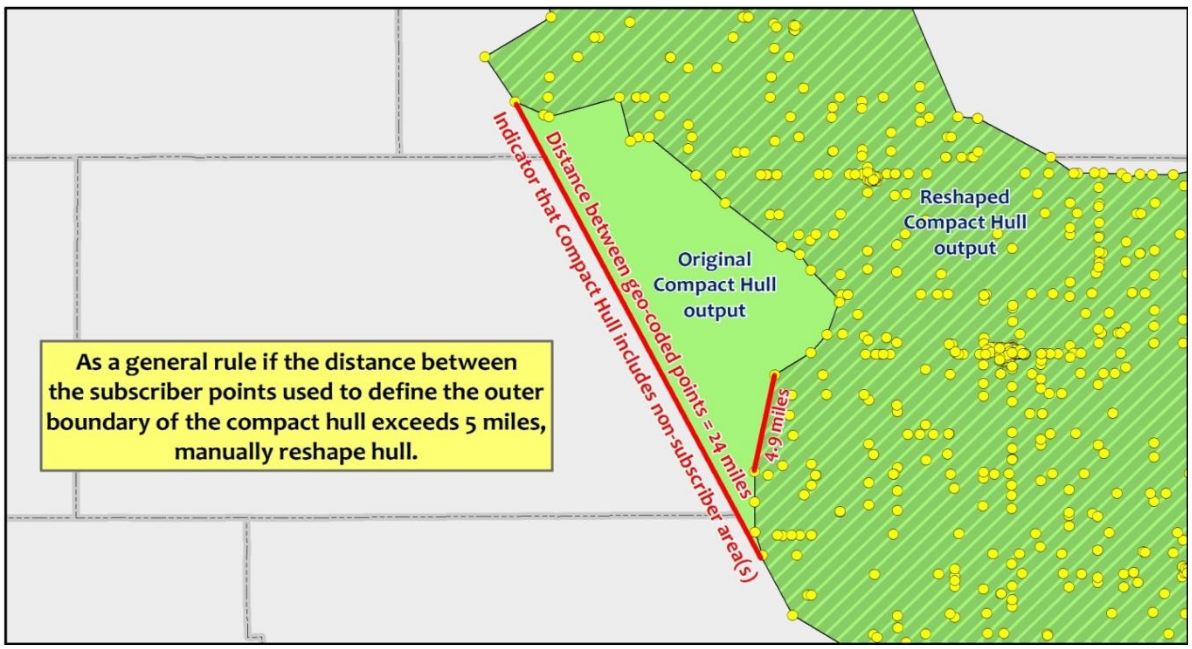
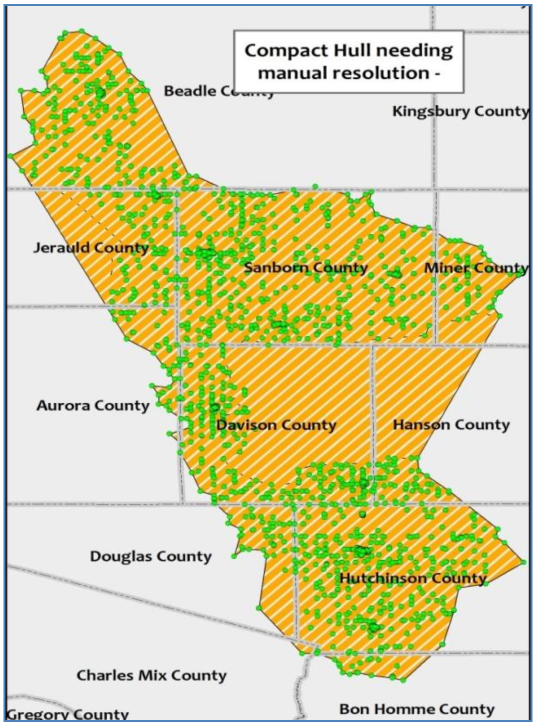
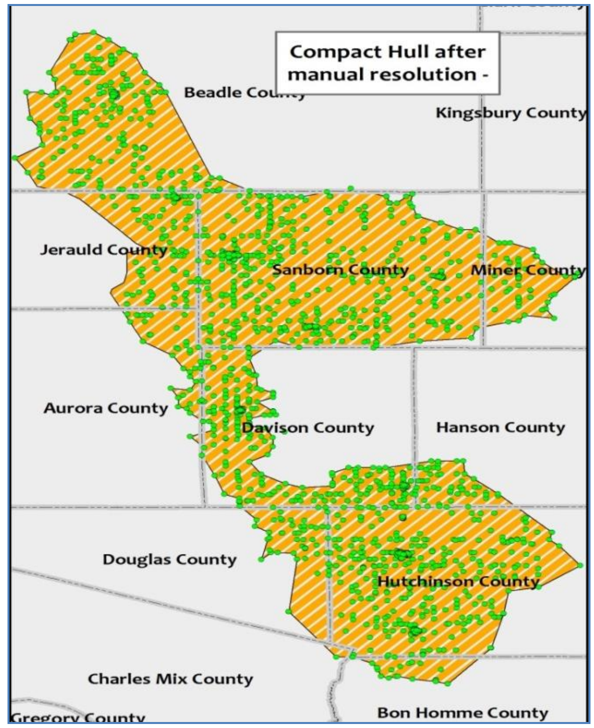


FIGURE 3a- Compact Hull: Manual Resolution Required *FIGURE 3b- Compact Hull: After Manual Resolution*





- To attribute the compact polygon - Perform a "Spatial Join" where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate "stcty_fips" field. Also use the county name field to populate the "BBCov_Name" field.

    - Exceptions is where a provider's coverage is distributed throughout more than one area of any given county where the "BBcov_Name" should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

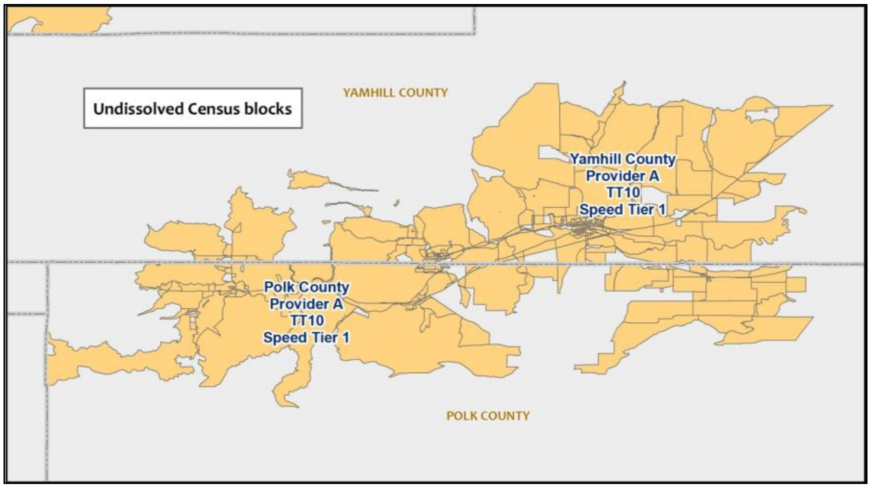


Figure 1: Undissolved census block polygons

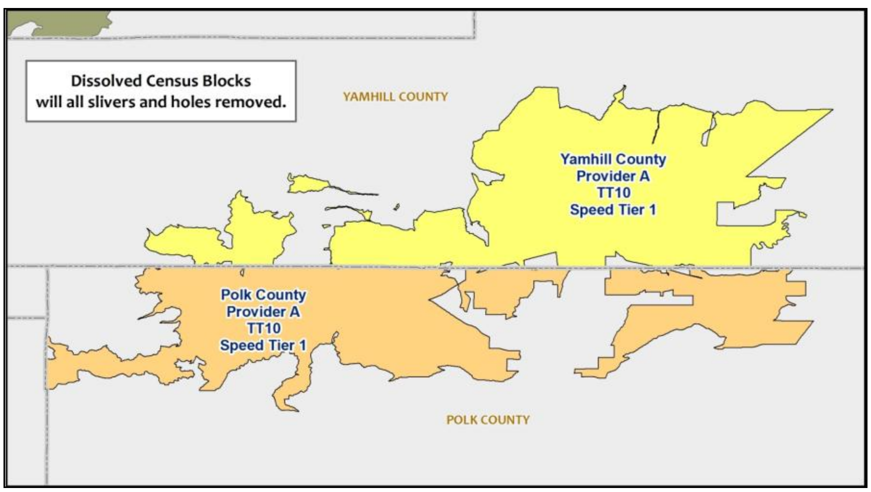


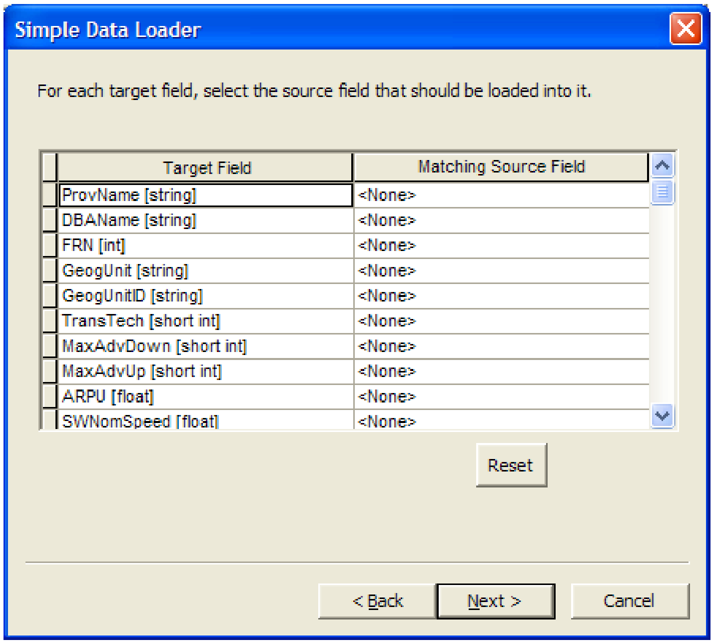
Figure 2: Census block polygons dissolved by county

2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b. Press the Add button, hit Next

c. Accept the defaults and hit Next

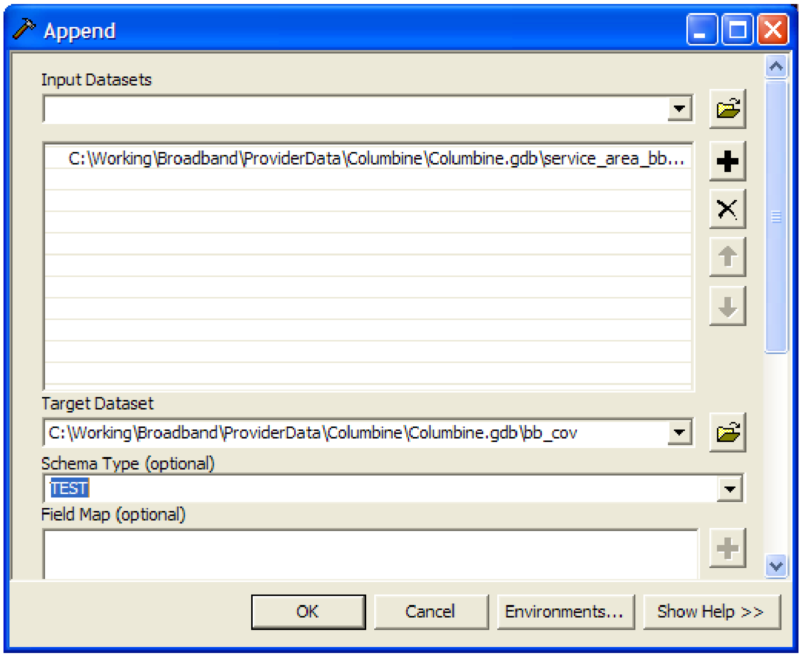
d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

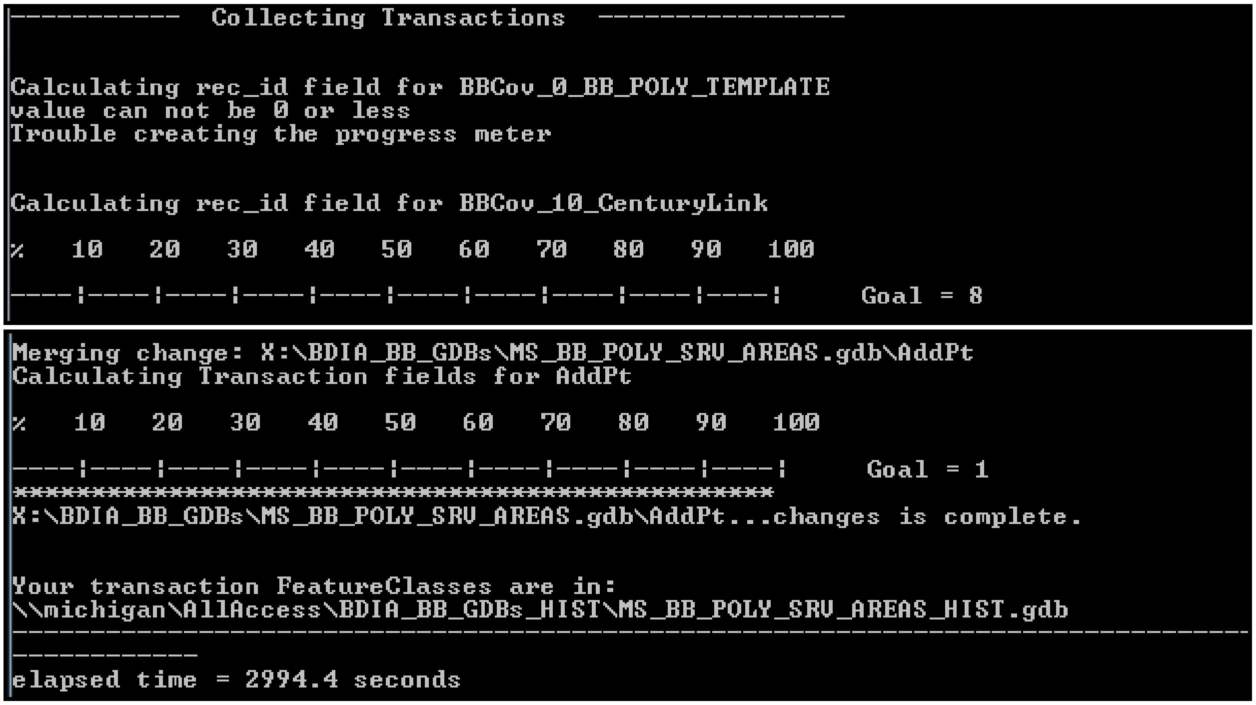
Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

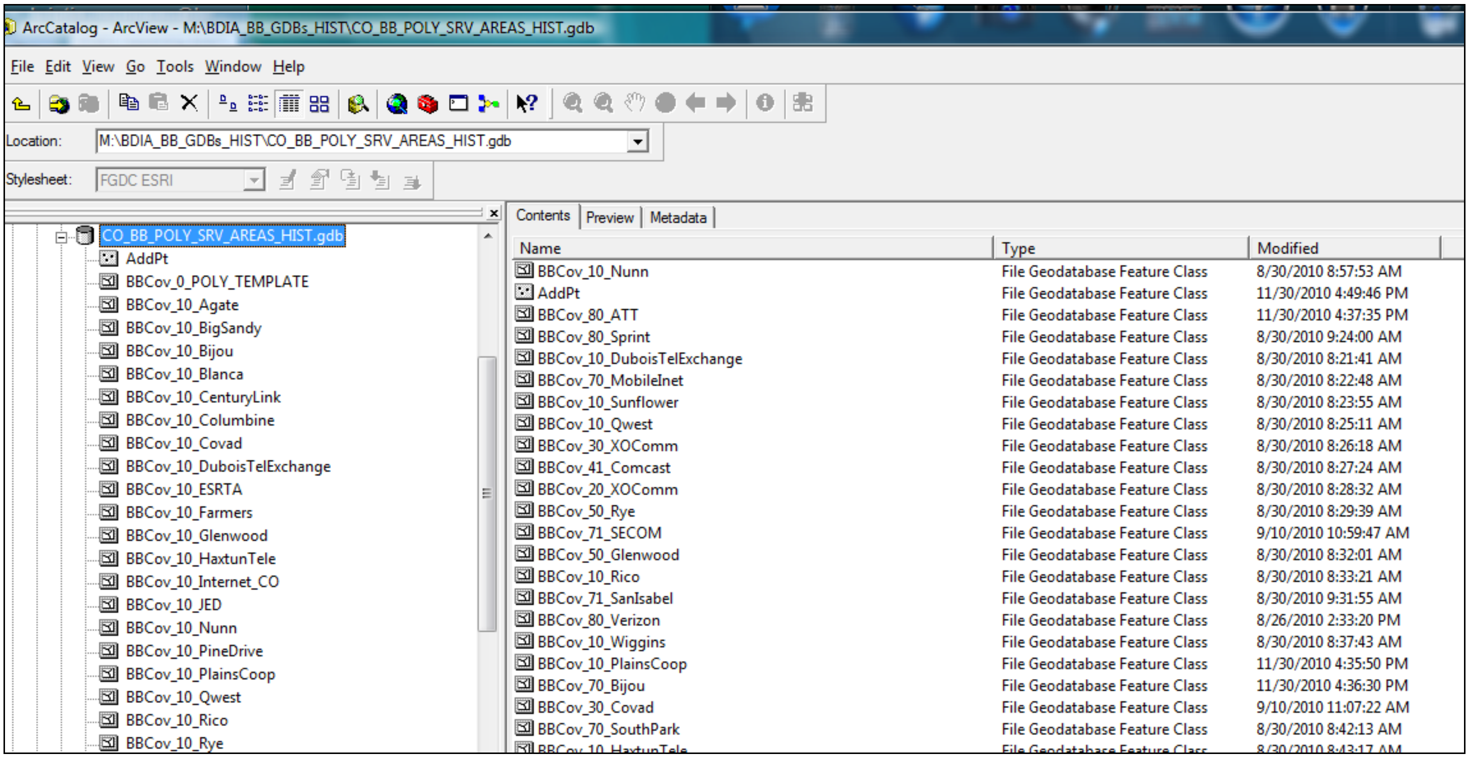
    b. Example of command line:

<path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:



3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb
    a. The transactions scripts records changes at a feature level.
    b. Below is a screen shot supporting the directory structure of the historical fGDB.



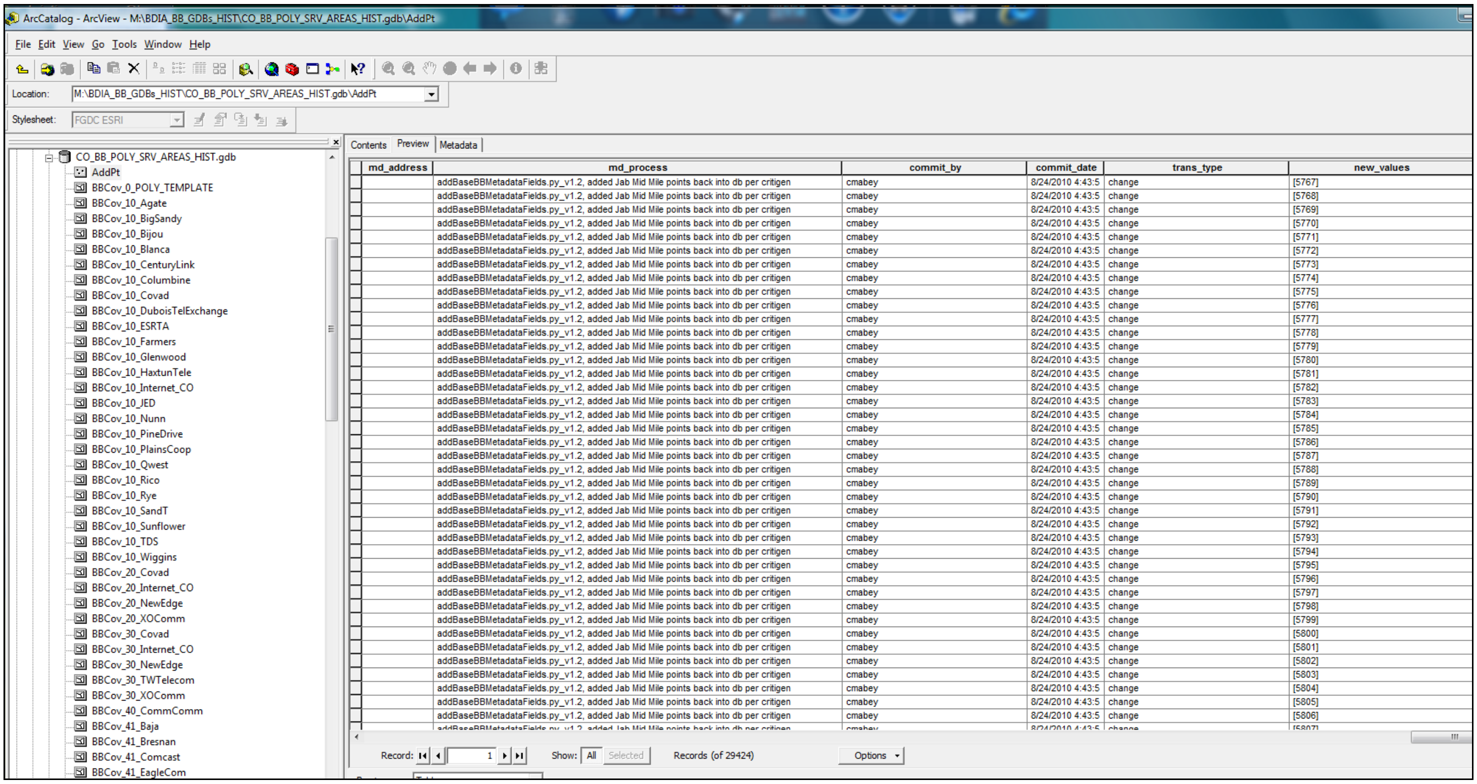
c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:
   i. Commit_by
      1. Records the GIS-Analyst that committed the changes to the historical fGDB.

   ii. Commit_date
      1. Records the date and time stamp that the changes were committed.

   iii. Trans_type
      1. This field reflects the type of change recorded.
      2. Categorized by:
         a. Adds/Change/Deletes

   iv. New_values
      1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



md_address	md_process	commit_by	commit_date	trans_type	new_values
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5767]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5768]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5769]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5770]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5771]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5772]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5773]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5774]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5775]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5776]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5777]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5778]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5779]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5780]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5781]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5782]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5783]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5784]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5785]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5786]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5787]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5788]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5789]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5790]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5791]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5792]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5793]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5794]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5795]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5796]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5797]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5798]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5799]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5800]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5801]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5802]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5803]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5804]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5805]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5806]

3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where we are supplied with subscriber speed information by the data provider, we use the following formula from the NOFA:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

When these values have been obtained or calculated, they are used to update the service overview layer. This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer you would like to join to and select Joins and Relates>Join… from the dropdown menu. Then navigate to the table you want to join and select the join fields from the drop down lists. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.

2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.
3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given

Name	Alias	Description
		area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the data is then validated by the provider to ensure the data aggregated is an accurate representation of their coverage area and supporting broadband information. This is completed through the Provider Portal web application, which is a secure interactive map displaying their coverage areas and allows the user to validate, submit feedback or request changes. If changes are requested, then the features on the portal are then updated and an automatic request is sent to the provider to complete the validation effort.

For some providers that did not use the Provider Portal, a PDF was sent displaying their coverage map and validation was then completed via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

Once the provider has validated their coverage areas, a 3rd party source comparison and analysis is then performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments applied so they can later be reviewed with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All efforts from the above-mentioned validation and verification activities, plus internal peer quality reviews are combined and tracked in a Validation table. Based on the results of this analysis, a confidence value is assigned for each provider and then each technology.

The confidence values are as follows:

0 = Coverage area has not been reviewed
10 = Extremely Low. Single Source QC.
20 = Very Low. Needs Additional Validation\Verification
30 = Low. Even with Validation\Verification, Coverage is still suspect.
40 = Acceptable, confirm with State prior to shipment.
50 = Meets requirements to be included in shipment.
60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
70 = High. Accurate representation of coverage based upon TT.
80 = Very High. Multiple validation\verification with most 3rd party sources
90 = Extremely High. Multiple validation\verification sources
100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is then maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs, address and broadband data.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:

a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.

b. Standardize the address format as defined in the staging CAI database

c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.

d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.

   i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.

2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.

3) Using ArcCatalog, load the new data into the staging CAI database.

4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.

The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories
    - 1: School: K through 12
    - 2: Library
    - 3: Medical/Healthcare
    - 4: Public Safety

- 5: University/College
- 6: Other Government
- 7: Other Community non-government
- None: Unknown Category
  - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately
- Reports out the following counts
  - Total CAIs within that category
  - Total CAIs that contain partial BB coverage
    - Contains any of the following information for given CAI:
      - BB Subscriber, Transmission Technology, Speed Down Speed Up
  - Total CAIs that contain full BB coverage
    - Contains all of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
  - Correct names and format of data deliverables
    - BDIA_QC_SUITES (please see below for details)
  - Correct Projections/Datum
    - Manual interaction with product
  - Metadata Present and Correct
    - Manual interaction with product
- Table Structure
  - All required tables included
    - BDIA_QC_SUITES
  - Extraneous tables identified
    - BDIA_QC_SUITES
- Field Structure
  - All fields included
    - BDIA_QC_SUITES
  - Extraneous fields identified
    - BDIA_QC_SUITES

- Correct field names, types and widths
    - BDIA_QC_SUITES
- Field Domains
  - Values in all tables are constrained to the specified values specified
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
  - Identify if all layers have the correct geometric representation
    - Manual review of the BB_ServiceOverview layer
    - Dependent on NTIA and client requirements
- Geographic Extent
  - Product includes the necessary Geography associated with Product?
    - Manual Review - ArcGIS
  - Is there extraneous geography included in Product?
    - Manual Review - ArcGIS
- Completeness
  - Products contain the expected amount of data?
    - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product
    - Provider Validation
    - Verification using 3rd Party Data
    - Verification against reality, where applicable
- Data Regression
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations
- Prior Issues Resolved
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes
  - Have agreed upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium
  - Has the product medium been verified?
    - Manual review
  - All files present
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size

- Correct location
    - Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries
- which_build – this determines the current build and passes information to the configuration scripts

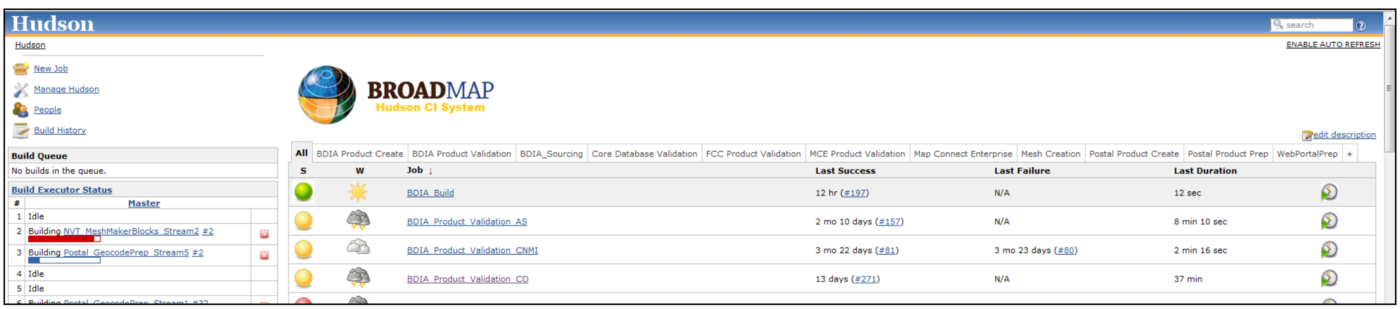
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

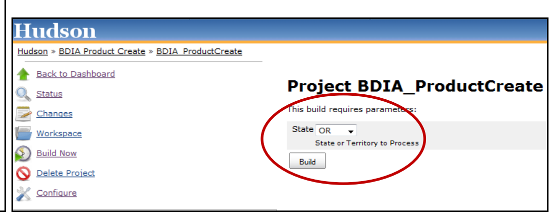
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

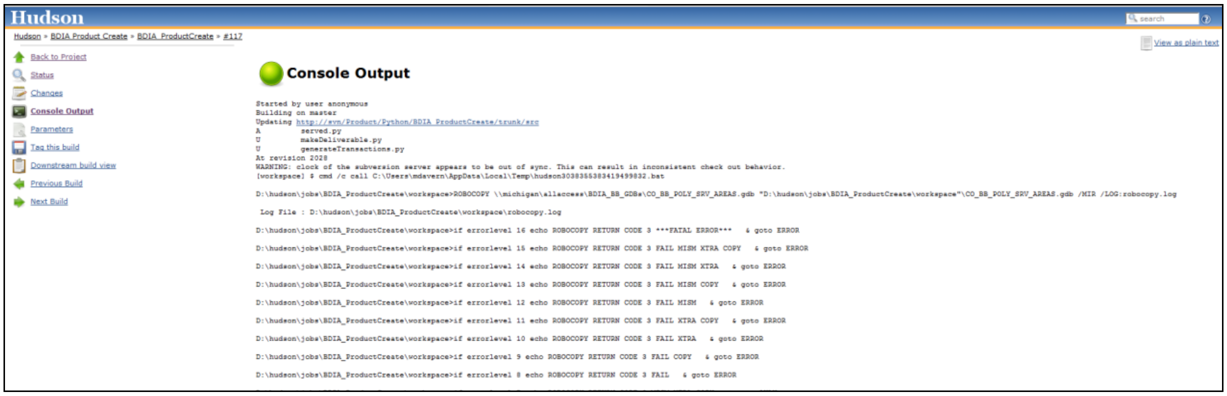
Below is an example of the main page where the type of product build can be selected.



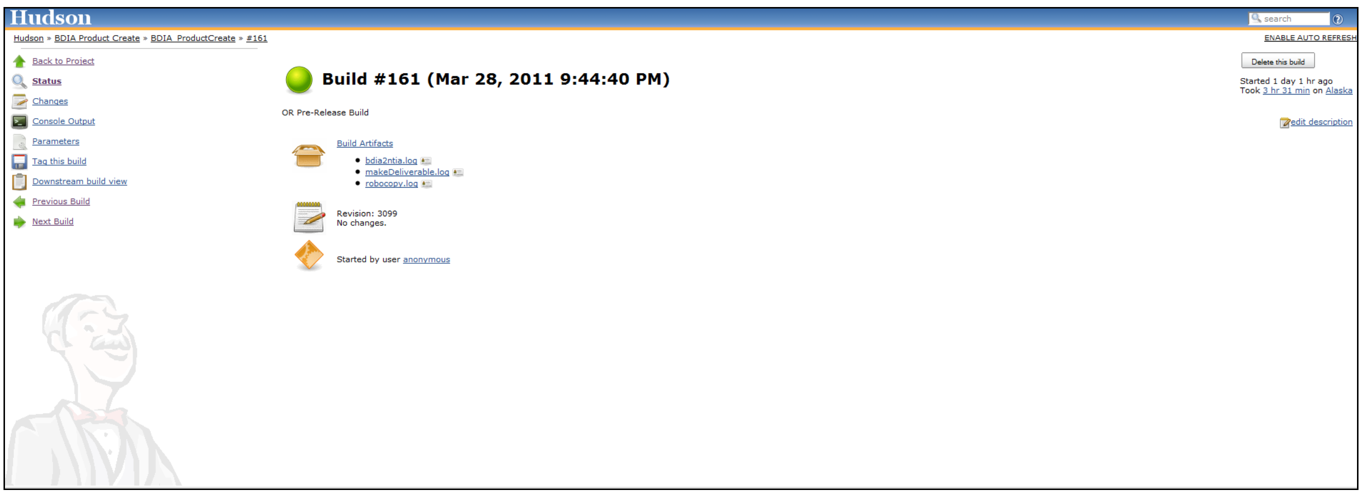
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



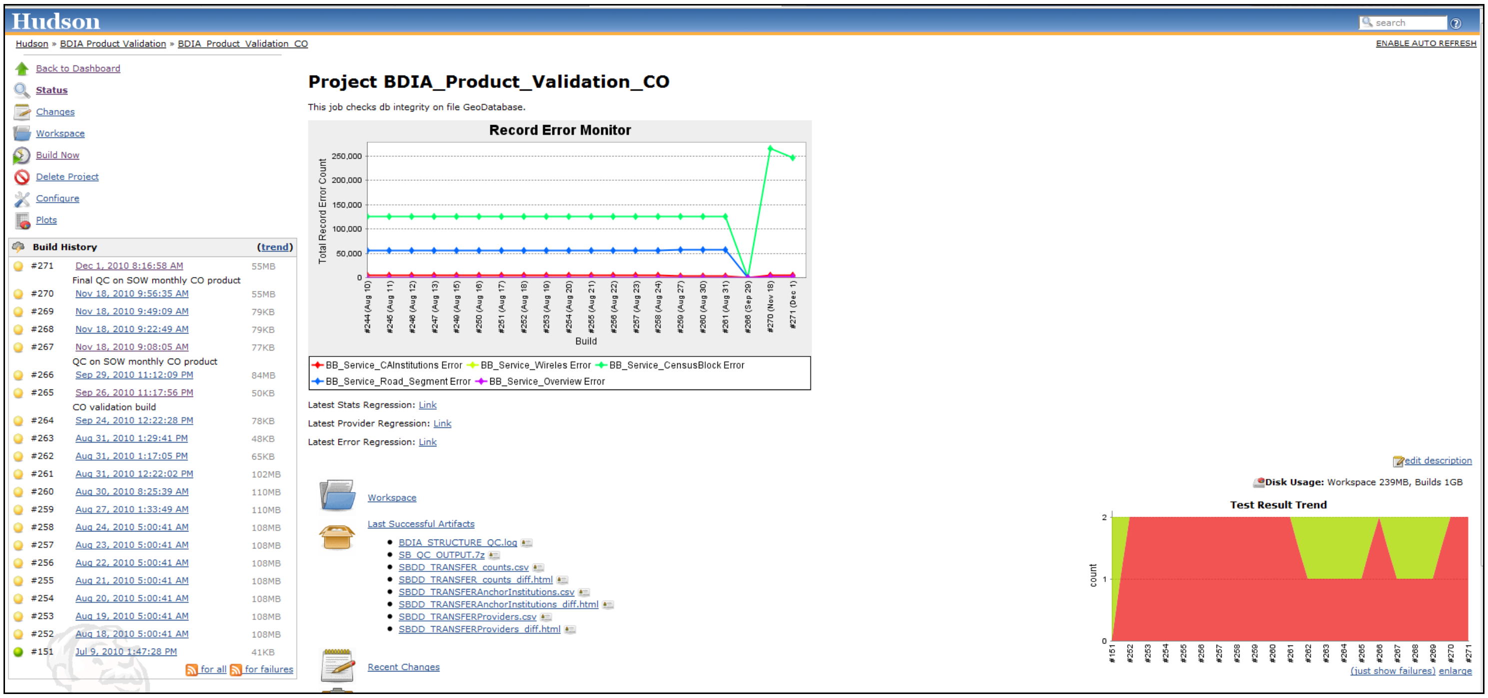
All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



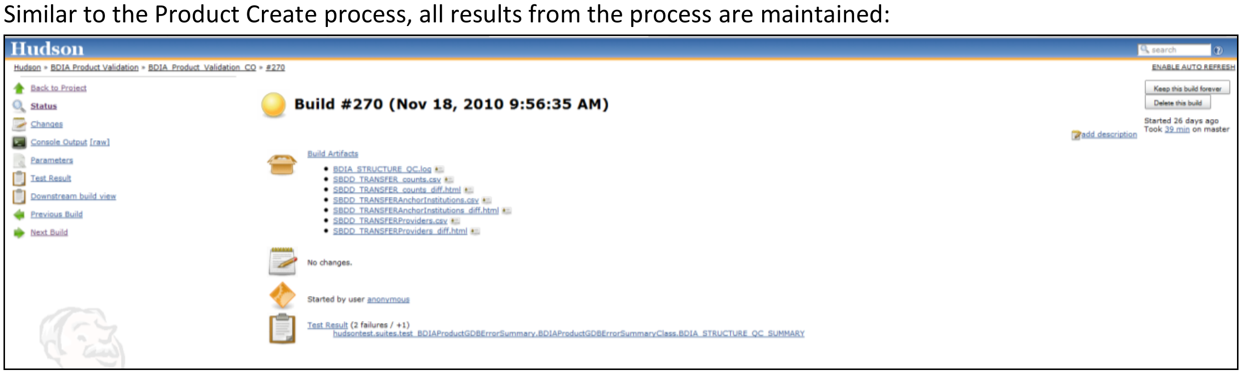
3.10.2 Product Validation and Statistics

Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.
All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

Below is an example of the report provided based on various control points running over a specified time period:

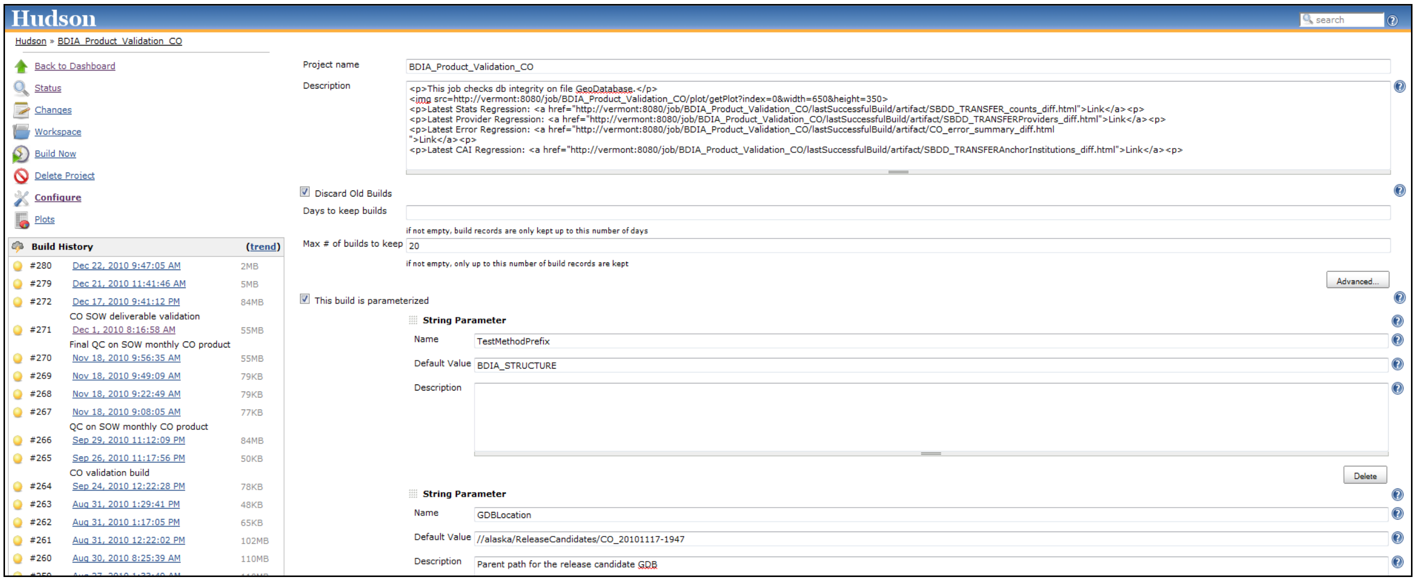


Similar to the Product Create process, all results from the process are maintained:



Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.

Further detail on the Hudson CI System environment can be found by navigating to the following link: http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson

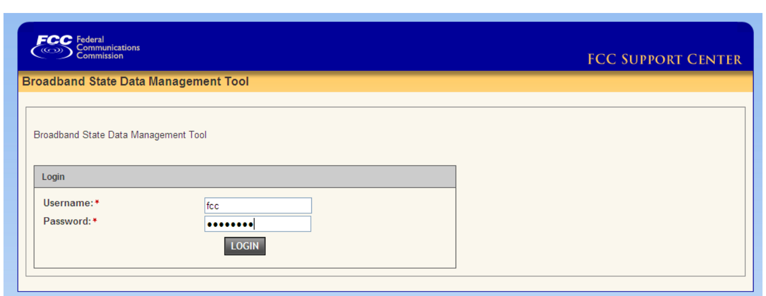


3.11 Product Extract Data Delivery

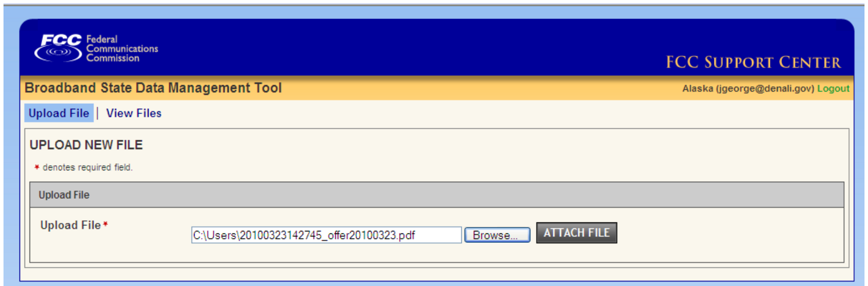
Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

2) NTIA Submittal
   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field
   e) Browse to local file for submission using the 'Browse' button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen

g) A receipt of submission is emailed to username e-mail address

Mississippi

Broadband Mapping Initiative
Product Release White Paper

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Product/Process: NTIA – April 1st, 2011 Data Deliverable
Dataset Submission QC: NTIA – SBDD_CheckSubmission.py

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.

- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is as accurate and comprehensive and possible, provider validation and internal verification activities are utilized. Following the initial mapping of providers' coverage area and serviceability claims, additional reviews are performed using the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality review results are tracked by provider / technology type and stored and maintained within a "Validation" table. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
  - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

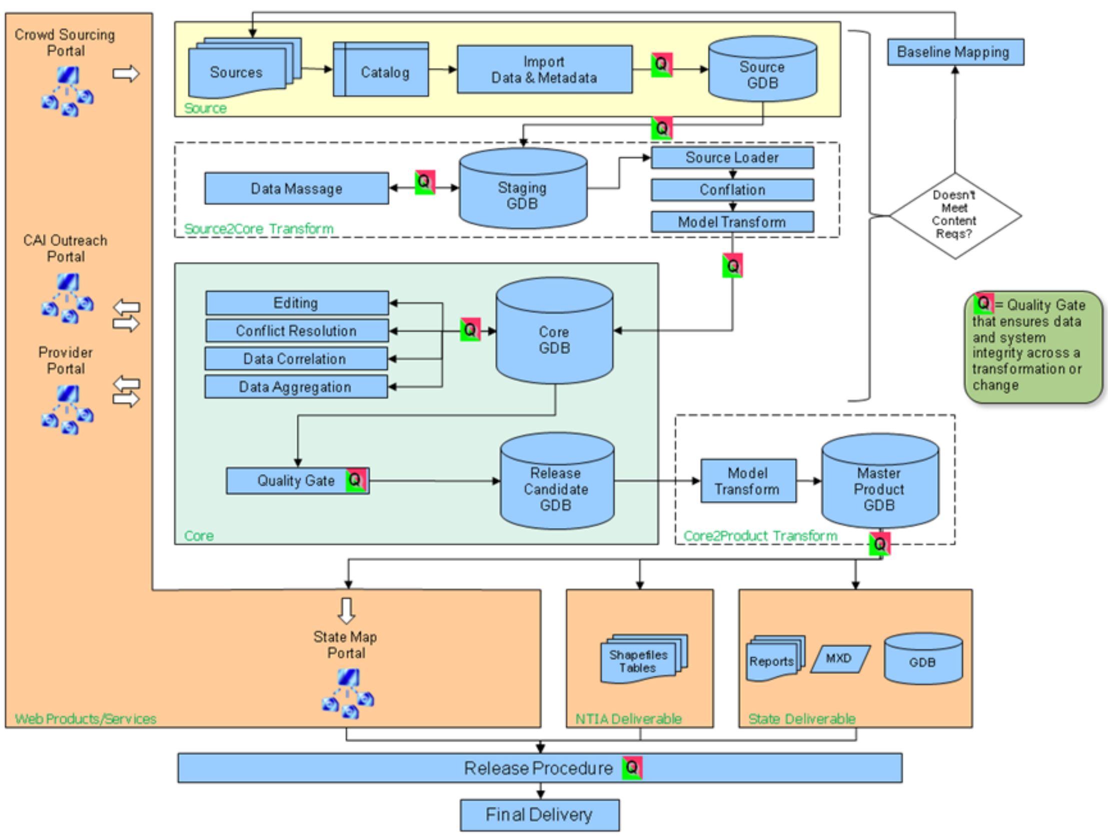
Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link: https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

- Longitude values for States outside the lower 48 (any table)
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is ‘No’ or ‘Unknown’
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.

8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application
2) Regular email
3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email
    a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:
Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

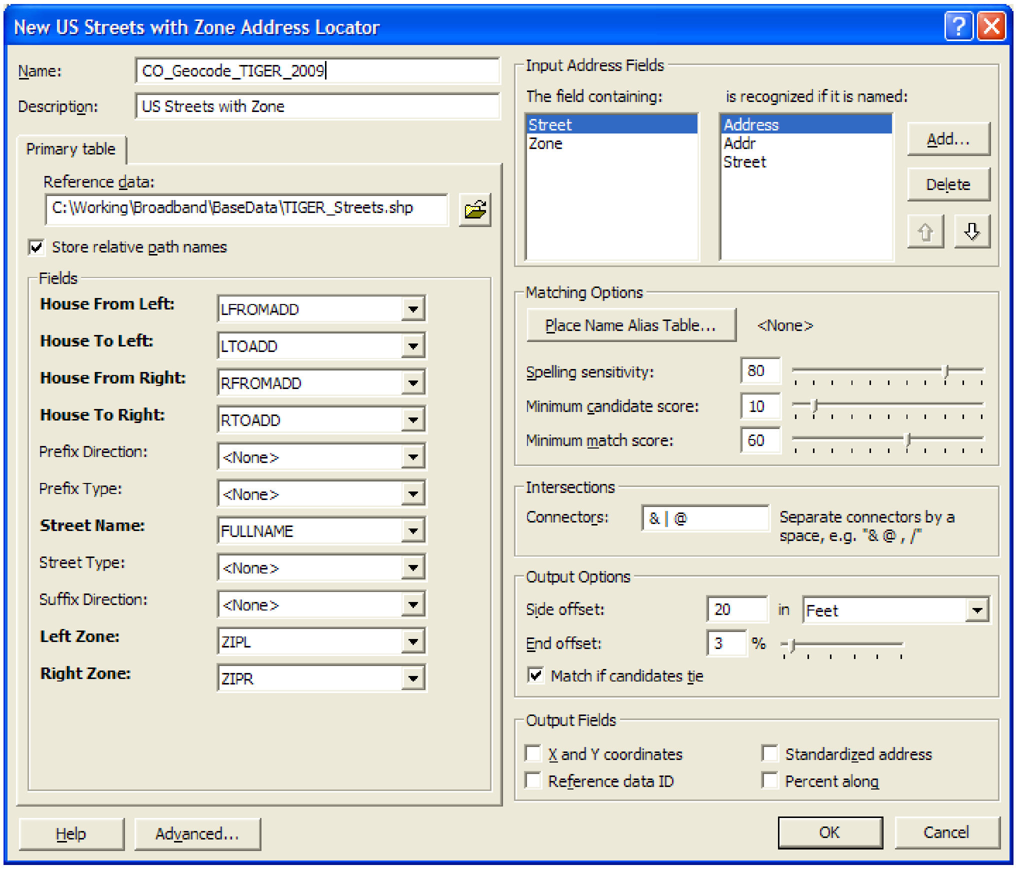
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

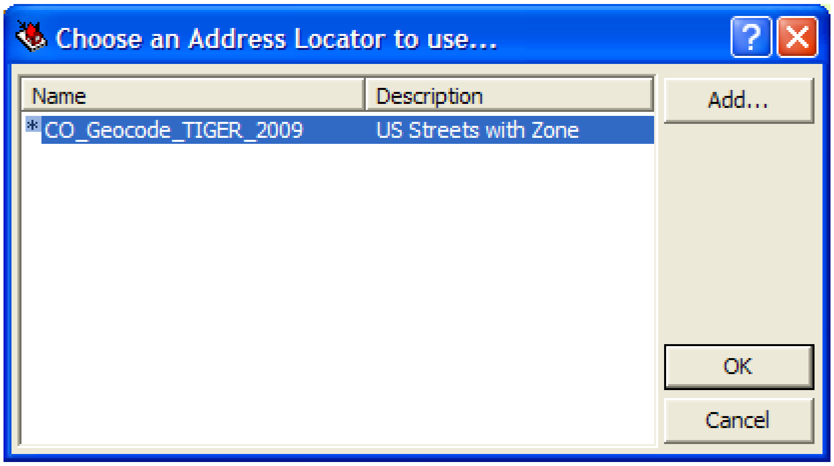
In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
    a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
    b) Select "US Streets with Zone" and press OK.
        i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
    c) Navigate to the TIGER Streets 2009 file and press OK.
    d) Fill in the dialog box as seen below:

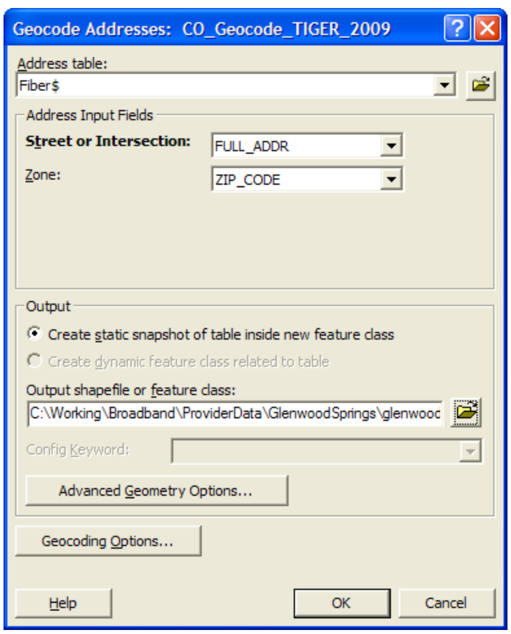


e) Click OK.

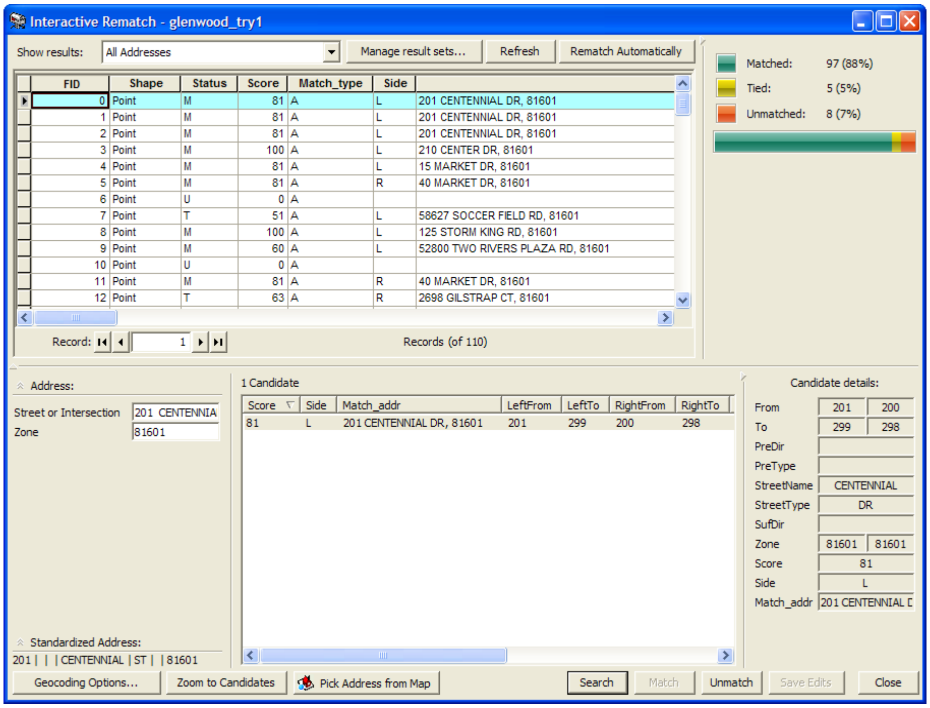
3) Open up ArcMap, and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.
5) Select the appropriate address locator by clicking Add…. then OK.



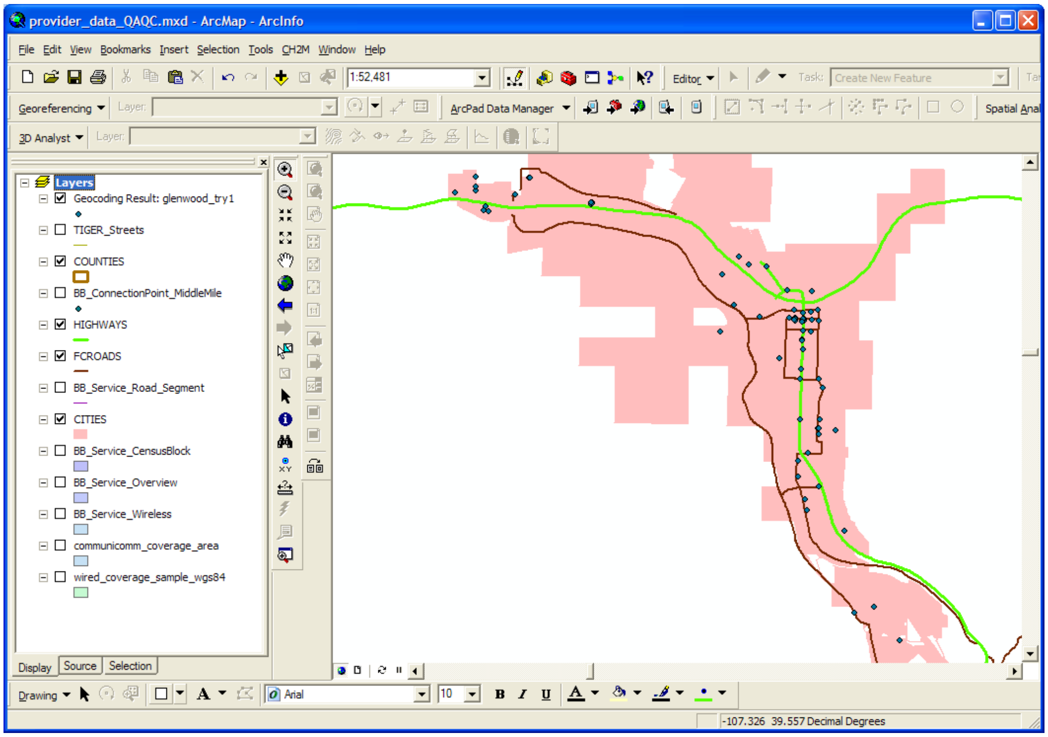
6) Fill out the Geocode Addresses dialog box as shown below:



7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.
8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:

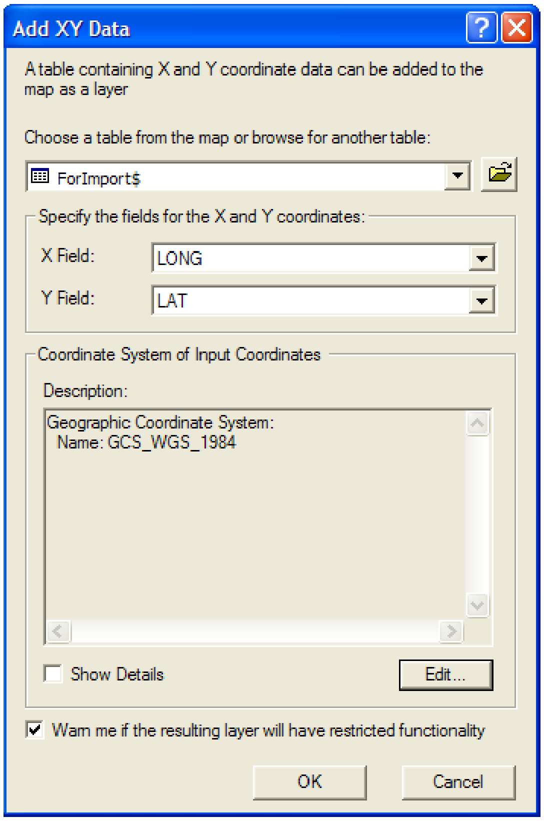


12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.
    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.
    b. Make sure that XY locations are in decimal degrees.
        i. To convert from degrees, minutes, seconds (39º 26' 45.67") to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).
        ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.
2) Open up the Excel worksheet in ArcMap.
3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

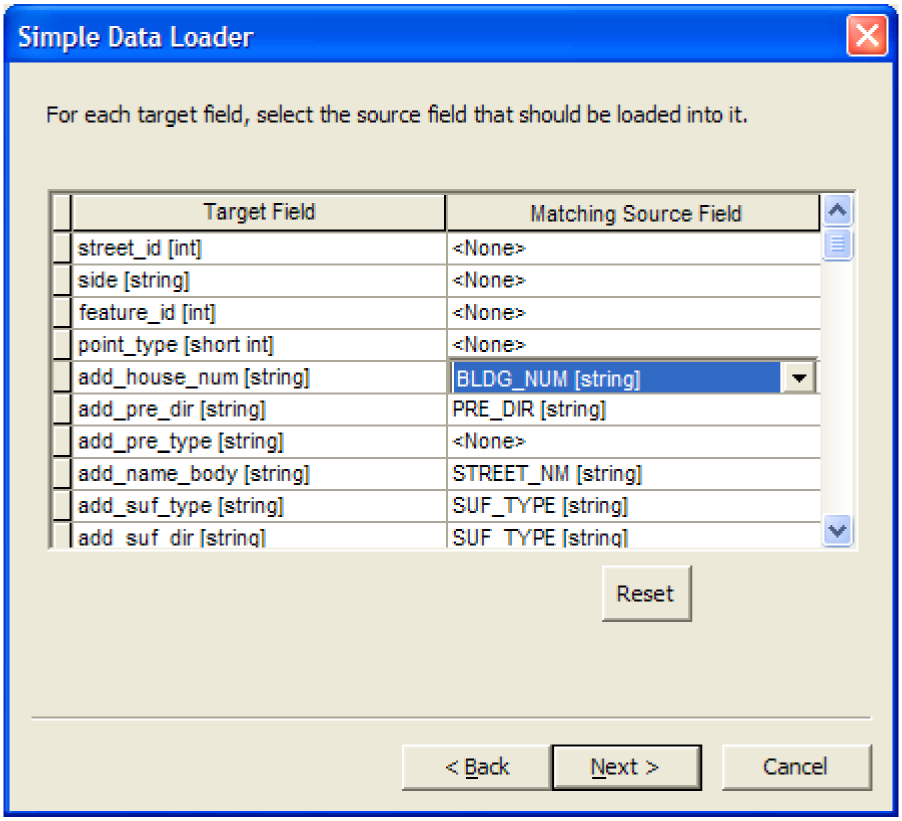
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

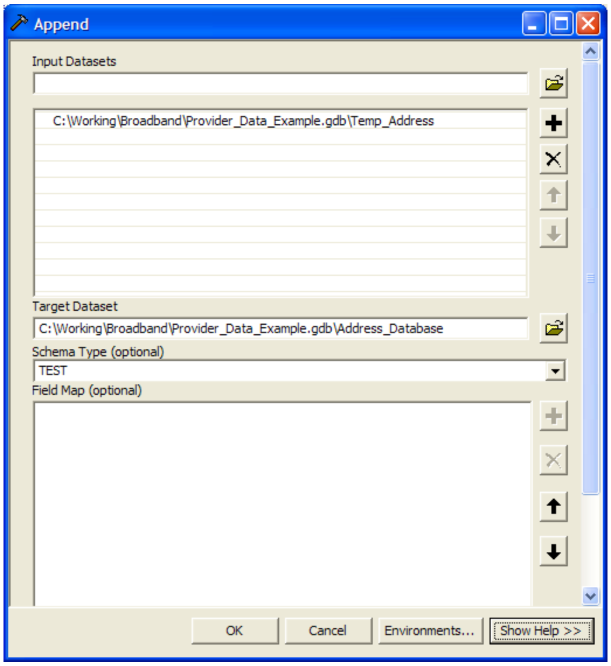
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

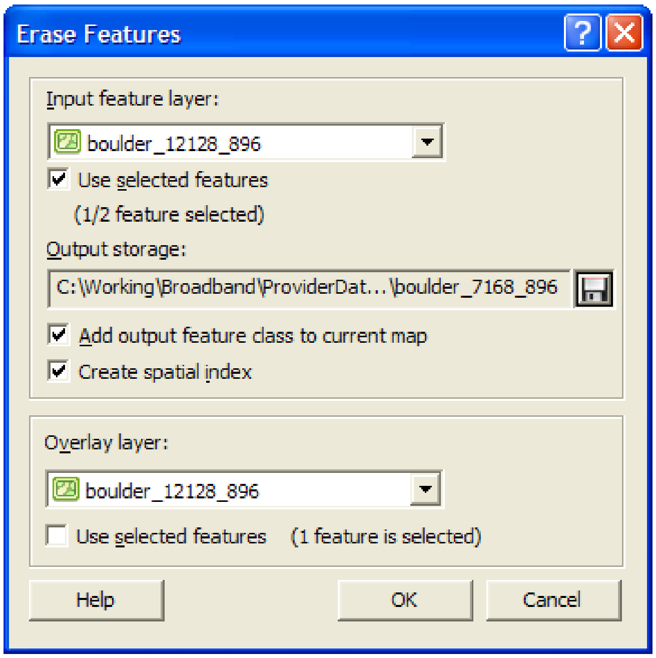


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
    a. <u>Within ArcGIS</u>
        i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
            1. This will save as a DBF table. Keep track of location for future reference.
        ii. Buffer county address point featureclass to 150'.
            1. During buffer command, dissolve on "ad_down"; "ad_up"; "provider"; "dba"; "frn"; "tt"; 'all metadata fields'; "stctyfips". Save as…. county_fastestdown_fastestup.
            2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
            3. Note: these attribute fields are specific to the Point Address database.
        iii. Select the features that represent the lowest speeds
    b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
        i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
        ii. Use the same feature class for Input and Overlay
        iii. Check Use selected features on the Input feature, as seen below.

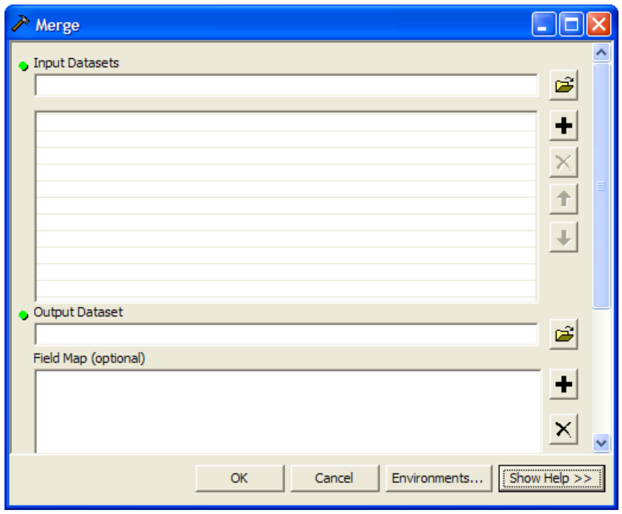
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. Within ArcGIS

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).

iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.

v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

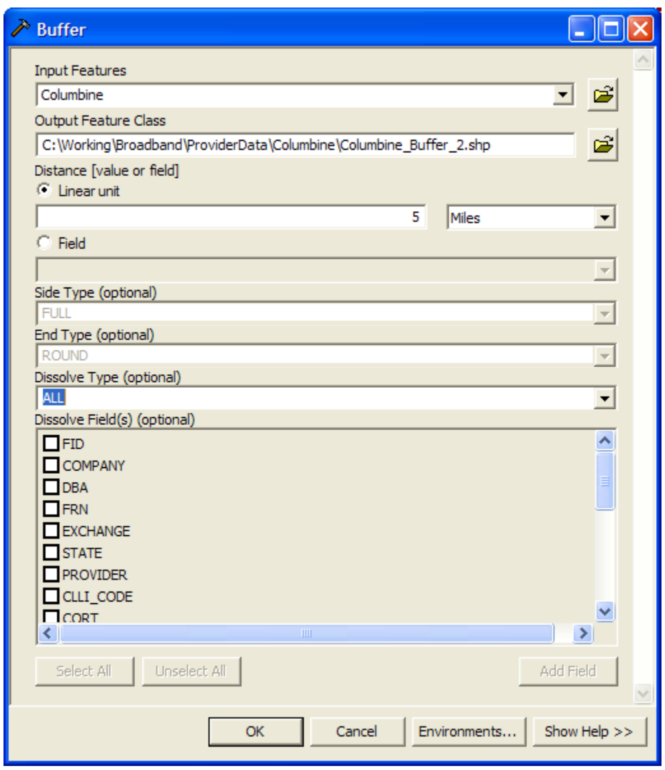
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

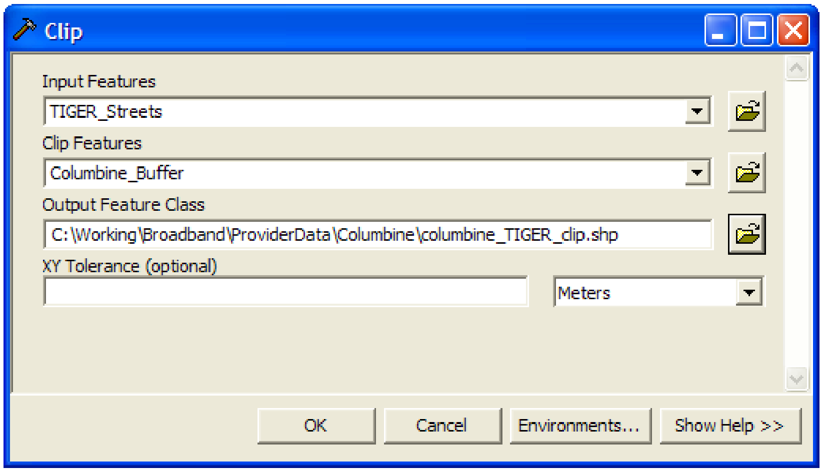
3.5.2.6 DSLAM or Central Office Location – GIS Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

1) Buffer the DSLAM/Central Office points feature class
    a) Add the point feature class to ArcMap
    b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
    c) Set the buffer distance to 5 miles
    d) Set the dissolve type to ALL
    e) Name the output feature class
    f) Typical Buffer tool is seen below:

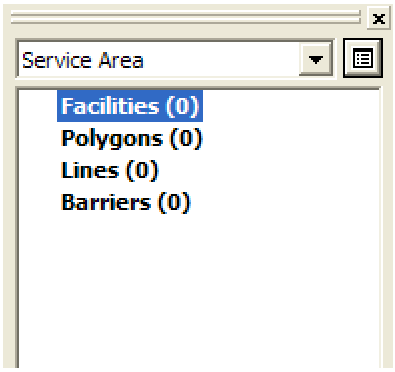


    g) Press OK
2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
    a) Add TIGER street layer to ArcMap
    b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
    c) Complete the dialog box as seen below:

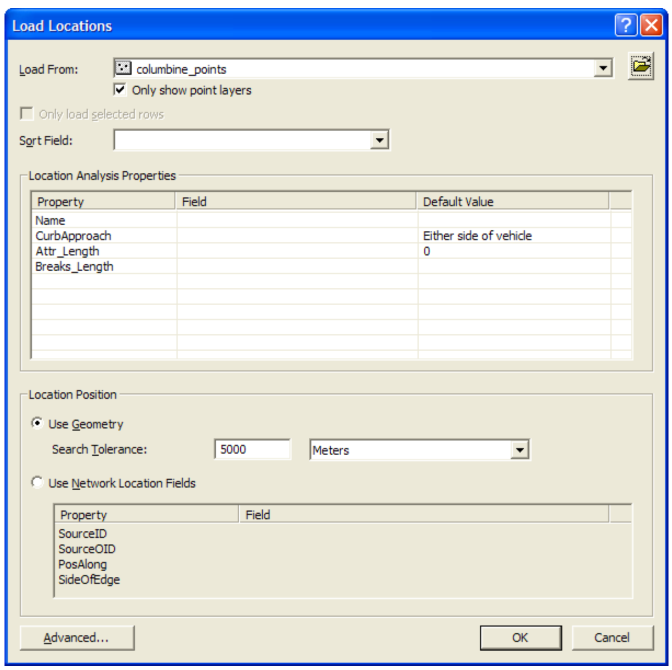


d) Press OK.

3) Using ArcCatalog and within the file geodatabase:
   a) Right Click and create a new Feature Dataset
      i) For the Feature Dataset settings:
         (1) Name the feature dataset accordingly
         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
         (3) No vertical coordinate system needed
         (4) Leave all x,y,z,m values at default.
         (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
   a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create "New Service Area"
9) Open up the Network Analyst Window by selecting the button.



10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.



11) Press OK.

12) Click the Service Area Properties button

13) For the following tabs change the following properties:

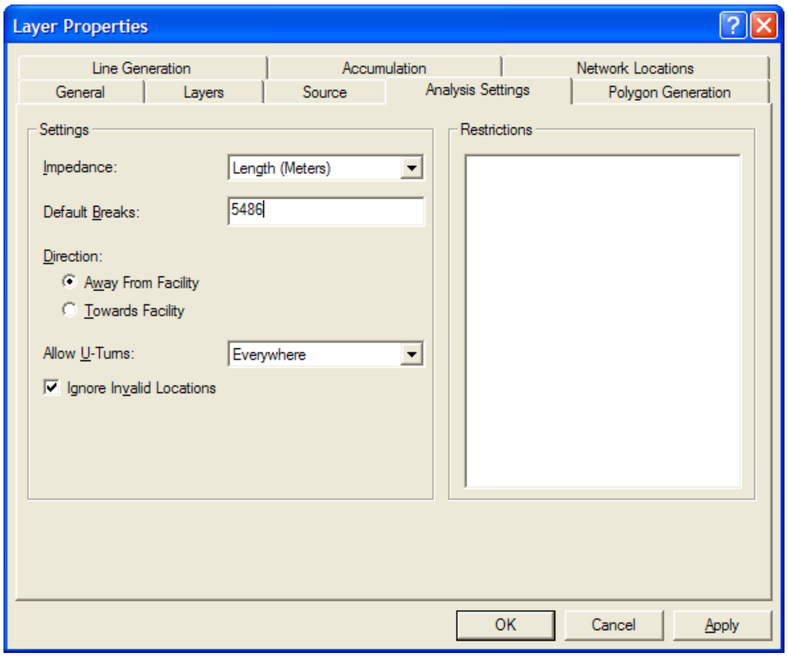
a) "Polygon Generation" tab

i) Select "Merge by break value"

ii) Also disable the Trim Polygons option

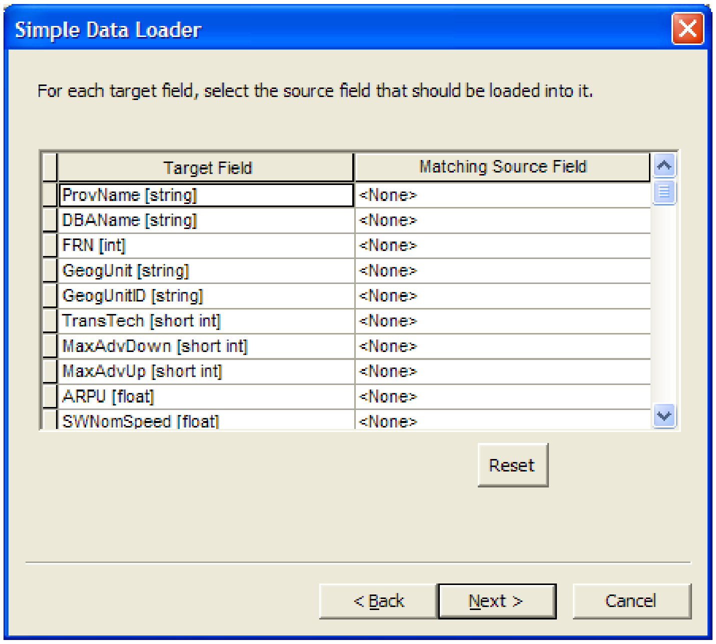
b) “Analysis Settings” tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the “Default Breaks” location

   i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

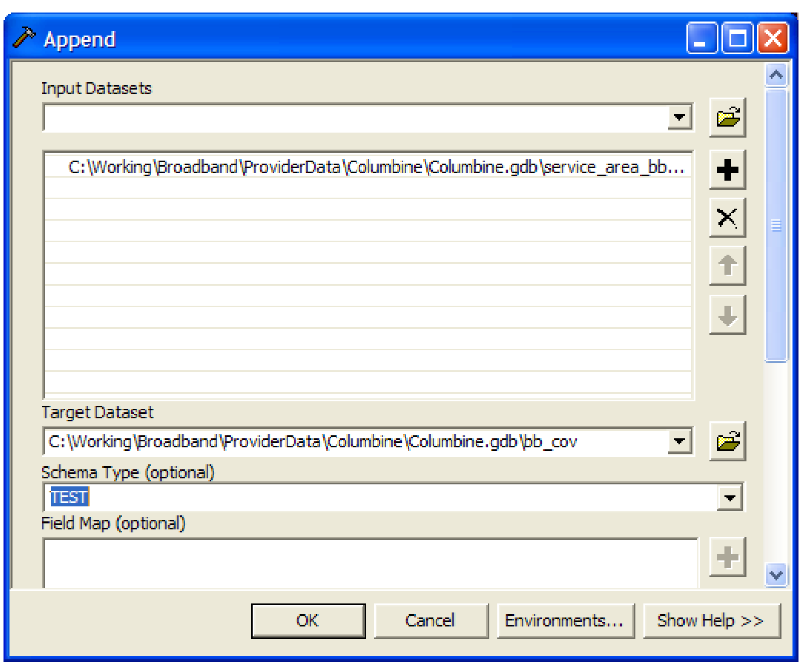
14) On the Network Analyst Toolbar click the “Solve” button to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST
21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

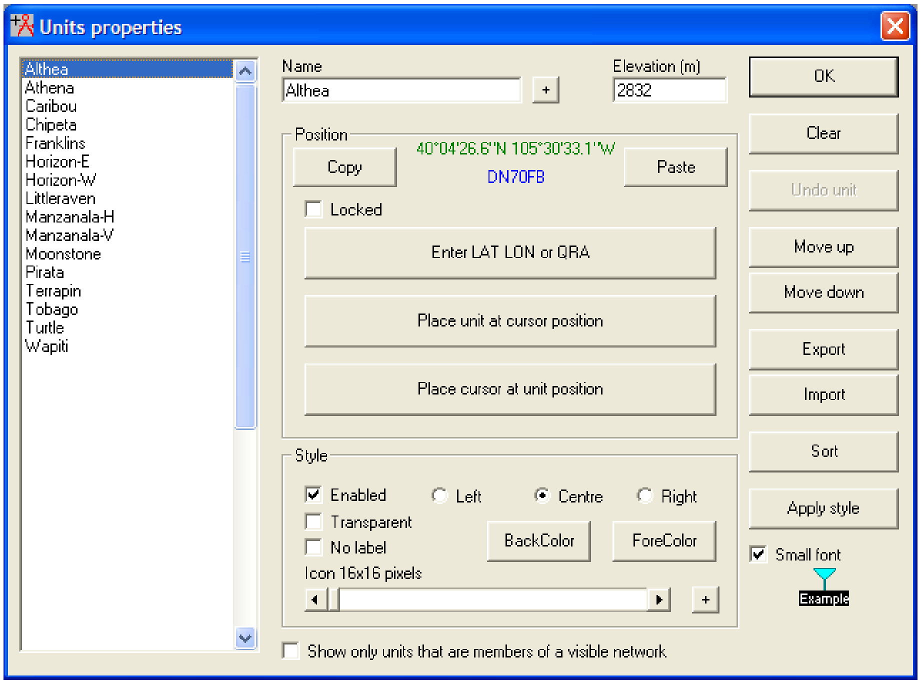
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

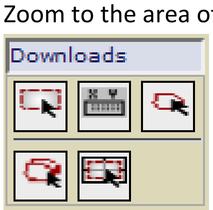
3.5.2.8.1 Broadcast Tower Location – GIS Data

In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

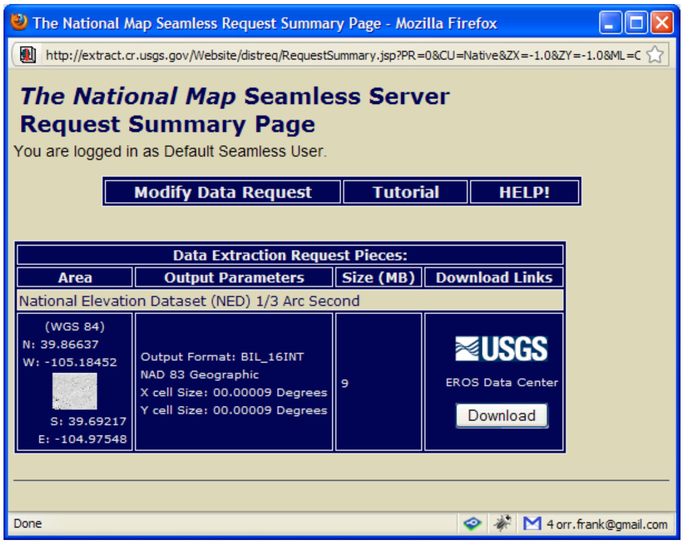
1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
   a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
   b. Zoom to the area of interest and use the Download tools:

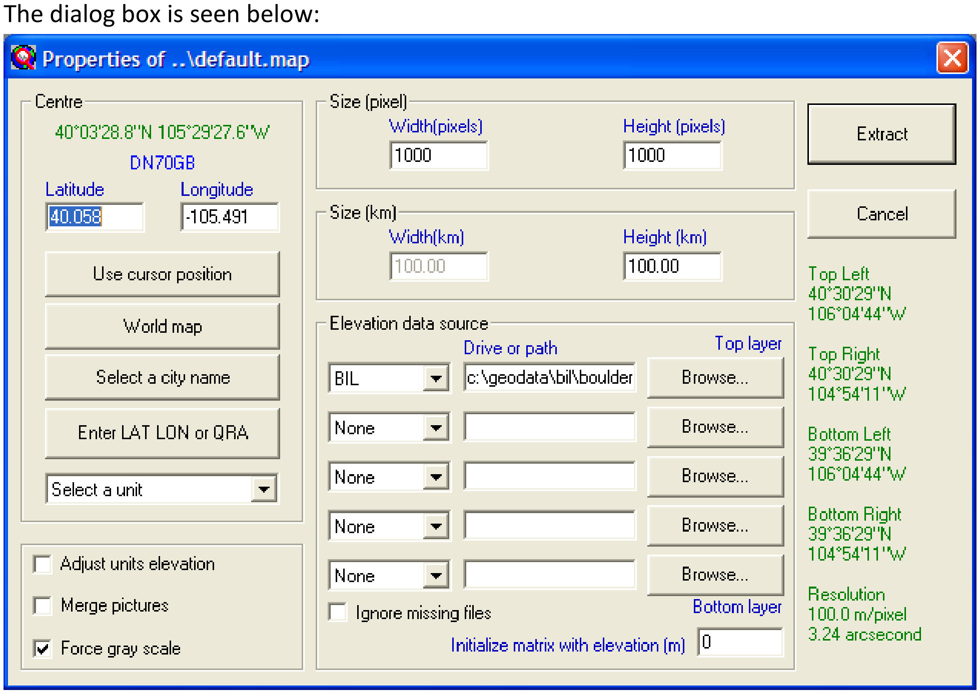


   to define the area to download.
   c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:

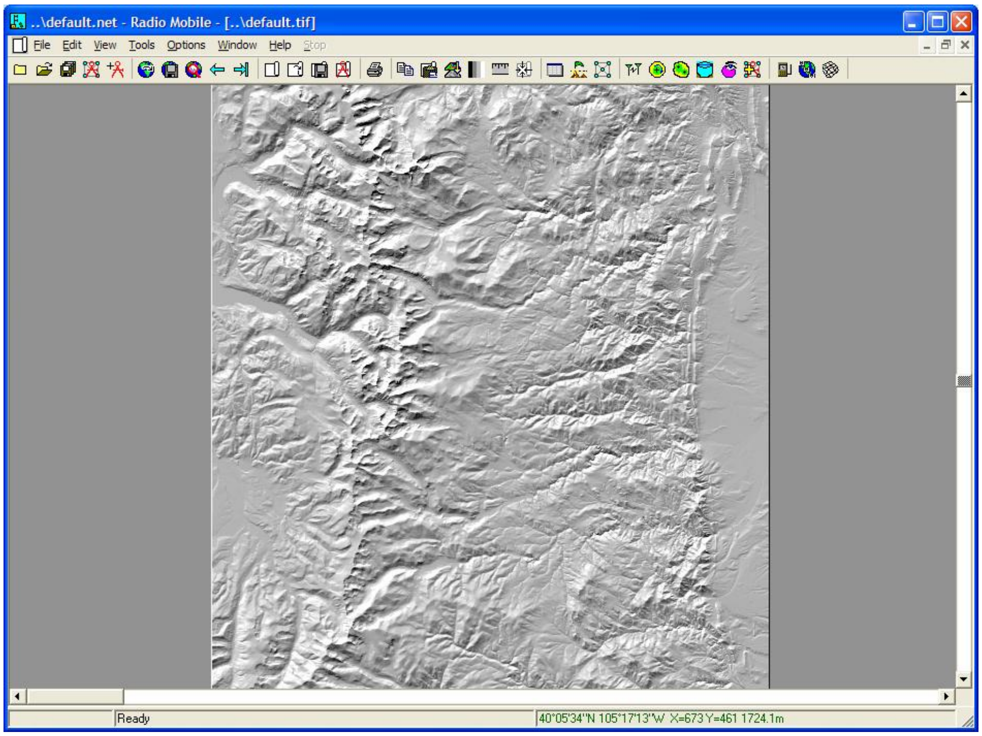


d. Download the data and unzip it.

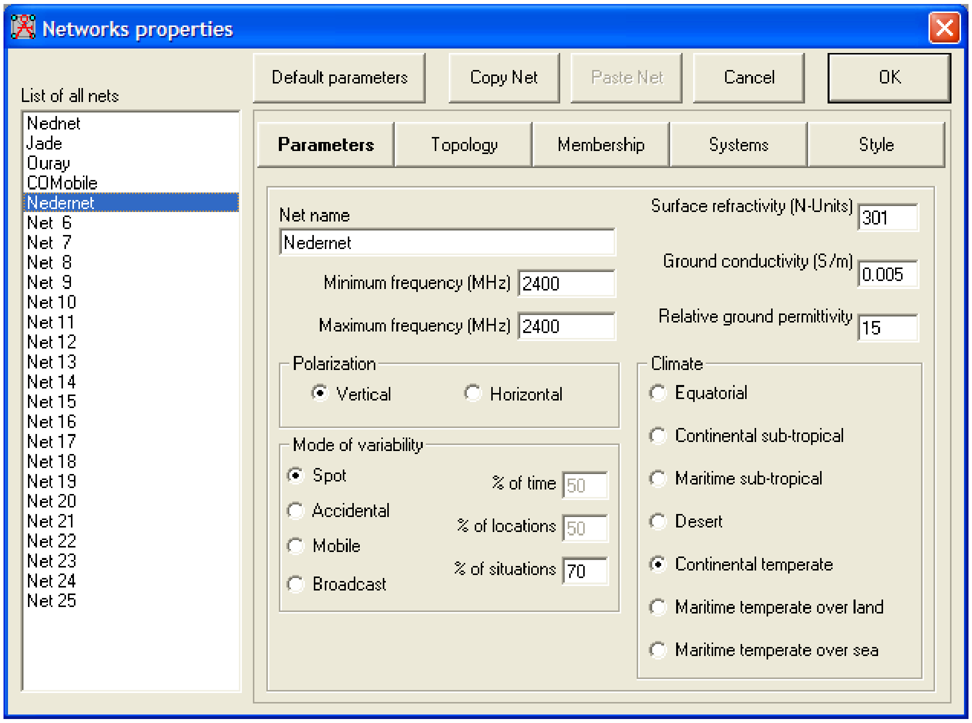
7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:



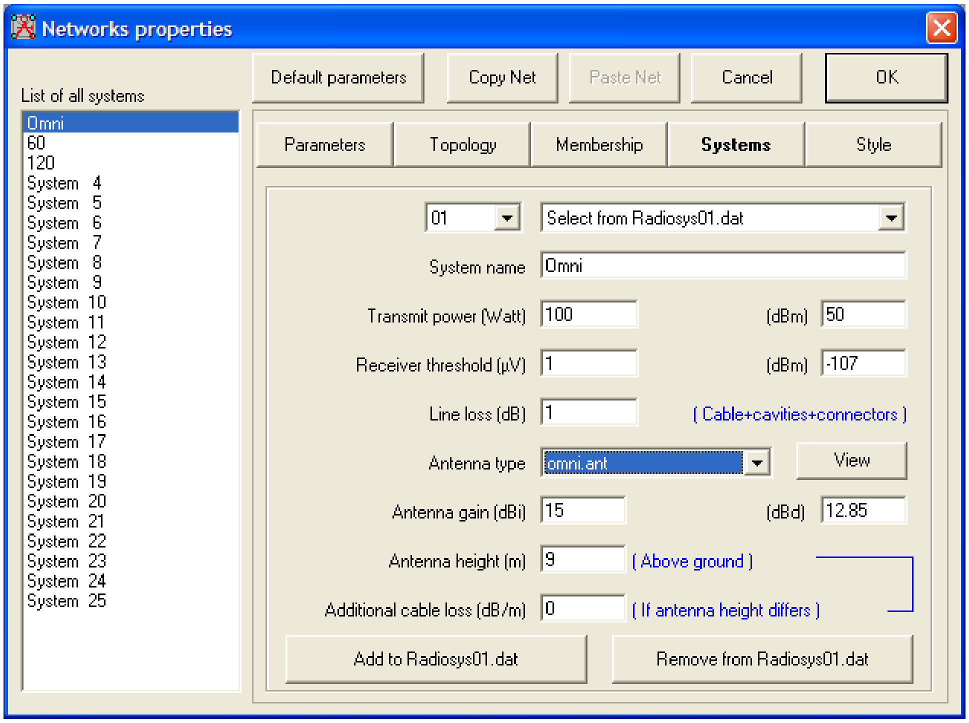
12) Hit Extract.
13) The elevation data is render as a hill shade, as seen below:



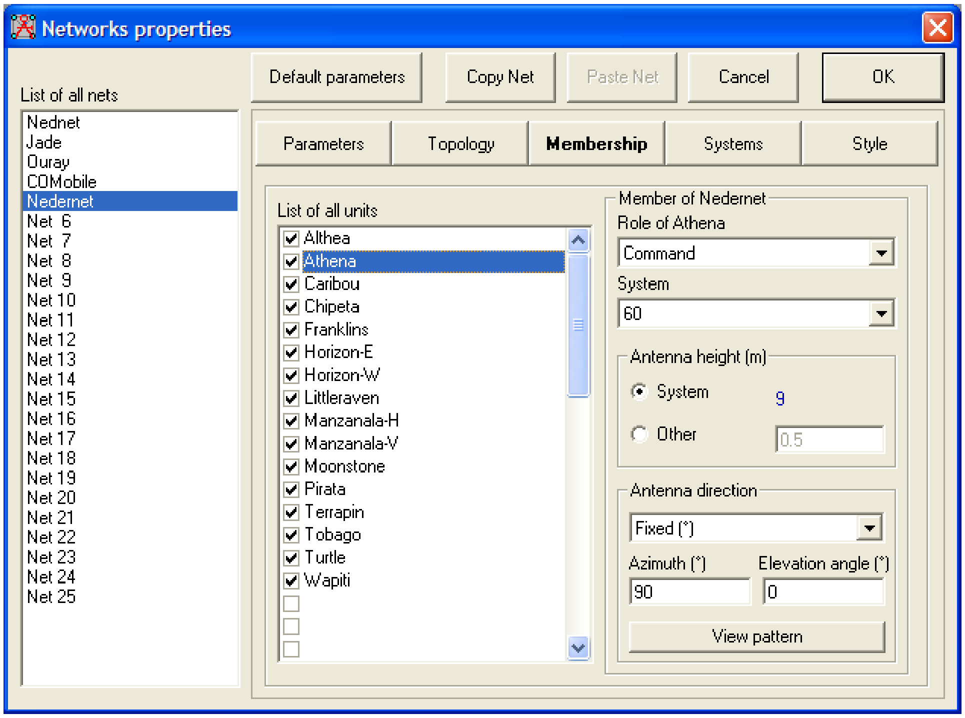
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



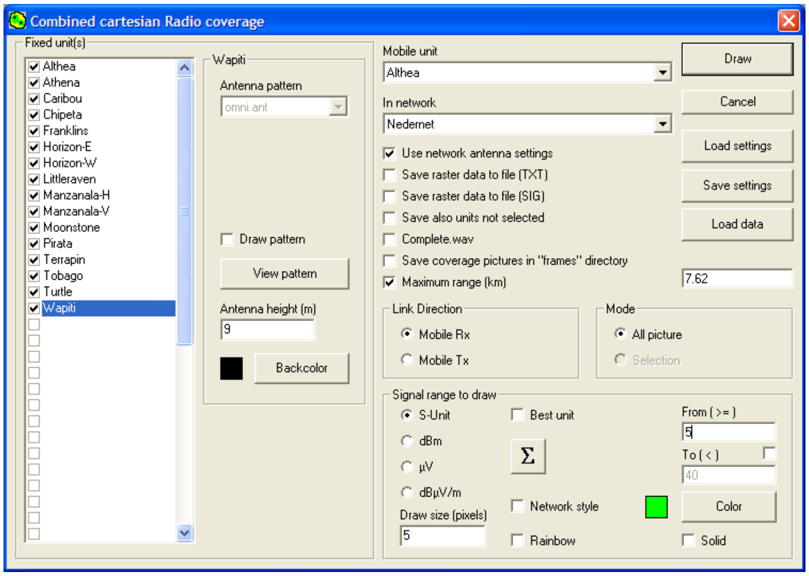
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



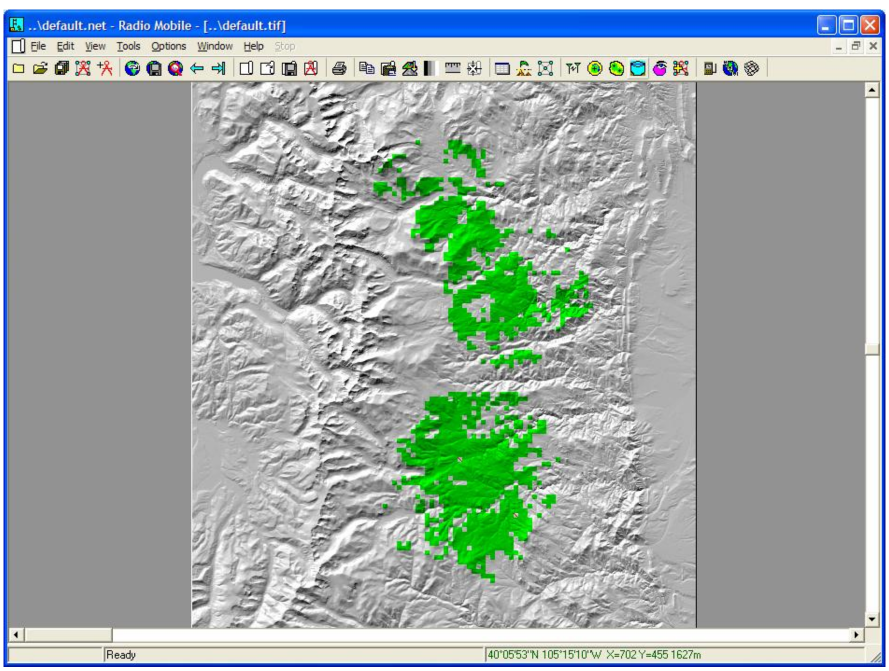
18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:



19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:



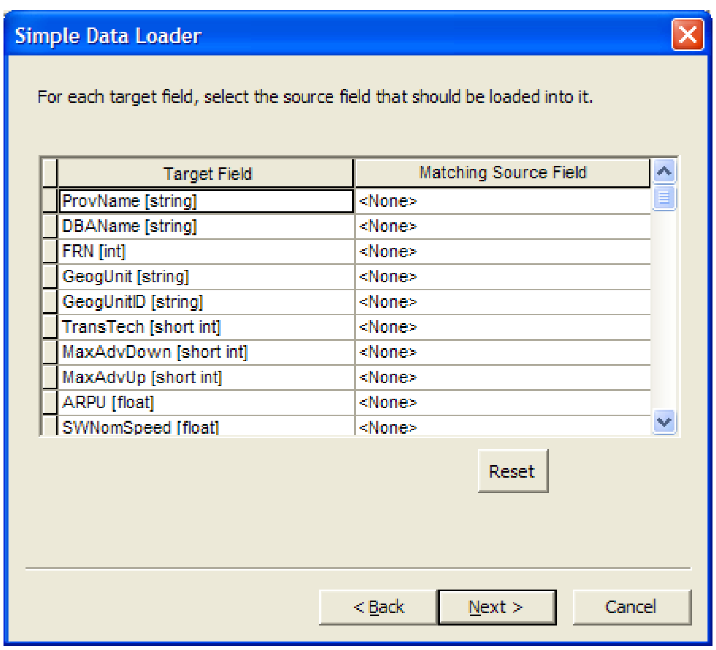
23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.
24) Press Draw.



25) Save the resulting image as a TIF by selecting File>Save Picture as.
26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.

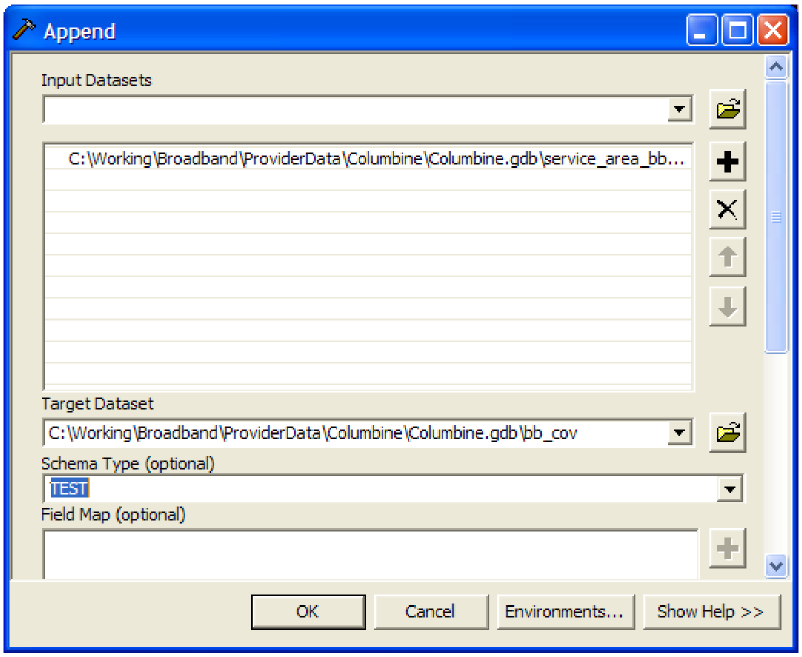
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.
29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.
30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:

31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



    e. Press Next, then Next again, then Finish.
33) In ArcToolBox, go to Data Management Tools>General>Append

34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



35) Leave the Schema Type as TEST

36) Press OK.

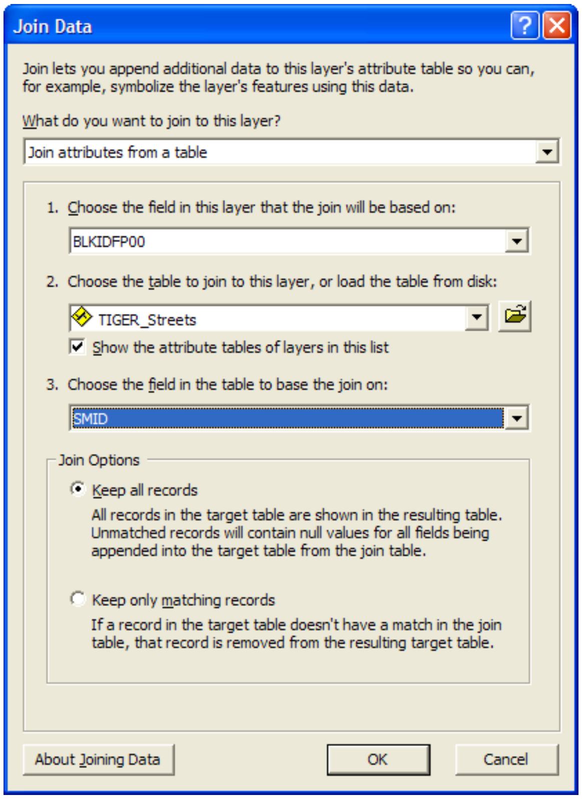
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
      i) Load both data sets into ArcMap
      ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
      iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:



iv) Press OK

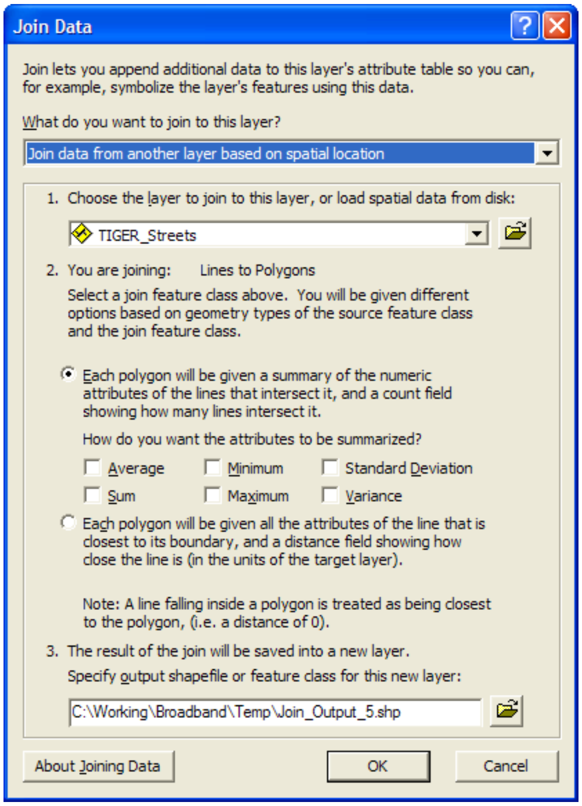
b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID

i) Load both data sets into ArcMap

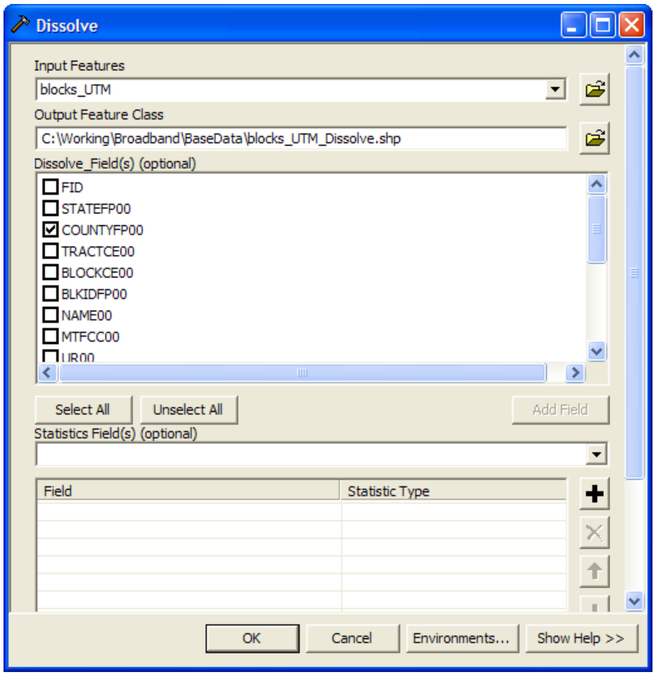
ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join

iii) Select “Join data from another layer based on spatial location” from the dropdown menu

iv) Complete the dialog box as seen below and press OK.



2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
   a) Use the County FIPS code to dissolve by county.
   b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
   c) Complete the Dissolve dialog box as seen below:

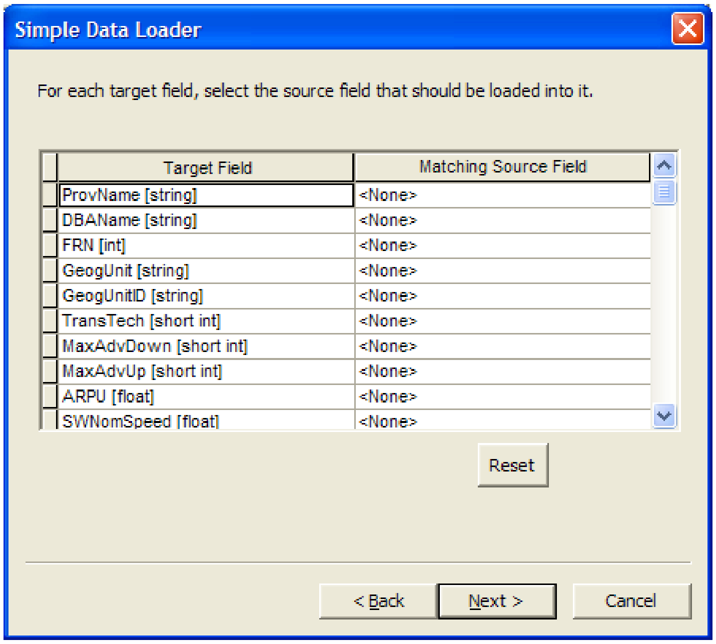


   d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

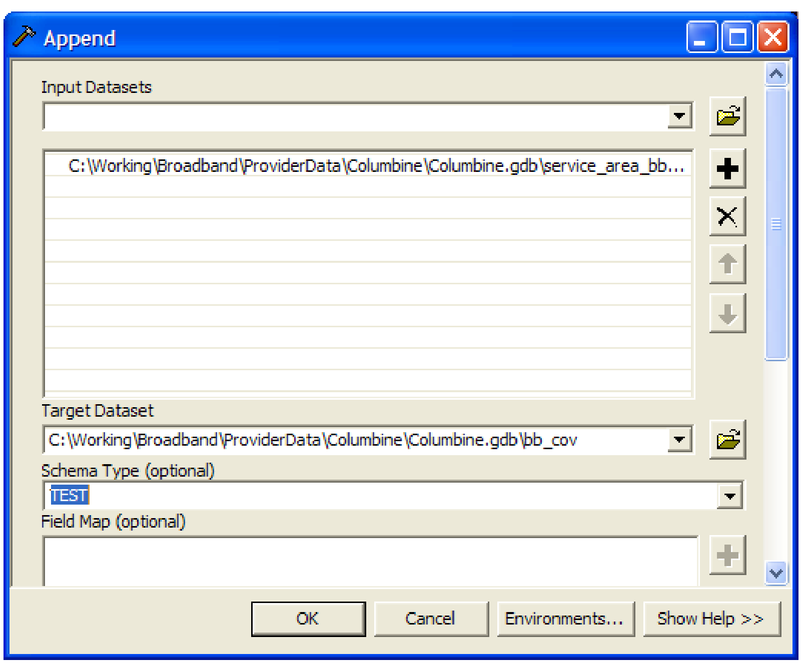
   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



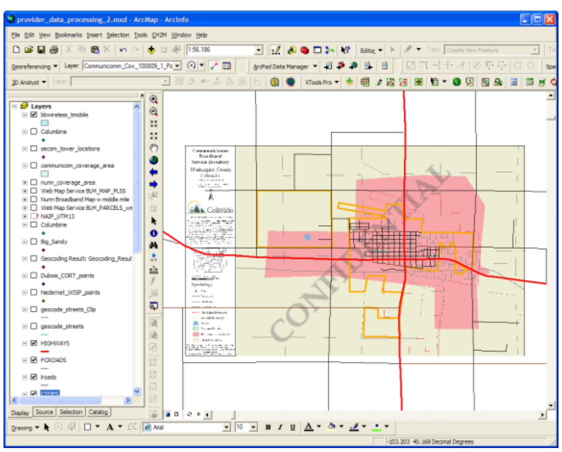
8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

3.5.4 Polygonal Data

3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

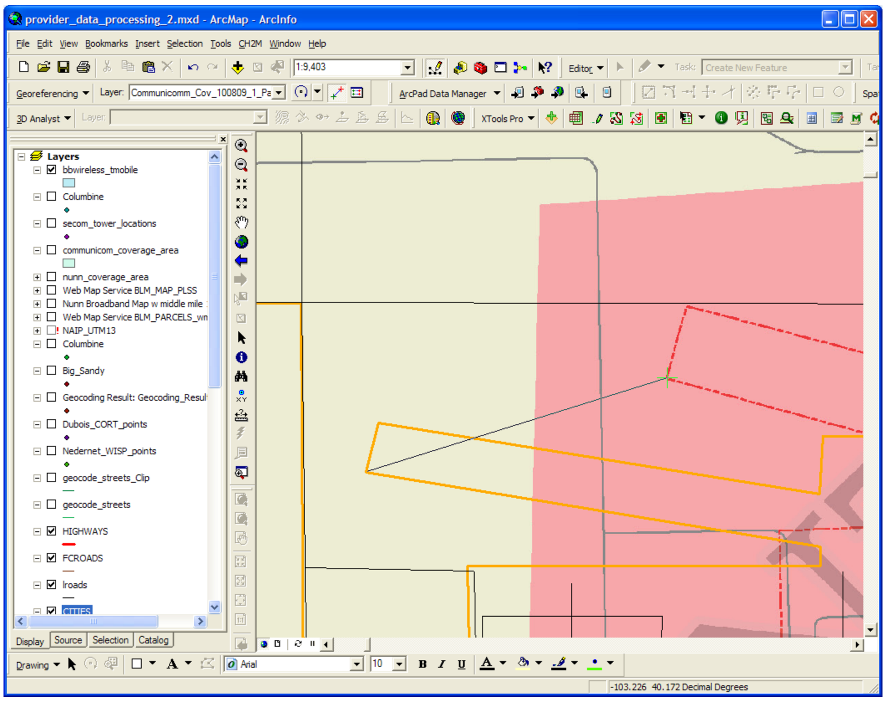
In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

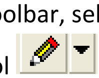
1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
    a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
    a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button to add control points to the map
9) Use common points in the base data set and the JPG image
    a) For example, find major street intersections, county/city boundaries, etc.
    b) Try to distribute the points more or less in the four corners on the image for the best transformation

10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:

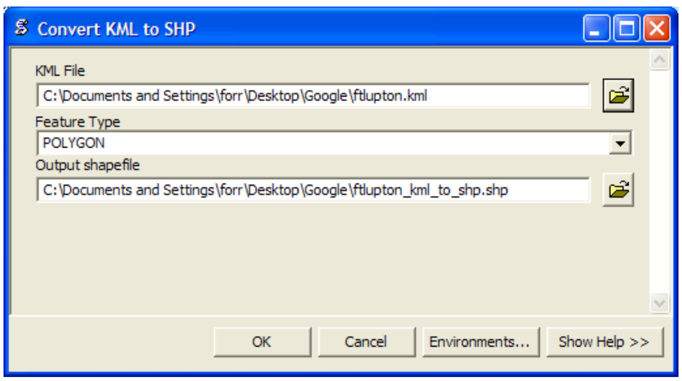


11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a “world” file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to “Create New Feature.”
17) Use the Sketch Tool  to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

1) Use a KML to SHP converter to translate file into an ESRI format
2) http://arcscripts.esri.com/details.asp?dbid=15603
3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

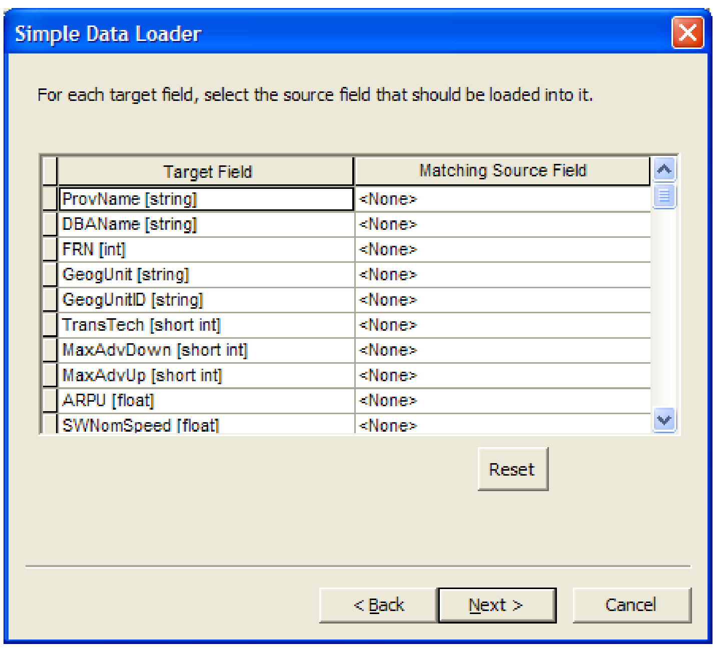
In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
   a) To do so, follow the instructions provided above in "Coverage Area – PDF/JPG/Other Image Format."
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
8) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

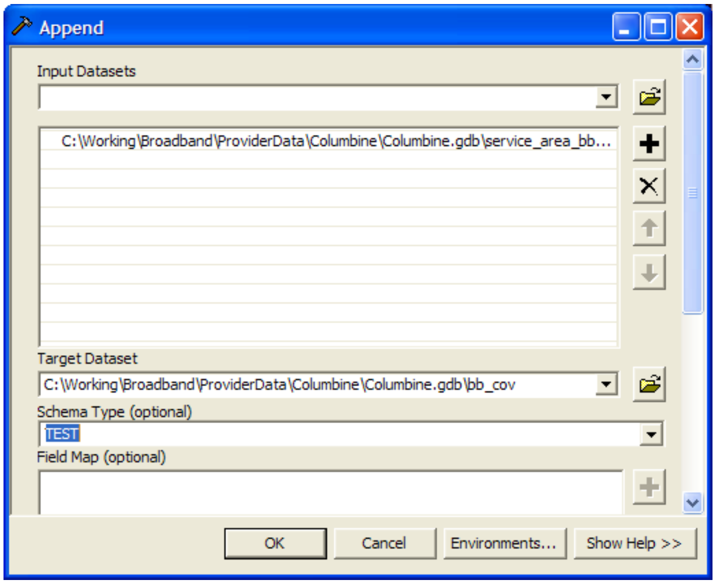
3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



   e) Press Next, then Next again, then Finish.
2) In ArcToolBox, go to Data Management Tools>General>Append
3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state "Composite Locator"

- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.

- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.

- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.

- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

- Un-join the county data from the geo-code subscribers list.

- Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

- Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

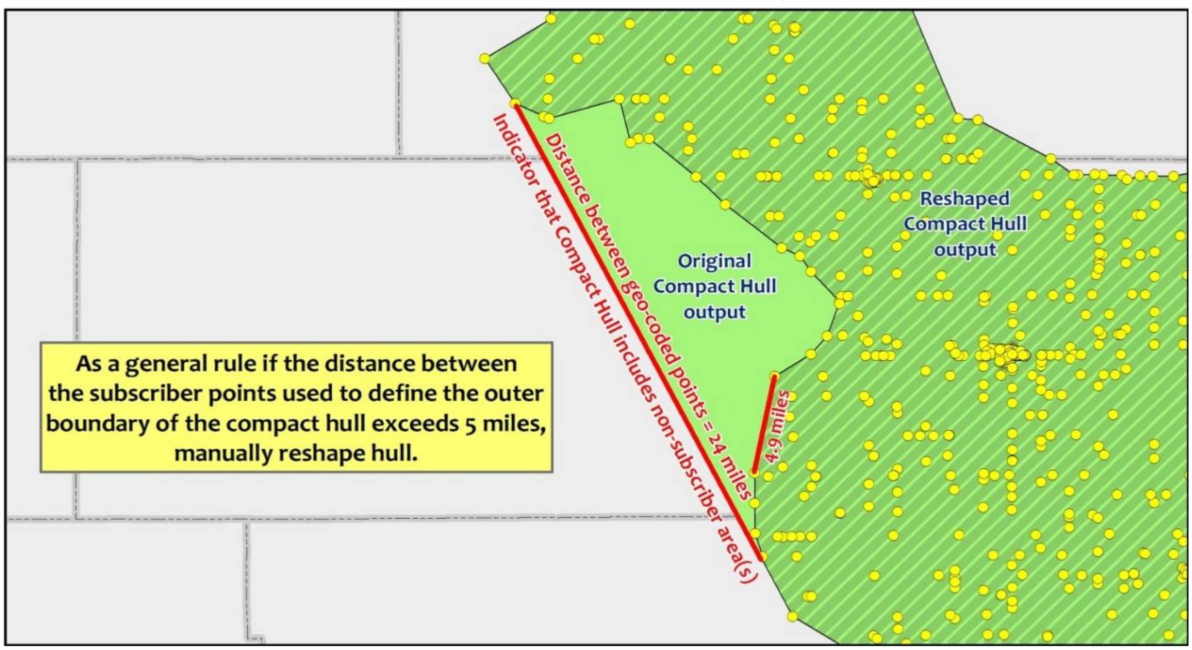


FIGURE 3a- Compact Hull: Manual Resolution Required

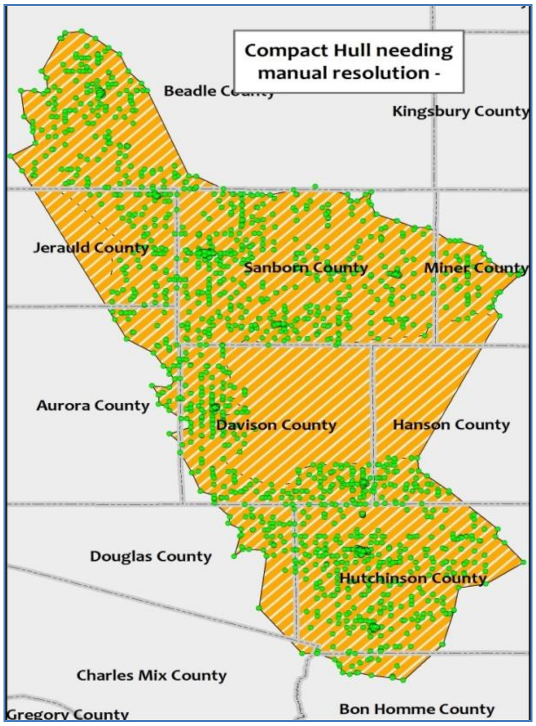
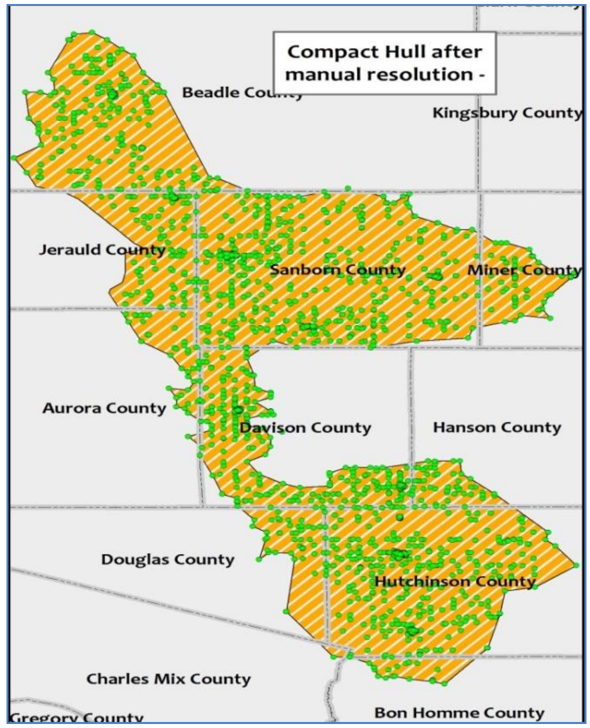


FIGURE 3b- Compact Hull: After Manual Resolution



- To attribute the compact polygon - Perform a "Spatial Join" where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate "stcty_fips" field. Also use the county name field to populate the "BBCov_Name" field.

    - Exceptions is where a provider's coverage is distributed throughout more than one area of any given county where the "BBcov_Name" should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

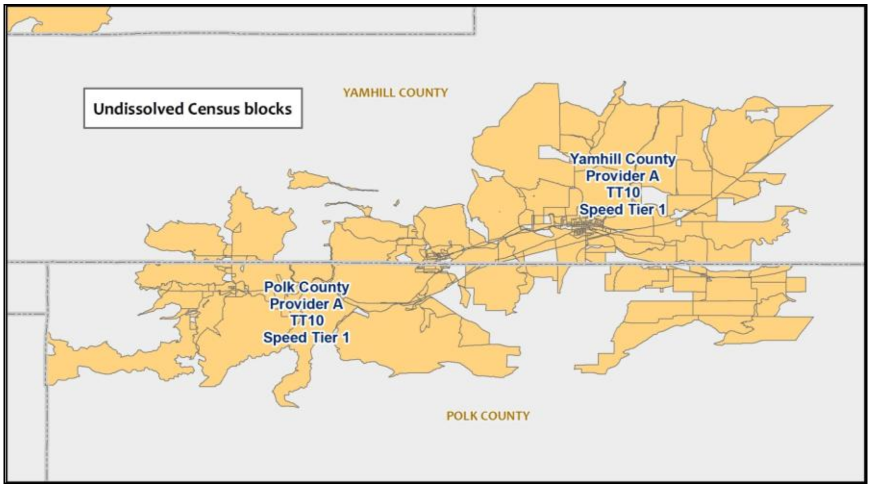


Figure 1: Undissolved census block polygons

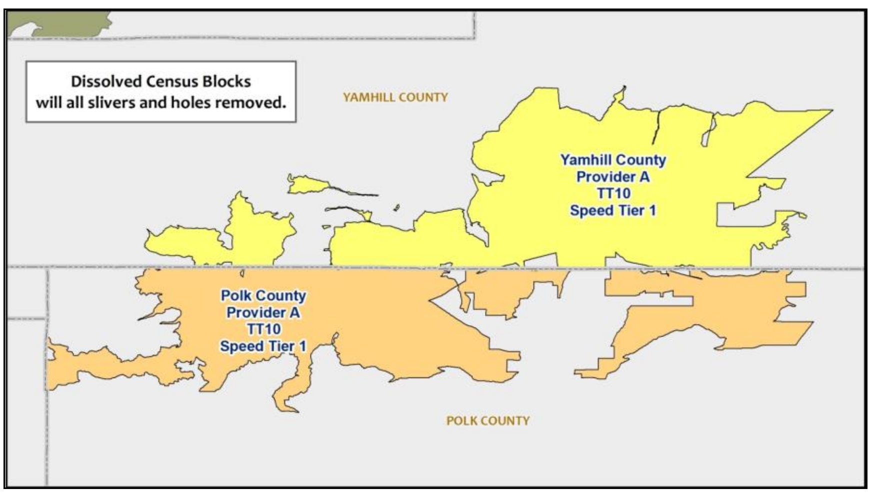


Figure 2: Census block polygons dissolved by county

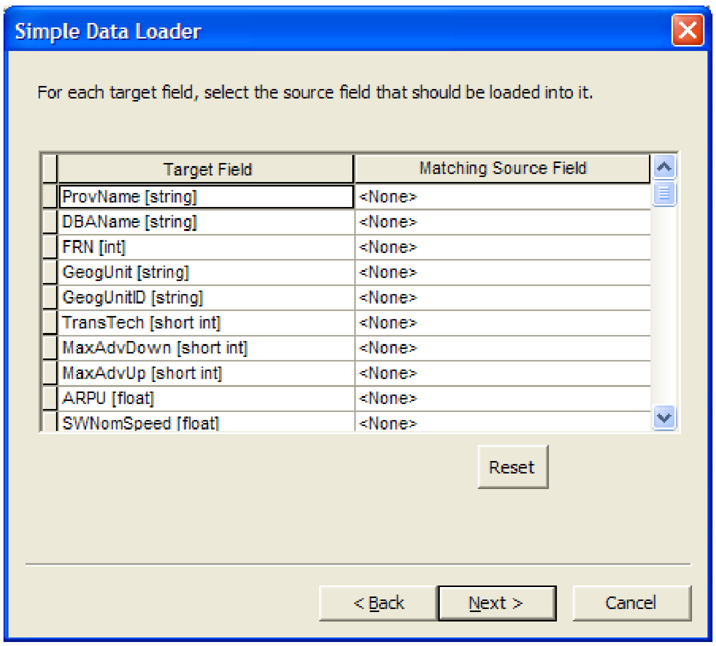
2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.

a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b. Press the Add button, hit Next

c. Accept the defaults and hit Next

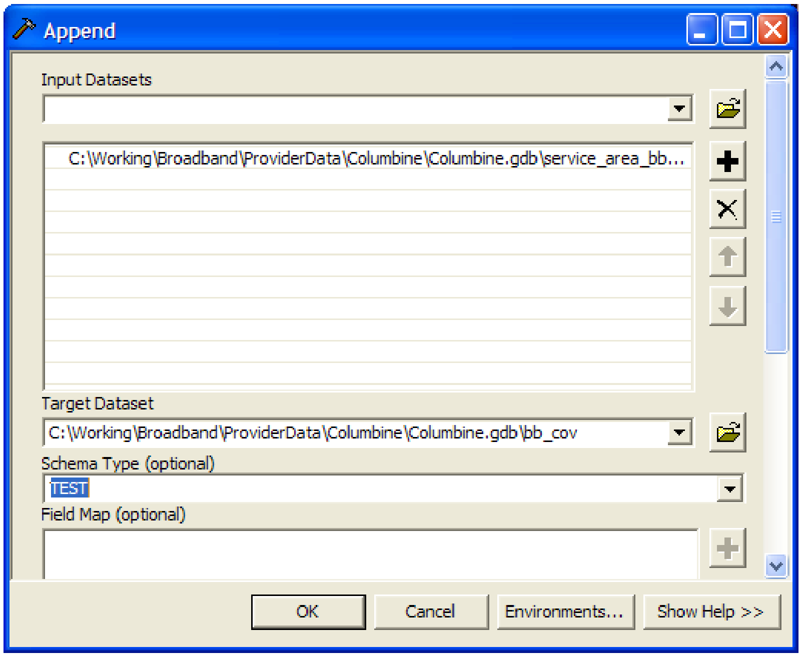
d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

    b. Example of command line:

<path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

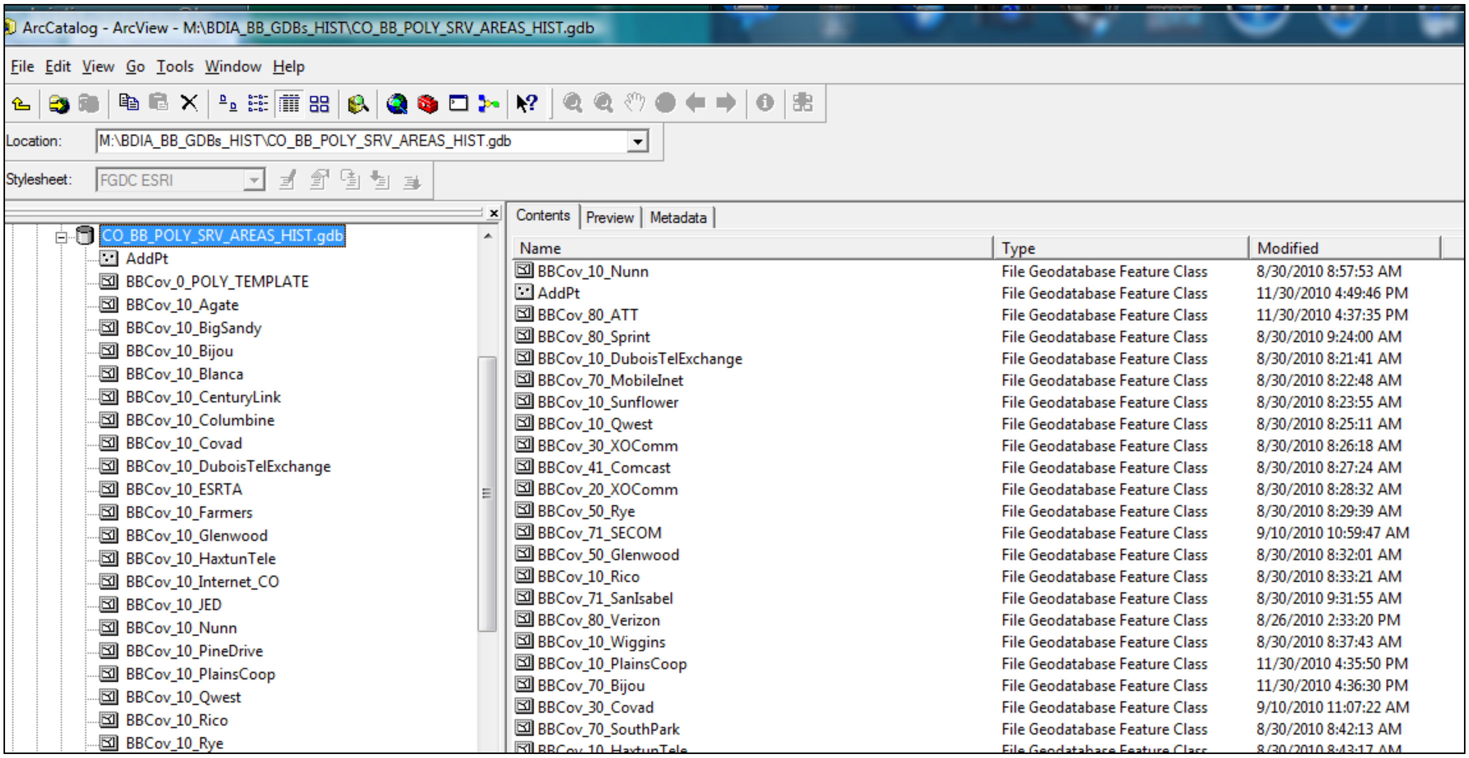
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb
    a. The transactions scripts records changes at a feature level.
    b. Below is a screen shot supporting the directory structure of the historical fGDB.



c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:

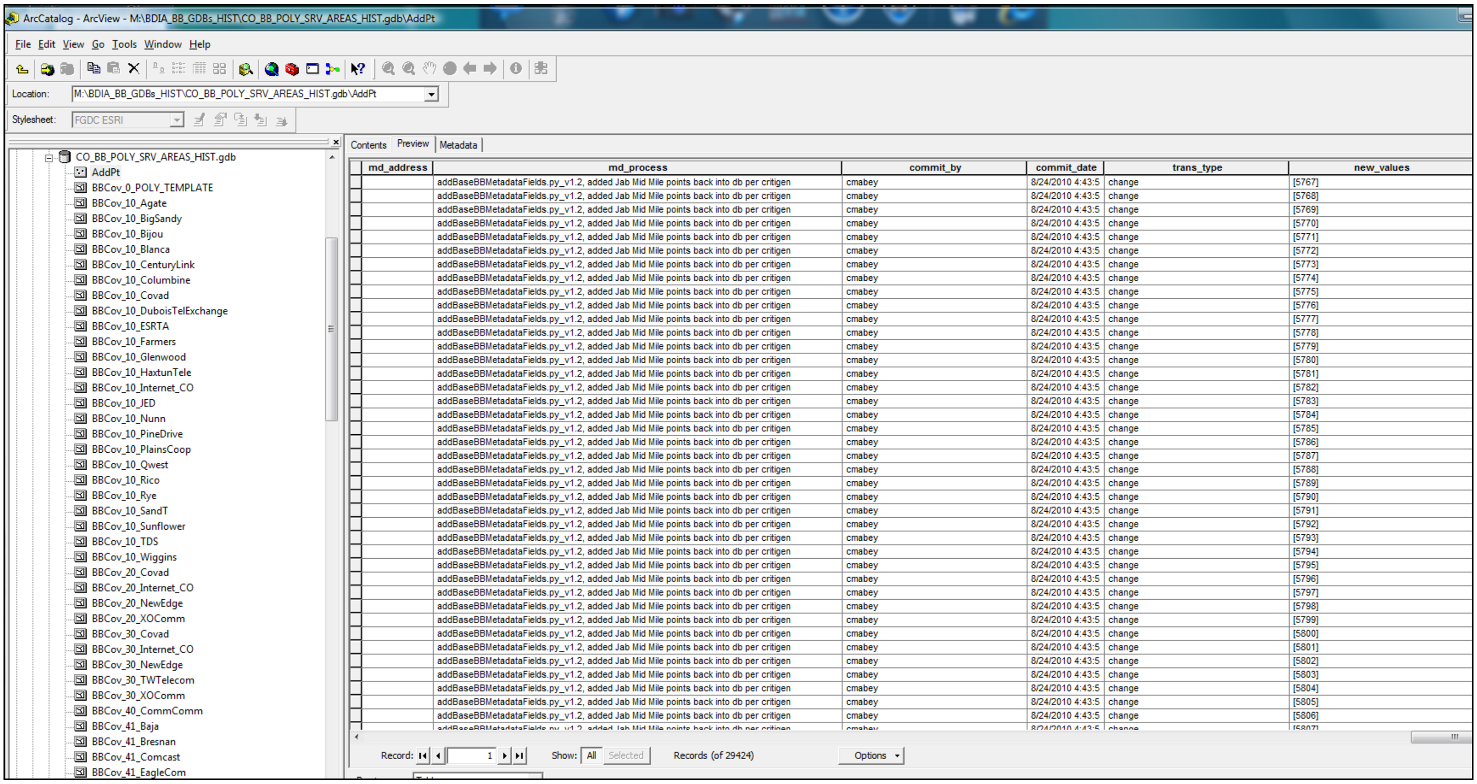
  i. Commit_by
     1. Records the GIS-Analyst that committed the changes to the historical fGDB.

  ii. Commit_date
     1. Records the date and time stamp that the changes were committed.

  iii. Trans_type
     1. This field reflects the type of change recorded.
     2. Categorized by:
        a. Adds/Change/Deletes

  iv. New_values
     1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



md_address	md_process	commit_by	commit_date	trans_type	new_values
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5767]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5768]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5769]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5770]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5771]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5772]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5773]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5774]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5775]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5776]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5777]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5778]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5779]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5780]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5781]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5782]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5783]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5784]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5785]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5786]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5787]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5788]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5789]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5790]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5791]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5792]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5793]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5794]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5795]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5796]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5797]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5798]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5799]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5800]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5801]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5802]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5803]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5804]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5805]
	addBaseBBMetadataFields.py_v1.2, added Jab Mid Mile points back into db per critigen	cmabey	8/24/2010 4:43:5	change	[5806]

3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where the data provider supplies subscriber speed information , the following formula from the NOFA is used:

$$\frac{\text{(speed tier-1 in kbps} \times \text{no. of tier-1 subscribers)} + \text{(speed tier-2 in kbps} \times \text{no. of tier-2 subscribers)} + \text{(etc.)}}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

These obtained or calculated values are used to update the service overview layer. This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer to join to and select Joins and Relates>Join… from the dropdown menu. Then navigate to the table to join to and select the join fields from the drop down list. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.

3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBE R	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)

Name	Alias	Description
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.
This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes. If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.

Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). this is accomplished via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

After the provider has validated its coverage areas, a 3rd party source comparison and analysis is performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments are applied to be reviewed later with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
InfoUSA	Consumer and Business Listings	Community Anchor Institutions Can also be used for demographic information supporting the State websites
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41)
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All findings and results from the above-mentioned validation and verification activities, plus internal peer quality reviews are captured and tracked in a Validation table and form the basis of the confidence value assigned for each provider and then each technology.

The confidence values are as follows:

- 0 = Coverage area has not been reviewed
- 10 = Extremely Low. Single Source QC.
- 20 = Very Low. Needs Additional Validation\Verification
- 30 = Low. Even with Validation\Verification, Coverage is still suspect.
- 40 = Acceptable, confirm with State prior to shipment.
- 50 = Meets requirements to be included in shipment.
- 60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
- 70 = High. Accurate representation of coverage based upon TT.
- 80 = Very High. Multiple validation\verification with most 3rd party sources
- 90 = Extremely High. Multiple validation\verification sources
- 100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_CoItonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.

The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories

- 1: School: K through 12
- 2: Library
- 3: Medical/Healthcare
- 4: Public Safety
- 5: University/College
- 6: Other Government
- 7: Other Community non-government
- None: Unknown Category
  - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately
- Reports out the following counts
  - Total CAIs within that category
  - Total CAIs that contain partial BB coverage
    - Contains any of the following information for given CAI:
      - BB Subscriber, Transmission Technology, Speed Down Speed Up
  - Total CAIs that contain full BB coverage
    - Contains all of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
  - Correct names and format of data deliverables
    - BDIA_QC_SUITES (please see below for details)
  - Correct Projections/Datum
    - Manual interaction with product
  - Metadata Present and Correct
    - Manual interaction with product
- Table Structure
  - All required tables included
    - BDIA_QC_SUITES
  - Extraneous tables identified

        - BDIA_QC_SUITES
- Field Structure
    - All fields included
        - BDIA_QC_SUITES
    - Extraneous fields identified
        - BDIA_QC_SUITES
    - Correct field names, types and widths
        - BDIA_QC_SUITES
- Field Domains
    - Values in all tables are constrained to the specified values specified
        - This action is accomplished via BDIA_QC_SUITES and manual review of the product
        - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
    - Identify if all layers have the correct geometric representation
        - Manual review of the BB_ServiceOverview layer
        - Dependent on NTIA and client requirements
- Geographic Extent
    - Product includes the necessary Geography associated with Product?
        - Manual Review - ArcGIS
    - Is there extraneous geography included in Product?
        - Manual Review - ArcGIS
- Completeness
    - Products contain the expected amount of data?
        - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
    - Product meets the stated accuracy requirements for the deliverable?
        - Sampling procedure to manually review source material to resulting product
        - Provider Validation
        - Verification using 3rd Party Data
        - Verification against reality, where applicable
- Data Regression
    - Any unexplainable data loss or change?
        - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
    - Any unauthorized confidential information included in the delivery?
        - Review of NDAs and delivery expectations
- Prior Issues Resolved
    - Have expected internal issues been resolved?

    - Manual review of data against previous product release notes
  - Have agreed upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium
  - Has the product medium been verified?
    - Manual review
  - All files present
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size
  - Correct location
    - Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries
- which_build – this determines the current build and passes information to the configuration scripts

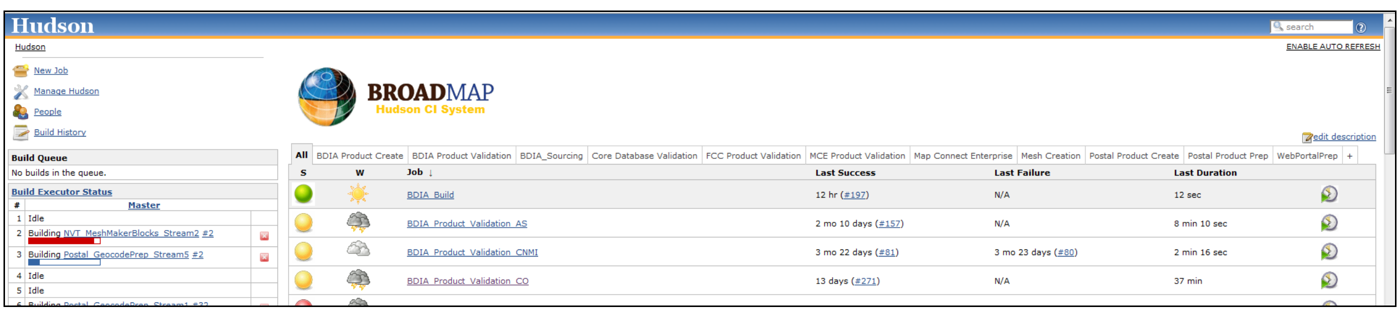
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

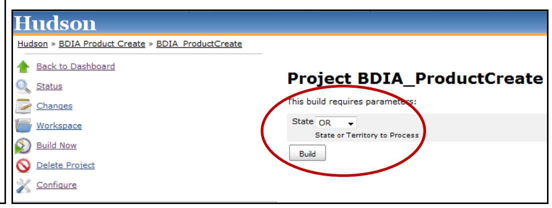
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

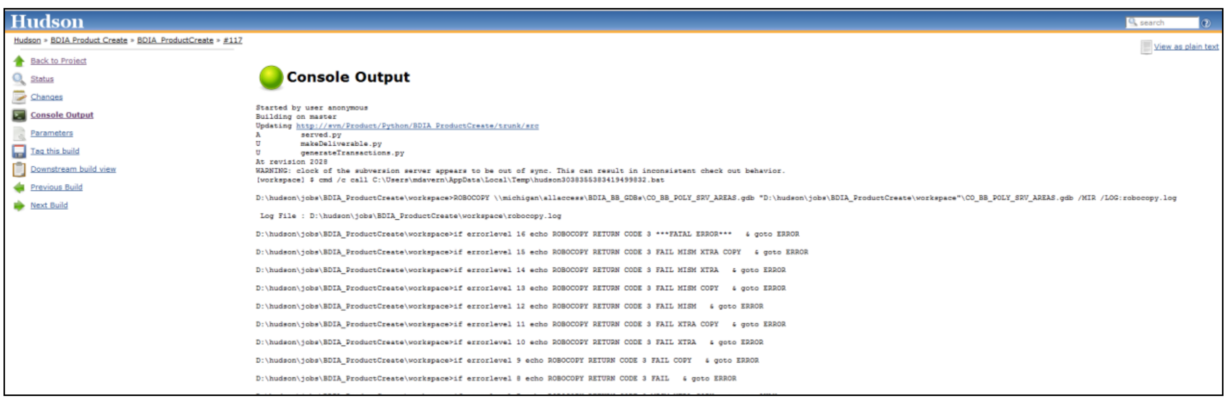
Below is an example of the main page where the type of product build can be selected.



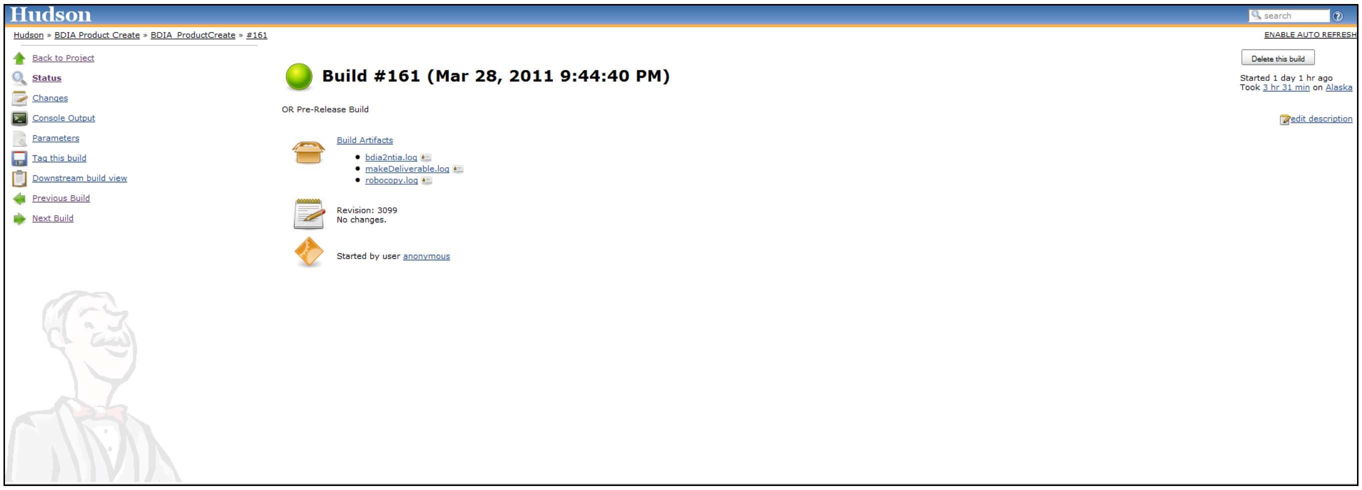
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



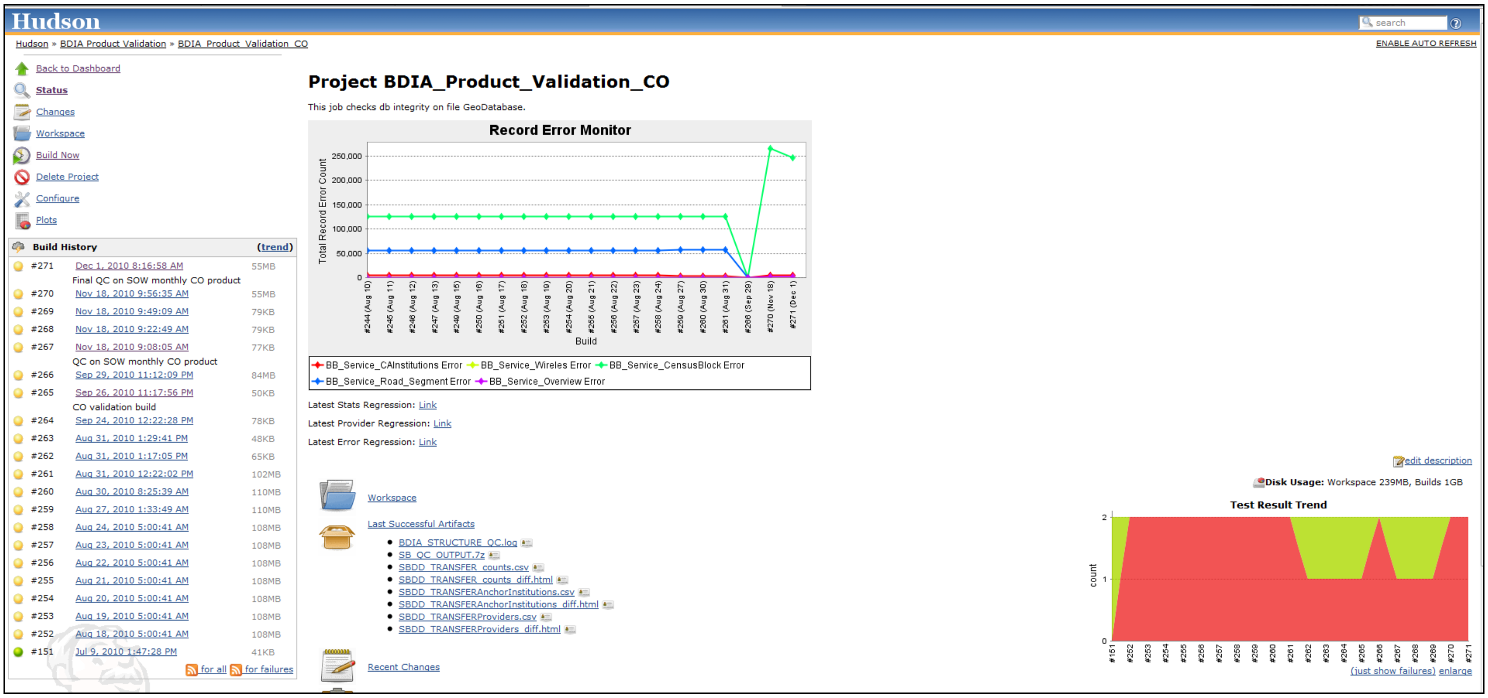
All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



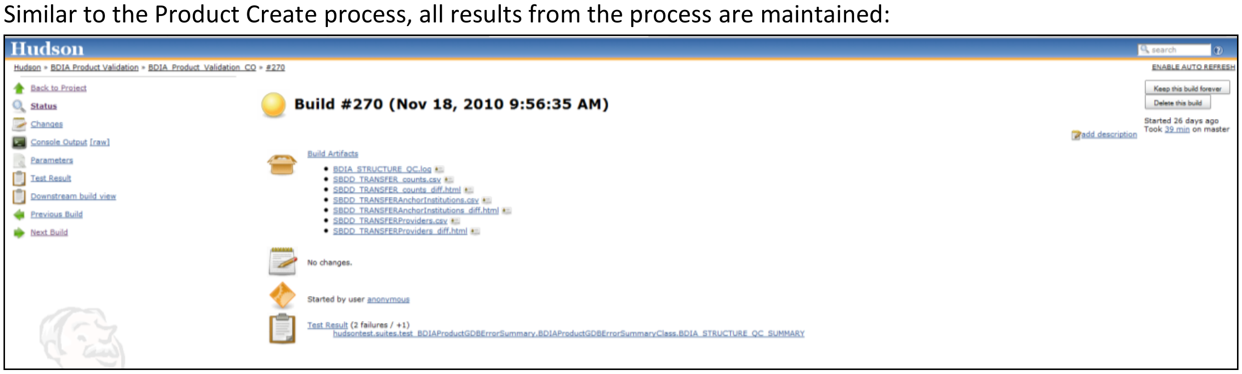
3.10.2 Product Validation and Statistics

Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.
All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

Below is an example of the report provided based on various control points running over a specified time period:

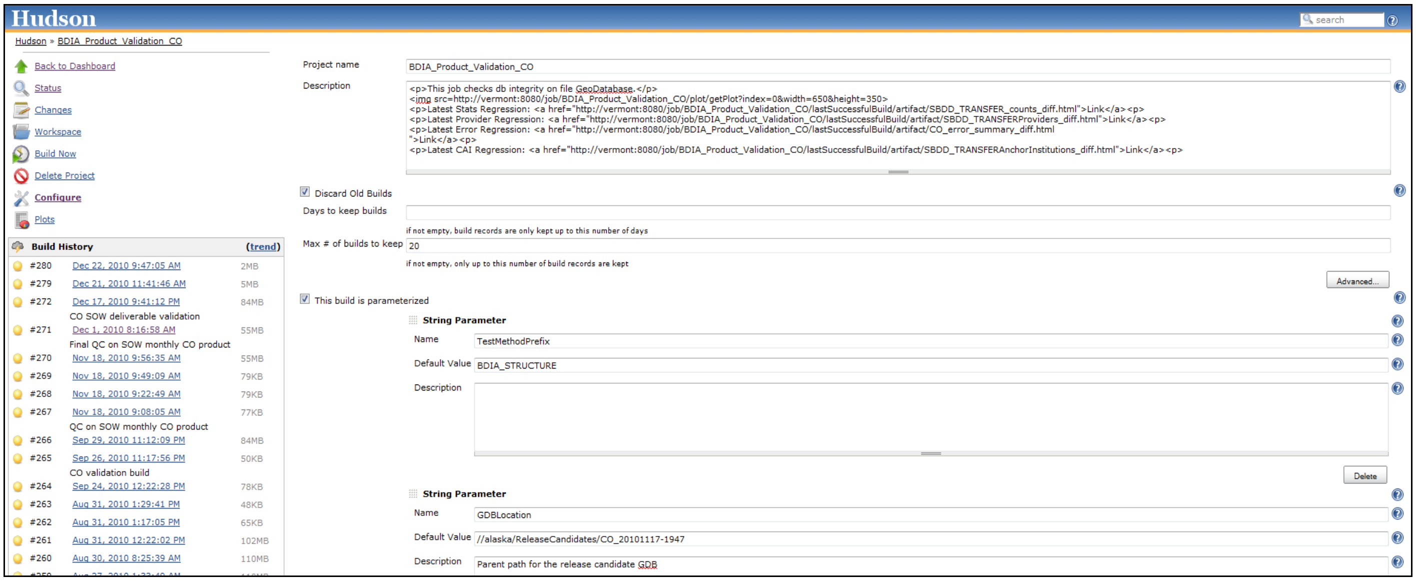


Similar to the Product Create process, all results from the process are maintained:



Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.

Further detail on the Hudson CI System environment can be found by navigating to the following link: http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



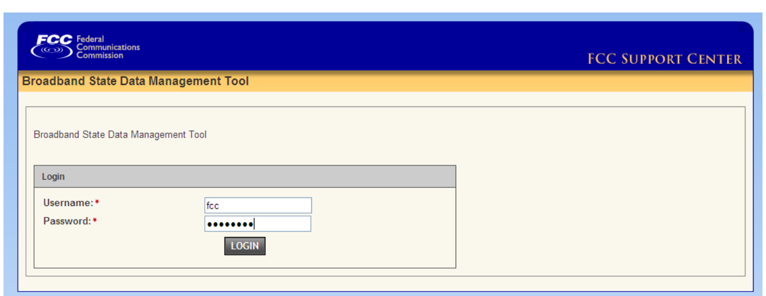
3.11 Product Extract Data Delivery

Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

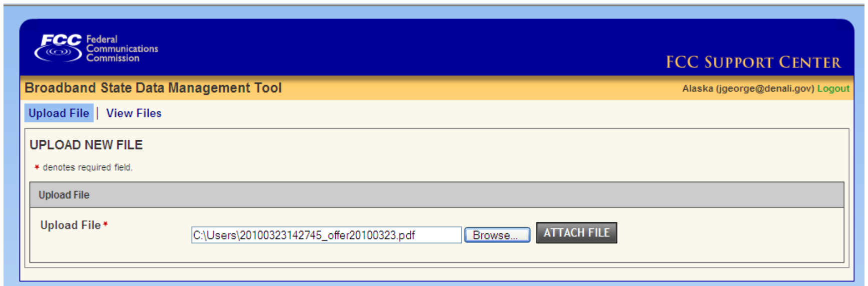
2) NTIA Submittal

   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field

e) Browse to local file for submission using the ‘Browse’ button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen

g) A receipt of submission is emailed to username e-mail address

Montana Broadband Mapping Methodology Report

Submitted To:
Chad Hultin
Montana Broadband Mapping Project Coordinator
Montana Department of Commerce

Submitted By:
Fred Gifford
Tetra Tech EC Inc.
and
Ken Wall
GeoData Services Inc.
March 24, 2011

Executive Summary

The following report describes methods and issues related to the April 1, 2011 deliverables to NTIA for Broadband Mapping in Montana. This data submission is compliant with all guidance and specifications provided by NTIA as of March 24th, 2011. As per NTIA guidance we are using the Jan 13th, 2011 version of the Broadband data model and the March 14th, 2011 version of the validation script.

Montana has developed a very robust operational data model, components of which are described in this report, to support our broadband mapping efforts. We feel our operational model can support any reasonable modifications to NTIA requirements or the NSGIC data model. Since this deliverable format is derived from our operational data model, we anticipate some modifications will be required. We are able to take best practices recommendations from the NTIA and incorporate those into the final deliverable without major modifications of our work flow and operating rules.

Our mapping process starts with infrastructure points (central offices, remote terminals, wireless towers and antenna locations, middle mile and backhaul), cable franchise areas, and anchor institution addresses. When providers have not supplied detailed information of their service areas that can be mapped at the census block level, coverage models are derived dynamically from this infrastructure based on geoprocessing techniques specific to each broadband technology. Examples of geoprocessing techniques include developing propagation models using the Longley-Rice model for wireless coverage and using infrastructure points in conjunction with the road network to predict the area served for DSL coverage.

We have developed a system to quantify “validated” data for the purpose of determining what is suitable for delivery to NTIA. The operational data model maintains reliability and validity codes, together with completeness checks to track which data elements are complete or still in process of refinement. Infrastructure is compared to public data, independent measurements, and telecommunications provider submittals at varying levels of geography. As more data is obtained from providers and systematically checked against infrastructure points, the reliability and validity progress from 1 (not validated or reliable) to 10 (validated and reliable). Completeness is primarily dependent on provider input, and can be supplemented in many instances with independent measurements. The process is iterative. Five of the providers included in this data set submitted infrastructure data at the address level. The remainder have submitted at a coarser geographic scale, most often by census tract, small scale paper or digital map, or generalized town location. Our validation methods provides the ability to use general information and iteratively cross check and improve the coverage models as more accurate data is obtained.

Reliability, Validity and Completeness

Reliability codes apply to the source data points and polygons and assess the authority of the source we obtained the data from and the level or coarseness of the geography (address or town). Validity codes are determined from cross checks of data sources and the number of independent sources of verification. These are as simple as comparing speed test locations against DSL modeled polygons, or as complex as geospatial analysis operations such as a kernel density function cluster analysis. Completeness is determined by public sources, independent measurements or provider submittals and checks on the domain classes required for the final NTIA deliverables such as Technology of Transmission domains, Speed Test domains and serving facility and wireless spectrum facility types and categories. The categories for these, and the subsequent records in our operational geodatabase tables grow and change as new data is obtained. We are maintaining these as feature level metadata tied to points and polygons maintained by analysts and technicians in a wiki table and coding them to the geodatabase. In this way the unique situations that arise can be cataloged and maintained with some level of flexibility while contributing to the final indices in a controlled fashion.

Reliability Codes

The two factors incorporated in reliability codes include the level of geography that was used as a source or provided as a clarification of location and the authority of the source for the information. We are also considering clusters of point information from independent measurements and sources to be higher in reliability than individual point information.

Generally, the coarser the source geography the lower the resultant score. Everything besides an address or street intersection, latitude/longitude location, or location provided in a georeferenced digital source is assigned a reliability score less than 5. This applies to source data coming (e.g. a central office located in a city instead of an address) and review comments on a previously mapped location (e.g. “That location is wrong, I know it is on the south side of town”).

We have incorporated the reliability code into our last point of aggregation (LPA) and provider coverage geodatabase files, and into some of the publicly available data (PAD) geodatabases. We are also carrying a short text field (50 characters) with a descriptive rationale for the score. This will allow us to focus more on the lower scores that need to be confirmed, and ignore the high confidence data scored as 9’s and 10’s.

Reliability Codes		
Code	**Description**	**Detailed Description**
0	Not assigned	• Not yet assigned
1	Level 1	• Checked but unverified
2	Level 2	• County • Presence by other coarse geography (e.g. administrative region)

3	Level 3	• City • Census tracts • Cable Plus (area likely to have been annexed into an incorporated town or CDP)
4	Level 4	• Cable - incorporated • Zipcodes • Census blocks
5	Level 5	• GeoTel unverified • Confirmed by provider or anchor institution key advisor but to geography coarser than address or intersection
6	Level 6	• Qwest/Midcontinent or other web site random testing check • Speed test from individual average residential
7	Level 7	• From anchor institution key advisor Webex • GeoTel verified address only with no 3rd party confirmation from public sources o Building unverified • Speed test from anchor institution
8	Level 8	• From provider • FCC ULS or ARS • Geotel verified address and possibly verified by 3rd party source (Google Streetview) o Another provider's sign is on building (usually Qwest) • Geotel possibly verified by 3rd party source (NAIP, Google Streetview) • From state authoritative public data source (e.g. DCN or SummitNet) o Address or building unverified • Speed test from cluster of average residential
9	Level 9	• From provider with authoritative confirmation • Geotel verified address and verified by 3rd party source (NAIP, Google Streetview) o Provider sign on building o Tower or dish visible • From provider or anchor institution check of our data * Root Wireless
10	Level 10	• From 2+ authoritative confirmations

Validity Codes

We include validity codes in the last point of aggregation infrastructure data which drives creation of the DSL models. We also include validity codes in each of the final technology of transmission deliverables for polygons and point feature classes. The scales of validity vary by each major type and function.

Infrastructure Validity Codes

The purpose of this validity code is twofold:

1. To determine which infrastructure points are turned into DSL model coverages
2. To use as a reference in other coverage validity checks

Infrastructure Validity Codes		
Code	**Description**	**Detailed Description**
0	Level 0	• Not yet assigned
1	Level 1	• Not yet assigned
2	Level 2	• Not yet assigned
3	Level 3	• Checked against MT PSC Report or DSLReports at the town level • Checked against SummitNet anchor institution data
4	Level 4	• Checked against two or more independent public sources at the town level • Checked against provider public data (e.g. Qwest ICONN) at the town level
5	Level 5	• Not yet assigned
6	Level 6	• Confirmation of DSL or cable from authoritative public data to broader geography than address not confirmed by provider
7	Level 7	• Authoritative public data at address level (e.g. Geotel) not confirmed by provider
8	Level 8	• Provider submission at the census tract level • Provider website independent address checks (Qwest, Verizon)
9	Level 9	• Provider submission at the census block level
10	Level 10	• Provider submission at the address level

Final Technology of Transmission Validity Codes

The purpose of this validity code is twofold:

1. To determine which elements are loaded in the spreadsheet provider submission packages in their review
2. To determine which provider coverages are chosen for submittal with one of the NTIA deliverables (April 15, June 24)

Final Technology of Transmission Validity Codes		
Code	**Description**	**Detailed Description**
0	Not assigned	• Not yet assigned
1	Level 1	• Unassigned at this time
2	Level 2	• Unassigned at this time
3	Level 3	• Checked against MT PSC Report or DSLReports at the town level • Checked against SummitNet anchor institution data
4	Level 4	• Checked against two or more independent public sources at the town level • Checked against provider public data (e.g. Qwest ICONN) at the town level
5	Level 5	• Confirmation of DSL or cable from authoritative public data
6	Level 6	• Provider website independent address checks (Qwest, Verizon) • Provider submission at the census tract level

7	Level 7	• Provider submission at the census block level • Provider submission at the census block level confirmed by Speed test cluster OR RootWireless
8	Level 8	• Provider submission at the address level
9	Level 9	• Provider submission at the address level confirmed by Speed test cluster OR RootWireless
10	Level 10	• Provider submission at the address level confirmed by Speed test cluster OR RootWireless

State Specific Issues

The most notable issue specific to Montana is the lack of non-disclosure agreements (NDAs) with the providers. To date no provider has agreed to sign a NDA in Montana due to open records laws in the State. However, the vast majority of broadband providers in the State have elected to cooperate with the project and have provided at least some information about their coverage areas. Where providers have not provided data, or not provided adequate data we have used a variety of methods including modeling, field mapping, and use of public sources to develop map data.

Detailed Processing Steps

BROADBAND COVERAGE (BB_SERVICE_CENSUSBLOCK AND BB_SERVICE_ROAD_SEGMENT)

LOGICAL CONSISTENCY REPORT

Data submitted by broadband providers was accepted as is when it was provided as a broadband coverage or at a census block level. Provider coverage submitted at a coarser geographic scale was supplemented with public data, independent measurements and GIS modeling techniques. When independent measurements were available for typical broadband speeds and modeled location of infrastructure, some provider data was overridden or supplemented.

COMPLETENESS REPORT

All data was submitted by broadband providers was mapped in complete form, except where independent measurements were used to supplement provider submittals. Several providers did not participate in the broadband mapping process, including some that were suspected to be providers.

PROCESS DESCRIPTION

Process final broadband coverage from provider submissions.

Broadband providers that chose to submit coverage data did so in a wide variety of formats, levels of completeness, and at varying geographic scales including: narrative descriptions, analog and digital coverage maps, CAD files, GIS shapefiles and geodatabases, KMZ and KML files, FCC 477 reports, and data spreadsheets. All data formats were accommodated and processed whenever possible.

If data was submitted by a provider in a format that did not allow mapping at the census block level of geography, providers were sent standardized maps that included census blocks and a data spreadsheet in an attempt to standardize the inputs and increase the geographic granularity of the provider data submission.

Although each provider had individual characteristics and nuances in their data submissions, several data patterns can be described generalizing the provider submissions.

FCC FORM 477 REPORT OR SIMILAR FORMAT:

Broadband providers are required to submit FCC Form 477 reports twice a year to the FCC; recently 477 submissions have been done using a structured web site maintained by the FCC. The 477 reports require broadband providers to submit a list of census tracts with the number of subscribers based on maximum advertised downstream and upstream speed tiers. Several providers submitted their actual FCC 477 report or a modified version in analog or digital format.

HOW THEY WERE HANDLED:

FCC Form 477 reports were entered into a standardized format that included the census tract ID code, maximum advertised downstream and upstream speed tier code, and number of subscribers if available. Since the FCC 477 reports requires providers to submit data for all speed tiers within a census tract, only the highest maximum advertised speed for any given census tract was entered into the standardized spreadsheet in order to be compliant with the definition of broadband service. The spreadsheets were then joined to a census tract feature class template that included the attribute fields from the NTIA schema. The resulting feature class was a geographical representation of the FCC 477 report including the technology of transmission and speed information. This feature class was used in conjunction with validated LPA data to run the DSL or Cable geoprocessing models respectively. The resulting census block selection from the DSL or Cable models were added to a standardized review map and returned to the provider for confirmation. When providers returned additional data at a finer level of geographic detail they were processed as census block or coverage provider data as described below. For those that did not respond, the final submission was our best modeled estimates of their coverage at the census block level for DSL and/or Cable technologies. Providers that submitted FCC 477 data for fiber to the end user or fixed wireless could not be mapped and were not included in the final broadband map unless they provided additional data.

PROVIDERS SUBMITTING CENSUS BLOCK COVERAGE:

Census blocks submitted by providers representing their broadband coverage area come in a wide range of formats including: analog and digital maps, CAD files, GIS shapefiles and geodatabases, tabular lists, and spreadsheets.

HOW THEY WERE HANDLED:

All census block submittals were loaded into a census block feature class template that included all of the attribute fields from the NTIA schema. Census 2000 geography was used as required by NTIA. Domain codes were entered in the appropriate attribute field for technology of transmission, maximum advertised downstream speed, and maximum advertised upstream speed. If a provider did not identify the technology of transmission for any given census block or blocks, they were contacted by phone or email in order to obtain this information. In instances where speed information was not included in the data submission providers were contacted and asked to supply this data; in cases where the provider refused to give either the downstream, upstream, or both speeds, the lowest domain code was entered in the applicable attribute field. Standardized confirmation maps were created for each provider by type of technology and sent to the provider for review. Once processing was completed for a provider's census block submission, they were run through an ESRI geoprocessing model that performed several quality control-quality assurance tests and selected census blocks less than or equal to two square miles and road segments that intersected with census blocks greater than two square miles.

PROVIDERS SUBMITTING COVERAGE DATA:

Provider submitted coverage data were differentiated from the other types of geographic data submissions coarser than a census block since they represented the full and explicit range of broadband coverage. Similar to the other types of data submissions, coverage data also came in a wide range for formats including: analog and digital maps, CAD files, GIS shapefiles and geodatabases. Coverage data was submitted by several providers or was available on several providers' websites.

HOW THEY WERE HANDLED:

All coverage data was loaded into a coverage template feature class schema that included all of the attribute fields from the NTIA schema. The method of data loading was driven by the format in which it was received. Providers who supplied GIS shapefiles or feature classes could generally be loaded into the coverage template feature class schema using the simple data loader while CAD data had to be exported to GIS format prior to being loaded into the coverage template. Coverage data supplied as digital or analog maps required georectification and digitizing prior to loading into the coverage template feature class. Domain codes were entered in the appropriate attribute field for technology of transmission, maximum advertised downstream speed, maximum advertised upstream speed, and spectrum. If a provider did not identify the technology of transmission for any given coverage area, they were contacted by phone or email in order to obtain this information. When speed information was not included in the data submission, providers were contacted and asked to supply this data; in cases where the provider refused to give either the downstream, upstream, or both speeds, the lowest domain code was entered in the applicable attribute field. If a provider did not specify the type and spectrum used for fixed wireless the default values for unlicensed were used. Standardized confirmation maps were created for each provider by type of technology and sent to the provider for review. Once processing was completed for a providers census block submission, they were run through an ESRI geoprocessing model that performed several quality control-quality assurance tests and selected census blocks less than or equal to two square miles whose centroid was within the coverage area and road segments that intersected with census blocks greater than two square miles were clipped to the coverage area. Providers who submitted customer locations typically fell into four categories. Some were submitted as AutoCAD files where the points could be transferred to the GIS, then spatially joined to the census blocks they were located within. Others submitted maps in image format that were georectified in the same manner as other images, then census blocks were selected by an operator viewing the customer point images underlying the census blocks. When customer lists were submitted, they were loaded in a database and geocoded using ESRI Business Analyst USA Geocoding engine based on TeleAtlas road features. The geocoded points were subsequently treated identically to customer locations submitted in GIS or CAD format, and spatially joined to the census block template file.

OTHER LEVELS OF COARSE GEOGRAPHIC SUBMISSION:

This category had a wide range of submissions. The most common was as telephone exchange areas or equivalent, wire centers, zip codes, counties or general references to towns or cities. The problem with these submissions was that often a given polygon overlapped a census block or multiple blocks, and in most cases, they were much larger geographic entities than a census block.

HOW THEY WERE HANDLED:

Operational rules established early in the project did not allow provider coverage data that significantly over-represent provider coverage. Those providers that submitted coverage area by geographic features coarser than a census block that crossed county lines were not able to be processed. No interpolated data was used to calculate this data, if the data was not submitted by a provider in a format capable of processing the data was not calculated for that provider. Some providers who submitted broader geography initially that also were represented in the last point of aggregation infrastructure point file were sent estimated census block coverage maps and spreadsheets, and provided a second submission with finer level geography. Providers submitting town locations for DSL or Cable were handled differently, and used as validation for central offices from the last point of aggregation table, and subsequently to run the DSL modeling routine or validate a cable or cable plus areas. In instances where no infrastructure was identified with a reliable location (no verified street address or visual location), if it was a small town, typically smaller than 3 miles in width or length, then the DSL model was applied.

Final processing was the same regardless of the source process to derive provider coverage to the census block level. All technology of transmission types except fixed and mobile wireless was handled in a similar fashion. Outstanding questions remain to NTIA about fixed wireless, as to whether that technology fit in table 1(A) or in 1(B). No answer has been forthcoming, so we chose to include those in table 1(B). For DSL, Cable, Copper Wire and Fiber to the End User, the census block coverages were split into two categories, those less than 2 square miles, and those greater or equal to 2 square miles.

Those less than 2 square miles in area were left intact as census blocks. The census block coverage files greater than or equal to 2 square miles were intersected with the Tiger 2009 road files, splitting the Tiger road files at the census block boundary. A subsequent spatial join allowed the transfer of the data attributes in the census blocks greater than or equal to 2 square miles to be transferred to the Tiger road segments intersecting the census block coverage.

Based on comments made by NTIA in several of the webinar sessions, the preference was to use 2000 census topology and 2009 Tiger road files. The final NTIA NSGIC geodatabase that was recommended by NTIA as a preferred delivery format had parsed street attribute fields in the geodatabase schema. The Tiger 2000 roads had parsed street segment database fields for address, prefix, suffix, etc. The Tiger 2009 road data carried these as one field labeled "FULLNAME". The state does not plan to geocode using Tiger 2009 files, so it was not practical to do the large amount of manual work to parse the FULLNAME address field into individual components.

PROCESS DESCRIPTION
Solicit census block level broadband coverage areas from providers who initially submitted more generalized geographic coverage.

Several providers initially sent coverage at a broader level of geography than required, typically census tracts, telephone exchange areas, or zip codes. With public and commercial data on infrastructure, DSL and Cable models were prepared for each of these providers with best estimates of their coverage down to the finer granularity of a census block, along with the standardized spreadsheets with the details on each census block in the model. A dynamic web based map service was also made available to assist them in identifying census blocks and tracts with a Google map backdrop. Several providers subsequently used these tools and other analysis to submit more detailed coverage and data attributes in a second submittal.

PROCESS DESCRIPTION

Model Cable coverage (technology of transmission codes 40 & 41).

An ESRI geoprocessing model was created to generate coverage areas for Cable providers who did not submit census block or coverage data (i.e., census tract providers).

The most authoritative GIS layer available from the state with incorporated areas and city boundaries was used as a surrogate to model cable broadband coverage. Municipalities and towns were sporadic in their digital update of these maps, since annexations and other boundary modifications were ongoing and difficult to maintain in real time updates. To compensate, likely areas contiguous to these city boundaries were added, labeled "Cable-Plus" in the operational data model. These additional polygons were determined using operator interpretation, road density, structures points from Info USA in ESRI Business Analyst, and in some instances NAIP imagery. In general areas were added that were immediately contiguous to existing city or town boundaries that represented likely areas where cable service existed.

Cable broadband providers primarily work under the structure of franchise agreements with municipalities. Phone calls were made to the largest cities in the state in order to obtain that respective city's cable franchise agreement. They were all either unknown or a text agreement without maps.

The full set of potential cable areas were then passed through validation sources to determine if cable was provided. This included public sources, such as the Warren Communications Cable Fact book (http://www.warren-news.com/factbook.htm).

The second and most authoritative form of validation was data received from cable providers at the census tract, block, or coverage level of geography. A spatial join geoprocessing operation was performed on these datasets with the full set of potential cable coverage areas in order to further validate areas with cable coverage.

The third source of validation came from the public speed test site maintained throughout the project. Whenever user submitted speed tests identified cable modem broadband service near or adjacent to existing estimated cable areas, the cable-plus boundaries were expanded using the same method of digitizing outlined above.

It was not possible to differentiate between technology of transmission codes 40 and 41 using this indirect mapping method. The only authoritative way to determine this information was from data submitted by a provider. In all cases where the provider did not indicate the type of cable modem technology being used, the code for Cable Modem-Other (41) was assumed.

PROCESS DESCRIPTION

Model DSL coverage (technology of transmission codes 10 & 20).

An ESRI geoprocessing model was created to generate coverage areas for DSL providers who did not submit census block or coverage data (i.e., census tract providers). This model is based on typical DSL technology which can provide service up to 18,000 feet from a central office or remote terminal, unless otherwise specified by a provider. Since DSL lines are typically buried alongside roadways, underneath roadbeds, or strung on aerial telephone lines which tend to run alongside a road, a GIS dataset of a state's road network could be used as a surrogate to model DSL areas. Commercial (GeoTel) and publicly available data sources representing last points of aggregation (LPA) for DSL were collected including central offices and remote terminals. Each LPA was validated based on publicly available data, provider data, and independent measurements; LPAs were used in a DSL model only if they were supplied directly from a provider or could be verified by two or more sources. The actual geoprocessing model used the validated central office and remote terminal locations to generate a raster cost surface based on all of the available roads radiating out 18,000 feet from each active LPA point. The raster coverage was converted to a polygon feature class and a small back-buffer was applied to achieve the final DSL coverage polygon representing a provider's maximum possible DSL coverage area. The DSL coverage areas were then used to select intersecting census blocks and

Remote terminals were provided or publicly available for only a small number of providers, therefore this method may tend to underestimate the full DSL coverage.

It was not possible to differentiate between ADSL or SDSL based on the LPA data; the only authoritative way to determine this was from data submitted by a provider. In all cases where the provider did not indicate which type of DSL service was being provided, the technology code was assigned to 10 "Asymmetric xDSL".

Process Description

Public broadband data research.

Provider presence maps were developed for central office locations and incumbent local exchange carrier locations for all assumed providers in the state. These were identified through a commercial spatial database purchased from GeoTel Inc., and supplemented by other public data sources such as the State's Public Service Commission and DSLReports.com. These were intended to be "talking maps" and general intelligence on where providers have infrastructure for subsequent phone and written communications with providers. These maps were compared to counties served by provider in the state's telecommunications association directory.

Web site research, review of materials submitted to the state by providers, and public websites, such as the FCC were researched for each provider.

Process Description

Solicit census block level broadband coverage areas from providers who initially submitted more generalized geographic coverage.

Several providers initially sent coverage at a broader level of geography than required, typically census tracts, telephone exchange areas, or zip codes. With public and commercial data on infrastructure, DSL and Cable models were prepared for each of these providers with best estimates of their coverage down to the finer granularity of a census block, along with the standardized spreadsheets with the details on each census block in the model. A dynamic web based map service was also made available to assist them in identifying census blocks and tracts with a Google map backdrop. Several providers subsequently used these tools and other analysis to submit more detailed coverage and data attributes in a second submittal.

Community Anchor Institutions (CAI)

Logical Consistency Report

All institutions on the initial draft spreadsheets used for the first two submittals were geocoded using ESRI Business Analyst Desktop with the USA Geocoding engine using TeleAtlas premium road features. This was judged to be the best available geocoding source for batch processing of addresses. No commercial source is 100% accurate in a primarily rural state such as this with low population numbers compared to other states and no large cities or metropolitan statistical areas. In every round of geocoding we used conservative matching criteria, and maintained and stored the type of match (building match, address match, or zip code match), along with a record of those not matching and not able to geocode.

COMPLETENESS REPORT

All geocoding is dependent on accurate road locations and complete and accurate street segment attribution. The GIS road layers available from the state were not judged as complete as the premium commercial sources. The Tiger 2009 road files, while spatially comparable to the commercial sources, have a large percentage of null values in the database attribution and street segment address ranges necessary for accurate geocoding. As in most parts of the country, geocoding is more accurate in urban settings than in rural routes. Complicating the process in a rural state for anchor institutions are the situation where some anchor institutions, such as public safety anchors are often staffed by volunteer staff and a post office box is the only valid address, and the physical address is wherever the public safety equipment is parked or stored at any given point in time.

PROCESS DESCRIPTION

Acquire lists of community anchor institutions.

Lists were obtained from the state and affiliated processional organizations for anchor institutions to be included in the broadband mapping in each of the community anchor institution community code categories. These were sorted and cross referenced and an initial round of elimination of duplication was accomplished.
PROCESS DATE 2010-06-15

PROCESS DESCRIPTION

Create and publish and process user speed test web site.

Created a public facing web site allowing anchor institutions to complete a brief survey and run a speed test on their connection using the Ookla speed test. The speed test site allowed a user to enter their location as an address on a simple Google map driven interface, and subsequently choose to move the location if it did not geocode to their satisfaction. Users were asked to select their technology of transmission from a list, enter their provider as a free text field, complete an optional questionnaire, and run a standard speed test on their connection. Behind the scenes, the date and time, and IP address of the user were captured.
All speed tests were geocoded, and the IP address was looked up in batch mode in the WHOIS database returning one or two providers registered with WHOIS. All speed tests registered between March 3, 2010 and February 14, 2011 were cleaned and analyzed against provider submissions and models.

A final provider assignment was assigned by examining the WHOIS fields, and the provider submitted by users.

There was considerable variation in the technology of transmission reported by users taking the speed tests. A final connection field was created and in most cases, the user selection was carried into this field. If a provider had only one confirmed technology of transmission, than all technologies listed by users were standardized to that, otherwise the user selection was carried. The state chose to not use the speed test data for an authoritative determination of the question if the institution subscribes to broadband service at the location. This was due to variability in user responses, the anonymity of the user submission and the lack of a practical mechanism for authoritative user identification. In future maintenance updates, the intent is to use the speed tests for anchor institutions in aggregate generalized analysis.

PROCESS DESCRIPTION

Geocode addresses and attribute anchor institutions.

All institutions on the initial draft spreadsheet were geocoded using ESRI Business Analyst Desktop with the USA Geocoding engine using TeleAtlas premium road features. This was judged to be the best available geocoding source for batch processing of addresses. No commercial source is 100% accurate in a primarily rural state such as this with low population numbers compared to other states and no large cities or metropolitan statistical areas. All geocoding is dependent on accurate road locations and complete and accurate street segment attribution. The GIS road layers available from the state were not judged as complete as the premium commercial sources. The Tiger 2009 road files, while spatially comparable to the commercial sources, have a large percentage of null values in the database attribution and street segment address ranges necessary for accurate geocoding. As in most parts of the country, geocoding is more accurate in urban settings than in rural routes. Complicating the process in a rural state for anchor institutions are the situation where some anchor institutions, such as public safety anchors are often staffed by volunteer staff and a post office box is the only valid address, and the physical address is wherever the public safety equipment is parked or stored at any given point in time.

PROCESS DESCRIPTION

Assign community anchor institution category codes.

Category codes were assigned based on the original source list and from keywords in the name of the institution and independent research. Technology of transmission and advertised speeds were obtained when possible, which initially was entirely based on the anchor institutions maintained by the state for consortiums providing state service contracts. Two iterations were accomplished with these state maintained lists, and all available attributes were obtained with assistance of the state analysts.

PROCESS DESCRIPTION

Cross reference anchor institutions against public data, research data attribution and delete duplicates.

After initial data collection, analysts worked on researching, calling and improving the addresses for those below an 80% match criteria. Many on the 70 percent matching range were fairly accurately located. The difference between a 70% and 80% match typically occurred when an address lacked a prefix or suffix cardinal direction on a street that had two cardinal directions (example 101 1st Street, on a street segment with 101 N. 1st Street and 101 S. 1st Street). Analysts were also able to obtain physical addresses for some lists supplied by the state with only a P.O. Box.

PROCESS DESCRIPTION

Final geocode addresses with corrections.

The lists with updated and corrected addresses were re-geocoded for the final mapping effort, and any anchor with any level of geocoding was included on the final map. The operational database identifies the type of match, so future maintenance cycles can be prioritized and targeted to those matching only zip codes or with address changes.
PROCESS DATE 2010-06-15

PROCESS DESCRIPTION

Overlay all remaining anchor institution points via spatial join on broadband coverages unioned and dissolved by concatenated provider/technology of transmission combinations.

Geocoded anchor institutions were spatially joined to unioned and dissolved concatenated provider/.technology of transmission combination broadband coverages. This provided some level of validation that an anchor at least was located within an area of available broadband coverage.

PROCESS DESCRIPTION

Populate technology of transmission, availability of broadband service, and maximum advertised download and upload speeds.

From the results of the previous step some attribution of database attributes for attributes with null values was accomplished. This step was rule based. The attribute of whether an anchor institution subscribes to broadband service could only authoritatively be answered yes, if the information was provided by the state, or a confirmation from an anchor speed test could be matched. Those anchors that were located within an area covered by a DSL, cable, other copper or fixed wireless were also assumed to have the ability to subscribe to broadband coverage and were also estimated to be subscribers. Assigning the technology of transmission and the advertised speeds (which required identifying a provider for the anchor institution) was only possible on a subset of all coverage in those areas where only one provider/technology of transmission was present. This allowed a few hundred more anchors to be identified, but typically only occurred in rural settings. Most urban settings had multiple providers. In addition many providers submitted multiple technology options, so identifying one provider/technology of transmission combination was not possible even if there was only one provider possible for the anchor institution.

It is likely that in some instances in the rural settings and small towns an anchor institution may rely on mobile wireless broadband. This is common in public safety mobile equipment such as vehicles, but likely less common in anchor facilities. For the purpose of assigning attribution to anchor institutions with remaining null attributes, we took a conservative approach and did not overlay anchor institutions on mobile wireless coverages to assign attributes.

PROCESS DESCRIPTION

Maximum advertised downstream and upstream speeds were not available or collected for any of the CAIs.

A new domain value of "U" for Unknown was added to the data model for the current submission, and all values formerly coded as 0, were changed to "U".

PROCESS DATE 2011-03-01

PROCESS DESCRIPTION

A new optional attribute was requested by NTIA for the current submittal requesting knowledge about the presence or absence of WIFI at the CAI location.

This was not researched and attributed by the state in the current submission. All records were set to "Unknown" for the attribute, Public Wi-Fi.

PROCESS DESCRIPTION

In the first two submission processes for geocoding we used conservative matching criteria, and maintained and stored the type of match (building match, address match, or zip code match), along with a record of those not matching and not able to geocode. The current submission was completed by state analysts, and new additions to the list were not geocoded. The additions of new anchor institutions in this submission were assigned their latitude and longitude geographic location based on their location used in the Montana Structures Framework.

PROCESS DESCRIPTION

A new optional attribute was requested by NTIA for the current submittal requesting a CAI unique identification number for K-12 schools, libraries and colleges and universities. The following steps were completed for this request.

1. Added CAIID for the Library category using a combination of the FSCSKEY and FSCS_SEQ number attributes from http://harvester.census.gov/imls/data/pls/index.asp. Added 49 records using the Montana Structures Framework to assign their geographic location.

2. Added CAIID for the University, college, other post-secondary category using the NCES IPEDS ID from http://nces.ed.gov/ipeds/datacenter/. Added 10 records using the Montana Structures Framework to assign their geographic location.
3. Added CAIID for the School – K through 12 category using the NCES ID CCD ID from http://nces.ed.gov/ccd/bat/ . Added 118 schools using information from the OPI Schools http://www.publiclibraries.com/montana.htm list, the NCES Schools List and the Montana Structures Framework. NOTE: NTIA asked that each school be given a unique ID but in the CAI table, many schools at the same address were combined. These were not separated for this round of the NTIA submittal.

PROCESS DESCRIPTION

A new optional attribute was requested by NTIA for the current submittal requesting a URL for each anchor institution.

Assigned URLS to CAI records: for the University, college, other post-secondary category assigned the actual URL for that institution; for the Library category added a standard URL (http://www.publiclibraries.com/montana.htm); for the School – K through 12 category added the OPI URL (http://opi.mt.gov/Resources/Directory/Index.html); and for other institutions, added an appropriate URL for the type of CAI.

WIRELESS SERVICE COVERAGE (BB_Service_Wireless)

LOGICAL CONSISTENCY REPORT

Data submitted by broadband providers was accepted as is when it was provided as a broadband coverage or at a census block level. Provider coverage submitted at a coarser geographic scale was supplemented with public data, independent measurements and GIS modeling techniques. When independent measurements were available for typical broadband speeds and modeled location of infrastructure, some provider data was overridden or supplemented.

COMPLETENESS REPORT

All data submitted by broadband providers was mapped in complete form, except where independent measurements were used to supplement provider submittals. Several providers did not participate in the broadband mapping process, including some that were suspected to be providers.

PROCESS DESCRIPTION

Public broadband data research.

Two forms of wireless coverage were provided in this table, fixed point to point wireless and mobile wireless. Outstanding questions remain to NTIA about fixed wireless, as to whether that technology fit in table 1(A) or in 1(B). No answer has been forthcoming, so we chose to apply those in table 1(B). No public data was located on fixed wireless infrastructure points, except notification of availability on provider's web pages, and in some instances, specific towns, recreation or commercial locations where wireless service was provided. No modeling was attempted on fixed wireless coverage. All coverage came directly from providers or was mapped from locations provided on a provider web page. We did not attempt any propagation modeling on fixed wireless, since that can be influenced by local structures and vegetation in the vicinity. A few providers did provide coverages that appeared to be derived from propagation modeling. Most of the public data research focused on mobile wireless providers using cellular service spectrums. The Federal Communications Commission (FCC) Universal Licensing System (ULS) is the consolidated database and application filing system for most Wireless Radio Services. ULS supports electronic filing and provides public access to licensing information, weekly Public Notices, FCC rulemakings, processing utilities, a telecommunications glossary, and much more." The FCC ULS Advanced Licensing Search was queried for all FCC licenses filed in the state; a relational database was built from the results. Information from the database was extracted in order to perform the cellular tower propagation modeling for wireless broadband.

The FCC ALS and ULS reporting systems were the source for most of the tower locations. Towers were required to be licensed when they meet specific published criteria. These included some variables that could be modeled with GIS statewide, such as varying proximity to airports and heliports, combined with specific local level criteria not easily obtained or modeled statewide such as the grade construction within proximity of these, and any structure over 200 ft in height. A number of cell towers providing broadband were likely not located in the FCC database. None of the mobile wireless providers were willing to provide infrastructure such as tower locations and parameters, and the coverages provided were very generalized.

The mobile wireless coverage in the state is in transition. There were currently no GSM mobile wireless providers meeting the NOFA criteria for being a provider. There is some GSM infrastructure in the state maintained for wholesale arrangements and roaming users with GSM technology.

PROCESS DESCRIPTION

Create and publish user speed test web site.

A public facing website was created in the spring of 2010 asking internet users in the state to complete a brief survey regarding their internet connection and run a speed test on their connection using the Ookla speed test. The speed test site asked that a user enter their location as an address on a Google map interface. If the address did not geocode to their satisfaction, the user could choose to move the place mark to their desired location. Next, users were asked to select their technology of transmission from a list, enter their provider in a free form text field, complete an optional questionnaire, and run a standard speed test on their connection. The date and time, and IP address of the user were captured during the speed test.

All speed tests were geocoded, and the IP address was looked up in batch mode in the WHOIS database returning one or two providers registered with WHOIS. All speed tests registered between March 3, 2010 and May 14, 2010 were cleaned and analyzed against provider submissions and models for the first and second data submissions. For the current (third) submission, all the data between March 3, 2010 and February 15, 2011 was standardized and used.

For the first two submissions a final provider assignment was assigned by examining the WHOIS fields, and the provider submitted by users. Consistent rules were not always possible, but generally when two WHOIS records were returned, the second more specific WHOIS provider was selected. In some instances, where the WHOIS providers were backhaul or other and were not providers meeting the NOFA criteria, the user submitted provider designation was cleaned and standardized and assigned as the final provider. For the current submission a rule based database program was built by the Montana Dept. of Administration to automate the final provider assignment.

There was considerable variation between the user reported technology of transmission (TOT) and the known technologies for any given provider. Records were divided on unique provider/ TOT combinations for the first and second submissions, which limited the record count in many instances. For the current submission the records were divided only by provider, not taking TOT into consideration.

For the first two submissions, the speed test records were used in two ways for the final processing.

1) As an independent measurement to validate the presence/absence of a provider coverage for DSL and/or Cable technologies.
In the first submission a few providers were identified as DSL broadband providers based primarily on speed tests. In these instances, DSL models were executed for both providers based on verified central office locations. Some Speed tests with an identified technology of transmission of Cable Modem were used to expand “likely” cable areas which were typically adjacent to incorporated and urban areas. These “cable-plus” areas were created to supplement submissions from Cable Modem providers who did not provide detailed coverage or census blocks. No new DSL providers or Cable providers were identified using speed tests in the current submission.

2) As an independent measurement for typical upload and download speeds.
Once data were cleaned and final provider and technology of transmission assigned, these fields were concatenated. In the first two submissions, if the remaining records exceeded 10 for the combination of provider and technology, and the speed test was successfully completed (values > 0) the average value and standard deviation of the download speed were calculated. Any values exceeding 1 standard deviation were removed as outliers, and the mean of the remaining records within 1 standard deviation was calculated for the download and upload speed. This value was reported for each provider/technology of transmission record as the typical speeds for that provider. In some instances the typical speed was lower than that required to meet the definition of broadband by NTIA, but that did not preclude the records from being included in the broadband map in the first two submissions as it did in the current submission.

For the current submission, these procedures were modified and all records were re-run. The steps of the current processing are provided below. The primary procedural change was to drop the validation of the presence/absence of provider coverage for DSL and/or Cable technologies, since providers had been validated in the first two submissions and potential new providers identified through additional speed tests were determined to not meet the NOFA criteria for being considered a broadband provider. The use of the speed test data for determining typical speeds was implemented with similar rules as the first two submissions with the exception of the use of the technology of transfer, and raising the minimum number of speed tests to 15, after removing outliers, to be used in typical speed calculations. Procedurally, the process was also automated with a Python script to improve processing performance and minimize quality control/quality assurance testing.

Typical upload and download speeds for all providers with less than 15 processed speed test records were coded as null values. In addition, based on telephone communication with NTIA on March 9, 2011, all typical speeds less than minimum NOFA upload of download speed criteria were also ignored and reported as null. Based on a related request in the same communication, the typical speeds greater than the advertised speeds were ignored and reported as null. Subsequently on March 17, in the NTIA grantee webinar, the NTIA staff indicated that typical speeds would not be compared to advertised speeds. This rule change was not received in time to implement in the workflow for the current submission, and will be implemented in the fourth submission in the fall, 2011. We anticipate other significant modifications in the use of the speed test data for the next submission, since many of the records older than one year will not be used in future calculations.

Processing steps for the current submission are provided below:

1. Speed test records were imported into a SQL Server data file, adding fields Final Provider and IPGroup to the initial records.
2. IPGroup attribute was set by extracting the left three nodes of the IP Address of the speed test (e.g. 161.7.1.236 had 161.7.1) moved to the IPGroup attribute.
3. An IPGroup to Final Provider cross reference table was created to determine the final provider from the unique three part IPGroup (e.g. 161.7.1 is known to be the State of Montana).
4. Each IPGroup was reviewed with the data in the who is 1 provider, who is 2 provider and then the user specified provider to determine the most authoritative final provider from the official list of providers. None of the WHOIS or user submitted fields were absolutely authoritative in all instances, so expert opinion by technicians knowledgable of the providers was used in some instances to assign the IPGroups, and subsequently the Final Provider attribute.
5. Run a python script to remove outliers and calculate summary statistics for each Final Provider assignment. The rationale for removing outliers was to mitigate the many variables that effect a typical speeed test, such as the time of day, others on the network, etc. The script implemented the following work flow rules:

a. Use all records for each unique FinalProv attribute value with D_kbps greater than 0 or U_kbps greater than 0 , then:
b. Calculate a mean for the unique provider group for each D_kbps and U_kbps.

c. Calculate a standard deviation for the unique provider group for each D_kbps and U_kbps. Each speed attribute was calculated independently of the other.
d. Subtract the outliers (if any) higher or lower than one standard deviation from the mean.
e. Calculate the median value of the remaining non-outliers for each provider D_kbps and U_kbps respectively.
f. Create a summary table with the final calculated assignment of FinalProv, D_kbps and U_kbps.

6. Post process the summary table in the following sub steps:

a. Join the summary tables by provider for the upload and download speeds into one summary file including the number of records or frequencies for up and down speeds for each provider after removing the outliers, and the mean up and down speeds in kilobits per second for each provider.
b. Select "FreqDown" < 15 AND "FreqUp" < 15 then delete the resulting selection set from the joined table. The FreqDown/Up fields counted the number of speed test records for a provider after the outliers more or less than one standard deviation from the mean value were removed from consideration.
c. Select "D2_kbps" <= 768 kbps AND "U2_kbps" <= 200 kbps. then delete the resulting selection set from the joined table.

7. Import the remaining valid mean values for each provider into the appropriate broadband coverage feature classes.
8. Select any typical speeds greater than advertised speeds either up or down, and make the resulting records null in the final broadband coverage feature classes (as per NTIA request 3/9/2011).

PROCESS DESCRIPTION

Creation, processing and maintenance of last point of aggregation for infrastructure.

Any fixed or mobile wireless antenna or tower location submitted by a provider, or obtained from the FCC that was used in the final processing for wireless broadband coverage was maintained in the operational database for last point of aggregation, and subsequently transferred to Table 3 backhaul and middle mile points.

PROCESS DESCRIPTION

Solicit broadband coverage areas, infrastructure, advertised and typical speeds and components of subscriber weighted nominal speed from providers.

Requests were made via email and phone calls to every broadband provider to provide coverage, technology of transmission, advertised and typical download and upload speed at the census block level.

All data types were accepted as submittals and a large variety of data were submitted, including narrative descriptions, coverage maps as JPG or PDF images, CAD files, GIS shapefiles, KMZ and KML files, FCC form 477 reports , and data spreadsheets.

Providers that submitted actual broadband coverage data or census block representation of coverage along with the components necessary to complete the data attribution were not contacted for a follow up. The providers who did not submit data based on initial queries were sent a standardized spreadsheet to map their coverage and optionally infrastructure, and subsequently a final notice email.

PROCESS DESCRIPTION

Fixed Wireless.

Providers submitted coverage data in a wide variety of formats, levels of completeness, and at varying geographic scales. All types of data was accommodated and processed whenever possible. An open structure process for submittals was allowed, accepting any data, and attempting to work with the provider when questions arose. If data was submitted by a provider in a format that did not allow a direct coverage to be mapped, such as a coarse level of geography such as a census tract, or county, feedback was provided to the providers in the form of standardized spreadsheets in an attempt to standardize the inputs, and increase the geographic granularity of the provider data submission. Although each provider had individual characteristics and nuances in their data submissions, some data patterns can be described generalizing the typical types of submissions. In general, for fixed wireless to be mapped it was necessary to receive data from a provider, since there were no public sources available on point to point wireless tower locations in public form, except as depicted on providers web pages in a few instances.

FCC FORM 477 REPORT OR SIMILAR FORMAT:
Geographically, these were lists of census tracts of coverage, accompanied by additional documentation on technology of transmission, speed tiers, and number of customers. Providers submit these twice a year to the FCC and recent submissions have been done using a structured web site maintained by the FCC. A few providers submitted printouts that appeared to be from this web format and were typically complete and standardized. More providers submitted spreadsheets roughly in the F477 format, but with modified and generalized data.

HOW THEY WERE HANDLED:
If the providers identified specific coverage areas as census blocks, or direct coverage area, or as infrastructure tower locations, they were processed and mapped. Providers identifying census blocks were processed by dissolving the census blocks into single coverage polygons by speed tier. Providers identifying a direct coverage area were converted directly to GIS polygon files and attributed. Providers submitting tower locations were mapped as circular polygons centered on the tower with a radius averaging 10 miles measured as Euclidian (straight line) distance from the tower. Providers that specified variable radius were mapped as circles at the radius they submitted.

PROVIDERS SUBMITTING CENSUS BLOCK COVERAGE:
A few providers submitted coverage as census blocks, either through a tabular listing of census blocks or spreadsheet, or in map format. It was common that a provider where public data

indicated multiple technologies of transmission only submitted some of the technologies of transmission.

HOW THEY WERE HANDLED:
These were loaded directly into the master Census 2000 block coverage by provider and attributed with available data submitted by the provider. In instances where some data attributes were missing, such as advertised or typical speed tiers, or subscriber data, the data attributes were left blank or null. Providers identifying census blocks were processed by dissolving the census blocks into single coverage polygons by speed tier. A visual inspection of independent speed test data overlaying the provider submitted block coverage was completed, but no action was taken to override a provider's submittal.

PROVIDERS SUBMITTING ACTUAL COVERAGE MAPS:
Coverage maps were submitted by several providers, or coverages were derived from public sources or from other indirect indicators of coverage such as customer point maps or tabular lists in text or spreadsheet format. These were differentiated from the other types of geographic submission coarser than a census block since they represented the full and explicit range of coverage.

HOW THEY WERE HANDLED:
Coverage maps were treated as explicit coverage and all census blocks intersecting any portion of a coverage were selected and attributed with the provider coverage by technology of transmission, and all related attributes were transferred to the census block representation. The method of creating the coverage varied by source. Providers who supplied broadband coverage as a GIS polygon or CAD feature were converted to polygons. Some providers, including non-responsive providers who did not submit anything to the project, had published coverage maps of various forms on their web sites or submitted an image in jpg, tiff, pdf or other graphic format. These were geogeorectified to base map layers, typically roads, but sometimes other features such as state or county boundaries or towns, and subsequently converted to polygon features. Then they were intersected and transferred to census block feature classes like the digital GIS submissions. Providers who submitted customer locations typically fell into four categories. Some were submitted as AutoCAD files where the points could be transferred to the GIS, then spatially joined to the census blocks they were located within. Others submitted maps in image format that were georectified in the same manner as other images, then census blocks were selected by an operator viewing the customer point images underlying the census blocks. When customer lists were submitted, they were loaded in a database and geocoded using ESRI Business Analyst USA Geocoding engine based on TeleAtlas road features. The geocoded points were subsequently treated identically to customer locations submitted in GIS or CAD format, and spatially joined to the census block template file. A visual inspection of independent speed test data overlaying the provider submitted block coverage was completed, but no action was taken to override a provider's submittal.

OTHER LEVELS OF COARSE GEOGRAPHIC SUBMISSION:
This category had a wide range of submissions. The most common was as telephone exchange areas or equivalent, wire centers, zip codes, counties or general references to towns or cities. The

problem with these submissions was that often a given polygon overlapped a census block or multiple blocks, and in most cases, they were much larger geographic entities than a census block.

HOW THEY WERE HANDLED:
Our operating rules established early in the project did not allow final provider coverage to significantly over represent provider coverage. Those providers that submitted coverage area by coarse geographic features and did not specifically identify coverage as a coverage layer or census blocks were not able to be processed. No interpolated data was used to calculate these data, if the data was not provided by a provider in a format capable of processing; the data was not calculated for that provider.

PROCESS DESCRIPTION

Mobile Wireless Verizon.

Where cell tower locations for specific providers could be consistently identified, propagation models of wireless coverage were developed for mobile wireless. SoftWright's Terrain Analysis Package software with the Longley-Rice algorithm for model development was used to develop the models. The models were constrained in a 25 radius of the tower. Output grid size was .5 kilometers. Areas that had coverage with signal strength above 40 dbu was classified as having broadband availability. All propagation data meeting the above criteria were merged into a single geodatabase. Non- contiguous areas of less than .5 kilometers were removed from the coverage to climate scatter that was deemed to be an artifact of data processing limitations. Verizon Wireless was the only provider where this method was possible to apply. A mobile wireless coverage was not provided by Verizon for the June, 2010 submission. In August, 2010 Verizon provided a coverage that used an estimated one-quarter mile raster resolution, and the digital elevation model TetraTech used for this analysis and propagation modeling was based on 30 meter resolution. As a result individual TetraTech's coverage for Verizon shows a slightly more spotty pattern where influenced by local topographic characteristics. Due to some missing or unidentifiable towers, we anticipate that coverage may exist in some areas that were not indicated as coverage. Feedback from Verizon is needed to resolve differences, and is scheduled for the 2011 updates. As a result, in the September, 2010 update we submitted the actual coverage provided by Verizon, replacing the TetraTech model submitted in June. Provider submittals did not differentiate download or upload speeds by tower location, only statewide. The typical upload and download speeds for Verizon were reported based on the mean upload and download point samples from several hundred thousand speed test samples, averaged statewide. Since tower identification numbers are rotated by providers, it was not possible, without provider data input, to validate 3G speed availability on a tower by tower basis. CDMA technology does allow a switch from 2G to 3G via software, so it is more likely that most if not all CDMA towers in the state can theoretically provide broadband coverage. An adequate number of speed tests were received for Verizon wireless, but the RootWireless data was more robust and hundreds of thousands of sample points were available, so the public speed test submittals were not used for this provider. All mobile wireless coverage were processed as single coverage files. All polygons had the same data attributes carried in all polygons. For the third submission, April 2011 Verizon submitted a new and slightly revised wireless coverage map that was used for the submittal.

PROCESS DESCRIPTION

Mobile Wireless Alltel.

Alltel did not provide a mobile wireless coverage in any form for Montana. We did not have independent measurements for this provider that could reliably be used. Rootwireless drove several thousand miles on state and federal highways in the state and provided ongoing point samples from several handsets with speed tests every 2 min and signal strength every 10 seconds during operation. Provider submittals did not differentiate download or upload speeds by tower location, only statewide. The typical upload and download speeds for Verizon were reported based on the mean upload and download point samples from several hundred thousand speed test samples, averaged statewide. Since tower identification numbers are rotated by providers, it was not possible, without provider data input, to validate 3G speed availability on a tower by tower basis. CDMA technology does allow a switch from 2G to 3G via software, so it is more likely that most if not all CDMA towers in the state can theoretically provide broadband coverage. For the first and second and third submissions, June and September, 2010 and April, 2011, a coarse, generalized map available in Alltel retail outlets and on their web site was used as a base for their mobile wireless coverage. The image was georectified and used in heads up digitizing to select 6th code watersheds obtained from the Montana State Library, that matched the Alltel coarse map coverage as closely as possible. With the coarse nature of the small scale Alltel map, we determined that an established map layer with appropriate sized polygons that could be mapped in a consistent and repeatable manner would be the best way to depict Alltel mobile wireless coverage. The minimum number of speed tests from the public speed test site was not achieved for mobile wireless to allow independent typical speed measurements for Alltel, so those remain null values in Montana. All mobile wireless coverage were processed as single coverage files. All polygons in the two mobile provider coverage in the state had the same data attributes carried in all polygons.

PROCESS DESCRIPTION

Satellite

The parameters below show the satellite wireless models for MT. A few satellites are use the same azimuth and altitude, so they only need to be run once and subsequently copied and renamed for different providers. There was one coverage for WildBlue and Starband, and four coverage for Hughes/DirectTV. The Anik-F2 satellite appears to be shared by Hughes and WildBlue coverage, and was listed under both.

The process included running a hillshade with the parameters shown below, selecting the "Model shadows" parameter. This was reclassed into 3 classes 0,1,Max value. Then the Majority filter model in Spatial Analyst Generalization was run with a 4x4 neighborhood grid to filter out the smallest isolated shadow pixels. A conditional selection of the class 0 (shadow values) was made for the final grid. This was run through a raster to polygon conversion and added to the master coverage template from geodatabase.

Provider	Satellite	Azimuth	Altitude	Operator
Hughes / DirectTV				
	Anik-E2	141.6	33.7	Telesat Canada Ltd.
	Anik-F2	181.8	36.13	Telesat Canada Ltd.
	Spaceway-1	170.6	35.68	Direct TV, Inc.
	Spaceway-3	160.1	34.17	Hughes Network Systems
WildBlue				
	Anik-F2	181.8	36.13	Telesat Canada Ltd.
	Wildblue 1	181.8	36.1	Wildblue Communications
Starband				
	Echostar 9	195.1	35.03	Echostar Technologies, LLC

PROCESS DESCRIPTION

Quality assurance testing. A separate analyst checked each provider submission. Due to the variety of provider submissions, the analyst originally doing the work and the analyst checking discussed the interpretations when the criteria were subject to interpretation. Coverage, technology of transmission, and speed tier were checked completely for each provider.

SPEEDTEST DATA PROCESSING

PROCESS DESCRIPTION

Create and publish and process user speed test web site.

A public facing website was created in the spring of 2010 asking internet users in the state to complete a brief survey regarding their internet connection and run a speed test on their connection using the Ookla speed test. The speed test site asked that a user enter their location as an address on a Google map interface. If the address did not geocode to their satisfaction, the user could choose to move the place mark to their desired location. Next, users were asked to select their technology of transmission from a list, enter their provider in a free form text field, complete an optional questionnaire, and run a standard speed test on their connection. The date and time, and IP address of the user were captured during the speed test.

All speed tests were geocoded, and the IP address was looked up in batch mode in the WHOIS database returning one or two providers registered with WHOIS. All speed tests registered between March 3, 2010 and May 14, 2010 were cleaned and analyzed against provider submissions and models for the first and second data submissions. For the current (third) submission, all the data between March 3, 2010 and February 15, 2011 was standardized and used.

For the first two submissions a final provider assignment was assigned by examining the WHOIS fields, and the provider submitted by users. Consistent rules were not always possible, but generally when two WHOIS records were returned, the second more specific WHOIS provider was selected. In some instances, where the WHOIS providers were backhaul or other and were not providers meeting the NOFA criteria, the user submitted provider designation was cleaned and standardized and assigned as the final provider. For the current submission a rule based database program was built by the Montana Dept. of Administration to automate the final provider assignment.

There was considerable variation between the user reported technology of transmission (TOT) and the known technologies for any given provider. Records were divided on unique provider/ TOT combinations for the first and second submissions, which limited the record count in many instances. For the current submission the records were divided only by provider, not taking TOT into consideration.

For the first two submissions, the speed test records were used in two ways for the final processing.

1) As an independent measurement to validate the presence/absence of a provider coverage for DSL and/or Cable technologies.

In the first submission a few providers were identified as DSL broadband providers based primarily on speed tests. In these instances, DSL models were executed for both providers based on verified central office locations. Some Speed tests with an identified technology of transmission of Cable Modem were used to expand “likely” cable areas which were typically adjacent to incorporated and urban areas. These “cable-plus” areas were created to supplement submissions from Cable Modem providers who did not provide detailed coverage or census blocks. No new DSL providers or Cable providers were identified using speed tests in the current submission.

2) As an independent measurement for typical upload and download speeds.

Once data were cleaned and final provider and technology of transmission assigned, these fields were concatenated. In the first two submissions, if the remaining records exceeded 10 for the combination of provider and technology, and the speed test was successfully completed (values > 0) the average value and standard deviation of the download speed were calculated. Any values exceeding 1 standard deviation were removed as outliers, and the mean of the remaining records within 1 standard deviation was calculated for the download and upload speed. This value was reported for each provider/technology of transmission record as the typical speeds for that provider. In some instances the typical speed was lower than that required to meet the definition of broadband by NTIA, but that did not preclude the records from being included in the broadband map in the first two submissions as it did in the current submission.

For the current submission, these procedures were modified and all records were re-run. The steps of the current processing are provided below. The primary procedural change was to drop the validation of the presence/absence of provider coverage for DSL and/or Cable technologies, since providers had been validated in the first two submissions and potential new providers identified through additional speed tests were determined to not meet the NOFA criteria for being considered a broadband provider. The use of the speed test data for determining typical speeds was implemented with similar rules as the first two submissions with the exception of the use of the technology of transfer, and raising the minimum number of speed tests to 15, after removing outliers, to be used in typical speed calculations. Procedurally, the process was also automated with a Python script to improve processing performance and minimize quality control/quality assurance testing.

Typical upload and download speeds for all providers with less than 15 processed speed test records were coded as null values. In addition, based on telephone communication with NTIA on March 9, 2011, all typical speeds less than minimum NOFA upload of download speed criteria were also ignored and reported as null. Based on a related request in the same communication, the typical speeds greater than the advertised speeds were ignored and reported as null. Subsequently on March 17, in the NTIA grantee webinar, the NTIA staff indicated that typical speeds would not be compared to advertised speeds. This rule change was not received in time to implement in the workflow for the current submission, and will be implemented in the fourth submission in the fall, 2011. We anticipate other significant modifications in the use of the speed test data for the next submission, since many of the records older than one year will not be used in future calculations.

Processing steps for the current submission are provided below:

1. Speed test records were imported into a SQL Server data file, adding fields Final Provider and IPGroup to the initial records.

2. IPGroup attribute was set by extracting the left three nodes of the IP Address of the speed test (e.g. 161.7.1.236 had 161.7.1) moved to the IPGroup attribute.

3. An IPGroup to Final Provider cross reference table was created to determine the final provider from the unique three part IPGroup (e.g. 161.7.1 is known to be the State of Montana).

4. Each IPGroup was reviewed with the data in the who is 1 provider, who is 2 provider and then the user specified provider to determine the most authoritative final provider from the official list of providers. None of the WHOIS or user submitted fields were absolutely authoritative in all instances, so expert opinion by technicians knowledgable of the providers was used in some instances to assign the IPGroups, and subsequently the Final Provider attribute.

5. Run a python script to remove outliers and calculate summary statistics for each Final Provider assignment. The rationale for removing outliers was to mitigate the many variables that effect a typical speeed test, such as the time of day, others on the network, etc. The script implemented the following work flow rules:

a. Use all records for each unique FinalProv attribute value with D_kbps greater than 0 or U_kbps greater than 0 , then:

b. Calculate a mean for the unique provider group for each D_kbps and U_kbps.

c. Calculate a standard deviation for the unique provider group for each D_kbps and U_kbps. Each speed attribute was calculated independently of the other.

d. Subtract the outliers (if any) higher or lower than one standard deviation from the mean.

e. Calculate the median value of the remaining non-outliers for each provider D_kbps and U_kbps respectively.

f. Create a summary table with the final calculated assignment of FinalProv, D_kbps and U_kbps.

6. Post process the summary table in the following sub steps:

   a. Join the summary tables by provider for the upload and download speeds into one summary file including the number of records or frequencies for up and down speeds for each provider after removing the outliers, and the mean up and down speeds in kilobits per second for each provider.

   b. Select "FreqDown" < 15 AND "FreqUp" < 15 then delete the resulting selection set from the joined table. The FreqDown/Up fields counted the number of speed test records for a provider after the outliers more or less than one standard deviation from the mean value were removed from consideration.

   c. Select "D2_kbps" <= 768 kbps AND "U2_kbps" <= 200 kbps. then delete the resulting selection set from the joined table.

7. Import the remaining valid mean values for each provider into the appropriate broadband coverage feature classes.

8. Select any typical speeds greater than advertised speeds either up or down, and make the resulting records null in the final broadband coverage feature classes (as per NTIA request 3/9/2011).

Quality Assurance Testing

A separate analyst checked each provider submission. Due to the variety of provider submissions, the analyst originally doing the work and the analyst checking discussed the interpretations when the criteria were subject to interpretation.

Coverage, technology of transmission, and speed tier were checked completely for each provider.

Many of the models and block, tract and coverage level processes were completed with ESRI Modelbuilder and Python scripts, and these methods were tested for quality assurance in the preliminary mapping stages and in the initial sample data submissions to NTIA.

All providers who submitted geographic coverage coarser than a census block were provided a data checking package to assess for accuracy and completeness. Any comments received from providers were processed.

1. QA/QC Checks prior to Individual Data Processing (i.e., block or coverage geoprocessing model). [Automated Modelbuilder tools and follow-up by an analyst]
    a. Check for inconsistencies within the Provider Name, DBA Name, FRN
    b. Check for duplicate census blocks or coverage areas
    c. Check the Provider Name, DBA Name, FRN against the "Official Provider Table"

2. For each provider after initial data processing is completed [Review by an analyst that did not process the original data]
    a. Review correspondence log
        i. Review recent correspondence, since previous NTIA submission
        ii. Note changes/additions/comments on coverage area, technologies, speeds, infrastructure, subscriber weighted nominal speeds (SWNS)
    b. Review wiki data processing page (current metadata)
        i. Note changes/additions/comments on coverage area, technologies, speeds, infrastructure, SWNS
    c. Review individual Provider Wiki page (historic metadata)
        i. Note changes/additions/comments on coverage area, technologies, speeds, infrastructure, SWNS
    d. Check Provider Data Folder 2011_03
        i. Review recent data submissions, since previous NTIA submission
    e. Check Working Data Folder 2011_03
        i. Review current update feature class geography
        ii. Review coverage with provider's submissions
        iii. Review technology of transmissions (TOTs) with provider's submissions
        iv. Review Max Adv Speeds: Down/Up with provider's submissions

3. For each provider after final data processing is completed [Review by an analyst that did not process the original data]
    a. Check PROVCOV_Master geodatabase:Provider Blocks feature class and/or Provider Coverage feature class
        i. Review geography
        ii. Review TOTS
        iii. Review Max Adv Speeds: Down/Up

4. Check Infrastructure feature class [Review by an analyst that did not process the original data]
    a. Review recent submissions, since previous NTIA submission

5. Check SWNS feature class [Review by an analyst that did not process the original data]
    a. Determine if provider submission is valid

6. For each provider after speed tests are processed [Review by an analyst that did not process the original data]
    a. Check PROVCOV_Master geodatabase for Typical Speeds: Down/Up

7. QA/QC Checks and Reports on the Final NTIA Deliverable [Automated Modelbuilder tools and follow-up by an analyst]
    a. Check the Provider Name, DBA Name, FRN against the "Official Provider Table" for each NTIA feature class (i.e., BB_Service_CensusBlock, BB_Service_RoadSegment, BB_Service_Wireless, etc.). NTIA_Provider_Name_DBA_FRN_Errors_Sample.xls, looks at each NTIA feature class (i.e., census blocks, road segments, wireless, etc…) and checks to see if there is an identical match in the "Official Provider Table." If an identical match does not exist for that Provider Name, DBA Name, FRN concatenation it is written to a geodatabase table along with the NTIA feature class where the "error" occurred. When an "error" does occur it then has to be checked by an analyst and corrected if necessary.
    b. Change Detection Report – This geoprocessing model compares and reports any changes in the Census Block, Road Segment, and Wireless feature classes for the current and previous versions of the NTIA SBDD Transfer database. The user needs to supply the feature classes for each NTIA version as well as the name of the final change detection table. NTIA_Change_Detection_Example.xls, compares and reports any changes (limited to Provider Name, DBA Name, FRN, TOT combinations) in the Census Block, Road Segment, and Wireless feature classes for the current and previous versions of the NTIA SBDD Transfer database. If the final change detection table has no records, then no changes were detected between the two databases. If a Provider Name, DBA Name, FRN, TOT combination does not have a "pair" in either direction (the current or previous

NTIA database) then it is written to a geodatabase table along with the NTIA feature class and version where the "error" occurred. This report does not change any data in either database but rather acts as a flag, requiring an analyst to check if the "error" is valid.

c. Check for duplicate census blocks or road segments or wireless coverage areas.
d. Check for duplicate anchor institution points.

8. Review Final NTIA deliverables [Review by an analyst that did not process the original data]
    a. Review BB_ConnectionPoint_MiddleMile
    b. Review BB_Service_CAInstitutions
    c. Review BB_Service_Census Block
    d. Review BB_Service_Overview
    e. Review BB_Service_RoadSegment
    f. Review BB_Service_Wireless

9. Run the NTIA Check submission tool and python tool to confirm that all possible records passed the NTIA data checks. The only items that failed in the checking process were those where inconsistencies in the final NTIA NSGIC data model did not agree with the final documentation and rules established by NTIA and FCC in the final webinar and documentation presented March 17, 2011. These exceptions were documented along with the submission.

North Carolina Data Submission
April 2011

Data Collection Methodology

The e-NC Authority

4/15/2011

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Executive Summary

The e-NC Authority

The e-NC Authority, created by the N.C. General Assembly under Session Law 2003-425, is dedicated to growing local-level wealth and creating jobs and educational opportunity through increased broadband deployment. Mandated as the primary Internet policy and planning body for the state, e-NC works with citizens, broadband service providers, local and state government and partners across the state. Its responsibilities include:

- Serving as the Broadband Authority for the state, with a focus on rural and urban-distressed areas;
- Conducting research to help guide the state in economic development decision-making;
- Mapping of broadband infrastructure in North Carolina per the requirements of the National Telecommunications & Information Administration (NTIA);
- Providing Technical Assistance to communities and organizations;
- Responding to citizen inquiries;
- Facilitating local-level programs on technology-based economic development (i.e. the e-NC Business & Technology Telecenters); and
- Serving as a grant-making and monitoring organization.

e-NC finds and advocates for solutions to ensure that all North Carolina citizens and businesses increase broadband adoption and usage and have equal access to affordable, high-speed broadband. e-NC also promotes the benefits of broadband investments around commerce, education, healthcare, agriculture and government services to demonstrate greater economic opportunities. e-NC serves as a resource and manager for various statewide broadband initiatives and accomplishes its work through public-private partnerships, targeted research and direct outreach and education. Currently, the e-NC Authority is implementing a five-year project under the NTIA of the U.S. Department of Commerce.

North Carolina's SBDD Grant

The e-NC Authority (through its fiscal agent, the Rural Economic Development Center), is the recipient of the NTIA's State Broadband Data and Development Grant for North Carolina. The SBDD grant program enables North Carolina to collect comprehensive and accurate state-level broadband availability data and to display a state-level broadband map (http://e-ncbroadband.org/), with these efforts aimed at aiding in the development and maintenance of the national broadband map. The e-NC Authority is currently using provider data for its map, but is also evaluating other data collection methodologies including Web crawling techniques and collecting broadband consumer data at the local level. In addition, e-NC uses radio wave propagation prediction modeling (using GIS) to reflect wireless coverage in North Carolina. Initial broadband planning funds for the project were used to conduct the 2010 Citizen Survey on broadband usage in North Carolina and the 2010 e-Strategy Survey of businesses, organizations, and households looking at broadband usage and benefits among industry sectors. In addition to the data collection, validation and display work; and the initial broadband planning surveys, the SBDD funding allows e-NC to undertake the following additional programs: state broadband capacity building, a technical assistance program, a Lifeline Online pilot to improve computer ownership and Internet usage (LITE-UP), and funding to partner with the NC Center for Geographic Information and Analysis on address file improvements for the state, with all these efforts continuing through October 2014.

Spring 2011 Broadband Data Collection and Mapping Process

Data Collection

The official data request letter was sent to all 112 identified providers of broadband service on January 26, 2011, via e-mail and hardcopy mailed letter. Attachments were included explaining the SBDD mapping project effort, the e-NC Authority's role in the endeavor, and all parameters requested information. Providers were asked to reply to the request on or before February 28, 2011.

Excel and geodatabase templates were shared with providers, along with PDF format instructions summarizing all NTIA requirements and information relevant to each type of provider (mobile wireless, fixed wireless, and wireline). Technical assistance was provided to any organization who requested it.

A secure server hosted by MCNC is configured with an open source, browser-based direct file upload system called eGroupware. Providers were sent a log-in name and password for this upload system once they contacted either Samantha Jackson or Stephanie Jane Edwards to communicate that their data was ready for submission. A confirmation e-mail went to Stephanie Jane once data has been uploaded.

Reminder e-mails were sent to unresponsive providers with usernames and passwords for data upload. An official reminder e-mail was sent out in mid-March to providers of broadband service that were unresponsive to the data request. Phone calls were placed during the weeks of March 14th and 21st to organizations that had not yet responded to the data request or reminders. These phone calls and some background research allowed for e-NC to determine the companies that have gone out of business and those that refused to submit data. The number of known broadband service providers operating in North Carolina is now at 102.

Integration of Provider Data into NTIA Statewide Geodatabase

For ease of data integration, a front-end Excel format template was offered to all providers, containing notes defining required fields, explanations of which data is required in which formats by which types of providers, and hyperlinks connecting fields to additional tables listing the corresponding NTIA-specified values and codes (for speed tiers, technology types, connection point facility types and capacities, county codes, end user types). A brief description of how census block FIPS codes work was also taken from an internet source and distributed as needed to providers who had questions about how to report this information.

BB Service by Census Block

As requested by the NTIA mapping and planning team, all census block data is included with 2000 census block geometry. Technical assistance was often needed by providers to correctly report served areas by either the 15-digit FIPS codes or in some way by which e-NC staff could derive the appropriate FIPS codes.

BB Service Road Segment

The reporting and mapping of data by street segment presented significant challenges to accurate interpretation of where broadband availability is and is not. This is mainly attributed to the difficulty of standardization among the many data structures by which providers report street segments.

BB Service Address

A few address-level datasets were submitted to e-NC with the latitude/longitude coordinates already included, but most needed to be geocoded. This was done using the NC Master Address file as the primary reference file, significantly increasing the accuracy of matching records. Secondary sources for address records that did not find a match this way included street segment interpolation, ESRI data utilizing the 4-digit ZIP extension, and manual placement/digitizing based on a combination of reference data and online browser maps. Upon completion of geocoding for each provider submitting address data, the address point features were overlain with a 2000 census block layer to add the census block FIPS code attribute, then all address feature points were loaded into the geodatabase feature class. The geocoded shapefiles for each provider are kept with geocode match score and match reference type for every matched address, so the thoroughness of this data type could be tracked and/or improved with more time.

BB Service Wireless

Approximately seven small, fixed wireless providers have been able to share technical information about their transmitting towers, antennae, and frequencies, so that e-NC can produce for them a service coverage shapefile using the contracted services of the University of NC at Greensboro Center for Geographical Information Science. An Excel template was developed with all the relevant information that can be filled in by providers with technical assistance in some cases, and the propagation model is field-calibrated to reflect actual ground conditions.

BB Service Overview

Records for overview containing subscriber-weighted nominal speeds of a given provider were generally joined to a template layer of county features, using the option to keep matching records only. Then these matching features and their new attributes were exported as a new shapefile before being loaded into the collective overview feature class. For providers with multiple technology types serving a given county in at least one instance, this information was single-field geocoded using the 5-digit county FIPS code, and then geocoded point features were spatially joined to the county polygon using “within” criteria.

Some detail formatting performed as needed:

- Add state FIPS code and any needed leading zeros onto county code for the new State+County FIPS code. Most providers list just the county code because this was the original NOFA request.
- Change state abbreviation values from “37” to “NC”.
- Change weighted speeds to appropriate units (kbps) and remove unit text.
- Translate to county from weighted speeds reported by RSA/MSA.

BB Service - Critical Anchor Institutions

Only anchor Institutions that could be geolocated were included. Only 17 CAIs were identified that could not be geocoded to a point feature. CAIs were collected by contacting administrative offices of some CAI category types and receiving databases of information, as well as collecting from individual CAI locations for other types using survey emails and follow up phone calls as necessary. There are 4,224 CAI's identified, located, and included in the geodatabase to date.

Census Block data (tabular)

- Fields standardized and transferred into Excel template
- Geocoded to centroids of census blocks using 2000 Census Block layer in WGS1984 projection as reference file for "Address Locator".
- Spatial join of geocoded census block data points to polygon features

Street Data

Some datasets were submitted to e-NC by providers already in shapefile format, and others were reported in various tabular formats (text, Excel, CSV, etc.). Of the tabular datasets, some included a Tigerline ID ("TLID") field along with some or all other fields such as city, state, zip, and census block FIPS.

- For datasets submitted tabular with TLID:
  - Max and Min address ranges were calculated from the FromRight, ToRight, FromLeft, ToLeft format used by most standard street segment reference files and incoming datasets
  - All data formatted into back-end Excel format, including converted speeds if reported at some other granularity.
  - Table geocoded to Tigerline 2009 street segment file using single-field and "TLID" values, with zero offset.
  - Geocoded point features converted to street segment geometry via spatial join using "contains" criteria, keeping matched records only.
- For datasets submitted tabular without TLID:
  - Max and Min address ranges were calculated from the FromRight, ToRight, FromLeft, ToLeft format used by most standard street segment reference files and incoming datasets
  - All data formatted into back-end Excel format, including converted speeds if reported at some other granularity.
  - Table geocoded to Tigerline 2009 street segment file using false midpoint address and either ZIP5 or census block FIPS (whichever available) as address locator zone.
  - Geocoded point features converted to street segment geometry via spatial join using "contains" criteria, keeping matched records only.
- For datasets submitted as shapefiles: If/Then statements used to calculate "Max" and "Min" address range attributes required by the NTIA/FCC, converted from the FromRight, ToRight, FromLeft, ToLeft format used by most standard street segment reference files and incoming datasets:
  - **To calculate "Min":**

```
Dim dFROMRIGHT As Double
Dim dTORIGHT As Double
Dim dFROMLEFT As Double
Dim dTOLEFT As Double

dFROMRIGHT = val([RFROMADD])
dTORIGHT = val([RTOADD])
dFROMLEFT = val([LFROMADD])
dTOLEFT = val([LTOADD])


Dim minright As Double
If dFROMRIGHT = 0 And dTORIGHT = 0 Then
   minright = 0
ElseIf dFROMRIGHT = 0 Then
  minright = dTORIGHT
ElseIf dTORIGHT = 0 Then
  minright = dFROMRIGHT
Else
  If dFROMRIGHT < dTORIGHT Then
    minright = dFROMRIGHT
  Else
    minright = dTORIGHT
  End If
End If

Dim minleft As Double
If dFROMLEFT = 0 And dTOLEFT = 0 Then
   minleft = 0
ElseIf dFROMLEFT = 0 Then
  minleft = dTOLEFT
ElseIf dTOLEFT = 0 Then
  minleft = dFROMLEFT
Else
  If dFROMLEFT < dTOLEFT Then
    minleft = dFROMLEFT
  Else
    minleft = dTOLEFT
  End If
End If

Dim min As String
If minleft = 0 And minright = 0 Then
   min = "0"
ElseIf minleft = 0 Then
  min = Str(minright)
ElseIf minright = 0 Then
   min = Str(minleft)
```

```
Else
   If minleft < minright Then
     min = Str(minleft)
   Else
     min = Str(minright)
   End If
End If
```

- **To calculate "Max":**

```
Dim dFROMRIGHT As Double
Dim dTORIGHT As Double
Dim dFROMLEFT As Double
Dim dTOLEFT As Double

dFROMRIGHT = val([RFROMADD])
dTORIGHT = val([RTOADD])
dFROMLEFT = val([LFROMADD])
dTOLEFT = val([LTOADD])


Dim maxright as string
If dFROMRIGHT > dTORIGHT then
  maxright = dFROMRIGHT
Else
  maxright = dTORIGHT
End if

Dim maxleft as string
If dFROMLEFT > dTOLEFT then
  maxleft = dFROMLEFT
Else
  maxleft = dTOLEFT
End if

Dim max as string
If maxleft > maxright then
  max = maxleft
Else
  max = maxright
End if
```

Creating last mile and middle mile features

- Formatted numeric fields in Excel as text since the short integer format in the data model for these fields will not accept values from the Excel import's default general format.
- ArcToolbox > Data Management Tools > Layers and Table Views > Create XY Event Layer
- Zoom to Layer, <u>verifying</u> that all points are located inside NC boundaries

Provider-specific notes, functions and corrections performed by e-NC

Access/On Multimedia Inc.

- This is a middle mile only provider
- Provider confirmed no changes since last round so fall data was used

AT&T

- Converted subscriber weighted nom speed data from CBSA to county
- Converted max advertised speed data from CBSA to county
- Translated max advertised speeds from KBPS to NTIA codes
- Applied converted speeds to appropriate availability records by county based on FIPS codes, by pasting the CBlock FIPS codes into speed columns and using Find/Replace functions in Excel (ex Find fields with 37001* and Replace with 7). For data by street and CB.
- Copied max advertised speeds into typical speed columns (for which data was not supplied by AT&T)
- Parsed Street names from street types using Find/Replace functions in Excel
- Calculated conversion of Left and Right To/From addresses for street segment data to NTIA's required Max/Min values (using "min" and "max" formulas in Excel)
- Checked data by CB for duplicates, none found.

ATMC

- Missing End User Category, Typical Speeds data on address data
- Overlay of address points w/CB layer to get FIPS code field
- Created new fields and used Calculate Geometry function in ArcMap to generate Lat and Long attributes
- Substituted/duplicated max advertised speed values in typical speed fields for wireline and wireless address-level data.

CenturyLink

- Reprojected CB and street shapefiles and changed format of some fields for loading
- Excluded 593 CB's with speed codes outside the NTIA domain for ADSL (1, 2, and 9 for max down)
- Used If/Then scripts to calculate min and max address fields from left and right max/min ranges in ArcMap field calculator
- Created new fields of compatible type for TransTech and Provider_Type fields

Comcast

- Deleted records from fall as indicated in CB and Streets information
- Mapped new CB's and Streets
- Used Overview data from Fall 2010
- Low quality on streets (only a 61% match to tiger streets w/CB zone)

Country Cablevision and Carolina Mountain Cable

- Copied CB shapefile from Fall2010
- Duplicated max advertised speeds into typical speed fields via Field Calculator
- Added Provider Type field and populated with code 1

Covad/DIECA

- Geocoded streets to Tigerline 2009 using false address created from integer midpoint of max and min, and 5 digit ZIP code as zone. 77% match (1640 out of 2138). Zero offset from centerline for matched “addresses”.
- Spatial join with Tigerline 2009 (one to one, keep common, contains). 1504 found matches.

Electronic Solutions

Converted coordinates, added negative sign to longitude
Produced shapefile from data supplied in Tab D. Converted raw speeds to NTIA codes.
Put weighted speeds into correct units.

Epproach

- Copied Census blocks from Fall 2010 geodatabase
- Merged census block polygons
- Loaded into geodatabase and populated Unlicensed for spectrum field.

Frontier

- Used Spring 2010 Verizon data with legal agreement from both Verizon and Frontier.
- Applied Max Advertised speeds from MSA to CB and Street Segment level based on FIPS codes and relevant counties.
- Missing speed data: duplicated Max speeds for Typical which were not submitted. Speeds were not reported for all CB’s and streets reported, and for these the lowest (except for 1 CB) values from Max speed data, NTIA code 5 for down and 3 for up, were applied.
- Middle Mile: assumed “Owned” for Ownership field to substitute for missing information, as instructed by federal program office.
- Verification: checked tabular CB data for duplicates, none found.
- Streets: were provided in text files without city, zip, or Tigerline ID, but did have CB FIPS.
    - Overlay to associate statewide Tigerline streets to corresponding CB FIPS codes
    - Creation of address locator for geocoding tabular street data as street segment midpoint features.
    - Modification of Address locator properties to remove default 20 ft. offset from street centerline reference features.
    - Tabular street data geocoded to points using a false address created by the midpoint integer of the min max address range and census block FIPS
    - Select by Location on Tigerline layer for features that intersect geocoded points, exported selection as new shapefile
    - Spatial join w/new selected streets shapefile and geocoded broadband data points, one-to-one keeping matches only where segment lines CONTAIN geocoded midpoints w/broadband data

Greenlight (City of Wilson)

- Re-projected shapefiles into WGS84.
- Added FRN2 field with leading zeroes, Lat, Long, and Provider type field (populated with code 1) to address attributes, and re-concatenated “Address” field.
- Added/populated FRN w/leading zeroes, lat and long fields for middle and last mile
- Attribute join to county template feature class for Overview

Level 3

- 11 duplicate address records removed, 209 unique records remaining.

Mediacom

- Corrected fields in MidMile (provider name typo, ownership, positive longitude value)
- Used address data from Fall 2010, which contained many duplicates
    - Exported fall addresses into new shapefile
    - Exported .dbf of shapefile into new Excel file
    - Removed 11,992 duplicates in Excel
        - Data > Remove Duplicates (went from 108,043 records to 96,051)
    - Created an Address locator using Fall Mediacom's non-duplicate address points only
    - Re-geocoded new Excel table containing unique records.
    - Added short integer TransTech and Provider_Type fields and loaded into spring geodatabase
    - Excluded 286 address records that were PO Boxes only.

Morris

- Considerable cleanup and re-parsing to the provider sourced address-level data
- Found 3 address records with speed values of 14, 15, and 50 in all 4 speed fields, changed these to "ZZ". Then went back and deleted these per NTIA instructions. Will follow up with provider to learn what these values should be.

North State

- Emailed about missing FIPS digit and inserted (leading zero for tracts) upon their response.
- Speeds were reported as Typical Up/Down only. Substituted these values into Max Ad Up/Down as well.
- Duplicate CB records were given to us for each service tier. Merged into CB shapefile after geocoding by:
    - Splitting into separate shapefiles by tech type (10, 30, and 50)
    - one-to-one spatial join field merge rule taking the maximum value from duplicates' speed fields.
- Middle Mile, Last Mile: Added negative sign to longitude values
- Last Mile point with longitude -70.97528 fell out of state boundaries and was changed to -79.97528 based on locations of all the other last mile locations.
- Excluded 2 CB's that only had 14 digits in FIPS code field and could not be geocoded to the correct area.

Randolph Telephone and Randolph TMC

- Data was reported all by street segment in a text file, with no CB number, TLID, or Zip code field.
- Created false address from integer midpoint of address ranges concatenated with street name
- Built Address Locator using NC Streetmap reference file with city name as Zone, removed default offset of output.
- Geocoded street data false addresses, then spatially joined to line features
- One-to-One spatial join of geocoded street data POINTS to 2000 CB, using merge rule of Maximum for max advertised and typical speed fields. All tech types were 10. Sorted resulting polygons by area and exported just the CB polygons < 2 mi. These were loaded into the geodatabase with associated broadband attributes

- Clipped geocoded and joined street data POLYLINES by polygons created from merged CB's OVER 2 square miles. These were loaded into the geodatabase with associated broadband attributes.

Sprint Nextel
- Fixed topological errors
- Merged polygons with like spectrum, transtech, and speeds.

Star TMC
- Excluded 106 census blocks (out of 1641) whose numbers did not find an exact match.

Surry TMC and Piedmont TMC
- Contacted for clarification and formatted mislabeled "street" information into address tab
- Removed 7 duplicates from address data in Excel

Skybest and Skyline
- Duplicated Maximum advertised speeds into Typical speed fields which were not provided.
- Ran skyline through address sorter
- Geocoded address data

Sky Catcher
- Wireless Propagation study.
- Created XY Event Layer to map Middle Mile information, deleted duplicate records. Remaining records loaded into geodatabase.

Tele-media
- Provider type of 1 assumed and populated.
- Checked for duplicates CB's in Excel, none found

Time Warner Cable
- CB and Streets:
    - Padded FRN w/two zeroes
    - Reprojected into WGS 1984
    - Added Provider Type field and coded as a "1"
    - Input Max Advertised speeds as Typical Speeds as well, since they were not provided.
- Streets: created "AddyMax" and "AddyMin" fields and used If/Then statement to calculate values from LFrom, LTo, RFrom, and RTo fields

T-Mobile
- Reprojected shapefiles into WGS 1984.
- Repair Geometry to fix some incomplete polygons
- Executed spatial Union between coverage of HSPA Plus (higher speed) and the broader 3G coverage, then extracted (Data Export selected features) resulting 3G only features to distinquish max speeds here versus where HSPA Plus is also available.
- Simplify Polygon tool to delete excess vertices and simplified features <0.125 square mile.
- Loaded final features into geodatabase feature class and then attributed manually from information sent in a text file from T-Mobile.

Tri-County

- Concatenated address information into single Address field in BackEnd template spreadsheet.
- Duplicates removed by technology type (17 dsl, 3 wireless)
- Lat/longs from provider with address data, so mapped using Create XY Event Layer in ArcToolbox
- Sorted, selected, and exported by TransTech types 70 and 10, then one-to-one overlay of each shapefile with CB layer. Maximum merge rule used for speed information.
- For Tech Type 10: Selected and exported resulting aggregated CB data for CB's <2 mi. These were loaded into the geodatabase with associated broadband data.
- For Tech Type 70: created copy of resulting CB's <2 shapefile and merged all features into one multi-part polygon. This was loaded into the wireless feature class and manually assigned "Unlicensed" spectrum value.
- Address feature layer was clipped using polygons created from merged CB's OVER 2 miles, and those in the clip result were loaded into the geodatabase with associated broadband data.

Verizon Wireless

- Compared submitted shapefile with previously submitted shapefile, differences confirmed.

Windstream (Windstream North Carolina, Windstream Concord Telephone, and Lexcom)

- Sorted 2 Access tables by "DSL" field and deleted all records without a "Y"
- Sorted 2 Access tables by census block size field, dividing up data by CB and streets
- Copy pasted all relevant fields into Excel Template column by column, including number listed indicating company name and MSA/RSA name pasted into Max Advertised Download Speed field.
- Used Find/Replace to populate appropriate Provider, DBA Names and FRN's (sent in emails upon request) and Up/Down Max Advertised Speed info based on contents of cells w/direct relationship to this information.
- Recalculated left/right, to/from street segment address ranges to max and min
- Created false address using the integer midpoint of max and min concatenated with street name provided, then geocoded these "addresses" using Tigerline 2009 overlain with CB 2000 to use as Zone
- Split Windstream NC and Windstream CT geocode results up into two tables, then one-to-one keep common spatial join w/Tigerline 2009 features using "contains" criteria.

Post-processing Functions for Final Integration

Census Block

After Census Block data was loaded into the transfer geodatabase feature class, FIPS code fields were calculated using commands in the Field Calculator and contents of the FullFIPSID field. The following calculation formulas were used:

STATE FIPS = Left ([FULLFIPSID],2)
COUNTYFIPS = Mid([FULLFIPSID],3,3)
TRACT = Mid([FULLFIPSID],6,6)
BLOCKID = Right ([FULLFIPSID],4)

- 1033 duplicate records (with same value for Provider Name, DBA Name, FRN, TransTech, and FullFIPS ID) were removed using a python script created for this purpose.

Address Data

- Exported all features into a shapefile, conducted one-to-one, keep all spatial join with CB 2000 using "Is_Within" criteria to produce the associated 15-digit FIPS Code. These features were then reloaded into a clean version of the Address feature class.
- Reverse selection within state boundary used to then export (for record-keeping) and deletion of addresses outside North Carolina.
- Sorted out, selected, and field calculated missing End User Category values to "ZZ" default value
- Calculated geometry for missing Lat/long, for unmatched addresses changed to -9999

Wireless

- Duplication of multipart coverage polygons to reflect multiple spectrum ranges used, per NTIA/FCC instruction.
- To remove "donut holes" in coverage shapefiles less than 0.125 square mile in area as instructed by the NTIA/FCC:
  - Separated feature classes into unique attribute records. For each provider's feature class…
    - Created a polygon feature class with one large polygon covering all of NC, called BACKGROUND
    - Performed a Union between BACKGROUND and the wireless feature class so that gap areas were then polygons. (1)
    - Dissolved with multi-part feature unchecked to explode the multipart features, but preserved the attribution. (2)
    - Selected areas that were both part of the original polygon and are less than 0.125 sq mi (3484800 sq ft) in area. Dissolved the selection to remove donut holes; did not create multipart features. (3)
    - Selected areas that are greater than 0.125 sq mi (3484800 sq ft) in area. Exported selection to remove small islands. (4)
    - Dissolved again, this time creating multipart features.
  - Joined each feature class to the original datasets to re-acquire the attribute information.
  - Used append to merge the provider files back into one feature class per provider.

Overview

- Field Calculated "Geographic Unit Type" field to CO, and "StateAbbr" field to NC.
- Field Calculated missing Maximum Advertised Up and Down speed fields to "ZZ" "default" values.
- Deleted records of information for wireless technology types.
- Verified that all FRN's were either 9999 or 10 digits with leading zeroes.

Last Mile

- Field Calculated "Ownership" field to -9999, as we do not collect this field. Calculated "StateAbbr" field to NC. Then went back and calculated all "Ownership" field values to "0" for owned since the data model script does not accept the default values we were instructed to use.

Middle Mile

- Spatial join with census block layer to derive the 15-digit FIPS code, then reload features into middle mile feature class including the new values for populating the "FullFIPSID" field.
- Replaced Null Elevation values with -9999 "default" value using Field Calculator.
- Populated State Abbreviation column with "NC".

CAI

- Parsed address information for address fields
- Deleted "DMV Tag Office" in "Charlotte, NC" due to absence of street address information. Was geocoded incorrectly.
- Deleted 526 records for which survey respondents report that they do subscribe to broadband but did not give speed information accepted by the NTIA's script.

Verification Implemented Prior to Spring Data Submission

Data verification methods implemented by e-NC in time for submission at the federal level followed generally along the lines of quality control. Methods most often used are outlined below. Time constraints on existing staff did not allow for the execution of some less basic verification approaches that are in the planning/setup stages.

Standardizing

The files from datasets received from each provider, except for those few submitted in shapefile format, were manually transferred to a back end Excel-format template with field headers, to create a single-file, standardized field structure for each provider's data that could be used for quick reference and map feature creation. This step also helped staff to ensure that all required components were either present or requested in follow up to the provider, and that the components were reported in the correct format.

Lat/long coordinates

Some information was submitted to e-NC with lat/long coordinates included for the location of point features. This location information was checked during the mapping process, and values were corrected if the provider had made mistakes such as reversing the latitude with the longitude, or forgetting to include the negative sign for the longitude value. In addition, e-NC followed up with providers on point features that showed up in the map outside the state and/or outside the provider's reasonably expected service area. Point features that mapped outside the state after follow up with providers, including those that mapped to zero degrees latitude and longitude due to an unknown location, were deleted from the geodatabase for submission at the federal level. For fixed wireless data generated by propagation model from antenna specs, the latitude/longitude coordinates of the antenna locations reported by the provider to e-NC were verified by e-NC's university GIS research contractor using high-resolution orthoimagery.

Multiple FRNs

In several instances, providers reported multiple FRN's that increased in numerical increments of one for each record of data, and this was found to be a simple error when the providers were trying to paste their organization information down the rows applying to a list of broadband data records. This was checked for and corrected after confirming that the lowest/first reported FRN was the correct one.

Correct technology type codes

Knowledge from our technical staff and online research was sometimes used to supplement data that e-NC had relevant to a provider that was unresponsive or otherwise did not supply this specific piece of the information. For example, a provider may have gaps in their transmission technology field and these were filled in when technical staff could confirm that the provider operates with only a single technology type. Or the staff may know which technology type is used by a provider who simply left this field blank on all records.

Subscriber-weighted nominal speeds

Weighted nominal speed values were checked, and staff followed up with the provider if all values were the same for multiple counties, as this could result from either a single speed tier for a given transmission technology across counties, or in some cases providers were not following the formula provided and had manually entered the same value regardless of differences in subscriber numbers. When these cases were discovered, technical assistance was offered and a new subscriber-weighted nominal speed dataset created to reflect variation between counties.

Wireless model fieldwork

For fixed wireless provider data that was generated as coverage area output from models based on technology and environmental factors, the data was verified by "ground-truthing" with measurements of signal strengths at sample locations within a provider's service area, observation of the influential ground conditions in each location, and comparison to the expected signal strengths at the same locations in the model. Some calibration of the model was then performed so that the resulting polygons could more accurately reflect what would be found in real life.

Check geometry

After compiling all datasets into the geodatabase feature classes, the check geometry process in Arc Toolbox's Data Management section was used on each feature class to identify and repair any geometry errors in the features.

North Dakota Broadband Mapping Methodology Report

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Executive Summary

The following report describes methods and issues related to the April 1, 2011 deliverables to NTIA for Broadband Mapping in North Dakota. This data submission is compliant with all guidance and specifications provided by NTIA as of March 24th, 2011. As per NTIA guidance we are using the Jan 13th, 2011 version of the Broadband data model and the March 14th, 2011 version of the validation script.

North Dakota has developed a very robust operational data model, components of which are described in this report, to support our broadband mapping efforts. We feel our operational model can support any reasonable modifications to NTIA requirements or the NSGIC data model. Since this deliverable format is derived from our operational data model, we anticipate some modifications will be required. We are able to take best practices recommendations from the NTIA and incorporate those into the final deliverable without major modifications of our work flow and operating rules.

Our mapping process starts with infrastructure points (central offices, remote terminals, wireless towers and antenna locations, middle mile and backhaul), cable franchise areas, and anchor institution addresses. When providers have not supplied detailed information of their service areas that can be mapped at the census block level, coverage models are derived dynamically from this infrastructure based on geoprocessing techniques specific to each broadband technology. Examples of geoprocessing techniques include developing propagation models using the Longley-Rice model for wireless coverage and using infrastructure points in conjunction with the road network to predict the area served for DSL coverage.

We have developed a system to quantify "validated" data for the purpose of determining what is suitable for delivery to NTIA. The operational data model maintains reliability and validity codes, together with completeness checks to track which data elements are complete or still in process of refinement. Infrastructure is compared to public data, independent measurements, and telecommunications provider submittals at varying levels of geography. As more data is obtained from providers and systematically checked against infrastructure points, the reliability and validity progress from 1 (not validated or reliable) to 10 (validated and reliable). Completeness is primarily dependent on provider input, and can be supplemented in many instances with independent measurements. The process is iterative. Five of the providers included in this data set submitted infrastructure data at the address level. The remainder have submitted at a coarser geographic scale, most often by census tract, small scale paper or digital map, or generalized town location. Our validation methods provides the ability to use general information and iteratively cross check and improve the coverage models as more accurate data is obtained.

Reliability, Validity and Completeness

Reliability codes apply to the source data points and polygons and assess the authority of the source we obtained the data from and the level or coarseness of the geography (address or town). Validity codes are determined from cross checks of data sources and the number of independent sources of verification. These are as simple as comparing speed test locations against DSL modeled polygons, or as complex as geospatial analysis operations such as a kernel density function cluster analysis. Completeness is determined by public sources, independent measurements or provider submittals and checks on the domain classes required for the final NTIA deliverables such as Technology of Transmission domains, Speed Test domains and serving facility and wireless spectrum facility types and categories. The categories for these, and the subsequent records in our operational geodatabase tables grow and change as new data is obtained. We are maintaining these as feature level metadata tied to points and polygons maintained by analysts and technicians in a wiki table and coding them to the geodatabase. In this way the unique situations that arise can be cataloged and maintained with some level of flexibility while contributing to the final indices in a controlled fashion.

Reliability Codes

The two factors incorporated in reliability codes include the level of geography that was used as a source or provided as a clarification of location and the authority of the source for the information. We are also considering clusters of point information from independent measurements and sources to be higher in reliability than individual point information.

Generally, the coarser the source geography the lower the resultant score. Everything besides an address or street intersection, latitude/longitude location, or location provided in a georeferenced digital source is assigned a reliability score less than 5. This applies to source data coming (e.g. a central office located in a city instead of an address) and review comments on a previously mapped location (e.g. “That location is wrong, I know it is on the south side of town”).

We have incorporated the reliability code into our last point of aggregation (LPA) and provider coverage geodatabase files, and into some of the publicly available data (PAD) geodatabases. We are also carrying a short text field (50 characters) with a descriptive rationale for the score. This will allow us to focus more on the lower scores that need to be confirmed, and ignore the high confidence data scored as 9’s and 10’s.

Reliability Codes		
Code	**Description**	**Detailed Description**
0	Not assigned	• Not yet assigned
1	Level 1	• Checked but unverified
2	Level 2	• County • Presence by other coarse geography (e.g. administrative region)

3	Level 3	• City • Census tracts • Cable Plus (area likely to have been annexed into an incorporated town or CDP)
4	Level 4	• Cable - incorporated • Zipcodes • Census blocks
5	Level 5	• GeoTel unverified • Confirmed by provider or anchor institution key advisor but to geography coarser than address or intersection
6	Level 6	• Qwest/Midcontinent or other web site random testing check • Speed test from individual average residential
7	Level 7	• From anchor institution key advisor Webex • GeoTel verified address only with no 3rd party confirmation from public sources o Building unverified • Speed test from anchor institution
8	Level 8	• From provider • FCC ULS or ARS • Geotel verified address and possibly verified by 3rd party source (Google Streetview) o Another provider's sign is on building (usually Qwest) • Geotel possibly verified by 3rd party source (NAIP, Google Streetview) • From state authoritative public data source (e.g. DCN or SummitNet) o Address or building unverified • Speed test from cluster of average residential
9	Level 9	• From provider with authoritative confirmation • Geotel verified address and verified by 3rd party source (NAIP, Google Streetview) o Provider sign on building o Tower or dish visible • From provider or anchor institution check of our data * Root Wireless
10	Level 10	• From 2+ authoritative confirmations

Validity Codes

We include validity codes in the last point of aggregation infrastructure data which drives creation of the DSL models. We also include validity codes in each of the final technology of transmission deliverables for polygons and point feature classes. The scales of validity vary by each major type and function.

Infrastructure Validity Codes

The purpose of this validity code is twofold:

1. To determine which infrastructure points are turned into DSL model coverages
2. To use as a reference in other coverage validity checks

Infrastructure Validity Codes		
Code	**Description**	**Detailed Description**
0	Level 0	• Not yet assigned
1	Level 1	• Not yet assigned
2	Level 2	• Not yet assigned
3	Level 3	• Checked against MT PSC Report or DSLReports at the town level • Checked against SummitNet anchor institution data
4	Level 4	• Checked against two or more independent public sources at the town level • Checked against provider public data (e.g. Qwest ICONN) at the town level
5	Level 5	• Not yet assigned
6	Level 6	• Confirmation of DSL or cable from authoritative public data to broader geography than address not confirmed by provider
7	Level 7	• Authoritative public data at address level (e.g. Geotel) not confirmed by provider
8	Level 8	• Provider submission at the census tract level • Provider website independent address checks (Qwest, Verizon)
9	Level 9	• Provider submission at the census block level
10	Level 10	• Provider submission at the address level

Final Technology of Transmission Validity Codes

The purpose of this validity code is twofold:

1. To determine which elements are loaded in the spreadsheet provider submission packages in their review
2. To determine which provider coverages are chosen for submittal with one of the NTIA deliverables (April 15, June 24)

Final Technology of Transmission Validity Codes		
Code	**Description**	**Detailed Description**
0	Not assigned	• Not yet assigned
1	Level 1	• Unassigned at this time
2	Level 2	• Unassigned at this time
3	Level 3	• Checked against MT PSC Report or DSLReports at the town level • Checked against SummitNet anchor institution data
4	Level 4	• Checked against two or more independent public sources at the town level • Checked against provider public data (e.g. Qwest ICONN) at the town level
5	Level 5	• Confirmation of DSL or cable from authoritative public data
6	Level 6	• Provider website independent address checks (Qwest, Verizon) • Provider submission at the census tract level

7	Level 7	• Provider submission at the census block level • Provider submission at the census block level confirmed by Speed test cluster OR RootWireless
8	Level 8	• Provider submission at the address level
9	Level 9	• Provider submission at the address level confirmed by Speed test cluster OR RootWireless
10	Level 10	• Provider submission at the address level confirmed by Speed test cluster OR RootWireless

Detailed Processing Steps

BROADBAND COVERAGE (BB_SERVICE_CENSUSBLOCK AND BB_SERVICE_ROAD_SEGMENT)

LOGICAL CONSISTENCY REPORT

Data submitted by broadband providers was accepted as is when it was provided as a broadband coverage or at a census block level. Provider coverage submitted at a coarser geographic scale was supplemented with public data, independent measurements and GIS modeling techniques. When independent measurements were available for typical broadband speeds and modeled location of infrastructure, some provider data was overridden or supplemented.

COMPLETENESS REPORT

All data was submitted by broadband providers was mapped in complete form, except where independent measurements were used to supplement provider submittals. Several providers did not participate in the broadband mapping process, including some that were suspected to be providers.

PROCESS DESCRIPTION

Process final broadband coverage from provider submissions.

Broadband providers that chose to submit coverage data did so in a wide variety of formats, levels of completeness, and at varying geographic scales including: narrative descriptions, analog and digital coverage maps, CAD files, GIS shapefiles and geodatabases, KMZ and KML files, FCC 477 reports, and data spreadsheets. All data formats were accommodated and processed whenever possible.

If data was submitted by a provider in a format that did not allow mapping at the census block level of geography, providers were sent standardized maps that included census blocks and a data spreadsheet in an attempt to standardize the inputs and increase the geographic granularity of the provider data submission.

Although each provider had individual characteristics and nuances in their data submissions, several data patterns can be described generalizing the provider submissions.

FCC FORM 477 REPORT OR SIMILAR FORMAT:

Broadband providers are required to submit FCC Form 477 reports twice a year to the FCC; recently 477 submissions have been done using a structured web site maintained by the FCC. The 477 reports require broadband providers to submit a list of census tracts with the number of subscribers based on maximum advertised downstream and upstream speed tiers. Several providers submitted their actual FCC 477 report or a modified version in analog or digital format.

HOW THEY WERE HANDLED:

FCC Form 477 reports were entered into a standardized format that included the census tract ID code, maximum advertised downstream and upstream speed tier code, and number of subscribers if available. Since the FCC 477 reports requires providers to submit data for all speed tiers within a census tract, only the highest maximum advertised speed for any given census tract was entered into the standardized spreadsheet in order to be compliant with the definition of broadband service. The spreadsheets were then joined to a census tract feature class template that included the attribute fields from the NTIA schema. The resulting feature class was a geographical representation of the FCC 477 report including the technology of transmission and speed information. This feature class was used in conjunction with validated LPA data to run the DSL or Cable geoprocessing models respectively. The resulting census block selection from the DSL or Cable models were added to a standardized review map and returned to the provider for confirmation. When providers returned additional data at a finer level of geographic detail they were processed as census block or coverage provider data as described below. For those that did not respond, the final submission was our best modeled estimates of their coverage at the census block level for DSL and/or Cable technologies. Providers that submitted FCC 477 data for fiber to the end user or fixed wireless could not be mapped and were not included in the final broadband map unless they provided additional data.

PROVIDERS SUBMITTING CENSUS BLOCK COVERAGE:

Census blocks submitted by providers representing their broadband coverage area come in a wide range of formats including: analog and digital maps, CAD files, GIS shapefiles and geodatabases, tabular lists, and spreadsheets.

HOW THEY WERE HANDLED:

All census block submittals were loaded into a census block feature class template that included all of the attribute fields from the NTIA schema. Census 2000 geography was used as required by NTIA. Domain codes were entered in the appropriate attribute field for technology of transmission, maximum advertised downstream speed, and maximum advertised upstream speed. If a provider did not identify the technology of transmission for any given census block or blocks, they were contacted by phone or email in order to obtain this information. In instances where speed information was not included in the data submission providers were contacted and asked to supply this data; in cases where the provider refused to give either the downstream, upstream, or both speeds, the lowest domain code was entered in the applicable attribute field. Standardized confirmation maps were created for each provider by type of technology and sent to the provider for review. Once processing was completed for a provider's census block submission, they were run through an ESRI geoprocessing model that performed several quality control-quality assurance tests and selected census blocks less than or equal to two square miles and road segments that intersected with census blocks greater than two square miles.

PROVIDERS SUBMITTING COVERAGE DATA:

Provider submitted coverage data were differentiated from the other types of geographic data submissions coarser than a census block since they represented the full and explicit range of broadband coverage. Similar to the other types of data submissions, coverage data also came in a wide range for formats including: analog and digital maps, CAD files, GIS shapefiles and geodatabases. Coverage data was submitted by several providers or was available on several providers' websites.

HOW THEY WERE HANDLED:

All coverage data was loaded into a coverage template feature class schema that included all of the attribute fields from the NTIA schema. The method of data loading was driven by the format in which it was received. Providers who supplied GIS shapefiles or feature classes could generally be loaded into the coverage template feature class schema using the simple data loader while CAD data had to be exported to GIS format prior to being loaded into the coverage template. Coverage data supplied as digital or analog maps required georectification and digitizing prior to loading into the coverage template feature class. Domain codes were entered in the appropriate attribute field for technology of transmission, maximum advertised downstream speed, maximum advertised upstream speed, and spectrum. If a provider did not identify the technology of transmission for any given coverage area, they were contacted by phone or email in order to obtain this information. When speed information was not included in the data submission, providers were contacted and asked to supply this data; in cases where the provider refused to give either the downstream, upstream, or both speeds, the lowest domain code was entered in the applicable attribute field. If a provider did not specify the type and spectrum used for fixed wireless the default values for unlicensed were used. Standardized confirmation maps were created for each provider by type of technology and sent to the provider for review. Once processing was completed for a providers census block submission, they were run through an ESRI geoprocessing model that performed several quality control-quality assurance tests and selected census blocks less than or equal to two square miles whose centroid was within the coverage area and road segments that intersected with census blocks greater than two square miles were clipped to the coverage area. Providers who submitted customer locations typically fell into four categories. Some were submitted as AutoCAD files where the points could be transferred to the GIS, then spatially joined to the census blocks they were located within. Others submitted maps in image format that were georectified in the same manner as other images, then census blocks were selected by an operator viewing the customer point images underlying the census blocks. When customer lists were submitted, they were loaded in a database and geocoded using ESRI Business Analyst USA Geocoding engine based on TeleAtlas road features. The geocoded points were subsequently treated identically to customer locations submitted in GIS or CAD format, and spatially joined to the census block template file.

OTHER LEVELS OF COARSE GEOGRAPHIC SUBMISSION:

This category had a wide range of submissions. The most common was as telephone exchange areas or equivalent, wire centers, zip codes, counties or general references to towns or cities. The problem with these submissions was that often a given polygon overlapped a census block or multiple blocks, and in most cases, they were much larger geographic entities than a census block.

HOW THEY WERE HANDLED:

Operational rules established early in the project did not allow provider coverage data that significantly over-represent provider coverage. Those providers that submitted coverage area by geographic features coarser than a census block that crossed county lines were not able to be processed. No interpolated data was used to calculate this data, if the data was not submitted by a provider in a format capable of processing the data was not calculated for that provider. Some providers who submitted broader geography initially that also were represented in the last point of aggregation infrastructure point file were sent estimated census block coverage maps and spreadsheets, and provided a second submission with finer level geography. Providers submitting town locations for DSL or Cable were handled differently, and used as validation for central offices from the last point of aggregation table, and subsequently to run the DSL modeling routine or validate a cable or cable plus areas. In instances where no infrastructure was identified with a reliable location (no verified street address or visual location), if it was a small town, typically smaller than 3 miles in width or length, then the DSL model was applied.

Final processing was the same regardless of the source process to derive provider coverage to the census block level. All technology of transmission types except fixed and mobile wireless was handled in a similar fashion. Outstanding questions remain to NTIA about fixed wireless, as to whether that technology fit in table 1(A) or in 1(B). No answer has been forthcoming, so we chose to include those in table 1(B). For DSL, Cable, Copper Wire and Fiber to the End User, the census block coverages were split into two categories, those less than 2 square miles, and those greater or equal to 2 square miles.

Those less than 2 square miles in area were left intact as census blocks. The census block coverage files greater than or equal to 2 square miles were intersected with the Tiger 2009 road files, splitting the Tiger road files at the census block boundary. A subsequent spatial join allowed the transfer of the data attributes in the census blocks greater than or equal to 2 square miles to be transferred to the Tiger road segments intersecting the census block coverage.

Based on comments made by NTIA in several of the webinar sessions, the preference was to use 2000 census topology and 2009 Tiger road files. The final NTIA NSGIC geodatabase that was recommended by NTIA as a preferred delivery format had parsed street attribute fields in the geodatabase schema. The Tiger 2000 roads had parsed street segment database fields for address, prefix, suffix, etc. The Tiger 2009 road data carried these as one field labeled "FULLNAME". The state does not plan to geocode using Tiger 2009 files, so it was not practical to do the large amount of manual work to parse the FULLNAME address field into individual components.

PROCESS DESCRIPTION

Solicit census block level broadband coverage areas from providers who initially submitted more generalized geographic coverage.

Several providers initially sent coverage at a broader level of geography than required, typically census tracts, telephone exchange areas, or zip codes. With public and commercial data on infrastructure, DSL and Cable models were prepared for each of these providers with best estimates of their coverage down to the finer granularity of a census block, along with the standardized spreadsheets with the details on each census block in the model. A dynamic web based map service was also made available to assist them in identifying census blocks and tracts with a Google map backdrop. Several providers subsequently used these tools and other analysis to submit more detailed coverage and data attributes in a second submittal.

PROCESS DESCRIPTION

Model Cable coverage (technology of transmission codes 40 & 41).

An ESRI geoprocessing model was created to generate coverage areas for Cable providers who did not submit census block or coverage data (i.e., census tract providers).

The most authoritative GIS layer available from the state with incorporated areas and city boundaries was used as a surrogate to model cable broadband coverage. Municipalities and towns were sporadic in their digital update of these maps, since annexations and other boundary modifications were ongoing and difficult to maintain in real time updates. To compensate, likely areas contiguous to these city boundaries were added, labeled "Cable-Plus" in the operational data model. These additional polygons were determined using operator interpretation, road density, structures points from Info USA in ESRI Business Analyst, and in some instances NAIP imagery. In general areas were added that were immediately contiguous to existing city or town boundaries that represented likely areas where cable service existed.

Cable broadband providers primarily work under the structure of franchise agreements with municipalities. Phone calls were made to the largest cities in the state in order to obtain that respective city's cable franchise agreement. They were all either unknown or a text agreement without maps.

The full set of potential cable areas were then passed through validation sources to determine if cable was provided. This included public sources, such as the Warren Communications Cable Fact book (http://www.warren-news.com/factbook.htm).

The second and most authoritative form of validation was data received from cable providers at the census tract, block, or coverage level of geography. A spatial join geoprocessing operation was performed on these datasets with the full set of potential cable coverage areas in order to further validate areas with cable coverage.

The third source of validation came from the public speed test site maintained throughout the project. Whenever user submitted speed tests identified cable modem broadband service near or adjacent to existing estimated cable areas, the cable-plus boundaries were expanded using the same method of digitizing outlined above.

It was not possible to differentiate between technology of transmission codes 40 and 41 using this indirect mapping method. The only authoritative way to determine this information was from data submitted by a provider. In all cases where the provider did not indicate the type of cable modem technology being used, the code for Cable Modem-Other (41) was assumed.

Process Description

Model DSL coverage (technology of transmission codes 10 & 20).

An ESRI geoprocessing model was created to generate coverage areas for DSL providers who did not submit census block or coverage data (i.e., census tract providers). This model is based on typical DSL technology which can provide service up to 18,000 feet from a central office or remote terminal, unless otherwise specified by a provider. Since DSL lines are typically buried alongside roadways, underneath roadbeds, or strung on aerial telephone lines which tend to run alongside a road, a GIS dataset of a state's road network could be used as a surrogate to model DSL areas. Commercial (GeoTel) and publicly available data sources representing last points of aggregation (LPA) for DSL were collected including central offices and remote terminals. Each LPA was validated based on publicly available data, provider data, and independent measurements; LPAs were used in a DSL model only if they were supplied directly from a provider or could be verified by two or more sources. The actual geoprocessing model used the validated central office and remote terminal locations to generate a raster cost surface based on all of the available roads radiating out 18,000 feet from each active LPA point. The raster coverage was converted to a polygon feature class and a small back-buffer was applied to achieve the final DSL coverage polygon representing a provider's maximum possible DSL coverage area. The DSL coverage areas were then used to select intersecting census blocks and

Remote terminals were provided or publicly available for only a small number of providers, therefore this method may tend to underestimate the full DSL coverage.

It was not possible to differentiate between ADSL or SDSL based on the LPA data; the only authoritative way to determine this was from data submitted by a provider. In all cases where the provider did not indicate which type of DSL service was being provided, the technology code was assigned to 10 "Asymmetric xDSL".

PROCESS DESCRIPTION

Public broadband data research.

Provider presence maps were developed for central office locations and incumbent local exchange carrier locations for all assumed providers in the state. These were identified through a commercial spatial database purchased from GeoTel Inc., and supplemented by other public data sources such as the State's Public Service Commission and DSLReports.com. These were intended to be "talking maps" and general intelligence on where providers have infrastructure for subsequent phone and written communications with providers. These maps were compared to counties served by provider in the state’s telecommunications association directory.

Web site research, review of materials submitted to the state by providers, and public websites, such as the FCC were researched for each provider.

PROCESS DESCRIPTION

Solicit census block level broadband coverage areas from providers who initially submitted more generalized geographic coverage.

Several providers initially sent coverage at a broader level of geography than required, typically census tracts, telephone exchange areas, or zip codes. With public and commercial data on infrastructure, DSL and Cable models were prepared for each of these providers with best estimates of their coverage down to the finer granularity of a census block, along with the standardized spreadsheets with the details on each census block in the model. A dynamic web based map service was also made available to assist them in identifying census blocks and tracts with a Google map backdrop. Several providers subsequently used these tools and other analysis to submit more detailed coverage and data attributes in a second submittal.

COMMUNITY ANCHOR INSTITUTIONS (CAI)

LOGICAL CONSISTENCY REPORT

All institutions on the initial draft spreadsheets used for the first two submittals were geocoded using ESRI Business Analyst Desktop with the USA Geocoding engine using TeleAtlas premium road features. This was judged to be the best available geocoding source for batch processing of addresses. No commercial source is 100% accurate in a primarily rural state such as this with low population numbers compared to other states and no large cities or metropolitan statistical areas. In every round of geocoding we used conservative matching criteria, and maintained and stored the type of match (building match, address match, or zip code match), along with a record of those not matching and not able to geocode.

COMPLETENESS REPORT

All geocoding is dependent on accurate road locations and complete and accurate street segment attribution. The GIS road layers available from the state were not judged as complete as the premium commercial sources. The Tiger 2009 road files, while spatially comparable to the commercial sources, have a large percentage of null values in the database attribution and street segment address ranges necessary for accurate geocoding. As in most parts of the country, geocoding is more accurate in urban settings than in rural routes. Complicating the process in a rural state for anchor institutions are the situation where some anchor institutions, such as public safety anchors are often staffed by volunteer staff and a post office box is the only valid address, and the physical address is wherever the public safety equipment is parked or stored at any given point in time.

PROCESS DESCRIPTION

Acquire lists of community anchor institutions.

Lists were obtained from the state and affiliated processional organizations for anchor institutions to be included in the broadband mapping in each of the community anchor institution community code categories. These were sorted and cross referenced and an initial round of elimination of duplication was accomplished.

PROCESS DATE 2010-06-15

PROCESS DESCRIPTION

Create and publish and process user speed test web site.

Created a public facing web site allowing anchor institutions to complete a brief survey and run a speed test on their connection using the Ookla speed test. The speed test site allowed a user to enter their location as an address on a simple Google map driven interface, and subsequently choose to move the location if it did not geocode to their satisfaction. Users were asked to select their technology of transmission from a list, enter their provider as a free text field, complete an optional questionnaire, and run a standard speed test on their connection. Behind the scenes, the date and time, and IP address of the user were captured.

All speed tests were geocoded, and the IP address was looked up in batch mode in the WHOIS database returning one or two providers registered with WHOIS. All speed tests registered between March 3, 2010 and February 14, 2011 were cleaned and analyzed against provider submissions and models.

A final provider assignment was assigned by examining the WHOIS fields, and the provider submitted by users.

There was considerable variation in the technology of transmission reported by users taking the speed tests. A final connection field was created and in most cases, the user selection was carried into this field. If a provider had only one confirmed technology of transmission, than all technologies listed by users were standardized to that, otherwise the user selection was carried. The state chose to not use the speed test data for an authoritative determination of the question if the institution subscribes to broadband service at the location. This was due to variability in user responses, the anonymity of the user submission and the lack of a practical mechanism for authoritative user identification. In future maintenance updates, the intent is to use the speed tests for anchor institutions in aggregate generalized analysis.

PROCESS DESCRIPTION

Geocode addresses and attribute anchor institutions.

All institutions on the initial draft spreadsheet were geocoded using ESRI Business Analyst Desktop with the USA Geocoding engine using TeleAtlas premium road features. This was judged to be the best available geocoding source for batch processing of addresses. No commercial source is 100% accurate in a primarily rural state such as this with low population numbers compared to other states and no large cities or metropolitan statistical areas. All geocoding is dependent on accurate road locations and complete and accurate street segment attribution. The GIS road layers available from the state were not judged as complete as the premium commercial sources. The Tiger 2009 road files, while spatially comparable to the commercial sources, have a large percentage of null values in the database attribution and street segment address ranges necessary for accurate geocoding. As in most parts of the country, geocoding is more accurate in urban settings than in rural routes. Complicating the process in a rural state for anchor institutions are the situation where some anchor institutions, such as public safety anchors are often staffed by volunteer staff and a post office box is the only valid address, and the physical address is wherever the public safety equipment is parked or stored at any given point in time.

PROCESS DESCRIPTION

Assign community anchor institution category codes.

Category codes were assigned based on the original source list and from keywords in the name of the institution and independent research. Technology of transmission and advertised speeds were obtained when possible, which initially was entirely based on the anchor institutions maintained by the state for consortiums providing state service contracts. Two iterations were accomplished with these state maintained lists, and all available attributes were obtained with assistance of the state analysts.

PROCESS DESCRIPTION

Cross reference anchor institutions against public data, research data attribution and delete duplicates.

After initial data collection, analysts worked on researching, calling and improving the addresses for those below an 80% match criteria. Many on the 70 percent matching range were fairly accurately located. The difference between a 70% and 80% match typically occurred when an address lacked a prefix or suffix cardinal direction on a street that had two cardinal directions (example 101 1st Street, on a street segment with 101 N. 1st Street and 101 S. 1st Street). Analysts were also able to obtain physical addresses for some lists supplied by the state with only a P.O. Box.

PROCESS DESCRIPTION

Final geocode addresses with corrections.

The lists with updated and corrected addresses were re-geocoded for the final mapping effort, and any anchor with any level of geocoding was included on the final map. The operational database identifies the type of match, so future maintenance cycles can be prioritized and targeted to those matching only zip codes or with address changes.

PROCESS DATE 2010-06-15

PROCESS DESCRIPTION

Overlay all remaining anchor institution points via spatial join on broadband coverages unioned and dissolved by concatenated provider/technology of transmission combinations.

Geocoded anchor institutions were spatially joined to unioned and dissolved concatenated provider/.technology of transmission combination broadband coverages. This provided some level of validation that an anchor at least was located within an area of available broadband coverage.

PROCESS DESCRIPTION

Populate technology of transmission, availability of broadband service, and maximum advertised download and upload speeds.

From the results of the previous step some attribution of database attributes for attributes with null values was accomplished. This step was rule based. The attribute of whether an anchor institution subscribes to broadband service could only authoritatively be answered yes, if the information was provided by the state, or a confirmation from an anchor speed test could be matched. Those anchors that were located within an area covered by a DSL, cable, other copper or fixed wireless were also assumed to have the ability to subscribe to broadband coverage and were also estimated to be subscribers. Assigning the technology of transmission and the advertised speeds (which required identifying a provider for the anchor institution) was only possible on a subset of all coverage in those areas where only one provider/technology of transmission was present. This allowed a few hundred more anchors to be identified, but typically only occurred in rural settings. Most urban settings had multiple providers. In addition many providers submitted multiple technology options, so identifying one provider/technology of transmission combination was not possible even if there was only one provider possible for the anchor institution.

It is likely that in some instances in the rural settings and small towns an anchor institution may rely on mobile wireless broadband. This is common in public safety mobile equipment such as vehicles, but likely less common in anchor facilities. For the purpose of assigning attribution to anchor institutions with remaining null attributes, we took a conservative approach and did not overlay anchor institutions on mobile wireless coverages to assign attributes.

PROCESS DESCRIPTION
Maximum advertised downstream and upstream speeds were not available or collected for any of the CAIs.

A new domain value of "U" for Unknown was added to the data model for the current submission, and all values formerly coded as 0, were changed to "U".
PROCESS DATE 2011-03-01

PROCESS DESCRIPTION
A new optional attribute was requested by NTIA for the current submittal requesting knowledge about the presence or absence of WIFI at the CAI location.

This was not researched and attributed by the state in the current submission. All records were set to "Unknown" for the attribute, Public Wi-Fi.

PROCESS DESCRIPTION
A new optional attribute was requested by NTIA for the current submittal requesting a CAI unique identification number for K-12 schools, libraries and colleges and universities.

The following steps were completed for this request: Added CAIID for the Library category using the NCESID from http://nces.ed.gov/surveys/libraries/librarysearch/ ; Added CAIID for the University, college, other post-secondary category using the IPEDS ID from http://nces.ed.gov/collegenavigator/ ; Added CAIID for the School – K through 12 category for public schools using the NCES ID from http://nces.ed.gov/ccd/schoolsearch/ ; Added CAIID for the School – K through 12 category for private schools using the PSS_SCHOOL_ID from http://nces.ed.gov/surveys/pss/privateschoolsearch/

PROCESS DESCRIPTION
A new optional attribute was requested by NTIA for the current submittal requesting a URL for each anchor institution.

Assigned URLs to CAI records: for the University, college, other post-secondary category assigned the URL from http://nces.ed.gov/collegenavigator/; for the Library category added the URL from http://nces.ed.gov/surveys/libraries/librarysearch/

WIRELESS SERVICE COVERAGE (BB_Service_Wireless)

LOGICAL CONSISTENCY REPORT

Data submitted by broadband providers was accepted as is when it was provided as a broadband coverage or at a census block level. Provider coverage submitted at a coarser geographic scale was supplemented with public data, independent measurements and GIS modeling techniques. When independent measurements were available for typical broadband speeds and modeled location of infrastructure, some provider data was overridden or supplemented.

COMPLETENESS REPORT

All data submitted by broadband providers was mapped in complete form, except where independent measurements were used to supplement provider submittals. Several providers did not participate in the broadband mapping process, including some that were suspected to be providers.

PROCESS DESCRIPTION

Public broadband data research.

Two forms of wireless coverage were provided in this table, fixed point to point wireless and mobile wireless. Outstanding questions remain to NTIA about fixed wireless, as to whether that technology fit in table 1(A) or in 1(B). No answer has been forthcoming, so we chose to apply those in table 1(B). No public data was located on fixed wireless infrastructure points, except notification of availability on provider's web pages, and in some instances, specific towns, recreation or commercial locations where wireless service was provided. No modeling was attempted on fixed wireless coverage. All coverage came directly from providers or was mapped from locations provided on a provider web page. We did not attempt any propagation modeling on fixed wireless, since that can be influenced by local structures and vegetation in the vicinity. A few providers did provide coverages that appeared to be derived from propagation modeling. Most of the public data research focused on mobile wireless providers using cellular service spectrums. The Federal Communications Commission (FCC) Universal Licensing System (ULS) is the consolidated database and application filing system for most Wireless Radio Services. ULS supports electronic filing and provides public access to licensing information, weekly Public Notices, FCC rulemakings, processing utilities, a telecommunications glossary, and much more." The FCC ULS Advanced Licensing Search was queried for all FCC licenses filed in the state; a relational database was built from the results. Information from the database was extracted in order to perform the cellular tower propagation modeling for wireless broadband.

The FCC ALS and ULS reporting systems were the source for most of the tower locations. Towers were required to be licensed when they meet specific published criteria. These included some variables that could be modeled with GIS statewide, such as varying proximity to airports and heliports, combined with specific local level criteria not easily obtained or modeled statewide such as the grade construction within proximity of these, and any structure over 200 ft in height. A number of cell towers providing broadband were likely not located in the FCC database. None of the mobile wireless providers were willing to provide infrastructure such as tower locations and parameters, and the coverages provided were very generalized.

The mobile wireless coverage in the state is in transition. There were currently no GSM mobile wireless providers meeting the NOFA criteria for being a provider. There is some GSM infrastructure in the state maintained for wholesale arrangements and roaming users with GSM technology.

PROCESS DESCRIPTION

Create and publish user speed test web site.

A public facing website was created in the spring of 2010 asking internet users in the state to complete a brief survey regarding their internet connection and run a speed test on their connection using the Ookla speed test. The speed test site asked that a user enter their location as an address on a Google map interface. If the address did not geocode to their satisfaction, the user could choose to move the place mark to their desired location. Next, users were asked to select their technology of transmission from a list, enter their provider in a free form text field, complete an optional questionnaire, and run a standard speed test on their connection. The date and time, and IP address of the user were captured during the speed test.

All speed tests were geocoded, and the IP address was looked up in batch mode in the WHOIS database returning one or two providers registered with WHOIS. All speed tests registered between March 3, 2010 and May 14, 2010 were cleaned and analyzed against provider submissions and models for the first and second data submissions. For the current (third) submission, all the data between March 3, 2010 and February 21, 2011 was standardized and used.

For the first two submissions a final provider assignment was assigned by examining the WHOIS fields, and the provider submitted by users. Consistent rules were not always possible, but generally when two WHOIS records were returned, the second more specific WHOIS provider was selected. In some instances, where the WHOIS providers were backhaul or other and were not providers meeting the NOFA criteria, the user submitted provider designation was cleaned and standardized and assigned as the final provider
There was considerable variation between the user reported technology of transmission (TOT) and the known technologies for any given provider. Records were divided on unique provider/ TOT combinations for the first and second submissions, which limited the record count in many instances. For the current submission the records were divided only by provider, not taking TOT into consideration.

For the first two submissions, the speed test records were used in two ways for the final processing.

1) As an independent measurement to validate the presence/absence of a provider coverage for DSL and/or Cable technologies.
In the first submission a few providers were identified as DSL broadband providers based primarily on speed tests. In these instances, DSL models were executed for both providers based on verified central office locations. Some Speed tests with an identified technology of

transmission of Cable Modem were used to expand “likely” cable areas which were typically adjacent to incorporated and urban areas. These “cable-plus” areas were created to supplement submissions from Cable Modem providers who did not provide detailed coverage or census blocks. No new DSL providers or Cable providers were identified using speed tests in the current submission.

2) As an independent measurement for typical upload and download speeds.
Once data were cleaned and final provider and technology of transmission assigned, these fields were concatenated. In the first two submissions, if the remaining records exceeded 10 for the combination of provider and technology, and the speed test was successfully completed (values > 0) the average value and standard deviation of the download speed were calculated. Any values exceeding 1 standard deviation were removed as outliers, and the mean of the remaining records within 1 standard deviation was calculated for the download and upload speed. This value was reported for each provider/technology of transmission record as the typical speeds for that provider. In some instances the typical speed was lower than that required to meet the definition of broadband by NTIA, but that did not preclude the records from being included in the broadband map in the first two submissions as it did in the current submission.
For the current submission, these procedures were modified and all records were re-run. The steps of the current processing are provided below. The primary procedural change was to drop the validation of the presence/absence of provider coverage for DSL and/or Cable technologies, since providers had been validated in the first two submissions and potential new providers identified through additional speed tests were determined to not meet the NOFA criteria for being considered a broadband provider. The use of the speed test data for determining typical speeds was implemented with similar rules as the first two submissions with the exception of the use of the technology of transfer, and raising the minimum number of speed tests to 15, after removing outliers, to be used in typical speed calculations. Procedurally, the process was also automated with a Python script to improve processing performance and minimize quality control/quality assurance testing.

Typical upload and download speeds for all providers with less than 15 processed speed test records were coded as null values. In addition, based on telephone communication with NTIA on March 9, 2011, all typical speeds less than minimum NOFA upload of download speed criteria were also ignored and reported as null. Based on a related request in the same communication, the typical speeds greater than the advertised speeds were ignored and reported as null. Subsequently on March 17, in the NTIA grantee webinar, the NTIA staff indicated that typical speeds would not be compared to advertised speeds. This rule change was not received in time to implement in the workflow for the current submission, and will be implemented in the fourth submission in the fall, 2011. We anticipate other significant modifications in the use of the speed test data for the next submission, since many of the records older than one year will not be used in future calculations.

Processing steps for the current submission are provided below:

1. Speed test records were imported into a SQL Server data file, adding fields Final Provider and IPGroup to the initial records.

2. IPGroup attribute was set by extracting the left three nodes of the IP Address of the speed test (e.g. 161.7.1.236 had 161.7.1) moved to the IPGroup attribute.
3. An IPGroup to Final Provider cross reference table was created to determine the final provider from the unique three part IPGroup
4. Each IPGroup was reviewed with the data in the who is 1 provider, who is 2 provider and then the user specified provider to determine the most authoritative final provider from the official list of providers. None of the WHOIS or user submitted fields were absolutely authoritative in all instances, so expert opinion by technicians knowledgable of the providers was used in some instances to assign the IPGroups, and subsequently the Final Provider attribute.
5. Run a python script to remove outliers and calculate summary statistics for each Final Provider assignment. The rationale for removing outliers was to mitigate the many variables that effect a typical speeed test, such as the time of day, others on the network, etc. The script implemented the following work flow rules:

a. Use all records for each unique FinalProv attribute value with D_kbps greater than 0 or U_kbps greater than 0 , then:
b. Calculate a mean for the unique provider group for each D_kbps and U_kbps.
c. Calculate a standard deviation for the unique provider group for each D_kbps and U_kbps. Each speed attribute was calculated independently of the other.
d. Subtract the outliers (if any) higher or lower than one standard deviation from the mean.
e. Calculate the median value of the remaining non-outliers for each provider D_kbps and U_kbps respectively.
f. Create a summary table with the final calculated assignment of FinalProv, D_kbps and U_kbps.

6. Post process the summary table in the following sub steps:

a. Join the summary tables by provider for the upload and download speeds into one summary file including the number of records or frequencies for up and down speeds for each provider after removing the outliers, and the mean up and down speeds in kilobits per second for each provider.
b. Select "FreqDown" < 15 AND "FreqUp" < 15 then delete the resulting selection set from the joined table. The FreqDown/Up fields counted the number of speed test records for a provider after the outliers more or less than one standard deviation from the mean value were removed from consideration.
c. Select "D2_kbps" <= 768 kbps AND "U2_kbps" <= 200 kbps. then delete the resulting selection set from the joined table.

7. Import the remaining valid mean values for each provider into the appropriate broadband coverage feature classes.
8. Select any typical speeds greater than advertised speeds either up or down, and make the resulting records null in the final broadband coverage feature classes (as per NTIA request 3/9/2011).

PROCESS DESCRIPTION

Creation, processing and maintenance of last point of aggregation for infrastructure.

Any fixed or mobile wireless antenna or tower location submitted by a provider, or obtained from the FCC that was used in the final processing for wireless broadband coverage was maintained in the operational database for last point of aggregation, and subsequently transferred to Table 3 backhaul and middle mile points.

PROCESS DESCRIPTION

Solicit broadband coverage areas, infrastructure, advertised and typical speeds and components of subscriber weighted nominal speed from providers.

Requests were made via email and phone calls to every broadband provider to provide coverage, technology of transmission, advertised and typical download and upload speed at the census block level.

All data types were accepted as submittals and a large variety of data were submitted, including narrative descriptions, coverage maps as JPG or PDF images, CAD files, GIS shapefiles, KMZ and KML files, FCC form 477 reports , and data spreadsheets.

Providers that submitted actual broadband coverage data or census block representation of coverage along with the components necessary to complete the data attribution were not contacted for a follow up. The providers who did not submit data based on initial queries were sent a standardized spreadsheet to map their coverage and optionally infrastructure, and subsequently a final notice email.

PROCESS DESCRIPTION

Fixed Wireless.

Providers submitted coverage data in a wide variety of formats, levels of completeness, and at varying geographic scales. All types of data was accommodated and processed whenever possible. An open structure process for submittals was allowed, accepting any data, and attempting to work with the provider when questions arose. If data was submitted by a provider in a format that did not allow a direct coverage to be mapped, such as a coarse level of geography such as a census tract, or county, feedback was provided to the providers in the form of standardized spreadsheets in an attempt to standardize the inputs, and increase the geographic granularity of the provider data submission. Although each provider had individual characteristics and nuances in their data submissions, some data patterns can be described generalizing the typical types of submissions. In general, for fixed wireless to be mapped it was necessary to receive data from a provider, since there were no public sources available on point to point wireless tower locations in public form, except as depicted on providers web pages in a few instances.

FCC FORM 477 REPORT OR SIMILAR FORMAT:
Geographically, these were lists of census tracts of coverage, accompanied by additional documentation on technology of transmission, speed tiers, and number of customers. Providers submit these twice a year to the FCC and recent submissions have been done using a structured

web site maintained by the FCC. A few providers submitted printouts that appeared to be from this web format and were typically complete and standardized. More providers submitted spreadsheets roughly in the F477 format, but with modified and generalized data.

HOW THEY WERE HANDLED:
If the providers identified specific coverage areas as census blocks, or direct coverage area, or as infrastructure tower locations, they were processed and mapped. Providers identifying census blocks were processed by dissolving the census blocks into single coverage polygons by speed tier. Providers identifying a direct coverage area were converted directly to GIS polygon files and attributed. Providers submitting tower locations were mapped as circular polygons centered on the tower with a radius averaging 10 miles measured as Euclidian (straight line) distance from the tower. Providers that specified variable radius were mapped as circles at the radius they submitted.

PROVIDERS SUBMITTING CENSUS BLOCK COVERAGE:
A few providers submitted coverage as census blocks, either through a tabular listing of census blocks or spreadsheet, or in map format. It was common that a provider where public data indicated multiple technologies of transmission only submitted some of the technologies of transmission.

HOW THEY WERE HANDLED:
These were loaded directly into the master Census 2000 block coverage by provider and attributed with available data submitted by the provider. In instances where some data attributes were missing, such as advertised or typical speed tiers, or subscriber data, the data attributes were left blank or null. Providers identifying census blocks were processed by dissolving the census blocks into single coverage polygons by speed tier. A visual inspection of independent speed test data overlaying the provider submitted block coverage was completed, but no action was taken to override a provider's submittal.

PROVIDERS SUBMITTING ACTUAL COVERAGE MAPS:
Coverage maps were submitted by several providers, or coverages were derived from public sources or from other indirect indicators of coverage such as customer point maps or tabular lists in text or spreadsheet format. These were differentiated from the other types of geographic submission coarser than a census block since they represented the full and explicit range of coverage.

HOW THEY WERE HANDLED:
Coverage maps were treated as explicit coverage and all census blocks intersecting any portion of a coverage were selected and attributed with the provider coverage by technology of transmission, and all related attributes were transferred to the census block representation. The method of creating the coverage varied by source. Providers who supplied broadband coverage as a GIS polygon or CAD feature were converted to polygons. Some providers, including non-responsive providers who did not submit anything to the project, had published coverage maps of various forms on their web sites or submitted an image in jpg, tiff, pdf or other graphic format. These were geogeorectified to base map layers, typically roads, but sometimes other features

such as state or county boundaries or towns, and subsequently converted to polygon features. Then they were intersected and transferred to census block feature classes like the digital GIS submissions. Providers who submitted customer locations typically fell into four categories. Some were submitted as AutoCAD files where the points could be transferred to the GIS, then spatially joined to the census blocks they were located within. Others submitted maps in image format that were georectified in the same manner as other images, then census blocks were selected by an operator viewing the customer point images underlying the census blocks. When customer lists were submitted, they were loaded in a database and geocoded using ESRI Business Analyst USA Geocoding engine based on TeleAtlas road features. The geocoded points were subsequently treated identically to customer locations submitted in GIS or CAD format, and spatially joined to the census block template file. A visual inspection of independent speed test data overlaying the provider submitted block coverage was completed, but no action was taken to override a provider's submittal.

OTHER LEVELS OF COARSE GEOGRAPHIC SUBMISSION:
This category had a wide range of submissions. The most common was as telephone exchange areas or equivalent, wire centers, zip codes, counties or general references to towns or cities. The problem with these submissions was that often a given polygon overlapped a census block or multiple blocks, and in most cases, they were much larger geographic entities than a census block.

HOW THEY WERE HANDLED:

> Our operating rules established early in the project did not allow final provider coverage to significantly over represent provider coverage. Those providers that submitted coverage area by coarse geographic features and did not specifically identify coverage as a coverage layer or census blocks were not able to be processed. No interpolated data was used to calculate these data, if the data was not provided by a provider in a format capable of processing; the data was not calculated for that provider.

PROCESS DESCRIPTION

Mobile Wireless Verizon.

Where cell tower locations for specific providers could be consistently identified, propagation models of wireless coverage were developed for mobile wireless. SoftWright's Terrain Analysis Package software with the Longley-Rice algorithm for model development was used to develop the models. The models were constrained in a 25 radius of the tower. Output grid size was .5 kilometers. Areas that had coverage with signal strength above 40 dbu was classified as having broadband availability. All propagation data meeting the above criteria were merged into a single geodatabase. Non- contiguous areas of less than .5 kilometers were removed from the coverage to climate scatter that was deemed to be an artifact of data processing limitations. Verizon Wireless was the only provider where this method was possible to apply. A mobile wireless coverage was not provided by Verizon for the June, 2010 submission. In August, 2010 Verizon provided a coverage that used an estimated one-quarter mile raster resolution, and the digital elevation model TetraTech used for this analysis and propagation modeling was based on 30 meter resolution. As a result individual TetraTech's coverage for Verizon shows a slightly more spotty pattern where influenced by local topographic characteristics. Due to some missing or unidentifiable towers, we anticipate that coverage may exist in some areas that were not indicated as coverage. Feedback from Verizon is needed to resolve differences, and is scheduled for the 2011 updates. As a result, in the September, 2010 update we submitted the actual coverage provided by Verizon, replacing the TetraTech model submitted in June. Provider submittals did not differentiate download or upload speeds by tower location, only statewide. The typical upload and download speeds for Verizon were reported based on the mean upload and download point samples from several hundred thousand speed test samples, averaged statewide. Since tower identification numbers are rotated by providers, it was not possible, without provider data input, to validate 3G speed availability on a tower by tower basis. CDMA technology does allow a switch from 2G to 3G via software, so it is more likely that most if not all CDMA towers in the state can theoretically provide broadband coverage. An adequate number of speed tests were received for Verizon wireless, but the RootWireless data was more robust and hundreds of thousands of sample points were available, so the public speed test submittals were not used for this provider. All mobile wireless coverage were processed as single coverage files. All polygons had the same data attributes carried in all polygons. For the third submission, April 2011 Verizon submitted a new and slightly revised wireless coverage map that was used for the submittal.

PROCESS DESCRIPTION

Mobile Wireless Alltel.

Alltel coverage was mapped using the digital coverage submitted by the provider for the first submittal, June 2010. Alltel did not provide an updated coverage for the second and third submittal, September 2010 and April, 2011, so the original coverage has been carried forward in each subsequent submittal. The provider submitted mobile wireless coverage depicted a larger area than was indicated by the independent measurements from Rootwireless. Rootwireless drove several thousand miles on state and federal highways in the state and provided ongoing point samples from several handsets with speed tests every 2 min and signal strength every 10 seconds during operation. Provider submittals did not differentiate download or upload speeds by tower location, only statewide. The typical upload and download speeds for Verizon were reported based on the mean upload and download point samples from several hundred thousand speed test samples, averaged statewide. Since tower identification numbers are rotated by providers, it was not possible, without provider data input, to validate 3G speed availability on a tower by tower basis. CDMA technology does allow a switch from 2G to 3G via software, so it is more likely that most if not all CDMA towers in the state can theoretically provide broadband coverage. All mobile wireless coverage were processed as single coverage files. All polygons in the two mobile provider coverage in the state had the same data attributes carried in all polygons.

PROCESS DESCRIPTION

Quality assurance testing. A separate analyst checked each provider submission. Due to the variety of provider submissions, the analyst originally doing the work and the analyst checking discussed the interpretations when the criteria were subject to interpretation. Coverage, technology of transmission, and speed tier were checked completely for each provider.

SPEEDTEST DATA PROCESSING

PROCESS DESCRIPTION

Create and publish and process user speed test web site.

A public facing website was created in the spring of 2010 asking internet users in the state to complete a brief survey regarding their internet connection and run a speed test on their connection using the Ookla speed test. The speed test site asked that a user enter their location as an address on a Google map interface. If the address did not geocode to their satisfaction, the user could choose to move the place mark to their desired location. Next, users were asked to select their technology of transmission from a list, enter their provider in a free form text field, complete an optional questionnaire, and run a standard speed test on their connection. The date and time, and IP address of the user were captured during the speed test.

All speed tests were geocoded, and the IP address was looked up in batch mode in the WHOIS database returning one or two providers registered with WHOIS. All speed tests registered between March 3, 2010 and May 14, 2010 were cleaned and analyzed against provider submissions and models for the first and second data submissions. For the current (third) submission, all the data between March 3, 2010 and February 21, 2011 was standardized and used.

For the first two submissions a final provider assignment was assigned by examining the WHOIS fields, and the provider submitted by users. Consistent rules were not always possible, but generally when two WHOIS records were returned, the second more specific WHOIS provider was selected. In some instances, where the WHOIS providers were backhaul or other and were not providers meeting the NOFA criteria, the user submitted provider designation was cleaned and standardized and assigned as the final provider

There was considerable variation between the user reported technology of transmission (TOT) and the known technologies for any given provider. Records were divided on unique provider/ TOT combinations for the first and second submissions, which limited the record count in many instances. For the current submission the records were divided only by provider, not taking TOT into consideration.

For the first two submissions, the speed test records were used in two ways for the final processing.

1) As an independent measurement to validate the presence/absence of a provider coverage for DSL and/or Cable technologies.

In the first submission a few providers were identified as DSL broadband providers based primarily on speed tests. In these instances, DSL models were executed for both providers based on verified central office locations. Some Speed tests with an identified technology of transmission of Cable Modem were used to expand “likely” cable areas which were typically adjacent to incorporated and urban areas. These “cable-plus” areas were created to supplement submissions from Cable Modem providers who did not provide detailed coverage or census blocks. No new DSL providers or Cable providers were identified using speed tests in the current submission.

2) As an independent measurement for typical upload and download speeds.

Once data were cleaned and final provider and technology of transmission assigned, these fields were concatenated. In the first two submissions, if the remaining records exceeded 10 for the combination of provider and technology, and the speed test was successfully completed (values > 0) the average value and standard deviation of the download speed were calculated. Any values exceeding 1 standard deviation were removed as outliers, and the mean of the remaining records within 1 standard deviation was calculated for the download and upload speed. This value was reported for each provider/technology of transmission record as the typical speeds for that provider. In some instances the typical speed was lower than that required to meet the definition of broadband by NTIA, but that did not preclude the records from being included in the broadband map in the first two submissions as it did in the current submission.

For the current submission, these procedures were modified and all records were re-run. The steps of the current processing are provided below. The primary procedural change was to drop the validation of the presence/absence of provider coverage for DSL and/or Cable technologies, since providers had been validated in the first two submissions and potential new providers identified through additional speed tests were determined to not meet the NOFA criteria for being considered a broadband provider. The use of the speed test data for determining typical speeds was implemented with similar rules as the first two submissions with the exception of the use of the technology of transfer, and raising the minimum number of speed tests to 15, after removing outliers, to be used in typical speed calculations. Procedurally, the process was also automated with a Python script to improve processing performance and minimize quality control/quality assurance testing.

Typical upload and download speeds for all providers with less than 15 processed speed test records were coded as null values. In addition, based on telephone communication with NTIA on March 9, 2011, all typical speeds less than minimum NOFA upload of download speed criteria were also ignored and reported as null. Based on a related request in the same communication, the typical speeds greater than the advertised speeds were ignored and reported as null. Subsequently on March 17, in the NTIA grantee webinar, the NTIA staff indicated that typical speeds would not be compared to advertised speeds. This rule change was not received in time to implement in the workflow for the current submission, and will be implemented in the fourth submission in the fall, 2011. We anticipate other significant modifications in the use of the speed test data for the next submission, since many of the records older than one year will not be used in future calculations.

Processing steps for the current submission are provided below:

1. Speed test records were imported into a SQL Server data file, adding fields Final Provider and IPGroup to the initial records.

2. IPGroup attribute was set by extracting the left three nodes of the IP Address of the speed test (e.g. 161.7.1.236 had 161.7.1) moved to the IPGroup attribute.

3. An IPGroup to Final Provider cross reference table was created to determine the final provider from the unique three part IPGroup

4. Each IPGroup was reviewed with the data in the who is 1 provider, who is 2 provider and then the user specified provider to determine the most authoritative final provider from the official list of providers. None of the WHOIS or user submitted fields were absolutely authoritative in all instances, so expert opinion by technicians knowledgable of the providers was used in some instances to assign the IPGroups, and subsequently the Final Provider attribute.

5. Run a python script to remove outliers and calculate summary statistics for each Final Provider assignment. The rationale for removing outliers was to mitigate the many variables that effect a typical speeed test, such as the time of day, others on the network, etc. The script implemented the following work flow rules:

    a. Use all records for each unique FinalProv attribute value with D_kbps greater than 0 or U_kbps greater than 0 , then:

    b. Calculate a mean for the unique provider group for each D_kbps and U_kbps.

    c. Calculate a standard deviation for the unique provider group for each D_kbps and U_kbps. Each speed attribute was calculated independently of the other.

    d. Subtract the outliers (if any) higher or lower than one standard deviation from the mean.

    e. Calculate the median value of the remaining non-outliers for each provider D_kbps and U_kbps respectively.

    f. Create a summary table with the final calculated assignment of FinalProv, D_kbps and U_kbps.

6. Post process the summary table in the following sub steps:

    a. Join the summary tables by provider for the upload and download speeds into one summary file including the number of records or frequencies for up and down speeds for each provider after removing the outliers, and the mean up and down speeds in kilobits per second for each provider.

b. Select "FreqDown" < 15 AND "FreqUp" < 15 then delete the resulting selection set from the joined table. The FreqDown/Up fields counted the number of speed test records for a provider after the outliers more or less than one standard deviation from the mean value were removed from consideration.

c. Select "D2_kbps" <= 768 kbps AND "U2_kbps" <= 200 kbps. then delete the resulting selection set from the joined table.

7. Import the remaining valid mean values for each provider into the appropriate broadband coverage feature classes.

8. Select any typical speeds greater than advertised speeds either up or down, and make the resulting records null in the final broadband coverage feature classes (as per NTIA request 3/9/2011).

Quality Assurance Testing

A separate analyst checked each provider submission. Due to the variety of provider submissions, the analyst originally doing the work and the analyst checking discussed the interpretations when the criteria were subject to interpretation.

Coverage, technology of transmission, and speed tier were checked completely for each provider.

Many of the models and block, tract and coverage level processes were completed with ESRI Modelbuilder and Python scripts, and these methods were tested for quality assurance in the preliminary mapping stages and in the initial sample data submissions to NTIA.

All providers who submitted geographic coverage coarser than a census block were provided a data checking package to assess for accuracy and completeness. Any comments received from providers were processed.

1. QA/QC Checks prior to Individual Data Processing (i.e., block or coverage geoprocessing model). [Automated Modelbuilder tools and follow-up by an analyst]
    a. Check for inconsistencies within the Provider Name, DBA Name, FRN
    b. Check for duplicate census blocks or coverage areas
    c. Check the Provider Name, DBA Name, FRN against the “Official Provider Table”

2. For each provider after initial data processing is completed [Review by an analyst that did not process the original data]
    a. Review correspondence log
        i. Review recent correspondence, since previous NTIA submission
        ii. Note changes/additions/comments on coverage area, technologies, speeds, infrastructure, subscriber weighted nominal speeds (SWNS)
    b. Review wiki data processing page (current metadata)
        i. Note changes/additions/comments on coverage area, technologies, speeds, infrastructure, SWNS
    c. Review individual Provider Wiki page (historic metadata)
        i. Note changes/additions/comments on coverage area, technologies, speeds, infrastructure, SWNS
    d. Check Provider Data Folder 2011_03
        i. Review recent data submissions, since previous NTIA submission
    e. Check Working Data Folder 2011_03
        i. Review current update feature class geography
        ii. Review coverage with provider's submissions
        iii. Review technology of transmissions (TOTs) with provider's submissions
        iv. Review Max Adv Speeds: Down/Up with provider's submissions

3. For each provider after final data processing is completed [Review by an analyst that did not process the original data]
    a. Check PROVCOV_Master geodatabase:Provider Blocks feature class and/or Provider Coverage feature class
        i. Review geography
        ii. Review TOTS
        iii. Review Max Adv Speeds: Down/Up

4. Check Infrastructure feature class [Review by an analyst that did not process the original data]
    a. Review recent submissions, since previous NTIA submission

5. Check SWNS feature class [Review by an analyst that did not process the original data]
    a. Determine if provider submission is valid

6. For each provider after speed tests are processed [Review by an analyst that did not process the original data]
    a. Check PROVCOV_Master geodatabase for Typical Speeds: Down/Up

7. QA/QC Checks and Reports on the Final NTIA Deliverable [Automated Modelbuilder tools and follow-up by an analyst]
    a. Check the Provider Name, DBA Name, FRN against the "Official Provider Table" for each NTIA feature class (i.e., BB_Service_CensusBlock, BB_Service_RoadSegment, BB_Service_Wireless, etc.). NTIA_Provider_Name_DBA_FRN_Errors_Sample.xls, looks at each NTIA feature class (i.e., census blocks, road segments, wireless, etc…) and checks to see if there is an identical match in the "Official Provider Table." If an identical match does not exist for that Provider Name, DBA Name, FRN concatenation it is written to a geodatabase table along with the NTIA feature class where the "error" occurred. When an "error" does occur it then has to be checked by an analyst and corrected if necessary.
    b. Change Detection Report – This geoprocessing model compares and reports any changes in the Census Block, Road Segment, and Wireless feature classes for the current and previous versions of the NTIA SBDD Transfer database. The user needs to supply the feature classes for each NTIA version as well as the name of the final change detection table. NTIA_Change_Detection_Example.xls, compares and reports any changes (limited to Provider Name, DBA Name, FRN, TOT combinations) in the Census Block, Road Segment, and Wireless feature classes for the current and previous versions of the NTIA SBDD Transfer database. If the final change detection table has no records, then no changes were detected between the two databases. If a Provider Name, DBA Name, FRN, TOT combination does not have a "pair" in either direction (the current or previous NTIA database) then it is written to a geodatabase table along with the NTIA feature class and version where the "error" occurred. This report does not change any data in either database but rather acts as a flag, requiring an analyst to check if the "error" is valid.
    c. Check for duplicate census blocks or road segments or wireless coverage areas.
    d. Check for duplicate anchor institution points.

8. Review Final NTIA deliverables [Review by an analyst that did not process the original data]
    a. Review BB_ConnectionPoint_MiddleMile
    b. Review BB_Service_CAInstitutions
    c. Review BB_Service_Census Block
    d. Review BB_Service_Overview
    e. Review BB_Service_RoadSegment
    f. Review BB_Service_Wireless

9. Run the NTIA Check submission tool and python tool to confirm that all possible records passed the NTIA data checks. The only items that failed in the checking process were those where inconsistencies in the final NTIA NSGIC data model did not agree with the final documentation and rules established by NTIA and FCC in the final webinar and documentation presented March 17, 2011. These exceptions were documented along with the submission.

Nebraska Public Service Commission
Broadband Methodology Paper

April 15, 2011

Nebraska Public Service Commission

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April 15, 2011

Ms. Anne Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville,

Enclosed herewith please find the Nebraska Public Service Commission's (NPSC's) Broadband Methodology Paper. The Broadband Methodology Paper describes the data collection and submission process performed by and through the NPSC's vendor, Apex CoVantage, LLC, for the April 1, 2011, semi-annual update of broadband data pursuant to the requirements of the Program Office for the State Broadband Data and Development (SBDD) Grant Program.

The NPSC's April 1, 2011, data submission, at the request of the Program Office, was corrected and re-filed in its entirety on April 8, 2011. The NPSC's April 8, 2011, deliverables included the following:

1. SBDD Transfer Model
   a. BB_Service_Address
   b. BB_Connection Point_MiddleMile
   c. BB_Service_Road Segment
   d. BB_Service_Wireless
   e. BB_Service_CensusBlock
   f. BB_ConnectionPoint_LastMile
   g. BB_Service_Overview
   h. State_Boundary
   i. BB_Service_CAInstitutions
   j. NATL_Broadband_Map
2. Data Package.xls
3. Receipt and ScriptLog

The NPSC will continue to examine ways to improve the quality and completeness of the broadband data submitted to the Program Office. We have enjoyed working in collaboration with the NTIA on this project. Please do not hesitate to contact us if you have any questions.

Respectfully Submitted,

Mike Hybl
Executive Director

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1.0 Provider Outreach

1.1 Mapping Participants

Apex and the Nebraska Public Service Commission (NPSC) began the mapping project by collecting contact information for providers listed on the FCC's 477 data base and from Nebraska certificated and rural local exchange carriers, communications providers (internet service providers, cellular, fixed, and mobile wireless) that had registered with the NPSC and other potential providers thought to be in the State of Nebraska. The total number of potential internet service providers (ISPs) on the original combined list was 283. Using various research methods (telephone calls, web searches, crowd source) 159 names were identified as either a subsidiary of an ISP already on the list or did not provide internet access service at that time.

Non-disclosure agreements (NDAs) were sent to 124 potential ISPs. In reviewing the NDA information some ISPs determined that they did not meet the broadband speed qualification standard by the National Telecommunication and Information Administration (NTIA) or did not return the NDA. Two ISPs refused to participate in the mapping program. The NE_DataPackage_2011_04_08.xls file in the NE_SBDD_2011_04_08 data submittal provides a current list of ISPs and their status. The NPSC staff and Apex are engaged in ongoing outreach activities to encouraging ISPs to participate and identify new ISPs.

1.2 Non-disclosure Agreement (NDA) Process

The NDA process was completed for most providers during the first quarter of 2010. Prior to that time, Apex developed a standard NDA to be used in this project. Broadband providers were made aware of the NDA through a series of emails and reminder emails, workshops and individual calls to contact persons. Most providers used the standard NDA. However, a few of the providers requested minor changes in the standard NDA. Those changes were accepted whenever possible. In a limited number of instances, several iterations of changes were negotiated. Providers and Apex were able to agree on the final NDA.

NDAs will be executed with new ISPs as they are identified.

2.0 Data Collection

2.1 Data Input

2.1.1 First and Second Round

In the first round a data input template in an Excel spreadsheet format was developed by Apex and given to ISPs for use in the data submission. The template was based on the appendix to the NTIA Notice of Funds Available (NOFA) as amended by the NOFA clarification. The template included the following worksheets associated with the State Broadband Data and Development (SBDD) Grant Program Data transfer deliverable:

a. BB_Service_Address
b. BB_ConnectionPoint_MiddleMile
c. BB_Service_CensusBlock
d. BB_Service_RoadSegment
e. BB_Service_Wireless
f. BB_Service_Wireless_Antenna
g. BB_ConnectionPoint_LastMile
h. BB_Service_Overview
i. BB_Service_CAInstitutions

The wireless worksheet included information requested by the NOFA and information required to generate the propagation patterns for wireless service areas.

In the first round data collection, Apex experienced numerous occasions where Information Service Provider (ISPs) submitted data that was incorrect or insufficient.

In the second round the NPSC, selected ISPs based on geographic coverage and willingness to work with the NPSC to improve the data collection process.

These efforts included on-site meetings with the staff of the ISPs to explain in detail the overall mapping process, sharing of the specific data requirements of the NOFA, examining the results of the first round of data collection, and identifying issues that contributed to difficulties in data collection, submission, and presentation.

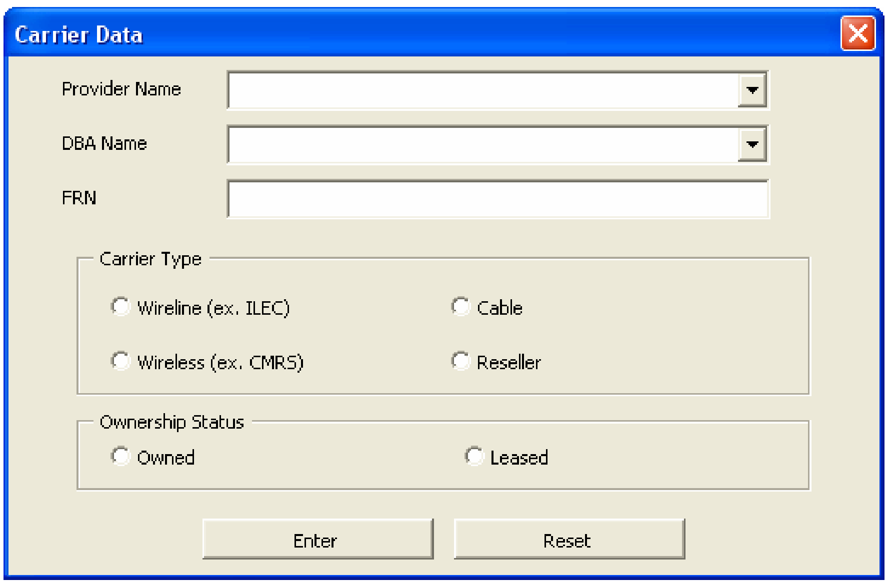
2.1.2 Third Round

After the one-on-one meetings with the selected ISPs in Round 2, the NPSC perceived a need for a more simplified, user-friendly, and standardized method for ISPs to provide the required data in the allowed Microsoft Excel format. Consequently, the NPSC began development of a sophisticated, user friendly, method to allow ISPs the ability to provide broadband data in a standardized, validated format. The DIM was implemented for the third round of data collection.

The DIM provides a uniform method of data entry; minimize the repetitive entry of company specific data, while performing real-time validation of submitted data. The DIM is a robust mechanism, developed in Microsoft Excel, on a Windows platform, with all supporting modules residing in a Visual Basic environment.

The DIM provides for three operations; manual record input, with field verification, import of an entire dataset, with field verification and error logging, and export of a verified dataset to be submitted to the NPSC.

To facilitate these operations, DIM users are guided through an interactive menu environment. Initial menus allow for entry of Provider Name and DBA Name unique pairs based on a dropdown list of predefined entities. The Federal Registration Number (FRN) associated with that unique pair is then populated as a function of the user's entries.[1] Finally, in order to enter the record input stage, an ISP must select the modality and ownership status of service for which broadband data is being provided.



Specific data requirements, also as a function of the user's selections, are then dynamically displayed and made available for entry. The data entry structure is demonstrated below.

<u>Wireline / Cable Carriers</u>

<u>Alternative I</u>

Required Tabs

[1] The NPSC requires all ISPs have an FCC Federal Registration Number (FRN) to submit data, ensuring all data and DBAs are appropriately assigned. The DIM allows the NPSC to manage this requirement as, absent the existence of a valid FRN, an ISP is unable to enter the data entry portion of the DIM. The NPSC enacted this requirement to ensure knowledge of any new ISP entering the Nebraska market, prior to its providing broadband data.

BB_SERVICE_ADDRESS
BB_SERVICE_OVERVIEW
BB_CONNECTIONPOINT _MIDDLEMILE

Optional Tabs

BB_CONNECTIONPOINT_LASTMILE
BB_SERVICE_CAINSTITUTION

Alternative II

Required Tabs

BB_SERVICE_CENSUSBLOCK
BB_SERVICE_ROADSEGMENT
BB_SERVICE_OVERVIEW
BB_CONNECTIONPOINT _MIDDLEMILE

Optional Tabs

BB_CONNECTIONPOINT_LASTMILE
BB_SERVICE_CAINSTITUTION

Wireless Carriers

Required

BB_SERVICE_WIRELESS
BB_SERVICE_OVERVIEW
BB_CONNECTIONPOINT _MIDDLEMILE

Verification Required

BB_WIRELESS_ANTENNA

Optional

BB_CONNECTIONPOINT_LASTMILE
BB_SERVICE_CAINSTITUTION

For each record in a worksheet, key fields are required to initiate and continue the data entry process. Each field is validated upon entry to ensure consistency and compliance with NTIA data model requirements.[2] Finally, once entry is complete, the ISP utilizes the DIM's export function and provides said results for submittal to the NPSC.

The data entry requirements inherent to the DIM's underlying validation result in a more uniform dataset for mapping purposes, ensuring a more accurate mapping process and effective mapping product. The project mapping vendor, California State University – Chico, found the use of the DIM in the third round of data collection created efficiencies not experienced in earlier rounds.

[2] To further facilitate the process, each data tab is color coded to indicate those datasets which are mandatory versus voluntary, as well as available help for each field.

The DMI's dynamic, forward-thinking, design gives the NPSC a priceless tool to utilize in its endeavors as it strives to provide an accurate picture of the landscape today, while maintaining focus in an ever-changing environment, on the visions of tomorrow.

2.2 Engage ISP Participants

2.2.1 Workshop

NPSC and Apex conducted a workshop prior to Round 3 data collection to explain how to use the DIM. This workshop was conducted in Lincoln, Nebraska, on October 7, 2010. ISPs that could not attend were able to participate via web based Live Meeting©

At the workshop NPSC discussed the data collection and mapping issues faced during the first two data submissions to the NTIA, the lessons learned, plans for the Third Round Data submission and how to use the data submission and review tools. Participants were provided a CD containing the DIM for use in collecting and submitting the next round of data to the Commission and the ESRI ArcReader tool for reviewing their data after processing and before submittal to the NTIA.

2.2.2 Teleconferences

The NPSC staff and Apex provide "help-desk" service to the broadband providers using both teleconferences and Live Meeting© sessions. During the calls, the NSPC staff and Apex gave in depth guidance to provider questions regarding the DIM, alternative data submission templates and other inquiries from the providers regarding the Nebraska and NTIA projects. In each of these sessions the ISP was walked through the process of loading data into the DIM and submitting the data to Apex using the SharePoint Portal.

2.3 SharePoint Portal for Data and Map

Apex uses a SharePoint portal to collect data and distribute information to broadband providers. General information and announcements are available to all participating providers. In addition, each provider is assigned a unique password protected folder. The provider submits confidential data into the folder. Apex gathers the submitted data from the folders to begin the data processing procedures.

2.4 Data Scrub using DataSlave

The NTIA SBDD data model requirements and python script (SBDD_CheckSubmission.py Version 1.0) checks were implemented in DataSlave. The Python source code was examined and reverse engineered into the DataSlave. ISP data submission in the DIM format was processed in DataSlave and fall outs were addressed with the individual providers. For example, if the maximum advertised Down/Up speed was missing, the provider was asked to re-submit the data.

3.0 Community Anchor Institutions

3.1 Community Anchor Institutions (CAI)

The method used to collect data consisted of the NPSC sending emails and making telephone calls to specific groups that represent Community Anchor Institutions (CAI's) in Nebraska such as:

- Chief Information Officer for Nebraska
- Nebraska Hospital Association
- Nebraska Office of Rural Health
- Nebraska Library Commission
- Nebraska Information Technology Commission
- Catholic Health Initiatives and Network Nebraska

These entities provided information on the locations and contact information for hospitals, county health departments, libraries and schools including post-secondary institutions. Network Nebraska is tasked with implementing legislation designed to migrate the past distance learning environment to an IP based system which includes scheduling software. The NPSC is represented on the Network Nebraska steering committee known as the Collaborative Aggregation Partnership (CAP) and significant information on broadband service provided to schools was obtained from Network Nebraska data. ISP's have also provided CAI broadband information.

The NPSC is considering expanding the definition of CAI's to include other entities based on public input that may qualify as anchor institutions. Nebraska has 93 counties and the NPSC is considering engaging county Geographical Information System (GIS) or Information Techknowledge (IT) personnel to obtain further broadband information.

The collection of CAI broadband information requires extensive time and effort to send initial emails, follow-up emails and place telephone calls. The following analysis is a summary of the classification of CAI's contained in our data set:

Nebraska Round 3 CAI Data Analysis	
1 - School - K through 12	1,487
2 - Library	91
3 - Medical/healthcare	147
4 - Public safety	129
5 - University, college, other post-secondary	162
6 - Other community support - government	348
7 - Other community support - nongovernmental	134
TOTAL	**2,498**

4.0 Data Validation

Four validation techniques were developed and implemented. First, a direct in-person survey was conducted by Edison Research (Appendix B). Second, Apex developed ProField Drive application to test the wireless signal coverage of major wireless broadband providers. Third, Apex conducted phone and mail survey of Nebraska residential customers. Finally Apex developed an online speed test, however as discussed below, this test was discontinued.

Validation Methods	Wireline	Wireless
ProField - Field Survey	x	x
Drive Test		x
Phone and Mail Survey	x	x
Online Speed Test	x	x

4.1 Edison's Sample Methodology Scope

The sample methodology for the Nebraska broadband study conforms to principles of probability sampling. That is, each census block has a known, and measurable, probability of being selected. Likewise, each household within a census block has a known selection probability. The population consists of all households in Nebraska. The sample frame is a list of all census blocks with households (as reported by the 2000 census) in Nebraska. For additional information on the sample methodology and survey refer to Appendix B.

Stratum	Sample Census Block Allocation	Percent of Households
1 – Douglas County	75	27.3%
2 – Cass, Lancaster, Sarpy counties	37	22.8%
3 – Medium Rural/Urban Area (17 counties)	97	24.7%
4 – Rural West (53 counties)	77	13.7%
5 – Rural East (18 counties)	57	11.1%
6 – Thurston County (Indian Reservation)	7	0.3%

The in-person survey was conducted in 597 Nebraska census blocks. The survey validated ISPs' supplied information that Broadband service was available in 583 (98%) of the survey census blocks. In the remaining 14 (2%) of the census blocks Edison was unable to determine if the offered service qualified as a Broadband service per NTIA's definition.

4.2 ProField Drive Test

Apex used two Nebraska residents to perform the Spectrum Drive Test. The hardware used included a laptop with 3 nationwide ISP data cards. (AT&T, Verizon and Sprint) and customized ProField software. The route was divided into two regions, Eastern and Western Nebraska. A total of over 3,000 road miles were covered during the drive test.

The ProField application cycles through each ISP card and captured the RSSI value and recorded to the database. The data was continuously uploaded to the Database Server. A chart of East and West routes along with the validation charts are contained in Appendix C.

The Spectrum drive test was conducted in 5,637 Nebraska census blocks. The drive test validated ISPs' (AT&T, Verizon and Sprint) supplied information that Broadband service was available in 5,287 (94%) of the census blocks. In the remaining 350 census blocks Apex was unable to determine if the offered service qualified as a Broadband service per NTIA's definition.

4.3 Mail and Phone Survey

Apex procured Nebraska resident data from US Data Corporation. Apex selected a random sample of residents. The sample was divided into two groups. The first group was called over a period of two weeks. The second group received the survey in the mail and was asked to complete the survey and return it in a pre-paid envelope.

The sample was selected to complement the in-person Edison survey and the planning survey. Census blocks already sampled by the Edison survey and the planning survey were excluded from the mail and phone survey.

Mail and phone survey questionnaire collected information that was similar to Edison's in-person survey.

The mail survey was sent to 3,003 Nebraska residents. A total of 506 residents responded to the survey, a response rate of 17%. Of the 506 residents, 445 had broadband service. The broadband customers resided in 433 unique census blocks. The responses indicated that 88% of the residential customers subscribed to a broadband service. The results validated ISPs' submitted data for census blocks with broadband service.[3]

The phone survey contacted 2,500 Nebraska residents in 293 unique census blocks. Broadband service was available in 63% of the census blocks. The results matched the ISPs' submitted data for the respective census blocks.

[3] A mail survey conducted by the Nebraska Planning group (consisting of the University of Nebraska – Lincoln, Nebraska Information and Technology Commission, and the Nebraska Department of Economic Development) in February/March 2010 had a response rate of 47% and identified similar broadband availability. The complete results of this survey were filed with the NTIA program office in the NPSC quarterly report on July 30, 2010.

4.4 Online Speed Test

As a component of verification, the NPSC's vendor, Apex, initially established an Online Speed Test, requesting consumers perform a test to record the speed of their broadband connection. Data collected was to include geographical identifiers, upload and download speeds, and latency. Preliminary review of the testing methodology was conducted by Apex.

In addition to the online availability of the Apex speed test, the NPSC provided a disclaimer to participants noting, in part, the irregular variability inherent to measuring broadband speed availability at a given time, using a given hardware configuration. Further, the NPSC stated, while a speed test may give consumers information on relative speed, the test was not endorsed as a definitive testing method.

Irrespective, subsequent to implementation, the NPSC began fielding numerous complaints regarding the testing results from consumers and industry representatives alike. In an independent effort, the NPSC conducted a review of the testing methodology and determined the testing results to be inconsistent and unreliable. Results deviated significantly when compared to those obtained utilizing Speedtest.net, owned and operated by Ookla, and displayed significant variation across platforms. Further, the results obtained via the Apex Online Speed Test were not consistent with those reported by ISPs themselves.

As such, the NPSC determined it necessary to remove access to the Online Speed Test, rather than risk losing the trust and confidence of consumers and the support of the industry.

The NPSC is itself currently in the initial stages of developing a statistically sound methodology to employ the speed test results provided by the Federal Communication Commission (FCC) speed test results, obtained in cooperation with Ookla Net Metrics and M-Lab, in its verification processes going forward. Expanding on this preexisting relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

5.0 Map Processing

5.1 CSU – Chico (Appendix A) Map Processing

Of the scrubbed ISP data to California State University (CSU), our sub-contractor for mapping, the following processing steps are involved in the mapping effort Apex transmits:

1. Address Geocoding
2. Census Block – less than two square mile
3. Road Segment – Census block greater than two square mile
4. Service Overview
5. Middle Mile
6. Wireless
7. Wireless Propagation

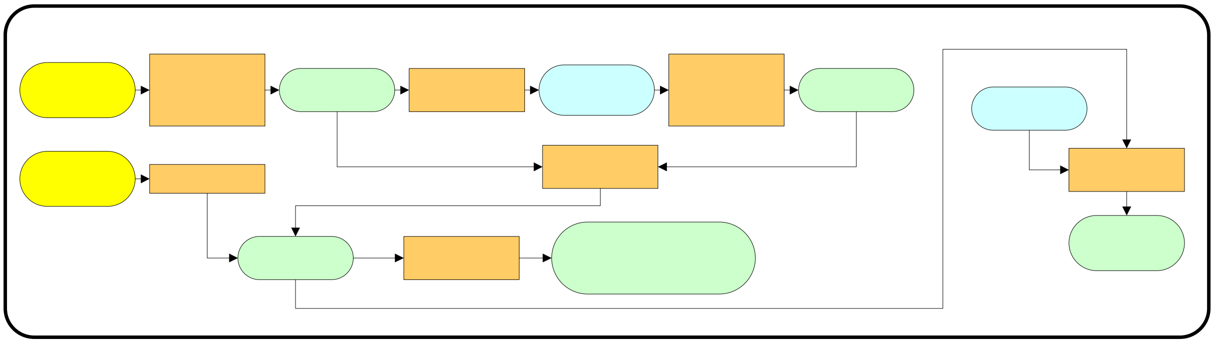
5.1.1 Address Geocoding (Figure 6-1)

ISPs submit address data in tabular format using the DIM. Address records are geocoded to the street segment level using Nebraska road segment E911 reference data. Matched records are preserved as a geographic point layer.

Records not meeting the minimum match requirements are selected and exported in tabular format. Non-matching records are run through a second geocoding process using a composite locator built on underlying TeleAtlas reference data.

This secondary geocoding process produces match results at the street segment level, where possible. If no qualifying street segment is found, the locator will move to a secondary level of matching based on city/state. City/state matches are represented as a generalized center point of the geographic area considered to be included or related to any city, town, or community within the state. Street segment and city/state matches are preserved as a geographic point layer. The two geocoding match result layers are then merged to create a single geographic point layer representing all records within the submission that matched with confidence at any particular level.

Figure 6-1: Geocoding Process



The attribute table of this layer is analyzed to produce a report of how many records were matched to each specific locator through both geocoding processes. The address point layer is then run through a spatial relation process against census block polygons in order to obtain the appropriate FIPS number for each address point location. All non-matching records are preserved in table format and returned to the provider for review.

Optionally, Internet service providers may submit address data as longitude and latitude coordinate pairs in tabular format. Longitude and latitude coordinate pairs are plotted on the map and preserved as geographic point locations. This layer is then run through the same spatial relation process as the address data to obtain the appropriate FIPS number for each address point location.

If a combination of address listings and longitude and latitude coordinate information is submitted, the data will be processed accordingly in respect to each data type and then combined upon output to create final address output layer.

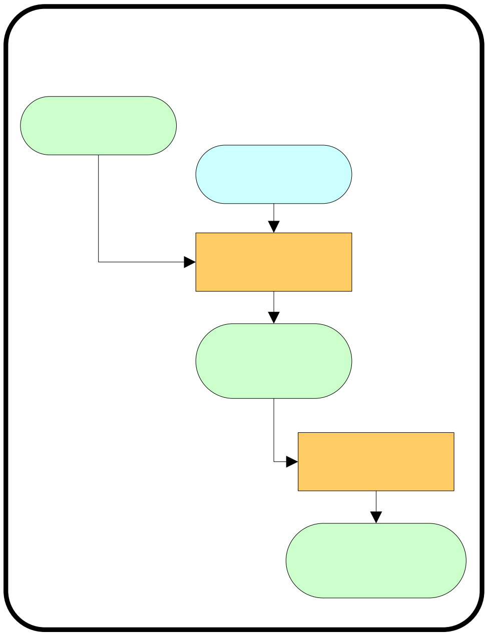
Addresses that fall in census blocks less than two square miles are removed from the Round 3 submission.

5.1.2 Address to Census Block Association (Figure 6-2)

Final address result layers are run through a spatial relation process against census block polygons. The resulting output is a polygon format representing all census blocks in which each geographic address point resides. All broadband-specific attribution is propagated over to the census block polygons from the provider's final address point layer. Census block polygons are then reviewed in regards to their geographic area.

Only those census block polygons that are less than two square miles in size are preserved. All polygons that are greater than two square miles in size are removed. This process can result in duplicate stacked polygon in cases where multiple address points fell within the same census block polygon and have the same underlying characteristics in regards to broadband data attribution. Census block polygons are reviewed for duplicate records and filtered to preserve unique records only.

Figure 6-2: Address to Census Block Association



Census Bloc

Output
Address Points

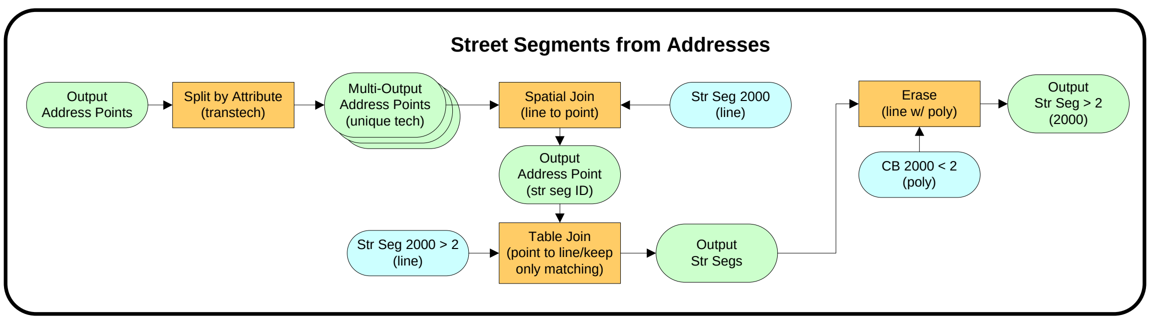
5.1.3 Address to Street Segments Association (Figure 6-3)

The final address result layer is divided into multiple layers specific to technology of transmission and speed characteristics. Each unique class of address is run through spatial relation processes along with a street segment line layer to obtain a unique identifier for the nearest segment to each individual address point. The resulting output is address point features containing the unique identifier of the closest street segment attributed in the address layer's data table. A table join is executed, appending the broadband characteristics of the address data to the street segments. The appropriate street segments are called out and preserved.

An erase operation is then run using the provider's resulting census block polygon layer to remove any street segments that fall within service census blocks that are less than two square miles in area. All remaining street segments are preserved to represent service in areas where census blocks are greater than two square miles in area.

Addresses which are submitted as latitude/longitude with no corresponding street address information and which are in census blocks greater than two square miles (representing no more than 5% of all address and latitude/longitude locations) were removed from the Round 3 submission because the latitude/longitude locations could not be verified by a unique address. These locations will be developed further in Round 4.

Figure 6-3: Street Segments from Addresses

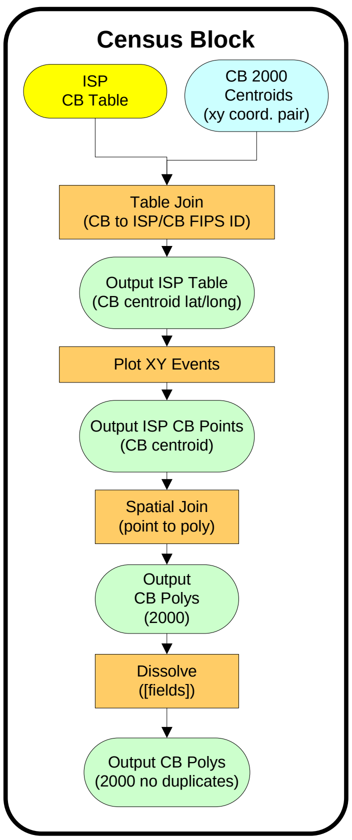


5.1.4 Census Block (Figure 6-4)

Internet service providers submit address data in tabular format. A table join is done using census block centroid points to append longitude and latitude coordinates to each record in the submitted census block table. Output is a stand-alone representing each census block submitted by the provider and now contains the longitude and latitude coordinates of a point within the relative census block. This information is used to plot coordinate pair events. The output is a point dataset representing each record submitted by the provider. This point layer is then run through a spatial relation process along with the census block polygons.

Output is a polygon layer representing all submitted census block records for said provider. Census block polygons are reviewed for duplicate records and filtered to preserve unique records only.

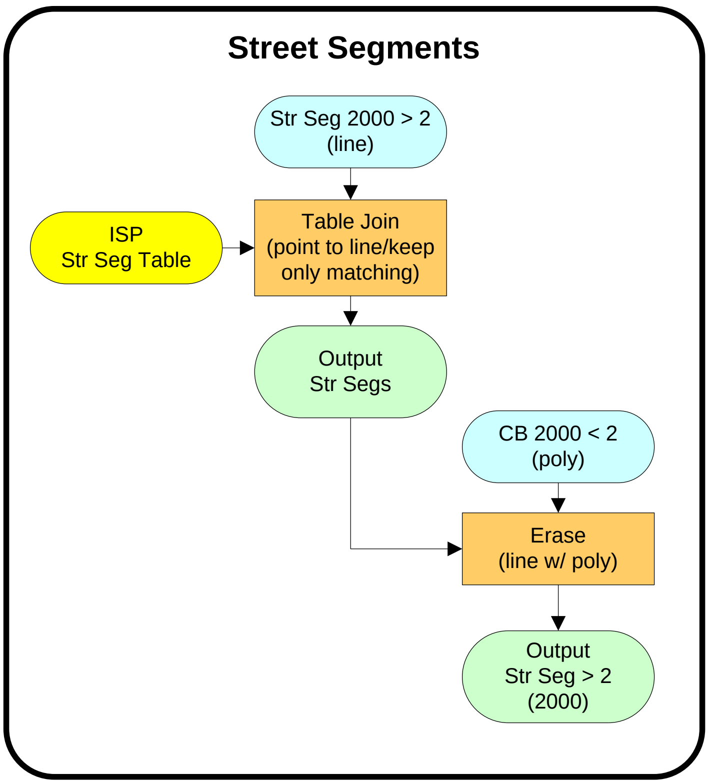
Figure 6-4: Census Block



5.1.5 Street Segment (Figure 6-5)

ISPs submit street segment data by census block in tabular format. A spatial relation process is run using the submitted census block records to call out the specific census blocks in which a provider claims to have service. The appropriate street segments are called out via the census blocks reported and preserved. An erase operation is then run using the provider's resulting census block polygon layer to remove any street segments that fall within service census blocks that are less than two square miles. All remaining street segments are preserved to represent service in areas where census blocks are greater than two square miles.

Figure 6-5: Street Segments

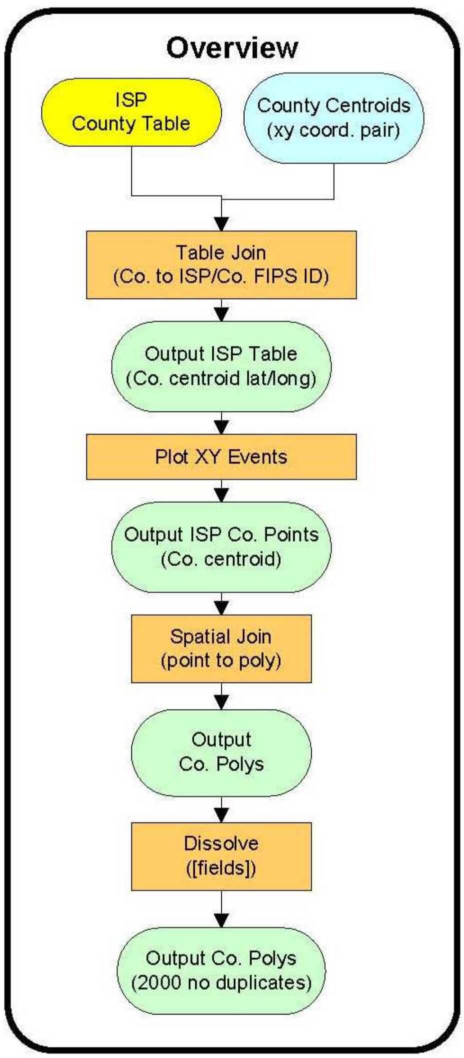


5.1.6 Service Overview (Figure 6-6)

ISPs submit county overview data in tabular format. A table join is done using county centroid points to append longitude and latitude coordinates to each record in the submitted census block table. Output is a standalone representing each county submitted by the provider and now contains the longitude and latitude coordinates of a point within the relative county. This information is used to plot coordinate pair events.

The output is a point dataset representing each record submitted by the provider. This point layer is then run through a spatial relation process along with the county polygons. Output is a polygon layer representing all submitted county records for said provider. County polygons are reviewed for duplicate records and filtered to preserve unique records only.

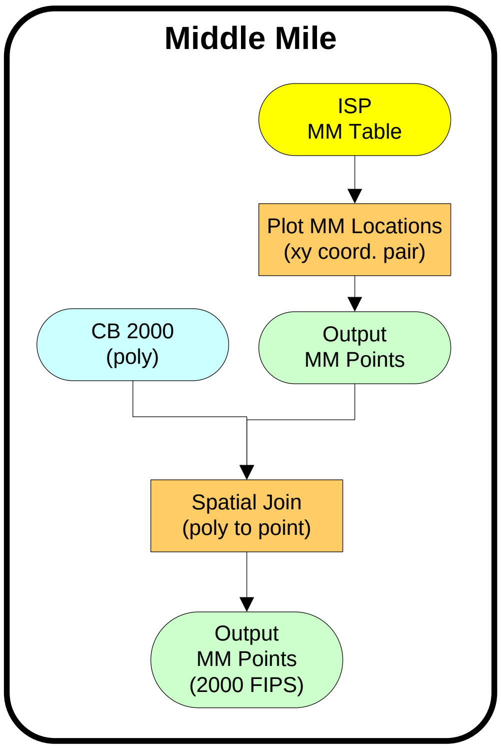
Figure 6-6: Service Overview



5.1.7 Middle Mile (Figure 6-7)

ISPs submit middle mile data as longitude and latitude coordinate pairs in tabular format. Longitude and latitude coordinate pairs are plotted on the map and preserved as geographic point locations. The middle mile point layer is then run through a spatial relation process against census block polygons in order to obtain the appropriate FIPS number for each middle mile point location.

Figure 6-7: Middle Mile



5.1.8 Wireless

Data is submitted by the ISPs in ESRI Shape file or Geodatabase format, which will be imported in the Geodatabase. CSU verifies the underlying data and creates a draft ISP coverage map.

5.1.9 Wireless Propagation

Providers who offer wireless service but could not submit a shape file or geographic representation of their service area provide tabular antenna information. Wireless antenna parameters are used to model a service area, and shape files are created for each provider. The wireless propagation model is based on the Longley-Rice, Irregular Terrain propagation model. Individual unit specifications are used to measure performance based on frequency, transmit power, receiver sensitivity, antenna gain and height. Signal coverage patterns are produced for each individual unit taking into account terrain and vegetation features that may hinder signal dispersion.

Longley-Rice is a system for forecasting the attenuation of radio waves in the frequency range of 20 MHz to 20 GHz (or path lengths ranging from 1 km to 2000 km) for a telecommunication link. In other words, this radio propagation model forecasts long-lasting median transmission loss across asymmetrical terrain relative to white-space transmission loss.

5.2 Provider Verification

During Rounds 2 and 3, broadband providers received static PDF maps which proved to be a less than adequate tool for the broadband providers to review the submitted data. . During Round 3, the project mapping partner produced a preliminary ESRI map file for each broadband provider. This changeover allowed the broadband providers to obtain a more focused and flexible mapping review product and therefore enhanced the confidence of the broadband providers in the mapping process. Apex and the NPSC staff helped the provider community obtain ESRI ArcReader and gave assistance to the providers in using the ESRI ArcReaders. The provider reviewed the map and either accepted the map or returned comments regarding any perceived inaccuracies. Apex, the NPSC staff and the provider discussed the comments and, when necessary, made corrections to the preliminary maps.

The use of the ArcReader maps revealed a problem with geocoding results. Too many locations were stacked at the centroid of a town or zip code rather than at the correct customer site. Apex and the NPSC staff engaged in a detailed analysis of this issue.

At the same time, the NPSC staff worked with selected providers in a one-on-one labor-intensive process comparing the submitted data tables to the preliminary maps. For locations that appeared problematic, the providers were able to collect additional information to improve the data table. In some instances, the additional information was acquired by driving past a customer location with GPS equipment to obtain the exact latitude and longitude of the customer. This improved data was entered into the data tables allowing CSU-Chico to revise the providers' maps.

6.0 Nebraska Matching Fund

6.1 E911 Data

The NPSC's implementation of enhanced wireless 911 throughout Nebraska required the arduous task of designing the framework to initiate, develop, and maintain the robust, and invaluable, GIS databases vital and necessary for the provision of enhanced wireless 911. These GIS databases are in a standard projection and include; street centerline, depicting all public roadways; railways; political boundaries, including city, township, and county; areas of interest, including parks, cemeteries, hazardous facilities, power plants and substations; water features; fire districts; ambulance districts; law enforcement districts; and emergency service boundaries.

Nebraska GIS data for all 93 counties, 77,358 square miles, has been developed and is continually maintained; all through funding support provided by the Nebraska Wireless E911 Fund. Nebraska data is housed within the NPSC's secure on-line statewide GIS Data Repository.

The NPSC utilized the data, developed through the Nebraska Wireless E911 Fund, to fulfill the matching requirements of the SBDD Grant Program.

Further, during the validation phase of the second round of data collection, the NPSC identified broadband unique field enhancements, when applied in addition to the existing E911 data, resulted in significant geocoding improvements in many rural areas of Nebraska served by smaller ISPs. The NPSC and the project mapping subcontractor worked extensively for several weeks to develop and implement these improvements prior to the third round of data collection. Sample geocoding results analyzed subsequent to completion of all enhancements, indicated an average record resolution increase of just over 51% in those rural areas.

The project mapping vendor, California State University – Chico, utilized the enhanced dataset to develop an Address Locator, unique to Nebraska, which is then used to geocode address data provided by ISPs and ultimately submit to the NTIA for the third round broadband data submission.

The NPSC will continue to utilize the E911 data resources for address processing and geospatial verification throughout the term of the SBDD Grant Program.

Appendix - A Mapping Project Partners

Apex CoVantage LLC

Apex CoVantage is a private, employee-owned company that has helped businesses to develop and execute information and knowledge strategies for more than two decades. Apex was a pioneer in offshore knowledge-based solutions and now has more than 2,500 employees in the US and abroad. Apex is known for developing and improving man-machine processes that optimally combine human creativity with machine processing efficiency, introducing transformative solutions that lead to quantum gains in efficiency.

Apex is recognized as one of the premier firms in its field, working for clients such as AT&T, Exelon, Baltimore Gas and Electric, Qwest, Silver Spring Networks, SMUD, Veridian Connections and more.

California State University (CSU)-Chico

The Geographical Information Center (GIC) at California State University, Chico was established in 1988 to introduce digital mapping and geographical information systems (GIS) technology to the Northern California region and to provide valuable on-the-job training and employment opportunities for our students. The Center's mission is both academic and service oriented. With numerous research opportunities available throughout California, the growth of the GIC has resulted in a renewed University commitment to strengthen ties to the Northern California region.

The GIC employs between 10 and 20 individuals. The staff includes professionals with extensive GIS training mentoring qualified graduates, student assistants and interns. The center runs its own intranet and is connected to the multi-campus CSU-Net, giving it state-of-the-art networking capability.

While the center’s primary area of expertise is GIS technology, the GIC also has experience in digital orthophoto development, global positioning system (GPS) applications, computer cartography, image processing and air photo interpretation.

The GIC has the technical expertise to plan, develop, install, serve and maintain an agency’s GIS. It uses ESRI GIS software and can develop a customized ArcGIS training workshop to meet an agency’s needs. Because it is affiliated with California State University, Chico, it can draw specialized expertise from the academic community. The center’s contracts are primarily with federal, state and local agencies, but it also serves a variety of private sector clients. Projects are equally split between urban and natural resource applications. Contracts are administered through the California State University, Chico Research Foundation.

Edison Research

Edison Research conducts market research and exit polling, providing strategic information for businesses and media organizations worldwide.

With an expertise in both quantitative and qualitative research, Edison works with many established corporations looking to keep their edge or expand, as well as young companies just starting to develop their businesses. Edison offers expertise in telephone, Internet and in-person research as well as focus groups and dial testing.

Edison Research has been the sole provider of exit poll information to the six major news organizations - ABC, CBS, CNN, FOX, NBC and the Associated Press - since 2003. Edison has conducted exit polls and collected precinct vote returns to project and analyze results for every major primary and the general election in 2004, 2006 and 2008.

Edison is also the leading provider of consumer exit polling and has conducted face-to-face research in almost every imaginable venue. Edison Research has conducted research at leisure locations (movie theaters, golf courses, health clubs, museums, cruise ships), transit locations (airports, subway stations, bus stations, truck stops, school buses, parking garages, gas stations), retail establishments (shopping malls, restaurants, stores), stadiums/arenas (concerts, sporting events), and many other locations including office buildings, conventions/conferences, and medical centers. Our network of more than 10,000 experienced interviewers allows us to conduct research in almost any location.

Another specialty for Edison is its work for radio stations throughout the world, conducting both strategic and music research for successful stations in North America, South America, Europe and Asia. Additionally, Edison conducts research for the U.S. Government's broadcasting ventures in the Middle East including "Radio Sawa" and "Radio Farda." This research is currently conducted weekly in Abu Dhabi, Egypt, Iraq, Jordan, Lebanon and Morocco.

Appendix - B

Strata Sample Methodology

An in person survey was conducted using personal digital assistants with customized software. The sample included four households or community anchor institutions in each selected census block. The initial phase included 1,400 in person's interviews.

Sample Design Overview

The sample design was a *stratified cluster sample*. The first layer consisted of six strata that encompassed the entirety of Nebraska. The second layer of the design consisted of a sample of 350 census blocks. These census blocks were referred to as the *primary sampling unit* (PSU). The third layer of the design was the household/community anchor. These locations are known as the *secondary sampling unit* (SSU), or observation unit.

Stratification

Six strata encompassing all of Nebraska were created for this sample design. These strata were created based on the relative rural/urban nature of the area, the cultural makeup of the area and the geographic region of the state. All strata boundaries follow county boundary lines.

These strata for Nebraska consist of:

1. Stratum 1 – Douglas County
2. Stratum 2 – Cass, Lancaster, Sarpy counties
3. Stratum 3 – Medium Rural/Urban Area – (17 counties)
4. Stratum 4 – Rural West – (53 counties)
5. Stratum 5 – Rural East – (18 counties)
6. Stratum 6 – Thurston County (Indian Reservation)

Of the sample of 350 census blocks, each strata were allocated a portion of the sample. The allocation was an optimal allocation procedure based on the racial makeup of each stratum. This means that the strata with greater racial variability will be allocated more census blocks than strata with less variability. Consequently, heterogeneous strata had more census blocks and homogeneous strata had fewer census blocks. This resulted in a more efficient use of the sample placing the census blocks where they were most needed. Stratification sample allocation and household distribution:

Stratum	Sample Census Block Allocation	Percent of Households
1 – Douglas County	75	27.3%
2 – Cass, Lancaster, Sarpy counties	37	22.8%
3 – Medium Rural/Urban Area (17 counties)	97	24.7%
4 – Rural West (53 counties)	77	13.7%
5 – Rural East (18 counties)	57	11.1%
6 – Thurston County (Indian Reservation)	7	0.3%

Primary Sampling Units – Census Blocks

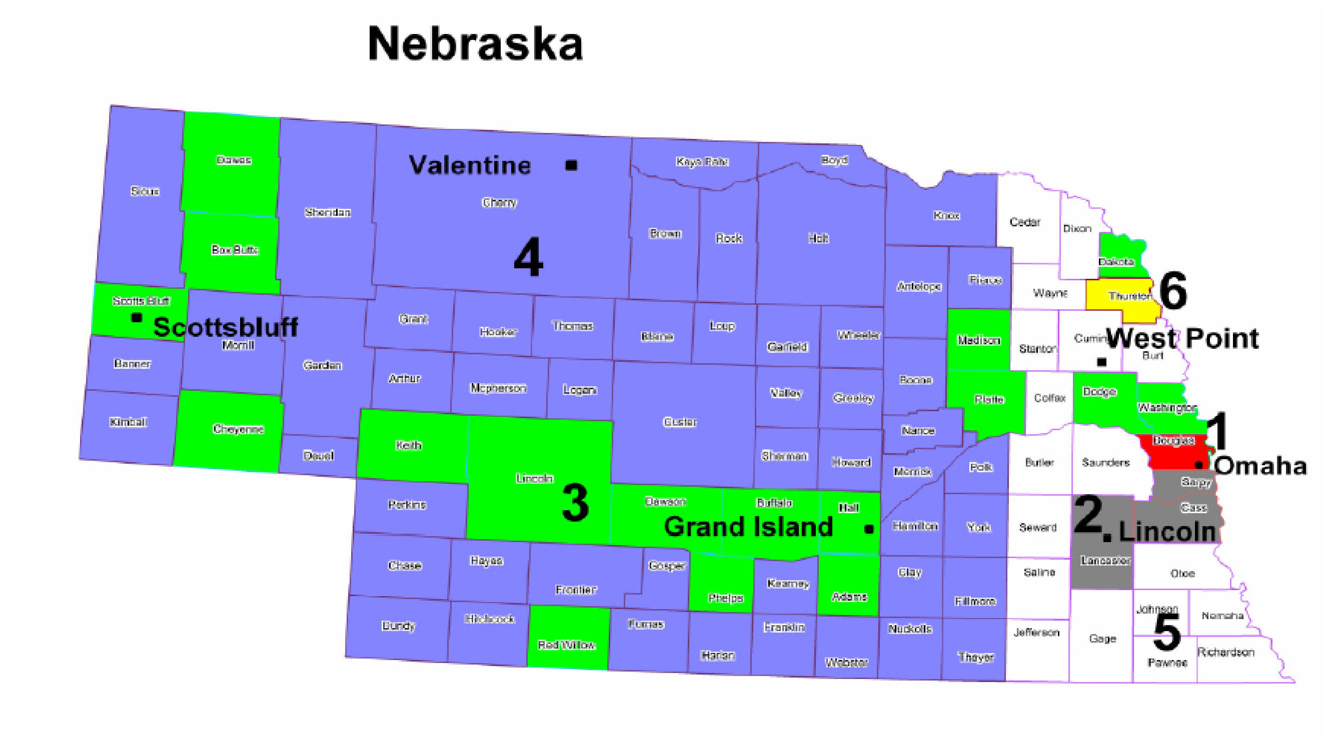
The primary sampling units was the census block. These census blocks were nested within a given stratum. Each census block had a known probability of selection based on the number of households that exist within that census block. Every census block was contained within a county. Nebraska has many small census blocks where the number of completed interviews from households/community anchors was less than four (4). In this situation the interviewer was instructed to begin sampling at the nearest neighboring census block contained within the census block group of the sampled census block. They continued interviewing until four interviews are obtained. By keeping the interviewer within the census block group this ensured that interviews obtained outside the original sampled block were still within the same county and consequently the same stratum.

Secondary Sampling Units – Households/CAI

Secondary sampling units, households/community anchors, were selected systematically within a census block. Community anchor locations were not specifically targeted. However, they were included if they fell within the systematic selection. The interviewer was given a random starting point within the census block. The interviewer proceeded to follow their assigned path and interviewing rate until four (4) completed interviews were obtained.

Conclusion

This sampling plan resulted in a statistically valid sample. This sampling plan consisted of an initial sample of size 350 (up to 425 in the final sample). This resulted in a final anticipated statewide margin of error of (+/- 5%). A total of 1,400 households/community anchors were sampled. The results of this sample could be used for further estimation and extrapolation to other census blocks that were not part of the final sample.



Edison In-person Survey Questionnaire

1. Enter census block number **(DO NOT READ)**: ___ ___ ___ ___

2. Code type of location **(DO NOT READ)**

Household **(Use "household")**	1	**SKIP TO Q.4**
Commercial Business **(Use "business")**	2	
Other location: ________________ **(Use "location")**	3	**SKIP TO Q.4**

3. What type of business is this? **(RECORD EXACT RESPONSE)**

   ____

   Don't Know/No Answer 9

4. Does this **(ANSWER FROM Q.2)** have Internet access? **(PROBE: IF UNSURE, ASK IF SOMEONE ELSE IS AVAILABLE)**

Yes	1	**CONTINUE**
No	2	**SKIP TO Q.10**
Don't Know/No one available	9	**TERMINATE**

5. Which type of Internet access does this **(ANSWER FROM Q.2)** have? If you are not sure, let me know and I can describe the difference between the two. **(READ LIST)**

Dial-up	1	**CODE Q.6 AS "DIAL-UP" & SKIP TO Q.10**
Broadband	2	**CODE Q.6 AS "BROADBAND" & SKIP TO Q.8**
Both **(DO NOT READ)**	3	**CODE Q.6 AS "BOTH" & SKIP TO Q.8**
Don't Know/No Answer **(DO NOT READ)**	9	**CONTINUE**

6. Most people who access the Internet do so through dial-up or broadband. A dial-up connection is where your computer connects to the Internet using your telephone line.

   A broadband connection usually uses a cable modem provided by your cable company or a service called DSL. Broadband connections access the Internet at much faster speeds than a dial-up connection, and allow you to always remain connected to the Internet.

   Which of these two types of Internet connections does this **(ANSWER FROM Q.2)** have-- a dial-up connection or a broadband connection?

Dial-up	1	**SKIP TO Q.8**
Broadband	2	**SKIP TO Q.8**
Both **(VOLUNTEERED)**	3	**SKIP TO Q.8**
Don't Know/No Answer **(DO NOT READ)**	9	**CONTINUE**

7. Is there anyone else who might know whether or not this **(ANSWER FROM Q.2)** accesses the Internet through dial-up or broadband?

Yes, available	1	**ASK FOR THAT PERSON, GO BACK TO Q.5**
Yes, not available	2	**THANK AND TERMINATE**
No	3	**THANK AND TERMINATE**
Don't Know/No Answer	4	**THANK AND TERMINATE**

8. Who is the broadband Internet provider for this **(ANSWER FROM Q.2)**? **(READ LIST) (PROBE: IF UNSURE, ASK IF SOMEONE ELSE IS AVAILABLE)**

   Insert list of known service providers in the census block entered in Q.1
   Other: ___________________ 98

   Don't Know/No Answer **(DO NOT READ)** 99

9. Which type of broadband service does your Internet provider supply to this **(ANSWER FROM Q.2)**? **(READ LIST) (PROBE: IF UNSURE, ASK IF SOMEONE ELSE IS AVAILABLE)**

Cable	1
DSL	2
Other: ______________	3
Don't Know/No Answer **(DO NOT READ)**	9

10. Code gender **(DO NOT READ)**

    Male 1

Female	2

11. Can you please tell me your age? **(RECORD EXACT RESPONSE) ________**

12. The last few questions are for classification purposes only. Which of the following best describes you? Are you…?

White	1
African-American	2
Asian	3
Or of some other background?	4
Refused/No Answer	9

13. Are you of Hispanic or Latino descent?

Yes	1
No	2
Refused/No Answer	9

IF Q.2 CODED "1", CONTINUE, OTHERWISE, SKIP TO NOTE ABOVE Q.17

14. What is the highest level of education achieved by ANYONE in this household? **(READ LIST)**

High school or less	1
One to three years of college	2
Four year college degree	3
Some graduate credits	4
Advanced degree such as MA, MBA or PhD	5
Don't Know/No Answer **(DO NOT READ)**	9

15. Including yourself, how many adults age 18 or older live in this household?
(RECORD EXACT RESPONSE) _______

16. Is there anyone under the age of 18 living in this household?

Yes	1
No	2
Don't Know/No Answer	9

IF Q.6 CODED "1"/DIAL-UP, SKIP TO Q.18, OTHERWISE, CONTINUE

17. The state of Nebraska would also like to know how fast the broadband connection is in this **(ANSWER FROM Q.2)**. Login to the Nebraska speed test web site, enter the ID number located on this postcard **(SHOW POSTCARD)** and it will automatically log your speed. No identifying information is captured on the speed test web site. This would be a great help and we would appreciate the additional effort.

UNIQUE ID NUMBER IS GENERATED

Enter the ID number on to the postcard. Hand it to the respondent. **(DO NOT READ)**

18. In case my supervisor needs to verify that I completed this interview, may I please have your first name? **(RECORD EXACT RESPONSE) ______________________**

Don't Know/No Answer 9

19. And may I have your phone number or email address? It will ONLY be used if my supervisor wants to verify any of the information in this interview. **(RECORD EXACT RESPONSE)**

Phone number (__ __ __) __ __ __ - __ __ __ __
E-mail address _____________@________.______

Don't Know/No Answer 9

20. Thank you for your time and cooperation!

21. Enter respondent's address. **(RECORD AFTER YOU HAVE COMPLETED THE INTERVIEW)**

Address 1: _________________________________
Address 2: _________________________________
City, State, Zip: Insert city, state and zip code as determined by the census block entered in Q.1

Mail Survey Questionnaire

Your response is important! Please fill out and promptly mail the Nebraska Broadband Mapping Survey. Results from these surveys will be used to map the availability of Broadband service for the ENTIRE STATE OF NEBRASKA. Without enough completed surveys, your community may not receive its fair share of government funding to support the build out of the Broadband network in Nebraska!

Please mark the appropriate answers to the survey questions below.

1. Do you have Internet access at your home?

☐ Yes (Continue) ☐ No (Skip to Question 5)

2. Which type of Internet access does your household have? (Mark all that apply)

☐ Dial-up (A dial-up connection is when you will not be able to receive a telephone call using the same telephone line that connects your computer to the Internet.)

☐ Broadband (A broadband connection usually uses a cable modem provided by your cable company or a service called DSL. Broadband connections access the Internet at much faster speeds than a dial-up connection, and allow you to always remain connected to the Internet.)

☐ Don't Know (Skip to Question 5)

3. Who is your broadband Internet provider?

____

4. Which type of broadband service does your Internet provider supply to your home? (Mark all that apply)

☐ Cable ☐ DSL

☐ Satellite ☐ Other: ________________________ (specify)

5. Gender: ☐ Male ☐ Female

6. Please provide your exact age: ___________

7. Are you…? (Mark all that apply)

☐ White ☐ African-American ☐ Asian

☐ Other background

8. Are you of Hispanic or Latino descent?

☐ Yes ☐ No

9. What is the highest level of education achieved by anyone in this household?

☐ High School or less

☐ One to three years of college

☐ Four year college degree

☐ Some graduate credits

☐ Advanced degree such as MA, MBA, or PhD

10. Including you, how many adults age 18 or older live in this household?

____

11. Is there anyone under the age of 18 living in this household?

☐ Yes ☐ No

The State of Nebraska would also like to know how fast your broadband connection is. Please go to the Nebraska Public Service Commission Web site at www.psc.nebraska.gov. Click on “Speed Test”, enter your address and it will automatically log your speed. No identifying information is captured. This would be a great help and we would appreciate the additional effort.

Thank you for your time and cooperation!

Phone Survey Questionnaire

Please use the script below for Nebraska Broadband Availability Mapping Survey.

1. Does your household have Internet access?

1 _____	Yes	**CONTINUE**
2 _____	No	**SKIP TO Q.5**
9 _____	Don't Know **(DO NOT READ)**	**SKIP TO Q.5**

2A. Which type of Internet access does your household have? If you are not sure, let me know and I can describe the difference between the two. **(READ LIST) (PROBE: IF UNSURE, ASK IF SOMEONE ELSE MIGHT KNOW AND IS AVAILABLE)**

1 _____	Dial-up	**SKIP TO Q.5**
2 _____	OR Broadband	**SKIP TO Q.3**
3 _____	Both **(DO NOT READ)**	**SKIP TO Q.3**
9 _____	Don't Know **(DO NOT READ)**	**CONTINUE TO Q.2B**

2B. Most people who access the Internet do so through dial-up or broadband. A dial-up connection is when you will not be able to receive a telephone call using the same telephone line that connects your computer to the Internet.

A broadband connection usually uses a cable modem provided by your cable company or a service called DSL. Broadband connections access the Internet at much faster speeds than a dial-up connection, and allow you to always remain connected to the Internet.

Which of these two types of Internet connections do you have -- a dial-up connection or a broadband connection?

1 _____	Dial-up	**SKIP TO Q.5**
2 _____	OR Broadband	
3 _____	Both **(DO NOT READ)**	

3. Who is your broadband Internet provider? **(PROBE: IF UNSURE, ASK IF SOMEONE ELSE MIGHT KNOW AND IS AVAILABLE)**

___________________ **If it was left blank, leave the cell blank.**

9______ Don't Know/No Answer **(DO NOT READ)**

4. Which type of broadband service does your Internet provider supply to your home? **(PROBE: IF UNSURE, ASK IF SOMEONE ELSE MIGHT KNOW AND IS AVAILABLE)** **(ACCEPT MULTIPLE RESPONSES)**

   1 _____ Cable

   2 _____ DSL

   3 _____ Satellite

   4 _____ Other: ______________________________ (**RECORD EXACT RESPONSE**)

5. Gender of the Resident answering the Survey **(DO NOT READ, BUT USE VOICE AND NAME TO RECORD GENDER)**

   1 _____ Male

   2 _____ Female

6. Can you please tell me your age? **(RECORD EXACT RESPONSE)** ________

   NA ______ No Answer **(DO NOT READ)**

7. The last few questions are for classification purposes only. Which of the following bests describes you? Are you…?

   1 _____ White

   2 _____ African-American

   3 _____ Asian

   4 _____ Other background

   9 _____ No Answer **(DO NOT READ)**

8. Are you of Hispanic or Latino descent?

1 _____ Yes

2 _____ No

9 _____ No Answer **(DO NOT READ)**

9. What is the highest level of education achieved by anyone in this household? **(ACCEPT MULTIPLE RESPONSES)**

1 _____ High School or less

2 _____ One to three years of college

3 _____ Four year college degree

4 _____ Some graduate credits

5 _____ Advanced degree such as MA, MBA, or PhD

9 _____ No Answer **(DO NOT READ)**

10. Including yourself, how many adults age 18 or older live in this household? **(RECORD EXACT RESPONSE) ________**

NA _____ No Answer **(DO NOT READ)**

11. Is there anyone under the age of 18 living in this household?

1 _____ Yes

2 _____ No

9 _____ No Answer **(DO NOT READ)**

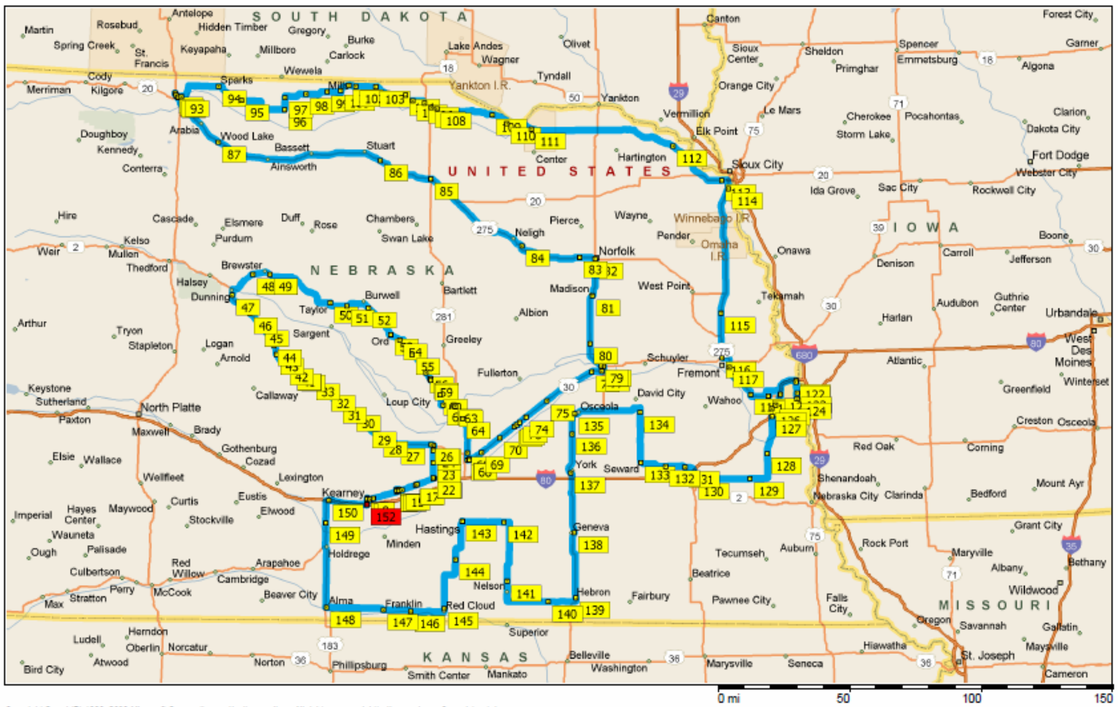
12. The State of Nebraska would also like to know how fast your broadband connection is. Go to the Nebraska Public Service Commission Web site at www.psc.nebraska.gov. Click on "Speed Test", enter your address and it will automatically log your speed. No identifying information is captured. This would be a great help and NPSC would appreciate the additional effort.

Thank you for your time and cooperation!

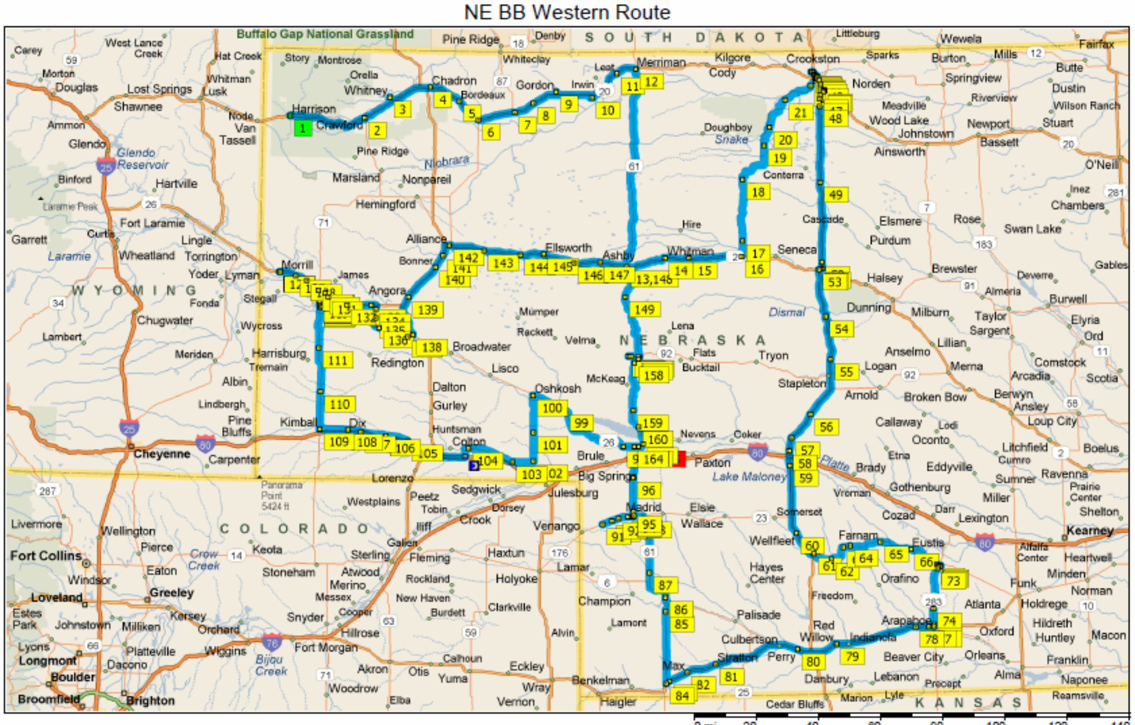
Appendix - C Spectrum Drive Test

ProField Drive Test

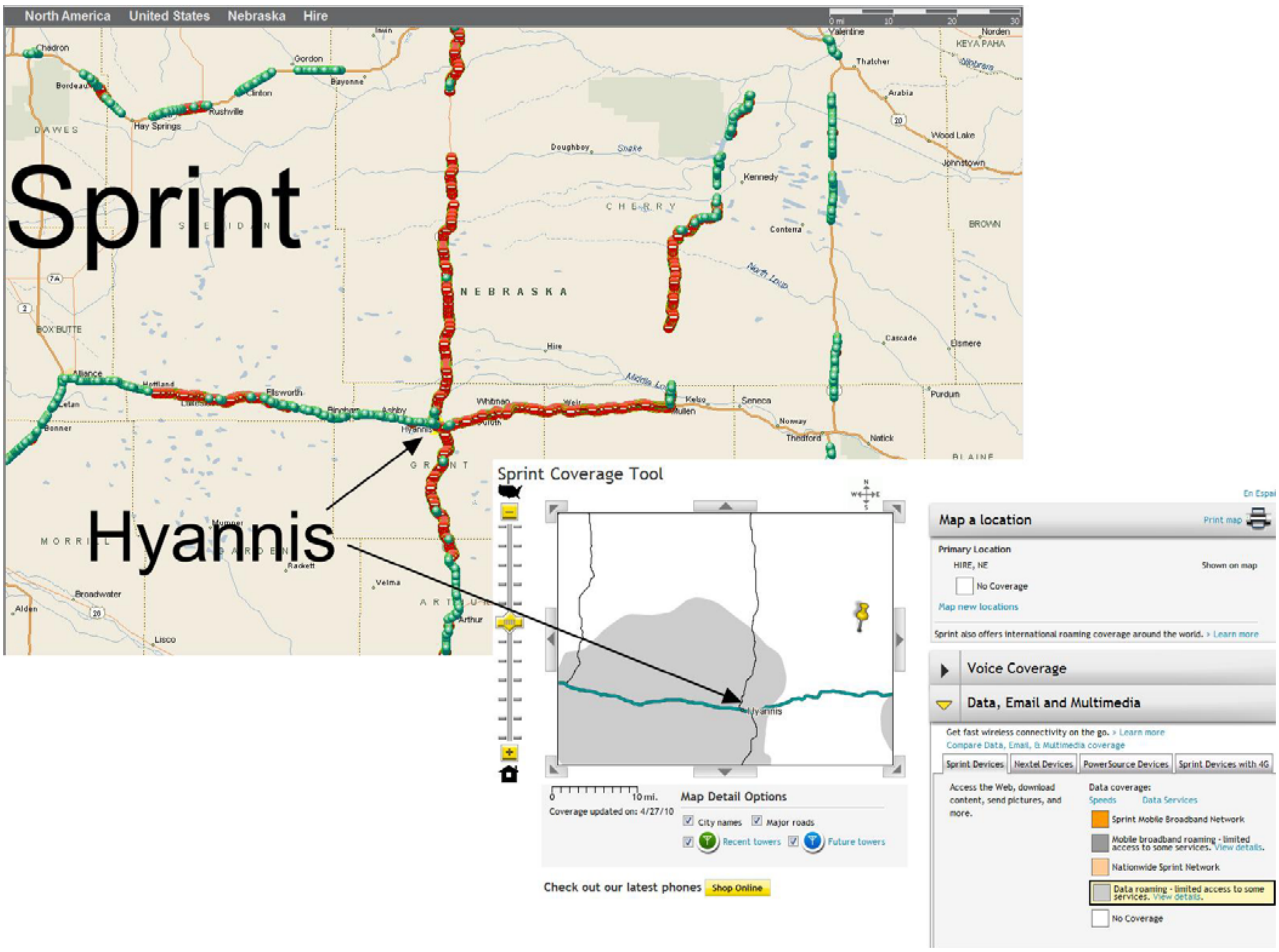
NE BB Eastern Route-2



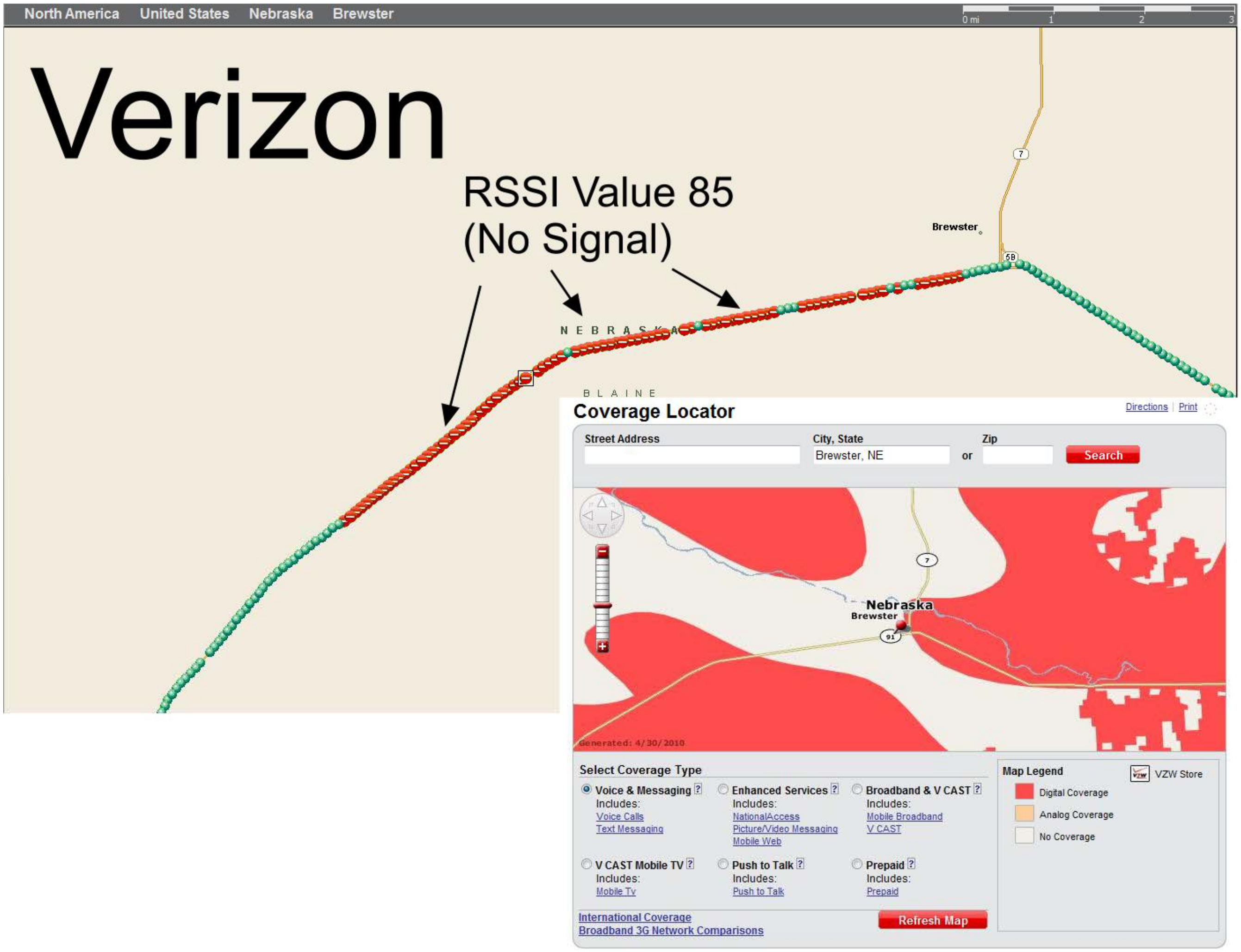
NE BB Western Route



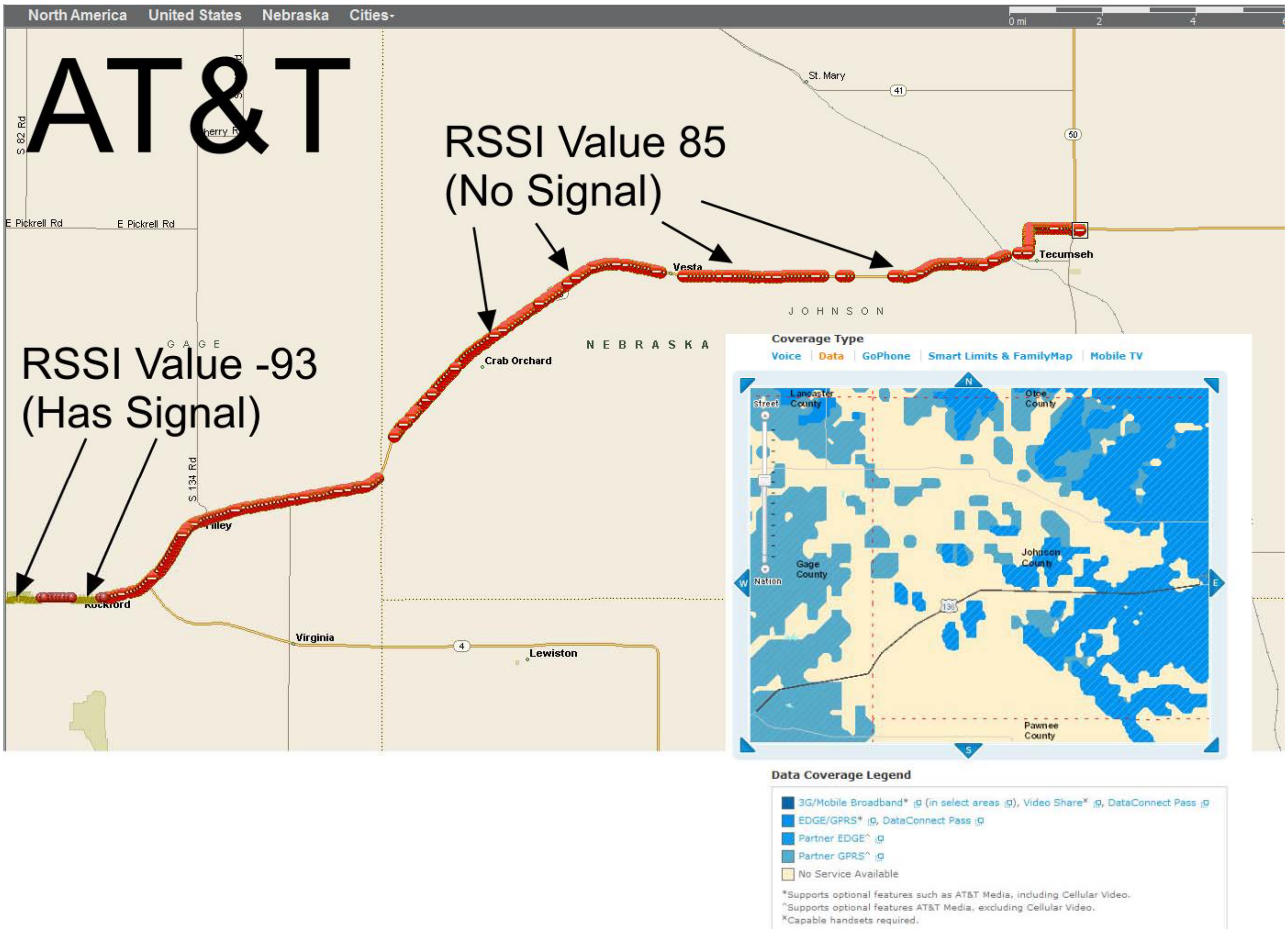
Results from Drive Test



http://coverage.sprint.com/IMPACT.jsp?ECID=vanity:coverage



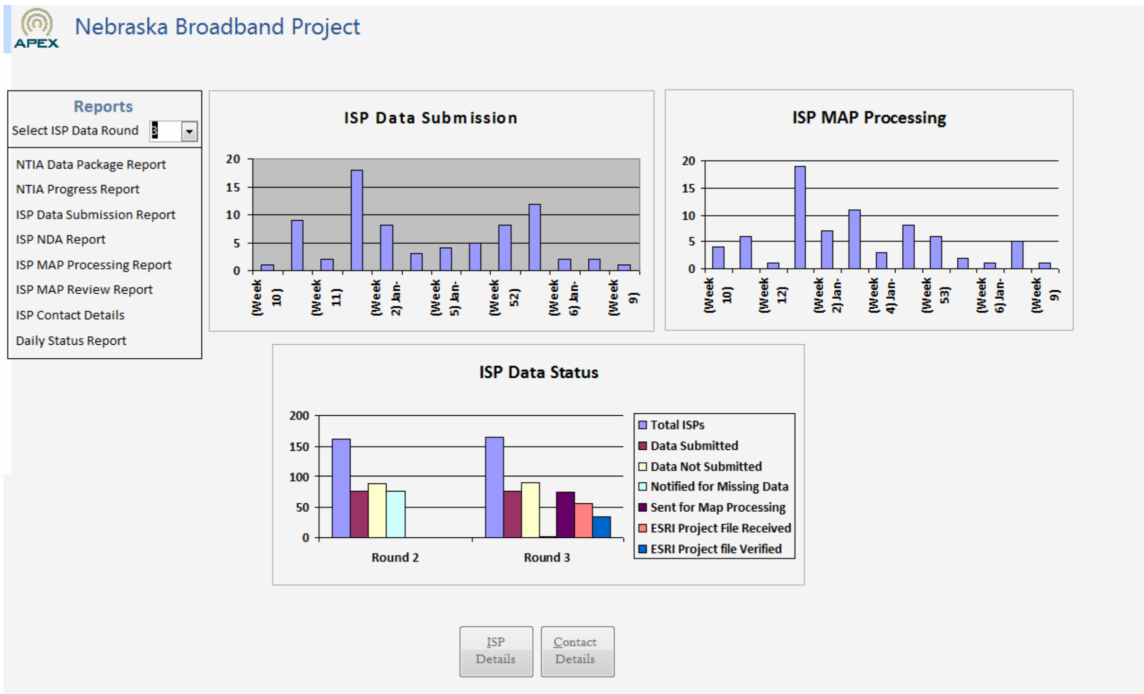
http://www.verizonwireless.com/wireless-coverage-area-map.shtml



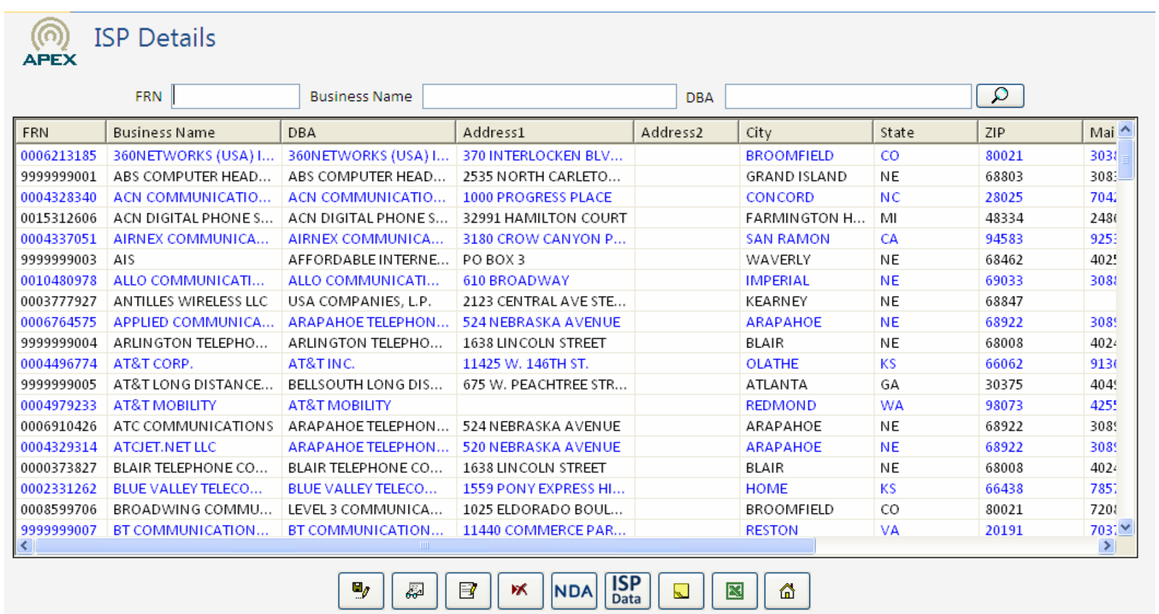
http://www.wireless.att.com/coverageviewer/#?type=data

Appendix - D Access Database

All information regarding Nebraska Broadband Project is available in an Access database. The database tracks the details such as ISP submission filings and contacts,



The ISP details table contains information regarding FRN, Business Name & DBA. It is possible to search the table by field



APEX

ISP Details

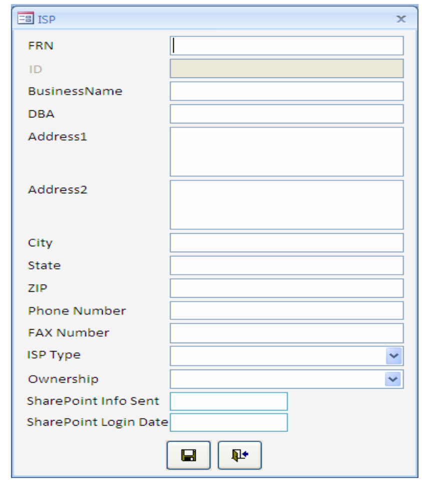
FRN | Business Name | DBA

FRN	Business Name	DBA	Address1	Address2	City	State	ZIP	Mai
0006213185	360NETWORKS (USA) I...	360NETWORKS (USA) I...	370 INTERLOCKEN BLV...		BROOMFIELD	CO	80021	303
9999999001	ABS COMPUTER HEAD...	ABS COMPUTER HEAD...	2535 NORTH CARLETO...		GRAND ISLAND	NE	68803	308
0004328340	ACN COMMUNICATIO...	ACN COMMUNICATIO...	1000 PROGRESS PLACE		CONCORD	NC	28025	704
0015312606	ACN DIGITAL PHONE S...	ACN DIGITAL PHONE S...	32991 HAMILTON COURT		FARMINGTON H...	MI	48334	248
0004337051	AIRNEX COMMUNICA...	AIRNEX COMMUNICA...	3180 CROW CANYON P...		SAN RAMON	CA	94583	925
9999999003	AIS	AFFORDABLE INTERNE...	PO BOX 3		WAVERLY	NE	68462	402
0010480978	ALLO COMMUNICATI...	ALLO COMMUNICATI...	610 BROADWAY		IMPERIAL	NE	69033	308
0003777927	ANTILLES WIRELESS LLC	USA COMPANIES, L.P.	2123 CENTRAL AVE STE...		KEARNEY	NE	68847	
0006764575	APPLIED COMMUNICA...	ARAPAHOE TELEPHON...	524 NEBRASKA AVENUE		ARAPAHOE	NE	68922	308
9999999004	ARLINGTON TELEPHO...	ARLINGTON TELEPHO...	1638 LINCOLN STREET		BLAIR	NE	68008	402
0004496774	AT&T CORP.	AT&T INC.	11425 W. 146TH ST.		OLATHE	KS	66062	913
9999999005	AT&T LONG DISTANCE...	BELLSOUTH LONG DIS...	675 W. PEACHTREE STR...		ATLANTA	GA	30375	404
0004979233	AT&T MOBILITY	AT&T MOBILITY			REDMOND	WA	98073	425
0006910426	ATC COMMUNICATIONS	ARAPAHOE TELEPHON...	524 NEBRASKA AVENUE		ARAPAHOE	NE	68922	308
0004329314	ATCJET.NET LLC	ARAPAHOE TELEPHON...	520 NEBRASKA AVENUE		ARAPAHOE	NE	68922	308
0000373827	BLAIR TELEPHONE CO...	BLAIR TELEPHONE CO...	1638 LINCOLN STREET		BLAIR	NE	68008	402
0002331262	BLUE VALLEY TELECO...	BLUE VALLEY TELECO...	1559 PONY EXPRESS HI...		HOME	KS	66438	785
0008599706	BROADWING COMMU...	LEVEL 3 COMMUNICA...	1025 ELDORADO BOUL...		BROOMFIELD	CO	80021	720
9999999007	BT COMMUNICATION...	BT COMMUNICATION...	11440 COMMERCE PAR...		RESTON	VA	20191	703

NDA ISP Data

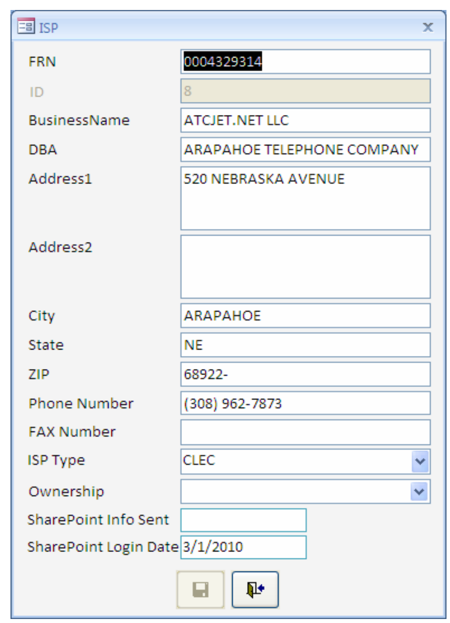
Add New ISP:

Click on add button to generate the add formpopulate the form with ISP data and press the save button.



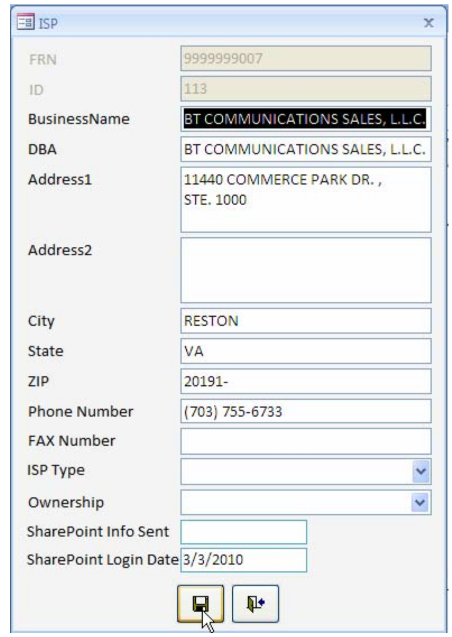
View ISP details:

Double click ISP details in list view or select the ISP from the list view and press view button.



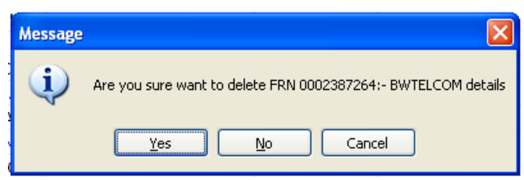
Edit ISP details:

To edit the ISP details, select the ISP from the list view and press view button Edit the ISP form and press save button.



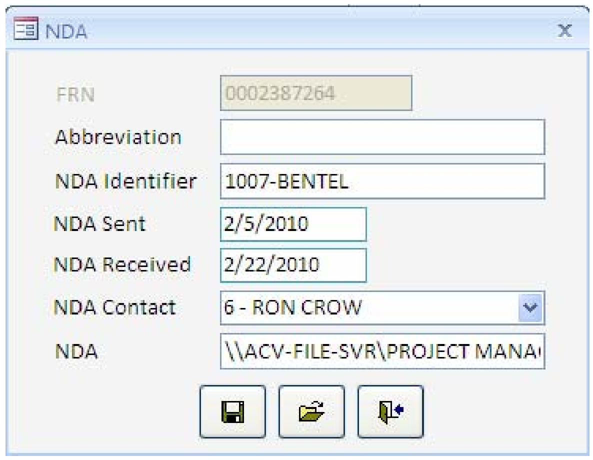
Delete ISP:

To delete an ISP details, select ISP from the list view and press delete button.



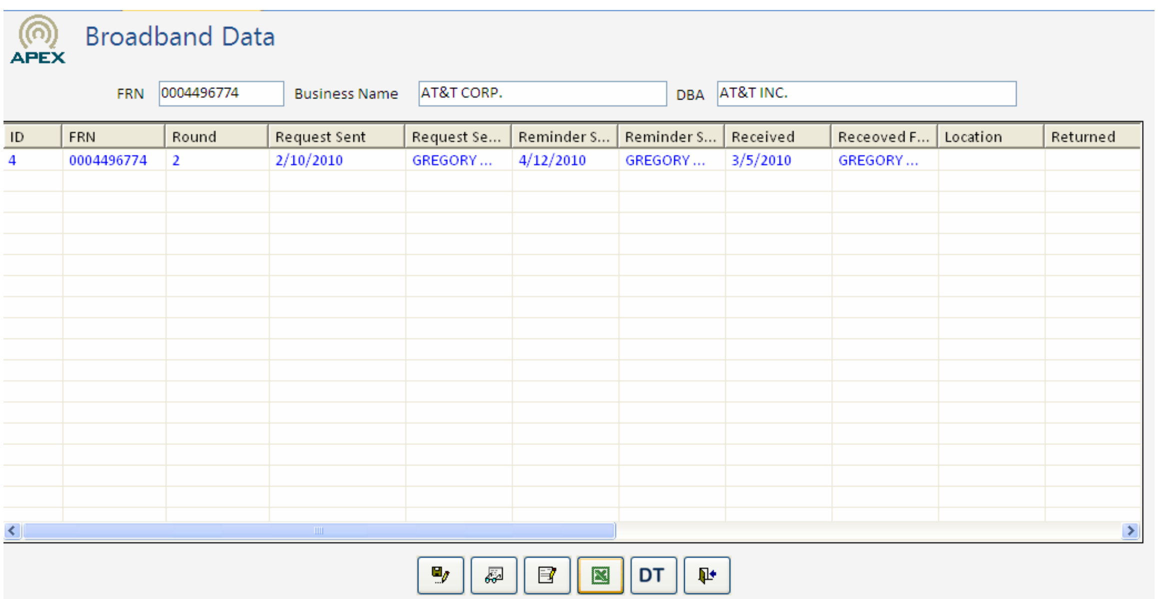
NDA:

To view the NDA details for an ISP select the ISP from the list view and press NDA button. Click on open NDA button to view the NDA scanned document.



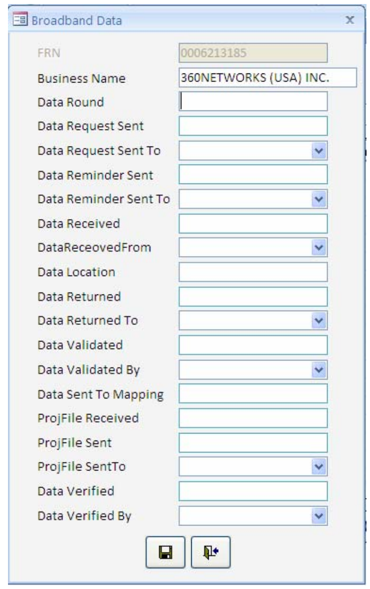
ISP Data:

To get the ISP Broadband Data we need to select ISP from the list view and press ISP Data ,then Broadband Data form opened. Using this module we can Add, Edit & View ISP Broadband Data & Data Tracking details of each round of data.



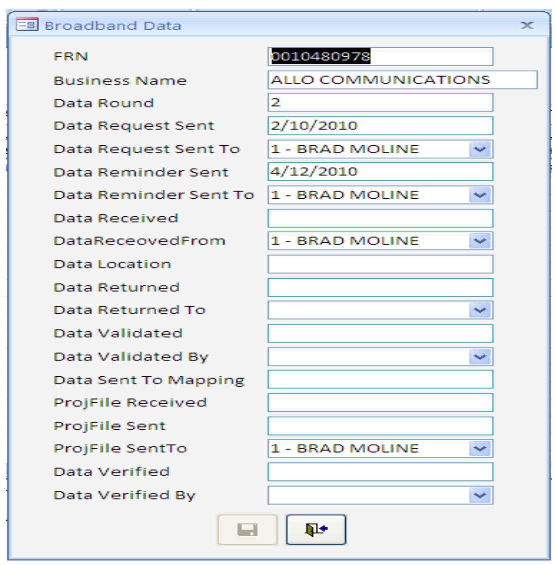
Add Broadband Data:

Click on “Add ISP Data” button. Broadband Data form will be opened. You need to fill the required fields and press save button.



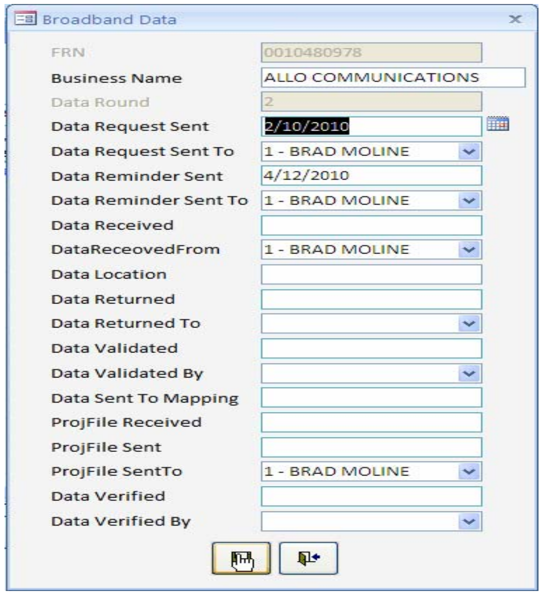
View Broadband Data:

Double click ISP round data in list view or select the round data from the list view and press view button. You can view all details as shown below.



Edit Broadband Data:

Select the round data which you want to edit from the list view and press button. Update the data and press save button.

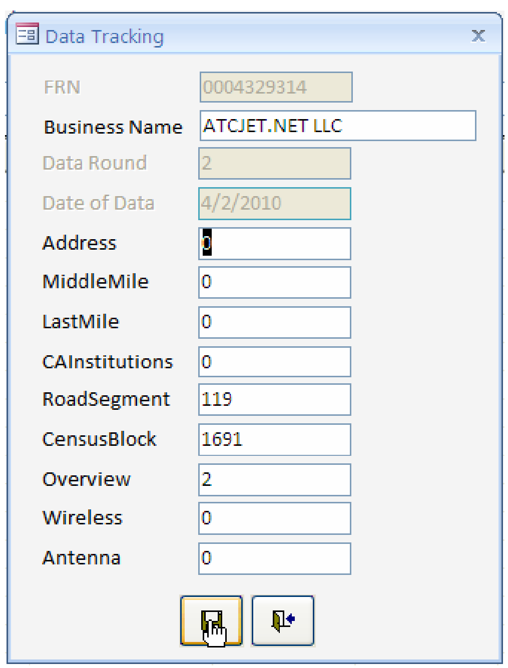


Export Broadband Data:

Click on the export button to export ISP Broadband Data to excel.

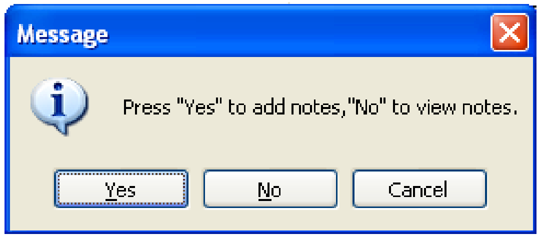
Add & Edit Data Tracking:

The number of records in “Geo Database” submitted by the ISP will be updated in Data Tracking module for each round of data. Select the round from the list view and click on Data Tracking button. The Data Tracking form will be opened. Update the values and press save button.

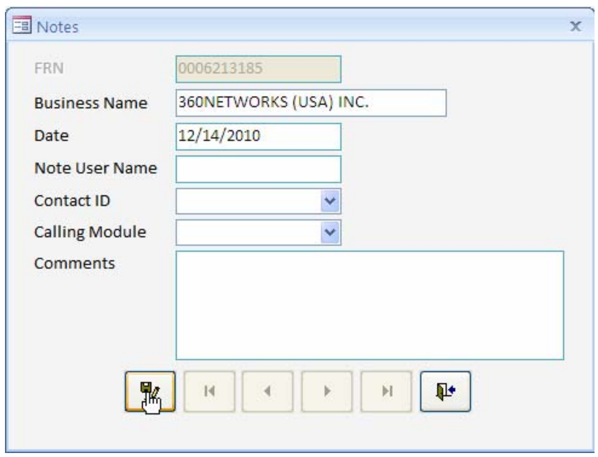


Notes:

Add or view notes by selecting the ISP from the list view and press the Notes button. Click the notes button you will get a message "Press Yes to add notes, No to view notes" as show below.



If you press "Yes", the Notes form will be displayed. Key in values and press the save button.

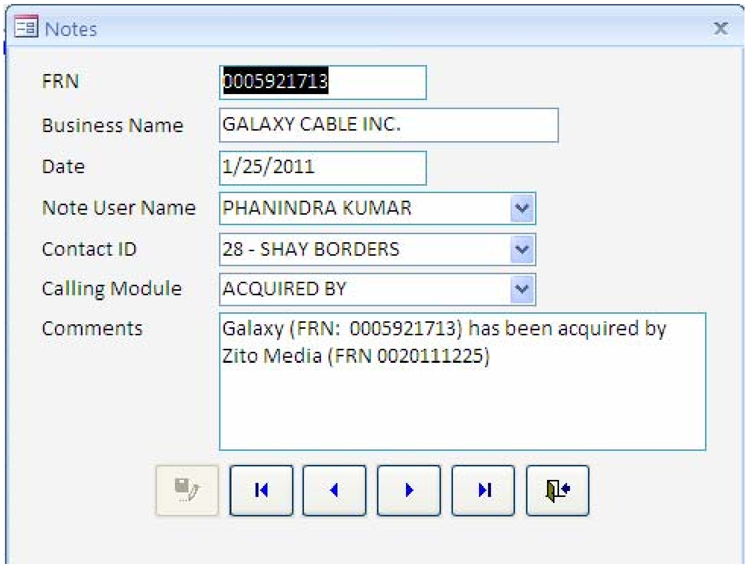


If you press "No", Notes form will be displayed. You can view all the notes by pressing navigation buttons.

Calling Module

- ISSUES IN SUBMITTED DATA: - If we have any issues with the data we need to select this option and add the missing data details in the comments. So that when we generate the daily status thes comments will be displayed.
- ISP COMMENTS: - If ISP's give any comments we need to select this.
- ACQUIRED BY: - If ISP acquired by any other ISP's we need to add a note by select this. So that when we generate the daily status this comments will be displayed.

  For Exp: - Galaxy (FRN:0005921713) has been acquired by Zito Media (FRN 0020111225)

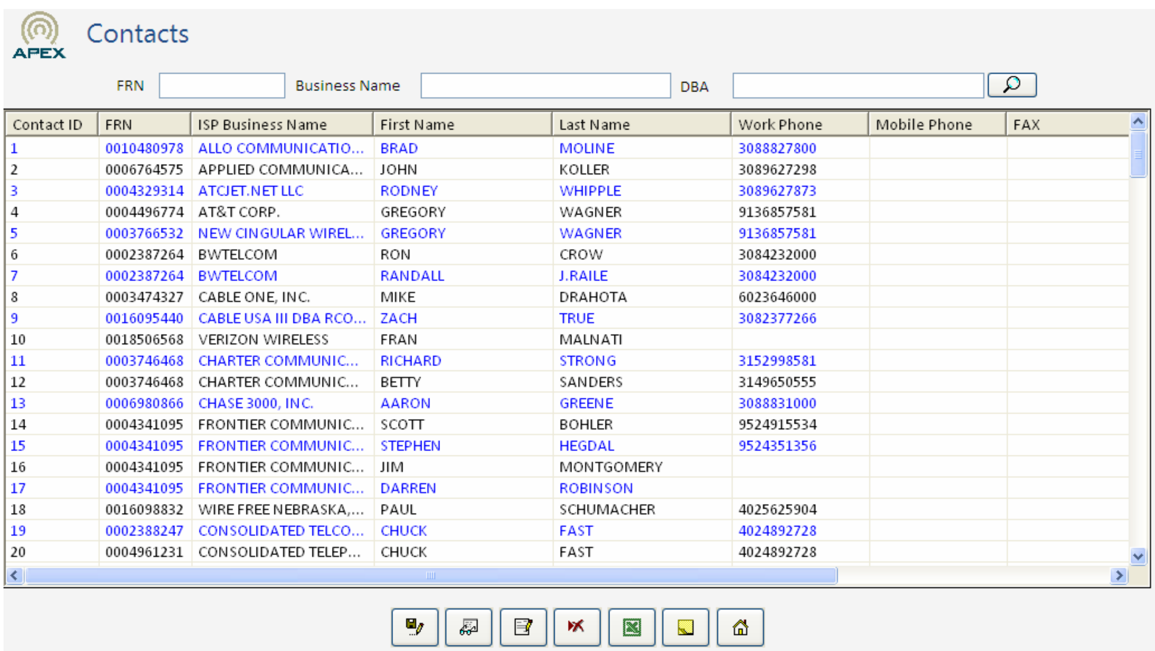


- NOTES:-if you want to add any notes select this as a calling module

Export to Excel

To export the ISP details to Excel by press export button.

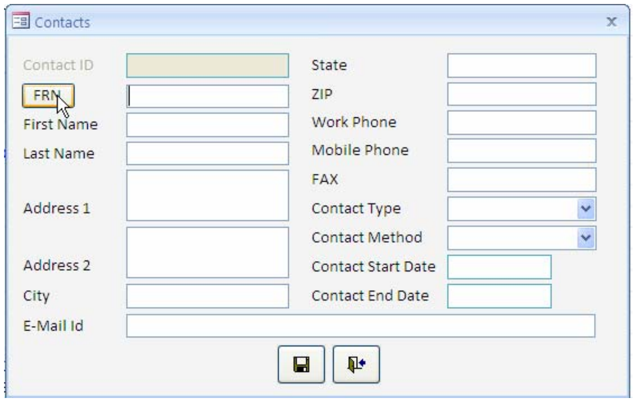
Click on the Contact details, to see the below contact details form. It is also possible to search contact details by FRN, Business Name & DBA and press the search button.



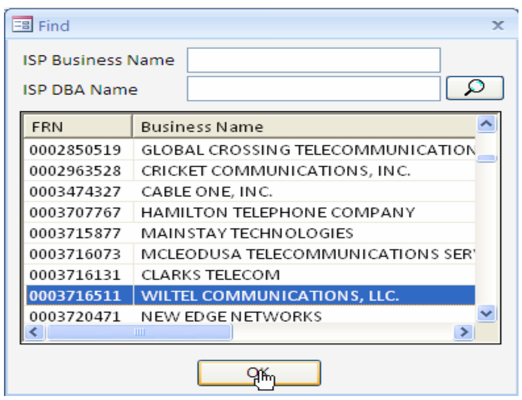
Contact ID	FRN	ISP Business Name	First Name	Last Name	Work Phone	Mobile Phone	FAX
1	0010480978	ALLO COMMUNICATIO...	BRAD	MOLINE	3088827800		
2	0006764575	APPLIED COMMUNICA...	JOHN	KOLLER	3089627298		
3	0004329314	ATCJET.NET LLC	RODNEY	WHIPPLE	3089627873		
4	0004496774	AT&T CORP.	GREGORY	WAGNER	9136857581		
5	0003766532	NEW CINGULAR WIREL...	GREGORY	WAGNER	9136857581		
6	0002387264	BWTELCOM	RON	CROW	3084232000		
7	0002387264	BWTELCOM	RANDALL	J.RAILE	3084232000		
8	0003474327	CABLE ONE, INC.	MIKE	DRAHOTA	6023646000		
9	0016095440	CABLE USA III DBA RCO...	ZACH	TRUE	3082377266		
10	0018506568	VERIZON WIRELESS	FRAN	MALNATI			
11	0003746468	CHARTER COMMUNIC...	RICHARD	STRONG	3152998581		
12	0003746468	CHARTER COMMUNIC...	BETTY	SANDERS	3149650555		
13	0006980866	CHASE 3000, INC.	AARON	GREENE	3088831000		
14	0004341095	FRONTIER COMMUNIC...	SCOTT	BOHLER	9524915534		
15	0004341095	FRONTIER COMMUNIC...	STEPHEN	HEGDAL	9524351356		
16	0004341095	FRONTIER COMMUNIC...	JIM	MONTGOMERY			
17	0004341095	FRONTIER COMMUNIC...	DARREN	ROBINSON			
18	0016098832	WIRE FREE NEBRASKA,...	PAUL	SCHUMACHER	4025625904		
19	0002388247	CONSOLIDATED TELCO...	CHUCK	FAST	4024892728		
20	0004961231	CONSOLIDATED TELEP...	CHUCK	FAST	4024892728		

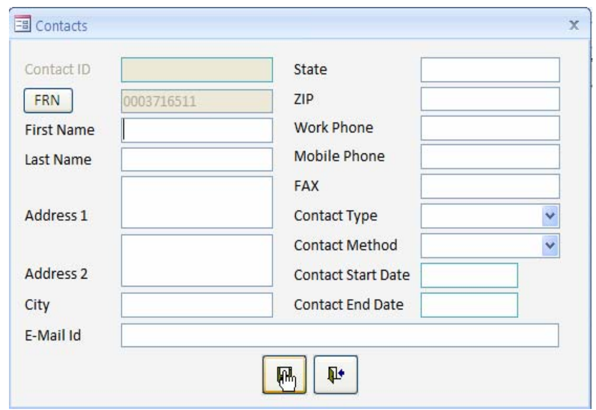
Add Contacts:

Click on add contact button. The Contacts form will be opened.



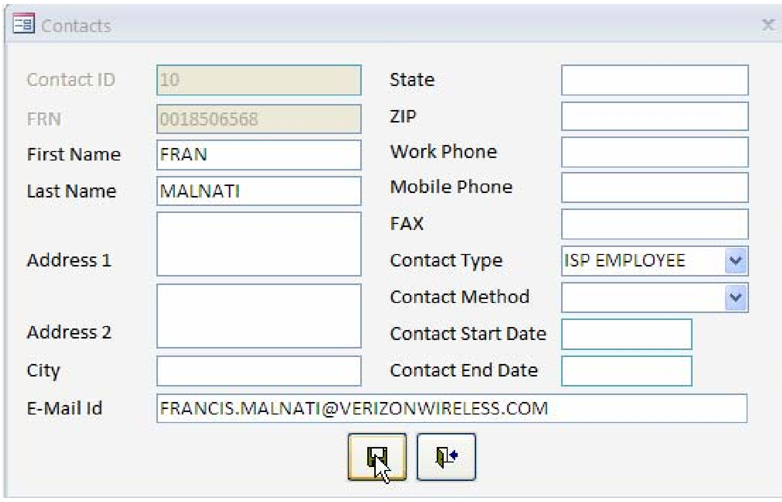
Click FRN button and the Find form will be opened. Select the FRN from the list and press Ok button as shown below. Key in First, Last name, etc and click save button.





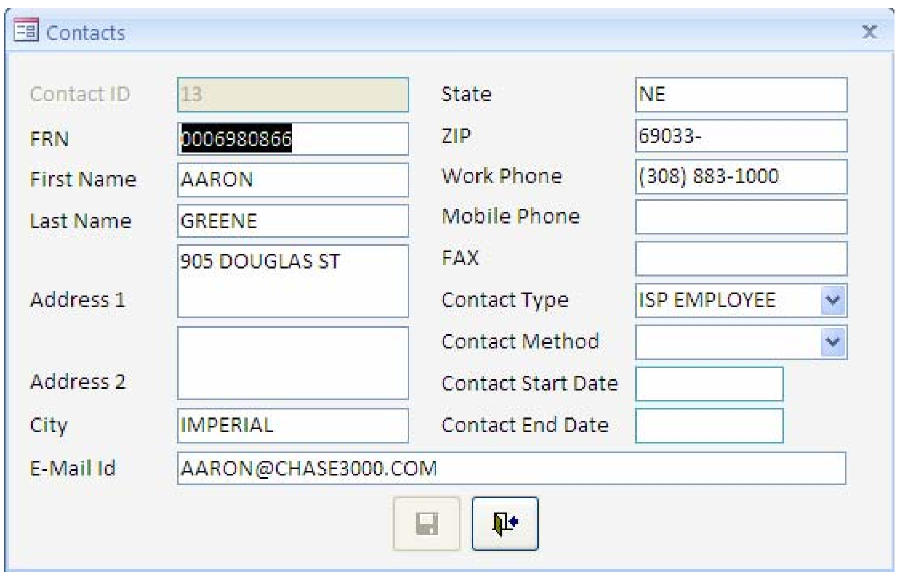
Edit Contacts:

Select contact person from the list view and press edit button. Update the data and press save button.



View Contacts:

Double click contact person in list view or select the contact person and press view button.



Delete Contacts:

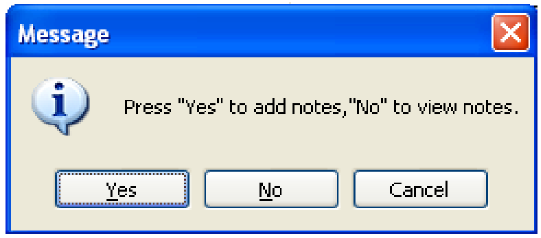
Select contact person whom you want to delete from the list view and press delete button.

Export to Excel:

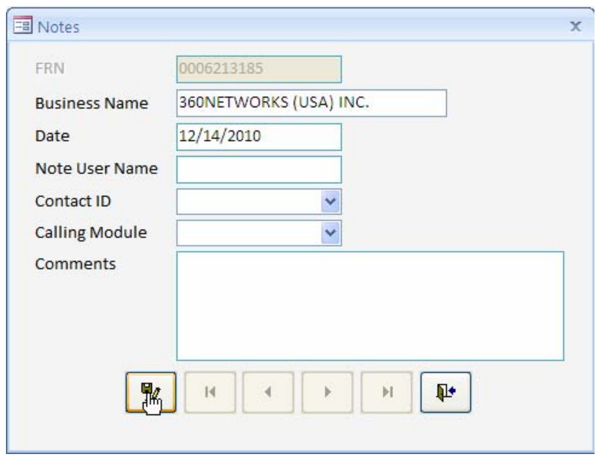
You can even export the Contact details to excel by pressing export button.

Notes:

To add or view notes, select the contact person from the list view and press the Notes button. Clicking the notes button and the following message is shown

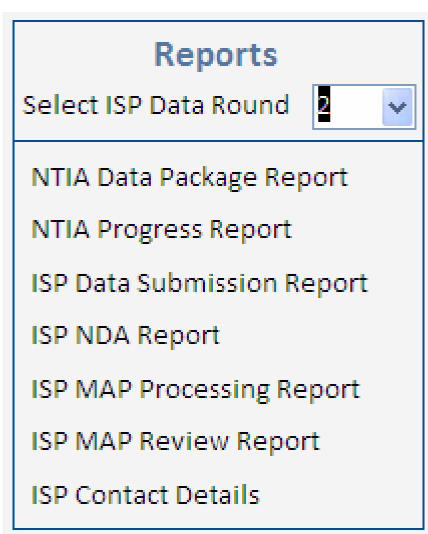


If you press “Yes”, the Notes form will be displayed. Key in values and press the save button.



If you press “No”, the Notes form will be displayed. You can view all the notes by pressing navigation buttons.

In access database main form there is a report option. Seven reports are available as shown below. Select ISP data round and click on the report name.



Appendix - E DataSlave

DataSlave™ is an award winning Windows product designed to help you validate, de-duplicate and transform your data. Quickly move data from in and out of your business applications.

- Migrate data from one system to another
- Import leads into your marketing system
- Validate and correct key data. Includes comprehensive data transformation tools.

DataSlave provides a graphical tool to import, validate, transform and export data. At all times the data can be reviewed in the data panel showing rows that pass validation and those that fail.

Any column can be validated to check, for example,

- The customer ID is in range
- The Contact Name is valid
- The Region is not missing
- The ZIP code is of correct format
- The Phone and Fax numbers are correctly formatted

Data can be mapped onto the fields of your database, and where required, transformed. In this case the Contact Name is split into separate FirstName and LastName fields

Validation of Feature Class in DataSlave

a) BB_Service_Address.

b) BB_ConnectionPoint_MiddleMile.

c) BB_ConnectionPoint_LastMile.

d) BB_Service_CAInstitutions.

e) BB_Service_CensusBlock.

f) BB_Service_RoadSegment.

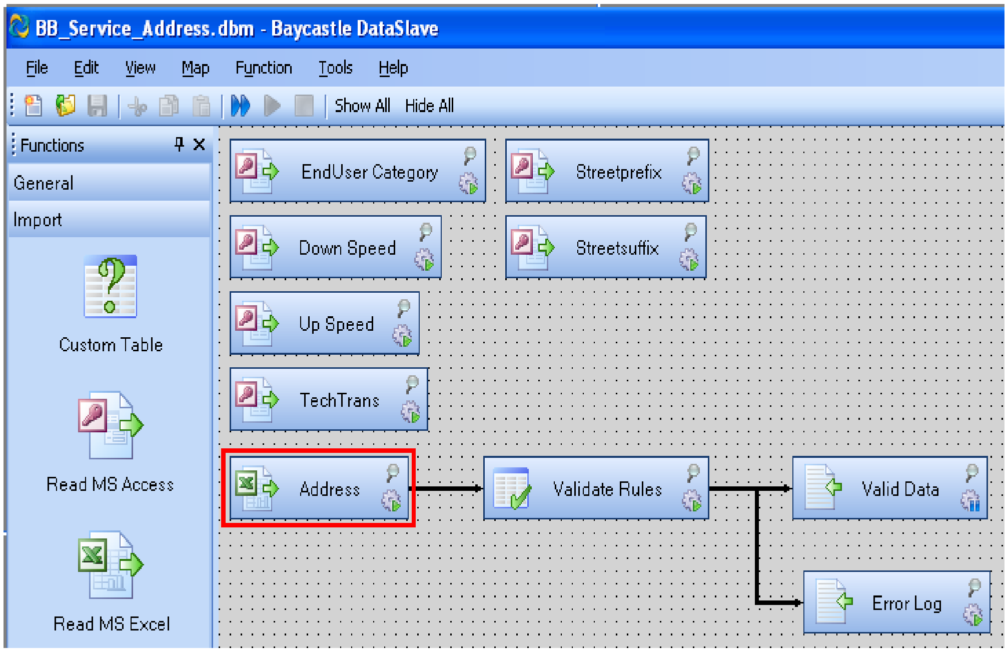
g) BB_Service_Overview.

h) BB_Service_Wireless.

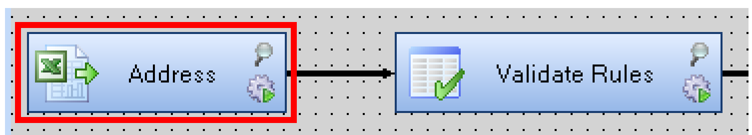
i) BB_Wireless_Antenna

Steps in DataSlave

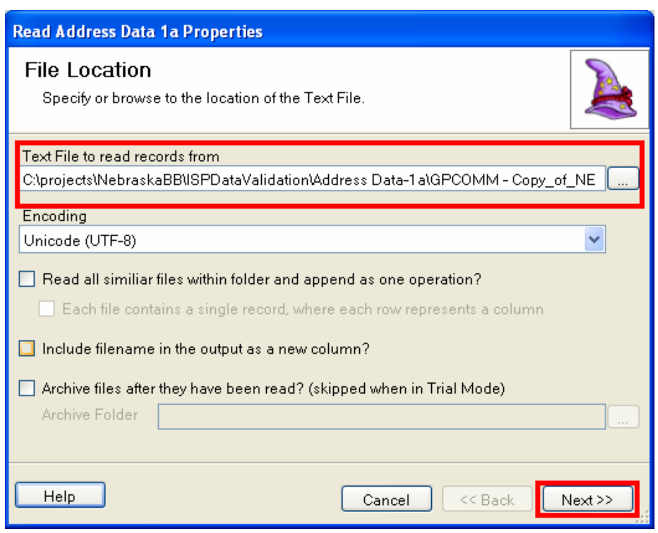
a) Go to “File” menu, click on “Open Map” and the “Open” dialog will be shown, open the file named “BB_Service_Address.dbm”, for validate “BB_Service_Address” tab data. The BB_Service_Address Map file was open as shown below.



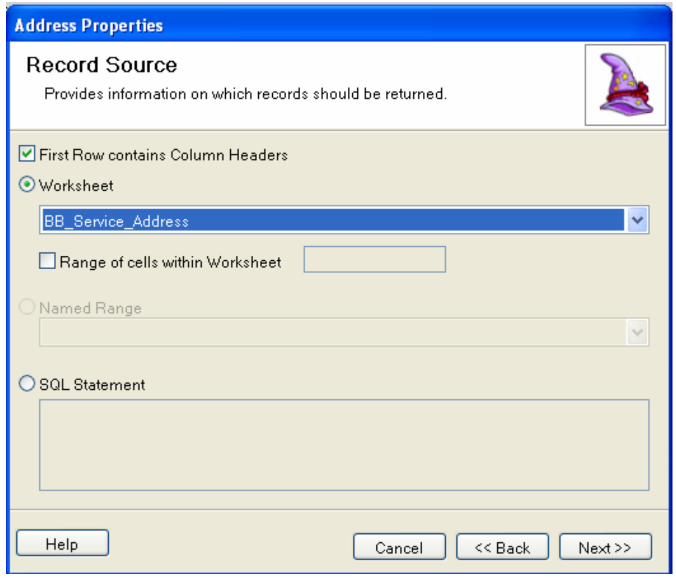
b) Click on the “Address” button for select the file data file



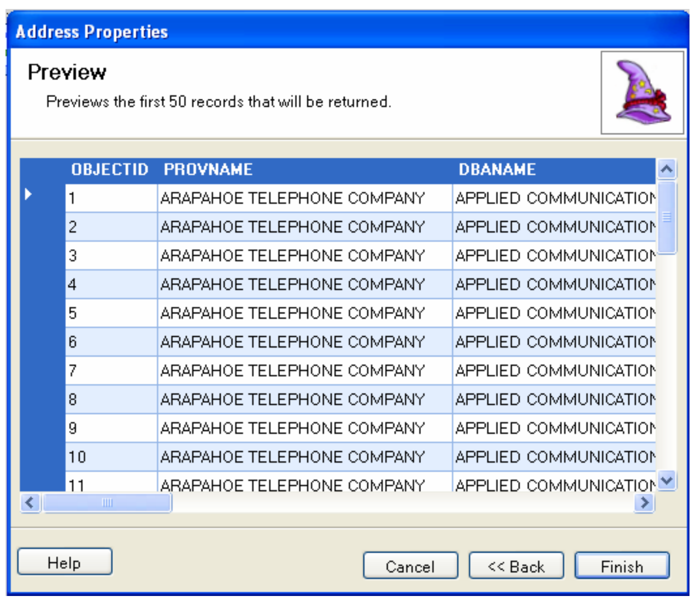
c) Then “File Location” dialog box will apprise as shown below. There select the path of the address file to be validated. Then press Next button.

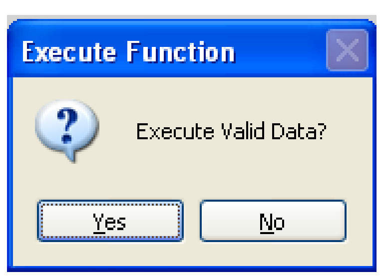


d) “Record Source” dialog box will apprise as shown below. Select the worksheet. Then press the Next button.



e) Preview dialog box will apprise as shown below. Then press the Finish button. Once you click on the Finish button you will get the message box asking "Execute Valid Data?" as shown below, press the "No" button.

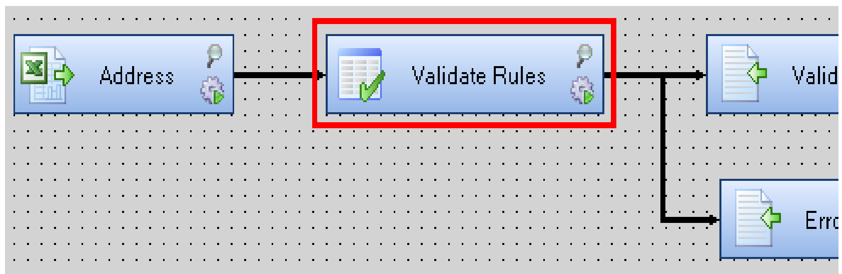




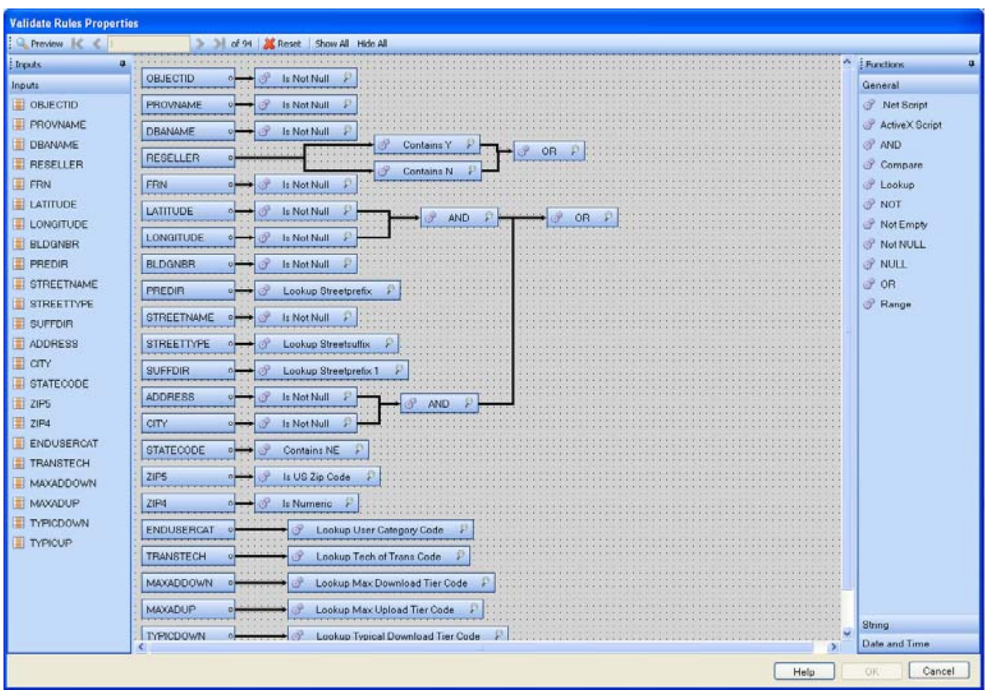
f) Click the double arrow button  on the toolbar to start validating all the Address Data files.

g) A summary of the results of the validation will appear in the “Output” area at the bottom. Invalid records are written to a log file called “Address Data Invalid.log” in the ISP Data directory. Valid records are written to “Address Data Valid.csv”.

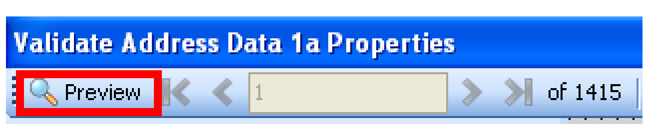
h) If you want to see the validation rules for the “BB_Service_Address. dbm”, click on the “Validate Rules” button as shown below.



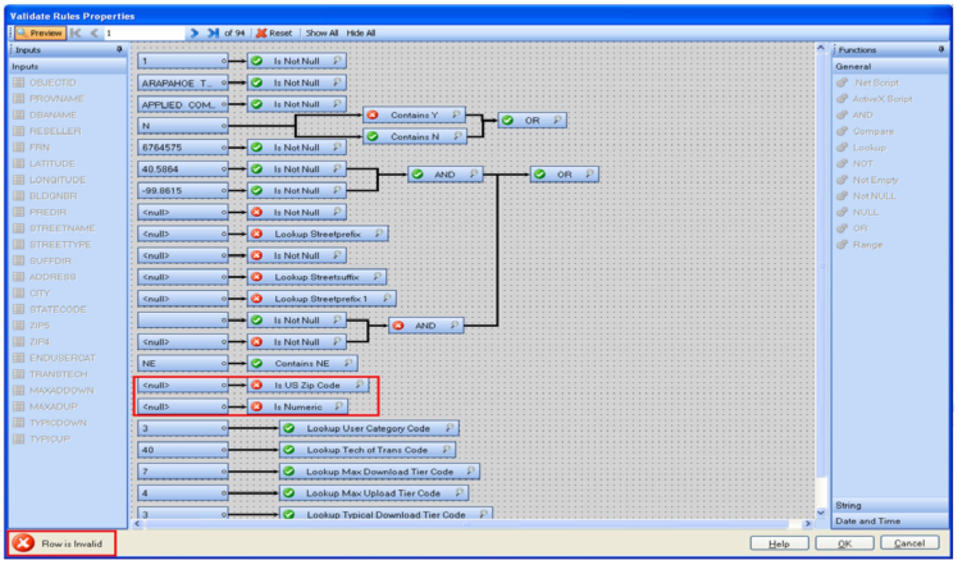
i) See the validation rule for the “BB_Service_Address.dbm” as shown below. It is possible to “Add or Delete or Edit” any rules from here.



j) To preview the validation status for each record, click on the “Preview” button.



k) To check if any record failed the validation checks, the application will mark error (sign.) to the value as shown in the below snapshot.



New Hampshire Broadband Mapping and Planning Program
University of New Hampshire
March 2011 Data Submission

I. Data Description

In accordance with the effective NTIA guidance for Round 3 data submissions, the New Hampshire Broadband Mapping and Planning Program (NHBMPP) submitted the data set described below and associated documents to NTIA in March of 2011.

NH_SBDD_2011_0401.gdb – file geodatabase containing feature classes for:

Feature Class	Number of Records
BB_ConnectionPoint_LastMile	0
BB_ConnectionPoint_MiddleMile	57
BB_Service_Address	18
BB_Service_CAInstitutions	3,376
BB_Service_CensusBlock	62,432
BB_Service_Overview	0
BB_Service_RoadSegment	31,874
BB_Service_Wireless	18
State_Boundary	1

In total, almost 95,000 individual data records on broadband availability were submitted by New Hampshire. Collectively, these records describe availability as reported by 31 broadband providers in the state. In addition, the NHBMPP submitted data on 3,376 community anchor institutions.

II. Provider Participation

The NHBMPP has identified 49 broadband providers in the state. As noted above, 31 of these providers actively participated in the program for the Spring, 2011 cycle. The participating providers include:

Provider Name	Technology
1. Argent Communications	Cable, Fixed Wireless
2. AT&T Mobility LLC	Mobile Wireless
3. Freedom Ring Communications	Middle Mile
4. Charter Ring Communications	Cable
5. Comcast	Cable
6. Covad Communications Company	DSL, Middle Mile
7. Cyberpine Cooperative, Inc.*	Fixed Wireless
8. Dunbarton Telephone Company, Inc.	DSL
9. FairPoint Communications, Inc.	DSL
10. G4	Middle Mile
11. Granite State Telephone	DSL, Fiber

12. Level 3 Communications	Fiber, Middle Mile
13. Lightower Fiber Networks	Middle Mile
14. MetroCast	Cable
15. Choice One of New Hampshire	DSL, Middle Mile
16. Oxford Networks*	Middle Mile
17. RadiusNorth	Middle Mile
18. Sidera Networks, LLC	Middle Mile
19. SkiSat*	Cable
20. Sovernet Communications*	DSL
21. Spectra Access*	Middle Mile
22. Sprint	Mobile Wireless
23. Tamworth Wireless Cooperative	Fixed Wireless
24. TDS Telecom	DSL, Fiber, Middle Mile
25. Time Warner Cable	Cable
26. T-Mobile	Mobile Wireless
27. Topsham Communications	Fiber
28. U.S. Cellular*	Mobile Wireless
29. Verizon Wireless	Mobile Wireless
30. Wireless LINC of NH and VT	Fixed Wireless
31. WiValley	Fixed Wireless

* Provider did not submit revised data for this round. Data collected for the September, 2010 submission was reported as still being effective.

The 5 providers listed below submitted data that could not be fully processed for this round or indicated they would participate in future rounds. Data that was not fully processed was either incomplete or was submitted to NHBMPP after the final date publicized for inclusion in this collection cycle:

Provider Name
1. Bretton Woods Communications
2. Great Auk Wireless
3. IAMNOW.net
4. Qwest Communications
5. WaveComm

The remaining 13 providers, listed below, remained unresponsive to multiple requests to participate in the NHBMPP:

Provider Name	
1. Akers Pond	8. NCIA
2. Boston Telephone	9. NHvt
3. Broadview Networks	10. Russet Communications
4. CityVoice	11. segTEL, inc.
5. Dixville Telephone Company	12. telJet

6. DSCI	13. Turnpike Technologies
7. The Granite Connection	

III. Data Collection and Integration

A. Primary Data Collection

Data Acquisition

Primary data was collected directly from the service providers. The NHBMPP first developed a set of guidance documents based on NTIA specifications, and distributed those to the individual providers. Once the guidance was disseminated, NHBMPP staff followed up with providers via phone/email to encourage participation and address questions, as required. Typically, multiple communications were required to ensure a complete data submission was received.

Data Pre-Processing

To support the data mapping and integration efforts, the following base data sets were acquired and/or retrieved from the NH GRANIT state GIS clearinghouse archives:

- State and town boundaries (based on 1:24,000 USGS DLG files);
- 2001 Land Cover data set (derived from Landsat TM imagery);
- 2000 TIGER Census Blocks;
- 2009 Census MAF/TIGER Road Segments; and
- 2009 USGS National Elevation Data set (NED).

All required NTIA fields were added to the census block and road segment data sets. In addition, the road segments were processed against the census blocks to populate two fields used internally – the left block ID and the right block ID associated with each road segment.

Data Processing and Integration

The broadband availability data was processed and integrated using a suite of GIS tools and procedures, depending upon the format and content of the data submitted by the individual providers. Generally, the processing involved executing one or more of the following steps:

- Scanning and georeferencing paper maps and using the digital products as a visual reference to select out corresponding features from the project base data sets;
- Geocoding addresses using both an internal locator based on the TIGER road segments, and where required, the ESRI TA_BatchAddress_US subscription service; where NDAs were in place, geocoded points were used to identify the host census block (if < 2 sq. mi.), or the TIGER road segment in closest proximity (if the host census block was > 2 sq. mi.). Related note(s):
    - In some cases, the selection of the TIGER road segment in closest proximity to the geocoded point yielded a pattern of disconnected road segments with broadband service.
- Using GIS buffering tools to generate service areas around central office locations

- Using ArcGIS Network Analyst to select road segments within a cumulative distance of 18,000 lineal feet from central office locations. The selected segments were subsequently used to identify adjacent census blocks <= 2 sq. mi. or used as features to quantify coverage along census blocks > 2 sq. mi.; and/or
- Using Cellular Expert ArcGIS extension to generate a signal prediction surface for wireless providers submitting antenna locations (and associated data). Related note(s):
  - A -85 DB threshold was used to define service areas of fixed-wireless providers.
  - In processing the fixed-wireless polygon data, the NHBMPP eliminated exterior polygons, e.g. those outside of the main coverage footprint, that were < .125 sq. mi. Interior non-coverage polygons were not eliminated.

<u>Data Processing Issues</u>
The NHBMPP encountered a number of issues in processing the broadband data for the state. These include:

- Most providers submitted data only on areas that are currently served, and not on areas that could be served following the NTIA guidance. This contributed to the pattern of occasional disconnected rural road segments with broadband service.
- Reliance on the TIGER road segments likely yielded overstated broadband coverage in rural areas. A single rural customer address, when geocoded, could result in a long street segment being selected as part of a provider's coverage area.
- Most providers did not submit typical speed data. As the volume of our speed test data set grows, we will explore using this information to estimate typical speeds.
- In our experience, smaller wireless providers were frequently unable to deliver the full set of antenna parameters required for the signal propagation software. Data was missing on exact antenna patterns (which in some instances was also unavailable from the antenna manufacturer), and/or on detailed power information specific to an antenna (e.g. power information provided on the host tower only). In these situations, default values were used to run the software. We believe this resulted in overstating coverage areas, and we will be working to refine our approach during the next submission period.
- Elevation data submitted by middle mile providers was typically reported relative to sea level, not relative to grade.
- Providers that are knowledgeable and experienced with the original 2009 NTIA NOFA and corresponding clarification documentation provided information appropriate to that data schema / model, and modifications to these in January 2011 resulted in additional follow-up required to achieve a complete data submission.

B. Community Anchor Institutions

Data was submitted for 3,376 Community Anchor Institutions (CAIs) in the state covering the full range of categories established by NTIA, as follows:

Category	Number of CAI's	Percent of Total
1. School – K through 12	654	19.4%
2. Library	602	17.8%
3. Medical/health care	743	22.0%
4. Public safety	544	16.1%
5. University, college, other post-secondary	55	1.6%
6. Other community support – government	728	21.6%
7. Other community support – non governmental	50	1.5%
TOTAL	3,376	100.0%

The data collection was largely accomplished by the nine regional planning commissions in New Hampshire, with the NHBMPP staff at the University responsible for developing initial guidance and for compiling the resulting regional data sets into a standardized statewide layer. The primary steps in the data development process included:

- Develop a master list of CAIs by category, relying on statewide lists (schools, libraries, health care facilities), existing GIS data sets (largely from local hazard mitigation plans), and local knowledge;
- Map the location of each CAI, using existing GIS data sets, reference to aerial imagery, web research, and field data collection where necessary;
- Contact each CAI by phone to collect the required broadband information; and
- Verify data (see verification section below).

IV. Validation

A. Primary Data Collection

Feedback/verification was primarily implemented in cases where the provider delivered non-geographic data, e.g. address lists, named road segments/address ranges, lists of census blocks/tracts, or wireless tower locations. In these cases, the NHBMPP returned maps (.pdf files) to the provider for their review and correction. Where providers delivered addresses or road segments, the product returned was a geographically referenced version of the data that was submitted. For wireless providers who delivered antenna locations and specifications, the program provided maps that displayed the modeled coverage area generated from the Cellular Expert signal propagation modeling software.

The Spring, 2011 feedback loop with providers was considerably more robust than prior efforts, largely due to increased effort on the part of program staff to solicit feedback. The process was successful in identifying several significant errors/omissions, e.g. in one instance, a provider omitted a large census tract from their original submission.

The NHBMPP continued to develop a number of additional verification resources and procedures, as described below:

- Speed test – The NHBMPP program has posted a customized speed test on the project web site (iwantbroadbandnh.org). To date, approximately 2,400 records have been submitted. We plan to explore ways to utilize this information to estimate typical speed.
- Broadband survey – The NHBMPP website also hosts an online broadband survey, encouraging users to report their broadband access (or lack thereof) at the address level. The address submitted is then geocoded, which delivers a means of verifying provider coverage data at specific locations. (The survey is also linked to the speed test, so that users completing the form are asked to take the speed test as well.) To date, 243 surveys have been completed.

- Satellite dish survey – The NHBMPP has completed a drive-by inventory of satellite dishes in selected rural areas of the state, under the premise that a cluster of buildings with satellite broadband dishes signifies an area with no other broadband options available. The data are now being processed, and will be utilized during the next submission.

B. Community Anchor Institutions

The CAI data has been subjected to three rounds of verification. An initial round of verification was completed in May, 2010 by re-interviewing a randomly selected subset of CAI contacts (20% of the entities within each of the 7 data categories). In August/September of 2010, a subsequent and comprehensive verification was accomplished by generating a broadband profile sheet for each participating CAI, emailing that to each CAI contact for review, and modifying the CAI record based on any updates returned. The latter process was repeated in December 2010/January 2011. Over 150 responses were received, and those updates were incorporated in the data set prior to the March submission.

New Jersey Broadband Mapping Project:

Methodology Report on Data Integration and Validation Procedures For April 2011 Submission

April 15, 2011

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Data Processing: Collection, Reception, Loading, Validation

This document presents a description of the process used by the New Jersey Office of Information Technology (OIT) and Telcordia Technologies to collect, receive, load, validate and verify broadband availability and usage data submitted to us by wireless and wireline service providers, CAIs, and other sources and organizations for the State of New Jersey. Individual provider data reports attached hereto provide details on each provider's submission and explain how the policies presented in this document were applied to the data. The CAI summary report, also attached, provides details on the CAI data processing. This report also describes some of the complexities and challenges we have encountered to date in this project.

1 Structure of this Report

This methodology report consists of the following

- Section 2 summarizes our outreach efforts to collect data
  - This section also describes some of the challenges in determining what service providers are in and out of scope for this work and what constitutes a reseller
- Section 3 provides an overview of our process for Service Provider Data Reception
- Section 4 provides an overview of our process for Service Provider Data Loading
- Section 5 provides an overview of our process for Data Validation
  - This section includes a table of business rules and how they were implemented.
- Section 6 illustrates a few of our challenges in geocoding.
- Section 7 describes results from our limited longitudinal study of service provider plans for a couple of service providers.
- Appendix A: NJ Provider Data Reports
  - This appendix concatenates 30 files in Microsoft Word format, one file for each provider whose data was included in the submission. Each report provides a narrative describing the steps involved in collecting, verifying, loading, and validating the provider data, including a log of the interactions with the provider.
- Appendix B: CAI Processing Report
  - This is a summary of the details of the CAI processing for this submission.

2 Data Outreach

2.1 Provider Data Outreach

Telcordia and OIT have contacted around 70 providers via email and telephone to determine their status with respect to this project. Our interactions included questions such as: Do they meet the NOFA definition of a current broadband facilities-based service provider in the state of New Jersey? Are they a reseller[1]? Are they willing to participate in the program? OIT continues to negotiate NDAs with those providers who require them. Providers are given instructions on data requirements, including how to submit via our custom-designed Web site found at http://connectingnj.state.nj.us/.

Most providers were willing to participate, although several expressed concerns about the burdens of the data collection process. One provider – Hotwire Communications -- declined to devote any effort to submitting data; a second provider – Cogent Communications -- instructed Telcordia to retrieve information from the company's web site. The large national providers clearly have processes in place to collect and submit data, while the small local providers require greater assistance. Telcordia offers assistance where possible, allowing providers to submit whatever data they have available in any convenient format. This increases the complexity of the data collection and processing operations, but enables greater coverage of providers. As examples, some smaller wireline providers simply submitted a list of addresses where they offer service and some small cable operators submitted the names of the municipalities they cover.

At the NTIA's request, we re-contacted three satellite providers to determine if they had more specific data on their coverage: Hughes, Starband and Wildblue. For the fall 2010 submission, these three satellite providers were not

[1] We have been using a general, layman's definition of a Reseller.

included, but they were added in this round. Two additional non-satellite providers are also included in this round: Broadview and Xchange.

Our initial company list comes from FCC aggregate Form-477 data that we receive under the Form-477 sharing arrangement. Two areas that need further investigation are the sufficiency of this data for identifying potential in-scope service providers and related issues associated with resellers. Specifically:

- We would encourage the NTIA to develop a precise definition of a reseller as soon as possible and, ideally, by May 30. Clear guidelines on how to accurately identify resellers, and how to unambiguously determine which resellers are in-scope for this project, is important for the fall 2011 submission.
- The NOFA definition of an in-scope service provider is complex and can be very difficult to apply. Many times we have had rather lengthy discussions with potential providers as we parse the definition of facilities-based and the 7-10 day service provision window.
  - Here is an interesting example: Telcordia's broadband service provider is Savvis Communications Corporation. Savvis has an FRN number – 013780044 – but is not included on the aggregate Form-477 data for New Jersey. Because we were curious, we contacted Savvis through our account executive and inquired. We received the following response on April 4 from their Counsel: "The products and services we offer generally qualify as information services or non-common carrier services and are therefore not subject to federal regulation, including Form 477 requirements." This anecdote raises a number of questions, including how the program scope aligns with Form-477 filers.
- There are numerous sources of potential information on broadband service providers -- who may or may not meet the NOFA definition of facilities-based and the 7-10 day service provision interval. As just one example, the Broadband Internet Directory (http://broadband.theispguide.com/) is a consumer website that lists broadband offerings and plans. Under the area code for Telcordia's location in Piscataway, NJ, dozens of providers[2] are listed, the majority of whom offer DSL options and are unfamiliar to us.
- Due to the combination of a potentially very large number of resellers and a lack of clarity on the definition of a reseller, we would argue that it is very important to develop clear goals and objectives around the inclusion of any providers that do not file Form-477 in this program.

The table below lists the 30 providers whose data was included in this submission and identifies those providers who were new in this round.

Provider Name	Data Verified and Submitted?
Advanza Telecom Inc	yes
AT&T Mobility LLC	yes
Broadview Network Holdings	yes
Cavalier Telephone Mid-Atlantic LLC	yes
CenturyTel, Inc. (CenturyLink)	yes
Cogent Communications Inc.	yes
Comcast Cable Communications, LLC	yes
CSC Holdings (Cablevision)	yes
DIECA Communications (Covad)	yes
Global Online Electronic Services	yes
Hometown Online	yes
Hughes Network Systems	yes (satellite, new this round)
Leap Wireless (also Cricket)	yes
Monmouth Telephone & Telegraph	yes
Netlogic (Voxitas)	yes
One Communications Corp	yes

[2] Interestingly, Savvis is not one of them.

RCN NY Communications	yes
Service Electric Cable, Hunterdon	yes
Service Electric Cable, Sparta	yes
Sprint Nextel	yes
StarBand Communications	yes (satellite, new this round)
Time Warner Cable	yes
T-Mobile	yes
tw telecom holdings	yes
Verizon	yes
Verizon Wireless	yes
Wave2Wave Communications	yes
WildBlue Communications	yes (satellite, new this round)
Xchange Telecom	yes (new this round)
XO Communications	yes

The table below lists providers who, based on initial screening and communications, were considered not in-scope for this program. In some cases, they were determined to be resellers based on our own internal definition; in other cases, they had not yet begun to offer service in New Jersey. These providers would be candidates for re-contact if and when we have a precise reseller definition and, importantly, clear scope and goals for inclusion of resellers in the program.

Company Name
Airespring, Inc.
American Telephone Company LLC
Atlantech Online, Inc.
Data Network Systems (DNS); Business Automation Technologies, Inc.
Eventis Telecom, Inc.
Global Crossing
Level 3 Communications; Wil Tel Communicationss; Broadwing Communications; TelCove Operations
Lightower Fiber Networks
Magellan Hill Technologies, LLC
Meriplex Communications
Metropolitan Telecommunications Holding Company
NetCarrier Telecom, Inc.
New Edge Network
Tata Communications (America) Inc.
Telecom Professionals, Inc.
Telefonica USA, Inc.
Towerstream, Inc.
Transbeam
Vocal IP Networx Ltd
World Discount Telecommunications

Zayo Group, LLC

2.2 CAI Data Outreach

Telcordia and OIT used a variety of means to collect Community Anchor institution data. We collected reference data with lists of CAIs of various types in the state and we collected broadband data from individual institutions via our website and from aggregated sources.

For each CAI category, the following table provides the number of records we obtained from the reference source, the number of broadband access records we obtained, the total number of records we submitted to the NTIA and the number of complete records, with verified address information and broadband access information.

CAI Category	Reference Records	Broadband Records	Total Records Submitted	Complete Records Submitted
School K-12 (Public)	2601	549 (230 of these records require further processing and verification)	2601	158
School K-12 (Private)	1260 (NCES)		1260	71
Libraries	427 (IMLS)	89	427	87 (2 library web submissions were unmatched)
Medical/Healthcare	111 (NJHA)	5	111	5
Public Safety	343 (NJ 911 Comm.)	99	343	88 (11 PSAP web submissions were unmatched)
University	157 (NCES IPEDS)	38 (NJEdge)	157	37 (1 entry for was unmatched)
Other – State Government		2700	500 (Remaining data to be analyzed and verified for next submission)	500
Other – Local Government	0	45	45	45
Other – Non Government	0	8	8	8

Abbreviations and Acronyms

911 Comm	New Jersey 9-1-1 Commission
IMLS	Institute of Museum and Library Services
IPEDS	Integrated Postsecondary Education Data System
NCES	National Center for Education Statistics
NJHA	New Jersey Hospital Association

New Jersey has a strong tradition of home rule and, like many eastern states, a plethora of small governance entities – towns, townships, boroughs, cities, and other local municipalities. Among the major challenges we face in collecting broadband CAI data in the state are the dearth of strong, state-level organizations that might compel members to provide data (as opposed to comparatively weaker coordinating bodies) and the lack of existing broadband data sources. NJEdge's data on the higher education institutions to which they provide service is one of the very few such resources in the state.

NJ OIT executives worked through state-level contacts in public safety, education and libraries, etc., to encourage their constituencies to participate and submit data through the website. While some groups were more responsive than others, many expressed concerns about placing additional burdens in a time of shrinking budgets and cutbacks.

We encountered a few issues with collection, interpretation and processing of CAI data:

- Some institutions provide information on multiple connections to the internet, each with its own technology of transmission and maximum speeds. These may represent separate redundant connections for a large institution that provides critical services or separate facilities for different classes of users (e.g., staff and clients). Our policy has been to submit a single entry for each institution, using the highest available download speed, but this policy may be a candidate for refinement.
- Satellite institutions such as branch libraries or campus outreach centers can complicate the CAI picture. Our policy is to attempt to collect data for each separate geographic location as a separate CAI.
- Sometimes multiple government offices are co-located in one geographic location; e.g., a large building or complex that may include county government offices, court, jail, and/or other government offices. Here the challenge is not to incorrectly overstate broadband capability or understate the need for broadband services.

3 Service Provider Data Reception

Telcordia defined a process for handling provider data upon receipt. The following steps describe that process:

These steps must be performed upon receipt of provider data. These steps set up the file system and database for later processing, including both the initial assessment and load, and protect the confidentiality of the information.

1. Update the provider interaction log spreadsheet with the date of receipt and other metadata.
2. Copy the email or decrypt the uploaded files to individual directory on dedicated and secure server.
3. Test that the files can be opened, read, etc. This may require using ESRI ArcCatalog to check a shapefile or file geodatabase.
4. Send an acknowledgement to the provider of receipt of readable submission, or request re-send as needed.
5. Create empty provider data report into the new folder, using the appropriate wireless or wireline template**.**
6. Connect to the PostgreSQL database and instantiate a schema for the provider
7. Import the NTIA transfer model tables to the new schema using ArcCatalog. These are available in the "ntiamodel" schema.
8. Add triggers to the newly imported tables. These triggers update columns with the user name and date/time for each insert and update.
9. Perform an initial evaluation on the submitted data, evaluating the completeness of the submission and the validity and reasonableness of the included values. Interact with provider to address any questions or issues.

4 Service Provider Data Loading

All providers are responding to the mandate to provide the different types of data that go into the various tables in the NTIA data transfer model. The provider data submissions vary in form, format and content and in the ease versus complexity of the processing and loading tasks.

In general, the most straightforward data to process are shape files submitted by wireless providers. Wireline providers who submit census block data are a step up in terms of complexity. Some cable providers simply list the municipalities which they serve. A number of smaller providers provide address lists corresponding to locations where they provide service. These are much more challenging to process as we must first manipulate the address information and then geo-code the locations; these operations can be time consuming and subject to inaccuracies.

The service provider reports attached in Appendix A give the full details per provider on all steps taken to extract, transform, and load the contents of the provider tables into the NTIA tables. Note that every NTIA table has a "shape" column where a geographic feature such as a point, line (e.g., road segment) or area (e.g., census block) must be submitted.

Here is a summary of some of our key policies and challenges:

- All non-disclosure agreements executed with providers prohibit us from disclosing customer addresses. Although some providers have not executed NDAs, we have chosen to treat all providers similarly. We have chosen to obfuscate the address data by transforming it to census blocks or street segments. This carries a slight risk of overstating coverage, but that seems more appropriate than simply dropping the data because it is sensitive.
- Speeds associated with address data from some providers represent the price plan chosen by the customer; they are definitely neither the max advertised speed nor the typical speed. Our decision was to keep the maximum speeds encountered in the census block and report them in the maximum advertised fields and to report typical as null. If customers' selections in neighboring census blocks were vastly different, we would use the highest speed in a (subjectively defined) area as the maximum advertised speed.
- Maximum advertised speed, combined with the 7-10 availability requirement, results in vagaries in interpretation. In particular, the concept of advertised speed is well suited for providers who offer services to extended areas, such as large telephone and cable television companies. Its application is less clear for smaller providers who offer service to defined set of specific addresses. They deliver services to those specific addresses, and could offer the same service to a new tenant within the time limit. In some cases, they could increase the speed within that time period as well. They could not easily deliver service to any neighboring location with a two-week period. We have operationalized the notion of maximum advertised speed by determining the maximum speed a provider could offer on the facilities they have in place at customer locations, then reporting that speed for census blocks or street segments. Please also see Section 7 for some additional comments on advertised speeds.
- After initial poor results in geo-coding the customer address lists provided by some cable providers who had no geo-spatial capabilities, we identified an alternate approach that leveraged the franchise-nature of cable television service in the state. We asked those cable TV providers to send us the list of municipalities that they are licensed to serve. We build the submission by locating the municipality shapes and using those shapes to find all census blocks contained within them. For large census blocks, we report all the TigerLine street segments that are contained within those blocks.
- For middle mile data, the exact definition of a connection point remains open to interpretation and requires further development. We are not completely sure that all providers interpret middle mile in the same fashion and do not have a clear enough picture ourselves to provide appropriate guidance or validation. Despite this, we have submitted the middle mile information that we received.

5 Data Validation

Incoming data was subjected to a number of validation checks. When incoming data failed a validation check, we first investigated our process to ensure that we were not inadvertently creating an issue. If the problem was determined to be with the submitted data, we notified the provider concerned and recorded the interaction in the provider data report as provided in Appendix A. Where possible, we impute missing data. We attempted to perform some data validation using the FCC speed-test data, but had limited success due to the sparseness of the coverage of the speed-test data. Here are a couple of observations:

- The use of 2000 census blocks caused some problems as we had some providers using 2009 Census Blocks. We applied corrections and interpolation to this data to use it.
- New Jersey placenames can be problematic. We validate against data from the following sources: State of New Jersey geographic information (https://njgin.state.nj.us/NJ_NJGINExplorer/DataDownloads.jsp), the Federal Government placename information (http://geonames.usgs.gov/domestic/download_data.htm), and the US Postal Service data (available for a fee).
- A survey of 3100 New Jersey households was conducted in November and December by Rutgers University as Telcordia's subcontractor under this program. Householders who responded that they were broadband users were asked who their service provider was and this was compared against service provider serving areas. 95% of the responses aligned with service provider information. In the remaining 63 cases, the survey respondents reported being served by a provider whose coverage area did not appear to cover that location. We continue to investigate these cases as we expect some may be due to address inaccuracies or geo-coding errors, whereas others may identify areas for improvement in service provider coverage.

We applied the business rules in the script supplied by the NTIA and other data-specific validations after the data were loaded into the tables. These were applied as a check on both the data supplied by the providers and on the process we used for data collections, reception and loading. The following tests were applied:

We checked uniqueness of the entries in each table, using the following definitions of uniqueness:

Layer	**Unique key**	**Notes**
Middle Mile	frn, latitude, longitude	
CAI	anchorname, address, transtech	
Census Block	frn, fullfipsid, transtech	
Street Segment	frn, tlid, transtech	Tlid is an internal column.
Wireless	frn,transtech, shape	

We also performed the following additional validations:

Layer	**Validation Rules**
Middle Mile	• Valid census block id within the state of New Jersey • Shape should not be empty • All check_submission rules
CAI	• Valid zip code • Shape should not be empty • Transtech should not be NULL • All check_submission rules
Census Block	• Valid census block id within the state of New Jersey • The area of a census block should be less than < 2 square Mile • Shape should not be empty • All check_submission rule
Street Segment	• Shape should not be empty • Street segment is present in a census block >= 2 square miles • All check_submission rule
Wireless	• Shape should not be empty • All check_submission_rule

The table below is a version of the Business Rules provided by NTIA with highlighted the rows to illustrate the tests that were performed on the data prior to submission.

1. Rules for Service Address and Overview were not implemented because we did not use the tables.
2. Legend

Rule is implemented
Rule is NOT implemented
There are issues implementing and/or understanding the rule

Business Rule	Layer?	Front End/Back End?	Notes
Provider Name / DBA / FRN must be consistent for all records in the entire state	Middle Mile	Back-end	Implemented by a foreign key
Ownership – valid value list of only 0 or 1	Middle Mile	Front-end	
Serving facility capacity – valid value list of only 1 – 6	Middle Mile	Front-end	
Serving facility type – valid value list of only 1 – 4	Middle Mile	Front-end	
REQUIRED COMBINATION BUSINESS RULE FOR serving capacity and serving type	Middle Mile	Front-end	Do not understand
Latitude – must be a positive decimal number greater than 13 and less than 72. Must have 6 decimal places populated.	Middle Mile	Front-end	The rule is dropped in the latest model. Process is to check latitude not between 38.7 and 41.4. The topology rule also would validate it.
Longitude – must be a Negative decimal number greater than -170 and less than -60 (Except for Guam). Must have 6 decimal places populated (right hand place cannot be 0)	Middle Mile	Front-end	The rule is dropped in the latest model. Process is to check longitude not between -75.6 and -73.8. The topology rule also would validate it.
Elevation – measured in ***feet***, must be a positive number between -282 and 20,320	Middle Mile	Front-end	The assumption is that number provided is in feet. The rule is dropped in the latest model.
Point (Combination of Latitude and Longitude must fall within the state awardee submitting the value	Middle Mile	Back-end	This is implemented in the topology rule
Require a FIPS Block code	Middle Mile	Front-end	This does not appear to be a front-end rule
Provider Name / DBA / FRN see Middle Mile	Service Address	Back-end	Not implemented since we do not use the service address table
FRN see Middle Mile	Service Address	Back-end	This rule is not clear
REQUIRED COMBINATION BUSINESS RULE FOR transmission technology speed combinations (see below)	Service Address	Back-end	
Latitude business rules, see Middle Mile	Service Address	Front-end	
Longitude business rules, see Middle Mile	Service Address	Front-end	

Point (Combination) see Middle Mile	Service Address	Back-end	
The point must not list a higher technology code than the highest technology code provided in the service area overview for the same provider.	Service Address	Back-end	
The point must not provide a higher technology code than the highest technology code of any provider listed in the block (if the block is < 2 sq mi).	Service Address	Back-end	
Flag the point(s) if, the block is > 2 sq mi AND this block neighbors a block < 2 sq mi w/o service availability from any provider.	Service Address	Back-end	
The Point must be in a block which contains population.	Service Address	Back-end	
FIPS Block code	Service Address	Front-end	
BBService – valid value list	CAI	Front-end	
Latitude see Middle Mile	CAI	Front-end	The rule is dropped in the latest model. We check latitude not between 38.7 and 41.4. The topology rule also would validate it.
Longitude see Middle Mile	CAI	Front-end	The rule is dropped in the latest model. Process is to check longitude not between -75.6 and -73.8. The topology rule also would validate it.
REQUIRED COMBINATION BUSINESS RULE FOR transmission technology speed combinations (see below)	CAI	Front-end	
Point (Combination) see Middle Mile	CAI	Back-end	
The CAI must not list a higher technology code than the highest technology code provided in the service area overview for the same provider.	CAI	Back-end	
The CAI must not provide a higher technology code than the highest technology code of any provider listed in the block (if the block is < 2 sq mi).	CAI	Back-end	
Flag the CAI(s) if, the block is > 2 sq mi AND this block neighbors a block < 2 sq mi w/o service availability from any provider.	CAI	Back-end	
If CAI must be in a block with other service.	CAI	Back-end	

The CAI must be in a block that contains population	CAI	Back-end	
Provider Name / DBA / FRN see Middle Mile	Census Block	Back-end	Implemented by a foreign key
FRN see Middle Mile	Census Block	Front-end	This rule is not clear. It is defined as back-end in other places
StateFIPS – valid value only	Census Block	Back-end	
CountyFIPS – valid value list only	Census Block	Back-end	
Tract	Census Block	Back-end	
Block	Census Block	Back-end	
CBYear – Valid value list is 2000 only	Census Block	Back-end	This column has been dropped
REQUIRED COMBINATION BUSINESS RULE FOR transmission technology speed combinations (see below)	Census Block	Front-end	
Combination StateFIPS, CountyFIPS, Tract, BlockGroup, Block need to be in the acceptable range of blocks < 2 sq mi (we need to produce this list) for that state	Census Block	Back-end	
The block must touch (e.g. be a neighbor with) at least one other block < 2 sq mile with availability	Census Block	Back-end	
Is the dissolve of the Block data for speed the same as the service overview for speed for that provider?	Census Block	Back-end	
The block must contain population	Census Block	Back-end	
Provider Name / DBA / FRN see Middle Mile	Service Overview	Back-end	Implemented by a foreign key
FRN see Middle Mile	Service Overview	Front-end	This rule is not clear It is defined as back-end in other places
GeoUnit – valid value list only (County only)	Service Overview	Back-end	Pre-fill to county.
GeogUnitID – valid value list only	Service Overview	Back-end	Change to StateCountyFIPS (5 characters)
REQUIRED COMBINATION BUSINESS RULE FOR transmission technology speed combinations (see below)	Service Overview	Front-end	
Speed business rule to check nominal weighted speed?	Service Overview	N/A	Service Overview is not used in this release
Provider Name / DBA / FRN see Middle Mile	Street Segment	Back-end	Implemented by a foreign key

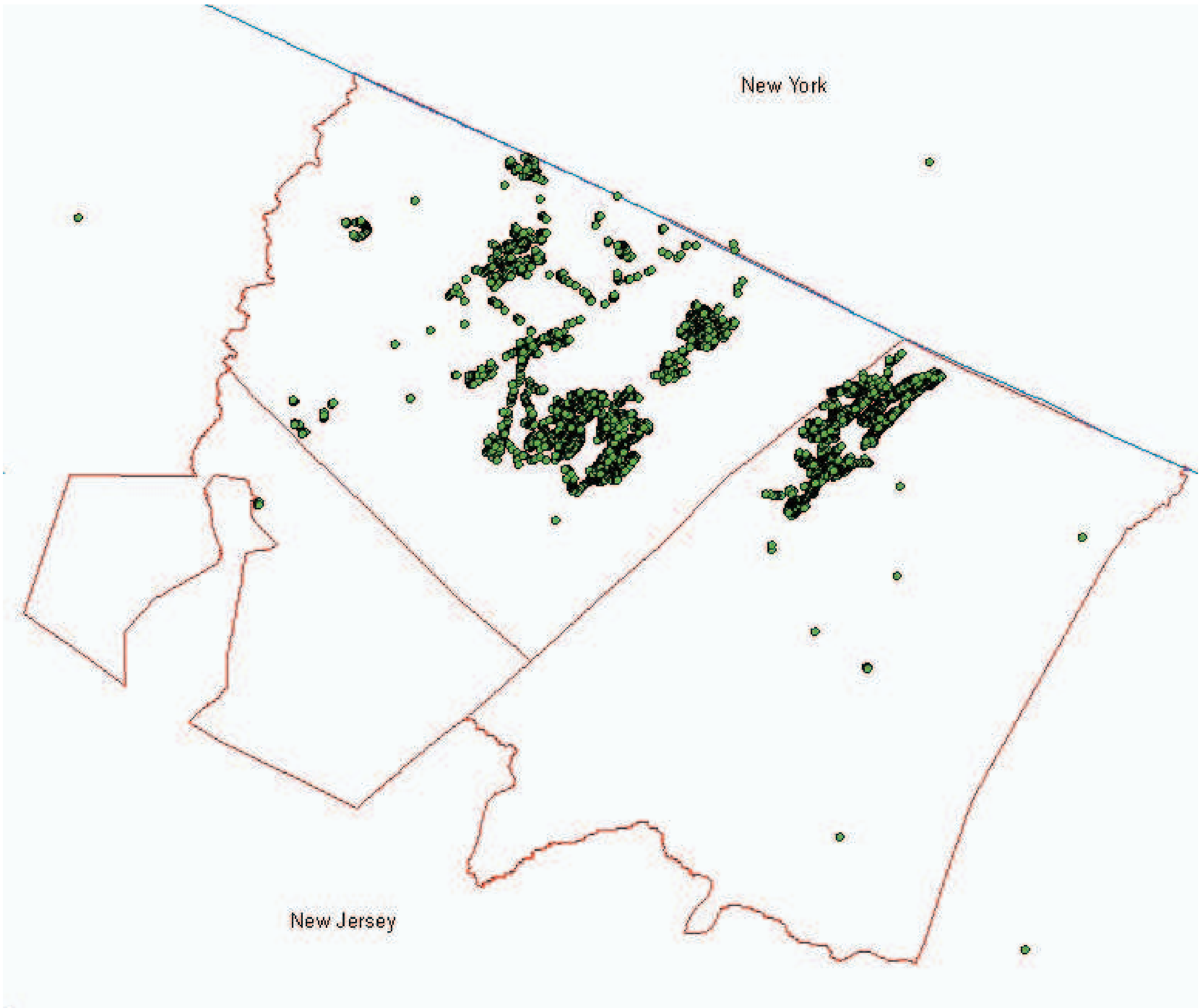
FRN see Middle Mile	Street Segment	Back-end	This rule is not clear
AddMin must be less than AddMax	Street Segment		
StateAbbrev – valid value list	Street Segment	Front-end	Check if stateabbr = 'NJ'
REQUIRED COMBINATION BUSINESS RULE FOR transmission technology speed combinations (see below)	Street Segment	Front-end	
The data must be in a block > 2 sq mi?	Street Segment	Back-end	
Flag the data, if the data is in a block that does NOT neighbor a block < 2 sq mi with service (e.g. all neighbor blocks that are < 2 sq mi have no availability)?	Street Segment	Back-end	
Flag the data if there is no neighbor with block with availability?	Street Segment	Back-end	
Provider Name / DBA / FRN see Middle Mile	Wireless	Back-end	Implemented with a foreign key
FRN see Middle Mile	Wireless	Back-end	This rule is not clear.
TransTech – valid value list only	Wireless	Front-end	
REQUIRED COMBINATION BUSINESS RULE FOR transmission technology / spectrum / speed combinations (see below)	Wireless	Front-end	

6 Some Examples of Geo-coding Challenges

Address geocoding, particularly in census blocks greater than 2 square miles, has been challenging due to the quality of provider data, to problems in processing non Tiger Line reference data, and to ambiguities and errors inherent in address resolution. In the remainder of this section we provide some specific examples and pictures to illustrate these challenges.

6.1 Hometown Online

Hometown Online, a regional telephone company serving northern New Jersey, provided 6778 records of address data for the April submission which we geo-coded. Hometown also told us that their service area covered three specific municipalities. The screenshot below shows geocoded data as dots and the three municipalities as red polygons. As you can see, there are a couple of addresses geocoded to New York State as well as two addresses geocoded outside of the three municipalities. Time constraints did not permit us to cycle back to the provider to get clarification on these specific addresses, so they were omitted from the submission.



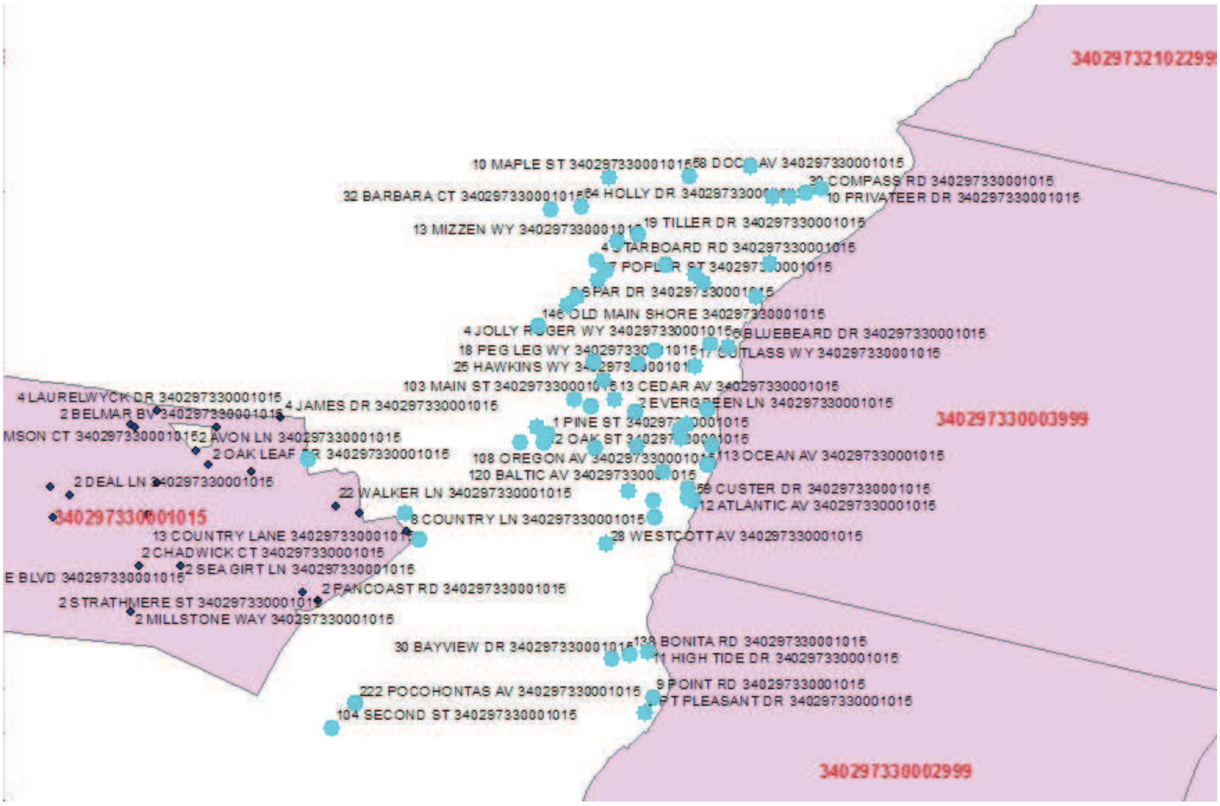
6.2 Comcast

One of the more complex cases we have dealt with is when a wireline service provider provides road segment data in text format for large census blocks without Tiger Line ID (TLID). Since the data are in text, there are no shapes. Comcast provided 1308 such road segment data with designated large census blocks, but without TLIDs; each data item had a starting and ending address number for the left and right side. We applied the following process:

a. Build addresses for geocoding from the line segment by selecting the first non-zero address number from the starting and ending address number of the left and right sides.
b. Geocode with the TIGER line: 807data items were successfully geocoded and 501 failed.
c. Spatial join the geocoded addresses with 2000 Census blocks and compare the spatial-joined census blocks with the provided census blocks.
d. Among 807 addresses, 530 had matching large census blocks; 12 mapped to a different large census block; and 265 mapped to small census blocks.
e. The overall success rate of this process is rather low – 530 correct matches out of 1308.

Given the low success rate, we worked with Comcast to obtain a list of municipalities they serve. They informed us, however, that in certain areas that approach would not produce an accurate picture of their coverage area. Where we had municipalities, we mapped these municipalities to census blocks; and then identified the road segments in the large census blocks in those regions. For the other areas of Comcast coverage, we used the small census blocks provided by Comcast, and omitted the street-segment data.

Below is a map that illustrates cases where one of the endpoints of line segments mapped to small census blocks rather than to large census blocks. The larger, sky blue dots indicate endpoints of street segments that mapped to small census blocks, indicated by the white background. The smaller, black dots indicate endpoints of street segments that mapped to correctly to large census blocks, which are shaded. While it is possible that some segments with one endpoint in a small census block may touch the large census block, in the majority of the cases shown, such is not the case.

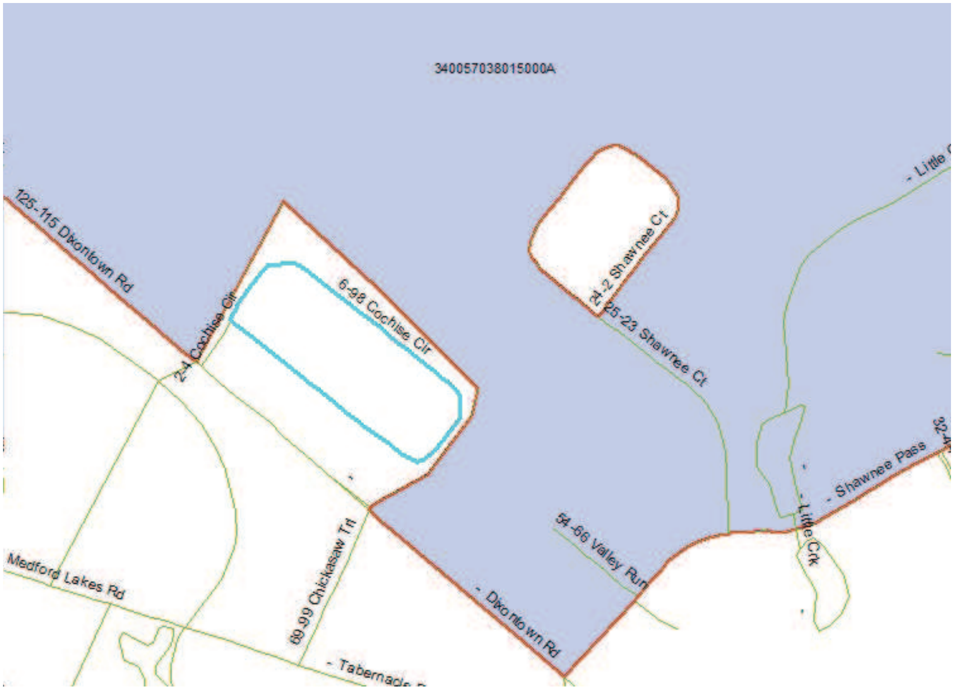


6.3 Verizon

Verizon provided line segment data for large census blocks with Tiger Line IDs. While this situation is certainly easier than that of Comcast discussed in Section 6.2, there were six cases where the TLIDs provided by Verizon for large census blocks actually mapped to small census blocks. In this case, we had adequate time to discuss with the provider and Verizon agreed that these line segments could be dropped.

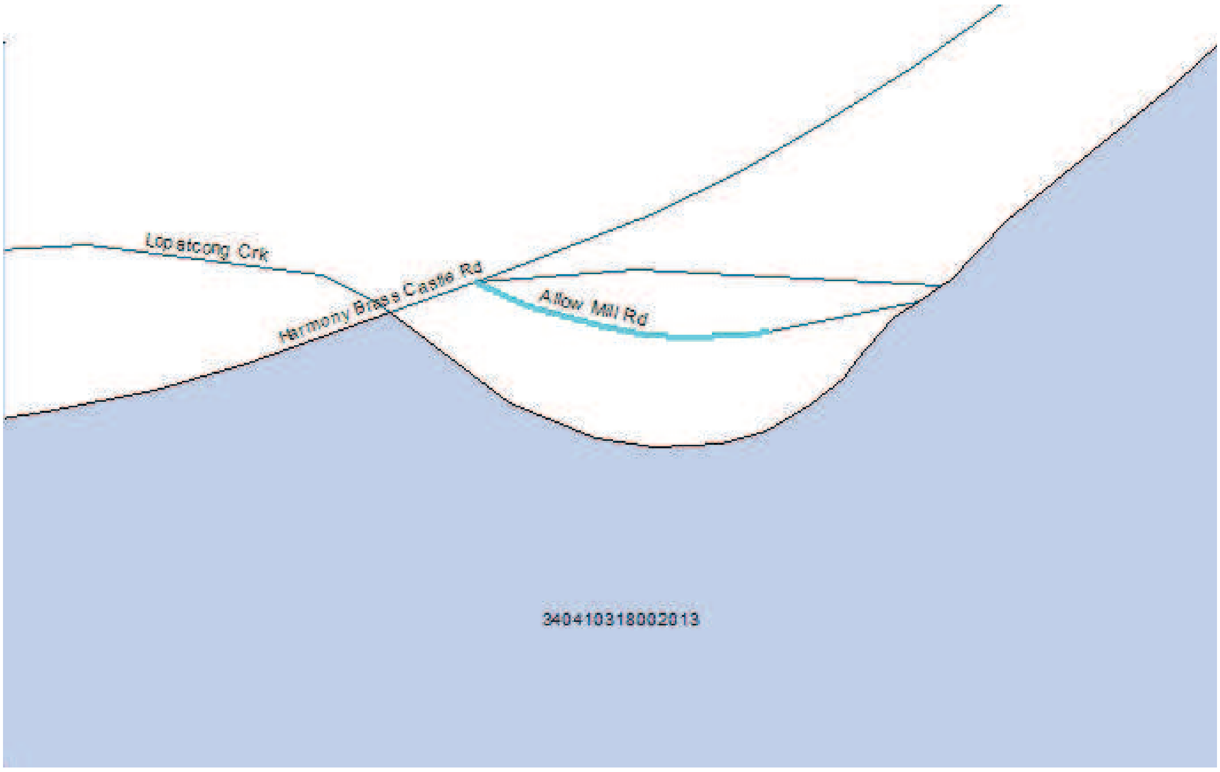
Below are pictures that illustrate a few of these anomalous cases. In the examples, the street segment identified by Verizon is indicated as an aqua line, the blue-shaded area is the large census blocks and the white, unshaded areas represent the small census blocks.

Example 1:	**TLID**	**FIPSID**	**Street**
	134097546	340057038015000A	Cochise Cir



Example 2:	**TLID**	**FIPSID**	**Street**
	203769459	340297360021005A	Main St

Example 3:	**TLID**	**FIPSID**	**Street**
	98114892	340410318002013	Allow Mill Rd



7. Limited Longitudinal Study of Service Provider Plans

We have been conducting a limited longitudinal study of wireline service provider plans. We began with a random stratified sample of about 20 addresses in the state. Each week we have gone to the websites of two major providers in the state – Verizon and Comcast – and noted the specific plans offered. This study, while clearly quite limited, has produced some intriguing findings regarding maximum advertised speeds, speed tiers, and change and evolution in service plans and pricing. Here are a few observations:

- Over the course of a year we have seen a shift in these providers from describing plans with a specific speed to describing them as either "up to" or with speed tiers. For example, where a plan had been previously defined as 3.0 Mbps upstream it may now be listed as 1.5 to 3 Mbps upstream.
- Most provider websites offer a wealth of information on what plans and speeds are offered on an address level as part of the consumer support and marketing. In some sense, these sites provide very accurate information on maximum advertised speeds at an address level. However, these sites typically have restrictions that limit or preclude the use of automatic tools or methods to capture information from them.
- As expected, service offerings evolve with various bundling opportunities, special offers, discounts and other promotions. These changes can be difficult to track due to the rapid rate of change and primarily impact affordability.
- Of more interest to this program are changes that reflect infrastructure upgrades. These are illustrated with, for example, the first introduction of FiOS, Verizon's fiber-to-the-home service, at some of the monitored addresses.

Appendix A

Broadband Provider Data Report

Provider: Advanza
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:
1. NDA Status
2. Submission Overview
3. Submission File Details
4. Data Validations and Results
5. Data Transformation and Loading
6. Clarification Questions and Provider Responses
7. Notes and Open Issues

Section 1: NDA Status

Advanza states that NONE is required.

Section 2: Submission Overview

<table>
<tr><th colspan="5">AVAILABILITY DATA – RECEIVED AUGUST, 2010</th></tr>
<tr><td rowspan="5">ID</td><td colspan="3">Provider name</td><td>Advanza Telecom Inc</td></tr>
<tr><td colspan="3">“Doing business as” name</td><td>Advanza</td></tr>
<tr><td colspan="3">FRN</td><td>0017029141</td></tr>
<tr><td colspan="3">Holding Company Name</td><td>Advanza Telecom, Inc.</td></tr>
<tr><td colspan="3">Holding Company Number</td><td>180002</td></tr>
<tr><th colspan="5">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="4">1 xlsx spreadsheet</td></tr>
<tr><td>File size</td><td colspan="4">NJBB_0017029141_AddressLevelAvailability-20101231.xls file has 50 records representing 36 unique addresses</td></tr>
<tr><td rowspan="4">Speeds</td><td>Type</td><td></td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</td><td rowspan="4">All provided speeds have code 4 (1.5 mbps ≤ BW < 3.0 mbps) for all records, which would make sense if all service is T1</td></tr>
<tr><td>Typical-upstream</td><td>X</td><td>address</td></tr>
<tr><td>Typical-downstream</td><td>X</td><td>address</td></tr>
<tr><td>Advertised-upstream</td><td>X</td><td>address</td></tr>
</table>

	Advertised-downstream	X	address
	Subscriber-weighted-up	☐	Not provided
	Subscriber-weighted-down	☐	Not provided
Technology Type	Code 30 (= Other Copper Wireline) given for all records		
End-user specification	Values 2, 3 or 4 (Government, Small Business or Enterprises).		
Comments:			

INTERCONNECTION DATA – NO DATA PROVIDED	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received one file by secure upload to the connectingnj web site, file subsequently updated and delivered via email

Size	**Name**
72,192	NJBB_0017029141_AddressLevelAvailability-20101231.xls

The addresses in this file appear to be for individual customers (as opposed to addresses of multi-tenant buildings in a central business district).

Section 4: Validations and Results

All addresses were successfully geocoded using Arroyo flow Advanza_geocode_yahoo.arroyo invoking the Yahoo geocoder..

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from the file mentioned above. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to " Advanza Telecom Inc"
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to "0017029141"
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Tehcnology of Transmission (sic)
MAXADDOWN	As supplied in column Maximum Advertised Downstream Speed
MAXADUP	As supplied in column Maximum Advertised Upstream Speed
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

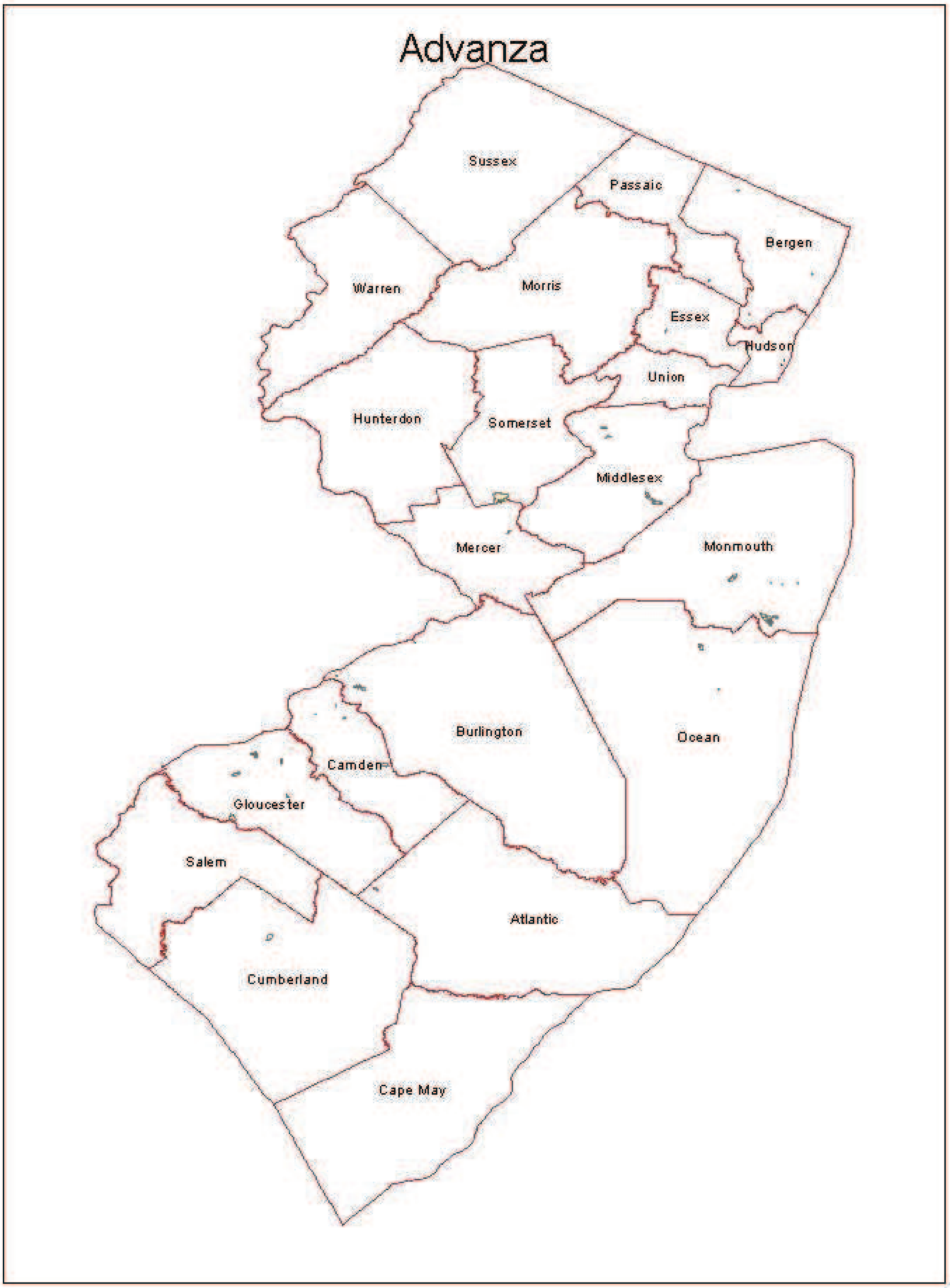
1. Geocoded the addresses using an Arroyo flow and the Yahoo geocoder, leaving the result with address and lat, long data in an Excel spreadsheet.
2. Imported the spreadsheed to a simple ESRI geodatabase table ("providerinput")
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option ("providerinput_shape")
4. Added a column containing the ID of the containing year 2000 census block using ArcCatalog's spatial join feature. The newly created point shapes are joined against census block shapes from reference data ("providerinput_shape_cb").
5. Discarded typical speeds since they were in all cases identical to maximum advertised speeds, not measured values.
6. Copied contents to the target data model table with the transformations specified above. Discarded 14 rows with duplicate census blocks.

Section 6: Clarification Questions and Responses

None required as part of initial review.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: ATT
Received: March1, 2011
Submission date: April, 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

8. NDA Status
9. Submission Overview
10. Submission File Details
11. Data Validations and Results
12. Data Transformation and Loading
13. Clarification Questions and Provider Responses
14. Notes and Open Issues

Section 1: NDA Status

Section 2: Submission Overview

AVAILABILITY DATA		
ID	AT&T Mobility LLC AT&T Mobility LLC FRN: 4979233	PROVIDER NAME DBA NAME FRN
FOR WIRELESS		
Filetypes	1 shapefile corresponding to NJ terrestrial 3G mobile wireless coverage (type 80)	
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)
	Upstream max adv	yes (polygon)
	Downstream max adv	yes (polygon)
	Upstream typical	no
	Downstream typical	no
	Subscriber-weighted	no

Technology Type	Spectrum : yes	3 (PCS) and 1(Cellular spectrum)
Comments:		
INTERCONNECTION DATA		
ID		
File size		
Ownership		
Transport Type		
Data Rates/Capacity		
Location		
Comments: no IC data provided.		

Quick loading results:

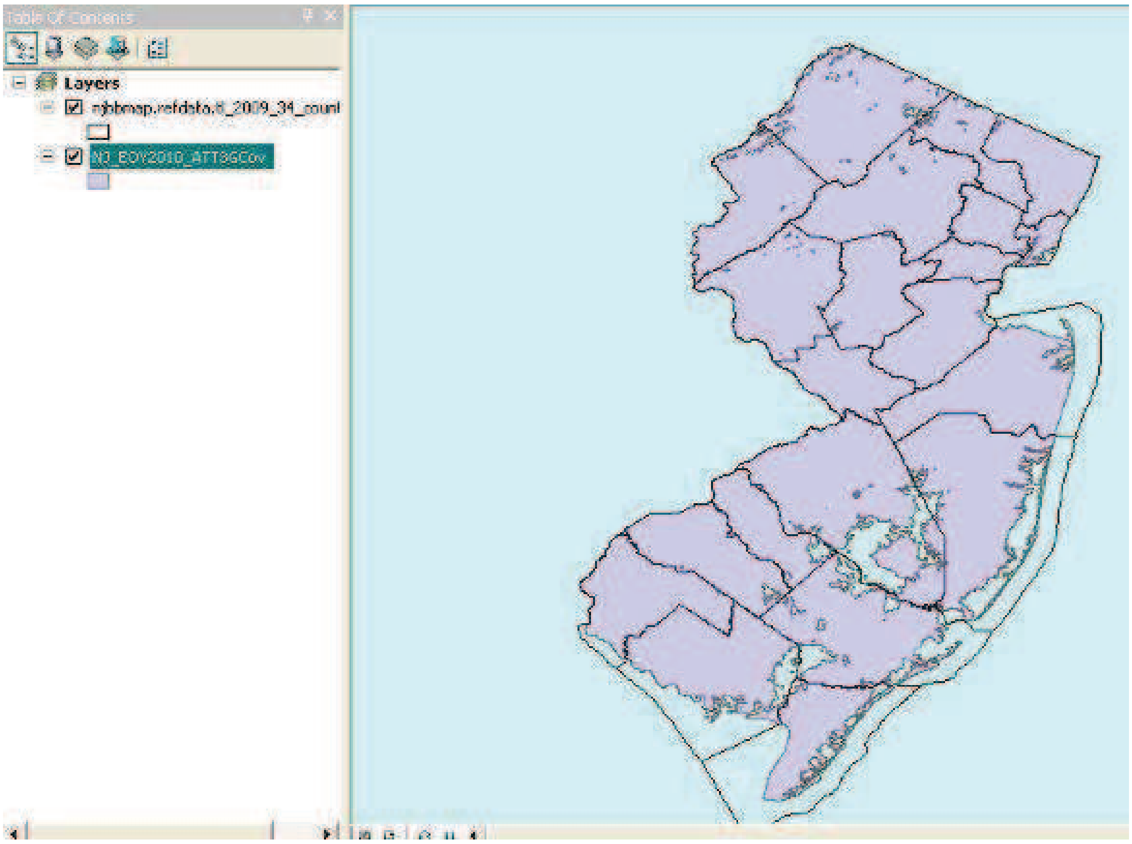


Figure 1. Loading results

Section 3: Submission File Details

1 zip file containing 5 files by (EMAIL, SECURE UPLOAD):

Size	Name
1KB	NJ_EOY2010_ATT3GCov.dbf
1KB	NJ_EOY2010_ATT3GCov.prj
1KB	NJ_EOY2010_ATT3GCov.shx
469KB	NJ_EOY2010_ATT3GCov.shp
9KB	ATT Mobility Response NJ December 2010.xlsx

Section 4: Validations and Results

(see above for initial load of shapefiles onto Arcmap)

Section 5: Data Transformation and Loading

Section 6: Clarification Questions and Responses

1. no typical up or down speeds
2. no subscriber weighted value

Section 7: Notes and Open Issues

Broadband Provider Data Report

Provider: Broadview Networks, Inc.
Received: September 2010
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

15. NDA Status
16. Submission Overview
17. Submission File Details
18. Data Validations and Results
19. Data Transformation and Loading
20. Clarification Questions and Provider Responses
21. Notes and Open Issues

Section 1: NDA Status

No NDA executed.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Broadview Networks Inc.
Broadview Networks
0003775285</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Excel spreadsheet</td></tr>
<tr><td>File size</td><td colspan="2">1,936 data rows</td></tr>
<tr><td>Speeds</td><td><table><tr><th>Type</th><th></th><th>Address level data</th></tr><tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr><tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr><tr><td>Advertised-upstream</td><td></td><td>Customer speed choice listed</td></tr><tr><td>Advertised-downstream</td><td></td><td>Customer speed choice listed</td></tr><tr><td>Subscriber-weighted-nominal speed</td><td></td><td>Not provided</td></tr></table></td><td>Instead of max advertised, each service address price plan is shown.</td></tr>
<tr><td>Technology Type</td><td colspan="2">10 (ADSL), 20 (SDSL), 30 (Other Wireline)</td></tr>
</table>

End-user specification	Yes
Comments:	
INTERCONNECTION DATA	
ID	
File size	Excel spreadsheet with 31 rows
Ownership	Not provided
Transport Type	Code 2, copper
Data Rates/Capacity	Not provided
Location	Address provided
Comments:	

Section 3: Submission File Details

Received 2 files by secure upload:

Size	**Name**
514560	NJ Table 1 063010.xls
24576	NJ Table 8 - Middle Mile & Backbone Interconnection Point 063010.xls

Section 4: Validations and Results

Table 1 has 1,936 service addresses (with abbreviated town names and many missing zip codes), the technology speed tiers in service at each address, and the count of connections. Most records contain max advertised up/down speed codes, but over 100 do not. Records have no typical up/down speed and no specification of subscriber-weighted nominal speed. Table 1 shows no provider name, no DBA name, and no FRN. Geocoding succeeded for N of the addresses and failed for 628 addresses. Most of the addresses that failed geocoding have no street component, just a city name.

Table 8 has 33 middle-mile points, with addresses, CLLI codes, and the service facility type (all copper). There is no specification of ownership or facility capacity. Table 8 lists provider name, DBA name, and FRN. Geocoding succeeded for 32 of the addresses and failed for 1 ("Delsea Dr N & Focer St, Glassboro, NJ 08028, USA").

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from data supplied in the XLS sheet . The following table explains the necessary transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "Broadview Networks Inc."
DBANAME	Set to "Broadview Networks"
FRN	As supplied in column "FRN"
OWNERSHIP	Set to null, not supplied
BHCAPACITY	Set to null, not supplied
BHTYPE	As supplied in column "Serving Facility Type"
LATITUDE	Obtained by geocoding the address
LONGITUDE	Obtained by geocoding the address
ELEVFEET	Set to "0" (zero), not supplied
STATEABBR	Set to "NJ"
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

1. Geocoded the addresses to obtain Latitude, Longitude value pairs.
2. Created an excel sheet and imported to a geodatabase table.
3. Added a point shape corresponding to the Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
4. Added a column containing the ID of the containing Year 2000 Census Block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

The standard NDA prohibits us from submitting address-level data to the NTIA. So we do not populate the table BB_Service_Address with the availability data. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

Loaded from supplied file of addresses after applying the corrections discussed below. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "Broadview Networks Inc."
DBANAME	Set to "Broadview Networks"
PROVIDER_TYPE	Set to 1

FRN	Set to " 0003775285"
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology
MAXADDOWN	As supplied in column Max Advertised Upstream
MAXADUP	As supplied in column Max Advertised Downstream
TYPICDOWN	Set to null
TYPICUP	As supplied in column Typical Upstreatm Speed (sic)
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

7. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.. Addresses that yielded results with accuracy of 6 or below were excluded; only intersection (7) or rooftop (8) accuracy is acceptable. The list of addresses that failed geocoding is available.
8. Created an Excel sheet and imported it to a geodatabase table.
9. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
10. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
11. Discarded 150 rows with no value for the maximum advertised download speed.
12. Discarded 383 rows with duplicate census blocks.
13. Loaded 1,377 census blocks.

NTIA Table BB_Service_RoadSegment

Loaded with street segments in census blocks larger than 2 square miles as gathered from Census Bureau TigerLine reference data. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "Broadview Networks Inc."
DBANAME	Set to "Broadview Networks"
PROVIDER_TYPE	Set to 1
FRN	Set to " 0003775285"
ADDMIN	From reference data
ADDMAX	From reference data
PREDIR	Set to null, not available in reference data
STREETNAME	From reference data

STREETTYPE	Set to null, not available in reference data
SUFFDIR	Set to null, not available in reference data
CITY	From reference data
STATECODE	Set to "NJ"
ZIP5	From reference data
ZIP4	Set to null, not available in reference data
TRANSTECH	As supplied in column Technology
MAXADDOWN	As supplied in column Max Advertised Upstream
MAXADUP	As supplied in column Max Advertised Downstream
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	From reference data

Internal processing notes:

1. Discovered all street segments that touch census blocks larger than 2 square miles using the census block list discovered as discussed for table BB_Service_Censusblock above.
2. Joined against reference data to discover street segment, for a total of 208 entries.

Section 6: Clarification Questions and Responses

1. The values you provided for the max. advertised up/down speeds appear to be the price plan choices. Do you want us to use these as your Maximum Advertised values?
2. Do you own or lease the facilities at the interconnection points you have listed?
3. You provided the service facility type for the middle-mile points but not the facility capacity. Would it be possible for you to provide this data.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 10:05 AM
To: 'jharper@broadviewnet.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: Broadview NJ Broadband data clarification

Jarrod,

We have reviewed the data you submitted to the NJ Broadband Mapping program and have a few clarification questions:

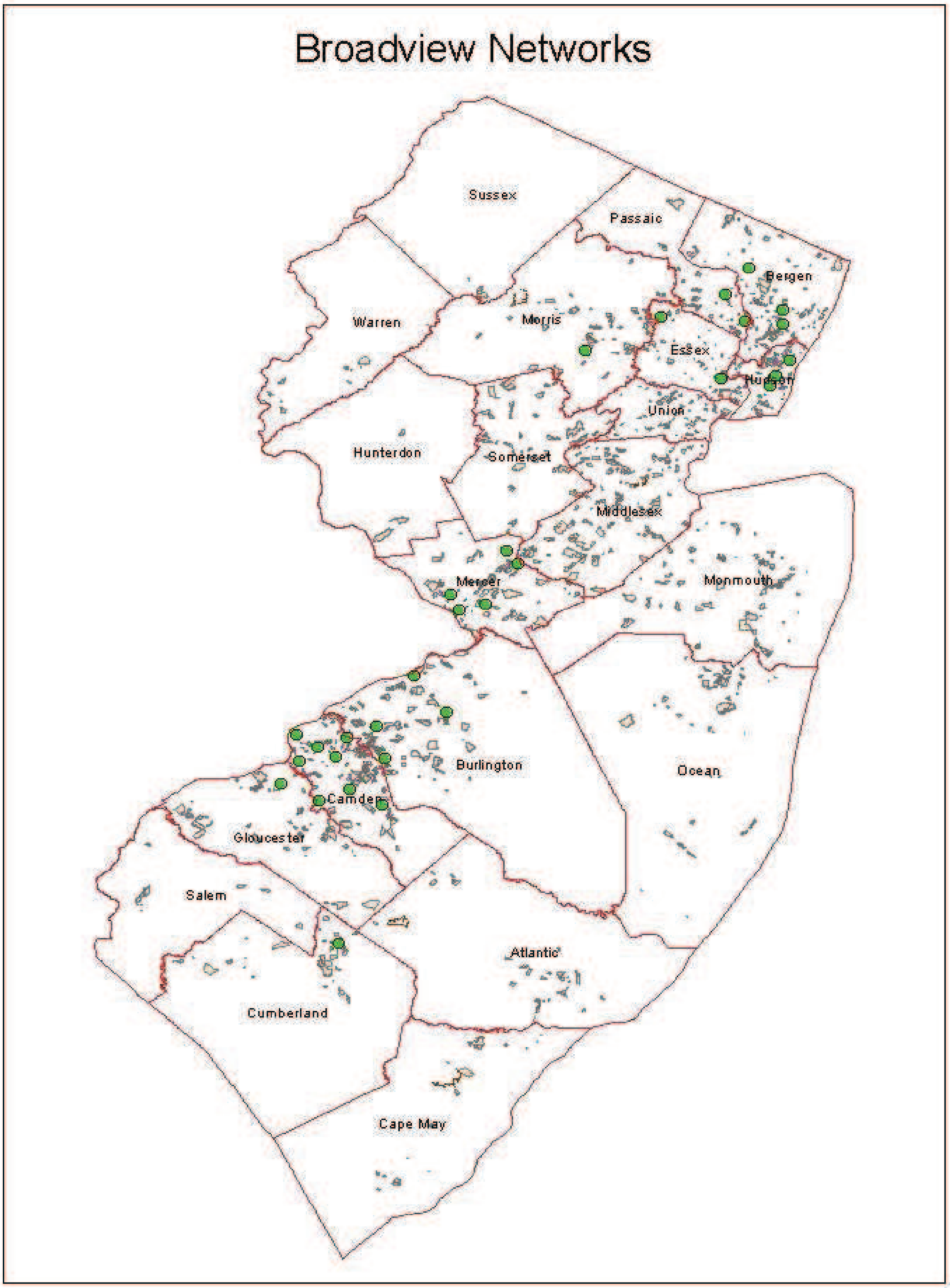
1. The values you provided for the max. advertised up/down speeds appear to be the price plan choices. Can we use the highest values as the Maximum Advertised speeds across all your locations??
2. Do you own or lease the facilities at the interconnection points you have listed?
3. You provided the service facility type for the middle-mile points but not the facility capacity. Would it be possible for you to provide this data.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Cablevision
Received:
Submission date:

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

22. NDA Status
23. Submission Overview
24. Submission File Details
25. Data Validations and Results
26. Data Transformation and Loading
27. Clarification Questions and Provider Responses
28. Notes and Open Issues

Section 1: NDA Status

Executed with NJ OIT.

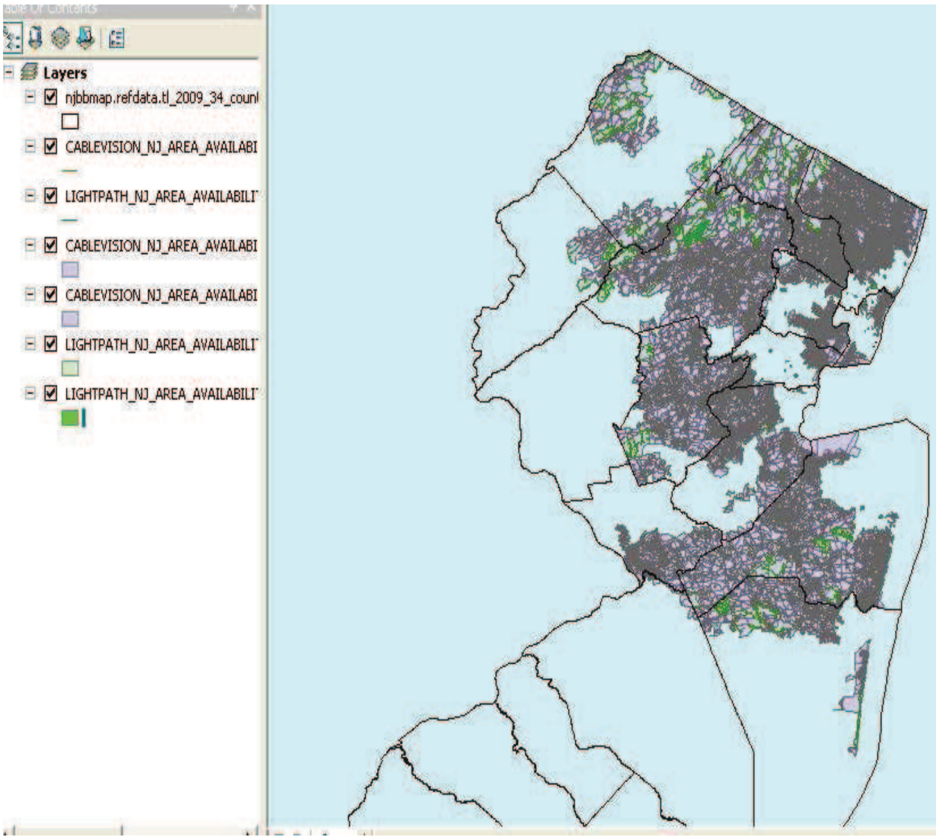
Section 2: Submission Overview

AVAILABILITY DATA				
ID	Provider name		CSC HOLDINGS INC	
	"Doing business as" name		CABLEVISION / LIGHTPATH	
	FRN		0003735909	
	Holding company name		CSC Holdings, Inc.	
	Holding company number		130370	
FOR WIRELINE				
Filetypes	Shapefile with Census Block Year 2009 data			
File size	Multiple tables and shapes, for cable modem and optical (Lightpath) technologies.			
Speeds	Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)	
	Typical-upstream		Not provided	
	Typical-downstream		Not provided	
	Advertised-upstream		Census block and street segment	
	Advertised-		Census block and	

	downstream		street segment	
	Subscriber-weighted-up		Not provided	
	Subscriber-weighted-down		Not provided	
Technology Type	40 (Cable Modem DOCSIS3.0), 41 (Cable Modem - Other), 50 (Optical carrier)			
End-user specification	Yes. Address data provided in 2 shape files (for both cable and optical) with street segment ID. (a field is called TLID, which is assumed means Tiger Line ID).			
Comments: Street data is comprised solely of polylines in the shapefile while the other files are polygons representing coverage. No subscriber weighted data found.				
INTERCONNECTION DATA: PROVIDED AFTER REQUEST				
ID	Data Interconnection Points Feb 2010.xls			
File size	17 KB, 5 records			
Ownership	Leased			
Transport Type	Fiber			
Data Rates/Capacity	Greater than 1 gbps			
Location	Provided addresses, only 1 is within NJ: 165 Halsey St, Newark NJ			
Comments: None.				

Figure 1. submitted data (quick load)

Overview of submitted data



Section 3: Submission File Details

Received one (1) file by SECURE UPLOAD. The zip archive contains six shapefiles: large census blocks (Cablevision and Lightpath), small census blocks (Cablevision and Lightpath), and one with roadsegments (Cablevision and Lightpath). The data and shapes appear to use Year 2000 Census Bureau geometry. The shapefiles use the XY Coordinate System GCS_North_American_1983.

Size Name

CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_GREATER_THAN_2MI.dbf	36 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_GREATER_THAN_2MI.prj	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_GREATER_THAN_2MI.shp	566 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_GREATER_THAN_2MI.shx	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_LESS_THAN_2MI.dbf	24,411 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_LESS_THAN_2MI.prj	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_LESS_THAN_2MI.shp	28,096 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_LESS_THAN_2MI.shx	422 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.dbf	5,159 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.prj	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.shp	942 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.shx	42 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.dbf	333 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.prj	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.shp	58 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.shx	3 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_GREATER_THAN_2MI.dbf	3 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_GREATER_THAN_2MI.prj	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_GREATER_THAN_2MI.shp	37 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_GREATER_THAN_2MI.shx	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_LESS_THAN_2MI.dbf	352 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_LESS_THAN_2MI.prj	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_LESS_THAN_2MI.shp	804 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_LESS_THAN_2MI.shx	7 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_GREATER_THAN_2MI.shp.N...	0 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2000_CENSUSBLOCKS_LESS_THAN_2MI.shp.NJBBM...	0 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.shp.NJBBMAP2-PC.448.371...	0 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2009_TIGER_STREETS.shp.NJBBMAP2-PC.448.3716.s...	0 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_GREATER_THAN_2MI.shp.NJBBMAP2-P...	0 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_CENSUSBLKS_LESS_THAN_2MI.shp.NJBBMAP2-PC.44...	0 KB

Section 4: Validations and Results

Feature class "CV_NJ_AR_AV_2009_TI_ST"

This road segment table has 1 duplicate shape.). The problematic TLID is

64454033 (Reservoir Dr); the record IDs are 50 and 187.

Feature class "LP_NJ_AR_AV_2009_TI_ST"
This road segment table has 1 duplicate shape. The problematic TLID is 64454033 (Reservoir Dr); the record IDs are 1485 and 3663.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from data supplied in the XLS sheet . Only one row describes a connection point in New Jersey. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “CSC HOLDINGS INC”
DBANAME	Set to “CABLEVISION”
FRN	As supplied in column frn_name
OWNERSHIP	Set to code 1, leased
BHCAPACITY	Set to code 4; 1gbps falls in range 600mbps – 2.4gbps
BHTYPE	Set to code 1, fiber
LATITUDE	Obtained by geocoding the address
LONGITUDE	Obtained by geocoding the address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

5. Created an excel sheet and imported to a geodatabase table.
6. Added point corresponding to the Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
7. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.
8. Reused the table created for the October 2010 submission.

NTIA Table BB_Service_CensusBlock

Loaded from the two supplied feature classes (shapefiles) with census blocks less than 2 square miles. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column prvd_name
DBANAME	As supplied in column dba_name
PROVIDER_TYPE	Set to 1
FRN	As supplied in column frn_name
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from cb_fips (first 3 digits)
TRACT	Populated from cb_fips (next 6 digits)
BLOCKID	Populated from cb_fips
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column cb_fips
TRANSTECH	As supplied in column tech_trans
MAXADDOWN	As supplied in column MaxAdvDown
MAXADUP	As supplied in column MaxAdvUp
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
SHAPE	As supplied in column shape

Internal processing notes:

1. Import the features with XY Coordinate System " GCS_North_American_1983" via the following three-step process. (A simple Import using ArcCatalog yields an incompatible tolerance value.)
    a. First, copy the data from the shapefile to the geodatabase using a geographic transformation "NAD_1983_to_WGS_1984_5". This yields a feature class with the required coordinate system but an incorrect tolerance value. Names are "cb_nj_ar_av_lt_2mi" and "lp_nj_ar_av_lt_2mi".
    b. Second, create a new feature class with the same schema as the provided shapefile feature and the required coordinate reference system (GCS_WGS_1984) and tolerance (0.000000002 degrees). Names are "cb_nj_ar_av_lt_2mi_tol" and "lp_nj_ar_av_lt_2mi_tol".
    c. Third, load the data into the newly created feature class to ensure perfect compatibility with the required coordinate reference system and tolerance.
2. Ignored the column "tech_trans2" in the Cablevision feature class

NTIA Table BB_Service_RoadSegment

Loaded from the two supplied features with line segments. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column prvd_name
DBANAME	As supplied in column dba_name
PROVIDER_TYPE	Set to 1

FRN	As supplied in column frn_name
ADDMIN	Set to the least of the non-empty address numbers
ADDMAX	Set to the greatest of the non-empty address numbers
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to null (no value supplied)
ZIP4	Set to null (no value supplied)
TRANSTECH	As supplied in column tech_trans
MAXADDOWN	As supplied in column max_ad_dwn
MAXADUP	As supplied in column max_ad_up
TYPICDOWN	Set to null (no value supplied)
TYPICUP	Set to null (no value supplied)
SHAPE	As supplied

Internal processing notes:

1. Feature classes were imported exactly as discussed above for table BB_Service_CensusBlock.
2. Ignored the column "tech_trans2" in the Cablevision feature class.
3. Dropped 1,562 rows with empty street name, address min, address max values.
4. One data column in the Cablevision and Lightpath feature classes is named "tlid" which I interpret as "Tiger Line ID". I validated the data in the TLID column against Year 2009 Census Bureau reference data. All are valid values. (N.B. Although we are instructed to use Year 2000 Census geometry, this table has no data such as a Census block ID. The shapes are all valid ESRI objects so in this case it seems perfectly acceptable to use data from the Year 2009 Census Bureau reference set.)
5. ESRI validation reported that each input feature class has one duplicate (i.e., two rows with identical shapes. The two duplicate records were dropped, one from each input feature class.
6.

Section 6: Clarification Questions and Responses

1. No typical values supplied.
2. No subscriber weighted data.
3. no interconnection data.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 8:20 AM
To: 'tbaecher@cablevision.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: CSC NJBB Data Clarification

Ted,

We have performed our initial review of the data you submitted and we have two clarification questions.

1. Your recent submission did not include any middle mile information. Is the middle mile information you submitted last time still valid? If not, could you please supply us with updated information?
2. During the last submission you indicated that you did not compile any network or usage information that would allow you to calculate Subscriber Weighted Nominal Speed or Typical Speeds. Is this still the case?

We would appreciate your prompt response to these questions.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Theodore Baecher [mailto:TBAECHER@cablevision.com]
Sent: Tuesday, March 08, 2011 5:46 PM
To: ConnectingNJ@research.telcordia.com
Cc: Roxanne Smestad
Subject: Re: CSC NJBB Data Clarification

John-

With regard to #1, please see attached list.

With regard to #2, the answer is yes.

Please let me know if you have any questions.

Ted

Theodore J. Baecher
Managing Counsel, Legislation and Ethics
Cablevision Systems Corp.

tbaecher@cablevision.com
516-803-2388 (Office)
516-803-2667 (Fax)

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:41 AM
To: 'Theodore Baecher'
Cc: 'Roxanne Smestad'
Subject: FW: Cablevision Broadband Map Question

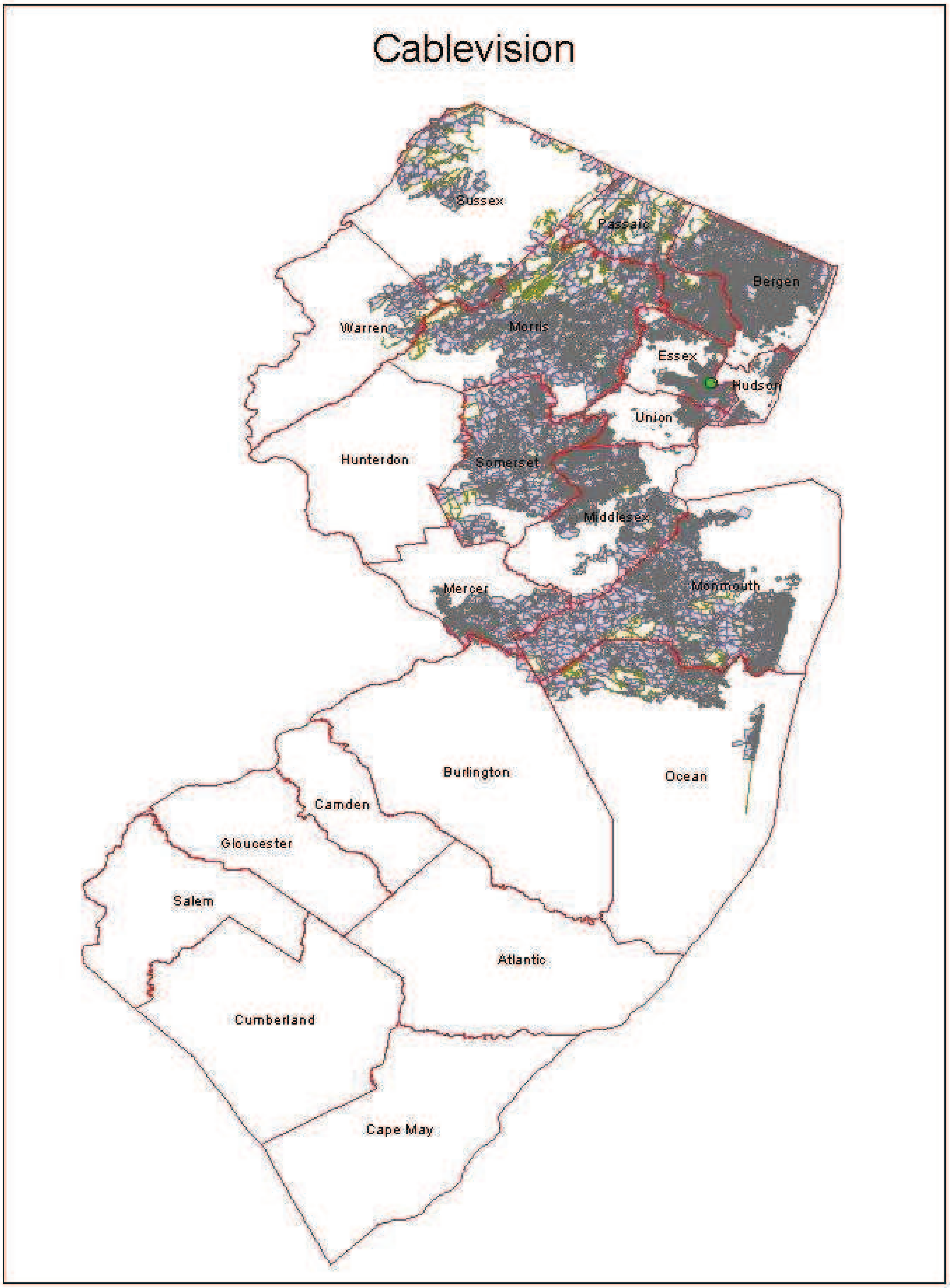
Ted,
Your email system rejected the email as being too large. It may have gotten through to Roxanne; I did not get any return mail from her. Please let me know if you need to arrange alternate delivery.
Also, the email that was returned had the following question:
I have one other question. The NTIA pulled data from the FCC and came up with the name CABLEVISION LIGHTPATH INC as being associated with the FRN 0003510195. Is that a valid name to use for your company?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Should we submit mixed-geometry street segments?

Section 8: Overview Map of Submitted Data



Connecting New Jersey - Broadband Provider Data Report

Provider: Cavalier Telephone Mid-Atlantic LLC
Submission date: April 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA). This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column "reseller" was dropped.
2. Set the new column "provider_type" to value 1 ("Broadband provider as described in the NOFA")
3. Dropped non-measured typical up/down speed code values.

NTIA Table BB_ConnectionPoint_MiddleMile

1. No changes.

Provider Interactions

From: Ring, Margaret H. [mailto:mhring@cavtel.com]
Sent: Friday, March 04, 2011 1:03 PM
To: 'ConnectingNJ@research.telcordia.com'
Subject: RE: NJ BB Data Collection - Spring 2011

Cavalier Telephone has had no substantial changes to its broadband footprint since its last data submission. Please feel free to use the same data for this round of reporting. Let me know if you have any questions or concerns.

Regards,

Margaret Ring, Director
Regulatory
Cavalier Telephone
850.465.1748

Broadband Provider Data Report

Provider: Cavalier Telephone Mid-Atlantic LLC
Received: August 2010
Submission date: August 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:
29. NDA Status
30. Submission Overview
31. Submission File Details
32. Data Validations and Results
33. Data Transformation and Loading
34. Clarification Questions and Provider Responses
35. Notes and Open Issues

Section 1: NDA Status

It appears that the company executed an NDA with NJ OIT; the submitted data references an NDA.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
"Doing business as" name
FRN</td><td>Cavalier Telephone Mid-Atlantic LLC
No DBA name (confirmed with company)
0015-7991-33</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Excel (Cavalier NJ Broadband Response.xls)</td></tr>
<tr><td>File size</td><td colspan="2">52736 bytes; 122 records</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Address</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Address</td></tr>
</table></td><td>Typical up speeds 3,4; down 5,6,7,7. Adv up speed 4, down 6. Note typical speed code that is greater than the max advertised speed code

Company clarified during October submission that the 7 typical speed should be a 6.</td></tr>
</table>

	Subscriber-weighted-up		Not provided	
	Subscriber-weighted-down		Not provided	
Technology Type	Initial submission included Codes 1 and 3. Provider clarified during October submission that these should be ADSL (1=10) and Other Copper Wireline (3-30).			
End-user specification	Codes 1 (residential) and 3 (small business).			
Comments:				
INTERCONNECTION DATA				
ID				
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments:				

Section 3: Submission File Details

Received 1 file by email.

Size	**Name**
52736	Cavalier NJ Broadband Response.xls

The file contains 124 rows and 122 data records for broadband availability by address, and 18 rows of middle-mile connection points.

Section 4: Validations and Results

Some of the address records (13) are post office boxes, which are invalid for this purpose.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file “Cavalier NJ Broadband Response.xls”, tab “Middle Mile Interconnection”. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider Name”
DBANAME	Not supplied; set same as PROVNAME
FRN	As supplied in column “FRN”, after removing hyphens
OWNERSHIP	As supplied in column “Ownership”
BHCAPACITY	As supplied in column “Serving Facility Capacity”
BHTYPE	As supplied in column “Serving Facility Type”
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

9. Geocoded the addresses using the Google geocoder.
10. Created an excel sheet and imported to a geodatabase table.
11. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
12. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

The standard NDA prohibits us from submitting address-level data to the NTIA. So we do not populate the table BB_Service_Address with the availability data. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

Loaded from supplied file “Cavalier NJ Broadband Response.xls”, tab “Wireline Address-Level” after applying the corrections discussed below. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider Name”
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”, after removing hyphens
STATEFIPS	Set to “34” (NJ)

COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology
MAXADDOWN	As supplied in column Max Advertised Upstream
MAXADUP	As supplied in column Max Advertised Downstream
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

14. Created a corrected spreadsheet based on response to questions, see next section.
15. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.. Addresses that yielded results with accuracy of 6 or below were excluded; only intersection (7) or rooftop (8) accuracy is acceptable. The list of addresses that failed geocoding is available.
16. Created an Excel sheet and imported it to a geodatabase table.
17. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
18. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
19. Discarded 173 rows with duplicate census blocks while preserving the greatest speed.

The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

1. What is the DBA name?
2. The tech trans codes 1 and 3 are not valid. Should technology of transmission code "1" really be "10" for ADSL? And about code 3, is that really 30?
3. Is the single record with a typical down speed of 7 a typo, possibly should be 6 to match the maximum advertised down speed?
4. One record (1151 N BLACK HORSE PIKE WILLIAMSTOWN NJ) is missing the zip code, which we believe should be 08094.
5. Thirteen records show an address that is a post office box. This is not a service address and we cannot work with these records. We need the service address instead of the billing address.

Questions sent 8/24/2010, Response received 8/24/2010

Hi John,
Sorry for any errors. Cavalier's answers/corrections are below. Let me know if you need anything further.

Thank you,
Margaret

Margaret Ring, Sr. Director
Cavalier Telephone
850.465.1748

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, August 24, 2010 3:12 PM
To: Ring, Margaret H.
Cc: NJ Broadband Data Collection
Subject: NJBB Clarification Questions

Margaret,
We have been reviewing the data you submitted to the New Jersey Broadband mapping program. Based on our initial review, we have some questions for you that will help us better understand the data and process it accurately.

1. Does Cavalier Telephone have a specific "Doing Business As" name? The legal name of the entity is listed. There is no d/b/a.
2. The transmission technology codes that you submitted (1 and 3) are not valid. Should technology of transmission code "1" really be "10" for ADSL? And about code 3, is that really 30 (Other Copper Wireline)? Yes, ADSL (1=10) and Other Copper Wireline (3-30)
3. Is the single record with a typical downstream speed of 7 a error? Did you intend for it to be 6 to match the maximum advertised down speed? Our records do not indicate an error, but it is certainly an anomaly. Please correct to 6 for consistency.
4. One record (1151 N BLACK HORSE PIKE WILLIAMSTOWN NJ) is missing the zip code, which we believe should be 08094. Is this correct? Correct.
5. Thirteen records show an address that is a post office box. This information does not allow us to determine the location at which the service is available. Could you please provide the service address rather than the billing address? These locations do not have a physical address indicated in the data I was provided. Please delete the records with a post office box.

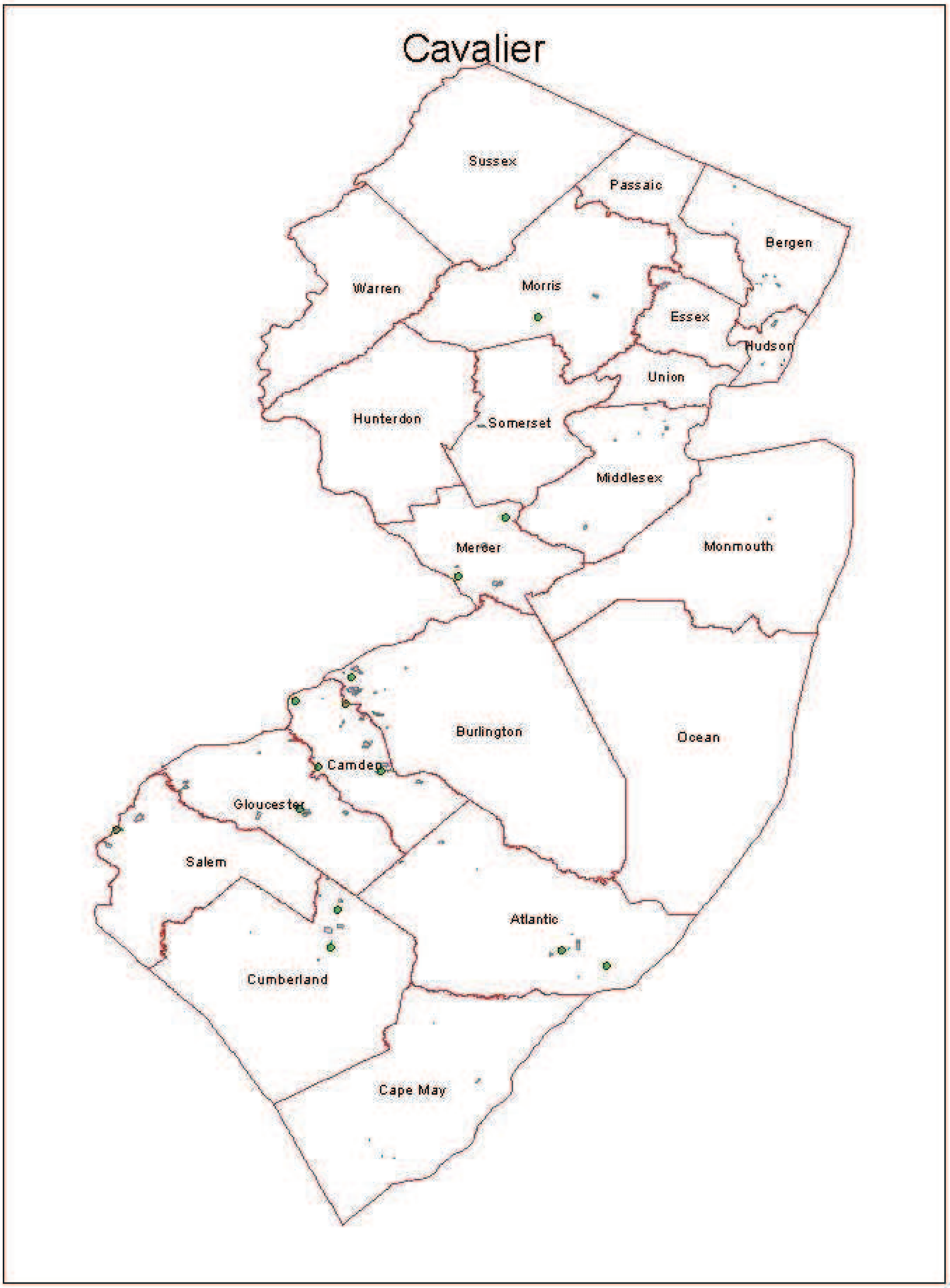
We would appreciate your prompt attention to these questions. If you need further clarification, please feel free to contact me.

Thank you for your participation!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: CenturyTel DBA Century Link
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

36. NDA Status
37. Submission Overview
38. Submission File Details
39. Data Validations and Results
40. Data Transformation and Loading
41. Clarification Questions and Provider Responses
42. Notes and Open Issues
43. Overview Map of Submitted Data

Section 1: NDA Status

Century Link executed an NDA with NJ OIT; the data files refer to the NDA.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name “Doing business as” name FRN	CenturyLink, Inc. (per email) Century Link 0018626853
FOR WIRELINE		
Filetypes	Text and shapefiles	
File size		
Speeds	(see table below)	

Type		Spatial Resolution: county
Typical-upstream		Census block and street segment (w. TigerLine REF)
Typical-downstream		Census block and street segment (w. TigerLine REF)
Advertised-upstream		Census block
Advertised-downstream		Census block
Subscriber-weighted-		Not provided

	up			
	Subscriber-weighted-down		County; all numbers are around 5000.	
Technology Type	10 (ADSL)			
End-user specification	Not provided			
Comments:				
INTERCONNECTION DATA				
ID				
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments: Not provided this submission (while it was last time)				

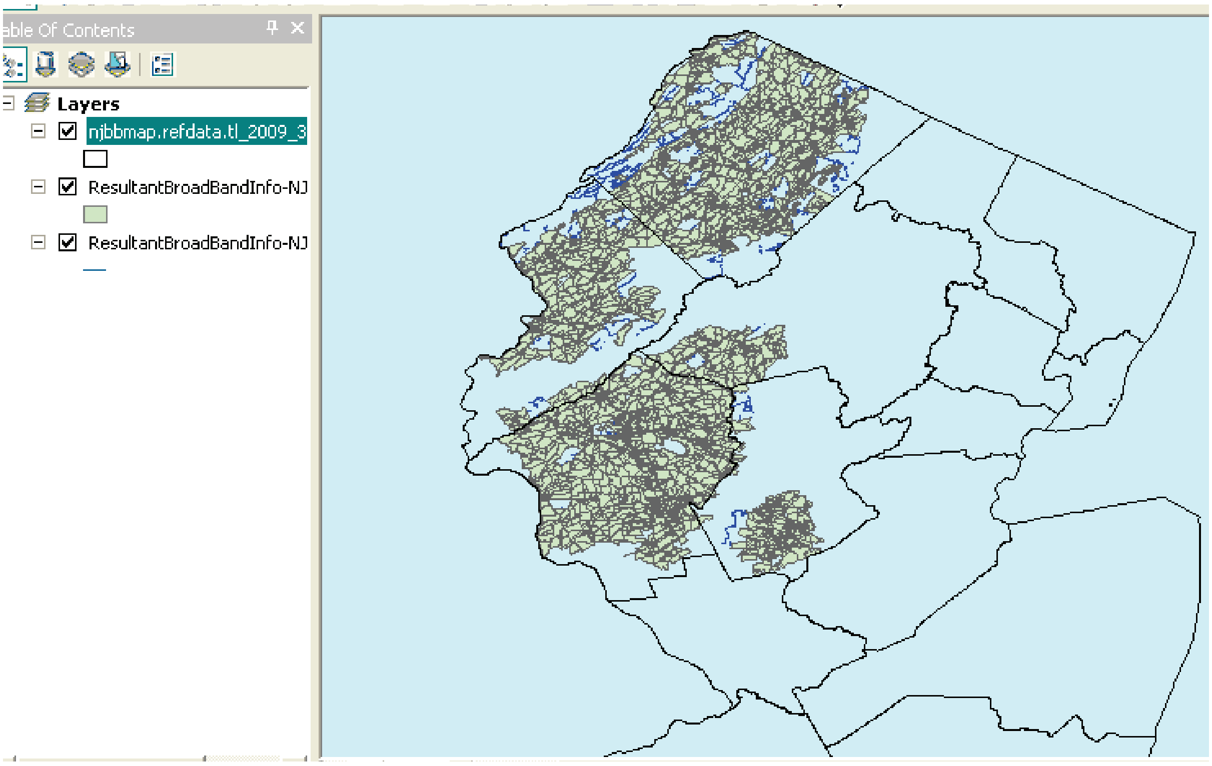


Figure1. Quick load test results

Section 3: Submission File Details

Size (kb)	Name
2702	CTL_NJ_sub_wtd_speed.txt
2219	NJ_BBavail.xls
1485	ResultantBroadBandInfo-NJ_polyline.dbf
1	ResultantBroadBandInfo-NJ_polyline.prj
836	ResultantBroadBandInfo-NJ_polyline.shp
35	ResultantBroadBandInfo-NJ_polyline.shx
2043	ResultantBroadBandInfo-NJ_region.dbf
1	ResultantBroadBandInfo-NJ_region.prj
3488	ResultantBroadBandInfo-NJ_region.shp
48	ResultantBroadBandInfo-NJ_region.shx

Section 4: Validations and Results

Initial check:

The overview data indicates this provider serves five counties in New Jersey. The county, state, and technology of transmission codes are valid. However, we will not populate the BB_Service_Overview in the April 2011 submission, so do not need the subscriber weighted nominal speed.

The large spreadsheet includes 10,476 rows with census block IDs. Additional columns have advertised and typical speeds at the census-block level. Some rows have road segment information (starting and ending addresses left and right); other rows have none. The spreadsheet seems to contain a mix of census block AND road segment information; the columns allow for both types of data in a row.

PROVIDER
DBA_NAME
FRN
CENSUS BLOCK
ADVERTISED MAX DOWNLOAD SPEED TIER
ADVERTISED MAX UPLOAD SPEED TIER
ADVERTISED TYPICAL DOWNLOAD SPEED TIER
ADVERTISED TYPICAL UPLOAD SPEED TIER
TECHNOLOGY

The shapefile has two feature classes:

Feature class ResultantBroadBandInfo-NJ_region appears to provide coverage data for census blocks with an area less than or equal to 2 square miles. It contains 6,113 records. All of the IDs shown in the shapefile correspond to valid Year 2000 Census Block IDs (although the column is named "2009") and all are smaller than 2 square miles.

Feature class ResultantBroadBandInfo-NJ_polyline shows street segments, we guess for census blocks larger than 2 square miles. It contains 4,362 records. The polyline data includes a field called TIGER_REF. We attempted to validate this as a Tiger Line ID against Year 2000 and Year 2009 line-segment reference data records, but none were matched, so we do not know what the column contains. We received an answer in response to email that the values are not TigerLine IDs.

The address left-from, left-to, right-from, and right-to fields are problematic because they are defined as numeric (not text) which precludes address such as those found in parts of NYC such as "12-26". The fields of this polyline data include:
AREA_SQMI
PROVIDER, DBA, FRN, ID, LOCATION
CENSUS_BLOCK
MAX_DOWNLOAD, MAX_UPLOAD, TYPICAL_DOWN, TYPICAL_UP
TECHNOLOGY
TIGER_REF

The speed data gives cause for concern. We see significantly different maximum advertised speeds in adjacent census blocks. How is this possible? Further, the typical and maximum advertised columns are *always* identical. Maybe these data correspond to actual customer speed and price-plan choices rather than advertised speeds.

We do not require BOTH the spreadsheet and the shapefile.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from Excel Spreadsheet "middlemile_NJ.txt" (1 row) that was supplied for the October 2010 submission. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "CenturyLink, Inc." per email
DBANAME	As supplied in column 1 "CenturyLink"
FRN	Set to "0018626853"
OWNERSHIP	As supplied in column 3
BHCAPACITY	As supplied in column 4
BHTYPE	As supplied in column 5
LATITUDE	As supplied in column 6
LONGITUDE	As supplied in column 7
ELEVFEET	Set to "0" (zero)
STATEABBR	Set to "NJ"

FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

13. Created an excel sheet and imported to a geodatabase table.
14. Added point corresponding to the Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
15. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.
16. Source table was reused from the previous submission.

NTIA Table BB_Service_CensusBlock

Loaded from supplied shapefile feature "ResultantBroadBandInfo-NJ_region". The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "CenturyLink, Inc." per email
DBANAME	As supplied in column "dba_name"
PROVIDER_TYPE	Set to 1
FRN	Set to "0018626853"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from 2009_Census_Block_FIPS_Code (1st 3 digits)
TRACT	Populated from 2009_Census_Block_FIPS_Code (next 6 digits)
BLOCKID	Populated from Census_Block_FIPS_Code (next 4 digits; dropped 5th character if present)
BLOCKSUBGROUP	Set to null
FULLFIPSID	First 15 digits of 2009_Census_Block_FIPS_Code See discussion of Census blocks below.
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	As supplied
MAXADUP	As supplied
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	As supplied

Internal notes on processing

1. The supplied feature class uses XY coordinate system name GCS_North_American_1983. The NTIA data model requires XY coordinate system GCS_WGS_1984. To change the projection we applied the geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159).
2. We had to create a new feature class and reload the data so that the tolerance value matches the NTIA transfer model's tolerance value exactly.

3. The feature class "region" has 285 rows that duplicate existing census block IDs. We discarded these to avoid creating duplicate shapes in the table.
4. Some records show max download speed code 2, which is not considered broadband. We discarded 95 records with this value.

NTIA Table BB_Service_RoadSegment

Loaded from supplied shapefile feature “ResultantBroadBandInfo-NJ_polyline”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “CenturyLink, Inc.” per email
DBANAME	As supplied in column “dba_name”
PROVIDER_TYPE	Set to 1
FRN	Set to "0018626853"
ADDMIN	Set to the least of the non-empty address numbers
ADDMAX	Set to the greatest of the non-empty address numbers
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to null (no value supplied)
ZIP4	Set to null (no value supplied)
TRANSTECH	As supplied
MAXADDOWN	As supplied
MAXADUP	As supplied
TYPICDOWN	Set to null
TYPICUP	Set to null
TKUD	As supplied in column tiger_ref
SHAPE	As supplied

Internal notes on processing:

1. The supplied feature class uses XY coordinate system name GCS_North_American_1983. The NTIA data model requires XY coordinate system GCS_WGS_1984. To change the projection we applied the geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159).
2. We had to create a new feature class and reload the data so that the tolerance value matches the NTIA transfer model’s tolerance value exactly.
3. We discarded 609 records with no street name (field empty).
4. The county number and a column "tiger_ref" are supplied for each segment. We checked for uniqueness using the county number and tiger_ref. After discarding records with an empty street name, 2498 unique records were accepted and 1255 duplicates were dropped. However this is questionable. As mentioned in

validations, the tiger_ref column is not a TLID, so using it for validation might not be reasonable.

5. Some records show max download speed code 2, which is not considered broadband. We discarded 73 records with this value.

Section 6: Questions
1. subscriber weighted uplink speeds?
2. we should assume interconnection data same as last submission?
3. duplicate records in both shapefile features
4. imputed maximum speeds

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, March 17, 2011 4:35 PM
To: 'Bonsick, David'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: CenturyLink NJBB Data Clarification

Dave,
We have performed our initial review of the data you submitted and have a couple of clarification questions:

1. During the last cycle, you submitted the attached middle-mile data. Does that still represent your middle mile access points in NJ?
2. Your data has significant variation in the maximum advertised speeds across neighboring census blocks. This gives the impression that the data represents what customers signed up for, rather than what is advertised. On your Web site, I see 10Mbps as the highest speed. Is it reasonable to use that as your maximum advertised across all the areas you offer service?
3. The FCC FRN database lists your provider name as "CenturyLink, Inc." Is this correct?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Flurer, Gerry F [mailto:Gerald.F.Flurer@centurylink.com]
Sent: Monday, March 21, 2011 10:25 AM
To: ConnectingNJ@research.telcordia.com
Cc: Bonsick, David
Subject: RE: CenturyLink NJBB Data Clarification

John: Dave Bonsick asked me to respond to your questions about the CenturyLink BB data for NJ.

1. I received our NJ middle-mile info this morning. See attachment.
2. Our data reports the top BB speed available in the census block – even if it is slower than our top speed promoted on our website, etc.
3. Our provider name is "CenturyLink, Inc."

Let me know if you have any other questions or would like clarification. Thanks.

Gerry Flurer
Voice: (913) 345-6413

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 23, 2011 10:09 AM
To: Flurer, Gerry F; Bonsick, David
Cc: ConnectingNJ@research.telcordia.com
Subject: Additional CenturyLink NJBB Data Clarification

Gerry and Dave,

We had an additional question regarding your NJ Broadband data submission. You provided a column tiger_ref in your street-segment data. The values in that column do not match Year 2000 nor Year 2009 TLID reference data. So, we do not know how to interpret the data. Could you please explain?

Thanks,

John

From: Flurer, Gerry F [mailto:Gerald.F.Flurer@centurylink.com]
Sent: Wednesday, March 23, 2011 11:17 AM
To: ConnectingNJ@research.telcordia.com; Bonsick, David
Subject: RE: Additional CenturyLink NJBB Data Clarification

That column was pulled from our MapInfo StreetPro Enhanced Address Layer data. It is documented as being a cross reference to the Tiger data and several other states had requested the cross reference. We have learned from other states that the reference is not good. We've processed all states by pulling the same fields from the StreetPro data. I was hoping that the info would be valid for some areas. You can disregard that column.

Gerry Flurer
Voice: (913) 345-6413

Please note new e-mail address: gerald.f.flurer@centurylink.com

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From: Flurer, Gerry F [mailto:Gerald.F.Flurer@centurylink.com]
Sent: Wednesday, March 23, 2011 2:53 PM
To: ConnectingNJ@research.telcordia.com; Bonsick, David
Subject: RE: Additional CenturyLink NJBB Data Clarification

Does that mean that you'll drop our coverage in the census blocks larger than 2 miles?

If I understood a state mapper in one of our western states did with our road segment data was that they found the centroid of our segment and looked for a nearby centroid of their Tiger'09 segments. I think they used 1000 ft. Not sure if 1000 ft is workable in NJ. If you'd like to talk to them about how they did it, I'll look for contact info. Thanks.

Gerry Flurer
Voice: (913) 345-6413

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 23, 2011 3:09 PM
To: 'Flurer, Gerry F'; Bonsick, David
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: Additional CenturyLink NJBB Data Clarification

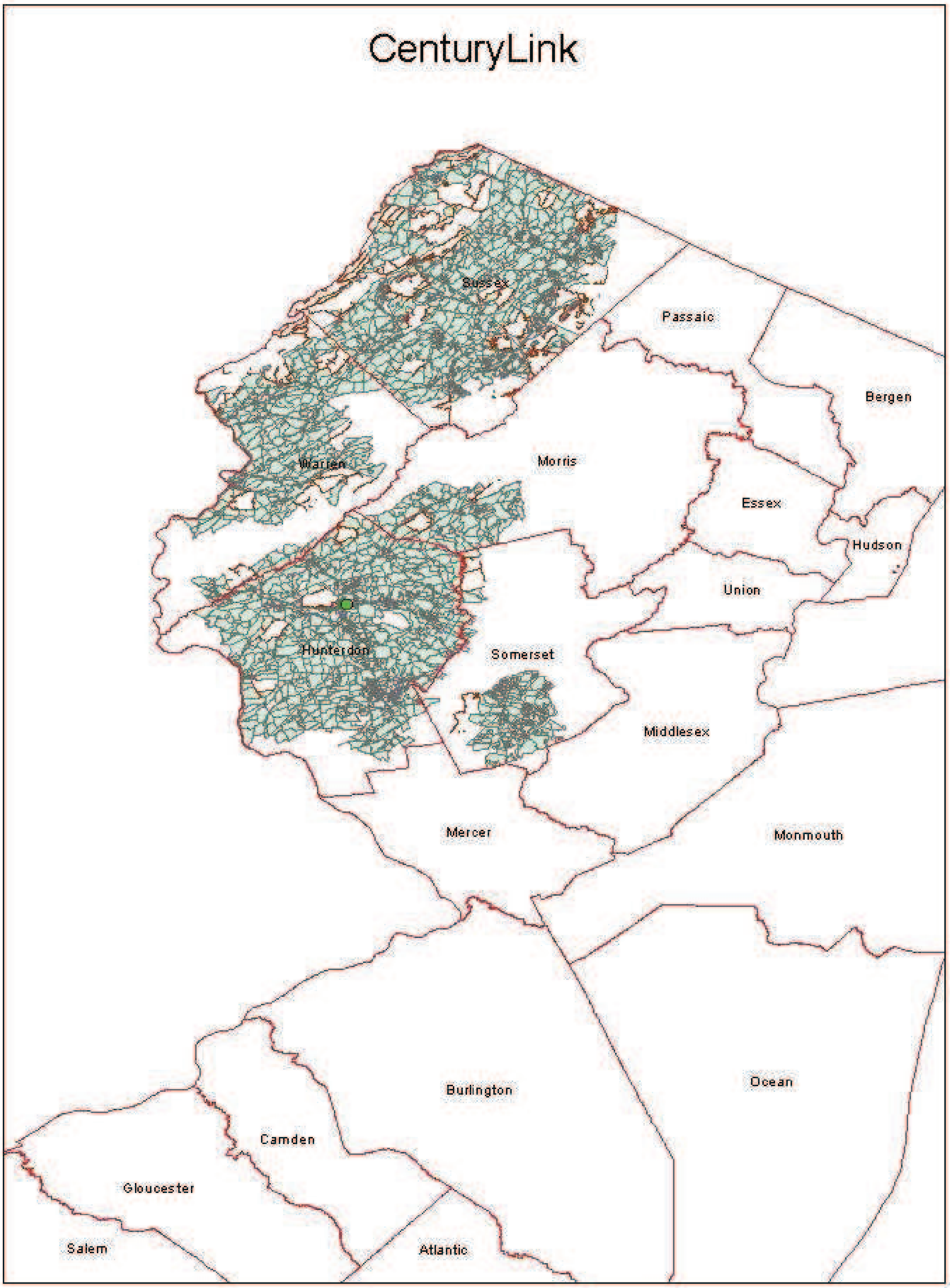
Gerry,
We opted to leave the data in place. We were able to map it, and it generally aligns with large census blocks. We removed the duplicate entries and will pass the rest as part of the submission.

Thanks for your help!

John

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Cogent Communications
Received: August 2010
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

44. NDA Status
45. Submission Overview
46. Submission File Details
47. Data Validations and Results
48. Data Transformation and Loading
49. Clarification Questions and Provider Responses
50. Notes and Open Issues

Section 1: NDA Status

No NDA was executed. All data were taken from the provider's public web site, FCC filings and/or information supplied by the provider via email

Section 2: Submission Overview

<table>
<tr><th colspan="4">MAPPING DATA - RECEIVED MARCH 1, 2011</th></tr>
<tr><td rowspan="3">ID</td><td colspan="2">Provider name</td><td>Cogent Communications, Inc.</td></tr>
<tr><td colspan="2">“Doing business as” name</td><td>Not provided</td></tr>
<tr><td colspan="2">FRN</td><td>0019898303</td></tr>
<tr><th colspan="4">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Txt, xls, pdf, etc.</td><td>Email and pointers to Web site and SEC filings</td></tr>
<tr><td>File size</td><td colspan="2">Number of records, data elements</td><td>List of 20 addresses where they offer service</td></tr>
<tr><td rowspan="6">Speeds</td><td>Type</td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)</td><td rowspan="6">Provided building addresses. Adver down and up are 10/11, very fast.</td></tr>
<tr><td>Adver down</td><td>Address</td></tr>
<tr><td>Adver up</td><td>Address</td></tr>
<tr><td>Typical down</td><td>Not provided</td></tr>
<tr><td>Typica up</td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted</td><td>Not provided</td></tr>
</table>

Technology Type	DOCSIS, xDSL, fiber, etc.	Fiber
End-user specification	Business, consumer, gov't etc	
Comments: They offer service directly to businesses at the addresses they provided. They are a reseller of broadband access to businesses at other locations. They had previously refused to provide data on Typical and Subscriber Weighted speeds. Inquired whether there was any change in their position on this via email.		
INTERCONNECTION DATA		
ID	Provider name "Doing business as" name FRN	
File size	Number of records, data elements	
Ownership	Leased/owned	
Transport Type	Fiber, wireless, copper	
Data Rates/Capacity		
Location	Street address, lat/lon, elevation	
Comments: We had previously extracted data for Middle Mile sites, based on the assumption that Cogent's Data Centers were interconnection points. We were instructed by the provider that these sites did not meet the definition of Middle Mile sites and thus should be removed.		
DATA COMPLETENESS		
Data Validation/ Verification		

Section 3: Submission File Details

Received one file by email on 13 Aug 2010: NJ State locations 100813 B.docx. Updated the address information via a query of "Service Locations" from provider's Web site (http://www.cogentco.com/?lang=en&option=com_content&view=article&id=40&action=search). Searched using: North America, United States, New Jersey.

Section 4: Validations and Results

Noted that 3 addresses have no street address, and one address did not have a valid zip code. Used Internet search to determine zip code for that location and verified with Cogent.

Confirmed provider reported data rates with their published information and SEC filings.

The only other validation to be done is whether each address can be successfully geocoded. See next section. One address is not

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

We copied the information to a spreadsheet. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "Cogent Communications, Inc."
DBANAME	Same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to "0019898303"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to "50"
MAXADDOWN	Populated from column "Maximum Advertised Speed Down"
MAXADUP	Populated from column "Maximum Advertised Speed Up
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

17. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each..
18. Created an excel sheet and imported it to a geodatabase table.
19. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
20. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
21. Discarded 8 rows with duplicate census blocks.

The mechanized procedure for the geocoding step is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 01, 2011 4:45 PM
To: 'Zulager, Ried'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011
Sensitivity: Private

Ried,
The attached spreadsheet integrates the data you submitted to us last year with and the data we could obtain from your Web site and SEC filings. We will use this data as the basis for the submission to the NTIA. If you have any comments or corrections on the data, please let me know.
We did notice that the "Service Location" form on your Web site did not return a valid zip code for the 5851 Westside Ave in North Bergen. We assigned an zip code of 07047 based on a Google search.
Of the data requested by NTIA, we were not able to obtain data on Typical speeds and the Subscriber Weighted Nominal Speed. You indicated last time that you were not prepared to offer this information. If your position on this matter has changed, we would be happy to receive the data.

Thanks for your cooperation

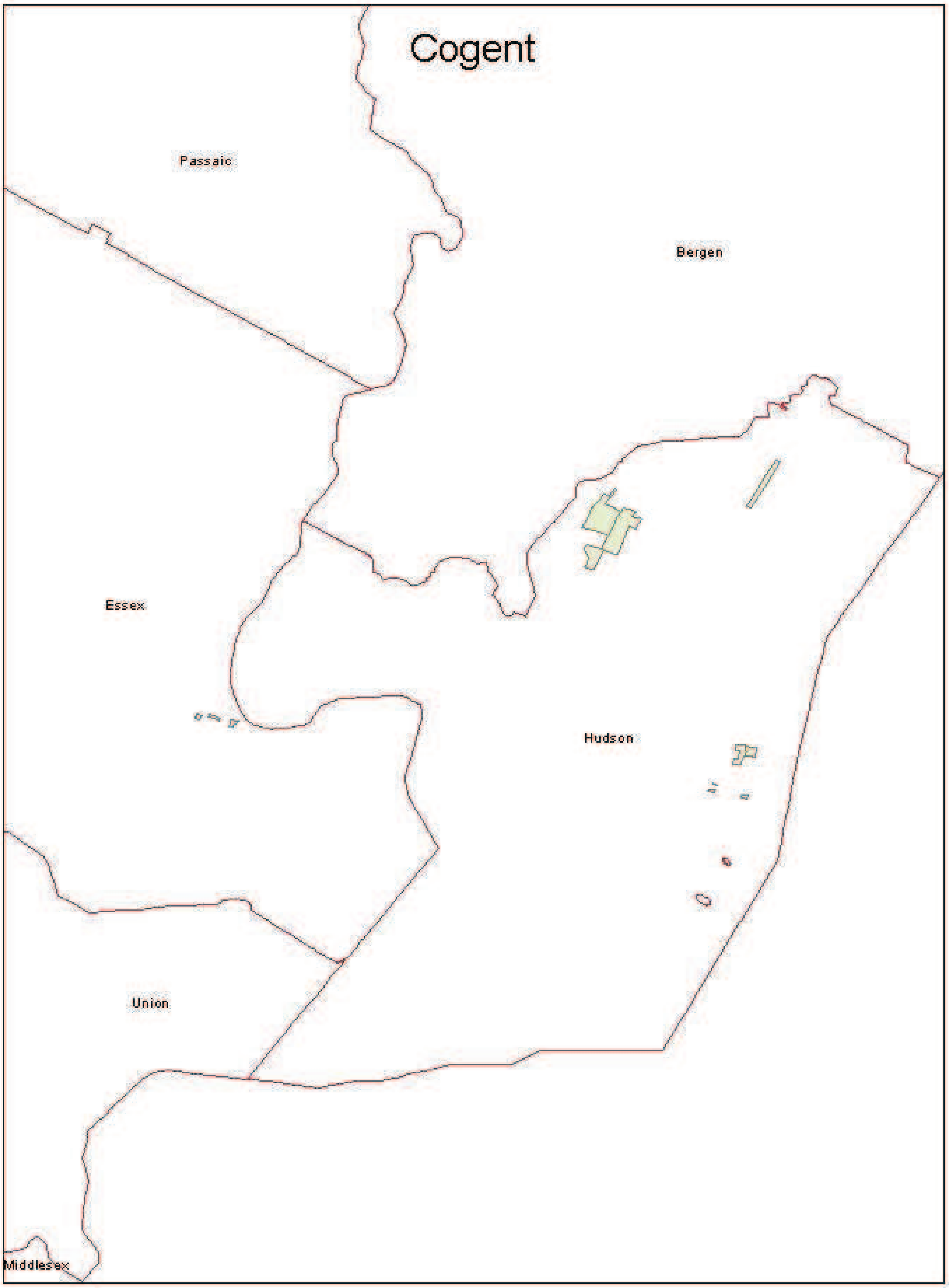
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Zulager, Ried [mailto:RZulager@Cogentco.com]
Sent: Tuesday, March 01, 2011 6:03 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011
Sensitivity: Private

"We did notice that the "Service Location" form on your Web site did not return a valid zip code for the 5851 Westside Ave in North Bergen. We assigned an zip code of 07047 based on a Google search."
Seems reasonable; since zip codes are fairly irrelevant to Cogent's business the zip code is not something that hits out A list of priorities in any database – nor is geocode.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data


Cogent
Passaic
Bergen
Essex
Hudson
Union
Middlesex

Broadband Provider Data Report

Provider: Comcast
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

51. NDA Status
52. Submission Overview
53. Submission File Details
54. Data Validations and Results
55. Data Transformation and Loading
56. Clarification Questions and Provider Responses
57. Notes and Open Issues

Section 1: NDA Status

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	COMCAST CABLE COMMUNICATIONS LLC COMCAST 0004-4416-63
FOR WIRELINE		
Filetypes	Excel files w. Census Block Year 2009 data. Street segment level and CB level availability tables for CB's less than and greater than 2 sq. mi.	
File size	see files	
Speeds		

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		yes (CBSA/RSA level)
Advertised-downstream		yes (CBSA/RSA level)
Subscriber-weighted-up		no

	Subscriber-weighted-down		no.	
Technology Type	40 (Cable Modem DOCSIS3.0)			
End-user specification	Comcast provides availability at the Census Block and Street Segment level.			
Comments: In a difference from October, the max DL speeds reported in the 7 RSA's have mostly increased up to the '10' level. In last submission, a xls file "34-cbsa_rsa-NJ.xlsx" providing avg down speeds was provided. Not this time.				
INTERCONNECTION DATA: PROVIDED AFTER REQUEST				
ID				
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments:				

Section 3: Submission File Details

Received four (4) files by SECURE UPLOAD.

Size	**Name**
121KB	34-streets-NJ.xlsx
2968KB	34-blocks-NJ.xlsx
9KB	New Jersey Maximum Advertised Speeds 12 31 10.xlsx
12KB	Broadband Mapping Data Information.doc

Section 4: Validations and Results

File 34-streets-NJ.xlsx contains 1,309 records. No shape is provided, and no reference ID such as Tiger Line ID is provided either. We cannot validate these segments against reference data, nor can we generate shapes for these segments.

File 34-blocks-NJ.xlsx contains 68,604 records. No shape is provided, but a Census Block ID is provided. Every ID is 15 digits long, suggesting this is Year 2000 Census Bureau geometry. We checked for duplicates and none were found. All blocks passed validation against Year 2000 reference data.

File "..Max Ad.." contains 7 records specifying the max advertised speed by CBSA/RSA. The max down speeds are 9 or 10; the max up speeds are all 7.

File "Broadband .." is a cover letter that provides no data suitable for loading.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded from supplied text file “NJ - Wireline Service By Census Block.txt”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider_Name”
DBANAME	As supplied in column “DBA_NAme”
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census_Block_FIPS_Code (first 3 digits)
TRACT	Populated from Census_Block_FIPS_Code (next 6 digits)
BLOCKID	Populated from Census_Block_FIPS_Code (next 4 digits; dropped 5th character if present)
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column Census_Block_FIPS_Code
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	Set to “10” (see below)
MAXADUP	Set to “7” (see below)
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
SHAPE	Copied from Census Bureau TigerLine 2000, As matched by Census block 2000 ID

Internal processing notes:

20. Census Blocks: Comcast supplied Census 2000 block IDs (all are 15 characters). We referenced the Census Bureau TigerLine database for Year 2000 to extract and submit geographic features (i.e., shapes) for each census block based on the Census_Block_FIPS_Code.
21. Speeds: Data for maximum advertised down and up speeds were taken from file “New Jersey Maximum Advertised Speeds.xlsx”, where the same values are supplied for every MSA that Comcast serves.

NTIA Table BB_Service_RoadSegment

Loaded as discussed below. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Comcast Cable Communications, LLC”
DBANAME	Set to “Comcast”
PROVIDER_TYPE	Set to 1
FRN	Set to “0004441663”
ADDMIN	Set to the least of the non-empty address numbers for the line segment
ADDMAX	Set to the greatest of the non-empty address numbers for the line segment
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to value of zipl column for the line segment
ZIP4	(no value supplied)
TRANSTECH	As supplied
MAXADDOWN	Set to 10
MAXADUP	Set to 7
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, As matched by County + Tiger Line ID

As mentioned above, the Comcast submission of street segments could not be matched with the Census Bureau TigerLine database. Instead we gathered a list of segments in large census blocks via two methods. We loaded a total of 6,868 segments.

First, for municipalities served in their entirety by Comcast, the following approach was used.

1. Adjusted the Municipality names provided by Comcast with the following rules to enable matching with official New Jersey Municipality reference data
    a. Changed to upper case
    b. Performed the following string replacements on the Municipality field
        i. TOWNSHIP -> TWP
        ii. BOROUGH -> BORO (only when preceded by a space)
        iii. MT. -> MOUNT
        iv. PT. -> POINT
        v. ORANGE CITY -> CITY OF ORANGE TWP (ORANGE at start of line)
    c. Removed any additional information in parentheses (I.e., appended county name)
2. Performed join between two data sources, using Municipality and County as keys

3. Dropped four military bases that did not match any municipality
4. Generated a file with Municipality, Type, County and Municipal Code
5. Joined this information with the large census blocks for each municipality, and then joined that result with the street segments for each large census block.
6. Loaded the resulting set of street segments and shapes after removing duplicates.

Second, we had to use a different approach for certain municipalities. Comcast indicated that for the following three municipalities, the approach of listing all street segments in a municipality would not be valid:

- Mount Olive Twp., Morris County
- Toms River (Dover Twp.), Ocean County
- Berkeley Twp., Ocean County

For these counties, we matched the segments provided by Comcast to the TigerLine segments. Of the 23 segments in these municipalities, we were able to locate 20 street segments.

Section 6: Clarification Questions and Responses

1. no typical values supplied (up or down) in any format (CB, etc.). This was an issue last submission as well when avg. downstream was provided for RSA/CBSA level only.
2. no subscriber weighted values supplied.
3. street segment data does not provide geographic features (e.g., shape) nor keys to a reference DB.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 5:33 PM
To: 'Michael_Ruger@comcast.com'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: Comcast NJ BB Data Clarifications

Michael,
We have been reviewing the data your submitted to the NJ Broadband Mapping Program and have a few clarification questions.

1. During the last round, we had difficulties in mapping the street-level data you provided for the large census blocks. The data is generally the same, so we anticipate similar issues. The approach we took during the last submission was to assume Comcast offered full coverage for a set of municipalities (the list you provided is attached.) You also named three municipalities where that approach would not be advisable (Mount Olive Twp, Toms River, Berkeley Twp.). Can we use that same approach during this submission? Can you provide an updated list of municipalities or confirm that the attached list still applies?
2. During the last submission round, you provided a file with average download speeds. That information was not included this round. Can you provide information that represents the typical speeds experienced by the customers of your highest speed service?

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Ruger, Michael [mailto:Michael_Ruger@comcast.com]
Sent: Tuesday, March 22, 2011 10:03 AM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Comcast NJ BB Data Clarifications

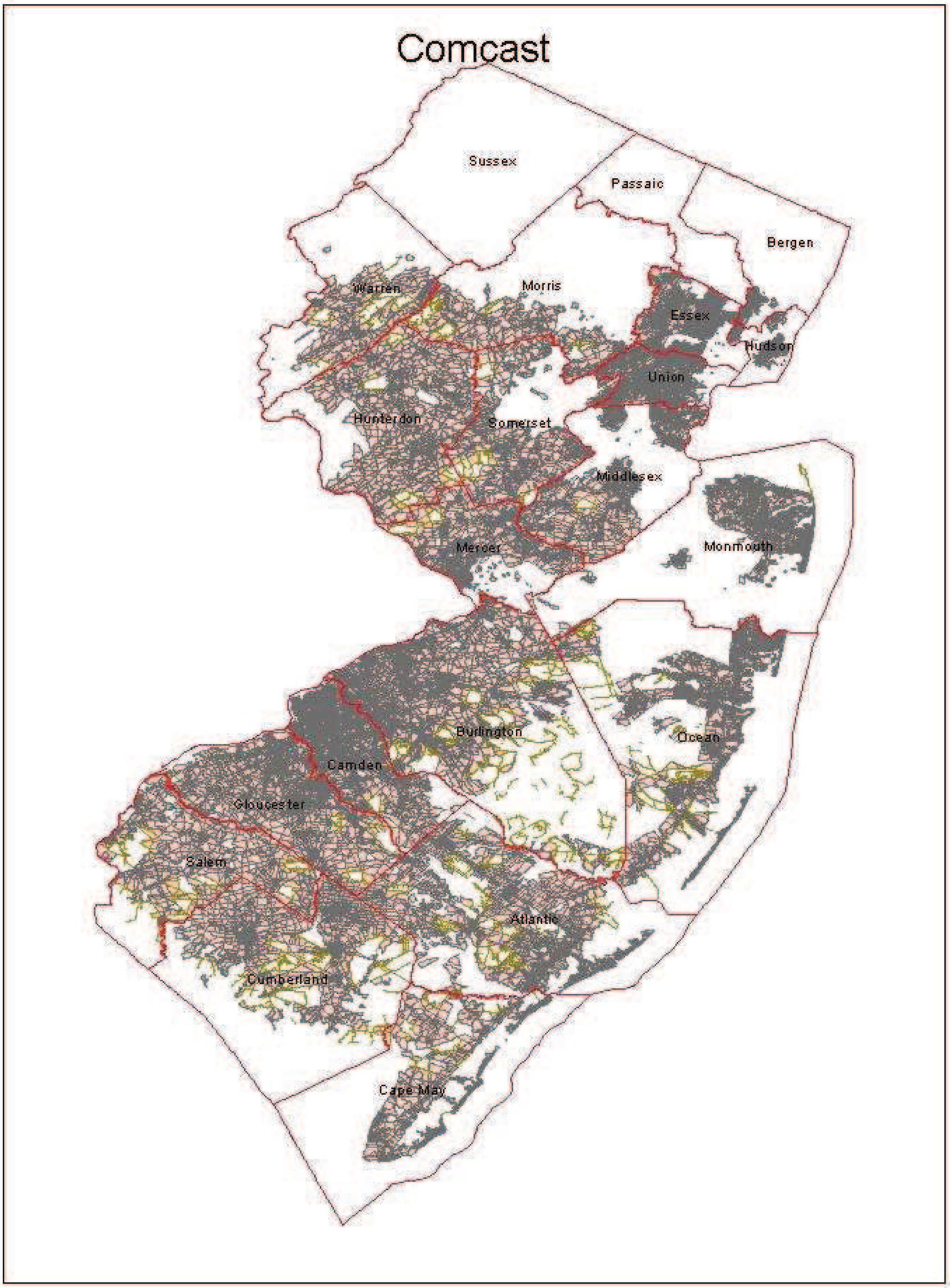
John—

I verified that the list still applies, with the same assumptions as last year.

Thanks—
Michael

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Dieca DBA Covad
Received: Feb, 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

58. NDA Status
59. Submission Overview
60. Submission File Details
61. Data Validations and Results
62. Data Transformation and Loading
63. Clarification Questions and Provider Responses
64. Notes and Open Issues

Section 1: NDA Status

No information provided.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	DIECA Communications, Inc. Covad Communications Company 0003753753
FOR WIRELINE		
Filetypes		
File size		
Speeds	(see table below)	Speeds are provided at address (line segment) and census block granularity.

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Address & block
Typical-downstream		Address & block
Advertised-upstream		Address & block
Advertised-downstream		Address & block
Subscriber-weighted-up		county level

	Subscriber-weighted-down		county level	
Technology Type	10 (ADS), 20 (SDSL), 30 (other copper)			
End-user specification	Not provided			
Comments:				
INTERCONNECTION DATA				
ID	File **MiddleMileConnection*.txt			
File size	1kb			
Ownership	1			
Transport Type				
Data Rates/Capacity	4, 5			
Location	5 locations			
Comments:Five (5) data rows provided				

Section 3: Submission File Details

Received a zip file by SECURE UPLOAD (name disambiguated from previous submissions).

Size (kb)	**Name**
610	DIECACommunicationsInc._NJ_CONFIDENTIAL3.zip

The archive contains the following five (5) files:

Size	**Name**
109	NJBB_0003753753_AddressSegmentAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
17924	NJBB_0003753753_CensusBlockAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
3	NJBB_0003753753_CMAAdvertisedAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
1	NJBB_0003753753_MiddleMileConnection_DIECACommunicationsInc._CONFIDENTIAL.txt
3	NJBB_0003753753_SubscriberWeightedNominalSpeed_DIECACommunicationsInc._CONFIDENTIAL.txt

Section 4: Validations and Results

File "..AddressSegmentAvailability.." (945 rows)
Technologies: 30,20,10 (xDSL and other copper)

Fields:

Provider Name
DBA Name
FRN
Census Block ID
Street NameStreet Segment ID (TLID)
Technology of Transmission
Maximum Advertised Downstream Speed
Maximum Advertised Upstream Speed
Typical Downstream Speed
Typical Upstream Speed

All TLID were validated against year 2000 Census Bureau reference data successfully, and all are in large census blocks.

File “..CensusBlockAvailability..” (193,193 rows)
Fields:
Provider Name
DBA Name
FRN
Census Block ID
Technology of Transmission
Maximum Advertised Downstream Speed
Maximum Advertised Upstream Speed
Typical Downstream Speed
Typical Upstream Speed

The input contains Year 2000 census block data, judging from the consistent length of 15 digit block IDs. Due to use of multiple technologies there are more rows here than the number of NJ census blocks (141,342). No duplicates were received, all submitted IDs are valid according to Year 2000 reference data, and all are less than 2 square miles.

File “..CMAAdvertisedAvailability..”
Provides three technology codes (10, 20, 30), MSA codes, and max advertised up and down speed codes. The max speed for a given technology is different for different MSAs. We are unlikely to use this data since max speed codes are provided on a row-by-row basis.

File “..MiddleMileConnection..”

5 rows, which is a significant change from the last submission, when only 2 rows were provided. Viewing the data in ArcMap indicates that all points are in New Jersey.

File “..SubscriberWeightedNominalSpeed..”

All CMA IDs are valid, technology of transmission codes are valid, and speed codes are plausible. We do not submit overview data in this round so will not use this input file.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file “..MiddleMileConnection..”. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column Provider Name
DBANAME	As supplied in column DBA Name
FRN	As supplied in column FRN
OWNERSHIP	As supplied in column Ownership
BHCAPACITY	As supplied in column Serving Facility Capacity
BHTYPE	As supplied in column Service Facility Type
LATITUDE	As supplied in column Latitude
LONGITUDE	As supplied in column Longitude
ELEVFEET	As supplied in column Elevation
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

22. Created an excel sheet and imported to a geodatabase table.
23. Added point corresponding to the Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option. Specify WGS84 for the coordinate system of the points (this is a guess).
24. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file “..CensusBlockAvailability..”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation

PROVNAME	As supplied in column Provider_Name
DBANAME	As supplied in column DBA_Name
PROVIDER_TYPE	Set to 1
FRN	As supplied in column FRN
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census_Block_ID (first 3 digits)
TRACT	Populated from Census_Block_ID (next 6 digits)
BLOCKID	Populated from Census_Block_ID
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column Census_Block_ID
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	As supplied in column Maximum_Advertised_Downstream_Speed
MAXADUP	As supplied in column Maximum_Advertised_Upstream_Speed
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	As found in Census Bureau TigerLine year 2000 reference data

Internal processing notes:

3. We used Census Bureau reference data for Year 2000 to locate and submit geographic features (i.e., shapes) for each census block.

NTIA Table BB_Service_RoadSegment

Loaded from supplied File “..AddressSegmentAvailability..". The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	As supplied in column Provider_Name
DBANAME	As supplied in column DBA_Name
PROVIDER_TYPE	Set to 1
FRN	As supplied in column FRN
ADDMIN	Set to the least of the non-empty address numbers from TigerLine
ADDMAX	Set to the greatest of the non-empty address numbers from TigerLine
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to zipl from TigerLine
ZIP4	Set to null (no value supplied)
TRANSTECH	As supplied

MAXADDOWN	As supplied in column Maximum_Advertised_Downstream_Speed
MAXADUP	As supplied in column Maximum_Advertised_Upstream_Speed
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Road segment shape copied from Year 2000 Census Bureau TigerLine reference data, as matched by TLID

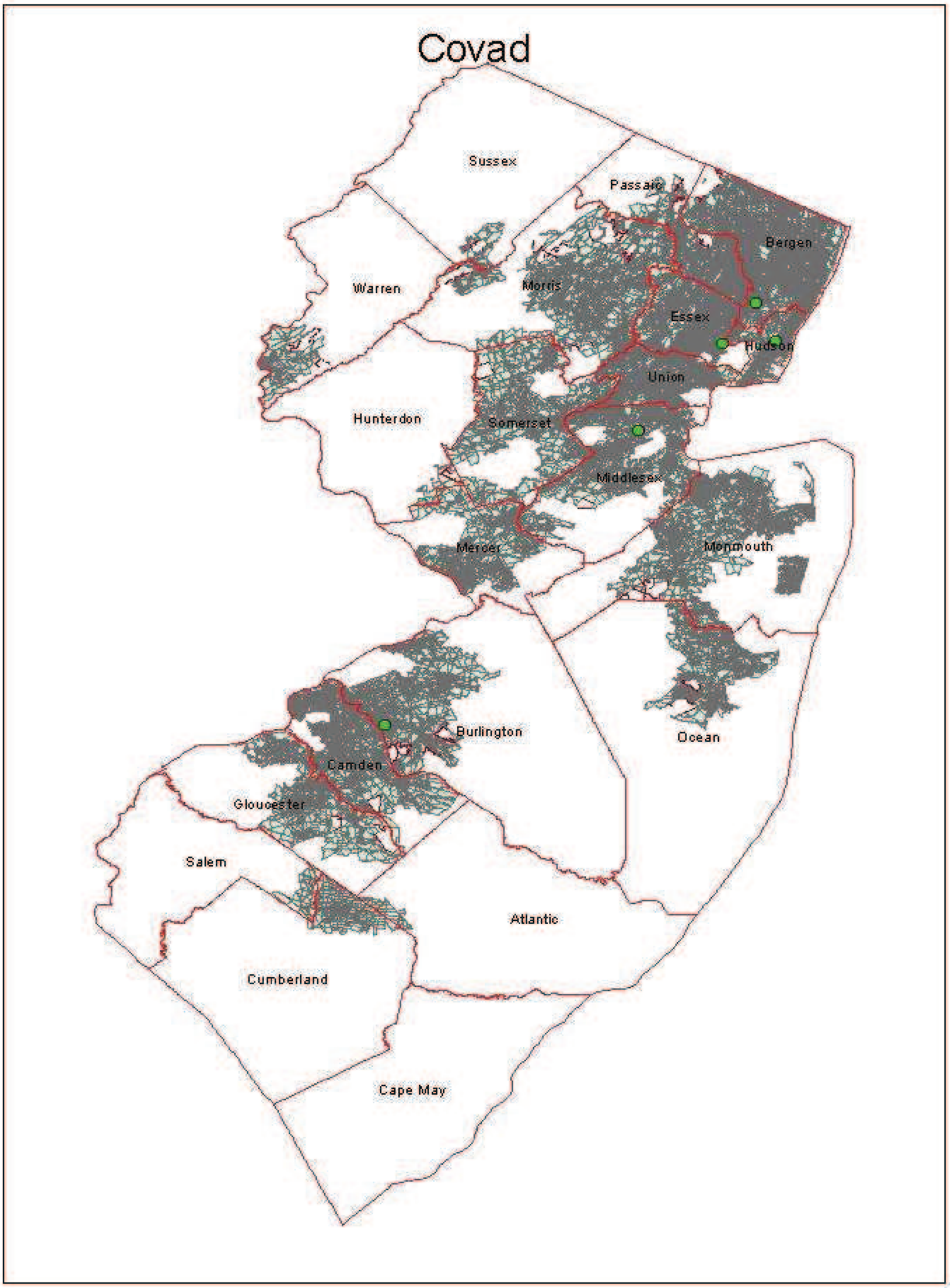
Internal processing notes:

1. Discarded 6 duplicate rows from the input based on compound key of county, TLID, and tech_transmission fields. These occur because the segment touches different census blocks, but we cannot submit duplicate shapes.
2. After join against Census Bureau reference data, 25 rows were discarded based on compound key of county, TLID, and tech_transmission fields. This is again due to segments touching multiple census blocks.
3. Total rows loaded is 938

Section 6: Clarification Questions and Responses

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: GOES Telecom
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

65. NDA Status
66. Submission Overview
67. Submission File Details
68. Data Validations and Results
69. Data Transformation and Loading
70. Clarification Questions and Provider Responses
71. Notes and Open Issues

Section 1: NDA Status

None

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td rowspan="5">ID</td><td>Provider name</td><td>GOES Telecom</td></tr>
<tr><td>“Doing business as” name</td><td>Not provided</td></tr>
<tr><td>FRN</td><td>0011437746</td></tr>
<tr><td>Holding company name</td><td>GOES</td></tr>
<tr><td>Holding company number</td><td>130548</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">1 Excel</td></tr>
<tr><td>File size</td><td colspan="2">worksheet 18432 bytes, approx 38 rows</td></tr>
<tr><td>Speeds</td><td><table><tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr><tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr><tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr><tr><td>Advertised-upstream</td><td></td><td>Not provided</td></tr><tr><td>Advertised-</td><td></td><td>Not provided</td></tr></table></td><td>Submitted 34 addresses with upload and download speeds (generally in kbps) for each address. These are delivered speeds to customers. We located advertised speeds on their Web site, and provider confirmed that those speeds were available at each location they served. We will use the data from Web site as</td></tr>
</table>

	downstream			advertised speeds. Note that for three addresses, submitted speeds as “10mpbh”. Need to ask them what that means. We asked these questions last time, but did not receive a response in time to submit. This time we received corrected data. Note also that some speeds are listed as having faster upload speeds than download speeds. Need to verify. We asked these questions last time, but did not receive a response in time to submit. This time we received corrected data. No typical or subscriber weighted speeds were provided.
	Subscriber-weighted-up		Not provided	
	Subscriber-weighted-down		Not provided	
Technology Type	10 (ADSL) and 70 (Terrestrial fixed wireless)			
End-user specification	None			
Comments: Provided a list of 34 customers and the speeds they are subscribed to. Most are 128K up, 512K down.				
INTERCONNECTION DATA				
ID	None provided			
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments:				

Section 3: Submission File Details

Received 1 file by email, subsequently updated:

Size	**Name**
17920	20110302 Telcordia.xls
17920	20110302 Telcordia_update.xls

The file contains a list of addresses and max speeds; e.g., the “up-to” limit of their rate plan. The addresses in this file appear to be for individual customers (as opposed to addresses of multi-tenant buildings in a central business district).

Section 4: Validations and Results

The addresses can be geocoded.

For many ADSL subscribers, a download/upload rating of 512K/128K looks reasonable, but this is not a "broadband" service according to the NOFA definition. We will discard records for slow services.

Some ADSL subscribers have upload speeds that exceed download. The last two entries have unknown speed ratings: 10mpbh up and 10mpbh down. The updated submission corrected these problems.

What spectrum is used by the fixed wireless service?

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we will discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file “20110302 Telcordia_update.xls” (37 data rows, only 9 broadband-speed rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Global Online Electronic Services, Inc.”
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to “0011437746”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology Code
MAXADDOWN	Set to code 4 per email response to questions
MAXADUP	Set to code 3 per email response to questions
TYPICDOWN	Set to null, not provided

TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

22. Geocoded the addresses using the Google geocoder to obtain latitude, longitude value pairs.
23. Created point shapes using ESRI from lat, long value pairs.
24. Spatially joined the points with Census Bureau TigerLine Year 2000 reference data to find the containing census block. This yielded census block attributes including the ID (aka FIPS code).
25. Dropped duplicate census blocks (caused by two customers in the same census block).
26. Loaded the resulting data into an SDE feature class. Of 37 original records, 33 were successfully geocoded, 9 have broadband speeds (rest are 128Kbps), and 1 is a duplicate, leaving just 8.

The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

NTIA Table BB_Service_Wireless

Loaded using shapes from reference data for the 2 unique records. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “Global Online Electronic Services, Inc.”
DBANAME	Not supplied; set same as PROVNAME
FRN	Set to "0011437746"
TRANSTECH	Set to 70 as supplied in XLS sheet
SPECTRUM	Set to 6
MAXADDOWN	Set to 7
MAXADUP	Set to 7
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to “NJ”
SHAPE	Year 2000 Census Block shape obtained from reference data.

Internal processing notes:

5. See above for discussion of geocoding addresses and finding the containing census block.
6. Spectrum: Set to 6, Unlicensed
7. Speeds: The fixed-wireless link is reported with 10Mbps in each direction (symmetric). That corresponds to NOFA speed code 7.

Section 6: Clarification Questions and Responses

Sent the following email based on our analysis:

From: Wullert, John R II
Sent: Wednesday, March 02, 2011 10:57 AM
To: 'George Beckenthal'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: FW: NJ BB Data Collection - Spring 2011

George
We have been reviewing the data you submitted to the New Jersey Broadband mapping program. Based on our initial review, we have some questions for you that will help us better understand the data and process it accurately.

1. Are some ADSL services configured to deliver faster UPSTREAM than downstream bit rate, or are the numbers accidentally reversed? For example, some entries show 1024K up and 384K down and others show 1536K up and 512K or 768K down, which looks unusual.
2. What does "10 mpbh" mean for the last three entries in your table? Should those really be 10 mbps?
3. The data you reported seems to be specific to customers. Do you advertise or offer higher speeds to those customers over the existing facilities? (Specifically, could these customers upgrade easily to a higher speed if needed?). If so, what upload and download speeds are possible for these customers? (If you have this information, we can use it as “maximum advertised” speeds and use the data you provided as “typical speeds”)

We would appreciate your prompt attention to these questions. If you need further clarification, please feel free to contact me.

Thank you for your participation!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: George Beckenthal [mailto:gbeckenthal@goes.com]
Sent: Wednesday, March 02, 2011 4:01 PM
To: Wullert, John R II
Subject: Re: FW: NJ BB Data Collection - Spring 2011

John,
The attached file has been has the corrected upload and download speeds..
In answer to you 3rd questions, the customers pay for different speed plans.
George

From: Wullert, John R II
Sent: Wednesday, March 02, 2011 4:32 PM
To: 'George Beckenthal'
Subject: RE: FW: NJ BB Data Collection - Spring 2011

George,

I see the following speed plans on your Web site. Are these available at any of the locations you serve?

- Direct* $39.95/month 512K Downstream/128K Upstream plus 5 Email Boxes
- Express* $49.95/month 768K Downstream/512K Upstream plus 5 Email Boxes
- Power* $59.95/month 1024K Downstream/384K Upstream plus 5 Email Boxes
- Select* $79.95/month 1536K Downstream/512K Upstream plus 5 Email Boxes
- Performance* $99.95/month 1536K Downstream/768K Upstream plus 5 Email Boxes

John

From: gbeckenthal@goes.com [mailto:gbeckenthal@goes.com]
Sent: Friday, March 04, 2011 2:42 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: FW: NJ BB Data Collection - Spring 2011

Hi John,
I meant to answer yes to you.
Thanks,
George

> George,
>
> I received this note from you yesterday, but it did not contain any new
> message from you.
>
>
>
> John

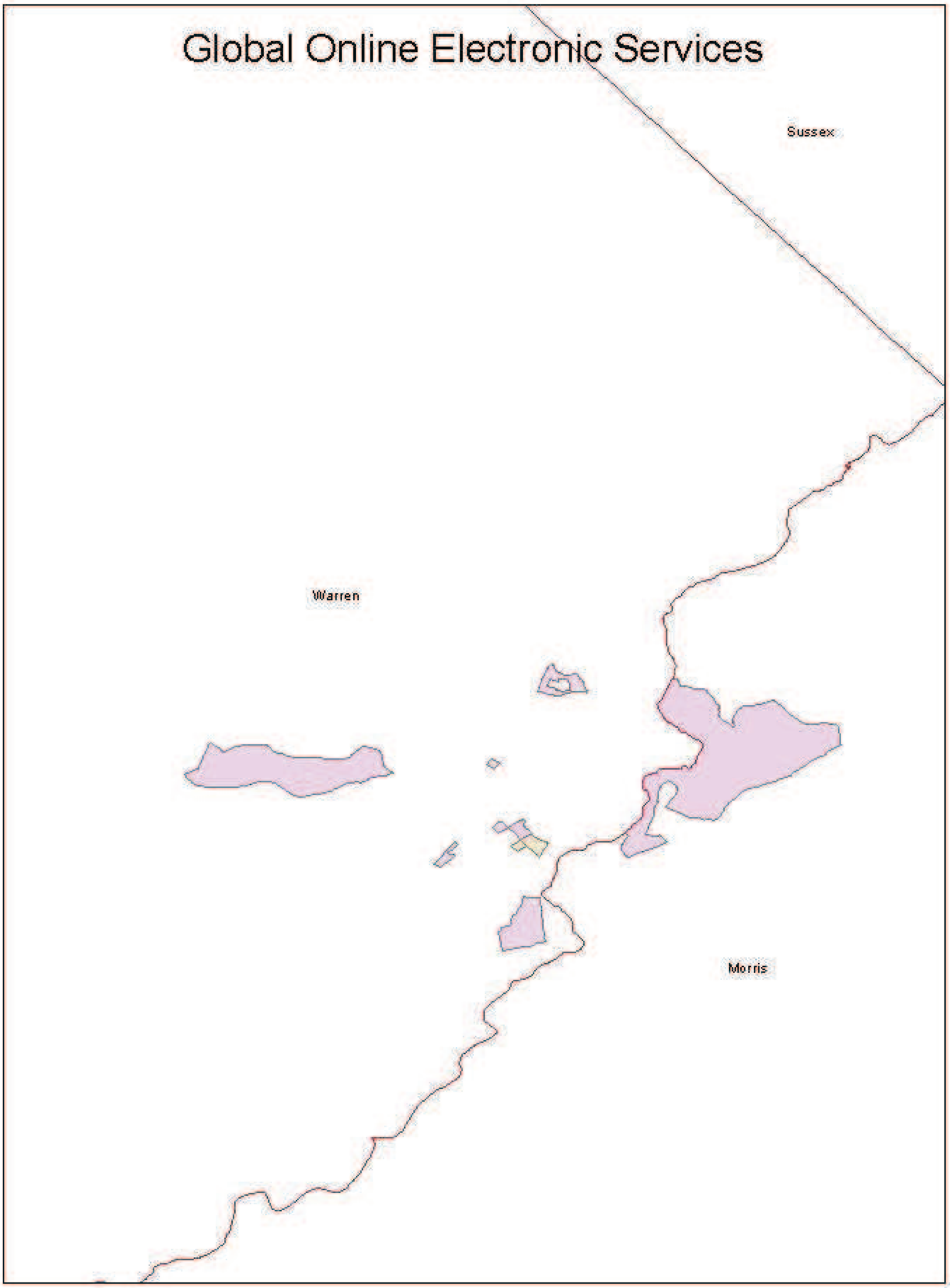
From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 2:52 PM
To: 'gbeckenthal@goes.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: FW: NJ BB Data Collection - Spring 2011

George,
Great. Then we will use the values below as your advertised speeds. Given that these are DSL and dedicated lines, we can also use the values below as your typical speeds. We will map these based on the addresses you provided. We may even be able to use the data your provided to get Subscriber Weighted Average speed.

John

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Hometown Online
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

72. NDA Status
73. Submission Overview
74. Submission File Details
75. Data Validations and Results
76. Data Transformation and Loading
77. Clarification Questions and Provider Responses
78. Notes and Open Issues

Section 1: NDA Status

No NDA in place.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Hometown Online Inc.
Warwick Online
0006-6512-44</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Text</td></tr>
<tr><td>File size</td><td colspan="2">1,761,280 bytes; 6,778 rows</td></tr>
<tr><td>Speeds</td><td>
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
</table>
</td><td>Provided list of customer locations with column “DSL speed avail”. This is probably downstream speed, but need to verify with provider.

Communications with provider and validation via their Web site resulted in clarification: Max advertised speeds are:
Downstream: 15 Mbps
Upstream: 800 Mbps.
‘
Rows where the speed and</td></tr>
</table>

	Subscriber-weighted-down	Not provided	DSL Qual columns are blank indicate no-service. These should be dropped. Provider has column that indicates geo-spatial capabilities, but only one address in list appears to be geo-located on their map
Technology Type	DSL – not clear in each case whether it is Asymmetric or Symmetric		
End-user specification	Not provided		
Comments: Address data with some indications of qualification for different data services.			
INTERCONNECTION DATA			
ID			
File size			
Ownership			
Transport Type			
Data Rates/Capacity			
Location			
Comments:No connection-point data provided			

Section 3: Submission File Details

Received one (1) file by EMAIL:

Size	**Name**
1,761,280	M4 STRUCTURES - NJ 3-10-11.xls

The file contains 6778 rows of data. Each row has a street address. Of the 6778 rows, 121 have no speed data. The rest have an indication of maximum possible DSL speed. Some indicate 5Mbps, some indicate 15Mpbs and some indicate 25Mbps. Also has information about TV qualification which we do not require.

Section 4: Validations and Results

All addresses were successfully geocoded using Arroyo flow Hometown_geocode_yahoo.arroyo invoking the Yahoo geocoder.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, and then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from the supplied file after geocoding. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Hometown Online Inc.”
DBANAME	Set to “Warwick Online”
PROVIDER_TYPE	Set to 1
FRN	Set to “0006651244”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS00 Code (first 3 digits)
TRACT	Populated from Census Block FIPS00 Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS00 Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS00 Code
TRANSTECH	Set to code “10” (ADSL)
MAXADDOWN	Set to code “7” (range includes 15Mbps, per email)
MAXADUP	Set to code “3” (range includes 1Mbps, per email)
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address point

Internal processing notes:

27. Geocoded the addresses using the Yahoo geocoder; all were geocoded successfully.
28. Created an excel sheet and imported to a geodatabase table.
29. PreLoaded the xls file (geocoded entries, joined with Census Blocks and exported into SDE).
30. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
31. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
32. Discarded 6,106 rows with duplicate census blocks, leaving 433 unique census blocks.
33. Kept only blocks in the cities of Hardyston, Highland, Vernon, and West Milford (several variations like Twp and Township). Discarded blocks that were

geoloated in cities Hewitt, Hillsdale, Wantage Twp, etc.

Section 6: Clarification Questions and Responses

1. You provide DSL Speed Available on most of the rows in the submitted data. In this data, 25 Mbps is the highest value. Can we use this as the maximum advertised downstream speed? Is this value potentially available at the other locations, even if the customer selected a lower speed tier?
2. Assuming the answer to question 1 is yes, what is the maximum upstream speed that corresponds to the downstream speed of 25Mbps? (Alternatively, what is the maximum advertised upstream speed?)
3. Of the data submitted, 121 records do not include any speed data. These records also have blanks in the DSL Qual column. Does that mean that you do NOT offer DSL services to these addresses? (If so, we will drop these records from the submission.)
4. Your data lists DSL as the technology used to deliver the broadband access. Is this ADSL or SDSL? Does that vary by location?
5. The NTIA has repeatedly asked us to request typical speed data at the census block level. Do you have this data available?

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 11:40 AM
To: 's.sommerer@wvtc.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: Hometown NJ Broadband Data Clarification

Scott,
We have reviewed the data you submitted to the NJ Broadband Mapping program and have a few clarification questions:

1. You provide DSL Speed Available on most of the rows in the submitted data. In this data, 25 Mbps is the highest value. Can we use this as the maximum advertised downstream speed? Is this value available at the other locations you provide, even if the customer has currently selected a lower speed service?
2. Assuming the answer to first part of item 1 is yes, what is the maximum upstream speed that corresponds to the downstream speed of 25Mbps? (Alternatively, what is the maximum advertised upstream speed?)
3. Of the data submitted, 121 records do not include any speed data. These records also have blanks in the DSL Qual column. Does that mean that you do NOT offer DSL services to these addresses? (If so, we will drop these records from the submission.)
4. Your data lists DSL as the technology used to deliver the broadband access. Is this ADSL or SDSL? Does that vary by location?
5. The NTIA has repeatedly asked us to request typical speed data at the census block level. Do you have this data available?

Thanks for you participation!

John Wullert

Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: s.sommerer@wvtc.com [mailto:s.sommerer@wvtc.com]
Sent: Tuesday, March 15, 2011 8:28 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Hometown NJ Broadband Data Clarification

John

See responses.

Have a great day.

Scott

-----Original Message-----
From: "NJ Broadband Data Collection" <ConnectingNJ@research.telcordia.com>
Sent: Monday, March 14, 2011 11:40am
To: s.sommerer@wvtc.com
Cc: ConnectingNJ@research.telcordia.com
Subject: Hometown NJ Broadband Data Clarification

Scott,
We have reviewed the data you submitted to the NJ Broadband Mapping program and have a few clarification questions:

1. You provide DSL Speed Available on most of the rows in the submitted data. In this data, 25 Mbps is the highest value. Can we use this as the maximum advertised downstream speed? **Ans. No. 15 mbps is max advertised** Is this value available at the other locations you provide, even if the customer has currently selected a lower speed service? **Ans. Yes in some cases.**
2. Assuming the answer to first part of item 1 is yes, what is the maximum upstream speed that corresponds to the downstream speed of 25Mbps? **Ans. 25 Mbps** (Alternatively, what is the maximum advertised upstream speed?)
3. Of the data submitted, 121 records do not include any speed data. These records also have blanks in the DSL Qual column. Does that mean that you do NOT offer DSL services to these addresses? (If so, we will drop these records from the submission.)**Ans. Blank entries mean we do offer service there and we just have not built out to establish the speed. Therefore we cannot give you a speed level for these locations.**
4. Your data lists DSL as the technology used to deliver the broadband access. Is this ADSL or SDSL? Does that vary by location?**Ans. It is mostly ADSL. Some locations do have SDSL.**
5. The NTIA has repeatedly asked us to request typical speed data at the census block level. Do you have this data available?**No.**

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 16, 2011 7:34 AM
To: 's.sommerer@wvtc.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: Hometown NJ Broadband Data Clarification

Scott,

A few additional clarifications on your answers

1. In your answers to questions 1 and 2, it sounds like:
    a. Maximum advertised downstream is 15 Mbps (toward customer)
    b. Maximum advertised upstream is 25 Mbps (from customer)

   I am assuming these two should be reversed.
2. Regarding question 4 – is there any way for us to distinguish the locations where you offer ADSL from those where you offer SDSL?

Thanks for your help.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

John

See responses.

Have a great day..

Scott

-----Original Message-----
From: "NJ Broadband Data Collection" <ConnectingNJ@research.telcordia.com>
Sent: Monday, March 14, 2011 11:40am
To: s.sommerer@wvtc.com
Cc: ConnectingNJ@research.telcordia.com
Subject: Hometown NJ Broadband Data Clarification

Scott,
We have reviewed the data you submitted to the NJ Broadband Mapping program and have a few clarification questions:

1. You provide DSL Speed Available on most of the rows in the submitted data. In this data, 25 Mbps is the highest value. Can we use this as the maximum advertised downstream speed? **Ans. No. 15 mbps is max advertised** Is this value available at the other locations you provide, even if the customer has currently selected a lower speed service? **Ans. Yes in some cases.**
2. Assuming the answer to first part of item 1 is yes, what is the maximum upstream speed that corresponds to the downstream speed of 25Mbps? **Ans. 25 Mbps** (Alternatively, what is the maximum advertised upstream speed?)
3. Of the data submitted, 121 records do not include any speed data. These records also have blanks in the DSL Qual column. Does that mean that you do NOT offer DSL services to these addresses? (If so, we will drop these records from the submission.)**Ans. Blank entries mean we do offer service there and we just have not built out to establish the speed. Therefore we cannot give you a speed level for these locations.**
4. Your data lists DSL as the technology used to deliver the broadband access. Is this ADSL or SDSL? Does that vary by location?**Ans. It is mostly ADSL. Some locations do have SDSL.**
5. The NTIA has repeatedly asked us to request typical speed data at the census block level. Do you have this data available?**No.**

From: "NJ Broadband Data Collection" <ConnectingNJ@research.telcordia.com>
Sent: Wednesday, March 16, 2011 7:33am
To: s.sommerer@wvtc.com
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: Hometown NJ Broadband Data Clarification

Scott,

A few additional cladrifications on your answers

1. In your answers to questions 1 and 2, it sounds like:
    a. Maximum advertised downstream is 15 Mbps (toward customer)
    b. Maximum advertised upstream is 25 Mbps (from customer)

   I am assuming these two should be reversed.
2. Regarding question 4 – is there any way for us to distinguish the locations where you offer ADSL from those where you offer SDSL?

Thanks for your help.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: s.sommerer@wvtc.com [mailto:s.sommerer@wvtc.com]
Sent: Wednesday, March 16, 2011 11:54 AM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Hometown NJ Broadband Data Clarification

John

Upon further review: I would like to change my response.

We do not advertise a downstream speed. We do not advertise an upstream speed.
We just advertise "its fast"

SDSL is offered in census track 3714.

Have a great day.

Scott

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 16, 2011 2:07 PM
To: 's.sommerer@wvtc.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: Hometown NJ Broadband Data Clarification

Scott,

On the wvtc.com Web site, I see multiple speed plans (2Mbps, 1Mbps and 512 kbps) as well as a reference “up to 15 Mbps in select areas”. These speeds are not specifically identified as upstream or downstream, but seem likely to be referring to downstream rates. These are the type of advertised speeds we are trying to collect and accurately reflect in the broadband map. I don't have any way to report a speed of "fast", and I don't want to have to leave your data out of our submission. I propose that we use 15 Mbps as the maximum advertised downstream speed. I'd still like to have a corresponding upstream speed. Other DSL providers with 15 Mbps downstream provide a 1 Mbps upstream rate. Is that an accurate value for your service?

John

From: s.sommerer@wvtc.com [mailto:s.sommerer@wvtc.com]
Sent: Thursday, March 17, 2011 3:43 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Hometown NJ Broadband Data Clarification

John

You've got me. It is on our website and I must have just spoken to the wrong person.

Lets go with 15 Mbps as max advertised downstream and corresponding upstream is more like 800K rather than 1 Mbps.

Have a great day.

J. Scott Sommerer

NOTE: These answers to questions from previous submission define the fields in the data file:

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, September 08, 2010 5:10 PM
To: 's.sommerer@wvtc.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: Hometown NJBB Data Clarification

Scott,
We have performed our initial review of the data you submitted and we have several clarification questions and requests for additional information.

1. Is **Hometown Online** the official company name? ***Yes***
2. Do have any other "doing business as" names? ***Warwick Online***
3. Can you please tell us which FCC Registration Number (FRN) we should use for your company? ***0006-6512-44***
4. What are the maximum advertised downstream and upstream speeds in your service area? ***downstream is 15 MG and upstream is 1MG***
5. The column headings seem to indicate satellite (DirectTV) and DSL qualifications. Is data only provided by DSL? Is this ADSL, SDSL, or other copper wireline (technology of transmission)?
6. ***Data is only provided via ADSL , VDSL & ADSL2+.***
7. What does the data mean in these columns:

1. GEOPlaced - ***This references indicates whether or not the address has a symbol on our map.***
2. DSL Qual - ***This reference indicates whether or not the address is within our DSL serving area..***
3. WVT TV Qual - ***This indicates whether or not the address is within our VDSL serving area (Wireline video)***
4. Direct TV Qual - ***This indicates whether or not the address has a line of sight for our Direct TV offering.***
5. DSL Speed avail - ***This is the MAX speed available to this particular address.***

8. The NTIA has repeatedly asked us to request "Subscriber Weighted Nominal Speed" at the county level. Can you provide this data? ***No.***

We would appreciate your prompt response to these questions.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: s.sommerer@wvtc.com [mailto:s.sommerer@wvtc.com]
Sent: Friday, September 17, 2010 11:14 AM
To: ConnectingNJ@research.telcordia.com
Cc: Christopher Welch; Joseph Krasniewicz
Subject: FW: RE: Hometown NJBB Data Clarification

John

1) regarding maximum download speed: you asked "What are the maximum **advertised downstream.... speeds..."**

My marketing manager tells me the maximum **advertised** downstream speed is15Mbps. I will stick with that answer.

2) Regarding the rows in the table listing 25 Mbps. This is the **actual** speed. But it is not what we advertise.

3) Regarding the corresponding upload speed for 2) above.. answer is 25 Mbps

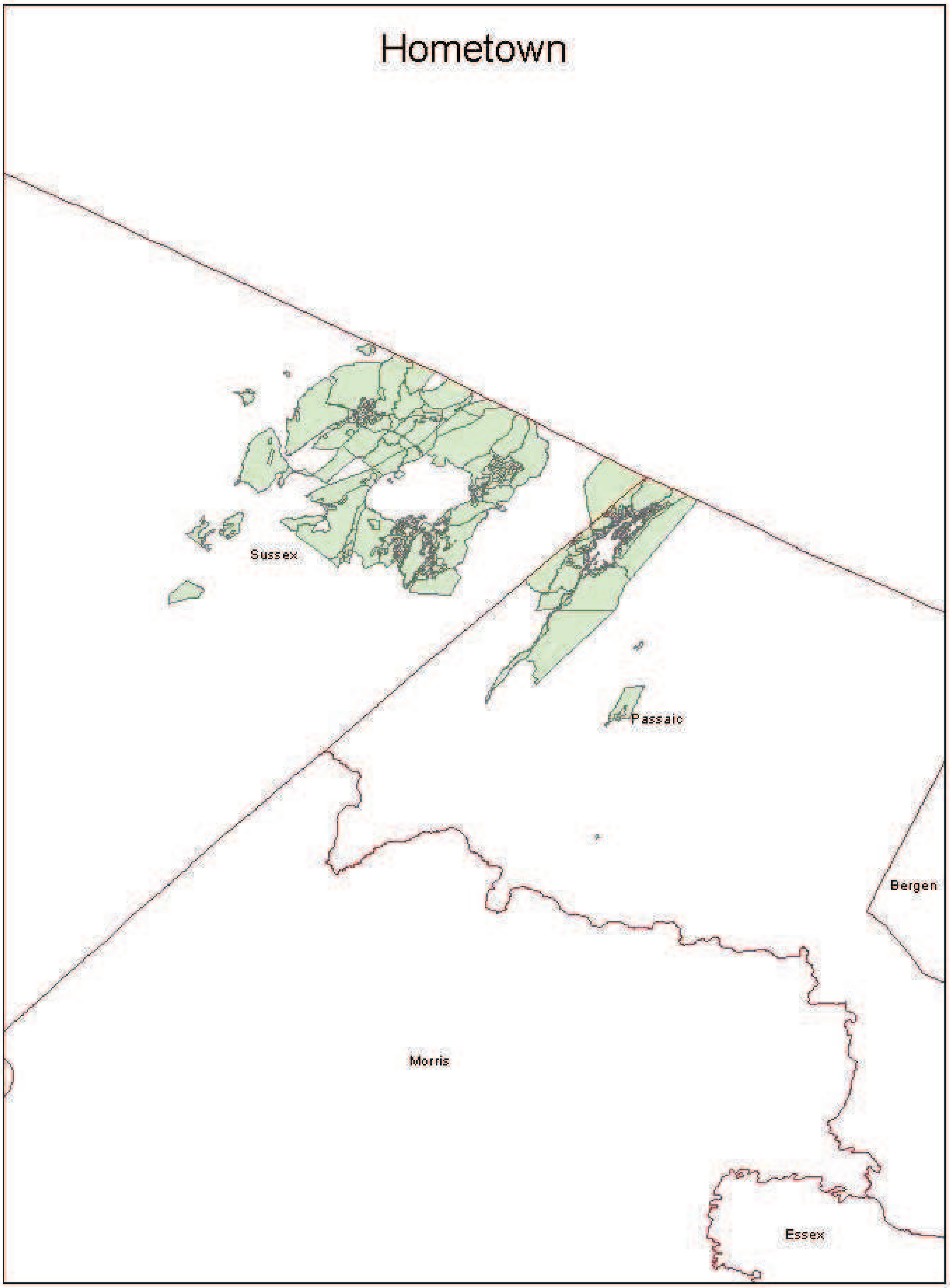
4) Rows with no DSL entry means the structure is not Geo coded on our map. This could mean that we do offer service there and we just have not built out to establish the speed. But we just **cannot give you the speed** level for these locations. So maybe you just obliterate them from the data.

John, I hope and think that these four answers will get us good to go.. And you have established earlier that you will not publicize the availability of our video services. So take it away my friend.

J. Scott Sommerer

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: HughesNet Communications Inc.
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

79. NDA Status
80. Submission Overview
81. Submission File Details
82. Data Validations and Results
83. Data Transformation and Loading
84. Clarification Questions and Provider Responses
85. Notes and Open Issues

Section 1: NDA Status

NONE

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Hughes Network Systems, LLC
HughesNet
0017434911</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2"></td></tr>
<tr><td>File size</td><td colspan="2"></td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Provided</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
</table></td><td>Submitted Excel file containing a list of counties per state that are covered by their service. This included all 21 counties in New Jersey.

Email message contained an image that listed their three consumer service plans and the associated upstream and downstream data rate.
Max plan "Power 200" is 2Mbps down, 300Kbps up. The corresponding speed range codes are 4 down, 2 up.</td></tr>
</table>

	Subscriber-weighted-down		Not provided	Spectrum is 7, satellite.
Technology Type	Code 60 (Satellite)			
End-user specification	Voice message indicated that the referenced plans are consumer-focused.			
Comments:				
INTERCONNECTION DATA: NONE				
ID				
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments: Not provided				

Section 3: Submission File Details

Received an extraordinarily short email explaining their service offering, with a JPG image of the northeastern United States showing where they have subscribers.

Section 4: Validations and Results

No rows of data need to be validated.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded county shapes from reference data for the State of New Jersey based on emailed statements that all counties are covered. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "Hughes Network Systems, LLC"
DBANAME	Set to "HughesNet"

FRN	Set to 0017434911
TRANSTECH	Set to 60
SPECTRUM	Set to 7 per translation shown below
MAXADDOWN	Set to 4, see below.
MAXADUP	Set to 2", see below.
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to "NJ"
SHAPE	County shape read from reference data.

Internal notes on processing:

8. Spectrum: No statement was provided. The NTIA data model has a single column for spectrum. Satellite corresponds to NTIA "SPECTRUM USED" code value 7.
9. Speeds: The maximum advertised speeds provided in the emailed brochure are as discussed above For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 2 (range 200 Kbps -- 768 Kbps).

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 1:46 PM
To: 'Mark Wymer'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Data Collection

Mark,
Thanks for the information. Sorry I did not return your call – I just got back from a meeting.

One question – do you have information on typical speeds that are experienced by your customers on each of these plans?

A side note – the NTIA is interested in finer-grained information than this, looking at specific factors that affect satellite coverage, such as terrain and building shadowing. As I understand it, they will be contacting satellite providers at some point in the future to discuss appropriate techniques to model such effects.

Thanks for you participation in the program.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:43 AM

To: 'Mark.Wymer@hughes.com'
Cc: 'NJ Broadband Data Collection'
Subject: Hughes NJ Broadband Clarification

Mark,
We need to report data to the NTIA using Provider Name, Doing-Business-As Name and FCC Registration number. The information we retrieved from the FCC is:

Provider Name: Hughes Network Systems, LLC
FRN: 00 17434911

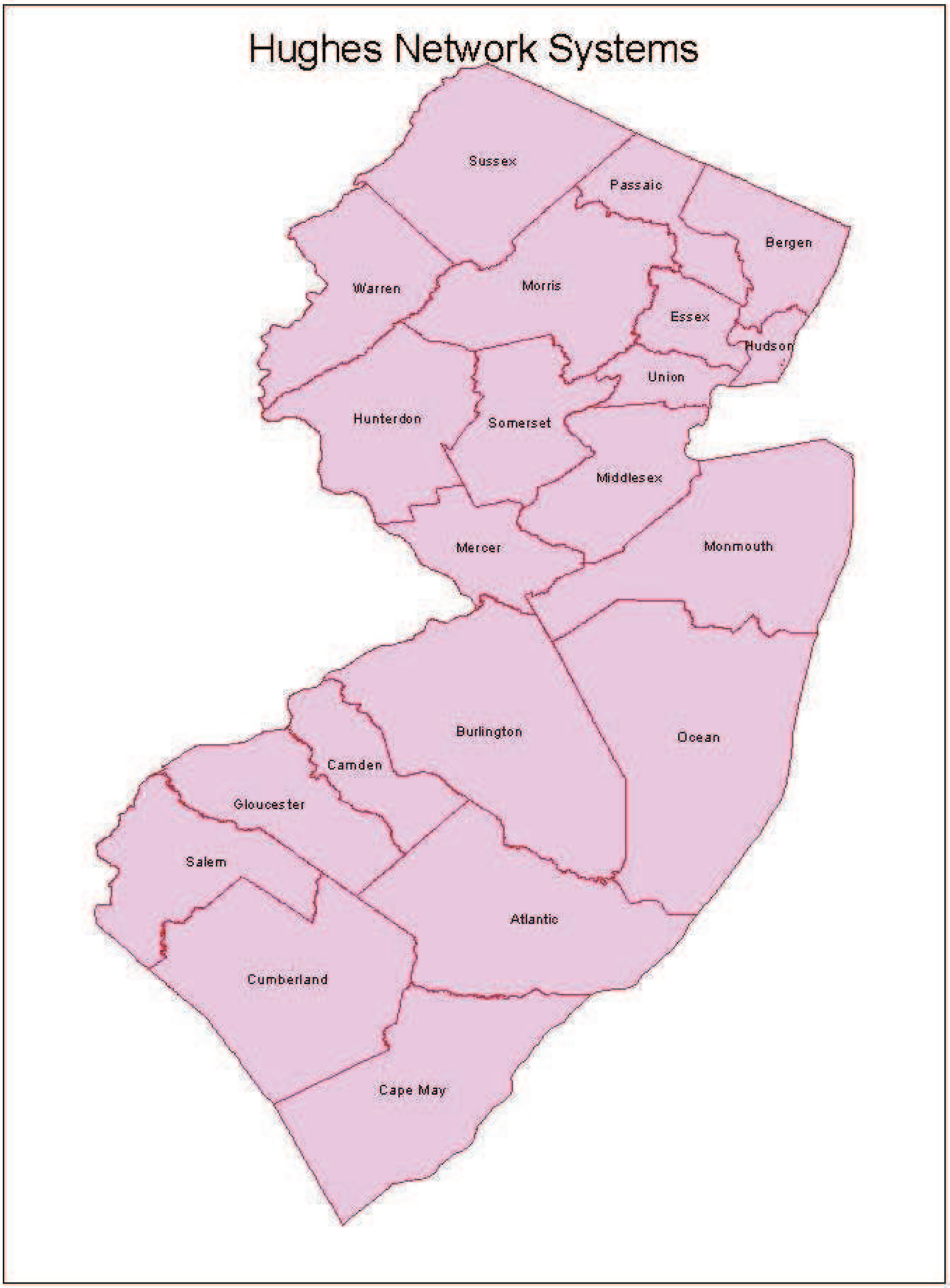
Are these correct? Also, do you have another "doing-business-as" name?

Thanks,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Leap Cricket
Received: March1, 2011
Submission date: April, 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

86. NDA Status
87. Submission Overview
88. Submission File Details
89. Data Validations and Results
90. Data Transformation and Loading
91. Clarification Questions and Provider Responses
92. Notes and Open Issues

Section 1: NDA Status

Section 2: Submission Overview

AVAILABILITY DATA		
ID	PROVIDER NAME	Leap Wireless International, Inc.
	DBA NAME	Cricket Communications, Inc.
	FRN	0002963528
	Holding company name:	Leap Wireless International, Inc."
	Holding company number:	130730
FOR WIRELESS		
Filetypes	1 Mapinfo file corresponding to NJ terrestrial mobile wireless coverage (type 80)	

Speeds

Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)
Upstream max adv	yes (for entire shapefile) given in tier
Downstream max adv	yes (for entire shape) given in tier
Upstream typical	no.
Downstream typical	no.

	Subscriber-weighted	no.	
Technology Type	Spectrum : yes		3 (PCS) and 4(AWS)
Comments:			
INTERCONNECTION DATA			
ID			
File size			
Ownership			
Transport Type			
Data Rates/Capacity			
Location			
Comments: no IC data provided.			

Quick loading results:

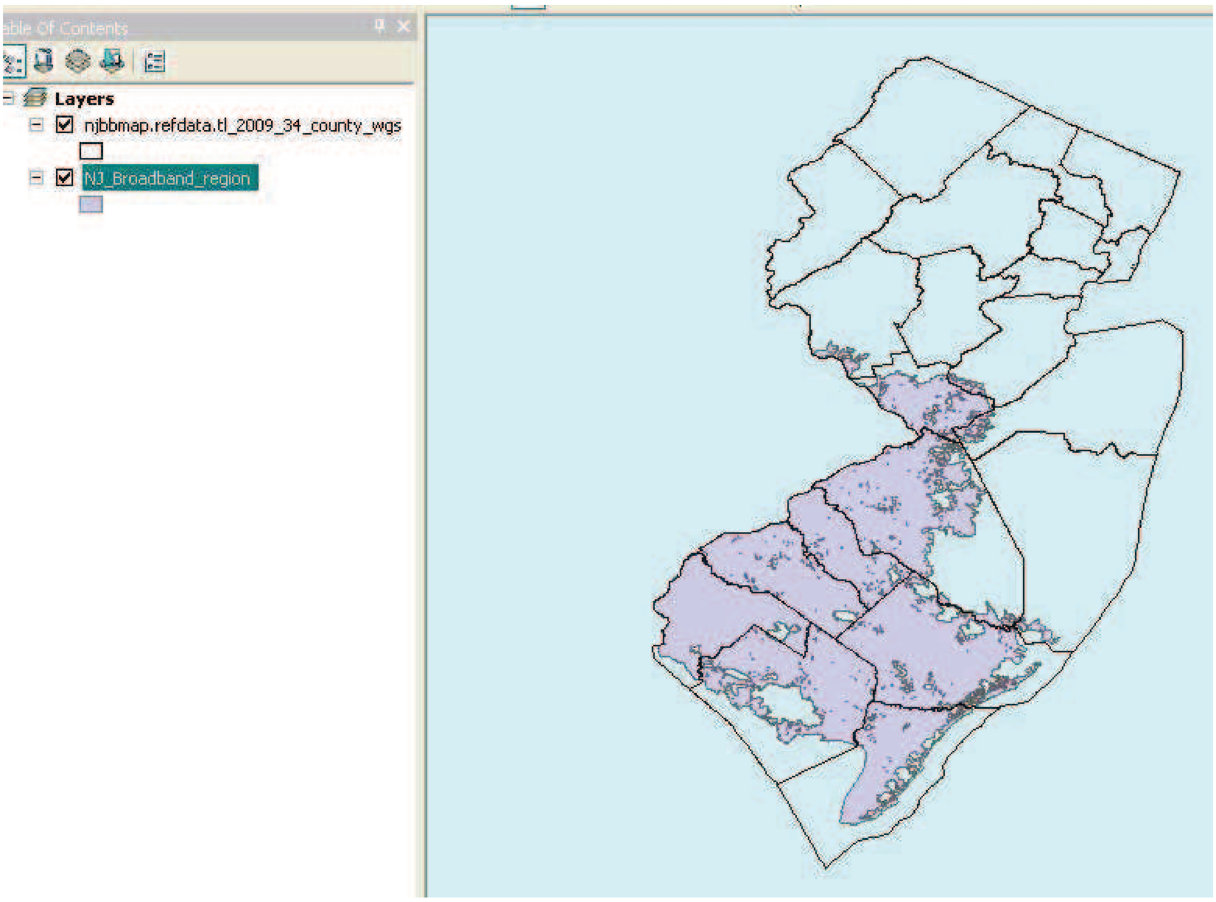


Figure 1. Loading results

Section 3: Submission File Details

1 zip file containing 5 files by (EMAIL, SECURE UPLOAD):

Size	**Name**
1KB	NJ_Broadband_region.dbf
1KB	NJ_Broadband_region.prj
1KB	NJ_Broadband_region.shx
1443KB	NJ_Broadband_region.shp
2KB	NJ_Broadband_region.TAB

Section 4: Validations and Results

The Mapinfo file contains a single row with a multipolygon shape (see above for preview picture). The columns identify that the technology of transmission is wireless and that two different spectrum ranges are in use.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded from the supplied Mapinfo file, with transformations as s

Table Column	Data Source / Transformation
PROVNAME	As supplied in column provider_name
DBANAME	As supplied in column dba_name
FRN	Set to "130730"
TRANSTECH	As supplied in column technology_of_transmission
SPECTRUM	Set to “4” per translation shown below
MAXADDOWN	As supplied in column downstream_speed.
MAXADUP	As supplied in column upstream_speed..
TYPICDOWN	Not supplied, set to null
TYPICUP	Not supplied, set to null.
STATEABBR	Set to “NJ”
SHAPE	As supplied.

Internal notes on processing:

10. The supplied shape uses geographic coordinate system GCS_WGS_1984, same as that required by the NTIA data model. First attempt at importing via this procedure failed with the error "Linestring or poly boundary is self-intersecting"
    a. Create new, empty feature class with expected XY Coordinate system, expected tolerance, and same schema.
    b. Loaded data to the new feature class from the supplied mapinfo file.
11. Second attempt at importing worked:
    a. Import the supplied mapinfo file to ArcCatalog.

    b. Create new, empty feature class with expected XY Coordinate system, expected tolerance, and same schema.
    c. Load data to the new feature class from the newly imported feature class
12. Spectrum: Leap provided “Y” value in the columns spectrum_pcs and spectrum_aws. In the NTIA model the AWS spectrum is coded as value 4. In a response to our query, Leap indicated that the different spectrum are in use in different places of their footprint. Unfortunately we do not have the data.

Section 6: Clarification Questions and Responses

Provider does not provide:
1. typical speeds
2. susbscriber weighted averages
3. interconnection data

Provider provides 2 spectrum values for the coverage shape (PCS and AWS). Request separation of the shapes for these different technologies and check on speeds.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 1:33 PM
To: 'dougwhite@cricketcommunications.com'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: NJBB Clarification Questions

Doug,
We have reviewed the data you submitted to the NJ Broadband mapping program and have a few clarification questions:
1. You include two spectrum values in the data you submitted. Are those two spectrum bands used uniformly throughout the area specified by the shape?
2. The NTIA is encouraging us to request and submit to them subscriber weighted nominal speed (down only) for each county served and middle mile locations. Are you willing to provide this data?

Thanks for your participation in the program.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Douglas White [mailto:dougwhite@cricketcommunications.com]
Sent: Monday, March 14, 2011 6:54 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarification Questions
Importance: High

John – please see Cricket's response below. Thanks,
-Doug

Doug White
Manager, Government Affairs
Cricket Communications, Inc.
5887 Copley Drive
San Diego, CA 92111
Phone: 858-882-9394
Fax: 858-882-6080
dougwhite@cricketcommunications.com

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 10:33 AM
To: Douglas White
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarification Questions

Doug,
We have reviewed the data you submitted to the NJ Broadband mapping program and have a few clarification questions:

3. You include two spectrum values in the data you submitted. Are those two spectrum bands used uniformly throughout the area specified by the shape?
   - No, they are not used uniformly in all the shape area. PCS spectrum band is used only in Mercer and Cumberland counties and AWS in all the rest of the counties with coverage.
4. The NTIA is encouraging us to request and submit to them subscriber weighted nominal speed (down only) for each county served and middle mile locations. Are you willing to provide this data?
   - We will not be providing middle mile data.

Thanks for your participation in the program.

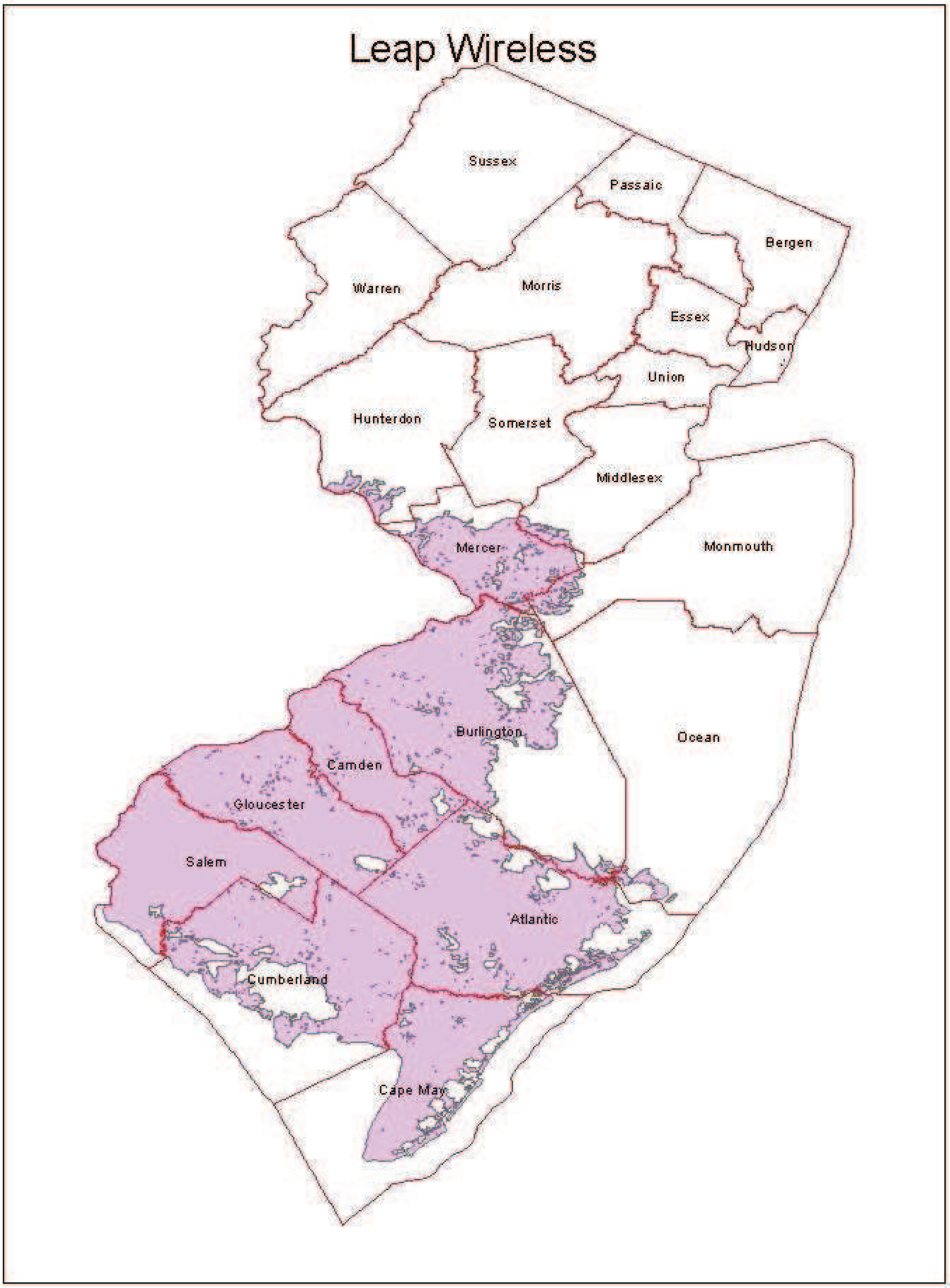
From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 8:44 PM
To: 'Douglas White'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: RE: NJBB Clarification Questions

Doug,
Can you provide us with separate shape files for the PCS and AWS? I would offer to extract a shape for the counties, but I am sure your coverage areas do not line up exactly with the county boundaries.

Thanks,
John

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Monmouth Telephone and Telegraph
Received: March, 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

93. NDA Status
94. Submission Overview
95. Submission File Details
96. Data Validations and Results
97. Data Transformation and Loading
98. Clarification Questions and Provider Responses
99. Notes and Open Issues

Section 1: NDA Status

Signed NDA is in place with NJ OIT.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Monmouth Telephone & Telegraph
same
0004325205</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Excel (NJBB_0004325205_AddressLevelAvailability.xls)</td></tr>
<tr><td>File size</td><td colspan="2">272896 bytes, 1071 records</td></tr>
<tr><td>Speeds</td><td colspan="2">
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Address</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Address</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>None provided</td></tr>
</table>
</td></tr>
</table>

	Subscriber-weighted-down		Not provided	
Technology Type	Code 30 – other copper line			
End-user specification	Code 4 – Medium or Large Enterprise			
Comments:				
INTERCONNECTION DATA				
ID				
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments: No middle mile was provided at this time. Monmouth gave the following explanation: Please note that Table 8, “Middle-mile and Backbone Interconnection Points Data”, is not included per instructions on page 11 of the Data Submission Specifications” “Middle-mile and Backbone Interconnection Point information should focus on the connectivity at a point. That is, if a point at which network elements or segments are joined would not reasonably offer the possibility of technical connectivity with the network[s], it should not be reported”.				

Section 3: Submission File Details

Received 1 zip file containing 3 .xls files and 1 .docx file:

Size	**Name**
272896	NJBB_0004325205_AddressLevelAvailability.xls

The file contains 1071 records. Note that data file does not have a header row, but follows (largely) the ADDRESS DATA table from the NTIA “State Broadband Data and Development Grant Program” document. The columns and the corresponding headers are:

A - Provider Name
C - FRN
D-L - Address
M - EndUserCat
N - TransTech
O - MaxAdvDown

P - MaxAdvUp
Q - TypicDown
R - TypicUp

The FRN is missing leading zeros. Very few entries are provided in the 4 digit zip column (L), some do not have the required leading zeros.
It was established (prior interactions) that the DBA is Monmouth Telephone & Telegraph. Certain addresses will need to be fixed for geocoding (also per prior interactions).
Some records have speed tiers of 2 or less.

27136 NJBB_0004325205_CMAAdvertisedAvailability.xls

The file contains 13 records. Note that data file does not have a header row, but follows the CMA data submission template that we posted on the connectingnj web site. The columns and the corresponding headers are:

A - Provider Name
C - FRN
D - CMA
E - TransTech
F - MaxAdvDown
G - MaxAdvUp

27136 NJBB_0004325205_SubscriberWeightedNominalSpeed.xls

The file contains 13 records. Note that data file does not have a header row, but follows the Subscriber-Weighted Nominal Speed data submission template that we posted on the connectingnj web site. The columns and the corresponding headers are:

A - Provider Name
C - FRN
D - CMA
E - TransTech
F - SubsWeightedSpeed

22016 Read Me.doc

Section 4: Validations and Results

Some of the addresses will be difficult or impossible to geo-locate due to format; e.g., 179 Ave at the Common & 11, Shrewsbury, NJ.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we will discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied Excel spreadsheet. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "Monmouth Telephone & Telegraph"
DBANAME	Set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to "0004325205"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column TransTech
MAXADDOWN	As supplied in column MaxAdvDown
MAXADUP	As supplied in column MaxAdvUp
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

34. Discarded 109 rows because the max adv down speed code was 1 or 2, which is not broadband according to the requirements of the NOFA
35. Geocoded the addresses using the Google and Yahoo geocoders to obtain a Latitude, Longitude pair for each.. Addresses that yielded results with accuracy of 6 or below were excluded; only intersection (7) or rooftop (8) accuracy is acceptable. All addresses were geocoded; none failed.
36. Created an Excel sheet and imported it to a geodatabase table.
37. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
38. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
39. Discarded 197 rows with duplicate census blocks while preserving the greatest speed. These result from multiple customers in the same census block.
40. Discarded 7 large census blocks (greater than 2 square miles).

41. Final record count loaded is 757.

The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

1. Some records in the NJBB_0004325205_AddressLevelAvailability.xls file have maximum advertised download speed tiers of 2 or less. If these values are the correct speeds, then they do not meet the NTIA definition of broadband.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 9:54 AM
To: Betty Booth
Cc: 'lchocolate@monmouth.com'; ConnectingNJ@research.telcordia.com
Subject: Monmouth NJ Broadband Data Clarification

Betty,
We have performed our initial review of your submission to the NJ Broadband mapping program and have a clarification question:

- Several locations included in your list have downstream speed tiers of 2. Can you just clarify which copper service you are using to deliver speeds less than 768 kbps?
- Also with respect to the downstream speed tiers of 2, the NTIA does not consider these speeds to be broadband. We are interested, however, in the maximum speed you advertise in the areas where you offer service. Can you provide us with the maximum advertised speed associated with your copper and fiber services? (If there is more than one type of each service, is it possible to differentiate the type based on the speed information you provided?

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Betty Booth [mailto:bbooth@monmouth.com]
Sent: Monday, March 21, 2011 4:19 PM
To: ConnectingNJ@research.telcordia.com
Cc: ConnectingNJ@research.telcordia.com; lchocolate@monmouth.com
Subject: Re: Monmouth NJ Broadband Data Clarification

Mr. Wullert:

Sorry for the delay of a reply.

Q: Several locations included in your list have downstream speed tiers of 2. Can you just clarify which copper service you are using to deliver speeds less than 768 kbps?

A: T1

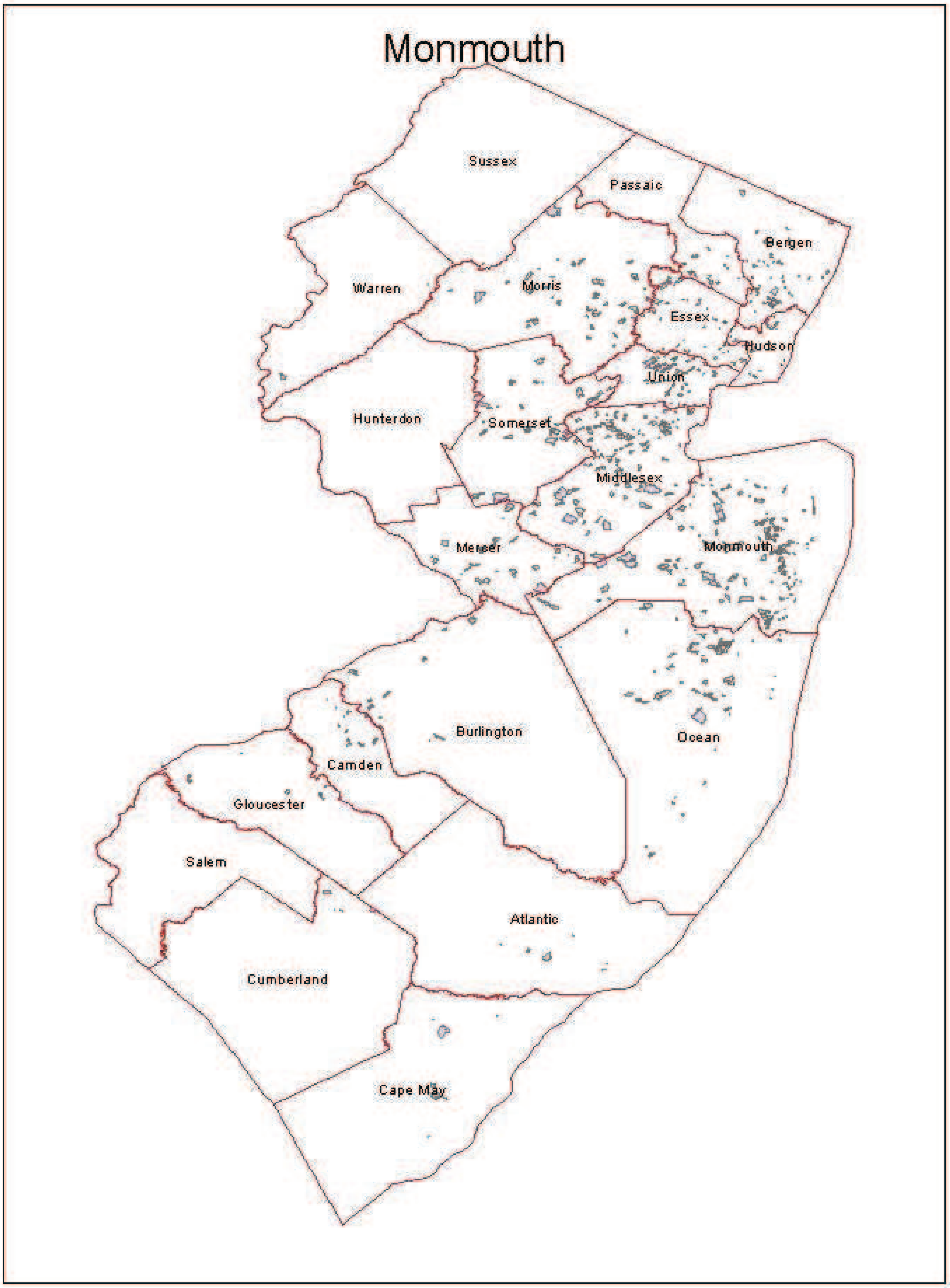
Q: Can you provide us with the maximum advertised speed associated with your copper and fiber services?
A: 100Mb for Fiber and 1.5Mb for copper

Thank you

Betty Booth
Monmouth Telephone & Telegraph

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: One Communications
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

100. NDA Status
101. Submission Overview
102. Submission File Details
103. Data Validations and Results
104. Data Transformation and Loading
105. Clarification Questions and Provider Responses
106. Notes and Open Issues

Section 1: NDA Status

Executed an NDA with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA			
ID	Provider name	One Communications	
	"Doing business as" name	None provided	
	FRN	015-33-7702	
	Holding company name	One Communications Corporation	
	Holding company number	140069	
FOR WIRELINE			
Filetypes	Excel ("Broadband Connections Data as of 12.31.10.xls")		
File size	106,496 bytes (506 rows)		
Speeds	Type	Spatial Resolution: **address**	Provided table with addresses and speeds at each address. Speed columns are labeled "Maximum downstream speed" and "Maximum upstream speed" with values 1..8. We determined during last submission to use these values as advertised speeds
	Typical-upstream	Not provided	
	Typical-downstream	Not provided	
	Advertised-upstream	Address Level*	
	Advertised-downstream	Address Level *	
	Subscriber-weighted-up	Not provided	

	Subscriber-weighted-down		Not provided	
Technology Type	10 (ADSL), 20 (SDSL), 30 (Other copper)			
End-user specification	All 3 (small business)			
Comments:				
INTERCONNECTION DATA				
ID	Not provided			
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments:				

Section 3: Submission File Details

Received 1 file by via email:

Size	**Name**
106,496	Broadband Connections Data as of 12.31.10.xls

Many addresses in this file appear to be for individual customers; some may be addresses of multi-tenant buildings.

Section 4: Validations and Results

The codes in columns end user, tech trans, up speed, and down speed are generally valid. However, several records have down-stream speed tiers of 1 or 2, which are not considered broadband. We will inform the carrier and propose to drop these records.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we will discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file “One NJ Broadband Connections Data as of 12.31.10.xls”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider Name”
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”, with leading zeroes added
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology of Transmission
MAXADDOWN	Set to 7, the largest value found in submission
MAXADUP	Set to 7, the largest value found in submission
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

25. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.
26. Created an excel sheet and imported it to a geodatabase table.
27. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
28. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
29. Discarded 59 rows with duplicate census blocks, which is a common result when several customers are in the same area.
30. Discarded 3 census blocks with an area larger than 2 square miles. We did not discover road segments in these blocks to report them.

The mechanized procedure for the geocoding step is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

1. You have several records that have downstream speed tiers of 1 or 2. Note that NTIA does not consider these values to be broadband, so we will drop these records from the submission.
2. The data you reported seems to be specific to customers. Do you advertise or offer higher speeds to those customers over the existing facilities? (Specifically, could these customers upgrade easily to a higher speed if needed?). If so, what upload and download speeds are possible for these customers? (If you have this information, we can use it as "maximum advertised" speeds and use the data you provided as "typical speeds")

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 02, 2011 2:25 PM
To: Cui, Jie
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Jie,
We have reviewed your data and have identified a couple of issues that we would like to clarify:

1. You have several records that have downstream speed tiers of 1 or 2. Note that NTIA does not consider these values to be broadband, so we will drop these records from the submission.
2. The data you reported seems to be specific to customers. Do you advertise or offer higher speeds to those customers over the existing facilities? (Specifically, could these customers upgrade easily to a higher speed if needed?). If so, what upload and download speeds are possible for these customers? (If you have this information, we can use it as "maximum advertised" speeds and use the data you provided as "typical speeds")

We appreciate your prompt attention to these questions.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Cui, Jie [mailto:JCui@OneCommunications.com]
Sent: Wednesday, March 02, 2011 2:42 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

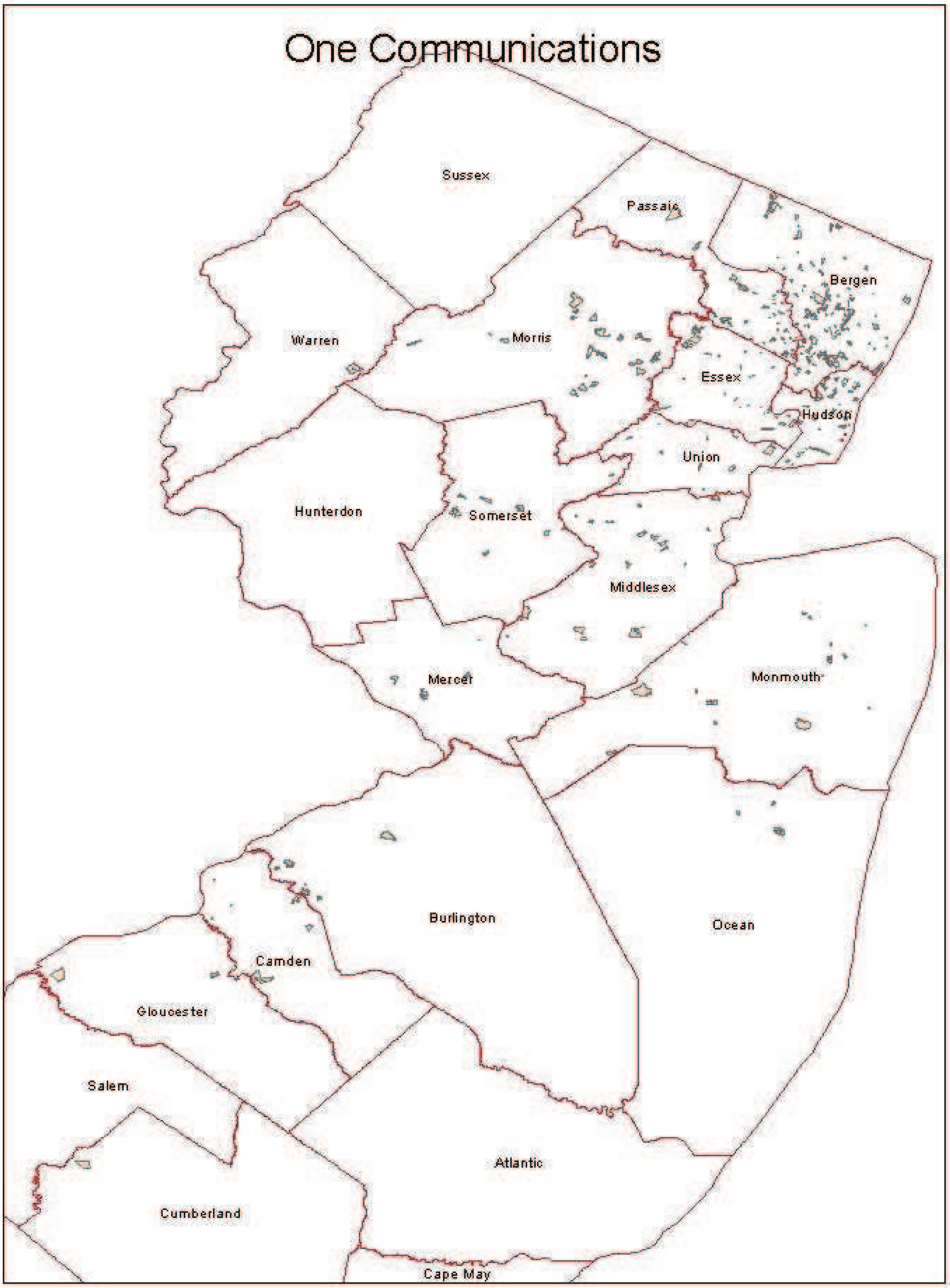
Hi John,

To respond to your 2nd bullet point, this is a question that has been raised by administrators of other states' BB collection programs in the past as well and I have not been able to obtain the maximum advertised/available speeds information by geographical area internally from our engineering department despite several attempts. I do think, in general, most of our customers can upgrade to a higher speed if needed and provided that it is achievable with the facilities that we have.

Thanks,

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Sidera Networks (formerly RCN)
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

107. NDA Status
108. Submission Overview
109. Submission File Details
110. Data Validations and Results
111. Data Transformation and Loading
112. Clarification Questions and Provider Responses
113. Notes and Open Issues

Section 1: NDA Status

Executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name “Doing business as” name FRN	Sidera Networks, LLC Sidera Networks 0006-2544-03
FOR WIRELINE		
Filetypes	Text	
File size	30 rows	
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
	Typical-upstream	Not provided (despite the provider’s claim)
	Typical-downstream	Not provided (despite the provider’s claim)
	Advertised-upstream	Address
	Advertised-downstream	Address
	Subscriber-weighted-	Not provided

	up			
	Subscriber-weighted-down		Not provided	
Technology Type	50 (fiber)			
End-user specification	Category 4 (med or lg enterprise)			
Comments:				
INTERCONNECTION DATA				
ID	Provided – see above			
File size	50 rows			
Ownership	Leased			
Transport Type	Fiber			
Data Rates/Capacity	Will use the max. of 3 provided values (Ethernet, SONET, and/or Waves)			
Location				

Section 3: Submission File Details

Received two (2) files by SECURE UPLOAD:

Size	**Name**
1805	NJ_Sidera_customer_data_20101231.txt

Given the prior interactions, each row is established to contain an address, end-user category, technology code (50), max advertised down/up speeds and two additional columns: ADVER_DOWNLOAD_SPEED and ADVER_UPLOAD_SPEED, which the provider claims (in their response) to be the typical down/up-load speed. We will NOT use data in these columns as the typical down/up-load speed data.

34304 middle_mile_nj_3-1-2011.xls

Contains 50 rows excluding headers. Each row has an address, building type, statement of Ethernet, SONET, and/or Waves backhaul network speed, building ownership (all leased), and entrance (all fiber).
We will use the max. of the three provided network speed values (Ethernet, SONET,

and Waves) as the serving facility backhaul capacity value.

Section 4: Validations and Results

Customer address data: 30 rows were submitted, 26 could be geocoded, 4 could not. Middle mile data: 50 rows were submitted, 47 could be geocoded, 3 could not. For details see files res_failed.xls and res_mm_failed.xls.

Section 5: Data Transformation and Loading

Loaded from supplied file “middle_mile_nj_3-1-2011.xls”, tab “NJ_Sidera” (50 rows). The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “Sidera Networks, LLC"
DBANAME	Set to “Sidera Networks”
FRN	Set to “0006254403”
OWNERSHIP	Set to 1 (leased)
BHCAPACITY	Set to 6 (10 Gbps or greater)
BHTYPE	Set to 1 (fiber)
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

31. Geocoded the addresses using the Google geocoder.
32. Created an excel sheet and imported to a geodatabase table.
33. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
34. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file “RCN_NY_20100630_customer_data.txt” (20 rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Sidera Networks, LLC"
DBANAME	Set to “Sidera Networks”
PROVIDER_TYPE	Set to 1
FRN	Set to “0006254403”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology_Code
MAXADDOWN	As supplied in column Max_Download_Speed
MAXADUP	As supplied in column Max_Download_Speed_1
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

42. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.
43. Created an Excel sheet and imported it to a geodatabase table.
44. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
45. Created a new feature class and loaded data to correct tolerance value.
46. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
47. Discarded 15 rows with duplicate census blocks while preserving the greatest speed.
48. Loaded 11 rows.

Section 6: Clarification Questions and Responses

1. NTIA specifies four serving facility types (1=Fiber; 2=Copper;3=Hybrid Fiber Coax (HFC); 4=Wireless) for the middle-mile connection points data. You have provided 3 columns referring (we assume) to the serving facilities in you network. One of them is titled 'Waves'. Does that indicate the wireless facility ?

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 16, 2011 4:04 PM
To: 'rich.duquette@rcn.net'
Subject: RCN NJBB Mapping Clarification

Rich,

We have reviewed the data you provided and have one clarifying question:

1. NTIA specifies four serving facility types (1=Fiber; 2=Copper;3=Hybrid Fiber Coax (HFC); 4=Wireless) for the middle-mile connection points data. In your middle mile data, you have provided 3 columns referring (we assume) to the serving facilities in you network. One of them is titled 'Waves'. Does that indicate the wireless facility ?

Thanks for your participation!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Rich Duquette [mailto:RDuquette@rcn.com]
Sent: Wednesday, March 16, 2011 4:09 PM
To: 'ConnectingNJ@research.telcordia.com'
Subject: RE: RCN NJBB Mapping Clarification

Hi John,

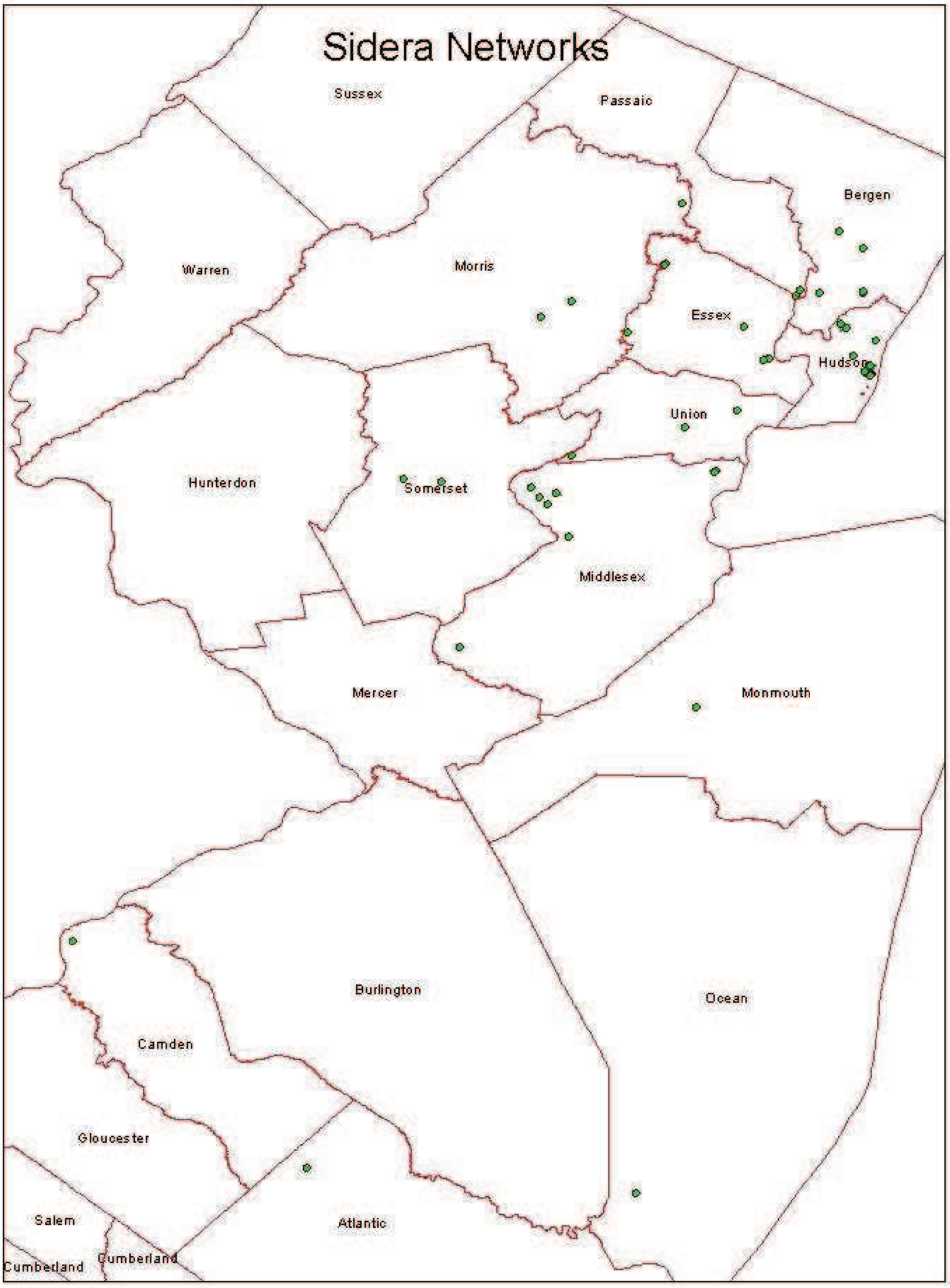
We are a transport company, this is all Fiber (1)

Thanks

Rich

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Connecting New Jersey - Broadband Provider Data Report

Provider: Service Electric Cable TV of Hunterdon
Submission date: April 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA). This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

4. Dropped the column "reseller".
5. Added the column "provider_type" and populated with value 1 ("Broadband provider as described in the NOFA")

NTIA Table BB_Service_RoadSegment

1. Dropped the column "reseller".
2. Added the column "provider_type" and populated with value 1 ("Broadband provider as described in the NOFA")

Provider Interactions

Tim Himmelright of Service Electric called and spoke to John Wullert on 4 March 2011 and confirmed that their data had not changed since the October data collection cycle and instructed us to use the previous data.

Broadband Provider Data Report

Provider: Service Electric Cable TV of Hunterdon
Received: August 2010
Submission date: October 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

114. NDA Status
115. Submission Overview
116. Submission File Details
117. Data Validations and Results
118. Data Transformation and Loading
119. Clarification Questions and Provider Responses
120. Notes and Open Issues

Section 1: NDA Status

None.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Service Electric Cable TV of Hunterdon, Inc.
DBA not provided
0003760014</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Text (a letter, not structured data)</td></tr>
<tr><td>File size</td><td colspan="2"></td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Municipality</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Municipality</td></tr>
<tr><td>Subscriber-weighted-</td><td></td><td>Not provided</td></tr>
</table></td><td>Advertised downstream speeds 1.5, 3, 5, 7 and 10 mbps; up speed 800 kbps.

Typical Speeds were confirmed prior to October submission to be 10-15% below advertised.</td></tr>
</table>

	up		
	Subscriber-weighted-down	Not provided	
Technology Type	Docsis 2.0 (use code 41)		
End-user specification	Not provided		
Comments:			
INTERCONNECTION DATA			
ID	None		
File size			
Ownership			
Transport Type			
Data Rates/Capacity			
Location			
Comments:			

Section 3: Submission File Details

Received email for October submission with information on the municipalities served in entirety, the technology of transmission, and the speed tiers offered to customers. Confirmed that information via phone on March 4, 2011

Section 4: Validations and Results

The sole data to validate is their provided list of municipality names. A sampling was all valid.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded based on email received on August 23, 2010. We submitted all census blocks in the named municipalities. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of Hunterdon, Inc.”

DBANAME	Not supplied; set same as PROVNAME
RESELLER	Set to “N”
FRN	Set to “0003760014”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to 41 (Cable Modem – Other) per email Docsis-2.0
MAXADDOWN	Set to 7 (10Mbps) per email
MAXADUP	Set to 3 (800Kbps) per email
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

49. Created a file with municipality names that match exactly names in the “name” column in the Year 2000 Census Bureau TigerLine database. Primarily this meant changing “Boro” to “Borough”.
50. Joined against reference data to discover census blocks.

NTIA Table BB_Service_RoadSegment

Loaded with street segments in census blocks larger than 2 square miles as listed in Census Bureau TigerLine reference data. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of Hunterdon, Inc.”
DBANAME	Not supplied; set same as PROVNAME
RESELLER	Set to “N”
FRN	Set to “0003760014”
ADDMIN	From reference data
ADDMAX	From reference data
PREDIR	From reference data
STREETNAME	From reference data
STREETTYPE	From reference data
SUFFDIR	From reference data
CITY	From reference data
STATECODE	From reference data
ZIP5	From reference data
ZIP4	From reference data

TRANSTECH	Set to 41 (Cable Modem – Other) per email Docsis-2.0
MAXADDOWN	Set to 7 (10Mbps) per email
MAXADUP	Set to 3 (800Kbps) per email
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	From reference data

Section 6: Clarification Questions and Responses

1. What is the FRN?
2. Should we expect any middle-mile data?

Interaction from August 2010:

Tim,

We have been reviewing the data you submitted to the New Jersey Broadband mapping program. Based on our initial review, we have some questions for you that will help us better understand the data and process it accurately.

1. Could you please provide the FRN for your company?
2. Is there any information you can provide about the typical speeds experienced by your customers, based on your network configurations, monitoring results or general experience?
3. Do you have any middle mile locations to report?

We would appreciate your prompt attention to these questions. If you need further clarification, please feel free to contact me.

Thank you for your participation!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Tim Himmel called John Wullert on 8/27/2010. He answered the questions as followed:

- He will have to check on the FRN. He wasn't quite sure what that meant.
- He said that their typical speeds are generally 10-15% below advertised (5.9 to 6.3 Mbps on a 7 Mbps line). (They are going to build out DOCSIS 3 over the next six months to a year to address this. With that, they may over-provision the lines (provide 12 Mbps for 10 Mbps line).

- They do not have any middle mile sites. They connect direct to PenTeleData, who provides Internet access for multiple cable operators.

Tim Himmel called John Wullert on 8/31/2010 to report the FRN number. The number he provided is: FRN 0003-7600-14

From: Tim Himmelwright [mailto:himmelt@sectv.com]
Sent: Friday, March 04, 2011 3:58 PM
To: ConnectingNJ@research.telcordia.com
Subject: Re: NJ BB Data Collection - Spring 2011

John,

Computing data rates are the same as our last report. We have deployed high-speed 2-way internet services in 100-percent of all 12 communities that we serve in New Jersey.

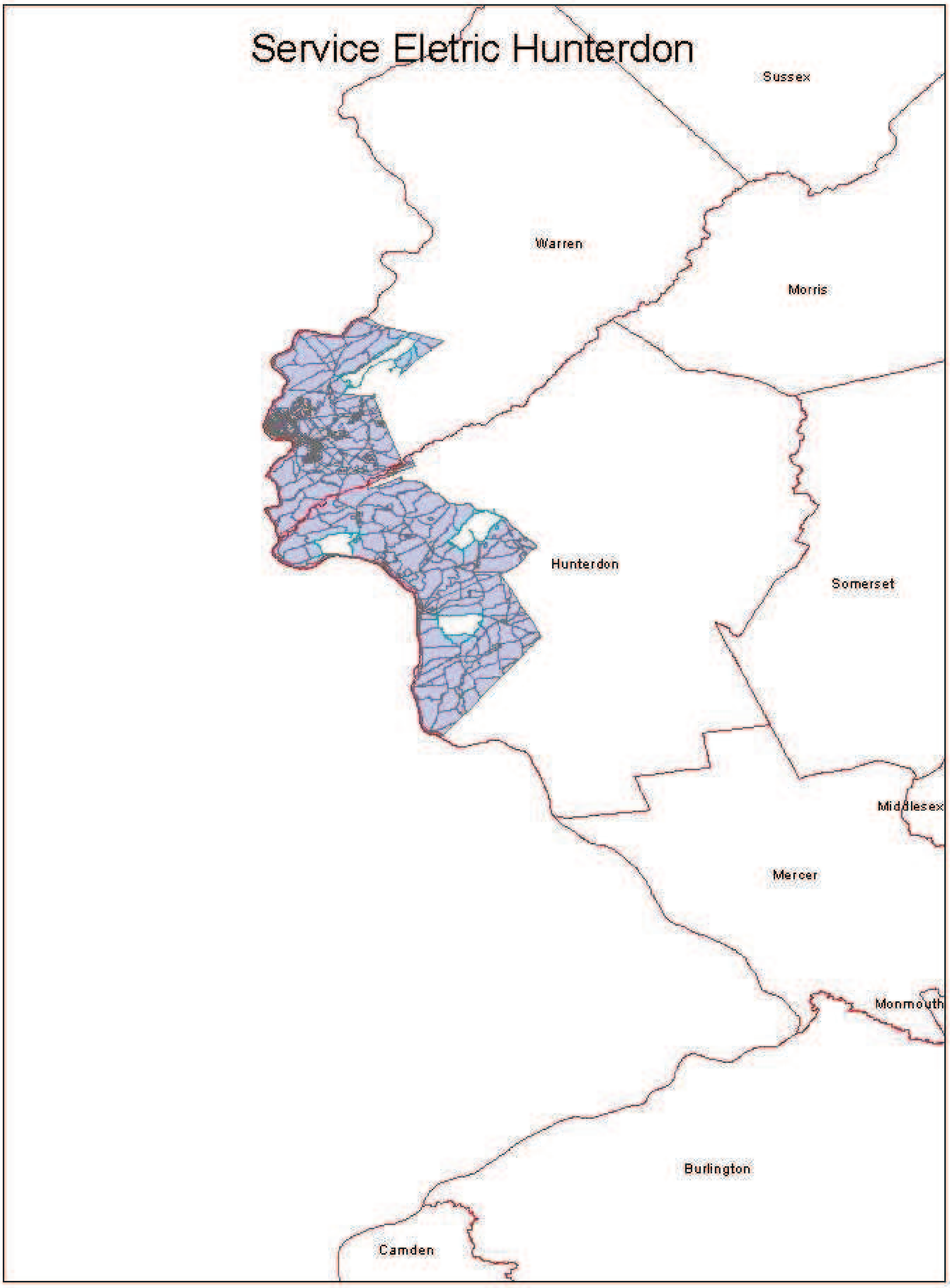
Our platform is still operating on DOCSIS 2.0. However, we are testing DOCSIS 3.0 in two of our Pennsylvania franchises. Once we work out the few small bugs we have encountered, we do plan to migrate our New Jersey properties to DOCSIS 3.0 as well. I will keep you up to date on our progress.

Best Regards,

Timothy S. Himmelwright
Communications & Public Affairs
Service Electric Cable TV & Communications

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Sprint
Received: 23 February 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

121. NDA Status
122. Submission Overview
123. Submission File Details
124. Data Validations and Results
125. Data Transformation and Loading
126. Clarification Questions and Provider Responses
127. Notes and Open Issues

Section 1: NDA Status

Executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	PROVIDER NAME DBA NAME FRN:	Sprint Nextel Communications Sprint 0003-77-45-93
FOR WIRELESS		
Filetypes	shapefile (2 polygons), text file	
Speeds	<table><tr><th>Type</th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)</th></tr><tr><td>Upstream max adv</td><td>yes (shapefiles for 2 spectrum types)</td></tr><tr><td>Downstream max adv</td><td>yes (shapefiles for 2 spectrum types)</td></tr><tr><td>Upstream typical</td><td>yes (shapefiles for 2 spectrum types)</td></tr><tr><td>Downstream typical</td><td>yes (shapefiles for 2 spectrum types)</td></tr><tr><td>Subscriber-weighted</td><td>yes. County-level data for all 21 counties (text file).</td></tr></table>	
Technology	2 spectrum types described: 3 (PCS) and 5	

Type	(Broadband radio). Technology of transmission is 80 (Terrestrial mobile wireless).	
Comments: **A somewhat cryptic note is provided saying:** **"The map is created using Sprint's 1XRTT coverage boundary as a proxy for service. The 1XRTT coverage boundary is created by defining the area where the network provides a -98dbm or stronger signal strength."**		

INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Instructed to use middle mile data from previous submission	

Quick loading results:

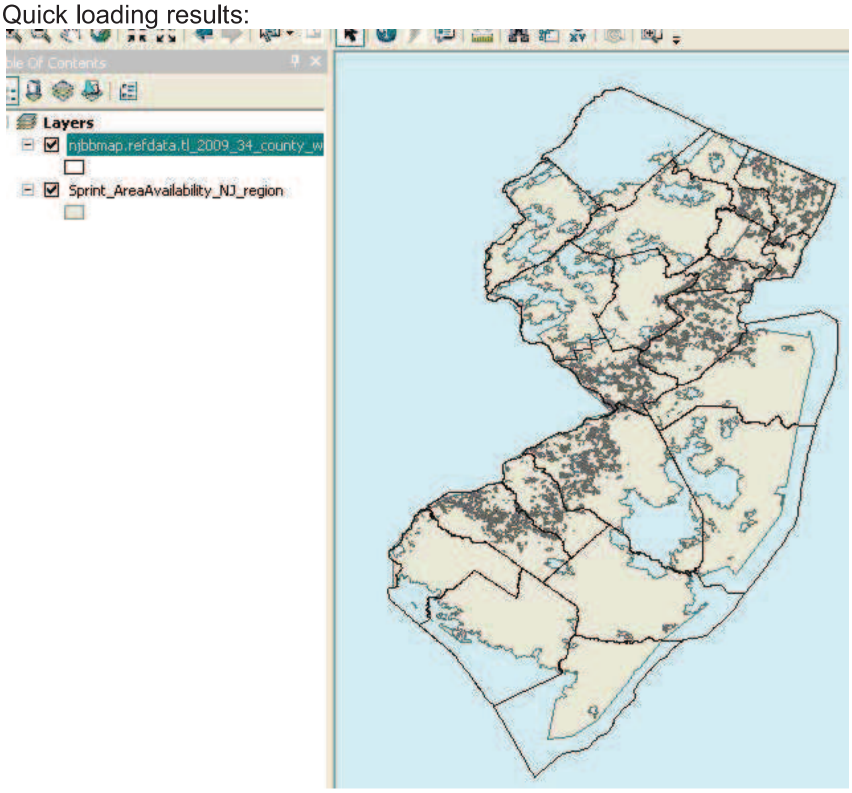


Figure 1. Loading results

Section 3: Submission File Details

First submission provided these 6 files by SECURE UPLOAD:

Size	Name
2KB	Confidential_Sprint_Pricing_NJ.txt
2KB	Sprint_AreaAvailability_NJ_region.dbf
1KB	Sprint_AreaAvailability_NJ_region.prj
5208KB	Sprint_AreaAvailability_NJ_region.shp
1KB	Sprint_AreaAvailability_NJ_region.shx
1KB	readme.txt

Section 4: Validations and Results

Sprint provided a shapefile with two polygons, one each for two data services. Both appear to fall entirely in side New Jersey (see above for initial preview of shapefiles in Arcmap). The slower service is spectrum 3 and rated max advertised down/up of 3/2. The faster service is spectrum 5 and rated max advertised down/up of 5/3.

The "pricing" text file provides subscriber-weighted nominal speed for counties in New Jersey. It does not distinguish between the two services. We are not submitting overview data so will not use this data.

The "readme" text file provides no data for loading.

No middle-mile data was provided. We received email directing us to reuse the middle-mile data from the previous submission.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from the text file “Confidential_Middlemile_NJ.txt” supplied in October 2010. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “providername”
DBANAME	As supplied
FRN	As supplied in column “frn”, after removing hyphens
OWNERSHIP	As supplied
BHCAPACITY	As supplied in column “servingfacilitycapacity”
BHTYPE	As supplied in column “servicefacilitytype”

LATITUDE	As supplied
LONGITUDE	As supplied
ELEVFEET	As supplied in column “elevation” (all zero)
STATEABBR	Set to “NJ”
FULLFIPSID	Year 2000 Census Bureau TigerLine reference data
SHAPE	Created via ArcMap “Add XY Data” feature for lat/long value pairs

Internal notes on processing:

35. Created an excel sheet with the data and imported to a geodatabase table.
36. Created a feature class from the table by creating a Point shape using ArcMap’s “Add XY Data” feature corresponding to each Latitude, Longitude pair.
37. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.
38. The only data imputed was the state abbreviation.
39. Reused the ESRI feature class created in the last round.

NTIA Table BB_Service_Wireless

Loaded from the supplied shapefile “Sprint_AreaAvailability_NJ_region. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “proname”
DBANAME	As supplied in column “dbaname”
FRN	As supplied in column “frn” after removing hyphens
TRANSTECH	As supplied in column “techtrans”
SPECTRUM	Set to 3 or 5 per translation shown below
MAXADDOWN	As supplied in column “maxaddnsp”
MAXADUP	As supplied in column “maxadupsp”
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to “NJ”
SHAPE	As supplied.

Internal notes on processing:

13. The supplied shape uses geographic coordinate system name GCS_WGS_1984 The NTIA data model requires the same coordinate system. No geographic transformation was required, but the XY Tolerance values differ if the shapefile is imported trivially into the geodatabase. Imported the table schema and the table data in two separate operations, thereby ensuring perfect compatibility with the NTIA data model.
    a. First attempt at import used these steps: create new feature class with appropriate XY coordinate system, tolerance, and columns; then load from original file. This failed with an error message about intersecting geometry.

b. Second attempt at import used these steps: import feature class unchanged, create new feature class with appropriate XY coordinate system, tolerance, and columns; then load from the feature class in the geodatabase. This succeeded.

14. Details on spectrum transformation: Sprint provided input columns: spectrum1, spectrum2, spectrum3, spectrum4, spectrum5, spectrum6, spectrum7. Sprint put a "Y" in columns spectrum3 (representing range 1850-1915 MHz) and spectrum5 (representing range 2496–2690 MHz). The NTIA data model has a single column for spectrum. The corresponding NTIA “SPECTRUM USED” coded values are 3 and 5.
15. The only data imputed was the state abbreviation.

Section 6: Clarification Questions and Responses

1. Clarification about the “note” (see above) might be useful.
2. no interconnection data.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 8:04 AM
To: 'jack.delaney@sprint.com'
Subject: NJ Broadband Mapping Clarification

Jack,
We have reviewed the data you submitted to the NJ Broadband mapping program. We had two clarification questions:

1. In the last round submission, you included middle mile information, but that was not included with this submission. Can we use the previously submitted data, or could you please supply updated information?
2. You include the note about how the map was created using the 1XRTT coverage boundary. Does this apply to both the 3G and 4G coverage?

We appreciate your participation in the program and ask for your cooperation in responding in a timely manner.

Thanks!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Delaney, Jack L [LEG] [mailto:Jack.Delaney@sprint.com]
Sent: Monday, March 14, 2011 12:10 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Mapping Clarification

John,

You can use the previously supplied info regarding the middle-mile data. I am still working with network to get you an explanation for how they generate the 4G footprint…

Jack Delaney
Manager, Systems Operations
Legal Department
Sprint Nextel
Office: 913-315-9705
Cell: 703-906-9533

From: Delaney, Jack L [LEG] [mailto:Jack.Delaney@sprint.com]
Sent: Friday, March 25, 2011 12:08 PM
To: Wullert, John R II
Subject: FW: 4G Map Generation

John,

Please see below. This is the explanation I got from Clearwire regarding the 4G coverage. This is what they have submitted to NTIA previously.

Does this help?

Thanks – sorry for the delay.

Jack Delaney
Manager, Systems Operations
Legal Department
Sprint Nextel
Office: 913-315-9705
Cell: 703-906-9533

From: Brad Gustafson [mailto:brad.gustafson@clearwire.com]
Sent: Friday, March 25, 2011 10:56 AM
To: Delaney, Jack L [LEG]
Subject: RE: 4G Map Generation

Jack,

I connected with our spectrum guys on this and they have communicated the Clearwire network coverage/description previously to NTIA. Below is the communication. Since Sprint is using Clearwire's network for 4G Services our folks believe the Clearwire submittal to the NTIA alone should be sufficient. But, feel free to reference the below text with the NTIA as/if you wish. Let me know if you have any questions/concerns regarding this and I'll get you connected to the right folks to discuss further. Thanks –

Bg

Clearwire appreciates the opportunity to participate. Attached are map files for Clearwire's WiMAX and

Expedience Coverage in Oregon State. Clearwire operates WiMAX service with respective speeds below in Portland and Salem. All other markets in the attached file operate using expedience technology. Below are some particulars regarding our service that you might need per NTIA form.

Provider Name: Clearwire Corporation
DBA: Clear (WiMAX markets), Clearwire (Expedience Markets)
FRN: 0017775628

Spectrum: Clearwire operates its WiMAX and Expedience network's using 2.5MHz spectrum (Spectrum 5 on the NTIA's list).

WIMAX Speed: Clearwire's WiMAX network delivers average mobile download speeds of 3 to 6 mbps with bursts over 10 mbps.* Wimax up is 1 Mbps

** Speed claims based on download speeds only. Actual performance may vary and is not guaranteed. CLEAR performance claim is based on average download user speeds achieved during tests performed on the CLEAR commercial network by CLEAR. Other carrier performance based on their advertised claims.*

Expedience Speed: Service is offered at Premium (1.5 Mbps down) and Premium Plus (2 Mbps down). 256 kbps up for both premium and premium plus.

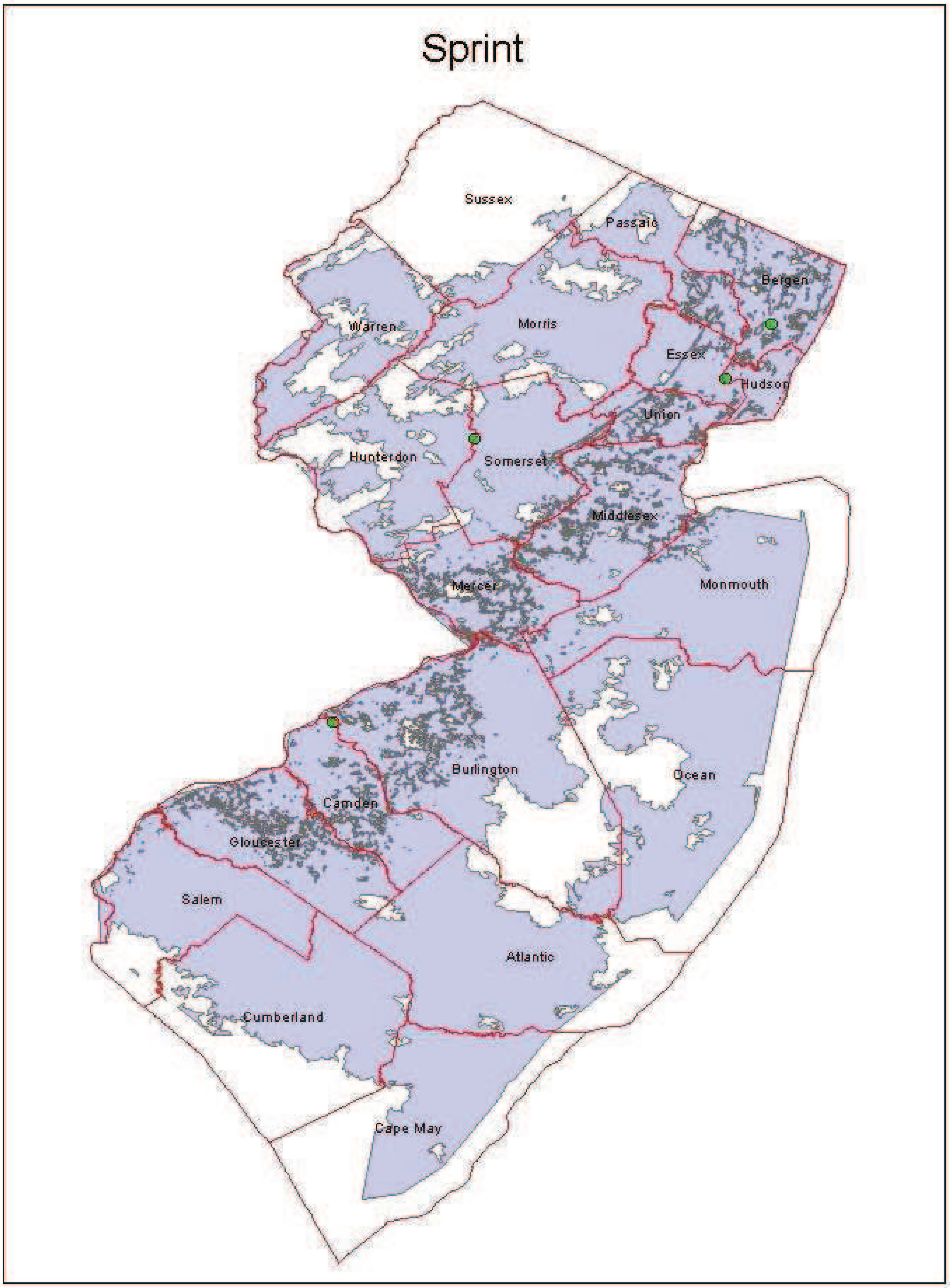
Average Speeds: Clearwire does not disclose speeds as stand-alone average only a range.

FCC Classification: Clearwire is classified as terrestrial mobile wireless-licensed spectrum.

Middle Mile Request: Non-response

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: StarBand Communications Inc.
Received: March 2011
Submission date: March 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

128. NDA Status
129. Submission Overview
130. Submission File Details
131. Data Validations and Results
132. Data Transformation and Loading
133. Clarification Questions and Provider Responses
134. Notes and Open Issues

Section 1: NDA Status

NONE

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name	StarBand Communications Inc.
	“Doing business as” name	Not provided
	FRN	0005087457
FOR WIRELINE		
Filetypes		
File size		
Speeds	(see table below)	Max advertised up is Code 2 (256 Kbps), down is Code 3 (1.5 Mbps)

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		
Advertised-downstream		
Subscriber-weighted-up		256Kbps

	Subscriber-weighted-down		1.5Mbps	
Technology Type	Code 60 (Satellite)			
End-user specification	Not provided			
Comments:				

INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Not provided	

Section 3: Submission File Details

Received email explaining their service offering. Satellite service is provided in all of New Jersey.

On subscriber weighted values, they say:
"Since we have only 1 service that meets the definition of broadband service, the weighted average is the same as the average for that service. Upload speed is 256 Kbps and download speed is 1.5Mbps."

Section 4: Validations and Results

No rows of data need to be validated.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded county shapes from reference data for counties in the State of New Jersey based on emailed statements that all counties are covered. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "StarBand Communications Inc."
DBANAME	Set to "StarBand"
FRN	Set to 0005087457
TRANSTECH	Set to 60
SPECTRUM	Set to 7 per translation shown below
MAXADDOWN	Set to 4, see below.
MAXADUP	Set to 2, see below.
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to “NJ”
SHAPE	County shape read from reference data.

Internal notes on processing:

16. Spectrum: No statement was provided. The NTIA data model has a single column for spectrum. Satellite corresponds to NTIA “SPECTRUM USED” code value 7.
17. Speeds: The maximum advertised speeds provided in the emailed brochure are as discussed above For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 2 (range 200 Kbps -- 768 Kbps).

Section 6: Clarification Questions and Responses

1. What is DBA name if different than provider name?

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:51 AM
To: 'Lesley Cooper - McLean'
Cc: 'NJ Broadband Data Collection'
Subject: Starband NJBB CLarification

Lesley,
One quick clarification: we have your provider name as Starband Communications Inc. Do you have any other “doing-business-as” name that we should include in the submission to the NTIA?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Lesley Cooper - McLean [mailto:Lesley.Cooper@Spacenet.com]
Sent: Tuesday, March 22, 2011 5:48 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Starband NJBB CLarification

John,

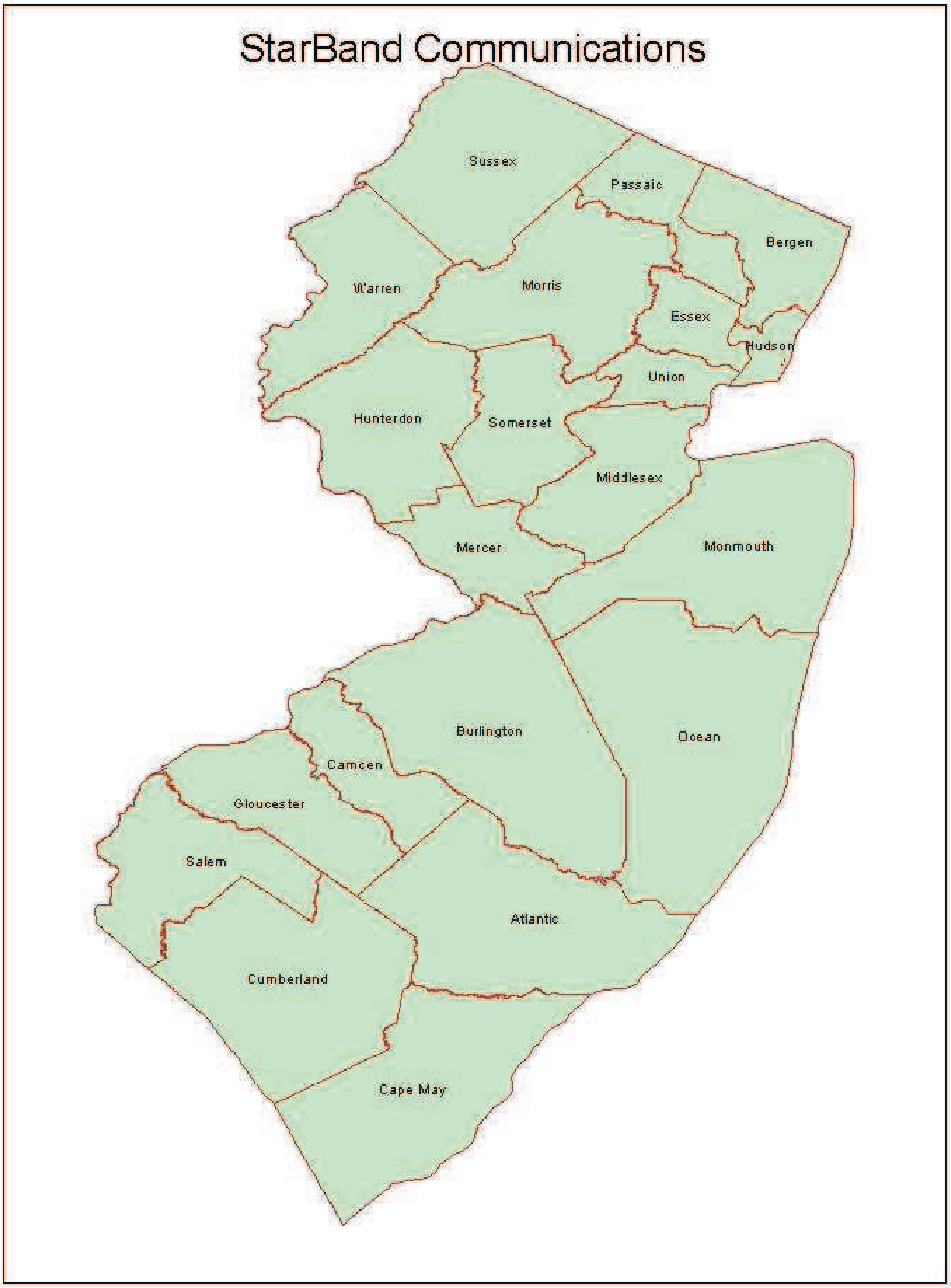
No, we do not. StarBand is the provider of consumer broadband. StarBand is a part of another company, Spacenet Inc., but Spacenet is not a provider of consumer broadband services.

Please let me know if you have any further questions.

Lesley

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Service Electric Cable TV of Sparta
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

135. NDA Status
136. Submission Overview
137. Submission File Details
138. Data Validations and Results
139. Data Transformation and Loading
140. Clarification Questions and Provider Responses
141. Notes and Open Issues

Section 1: NDA Status

No NDA executed.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name “Doing business as” name FRN	Service Electric Cable TV of NJ Inc. Service Electric Broadband Cable 0005007125
FOR WIRELINE		
Filetypes	Text	
File size	9728 bytes	

Speeds

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		Municipality
Advertised-downstream		Municipality
Subscriber-weighted-up		Municipality

	Subscriber-weighted-down		Municipality	
Technology Type	Docsis 3.1 (will use code 40)			
End-user specification	Not provided			
Comments:				
INTERCONNECTION DATA				
ID				
File size	Several addresses provided			
Ownership	Not provided			
Transport Type	Fiber			
Data Rates/Capacity	One says "Fiber 10 gbps"; others have no statement - Clarified this via email. See answers below.			
Location	Address			
Comments:				

Section 3: Submission File Details

Received one (1) file by EMAIL:

Size **Name**
9728 Broadband data Information.xls

Received a spreadsheet with information on the municipalities served in entirety, the technology of transmission, the modem speeds offered to customers, and some connection points.

We will gather all the census blocks in the municipality based on the TigerLine reference data and report those shapes in the BB_service_censusblock table.

Section 4: Validations and Results

Municipality names were normalized to agree with Census Bureau reference data.

In this submission the speeds appear to be provided in a straightforward fashion as Max.Down/MaxUp values, the 'Combined' value can probably be ignored.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from 8 rows in the supplied Excel spreadsheet. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of NJ Inc.” per email response
DBANAME	Set to “Service Electric Broadband Cable” per email response
FRN	Set to “0005007125” per email response
OWNERSHIP	Set to 0 to indicate owned per email
BHCAPACITY	Set to null, not provided
BHTYPE	Set to null, not provided
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

40. Created an excel sheet and imported to a geodatabase table.
41. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
42. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded based on the supplied file “Broadband data Information.xls”. We submitted all census blocks less than 2 square miles in the named municipalities. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of NJ Inc.” per email response
DBANAME	Set to “Service Electric Broadband Cable” per email response
PROVIDER_TYPE	Set to 1
FRN	Set to “0005007125” per email response
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)

BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to 41 (Cable Modem – Other) per file
MAXADDOWN	Set to code 7 per max speed 30Mbps on web site
MAXADUP	Set to code 4 per max speed 2Mbps on web site
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

51. Created a file with municipality names that match exactly names in the “name” column in the Year 2000 Census Bureau TigerLine database. Primarily this meant changing “Boro” to “Borough”.
52. Joined against reference data to discover census blocks, for a total of 4,135 blocks.

NTIA Table BB_Service_RoadSegment

Loaded with street segments in census blocks larger than 2 square miles as gathered from Census Bureau TigerLine reference data. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of NJ Inc.” per email response
DBANAME	Set to “Service Electric Broadband Cable” per email response
PROVIDER_TYPE	Set to 1
FRN	Set to “0005007125” per email response
ADDMIN	From reference data
ADDMAX	From reference data
PREDIR	Set to null, not available in reference data
STREETNAME	From reference data
STREETTYPE	Set to null, not available in reference data
SUFFDIR	Set to null, not available in reference data
CITY	From reference data
STATECODE	Set to "NJ"
ZIP5	From reference data
ZIP4	Set to null, not available in reference data
TRANSTECH	Set to 41 (Cable Modem – Other) per email Docsis-2.0
MAXADDOWN	Set to code 7 per max speed 30Mbps on web site
MAXADUP	Set to code 4 per max speed 2Mbps on web site
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	From reference data

Internal processing notes:

3. Discovered all street segments that touch census blocks larger than 2 square miles using the census block list discovered as discussed for table BB_Service_Censusblock.
4. Joined against reference data to discover street segment, for a total of 2,223 entries.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, March 10, 2011 8:54 AM
To: 'cherie@secable.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: Service Electric of Sparta - NJ BB Data Clarifications

Cherie,
We have reviewed the data you submitted to the NJ Broadband Data Mapping program and have a few clarification questions about the middle mile data you submitted:

4. You list Fiber at 10Gbps with one address in your middle mile list. Do you have this same type of connection at all the locations listed? If not, can you please provide the technology and speed for each location?
5. Do you own or lease the facilities at the interconnection points you have listed?

We appreciate your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: James Galliford [mailto:james.galliford@secable.com]
Sent: Thursday, March 10, 2011 1:13 PM
To: ConnectingNJ@research.telcordia.com
Cc: cherie@secable.com
Subject: Re: FW: Service Electric of Sparta - NJ BB Data Clarifications

Hello John,

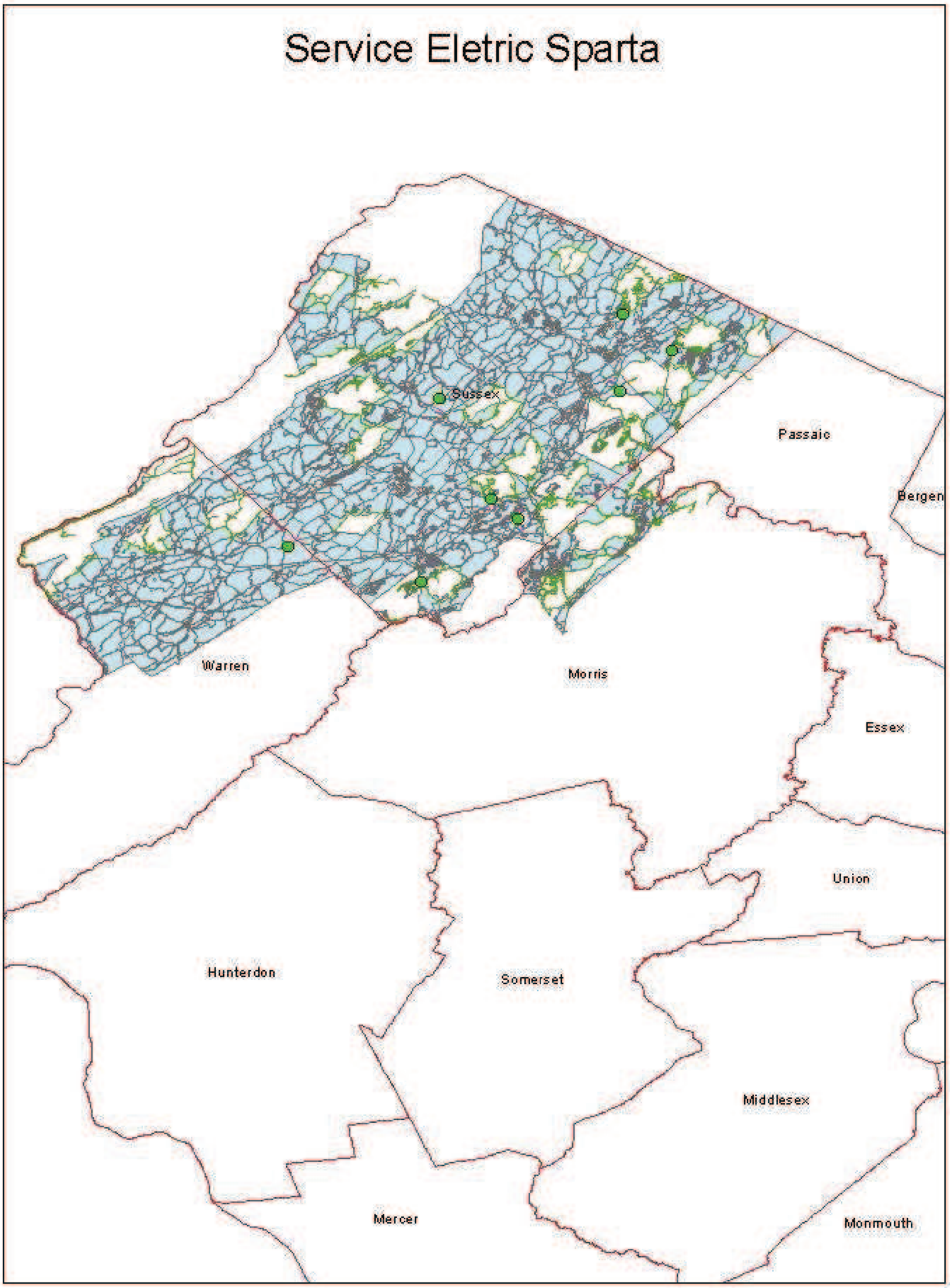
I hope my answers clear up your questions:

1. Further detail into interconnection links:
    1. 320 Sparta Ave, Sparta, NJ & 50 Esto Lane, Hamburg, NJ are interconnected via dual 10Gbps circuits
    2. All other hubsites are connected via dual 1Gbps circuits
2. We own all of the facilities used for data propagation.

Thanks.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Time Warner
Received: February 2010
Submission date: April 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

142. NDA Status
143. Submission Overview
144. Submission File Details
145. Data Validations and Results
146. Data Transformation and Loading
147. Clarification Questions and Provider Responses
148. Notes and Open Issues

Section 1: NDA Status

NDA established with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA			
ID	PROVIDER NAME	Time Warner Cable, LLC	
	DBA NAME	Time Warner Cable	
	FRN	0013430244	
	Holding company name	Time Warner Cable Inc.	
	Holding company number	131352	
FOR WIRELINE			
Filetypes	Time Warner supplied 1 .txt file, a pdf letter, and a shapefile showing coverage on FIPS census block level.		
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	
	Upstream max adv	yes (code 5). census block.	
	Downstream max adv	yes (code 9). census block	
	Upstream typical	not provided.	

	Downstream typical	not provided	
	Subscriber-weighted	yes – provided in 2 counties serviced in NJ for 2 cable technologies (40, 41)	
Technology Type	40, 41		

Comments: **‘typical’ vals not found.**

INTERCONNECTION DATA: INSTRUCTED TO USE PREVIOUS DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	

Comments: **not provided.**

Quick loading results: 501 polygons in shapefile, spanning 2 counties in NJ.

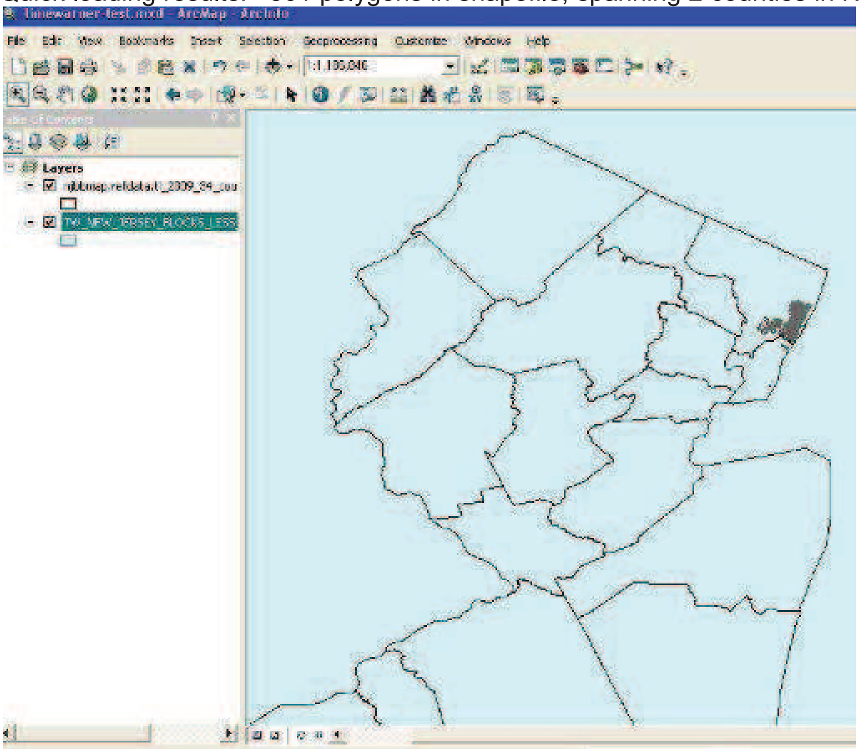


Figure 1. Loading results

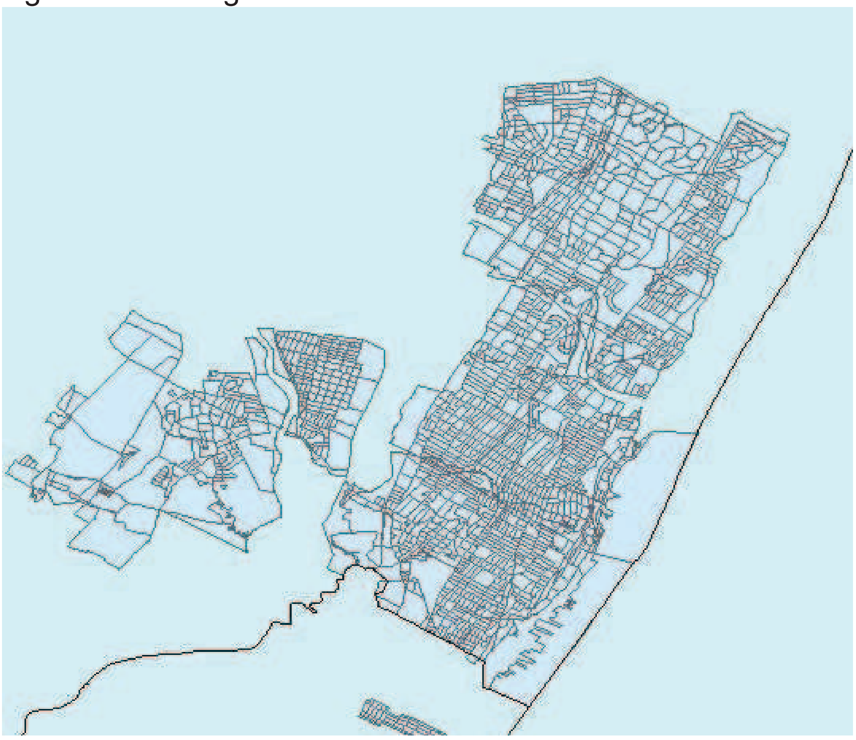


Figure 2. Zoom in on provided data

Section 3: Submission File Details

Received 5 (key) files by (EMAIL, SECURE UPLOAD):

Size	Name
1KB	0013430244_blendedaverage_NJ_12312010.txt
620KB	TW_NEW_JERSEY_BLOCKS_LESS_THAN_2MI_JAN_2011.dbf
1KB	TW_NEW_JERSEY_BLOCKS_LESS_THAN_2MI_JAN_2011.prj
510KB	TW_NEW_JERSEY_BLOCKS_LESS_THAN_2MI_JAN_2011.shp
15KB	TW_NEW_JERSEY_BLOCKS_LESS_THAN_2MI_JAN_2011.shx

Section 4: Validations and Results

File " 0013430244_blendedaverage_NJ_12312010.txt"

Contains name, DBA, FRN, county, state, technology of transmission (values 40 and 41), and subscriber-weighted nominal speed. As of this round we are not submitting overview data, so we will not use the SWNomSpeed values.

Shape “TW_NEW_JERSEY_BLOCKS_LESS_THAN_2MI_JAN_2011” in the shapefile "0013430244_area_availability_NJ_12312010" (1,899 rows)

See above for preview pictures. Shapes use XY coordinate system GCS_North_American_1983. Provides census-block shapes and associated speed data. All census block IDs are length 15, suggesting they are Year 2000 Census geometry. Only technology code 40 is present. Maximum advertised speed codes are present, which is a change from the previous submission. Typical speed codes are all zero like the previous submission; we will not submit typical speeds. Has notably fewer rows than in the last submission, possibly because rows are not present for tech code 41?

NOT PRESENT - SEE PREVOUS DATA REPORTS

- Middle-mile data - we will reuse data from the June 2010 submission per clarification email.
- Typical upstream/downstream values not provided and will not be submitted.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file “0013430244_middlemile_NJ_06302009.txt” (19 rows, only 1 in New Jersey), as received in June 2010. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “Time Warner Cable LLC” (“LLC” was missing)
DBANAME	As supplied in column ”DBAName”
FRN	Set to “0013430244”
OWNERSHIP	As supplied in column ”Ownership”
BHCAPACITY	As supplied in column ”Serving Facility Capacity”
BHTYPE	As supplied in column ”Serving Facility Type”
LATITUDE	As supplied in column “Latitude”
LONGITUDE	As supplied in column “Longitude”
ELEVFEET	As supplied in column “Elevation”
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau reference data
SHAPE	Point corresponding to Lat, Long created using ESRI ArcDesktop

Internal processing notes from prior report:

43. Created an excel sheet and imported to a geodatabase table.
44. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
45. We dropped all locations outside the New Jersey state boundary, leaving just one. In this row, the elevation value is 30, and we were told in June 2010 that the connection point is on the 7th floor of a building, so we did not change the value.
46. Added a column with the ID of the containing Year 2000 Census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied shape file. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Time Warner Cable LLC” (“LLC” was missing)
DBANAME	As supplied in column ”DBAName”
PROVIDER_TYPE	Set to 1
FRN	Set to “0013430244”
STATEFIPS	Set to “34”
COUNTYFIPS	Populated from cb_fips (digits 3-5)
TRACT	Populated from cb_fips (next 6 digits)
BLOCKID	Populated from cb_fips (next 4 digits; dropped 5th character if present)
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column cb_fips

TRANSTECH	As supplied in column tech_trans
MAXADDOWN	As supplied in column max_ad_dwn
MAXADUP	As supplied in column max_ad_up
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
SHAPE	As supplied

Internal notes on processing

1. Geographic coordinate system: The supplied shape uses geographic coordinate system name GCS_North_American_1983. The NTIA transmittal data model requires coordinate system GCS_WGS_1984. To change the projection we applied the geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159). We also had to load the data into a second feature class such that the tolerance value matches the NTIA transmittal model's value of 0.000000002.
2. Census Blocks: The submitted shapefile seems to use Census 2000 geometry, judging from the block IDs that are all 15 characters long. All submitted block IDs are unique and were found in Year 2000 reference data.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 3:18 PM
To: monique.crawford@twcable.com
Cc: 'NJ Broadband Data Collection'
Subject: Time Warner NJ Broadband Data Clarifications

Monique,
We have reviewed the data you submitted to the NJ Broadband data program and have a few questions:

1. In your last submission, you included information on your middle-mile access points. That was not included with the current submission. Is the prior data still valid? If not, could you please provide updated information?
2. Your submission did not include any information on the typical speeds experienced by your customers. Is this information you have available and could provide to us?

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Crawford, Monique [mailto:monique.crawford@twcable.com]

Sent: Wednesday, March 09, 2011 4:35 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Time Warner NJ Broadband Data Clarifications

Hello John:

Please see my clarifications below. Let me know if you need anything else.

Sincerely,

Monique R. Crawford
Regulatory Affairs
Time Warner Cable
13820 Sunrise Valley Dr.
Herndon, VA 20171

(703) 345-3175 Office
(703) 554-5019 Mobile
(704) 697-4933 E-fax

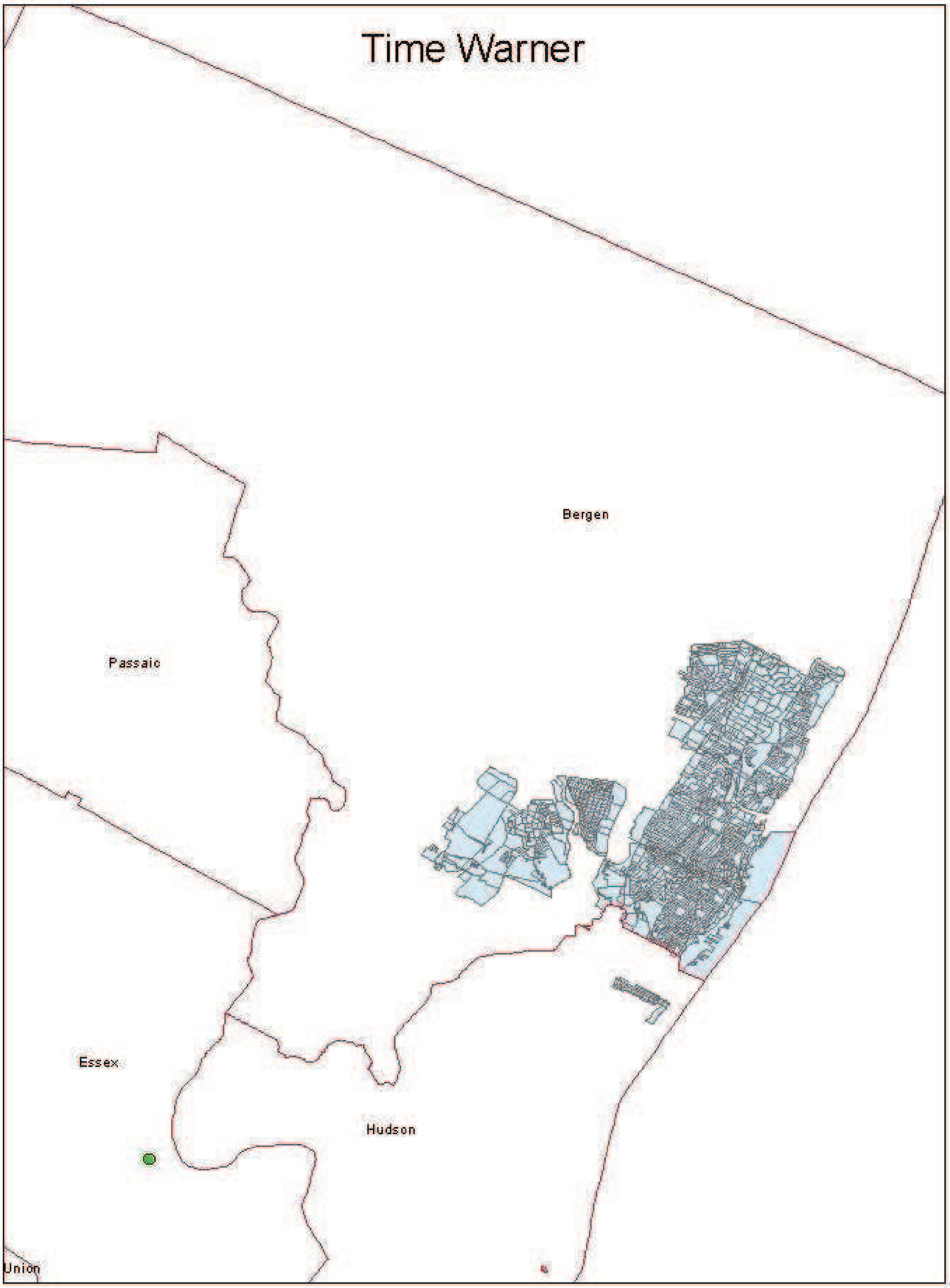
From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 3:18 PM
To: Crawford, Monique
Cc: 'NJ Broadband Data Collection'
Subject: Time Warner NJ Broadband Data Clarifications

Monique,
We have reviewed the data you submitted to the NJ Broadband data program and have a few questions:

1. In your last submission, you included information on your middle-mile access points. That was not included with the current submission. Is the prior data still valid? If not, could you please provide updated information?
   TWC's Middle-Mile data has not changed. Please use the data from the original submission.
2. Your submission did not include any information on the typical speeds experienced by your customers. Is this information you have available and could provide to us?
   Information regarding the typical speeds experienced by customers is not available.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: T-Mobile
Received: 23 February 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

149. NDA Status
150. Submission Overview
151. Submission File Details
152. Data Validations and Results
153. Data Transformation and Loading
154. Clarification Questions and Provider Responses
155. Notes and Open Issues

Section 1: NDA Status

Executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	PROVIDER NAME	T-Mobile USA, Inc.
	DBA NAME	T-Mobile
	FRN	0006945950
	Holding company name	T-Mobile USA
	Holding company number	130403
FOR WIRELESS		
Filetypes	T-mobile supplies .xls, .txt. and shapefiles (availability). They supply 2 sets of shape files: one for HSPA+ coverage and another for 3G coverage.	
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)
	Upstream max adv	yes (shapefiles for both 3G and 4G)
	Downstream max adv	yes (shapefiles for both 3G and 4G)
	Upstream typical	not found.

	Downstream typical	not found.
	Subscriber-weighted	Provided as a table of vals in mbps (not kbps) correlated to 20 FIPS codes (code 80)
Technology Type	Spectrum (Mhz, FCC code)	Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155)
Comments: **'typical' vals not found.**		

INTERCONNECTION DATA	
ID	
File size	10 rows
Ownership	Code 1
Transport Type	Type 1
Data Rates/Capacity	codes 4 and 5
Location	lat/lons given for all (either A or Z end is in NJ)
Comments:	

Quick loading results:

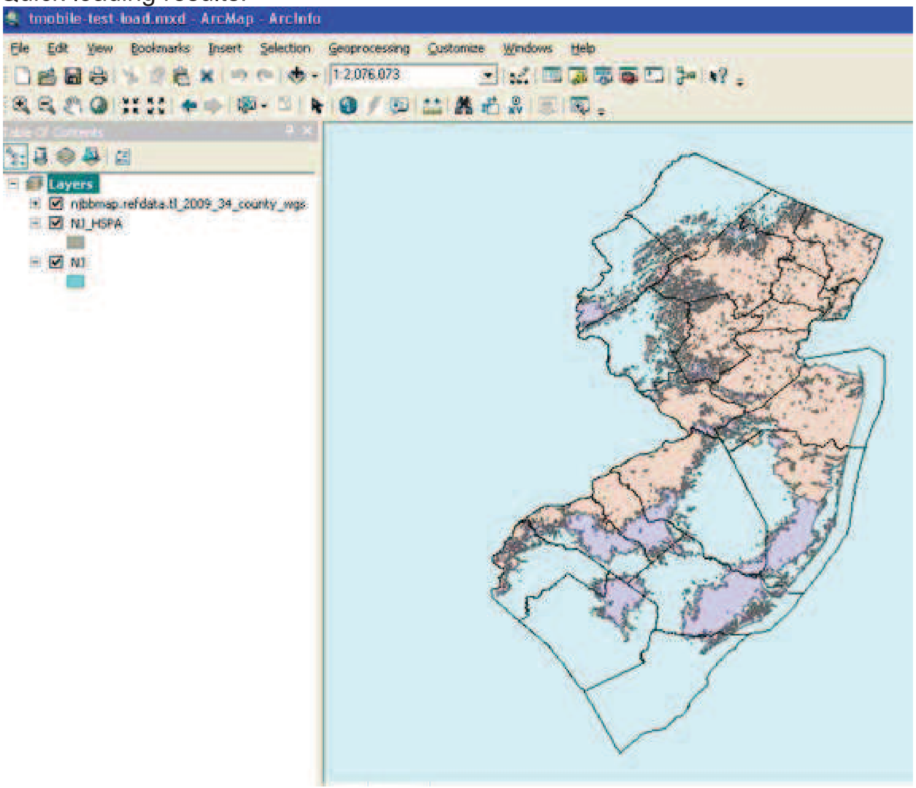


Figure 1. Loading results

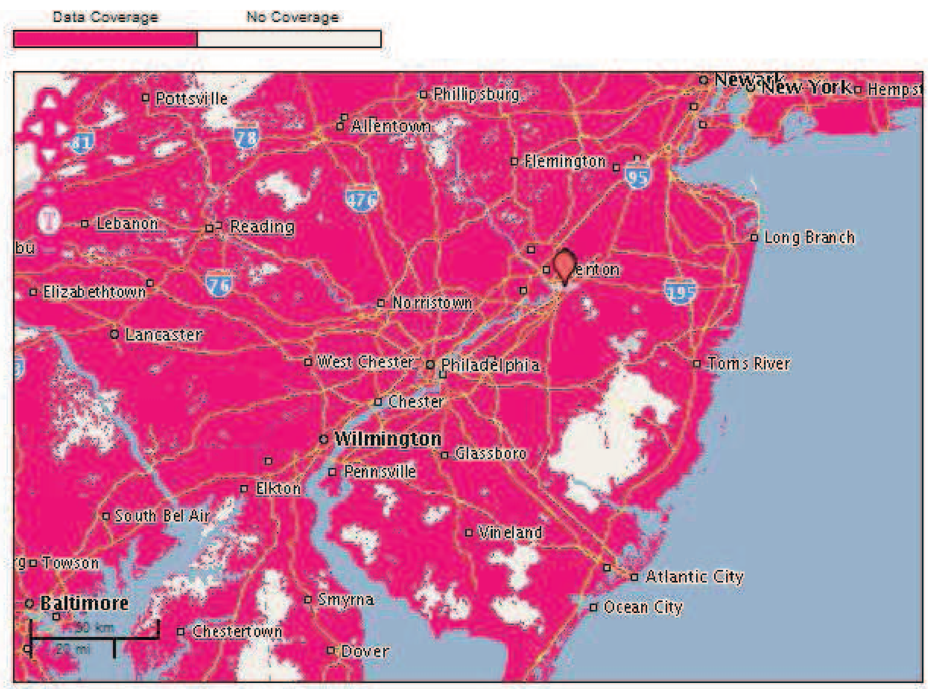


Figure 2. T-Mobile Website (“data coverage”).

Section 3: Submission File Details

Received 13 file by (EMAIL, SECURE UPLOAD):

Size	Name
2152KB	Area_availability.zip (contains below shape files)
3KB	Area_availability.txt
1KB	Middle_mile_NJ.txt
10KB	Middle_mile_NJ.xls
1KB	avg_speed_nj.xls
1KB	NJ.dbf
1KB	NJ.prj
4617KB	NJ.shp
1KB	NJ.shx
1KB	NJ_HSPA.dbf
1KB	NJ_HSPA.prj
2569KB	NJ_HSPA.shp
1KB	NJ_HSPA.shx

Section 4: Validations and Results

We validated the following data items in the original submission.

Geospatial Data
- Received two shape files (one polygon each) with shapes within the state of New Jersey. See above for initial load of shapefiles onto Arcmap.

Middle Mile Data
- File middle_mile_nj.xls lists 10 connections, with 3 unique endpoints in New Jersey. Ownership, facility capacity, facility type codes are all valid

Speed/Technology Data
- File area_availability.txt provides technology and spectrum codes that are within the valid set
- File avg_speed_nj.xls provides subscriber-weighted nominal speeds, which we will not be using for this round (no overview table required).

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file “middle_mile_NJ.xlsx” (14 rows, 3 unique points). The following table explains the transformations that were applied.

Table	Data Source / Transformation

Column	
PROVNAME	Set to “T-Mobile USA, Inc."
DBANAME	Set to "T-Mobile"
FRN	Set to “0006945950”
OWNERSHIP	As provided in column Ownership (value 1)l
BHCAPACITY	As provided in column Serving Facility Capacity
BHTYPE	As provided in column Serving Facility Type
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	As provided in column State
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

47. Created an excel sheet with the original data and imported to a geodatabase table.
48. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
49. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the Year 2000 census block shapes from Tiger Line reference data.
50. Reused the source table created in October 2010 by this process.

NTIA Table BB_Service_Wireless

Loaded from the supplied shapefiles “NJ” and “NJ_HSPA”. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "T-Mobile USA, Inc." per area_availability_NJ.txt
DBANAME	Set to “T-Mobile" per area_availability_NJ.txt
FRN	Set to “0006945950”
TRANSTECH	Set to 80 per area_availability_NJ.txt
SPECTRUM	Set to “4” per translation shown below
MAXADDOWN	Set to 4 or 6 according to shapefile (technology), as specified in file area_availability_NJ.txt
MAXADUP	Set to 2 or 4 according to shapefile (technology), as specified in file area_availability_NJ.txt
TYPICDOWN	Set to null (not supplied)
TYPICUP	Set to null (not supplied)
STATEABBR	Set to "NJ”
SHAPE	As supplied.

Internal notes on processing:

18. The supplied shapes use geographic coordinate system name GCS_North_American_1983. The NTIA data model requires coordinate system GCS_WGS_1984. To change the projection we applied the ESRI geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159). We also had to load the data into a feature class such that the tolerance value matches the NTIA transmittal model.
19. Spectrum: NOFA defines 7 spectrum columns. T-Mobile provided a “Y” value in column 4 (Advanced Wireless Services, ranges 1710-1755 MHz; 2100-2155) in file area-availability_NJ.txt, so we coded the value as '4'.
20.

Section 6: Clarification Questions and Responses

1. Submitted shapes bear some - but not exact - resemblance to the “data coverage maps” on tmobile.com (see Figure 2). While the Web maps are not guaranteed to be completely precise it may be worth asking about the differences. E.g., the no coverage region in the Web map seems to be smaller than what we find on the submitted shapefiles.

2. No upstream/downstream ‘typical speeds’ found.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 1:46 PM
To: 'jeni.wilcox@t-mobile.com'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: NJBB Clarification questions

Jeni,

We have reviewed the data you submitted to the NJ Broadband mapping program and have a few clarification questions:

5. The shapes file you submitted is similar but not identical, to the the data coverage map that is published at tmobile.com. For example, the region without coverage appears smaller on the Web map than on the submitted shape files. Could you provide an explanation for the differences?
6. The NTIA is encouraging us to request and submit to them typical speeds as experienced by your customers. Are you willing to provide this data?

Thanks for your participation in the program.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Wilcox, Jeni [mailto:Jeni.Wilcox@t-mobile.com]
Sent: Friday, March 04, 2011 2:02 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarification questions

Hi John,

Thanks for the email. Please see my responses below in red. Please let me know if you have further questions.

Thanks,
Jeni

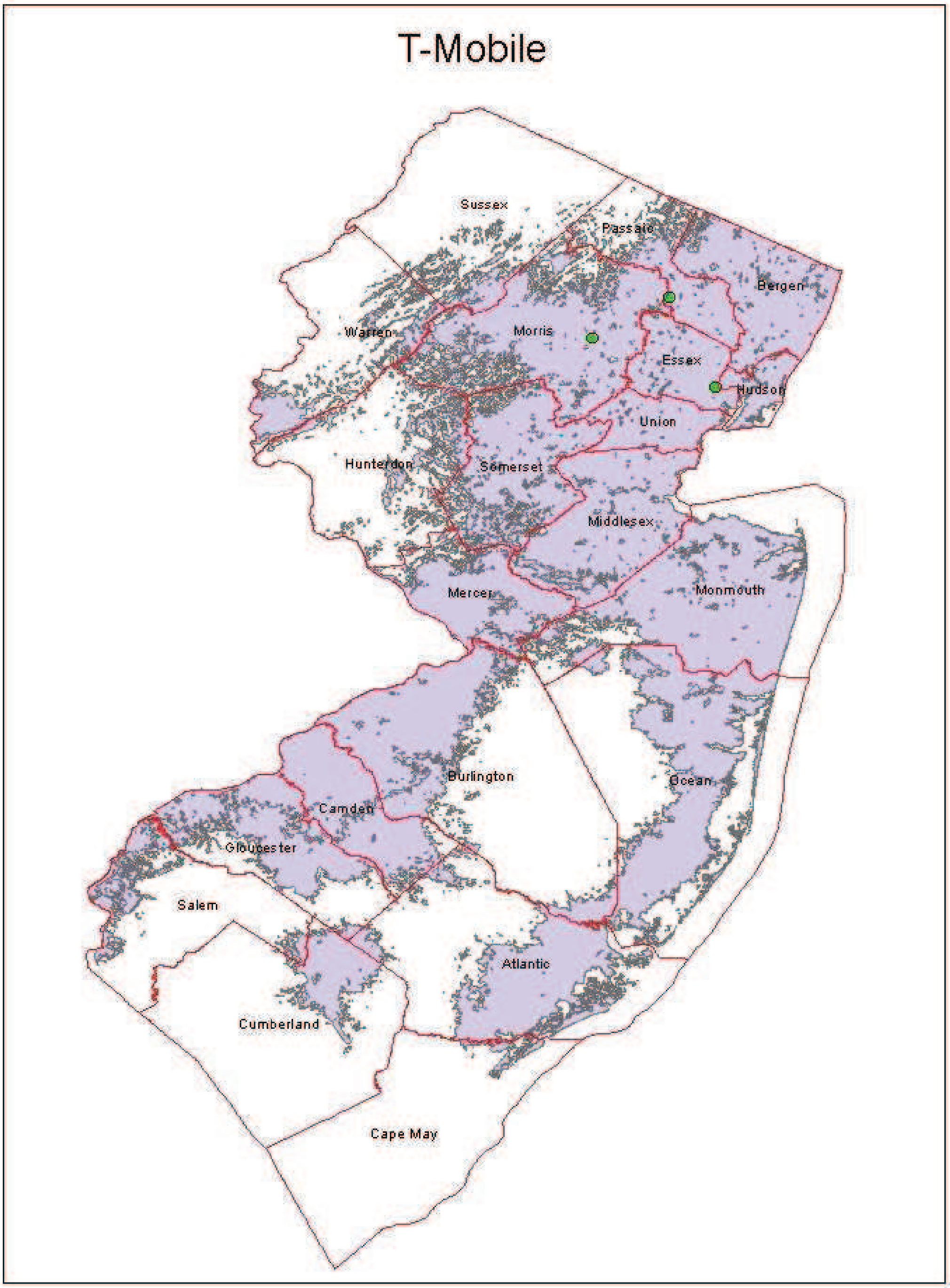
From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 10:46 AM
To: Wilcox, Jeni
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarification questions

Jeni,
We have reviewed the data you submitted to the NJ Broadband mapping program and have a few clarification questions:

3. The shapes file you submitted is similar but not identical, to the the data coverage map that is published at tmobile.com. For example, the region without coverage appears smaller on the Web map than on the submitted shape files. Could you provide an explanation for the differences? The differences are likely due to the fact that T-Mobile.com displays current coverage and the shapefile I sent to you represent broadband coverage as of 12/31/10.
4. The NTIA is encouraging us to request and submit to them typical speeds as experienced by your customers. Are you willing to provide this data? T-Mobile is not providing typical speed data.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: tw telecom of new jersey l.p.
Received: March, 2011
Submission date: March 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

156. NDA Status
157. Submission Overview
158. Submission File Details
159. Data Validations and Results
160. Data Transformation and Loading
161. Clarification Questions and Provider Responses
162. Notes and Open Issues

Section 1: NDA Status

NONE

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name	tw telecom of new jersey l.p.
	"Doing business as" name	Not provided
	FRN	0004351417
	Holding company name	tw telecom inc.
	Holding company number	160153
FOR WIRELINE		
Filetypes	Text	
File size	3419 bytes, 35 records	

Speeds

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		Address; values 2..11
Advertised-downstream		Address; values 2..11

	Subscriber-weighted-up	Not provided	
	Subscriber-weighted-down	Not provided	
Technology Type	30 (Other copper) and 50 (fiber)		
End-user specification	4 (medium – large enterprise)		
Comments:			

INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: None provided	

Section 3: Submission File Details

Received 1 file by secure upload:

Size	**Name**
3419	NJBB_0004351417_AddressLevelAvailability.txt

The file has 35 records. All are addresses; no apartment/suite/unit numbers are provided. Some addresses are repeated, sometimes with different speed numbers, suggesting that these entries are customer service addresses. Several are the addresses of multi-tenant buildings.

Section 4: Validations and Results

All addresses could be geocoded. All coded values in the tech trans and speed columns are valid.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file “NJBB_0004351417_AddressLevelAvailability.txt”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider Name”
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”, with leading zeroes
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology of Transmission
MAXADDOWN	For technology 30: Set to 7, the max val in MaxAdDown For technology 50: Set to 11, the max val in MaxAdDown
MAXADUP	For technology 30: Set to 7, the max val in MaxAdDown For technology 50: Set to 11, the max val in MaxAdDown
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

51. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each..
52. Created an excel sheet and imported it to a geodatabase table.
53. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
54. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
55. Discarded 11 rows with duplicate census blocks, which means multiple customers are present in the same census block.

The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

1. Based on the prior interactions with the provider, the following was assumed:

DBNAME	- not supplied; set same as PROVNAME
address level data	- need to obfuscate
middle mile	- none
typical speeds	- not provided

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 8:27 AM
To: 'tammy.chatfield@twtelecom.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: TW Telecom Clarification Questions

Tammy,
We have reviewed the data you submitted to the NJ Broadband data Mapping program and have two clarification questions:

1. During your last submission, you indicated that you did not have any middle mile connection points in NJ. Is that still the case?
2. You provided us with maximum advertised speeds. Would it be possible for you to provide typical speeds experienced by your customers?

Thanks for your participation in the program.

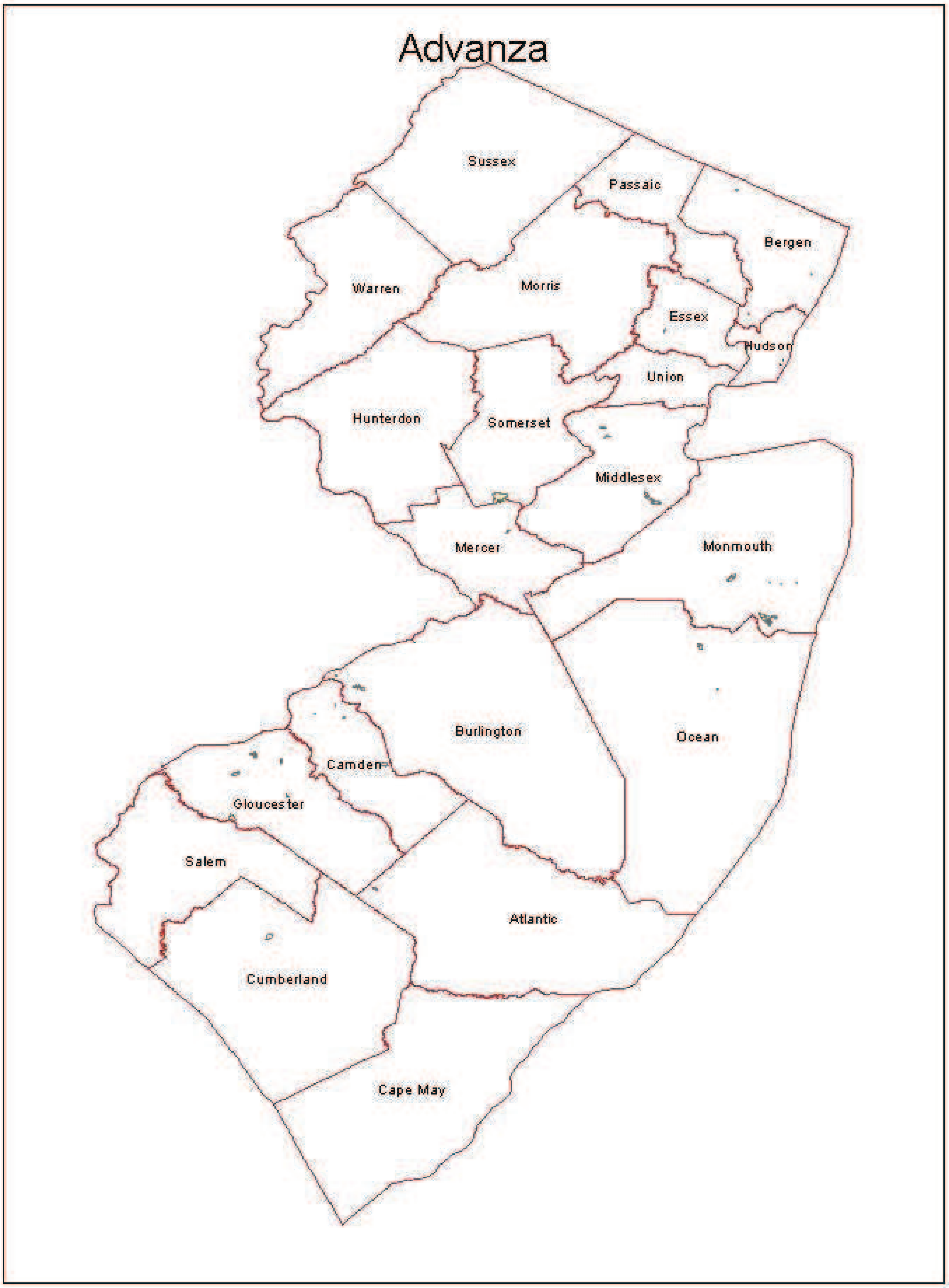
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Chatfield, Tammy [mailto:Tammy.Chatfield@twtelecom.com]
Sent: Tuesday, March 08, 2011 8:45 AM
To: ConnectingNJ@research.telcordia.com
Subject: RE: TW Telecom Clarification Questions

1. Correct, we do not have any middle mile facilities in NJ.
2. Unfortunately, we do not have any information on typical speeds.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Verizon
Received: September, 2010
Submission date: October 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

163. NDA Status
164. Submission Overview
165. Submission File Details
166. Data Validations and Results
167. Data Transformation and Loading
168. Clarification Questions and Provider Responses
169. Notes and Open Issues

Section 1: NDA Status

Verizon executed an NDA with NJ OIT.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Must choose one of 7
DBA name(s) not provided
Must choose one of 7</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Text and excel</td></tr>
<tr><td>File size</td><td colspan="2">See below</td></tr>
<tr><td>Speeds</td><td colspan="2">
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>County (code 7)</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>County (code 9)</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
</table>
</td></tr>
</table>

	Subscriber-weighted-down		County	
Technology Type	DSL (10) and FTTP (50)			
End-user specification	Not provided (no availability data by address, so not needed)			
Comments: Cover letter lists several business entities. Data file columns for provider, DBA name, FRN are always blank.				
INTERCONNECTION DATA				
ID				
File size	Excel file, 11 riwsm see below			
Ownership	Not provided			
Transport Type	Not provided			
Data Rates/Capacity	Not provided			
Location	Address			
Comments:				

Section 3: Submission File Details

Received these files by CD-ROM (forwarded by NJ OIT, arrived 2 September 2010):

Directory 1_Broadband Service Availability Data by Census Block:

Size	**Name**
584	NJ - Advertised Speed by County.txt
5618170	NJ - Wireline Service By Census Block.txt
136288	NJ - Wireline Service By Street Segment.txt

Directory 2_Residential Broadband Service Pricing and Speed Characteristic:

Size	**Name**
2294	NJ - Pricing.txt

Directory 3_Middle Mile Data:

Size	**Name**
24064	NJ - POP List (as of 6-30-10).xls

Section 4: Validations and Results

We validated the following data items in the original submission.

File “NJ - Advertised Speed by County.txt” (21 rows)

Lists these columns (* indicates no data): Provider Name*, DBA Name*, FRN*, ID, County FIPS Code, County Name, Maximum Advertised Downstream Speed, Maximum Advertised Upstream Speed.

County codes are valid. Speed codes are valid; every county is listed at 9 (down) and 7 (up).

File “NJ - Wireline Service By Census Block.txt” (158,653 rows)

Lists these columns (* indicates no data): ProviderName*, DBAName*, FRN*, ID, 2009 Census Block FIPS Code, 2009 Census Block Square Miles, Technology of Transmission.

All block IDs were matched against Year 2009 Census Bureau TigerLine reference data. Two technology codes are present, 10 and 50, both are valid.

File “NJ - Wireline Service By Street Segment.txt” (1,775 rows)

Lists these columns (* indicates no data): Provider Name*, DBA Name*, FRN*, ID, Census Block FIPS Code, Census Block Square Milage, TLID, Street Name, FRADDL, TOADDL, FRADDR, TOADDR, Technology of Transmission.

All block IDs were matched against Year 2009 Census Bureau TigerLine reference data for blocks 2 sq mi or larger. All TigerLine IDs were matched against the same reference data source. Note that the input set contains 19 records that are duplicates when checked by county (characters 2..5 of Census Block FIPS Code) TLID and TechTrans; the census blocks are different for the records. To avoid duplicates in the target table, these records were discarded.

File “NJ - Pricing.txt” (43 rows)

This file provides subscriber-weighted nominal speeds. The columns are not labeled but appear to be as follows (* indicates no data in any row): Provider_Name, DBA Name*, FRN, County ID (based on odd numbers 1..41), State, Technology of Transmission, Unlabeled*, Subscriber Weighted Nominal Speed.

The county IDs are valid, the state ID (“34”) is valid, and the technology of transmission codes 10, 20, and 50 are all valid. The Subscriber Weighted Nominal Speed values are plausible for the specified technology of transmission codes; e.g., DSL speeds are about 4,000. However, every FIOS speed is shown at 25,000 or higher. Given the availability of FIOS/FTTP plans at download speeds of less than 25Mbps, it seems unlikely that not a single customer uses one of those plans and/or that so many customers use a 50Mbps plan that the average is brought up so high.

File “NJ - POP List (as of 6-30-10).xls” (11 rows)

Column names: Address, City, State, Zip.

We geocoded the addresses to obtain latitude, longitude value pairs. All addresses were found. However, Verizon did not supply needed information on the elevation, ownership, serving facility capacity, and service facility type of these addresses. In June 2010 Verizon indicated they had no intention of supplying this information.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied Excel Spreadsheet “NJ - POP List.xls” (11 rows). The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Verizon Online LLC””
DBANAME	Set to “Verizon”
FRN	Set to “0012254363”
OWNERSHIP	Set to null
BHCAPACITY	Set to null
BHTYPE	Set to null
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

56. Created an excel sheet and imported to a geodatabase table.
57. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
58. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied text file “NJ - Wireline Service By Census Block.txt” (158,653 rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Verizon Online LLC”
DBANAME	Set to “Verizon”
RESELLER	Set to “N”
FRN	Set to “0012254363”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from 2009_Census_Block_FIPS_Code (1st 3 digits)
TRACT	Populated from 2009_Census_Block_FIPS_Code (next 6 digits)
BLOCKID	Populated from Census_Block_FIPS_Code (next 4 digits; dropped 5th character if present)
BLOCKSUBGROUP	Set to null
FULLFIPSID	First 15 digits of 2009_Census_Block_FIPS_Code See discussion of Census blocks below.
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	Set to 6 or 9, see below.
MAXADUP	Set to 3 or 7; see below
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, As matched by Census block 2000 ID

Internal processing notes:

3. Census Blocks: Verizon supplied Census 2009 block IDs (15 or 16 characters). The NTIA directed us to supply data using Census 2000 blocks for the October 2010 data submissions, including the shapes. We transformed the data as follows. The vast majority of 2000 versus 2009 blocks are identical; most of the blocks newly added in the Census 2009 data were formed by splitting Census 2000 bocks into smaller pieces. We show service available in a Census 2000 block if any Census 2009 block that has the Census 2000 block ID as a proper prefix has service available. Of the original data, 141,002 rows required no changes; 17,651 rows have Census 2009 blocks with IDs that are a proper prefix of 2000 blocks IDs; no other cases were found. Altering the rows with Census 2009 block information meant discarding 7,335 duplicate rows (i.e., split blocks). Some of the resulting year-2000 blocks are large. We cannot report large blocks in this table. Instead, we reported the same availability by street segment for all streets in those large blocks by joining against the Census Bureau Tiger Line 2009 data set.
4. Speeds: We imputed max advertised up and down speeds based on the technology of transmission, the contents of the File “NJ - Advertised Speed by County.txt”, and information on the Verizon web site. Mad adv down for tech code 10 (DSL) is speed code 6, and max adv down for tech code 50 (FIOS) is speed code 9. Max adv up for tech code 10 (DSL) is speed code 3, and max adv up for tech code 50 (FIOS) is speed code 7.

NTIA Table BB_Service_Overview

Loaded from the supplied file “NJ - Pricing.txt” (43 rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Verizon Online LLC”
DBANAME	Set to “Verizon”
FRN	Set to “0012254363”
GEOUNITTYPE	Set to “CO” (county) per NTIA requirement
STATECOUNTYFIPS	As supplied in column Census Block County ID; padded with leading zeros to length 3 and prefixed with “34”
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	Set to 6 or 9, see below.
MAXADUP	Set to 3 or 7; see below
ARPU	Set to null
SWNOMSPEED	As supplied in column Subscriber_Weighted_Nominal_Speed
STATEABBR	Set to “NJ”
SHAPE	Copied from Year 2000 Census Bureau TigerLine reference data, as matched by StateCountyFIPS

Internal notes on processing

1. Speeds: : We imputed max advertised up and down speeds based on the technology of transmission, the contents of the File “NJ - Advertised Speed by County.txt”, and information on the Verizon web site. Max adv up for tech code 10 (DSL) is speed code 3, and max adv up for tech code 50 (FIOS) is speed code 7. Mad adv down for tech code 10 (DSL) is speed code 7, and max adv down for tech code 50 (FIOS) is speed code 9.

NTIA Table BB_Service_RoadSegment

Loaded from supplied text file “NJ - Wireline Service By Street Segment.txt” (1,775 rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Verizon Online LLC”
DBANAME	Set to “Verizon”
RESELLER	Set to “N”
FRN	Set to “0012254363”
ADDMIN	Set to the least of the non-empty address numbers
ADDMAX	Set to the greatest of the non-empty address numbers
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)

CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	(no value supplied)
ZIP4	(no value supplied)
TRANSTECH	As supplied
MAXADDOWN	Set to 6 or 9, see below.
MAXADUP	Set to 3 or 7; see below
TYPICDOWN	(no value supplied)
TYPICUP	(no value supplied)
SHAPE	Copied from Census Bureau TigerLine 2009, As matched by County + Tiger Line ID

Internal notes on processing:

1. We discarded 6 input rows that associate line segments with incorrect census blocks. This mistaken associations are

TLID	CBID
134039790	340057038015000A
134097546	340057038015000A
60466031	340270444019024C
203769459	340297360021005A
65273600	340312568031000A
98114892	340410318002013

    See the appendix to this document for full details.
2. All but one row were supplemented with a line-segment shape from the Census Bureau’s TigerLine data set.
3. Speeds: : We imputed max advertised up and down speeds based on the technology of transmission, the contents of the File “NJ - Advertised Speed by County.txt”, and information on the Verizon web site. Max adv up for tech code 10 (DSL) is speed code 3, and max adv up for tech code 50 (FIOS) is speed code 7. Mad adv down for tech code 10 (DSL) is speed code 7, and max adv down for tech code 50 (FIOS) is speed code 9.
4. Some entries originate from streets within large blocks that we found when changing from Year 2009 to Year 2000 Census Block geography, see discussion of table BB_Service_Censusblock above.

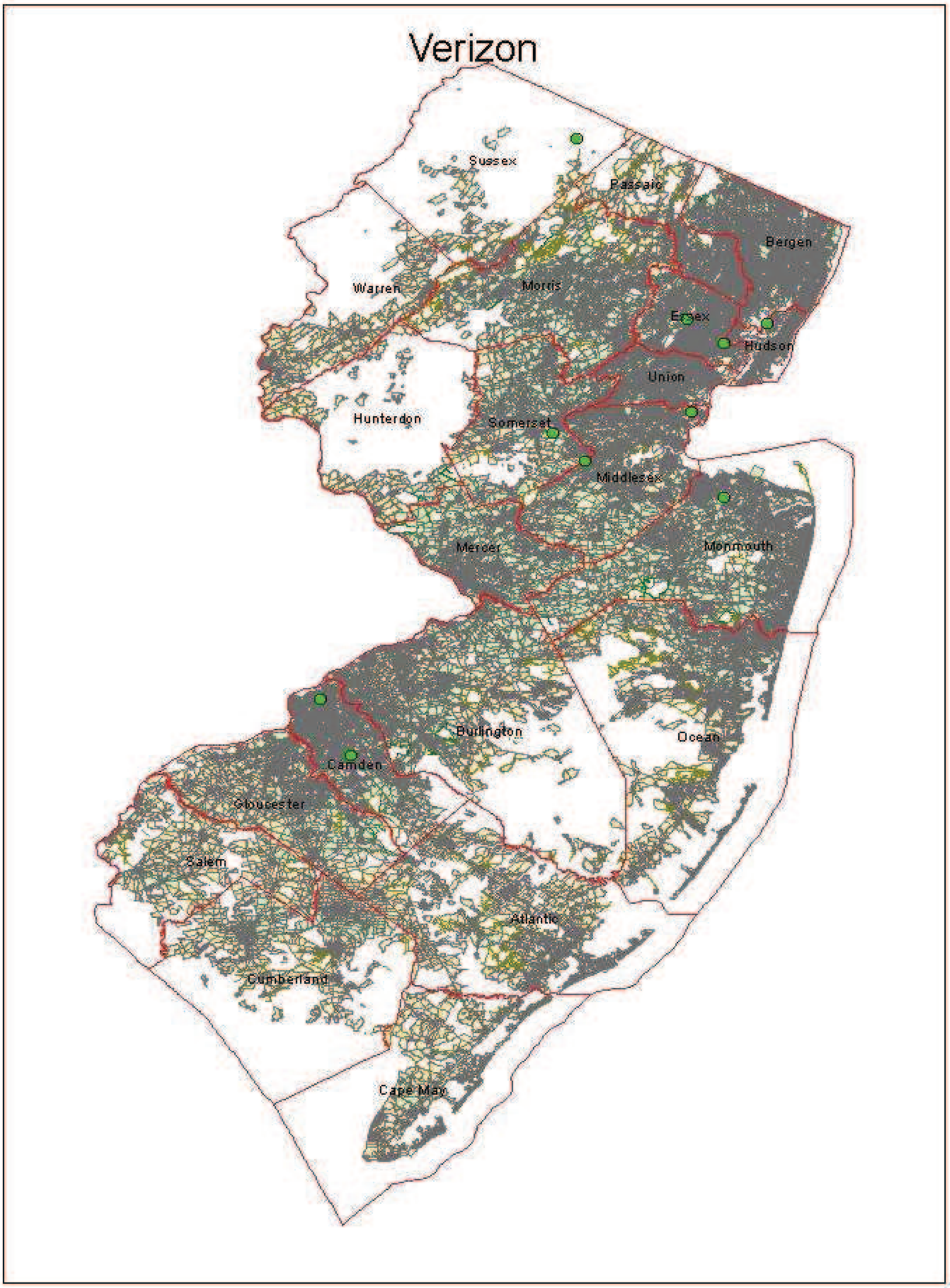
Section 6: Clarification Questions and Responses

1. Most data file rows have no entry for provider name, DBA name, and FRN. The cover letter includes a list of seven Verizon business units, showing their provider names, FRNs, and (some) DBA names. We propose to submit the same information as in June 2010: provider name is “Verizon Online LLC”, DBA name is “Verizon”, and FRN is 0012254363.

2. The NTIA has repeatedly urged us to request and transmit to them speed data at the census block and line segment level. The latest submission from Verizon provides maximum advertised speeds at the county level, which was a very welcome change compared to the previous submission where speed data was shown at the CMA level, however the numbers are the same for all counties. The latest submission does not provide typical speeds at any geographic resolution. Please consider providing this information.
3. We were very glad to see TigerLine ID data in the street segment data file. It would be a great help if the street addresses were provided with the components split into the fields expected by the NTIA, which are PREDIR, STREETNAME., STREETTYPE, and SUFFDIR. We would also like to receive CITY, ZIP5, and ZIP4 for each row.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Voxitas
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

170. NDA Status
171. Submission Overview
172. Submission File Details
173. Data Validations and Results
174. Data Transformation and Loading
175. Clarification Questions and Provider Responses
176. Notes and Open Issues

Section 1: NDA Status

Executed.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN Holding company name Holding company number	Netlogic, Inc. Voxitas 0006825954 Netlogic, Inc. 130896
FOR WIRELINE		
Filetypes	CSV file	
File size	389 bytes, 4 data rows	
Speeds		Address rows with provisioned speed entries were provided.

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		Not provided
Advertised-downstream		Not provided

	Subscriber-weighted-up	Not provided	
	Subscriber-weighted-down	Not provided	
Technology Type	Not provided; confirmed to be copper (prior interactions). Will use - other ("DS1")		
End-user specification	Not provided		
Comments:			
INTERCONNECTION DATA			
ID			
File size			
Ownership			
Transport Type			
Data Rates/Capacity			
Location			
Comments: Not provided			

Section 3: Submission File Details

Received 1 file by secure upload.

Size | **Name**
389 | NJBroadband.csv

The file has 4 (four) rows of data, no column names provided. All have provider's info, customer names and addresses and also speeds. Provider agreed (prior interactions) for the address level data to be submitted to the NTIA. All entries describe DS1 service (established through prior interactions). Speeds listed are the provisioned speeds, not typical or advertised. No coded representations of data such as end user type, technology of transmission, etc. are provided.

Section 4: Validations and Results

No codes etc. were provided; the only possible validations are to check the addresses, and all four appear valid (actually, only two different addresses are provided).

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Year 2000 Census Bureau reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file "NJ Broadband.csv". The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "Netlogic, Inc."
DBANAME	Set to "Voxitas"
RESELLER	Set to "N"
FRN	Set to "0006825954"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to "30"
MAXADDOWN	Set to 3 per input
MAXADUP	Set to 3 per input
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

59. Geocoded the addresses using the Google geocoder.
60. Created an excel sheet and imported to a geodatabase table.
61. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
62. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
63. Discarded NN rows with duplicate census blocks.

The mechanized procedure for the geocoding steps is described in file GeoExcel_proc.txt.

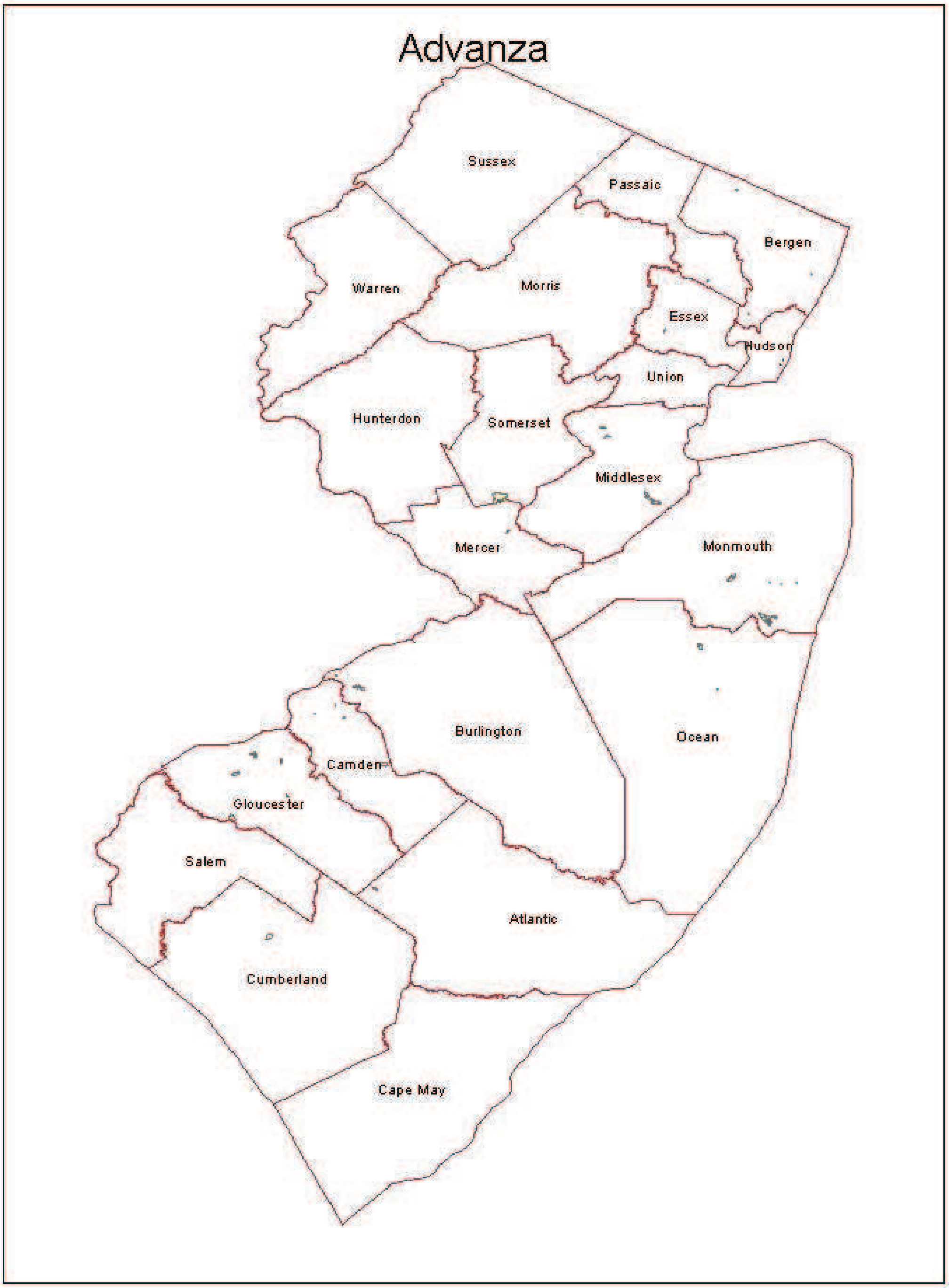
Section 6: Clarification Questions and Responses

1. Since no column names were included, based on the data itself and prior interactions with the provider, we interpret the columns (1 – 17) to be:
   - Provider Name
   - DBA
   - FRN
   - End User Address (columns 4 – 11)
   - User Category
   - Technology of Transmission
   - Max. Adv. Down Speed
   - Max. Adv. Up Speed
   - Typ. Down Speed
   - Typ. Up Speed

   We probably do not need to confirm that.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Verizon Wireless
Received: January, 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

177. NDA Status
178. Submission Overview
179. Submission File Details
180. Data Validations and Results
181. Data Transformation and Loading
182. Clarification Questions and Provider Responses
183. Notes and Open Issues

Section 1: NDA Status

NDA was executed.

Section 2: Submission Overview

AVAILABILITY DATA			
ID	Provider name	Cellco Partnership	
	"Doing business as" name	Verizon Wireless	
	FRN	0003290673	
	Holding company name	Verizon Communications Inc.	
	Holding company number	131425	
FOR WIRELESS			
Filetypes	shapefile collection: shp/dbf/prj/shx, mdb, gdb, imagefile etc.		Supplied 2 shapfiles (zip archive) with 119 and 13 rows. Shapefiles use projection GCS_WGS_1984..
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	Provided speeds apply to the first set of polygons.
	Upstream max adv	1.8 mbps	
	Downstream max adv	3.1 mbps	
	Upstream typical	500k-800kbps	Ranges provided instead of single values. Lower end of the Down Typical range is OUTSIDE of the Broadband speed definition (will use upper end values for the time
	Downstream	600kpbs-1.4mbps	

	typical		being).
	Subscriber-weighted	Not provided	
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	Provided speeds apply to the second set of polygons.
	Upstream max adv	1.8 mbps * 10 times	
	Downstream max adv	3.1 mbps * 10 times	
	Upstream typical	2mbps -5mbps	Ranges provided instead of single values. Lower end of the Down Typical range is OUTSIDE of the Broadband speed definition (will use upper end values for the time being).
	Downstream typical	5mbps -12mbps	
	Subscriber-weighted	Not provided	
Technology Type	Spectrum (Mhz, FCC code)		Code 80 [Cellular (824-849Mhz, 869-894 Mhz); PCS 1850-1990 Mhz; AWS (1710-1755Mhz, 2110-2155Mhz); 700 (757-758Mhz, 776-779Mhz, 787-788Mhz, 805-806Mhz)] One of the provided Spectrum 1 ranges is 869-894 Mhz, which is not within ranges defined for that spectrum The shapefile is named “EVDO_NJ” suggesting that the availability is only for EVDO. Verizon Wireless documents on the web suggest the company uses spectrum 850 MHz and 1900 MHz for their EVDO.
Comments:			

INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

All data was supplied by email.

Received overview file " Broadband Verizon Wireless' wireless broadband statistics.doc" with spectrum and speed information.

Received 2 shapefiles with the following contents. The EVDO_NJ shape has 119 polygons, and the VZW_LTE_NJ shape has 13 polygons.

Size	Name
42091	EVDO_NJ.dbf
145	EVDO_NJ.prj
720796	EVDO_NJ.shp
13156	EVDO_NJ.shp.xml
1052	EVDO_NJ.shx

Size	Name
2358	VZW_LTE_NJ.dbf
145	VZW_LTE _NJ.prj
144312	VZW_LTE _NJ.shp
51461	VZW_LTE _NJ.shp.xml
204	VZW_LTE _NJ.shx

No cover letter was included. We reused information provided in the June 2010 cover letter (stored as Broadband Verizon Wireless' wireless broadband statistics.doc)

Section 4: Validations and Results

We validated the following data items in the original submission.

Geospatial Data: Verizon Wireless provided two shape file with polygons.

Shape file EVDO_NJ: The total shape apparently covers the entire state of New Jersey. Some differences are visible along the water body edges. There are duplicate shapes in this shapefile.

Shape file VZW_LTE_NJ: The shape covers portions of central-Northern New Jersey; the NJ Turnpike appears to be covered for its entire length.

Middle-mile Data (e.g., interconnection points) was NOT provided.

Overview Data (e.g., Cellular Market Area, Subscriber-Weighted Nominal Speed) was NOT provided.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded from the supplied shapefiles. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in Word document
DBANAME	As supplied in Word document
FRN	Set to "0003290673"
TRANSTECH	Set to 80 per Word document
SPECTRUM	EVDO_NJ: Set to "3" per translation shown below VZW_LTE_NJ: Set to "2"
MAXADDOWN	EVDO_NJ: Set to "5", see below. VZW_LTE_NJ: Set to "6" per email clarification
MAXADUP	EVDO_NJ: Set to "4", see below. VZW_LTE_NJ: Set to "5" per email clarification
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to "NJ"
SHAPE	As supplied.

Internal notes on processing:

21. The supplied shape uses geographic coordinate system name GCS_WGS_1984 The NTIA data model requires the same coordinate system. No geographic transformation was required, but the XY Tolerance values differ if the shapefile is imported trivially into the geodatabase. Imported the table schema and the table data in two separate operations, thereby ensuring perfect compatibility with the NTIA data model.
22. We identified duplicate shapes in the EVDO feature class using the ESRI "Find Identical" feature, and removed them using the ESRI "Delete Identical" feature. That tool removed 23 rows of data. We found no duplicate shapes in the LTE feature class.
23. Spectrum:
    a. EVDO_NJ: Verizon Wireless provided a statement in their cover letter about their licensed spectrum. Searching on the web indicates that EV-DO uses frequencies 850MHz and 1900Mhz. The NTIA data model has a single column for spectrum. No mapping is provided for frequency 850MHz. Frequency 1900MHz corresponds to NTIA "SPECTRUM USED" code value 3.
    b. VZW_LTE_NJ: Verizon wireless web site advertises "nationwide

contiguous 700 Mhz 4G spectrum. The NTIA coding table provides value 2 for 700Mhz spectrum.

24. Speeds:
    a. EVDO_NJ: The maximum advertised speeds provided in the cover letter are 3.1Mbps down and 1.8Mbps up. The typical speeds are provided as ranges: 600K to 1.4Mbps down and 500Kbps-800Kpbs up. For max adv speeds we encoded the submitted 3.1Mbps down speed as value 5 (range 3-6Mbps) and encoded the submitted 1.8Mbps up speed as value 4 (range 1.5-3Mbps). For typical speeds we encoded the down speed as 3 (range 768Kbps-1.5Mbps) and the up speed as 2 (range 200-768Kbps).
    b. VZW_LTE_NU: The supplied Word document suggests speeds are "10 times EVDO". Per email clarification (see end of document) we will use downstream speed code 6 and upstream speed code 5.
25. The only data imputed was the state abbreviation.

Section 6: Clarification Questions and Responses

There are duplicate shapes in EVDO. Shapes with the same area and length are likely duplicate.

The document states " With Verizon 4G LTE, customers will experience speeds up to 10 times faster than with Verizon's 3G. "

Since 3G's Max Advertised Down is 3.1 Mbps and Max Advertised Up is1.8 Mbps, is it OK to translate to 31 Mbps and 18 Mbps.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, March 03, 2011 7:22 AM
To: Malnati, Francis D
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarifications

Francis,
We have reviewed the NJ Broadband access data submitted by Verizon Wireless and have identified a few issues that we need some clarification on.

1. Within the set of geo-spatial shapes submitted for Verizon Wireless EVDO coverage, there are multiple shapes that are duplicates of one another. NTIA has added a validation rule to eliminate such duplicate shapes.   Is there some distinction between these duplicates that we should know about? Is it acceptable for us to remove the duplicates prior to submission.
2. The document states " With Verizon 4G LTE, customers will experience speeds up to 10 times faster than with Verizon's 3G." Based on the 3G Maximum Advertised Downstream speed of 3.1 Mbps and the Maximum Advertised Upstream speed of 1.8 Mbps, this translates to 31 Mbps and 18 Mbps. This would correspond to a downstream speed tier of 8 and an upstream speed tier of 7. Is this a correct interpretation?

If you need further information or clarification on these questions, please contact me. We appreciate your prompt attention.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Malnati, Francis D [mailto:Francis.Malnati@VerizonWireless.com]
Sent: Thursday, March 03, 2011 10:27 AM
To: ConnectingNJ@research.telcordia.com
Cc: Malnati, Francis D
Subject: RE: NJBB Clarifications

John

1. We reported that we're licensed by the FCC to operate on 4 spectrum bands – 3 to provide our 3G wireless broadband service and 1 (700Mhz) for 4G LTE. As to our 3G service we make no distinction between the service coverage area for each of the spectrum bands. It would b appropriate to remove the duplicates.
2. Here's what we tell the public about 4G speeds on our website: "Verizon's 4G LTE network delivers an average throughput of 5-12 megabytes per second (Mbps) downlink and 2-5 Mbps uplink."

Hope this helps. If you'd like to speak please e-mail me or call me on my mobile.
Fran

Fran Malnati
Executive Director - Regulatory Matters
Mobile: 201-819-6262

Verizon Wireless
Legal & External Affairs Department
One Verizon Way, VC52S490
Basking Ridge, NJ 07920-1097

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, March 03, 2011 10:47 AM
To: 'Malnati, Francis D'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarifications

Fran,
Thanks for the quick response.
Your advertised rates span the boundaries that define the NTIA tiers. I propose that we will use the tiers that include the mid-point of your advertised ranges. Based on that, we would use tier 6 for downstream (Greater than or equal to 6 mbps and less than 10 mbps) and tier 5 for upstream (Greater than or equal to 3 mbps and less than 6 mbps). That seems to maximize the overlap. Is that acceptable to you?

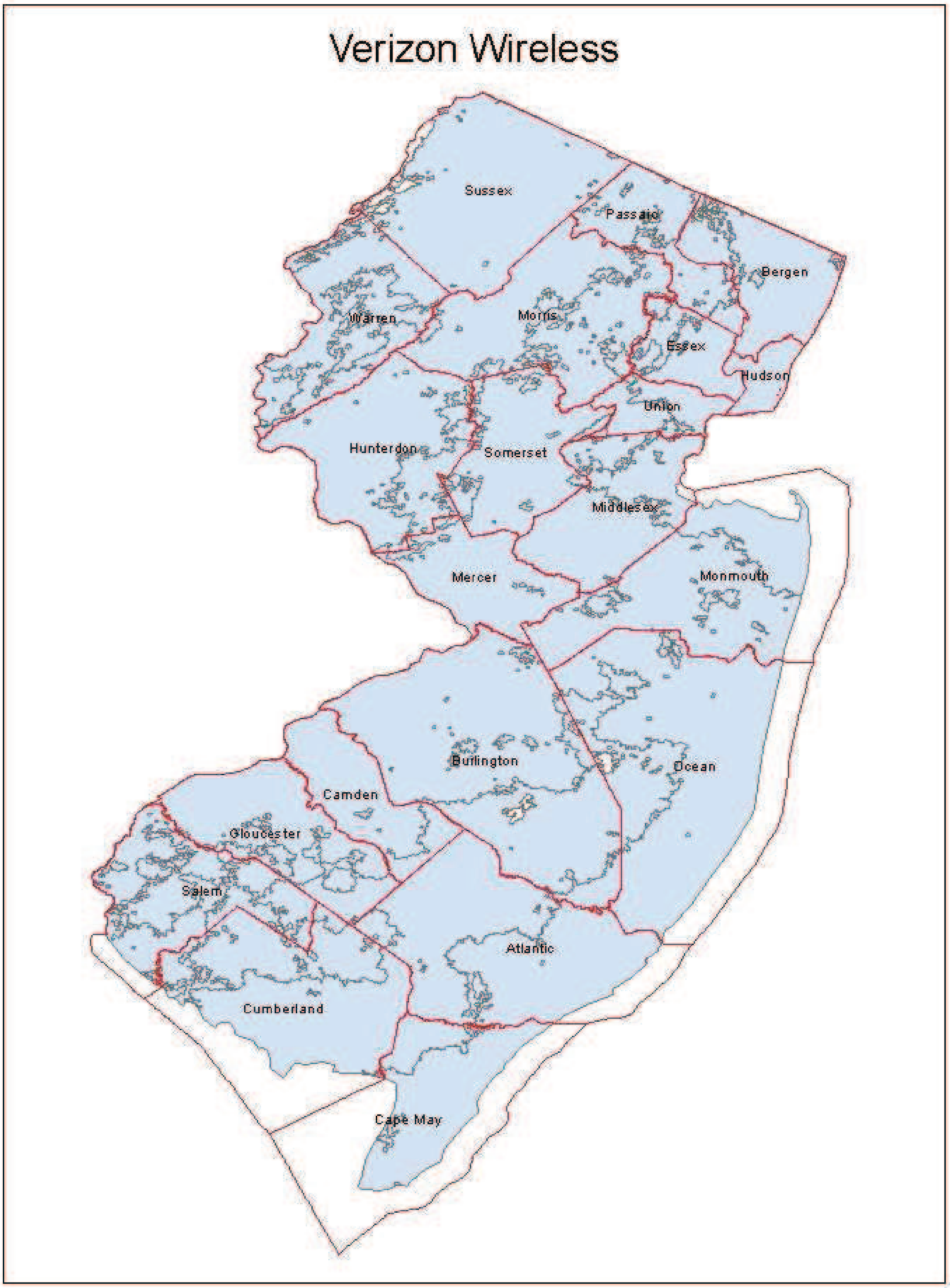
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Malnati, Francis D [mailto:Francis.Malnati@VerizonWireless.com]
Sent: Thursday, March 03, 2011 11:48 AM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarifications

Sure, not an exact science and we hope to continue to improve. Fran

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Wave2Wave Communications, Inc.
Received: March, 2011
Submission date: March, 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

184. NDA Status
185. Submission Overview
186. Submission File Details
187. Data Validations and Results
188. Data Transformation and Loading
189. Clarification Questions and Provider Responses
190. Notes and Open Issues

Section 1: NDA Status

NDA executed with NJ OIT.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Wave2Wave Communications, Inc.
Wave2Wave Communications
0015329394</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">XLS</td></tr>
<tr><td>File size</td><td colspan="2">229 rows</td></tr>
<tr><td>Speeds</td><td colspan="2">
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Address</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Address</td></tr>
<tr><td>Subscriber-weighted-</td><td></td><td>Not provided</td></tr>
</table>
</td></tr>
</table>

	up		
	Subscriber-weighted-down	Not provided	
Technology Type	30 (other copper - probably Ethernet) and 70 (Terrestrial Fixed Wireless)		
End-user specification	Codes 3 and 4		
Comments:			
INTERCONNECTION DATA			
ID	None provided		
File size			
Ownership			
Transport Type			
Data Rates/Capacity			
Location			
Comments:			

Section 3: Submission File Details

Received 1 file by SECURE UPLOAD:

Size	**Name**
76800	NJBB_0015329394_AddressLevelAvailability_03.08.2011.xls

Section 4: Validations and Results

The submitted file has 229 rows with street addresses, tech transmission, max adv speeds, and typical speeds. The codes look reasonable, but the high variety in maximum advertised speeds should be corrected. Of the original rows, 223 could be geocoded successfully and 6 could not. The input address set yielded 163 unique census blocks.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded from supplied XLS file. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “ProvName”
DBANAME	As supplied in column “DBAName”
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column TransTech
MAXADDOWN	As supplied in column MaxAdvDown
MAXADUP	As supplied in column MaxAdvUp
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau 2000 reference data, as matched by spatial join on geocoded address

Internal processing notes:

53. Geocoded the addresses using the Google geocoder.
54. Created an excel sheet and imported to a geodatabase table.
55. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
56. Added a column containing the ID of the containing year 2000 census via a spatial join of the point shapes and the census block shapes from reference data.
57. Copied the Census Block shape from reference data.
58. Discarded 60 rows with duplicate census blocks, leaving 63 for technology 30.

NTIA Table BB_Service_Wireless

Loaded using census block shapes from reference data for the records with transmission technology 70. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “ProvName”
DBANAME	As supplied in column “DBAName”
FRN	As supplied in column “FRN”
TRANSTECH	As supplied

SPECTRUM	Set to 6, Unlicensed
MAXADDOWN	Set to 10, the largest value submitted for this tech
MAXADUP	Set to 10, the largest value submitted for this tech
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to “NJ”
SHAPE	Year 2000 Census Block shape obtained from reference data.

Internal processing notes:

26. See above for discussion of geocoding addresses and finding the containing census block.
27. Spectrum: Imputed the code for unlicensed spectrum.

Section 6: Clarification Questions and Responses

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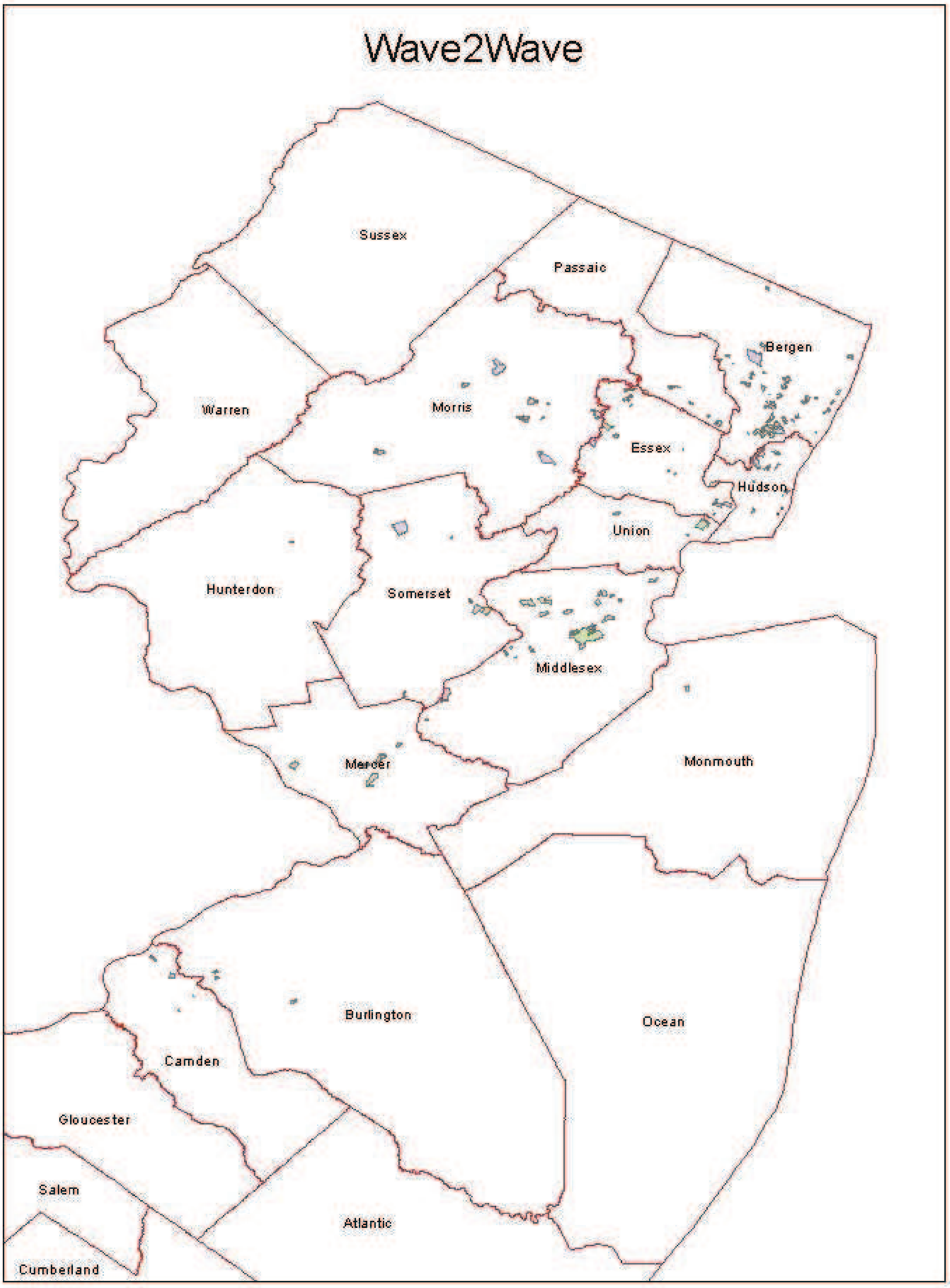
Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: WildBlue Communications Inc.
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

191. NDA Status
192. Submission Overview
193. Submission File Details
194. Data Validations and Results
195. Data Transformation and Loading
196. Clarification Questions and Provider Responses
197. Notes and Open Issues

Section 1: NDA Status

NONE

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>WildBlue Communications, Inc.
WildBlue
0007843766</td></tr>
<tr><th colspan="3">FOR WIRELESS</th></tr>
<tr><td>Filetypes</td><td colspan="2">text file, shape file</td></tr>
<tr><td>File size</td><td colspan="2"></td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided (‘0’)</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided (‘0’)</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>yes. Entire state.</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>yes. Entire state</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided?</td></tr>
</table></td><td>Submitted shape file describing the entire state of NJ with attributes for</td></tr>
</table>

	Subscriber-weighted-down		By county	
Technology Type	Code 60 (Satellite)			
End-user specification	Voice message indicated that the referenced plans are consumer-focused.			

Comments: From the provider's input package:

"The subscriber-weighted nominal speed information has been calculated using only the service tiers that meet the NTIA definition of broadband speed, and is based on subscriber data for active subscribers as of March 17, 2011

WildBlue notes that of the possible 'Spectrum Used' options provided, none listed Ka-Band as an option for Satellite Providers. WildBlue uses Ka-Band spectrum (uplink in the 29.5 – 30 gigahertz band and downlink in the 19.7 – 20.2 gigahertz band). WildBlue has not provided Typical Upstream Speed and Typical Downstream Speed values. WildBlue does not track speeds on a state-by-state basis, but instead primarily monitors overall network speeds. WildBlue has begun the process of recording more granular data relating to the speeds normally experienced by subscribers on a spot-beam basis. WildBlue believes that it will be able to provide this data in the coming months.

The map and supporting data are for one singular service area polygon that equals the entire State of New Jersey. The WildBlue service data values provided do not vary across any county or region within the state; therefore, there is only one service area polygon, namely the entire State of New Jersey

INTERCONNECTION DATA: NONE	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	

Comments: Not provided

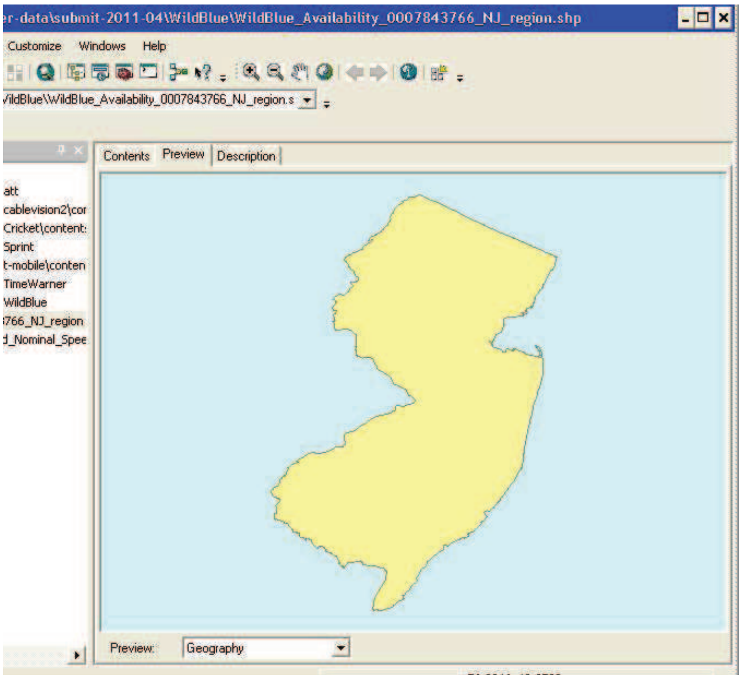


Figure 1. The shape submitted by the provider (the entire state of NJ)

Section 3: Submission File Details

Size (kb)	Name
2	WildBlue_Subscriber_Weighted_Nominal_speed_By_County_NJ.txt
1	WildBlue_Availability_0007843766_NJ_region.shx
1	WildBlue_Availability_0007843766_NJ_region.dbf
1	WildBlue_Availability_0007843766_NJ_region.prj
19	WildBlue_Availability_0007843766_NJ_region.shp

Section 4: Validations and Results

Section 5: Data Transformation and Loading

Loaded county shapes from reference data for counties in the State of New Jersey based on emailed statements that all counties are covered. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "WildBlue Communications, Inc."
DBANAME	Set to "WildBlue"
FRN	Set to 0007843766
TRANSTECH	Set to 60
SPECTRUM	Set to 7 per translation shown below

MAXADDOWN	Set to 4, see below.
MAXADUP	Set to 2, see below.
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to “NJ”
SHAPE	County shape read from reference data.

Internal notes on processing:

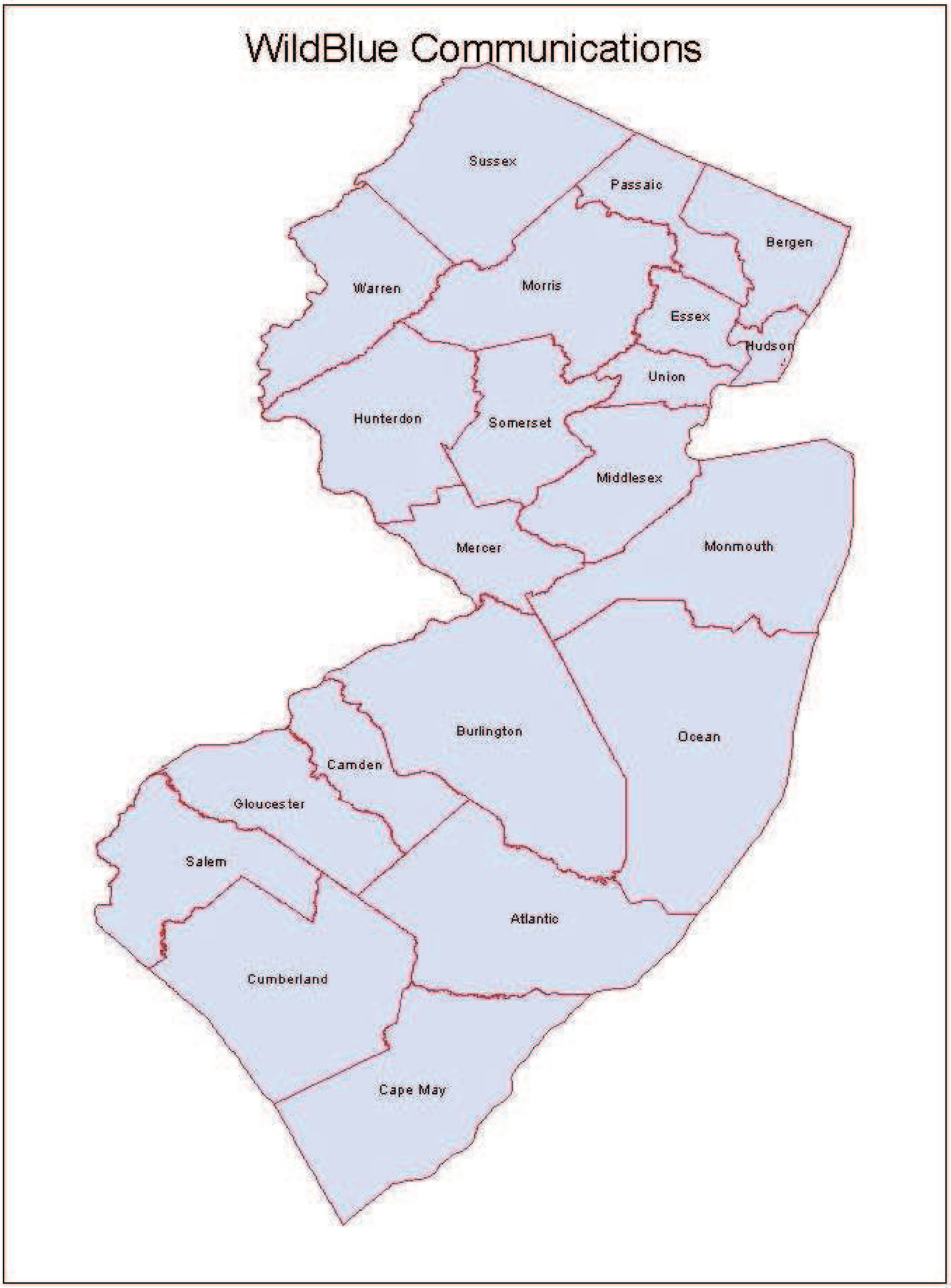
28. Spectrum: No statement was provided. The NTIA data model has a single column for spectrum. Satellite corresponds to NTIA “SPECTRUM USED” code value 7.
29. Speeds: The maximum advertised speeds provided in the emailed brochure are as discussed above For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 2 (range 200 Kbps -- 768 Kbps).
30. Did not use the supplied shapefile because it was faster to copy over reference data that's already in the right XY coordinate system and tolerance value.

Section 6: Clarification Questions and Responses

1. coverage info not supplied at resolution finer than entire state

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Broadband Provider Data Report

Provider: Xchange Telecom
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

198. NDA Status
199. Submission Overview
200. Submission File Details
201. Data Validations and Results
202. Data Transformation and Loading
203. Clarification Questions and Provider Responses
204. Notes and Open Issues

Section 1: NDA Status

None so far

Section 2: Submission Overview

AVAILABILITY DATA				
ID	Provider name “Doing business as” name FRN		Xchange Telecom Corp Xchange Telecom 0006831713	
FOR WIRELINE				
Filetypes				
File size				
Speeds	Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)	Information provided via email exchange (see below). Provider originally indicated that their coverage was limited to the area supported by a single central office. In further exchanges, the provider indicated that their coverage is limited to city of Lakewood and that they cover the entire city limits.
	Typical-upstream			
	Typical-downstream			
	Advertised-upstream		2 Mbps (code 4)	
	Advertised-downstream		10 Mbps (code 7)	
	Subscriber-weighted-nominal speed			

Technology Type	ADSL (code 10)
End-user specification	In response to inquiry, provider reported residential and small business.
Comments:	
INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received no file submission, only statements by email.

Section 4: Validations and Results

No data was submitted, so no validation was required.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded based on the emailed statement of service to all of Lakewood Township, Ocean county, New Jersey. We submitted all census blocks less than 2 square miles in this municipality. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Xchange Telecom Corp” per email response
DBANAME	Set to “Xchange Telecom”
PROVIDER_TYPE	Set to 1
FRN	Set to “0006831713” per email response
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)

BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to 10 (ADSL) per email
MAXADDOWN	Set to code 7 per email
MAXADUP	Set to code 4 per email
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000

Internal processing notes:

59. Created a file with a municipality name that matches exactly the “name” column in the Year 2000 Census Bureau TigerLine database.
60. Joined against reference data to discover census blocks, for a total of 681 blocks.
61. All of the census blocks discovered for Lakewood Township are smaller than 2 square miles, so no road segments were loaded.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 8:34 AM
To: 'Duvid Rottenberg'; 'ConnectingNJ@research.telcordia.com'
Cc: 'Shelley Bates'
Subject: RE:

Duvid,
We can work with that information as far as geography and mapping into Census blocks. What we would need then is information on your speeds and middle-mile interconnection points. In terms of speeds, we are requesting the maximum upstream and downstream speeds you advertise in Lakewood, and the typical upstream and speeds experienced by your customers. For middle-mile interconnection points, we are requesting the address, and the technology and bandwidth you have available and whether you own or lease the trunks.

There is also a small amount of general information we need. Specifically, we need you official company name, and other names you do business as and your FCC FRN number.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Tuesday, March 08, 2011 3:36 PM
To: ConnectingNJ@research.telcordia.com

Cc: 'Shelley Bates'
Subject: RE:

John,
We are a UNE-L company, we lease the loop from Verizon and provide broadband for the end user on the leased circuits. I believe we do cover the whole city of Lakewood.

Duvid Rottenberg
Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 3:21 PM
To: drottenberg@xchangetele.com
Cc: ConnectingNJ@research.telcordia.com; 'Shelley Bates'
Subject:

Duvid,
I received the note that you sent to Shelley Bates regarding the questions you have about submitting your broadband availability data. Rather than attempting to answer your question, let me first ask another question that will help determine if you are required to report data at this time. We are currently only collecting data from "facilities-based" providers. NTIA definition is:

An entity is a ''facilities-based'' provider of broadband service connections to end user locations if any of the following conditions are met: (1) It owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the end user location and provisions/equips them as broadband; or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed.

If you fit the definition, then we would be looking to collect data from you. In that case, we need to come up with a method of determining your coverage area. We do not have a clean way of mapping from COs to census blocks. We do have a couple options:

1. If you could estimate your coverage area in terms of governmental boundaries, we could map that into census blocks. For example, if you know that you cover the entire town/city of Lakewood, we could handle the rest.
2. If you were to send us a list of addresses, we could geo-code those locations. This is less desirable, as where you have customers does not fully represent the locations where you could offer service, but we have done it in some cases.

Let me know how I can help you in determining an approach.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Tuesday, March 08, 2011 11:41 AM
To: Bates, Shelley

Cc: Michael Robinson
Subject: Xchange Telecom Broadband Service

Hi Shelley,

I am working on providing the data you requested from Michael. Our broadband service is currently available for all customers served by the LKWDNJLKDS5 CO, I'm not sure how to map that into census tracts. I have tried setting up an account at http://connectingnj.state.nj.us but I got an error stating that Xchange Telecom is not a recognized provider.

Thank You,
Duvid Rottenberg
Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 3:21 PM
To: drottenberg@xchangetele.com
Cc: ConnectingNJ@research.telcordia.com; 'Shelley Bates'
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1. If you could estimate your coverage area in terms of governmental boundaries, we could map that into census blocks. For example, if you know that you cover the entire town/city of Lakewood, we could handle the rest.
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Let me know how I can help you in determining an approach.

John Wullert
Manager – NJ BB Data Collection
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To: ConnectingNJ@research.telcordia.com
Cc: 'Shelley Bates'
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Duvid Rottenberg
Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 8:34 AM
To: 'Duvid Rottenberg'; 'ConnectingNJ@research.telcordia.com'
Cc: 'Shelley Bates'
Subject: RE:

Duvid,
We can work with that information as far as geography and mapping into Census blocks. What we would need then is information on your speeds and middle-mile interconnection points. In terms of speeds, we are requesting the maximum upstream and downstream speeds you advertise in Lakewood, and the typical upstream and speeds experienced by your customers. For middle-mile interconnection points, we are requesting the address, and the technology and bandwidth you have available and whether you own or lease the trunks.

There is also a small amount of general information we need. Specifically, we need you official company name, and other names you do business as and your FCC FRN number.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 4:16 PM
To: 'NJ Broadband Data Collection'; 'Duvid Rottenberg'
Cc: 'Shelley Bates'
Subject: RE:

Duvid,
I am sending this again to request data from you on the types of service you advertise. I attempted to gain this information from your Web site, but was unable to get any information on the plans you offer. Could please send me information on the maximum upstream and downstream speeds you advertise in Lakewood? If you have information on the typical upstream and speeds experienced by your customers, that would be useful as well.
Please feel free to call me if you have any questions.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Monday, March 14, 2011 4:31 PM
To: ConnectingNJ@research.telcordia.com
Cc: 'Shelley Bates'
Subject: RE:

2 Mbps Upstream and 10 Mbps downstream.

Duvid Rottenberg

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 4:46 PM
To: 'Duvid Rottenberg'; 'ConnectingNJ@research.telcordia.com'
Cc: 'Shelley Bates'
Subject: RE:

Thanks for this.

One other question – do you serve both residential and business customers?

John

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Monday, March 14, 2011 4:57 PM
To: ConnectingNJ@research.telcordia.com
Cc: 'Shelley Bates'
Subject: RE:

Yes we do.

Duvid Rottenberg

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:41 AM
To: 'Duvid Rottenberg'
Cc: 'NJ Broadband Data Collection'
Subject: Xchange NJ BB Clarification

Duvid,
We need to report data using Provider Name, Doing-Business-As Name and FCC Registration number. The information we retrieved from the FCC is:

Provider Name: XCHANGE TELECOM CORP.
FRN: 0006831713

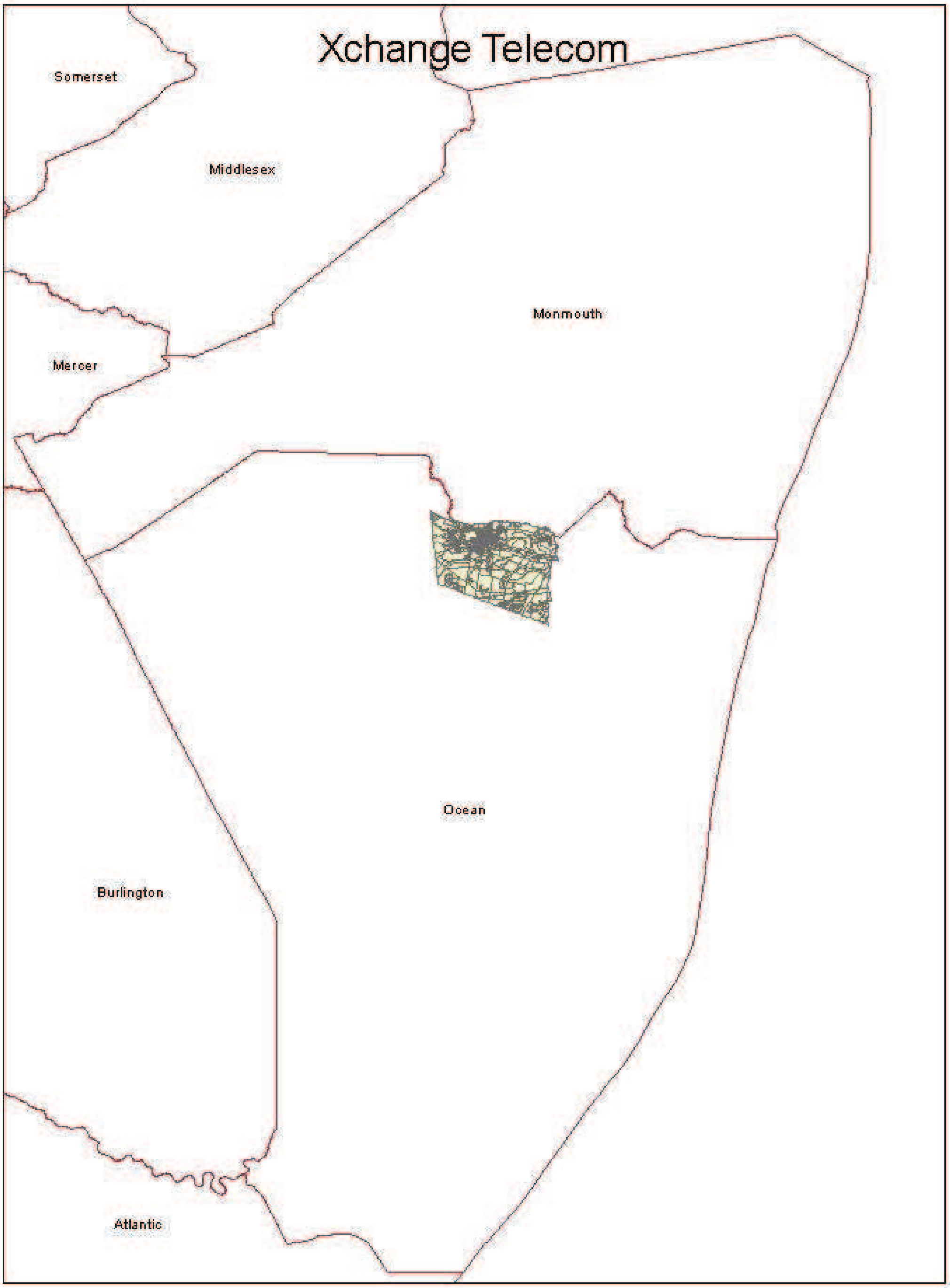
Are these correct? Also, do you have another “doing-business-as” name?

Thanks,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Connecting New Jersey - Broadband Provider Data Report

Provider: XO Communications
Submission date: April 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA). This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

6. Column "reseller" was dropped.
7. Set the new column "provider_type" to value 1 ("Broadband provider as described in the NOFA")
8. Set the max advertised speed code values (down and up) to 9, which is the maximum value among all records provided to us.
9. Dropped non-measured typical up/down speed code values.

Provider Interactions

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Tuesday, March 01, 2011 4:11 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Hi John,

I don't have any new data to report.

Thanks,
Sharon Adams

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 01, 2011 4:23 PM
To: Adams, Sharon E
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Sharon,
Are you saying that we can use the data you submitted last time (that it reflects your network capabilities as of 12/31/2011)?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies

732-699-2687

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Tuesday, March 01, 2011 4:41 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Yes, the previous data can be used again.

Thanks,
Sharon Adams

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 9:34 AM
To: 'Adams, Sharon E'
Cc: 'NJ Broadband Data Collection'
Subject: XO NJBB Data Clarification

Sharon,

We have performed our initial review of your data and have a clarification question:

We see several locations where your download speeds are a tier 2, which the NTIA does not consider broadband. This appears that it might be the provisioned speed sold to the customer. Is there a higher, advertised speed that you could provision to these locations if the customer asked? One option would be for us to use the highest speed you deliver in a larger area as the maximum advertised speed. Would that accurately represent your ability to deliver service?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Broadband Provider Data Report

Provider: XO Communications
Received: August, 2010
Submission date: October 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:
205. NDA Status
206. Submission Overview
207. Submission File Details
208. Data Validations and Results
209. Data Transformation and Loading
210. Clarification Questions and Provider Responses
211. Notes and Open Issues

Section 1: NDA Status

Executed.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name “Doing business as” name FRN	XO Communications, LLC Provided, but looks weird 0006275945
FOR WIRELINE		
Filetypes		
File size		
Speeds	(see below)	

Speeds

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		census block
Typical-downstream		census block
Advertised-upstream		census block
Advertised-downstream		census block
Subscriber-weighted-up		Not provided

	Subscriber-weighted-down		Not provided	
Technology Type	Entered codes 1, 2, and 3, which are not valid NOFA TechTrans codes.			
End-user specification	Business (444 entries), Residence (5 entries)			
Comments:				
INTERCONNECTION DATA				
ID				
File size				
Ownership				
Transport Type				
Data Rates/Capacity				
Location				
Comments: Not provided				

Section 3: Submission File Details

Received 1 file by SECURE UPLOAD.

Size	**Name**
41358	NJBroadbandData63009.xlsx

Section 4: Validations and Results

The spreadsheet provides census block IDs and associated max adv and typical speeds. The last two rows of the sheet are different from the 447 data rows proceeding them, and one of those last two is in New York. The DBA name looks unusual and the technology of transmission codes are not valid. After receiving clarification by email we created a corrected spreadsheet based on the original submission as follows:

1. Dropped the last two rows that have addresses instead of provider name, DBA name, etc.
2. Changed DBA Name entries to “XOCSI”
3. Changed technology of transmission codes: 1 to 10, 2 to 20, and 3 to 30.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded from the supplied spreadsheet. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider Name”
DBANAME	As supplied in column “DBA Name”
RESELLER	Set to “N”
FRN	As supplied in column “FRN”, after adding leading zeros
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from column census_block (1^{st} 3 digits)
TRACT	Populated from column census_block (next 6 digits)
BLOCKID	Populated from column census_block (last 4 digits)
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column census_block
TRANSTECH	As supplied in column Tech Code
MAXADDOWN	As supplied in column MaxDownload
MAXADUP	As supplied in column MaxUpload
TYPICDOWN	As supplied in column TypDownload
TYPICUP	As supplied in column TypUpload
SHAPE	Copied from Census Bureau TigerLine 2000, As matched by Census block ID

Internal processing notes:

1. No duplicate census blocks were found.

Section 6: Clarification Questions and Responses

1. The file name suggests the data are from June 30, 2009. We need data from June 30, 2010 for this submission.
2. The DBA name is provided as “XO Communications Services, Inc. (Affiliated Entity)” which seems unusually lengthy for a DBA name. Should it be reported simply “XO” or “XO Communications”?
3. The technology codes 1, 2, and 3 are not known to us. Do you mean 10 (ADSL), 20 (SDSL), and 30 (Other Copper)? Please refer to the NOFA technical appendix for valid technology of transmission codes (page numbered 32558, physical page 14):
http://www.ntia.doc.gov/frnotices/2009/FR_BroadbandMappingNOFA_090708.pdf
4. The typical and maximum down speeds always match, and the typical and maximum up speeds always match each other also. We are expecting typical user speeds and maximum *advertised* speeds. It seems unlikely that you have so many different maximum advertised speeds. Did you report the provisioned speeds here? Please clarify.

5. Some rows show speed code 9 (Greater than or equal to 50 mbps and less than 100 mbps), which seems more likely to be a fiber technology than copper. Please recheck, or help us understand what copper technology supports this speed over a long distance.
6. We believe you have submitted Census Block 2000 codes to us, because every entry is length 15; none are length 16. Please confirm.
7. The last two rows of the submission are different from the 447 data rows proceeding them, and one is in New York. We will discard these rows:

437 PARK AVE	PLAINFIELD	NJ	07060	Business
1401 MAIN ST	PORT JEFFERSON	NY	11777	Business

8. We received no connection point (middle-mile) data. Will you submit that?
9. We did not receive data on subscriber weighted nominal speeds, separated by county. Will you submit that?

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Thursday, September 16, 2010 4:57 PM
To: Wullert, John R II
Subject: RE: XO NJBB Data Questions/Clarifications

John,

I am rechecking the data for question 5 and will provide the answer in the morning.

Sharon

We have been reviewing the data you submitted to the New Jersey Broadband mapping program. Based on our initial review, we have some questions for you that will help us better understand the data and process it accurately.

1. The file name suggests the data are from June 30, 2009. We need data from June 30, 2010 for this submission. Can you confirm that this data is actually for 2010? **Provided June 30, 2010 data**
2. The DBA name is provided as "XO Communications Services, Inc. (Affiliated Entity)" which seems unusually lengthy for a DBA name. Should it be reported simply "XO" or "XO Communications"? **It can be shortened to XOCSI.**
3. The technology codes 1, 2, and 3 are not known to us. Do you mean 10 (ADSL), 20 (SDSL), and 30 (Other Copper)? Please refer to the NOFA technical appendix for valid technology of transmission codes (page numbered 32558, physical page 14): **10, 20 and 30 would be the correct codes for 1, 2, and 3 respectively.**
http://www.ntia.doc.gov/frnotices/2009/FR_BroadbandMappingNOFA_090708.pdf
4. The typical and maximum down speeds always match, and the typical and maximum up speeds always match each other also. We are expecting typical user speeds and maximum *advertised* speeds. It seems unlikely that you have so many different maximum advertised speeds. Did you report the provisioned speeds here? Please clarify. **XO does not have advertised speeds for these services, so I populated those fields with the same data.**
5. Some rows show speed code 9 (Greater than or equal to 50 mbps and less than 100 mbps). We would like to clarify – does this represent T3 links over copper?
6. We believe you have submitted Census Block 2000 codes to us, because every entry is length 15; none are length 16. Please confirm. **I did submit data from the 2000 codes.**

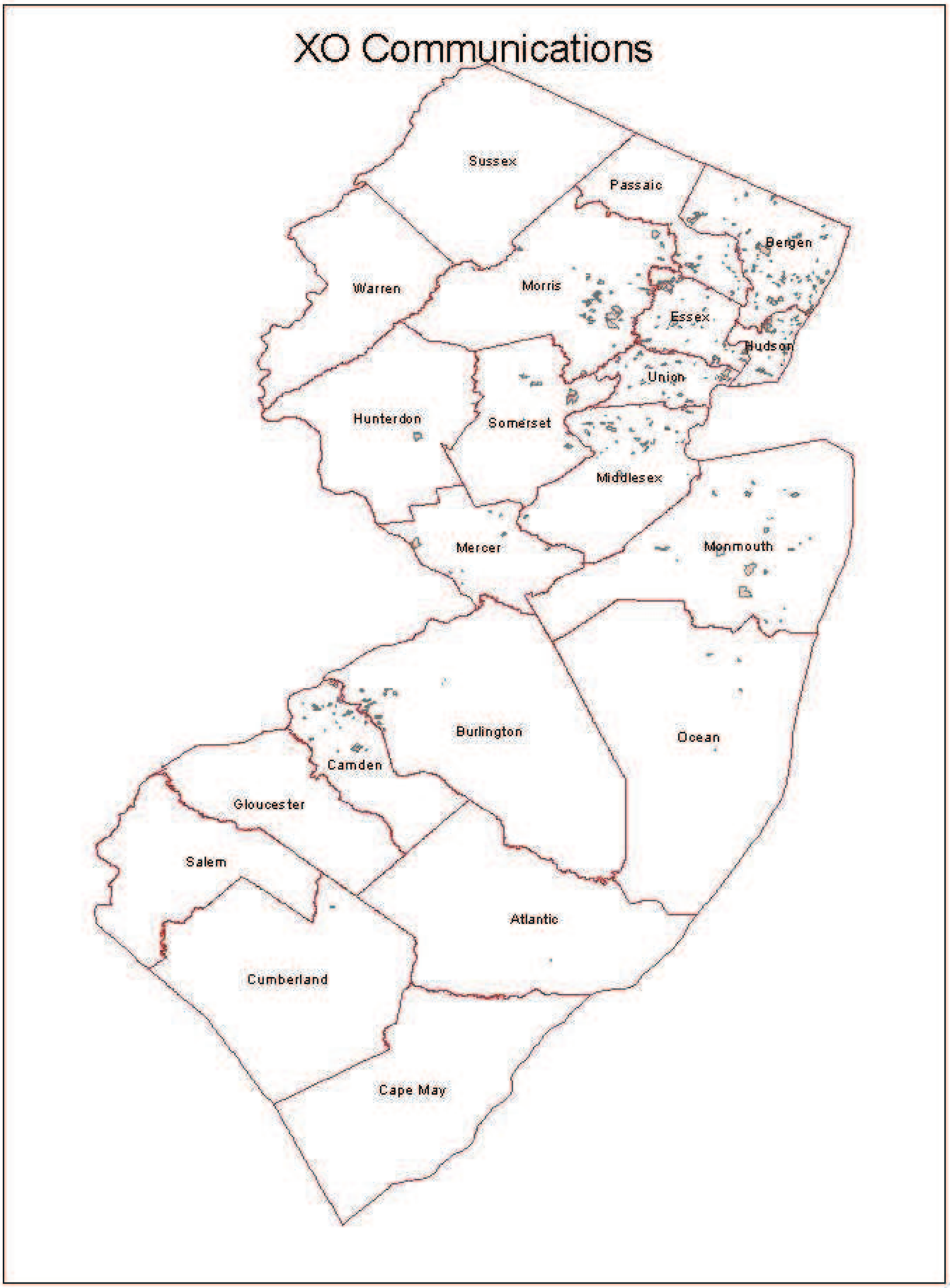
We would appreciate your prompt attention to these questions. If you need further clarification, please feel free to contact me.

Thank you for your participation!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



APPENDIX B:

Community Anchor Institution Processing

Summary

For each category of community anchor institution, we generally sought data from two types of sources. One source was a reference source that provided a more-or-less current list of institutions with name, address and ID number (where applicable). This reference source was expected to be nearly complete, representing all the institutions of the specified type in the state. Reference sources are listed where available in the table below. For some CAI categories, we had no reference list, e.g., for local government and non-governmental organizations.

The second type of source provided the broadband information. In most cases, the broadband information was supplied individually by the institutions via our Web site. In two cases, the broadband information was provided in aggregate:

- In the case of Higher Education, we obtained broadband access information from NJEdge, an organization that provides broadband service to institutions.
- In the case of State Government, we obtained a list of broadband circuits provided to the state by Verizon.

For each CAI category, the following table provides the number of records we obtained from the reference source, the number of broadband access records we obtained, the total number of records we submitted to the NTIA and the number of complete records, with verified address information and broadband access information.

<table>
<tr><th>CAI Category</th><th>Reference Records</th><th>Broadband Records</th><th>Total Records Submitted</th><th>Complete Records Submitted</th></tr>
<tr><td>School K-12 (Public)</td><td>2601</td><td rowspan="2">549
(230 of these records require further processing and verification)</td><td>2601</td><td>158</td></tr>
<tr><td>School K-12 (Private)</td><td>1260
(NCES)</td><td>1260</td><td>71</td></tr>
<tr><td>Libraries</td><td>427
(IMLS)</td><td>89</td><td>427</td><td>87
(2 library web submissions were unmatched)</td></tr>
<tr><td>Medical/Healthcare</td><td>111
(NJHA)</td><td>5</td><td>111</td><td>5</td></tr>
<tr><td>Public Safety</td><td>343
(NJ 911 Comm.)</td><td>99</td><td>343</td><td>88
(11 PSAP web submissions were unmatched)</td></tr>
<tr><td>University</td><td>157</td><td>38</td><td>157</td><td>37</td></tr>
</table>

CAI Category	Reference Records	Broadband Records	Total Records Submitted	Complete Records Submitted
	(NCES IPEDS)	(NJEdge)		(1 entry for was unmatched)
Other – State Government		2700	500 (Remaining data to be analyzed and verified for next submission)	500
Other – Local Government	0	45	45	45
Other – Non Government	0	8	8	8
Total Submitted			**5452**	**999**

Abbreviations and Acronyms

911 Comm	New Jersey 9-1-1 Commission
IMLS	Institute of Museum and Library Services
IPEDS	Integrated Postsecondary Education Data System
NCES	National Center for Education Statistics
NJHA	New Jersey Hospital Association

Detailed Processing

The following sections contain detailed descriptions of the data we received and the processing steps we applied to the data in order to generate the NTIA submission.

Local Government and Non-Government Organizations

1. Accepted data submitted by 45 local government and 8 non-governmental organizations via specially designed Web site. Data collected included:
    i. Community Anchor Institution Category
    ii. Community Anchor Institution Name (System, Branch)
    iii. CAI ID information: NCES School ID, NCES IPEDS ID, FSCSKEY, FSCS_SEQ
    iv. Address: Street, City, State, Zip,County
    v. Contact info: Name, Phone, Email, Web address
    vi. Wi-Fi access
    vii. Broadband info: Provider, Technology, Upstream and Downstream speeds
    viii. Comment
2. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
    a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.

State Government

1. Obtained a listing of 2700 connections provided by the primary broadband service provider to the state. List of connections included the following data:
    a. Service address
        i. This field included an indication of the office or department being served and an extremely abbreviated version of the address
        ii. e.g.: "(SPNL)STATE OF NJ-TLS 19 LANDIS AV, UP DRFLD T"
    b. Speed (single value, 1.5 to 1000 Mbps)
    c. Technology (ATM, Ethernet, Frame Relay, PRI, Point-to-Point
2. Manually interpreted the address field, using Web mapping tools (e.g., Google Maps), to get corresponding addresses that could be geo-coded
    a. This is a time consuming process and thus we were only able to complete this operation for 500 of the addresses
3. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
    a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.

Hospitals

1. Obtained a listing of 111 hospitals from NJ Hospital Association. List of connections included the following data:
    a. Facility Name
    b. Address: Street, City, State, Zip
2. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
    a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.
3. Merged NJHA data with data collected from 5 hospitals via our hosted Web site to merge address and ID information with speed and Wi-Fi availability information.
    a. Performed exact match between NJHA and submitted data on institution name
        i. Facilitated matching by Converting names to upper case, removing certain common words (THE, HOSPITAL, MEDICAL, CENTER, SYSTEM, HEALTHCARE), removing double spaces and trimming leading and trailing spaces.

Higher Education

1. Obtained the following data from the named sources
    a. List of higher education institutions from National Center for Education Statistics IPEDS Data Center. Table included information on 157 institutions with the following fields:
        i. Institution Name
        ii. Address: Street, City, County, State, ZIP
        iii. IPEDS ID
        iv. Latitude
        v. Longitude

  b. List of members of NJEdge. Table included information on 48 institutions, most of which (38) were state, community or private institutions of higher learning. Information from NJEdge included:
    i. Institution Name
    ii. Address
    iii. Technology Type
    iv. Upstream and downstream speeds
2. Merged IPEDS and NJEdge data to match institution data with broadband access information
  a. Performed exact match on institution name
    i. Facilitated matching by Converting library names to upper case and trimming excess spaces
  b. Of those NJEdge data entries that did not match, used approximate matching based on institution name
    i. Preprocess prior to approximate match involved
      1. Removing strings COLLEGE, UNIVERSITY, NEW JERSEY
      2. Removing any punctuation
    ii. Matched using Levenshtein Distance metric with threshold of 4.
  c. Reviewed unmatched NJEdge data manually and identified one additional match.
3. Successfully merged data from 37 of 38 NJEdge institutions into IPEDS data for total of 157 institutions
  a. Note that remaining NJEDGE institution (Fairleigh Dickenson) has different address than either of the campuses in the IPEDS data.

Libraries

2. Obtained the following data from the named sources
  a. Obtained the file "Public Libraries Survey Fiscal Year 2008" from http://harvester.census.gov/imls/data/pls/index.asp.
    i. Extracted 427 records for the state of New Jersey
    ii. Used the following data items:
      1. FSCSKEY
      2. FSCS_SEQ
      3. LIBNAME
      4. ADDRESS
      5. CITY
      6. ZIP
      7. LATITUDE
      8. LONGITUDE
  b. Data submitted by 89 library organizations via specially designed Web site. Data collected included same fields listed above for Local Governmental organizations
3. Merged library survey data with data collected from libraries via our hosted Web site to merge address and ID information with speed and Wi-Fi availability information.
  a. Performed exact match between survey and submitted data on library name

        i. Facilitated matching by Converting library names to upper case, cutting submitted names to fixed-field length of survey data (60 characters) and trimming excess spaces
    b. For those submitted data entries that did not match, performed an approximate match based on library name
        i. Preprocess prior to approximate match involved
            1. Removing strings “P.L.”, “FREE”, “PUBLIC”, “LIBRARY”, TOWNSHIP, TSWP, PUB, LIB, THE, SYSTEM
            2. Removing any punctuation
            3. Converting “NO”/”SO” at start of line to NORTH and SOUTH respectively
        ii. Matched using Levenshtein Distance metric with threshold of 3.
    c. Successfully matched all but two submitted entries
        i. Manual comparison showed that those libraries were not present in the survey data.

Private K-12 Schools

1. Obtained the following data from the named sources:
    a. List of private K-12 education institutions from National Center for Education Statistics Private School Universe Survey. Table included information on 1260 institutions with the following fields:
        i. Name
        ii. Address: Street, City, State, ZIP
        iii. NCES_ID
    b. Data submitted by schools via specially designed Web site. Data collected included same fields listed above for Local Governmental organizations. Total number of Public and Private schools submitting information was 549.
2. Merged NCES private school with data collected from private schools via our hosted Web site to merge address and ID information with speed information.
    a. Performed exact match between NCES and submitted data on institution name
        i. Facilitated matching by:
            1. Converting library names to upper case
            2. Removing string “, NJ”
            3. Converting string SAINT to ST
    b. For those submitted data entries that did not match NCES data, performed an approximate match based on institution name
        i. Preprocess prior to approximate match involved
            1. Replacing string SCHOO or SCHO with SCHOOL
            2. Replacing string “HIGH SCHOOL” with HS and string “ELEMENTARY” with ELEM
            3. Removing strings SCHOOL, THE, REGIONAL, HIGH and ACADEMY
            4. Trimming excess spaces
        ii. Matched using Levenshtein Distance metric with threshold of 3.

   c. Successfully merged data from 71 submitted private school into 1260 NCES institutions
      i. Manual comparison resulted in matching of two additional institutions
      ii. Remaining institutions were ambiguous or not present in the NCES data.
3. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
   a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.

Public K-12 Schools

1. Obtained the following data from the named sources:
   a. List of public K-12 education institutions from National Center for Education Statistics Private School Universe Survey. Table included information on 2601 institutions with the following fields:
      i. Name
      ii. Address: Street, City, State, ZIP
      iii. NCES_ID
      iv. Latitude, Longitude
   b. Data submitted by schools via specially designed Web site. This was entries in the school category that did not match any of the NCES private schools. Total number of Public and Private schools submitting information was 549.
2. Merged NCES private school with data collected from private schools via our hosted Web site to merge address and ID information with speed information.
   a. Performed exact match between NCES and submitted data on institution name and zip code
      i. Facilitated matching by:
         1. Removing SCHOOL and all truncated versions of the word from the ends of any string
         2. Performing the following conversions
            a. "SENIOR HIGH" and HIGH to HS
            b. "MIDDLE", "M S", "MID" and "MIDD" to MS
            c. "ELEMENTARY" to ELEM
            d. CHARTER to CS
            e. BOROUGH to BORO
            f. AVENUE to AVE
            g. TOWNSHIP to TWP
            h. STREET to ST
         3. Removing the strings REGIONAL, " REG" and ACADEMY
         4. Removing punctuation and double spaces
         5. Trimming any leading or trailing spaces
   b. For those submitted data entries that did not match NCES data, performed an approximate match based on concatenation of institution name and zip code
      i. Preprocess prior to approximate match involved
         1. Removing the following phrases

            a. "BOARD OF EDUCATION" and all truncated versions
            b. BOE
            c. DISTRICT and all truncated versions
            d. PRIMARY, INTERMEDIATE, ELEM, MS, HS, SR, JR
            e. # or any digits
            f. PUBLIC
         2. Trimming excess spaces
      ii. Matched using Levenshtein Distance metric with threshold of 2.
   c. For those submitted entities that did not match NCES data in either prior stage, performed manual comparison.
   d. Successfully merged data from 158 submitted entries into 1260 NCES institutions
      i. Remaining institutions were ambiguous or not present in the NCES data.
      ii. One particular issue was information submitted for a district that did not correspond to a specific school
3. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
   a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.

Public Safety Organizations

1. Obtained the following data from the named sources:
   a. List of local and state public safety organizations obtained from NJ State 911 Commission. Table included information on 343 institutions with the following fields:
      i. Name
      ii. Address: Street, City, State, ZIP, County
      iii. NCES_ID
   b. Data submitted by 104 public safety organizations via specially designed Web site. Data collected included same fields listed above for Local Governmental organizations
2. Merged 911 Commission data with PSAP data collected from via our hosted Web site (99 entries) to merge address and ID information with speed information.
   a. Performed exact match between 911 and submitted data on institution name
      i. Facilitated matching by:
         1. Converting names to upper case
         2. Removing the Strings DEPARTMENT, DEPT, TOWNSHIP, TWP
         3. Removing punctuation
         4. Replacing string PD with POLICE and string BOROUGH with BORO
   b. Performed manual merging to integrate submitted records that were not matched.
      i. Successfully merged 88 submitted PSAP entries with 911 Commission data.
3. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
   a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.

NEW MEXICO
DEPARTMENT OF
INFORMATION TECHNOLOGY

New Mexico State Broadband Data and Development Program
Methodology: April 1, 2011

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New Mexico State Broadband Data and Development Program
Methodology: April 1, 2011

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New Mexico State Broadband Data and Development Program
Methodology: April 1, 2011

Introduction

The State of New Mexico (hereafter, NM or State), through its agents Earth Data Analysis Center (EDAC) at The University of New Mexico and NM Department of Information Technology (DoIT), submitted the April 1, 2011 New Mexico Broadband (NMBB) Program data package, in compliance with the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Program (SBDD).

Data Submittal Description

The NMBB April 1, 2011 data submission included:

- Data Transmittal Memo (PDF). This document described NMBB data submittal components, state-restricted data fields, and contact information.
- Provider Data Request Template (XLS). The data-request spreadsheet contained an overview and upload instructions in addition to eight worksheets for different types of service, subscriber speed, and community anchor institutions.
- FCC-prepared Data Package Spreadsheet (XLS). The data-package spreadsheet consisted of three worksheets for overview and checklist, record count, and provider table.
- NTIA-compliant Geodatabase with FGDC-compliant Metadata (GDB). The NMBB geodatabase was created to NTIA standards and included metadata for the database layers.
- Check Submission Receipt (TXT). This document listed pass/fail for received data-submission layer and field entries.

All files were zipped together and submitted as NM_SBDD_20110401 (ZIP).

SBDD Geodatabase Layer	Number of Records: April 1, 2011
BB_Service_Address	0*
BB_Service_Road_Segment	9942
BB_Service_CensusBlock	126123
BB_Service_CAInstitutions	2595
BB_Service_Wireless	4166
BB_Service_Overview	115
BB_ConnectionPoint_LastMile	0*
BB_ConnectionPoint_MiddleMile	409

***** Due to restrictions in the Non-disclosure Agreement (NDA) with New Mexico Internet Service Providers (ISPs), New Mexico cannot populate the Service Address and Last-Mile feature classes in the NMBB Geodatabase.

Provider Participation

The NMBB Program requested broadband data from seventy NM Internet Service Providers (ISPs) in February 2011. A total of forty-two different ISPs provided data to the NMBB Program, representing thirty-seven companies. Two companies provided statewide satellite data and these data were not submitted to NTIA. Eight providers did not submit new data for the April 2011 submittal, and two companies (Cyber Mesa Computer Systems Incorporated and Higher-Speed Internet, LLC) were reluctant to further participate in the program. One company (Kit Carson Telecom) provided a data set but it was not usable and could not be processed for submission. Six ISPs confirmed that they currently do not provide broadband services in New Mexico.

Internet Service Providers	Number: April 1, 2011
Contacted	70
Responded: Provided Data	42*
Responded: Will Provide Data	4**
Responded: Will not Participate	2
Responded: Not Broadband Provider	6***
Did Not Respond	21

***** 5 ISPs of 42 provided data as 2 distinct companies/subsidiaries; 1 ISP would not provide data but directed NMBB to data on their Web site.
** 1 ISP submitted an unusable data set for processing.
******* These ISPs are not broadband providers.

In the Participating Providers table, below, an asterisk (*) indicates a statewide satellite-service provider.

Participating New Mexico Internet Service Providers: NTIA Data Submittal, April 1, 2011	
360networks (USA) Inc.	PVT Networks
Agavue Broadband LLC	Qwest Corporation
AT&T Mobility LLC	Sacred Wind Communications, Inc.
Baca Valley Telephone Company, Inc.	Sierra Communications (a subsidiary of Baca Valley Telephone)
Baja Broadband	Southwestern Wireless
Cable ONE	Sprint
Comcast	Suddenlink Communications
Cricket Communications, Inc.	T-Mobile
Cyber Mesa Telecom	Time Warner Cable
Dell Telephone Cooperative, Inc.	Tularosa Communications, Inc.
DIECA Communications, Inc. (Covad Communications Company)	TW Telecom of New Mexico, LLC
ENMR Plateau Telecommunications	US Cable
Frontier Navajo Communications (Navajo Communications Company, Inc.)	Valley TeleCom Group (Copper Valley Telephone, Inc.)
Higher-Speed Internet, LLC	Valley TeleCom Group (Valley Telephone Cooperative, Inc.)
La Jicarita Rural Telephone Cooperative	Verizon Wireless
Leaco Rural Telephone Cooperative	Windstream Communications SouthWest
Level 3 Communications, LLC	WNM Communications
MATI Networks (Mescalero Apache Telecom, Inc.)	Yucca Telecom (Roosevelt County Rural Telephone Cooperative, Inc.)
Penasco Valley Telecommunications	Yucca Telecom (Yucca Telecommunication Systems, Inc.)
Plateau Telecommunications, Inc.	Spacenet, Inc. (StarBand Communications, Inc.)*
PTCI (Panhandle Telephone Cooperative, Inc.)	WildBlue Communications, Inc.*

Workflow Processing Scheme

New Mexico acknowledges the importance of understanding data reliability and integrity as the Provider data are processed for NTIA submittal. The NMBB Data Workflow and Processing Scheme include four broad stages:

1. Obtain – Acquire raw Provider data.
2. Validate – Check for internal data consistency and for consistency with external data sources.
3. Process – Develop Geographic Information System (GIS) data and update NTIA Geodatabase.
4. Report – Submit the final Geodatabase to NTIA.

These stages and their relationships are depicted in the diagram below, and are discussed in the following sections. The April 1, 2011 Data Workflow and Processing Scheme, V3.0 reflects modifications to the procedures submitted for the September 30, 2010 Scheme, V2.0.

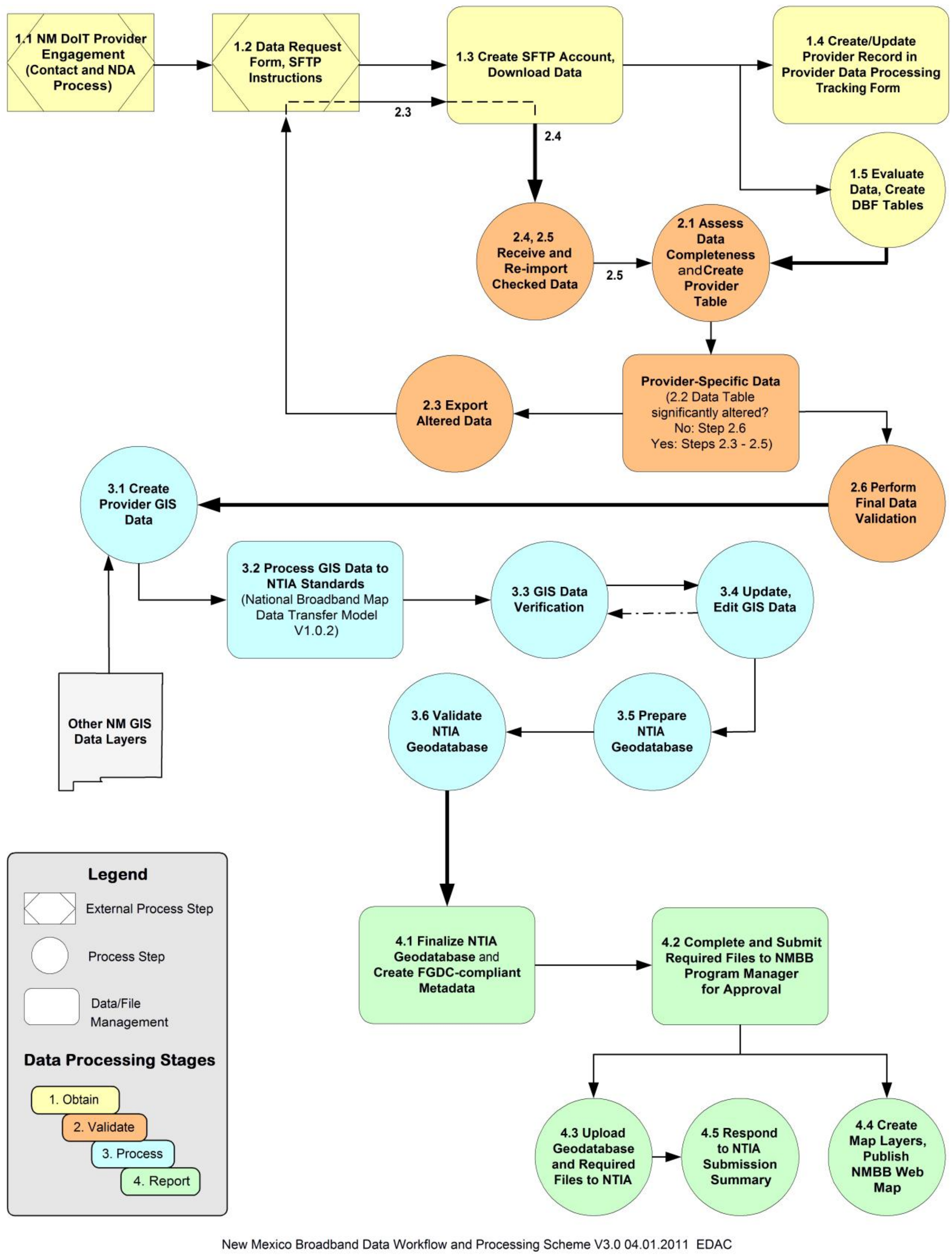

Figure 1 New Mexico Broadband Workflow and Processing Scheme

Data Collection

Provider Engagement

The NM Department of Information Technology established contact with each New Mexico Broadband Provider and negotiated a signed NDA with the State and with EDAC, if required.

Data Request

EDAC sent an e-mail requesting broadband data to seventy NM Internet Service Providers (ISPs) in February 2011 and a reminder e-mail in March. In addition to an NMBB Program overview and formal request for data, the message included a Web link for the NM Broadband Data Request Form (MS Excel Worksheet); this form included instructions for completing the eight data worksheets and for securely uploading Provider data to the EDAC Secure FTP site.

Data Receipt

EDAC created a Secure File Transfer Protocol (SFTP) site for broadband data upload, and created an account on the site for each NM Provider. Each Provider was assigned a unique username and password; this account information is stored in the NMBB SFTP Account Management form.

Provider data arrive in numerous formats, including NMBB or Provider spreadsheets, shapefiles, CAD files, and text files. These data are downloaded from the SFTP site to the EDAC network.

Provider and Data Tracking

EDAC creates or updates the specific Provider record in a Provider Data Processing Tracking Form. Throughout the data process, each Tracking Form step is recorded with analyst initials and date of task completion. Steps include:

- Record Provider name information and the assigned 2-digit Primary Key (PKey).
- Record the Holding Company Name, DBA Name, FRN (if available), and whether Community Anchor Institutions data are provided.
- Record type of files submitted; date of data submission and the initials of the receiving GIS analyst; and how data were submitted (e.g., FTP or physical medium).

Provider Database

EDAC evaluates the uploaded Provider data for consistency with the NTIA data model and creates database-format tables.

Data Validation

Data Assessment

EDAC assesses the submitted data for completeness according to the National Broadband Map Data Transfer Model V1.0.2:

- Identify fields (names, types);
- Fill in missing data, if possible; and
- Check field codes, and standardize the values where appropriate.

Data Export

If the data are incomplete, based upon the above assessment steps, EDAC performs the *If required* steps, below; otherwise, EDAC proceeds with data validation. Changes and assumptions are documented.

If required:

- Return data in standardized format to the Provider for completion.
- Receive modified data back from Provider.
- Re-import data.

Data Validation

EDAC performs the final data validation for each Provider's data set: all missing data filled in; all field codes checked and standardized where appropriate.

Data Processing

GIS Data

EDAC creates and verifies Provider-specific GIS data, using ArcGIS 10 software and third-party data sets:

- New Mexico Road Centerline (NM RCL) data files.
- NM Telephone Exchange Boundaries 911.
- U.S. Census TIGER/Line shapefiles.
- TomTom MultiNet Road shapefiles.
- ESRI Road shapefiles.
- ESRI Cable Boundaries data file.

Ancillary consistency checks include comparison with other data sources that are available through the New Mexico geospatial clearinghouse – Resource Geographic Information System (RGIS; http://rgis.unm.edu).

EDAC processes the GIS data according to the National Broadband Map Data Transfer Model V1.0.2.

<u>Middle Mile Points</u>

- ISPs provide the geographic coordinates for Middle Mile points. Those points are exported as shapefiles and a spatial join is performed against Census Blocks to obtain FULLFIPSID.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

<u>Census Blocks</u>

- If an ISP provides the Census Block IDs, then those tables are spatially joined with the Census Data and the blocks are extracted. Then, the Census Blocks (Area < 2 sq mi) are extracted.
- If the ISP provides address-specific data, those addresses are geocoded against the New Mexico Road Centerline (NM RCL) address locator. Unmatched addresses are processed against third-party data sets, such as the TomTom MultiNet Road data, which were purchased by the State as a part of the NMBB project, and ESRI Road data. All of those matched records are appended together to obtain a single address data set. The address points are aggregated spatially to the Census Blocks, and the Census Blocks (Area < 2 sq mi) are extracted.
- If an ISP provides shapefiles of Census Blocks, EDAC verifies those to make sure they are less than 2 sq. mi. in area.

- If an ISP provides their telephone exchange boundaries instead of addresses, then those boundaries are verified with the NM Telephone Exchange Boundaries 911 data set, and Census Blocks (Area < 2 sq mi) that lie within those boundaries are extracted. If an ISP provides the CO/RT locations, then a buffer of 1800 ft is drawn, and the Census Blocks (Area < 2 sq mi) that intersect with the buffer area are extracted.
- If an ISP provides service areas instead of addresses for Cable, then the service areas are verified with the ESRI Cable Boundaries data file. Census Blocks (Area < 2 sq mi) that lie within the boundaries are extracted.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Road Segments

- If an ISP provides address-specific data, EDAC geocodes those points (using a process similar to that explained above in *Census Blocks*). The address points are aggregated spatially to Census Blocks, and the blocks with area greater than 2 sq mi (Area > 2 sq mi) are extracted. NM RCL roads within those Census Blocks are exported, and the geocoded address points are spatially joined with adjacent road segments within a distance of 25 ft. The road segments with joined address points are selected and exported.
- If an ISP provides road segment data with address ranges, any one of the address range values (TO/ FROM) for the road is taken and the data are geocoded. Or, the address file is joined with the NM RCL roads, based on Street Name, City, and Postal Code and the matched records are extracted.
- If an ISP provides Tiger/Line roads data, those roads are extracted from the U.S. Census Tiger/Line shapefile by joining them based on the TLID (Tiger/Line ID). NM RCL road data that match the Tiger/Line roads are exported.
- If an ISP provides Telephone Exchange Boundaries or CO/RT locations or Cable service area boundaries, road segments for these data sets are not processed due to uncertainty about the NMBB procedures for these cases. NM DoIT and EDAC will request clarification from NTIA.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Community Anchor Institutions

- EDAC created an Anchor Geodatabase that has data on all the Community Anchor Institutions, such as Schools, Libraries, Health Care, Higher Education, Public Safety Facilities, and Government Agencies throughout the State of New Mexico. These data were obtained from different sources, including the Public Schools Facilities Authority (PSFA), New Mexico State Library, Homeland Security Information Program (HSIP), and NM Resource Geographic Information System Program (RGIS).
- The Anchor Geodatabase is further processed to meet the NTIA requirements. NCES IDs for schools, IPEDS IDs for higher education, and IMLS IDs for libraries are obtained from the respective Web sites and are joined with records in the geodatabase.
- Broadband data provided by the ISPs are also included in the geodatabase.

Wireless

- If an ISP has multiple spectrums, the provided polygon is duplicated for each spectrum and then appended together to obtain a single shapefile with stacked geometry.
- If an ISP provides tower location (address or coordinates) and transmit radius instead of shapefiles, those locations are mapped and a buffer is drawn with the transmit radius.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Overview

- If an ISP provides the Subscriber Weighted Nominal (SWNOM) Speed of respective technology types for the counties it serves, those values are joined with the County boundary file from the U.S. Census Tiger/Line shapefiles.
- If an ISP provides the technology of transmission, number of subscribers, and the maximum advertised speed for the Counties it serves, the SWNOM Speed is calculated and the values are joined with the County boundaries shapefile.
- These county files from each ISP are appended together to obtain a statewide stacked geometry. Data are further processed by adding required fields based on the NTIA Data Model.

GIS Data Verification, Updates, and Edits

Processed data are developed as Provider-specific spreadsheet and GeoPDF products. As the first step in New Mexico's Provider feedback loop, EDAC places each Provider's products on the SFTP site and requests that Providers verify accuracy and identify needed edits and corrections. Ten (10) ISPs responded to the verification request in the April 1, 2011 data submission cycle.

GIS data are updated and edited, based on Provider feedback, and modified data products (spreadsheet and GeoPDF) are delivered to the Provider through the SFTP site for final verification and to complete the feedback loop.

NTIA Geodatabase Preparation

EDAC produces a final "clean" GIS data set from the processed and Provider-specific, versioned feature data sets, and then prepares the NTIA Geodatabase from these finalized GIS data. Crowd sourced data were not used for preparation or validation.

NTIA Geodatabase Validation

EDAC validates the geodatabase by performing the validation checks provided below and by running the geodatabase through the SBDD_CheckSubmission tool. EDAC then assigns Quality Assurance/Quality Control (QA/QC) values.

- Repair Geometry.
- Validate Topology.
- Check Provider identification fields by Frequency tool and Summarize tool.
- Check for Null values in Transmission Technology codes, PROVIDER_TYPE, FULLFIPSID, STATEFIPS, COUNTYFIPS, TRACT, BLOCKID fields.
- Check Maximum advertised and typical down/upload speed fields for null values and for valid domain values. MAXADDOWN/TYPDOWN < MAXADUP/TYPUP; MAXADDOWN < '0' OR MAXADDOWN > '9'.
- Check for SPECTRUM values <1 and >10.

NMBB Report and Submittal

Finalized NTIA Geodatabase and Metadata

EDAC finalizes the Geodatabase per NTIA standards (National Broadband Map Data Transfer Model V1.0.2) and creates the associated metadata.

NMBB Program Manager

The NMBB Program Manager receives the finalized Geodatabase through the SFTP site and approves the files for submittal to NTIA.

EDAC completes and delivers all files to the NMBB Program Manager, as required by the Program. Files include correspondence logs with NM Providers, documentation for Web mapping activities, and the Provider-specific Data Processing Tracking Form.

NTIA Submittal

The Geodatabase and required files (data transmittal memorandum, Provider data request template [not a required file], data package spreadsheet, and check-submission receipt) are uploaded, using the FCC/ NTIA SFTP site.

NMBB Map Layers

EDAC creates GIS map layers from the Geodatabase and publishes them to the New Mexico Broadband Program Mapping site, www.nmbbmapping.org/mapping/.

Response: NTIA Submission Summary

NM DoIT and EDAC developed a document template to respond to the NTIA Submission Summary, both to address NTIA-identified issues or gaps and to request clarification and additional information. New Mexico responds within one week of receiving NTIA's Submission Summary.

NMBB System Security

System Security

The NM Broadband Server is a fully patched Windows Server 2008. The server is protected by Symantec Endpoint Protection and a double firewall.

The first layer of firewall protection is a Cisco hardware firewall that protects the Server from any intrusion from outside the EDAC network. This firewall only allows connections on Ports 80 and 22.

- Port 80 allows Web browsing.
- Port 22 allows Secure FTP. SFTP service is fully encrypted with SHA1 stored passwords.

The Windows software firewall is configured to allow access on Ports 80, 22, 443, and 3389.

- Port 443 gives EDAC developers the ability to configure ArcGIS Server from within the EDAC network.
- Port 3389 gives EDAC system administrators the ability to configure the base Windows server from within the EDAC network.

Server Connections

Connect to the Server from the outside:

- HTTP: No authentication (simple Web browsing).
- SFTP: Authentication required and fully encrypted.

Connect to the Server from within the EDAC network:

- HTTPS: Authentication required and fully encrypted.

- RDP: Authentication required and fully encrypted.
- SMB: Port 445, Windows file-share port.

Virtual Machine and Networked Drive Clones and Back-ups

The NMBB Virtual Machine (VM) is a dedicated server.

Back-up: Development Server (not published)

- Daily: A differential back-up to a tape server is performed; the tape server is connected to a tape library.
- Friday/Weekend: A full back-up of the networked drive is performed to the tape server. [Web Application (copy), Database (copy), and Data Deliverables (copy)]

Clone: Virtual Machine (published)

- Daily: A new clone is created each morning by deleting the “old” version and recreating the clone. Each clone is a complete copy of the currently running VM.
- Friday/Weekend: A complete clone of the VM is copied to an external hard drive and handed off to an EDAC manager for off-site storage. [Web Application, SFTP Site, Database, NMBB Server Software, and Data Deliverables] A permanent storage facility is being negotiated (with the High Performance Computing Center).

Physical Security

NM Broadband Server physical security is accomplished through:

- Controlled-environment floor space in a locked, code-protected room for system servers, and
- An uninterrupted power supply (UPS).

Lessons Learned

Provider Feedback Loop

EDAC identified and implemented several measures for more effective data collection. These included:

- Developing and formalizing an interaction process between data providers and EDAC. This helps to get both data and feedback from the ISPs during data collection, processing, and NMBB-feedback-to-Provider processes. This also may help to obtain data from ISPs that are not interested in participating in the NMBB Program.
- Modifying the data request template, based on the updated NTIA data model. The template will be reviewed for each round of data collection, prior to requesting data from ISPs.
- Setting deadlines for receiving data from ISPs because processing requires time depends on the type of data received. Also, this allows EDAC time to submit feedback maps to ISPs for their verification and to update the data according to changes in NTIA data models.

Data Validation and Processing

EDAC also addressed issues regarding data validation and processing. These included:

- Updating data validation procedures to meet the requirements of the data model.
- Learning to create and update metadata in ArcGIS 10, since editing metadata is different in ArcGIS 9.3.
- Researching and learning the propagation models for processing Satellite and Wireless data that are received from New Mexico Providers.

NMBB Server (VM) Clones

Initially, the NMBB Virtual Machine was cloned to an external hard drive every Friday morning. This schedule was modified to include a daily clone, as described above, to eliminate dependence upon the external drive (for example, to mitigate the potential loss from a damaged hard drive). Also, further analysis of the VM clone schedule led to encrypting the clone on the external hard drive.

NMBB Web Map

The New Mexico Broadband Map (www.nmbbmapping.org/mapping/) is developed as part of the NMBB Program for the State of New Mexico. This Web map displays all of the processed ISP broadband data that are submitted to NTIA for the National Broadband Map, and the processed statewide satellite-service data.

Figure 2, below, is a screen-capture image of the New Mexico Broadband Map showing DSL, Cable, Fiber, and Fixed Wireless broadband-coverage layers on the Streets base map. Satellite and Mobile Wireless layers are not displayed. Tools include: layer selection; base map selection; dynamic legend; slider-bar and custom zoom; drag-and-drop and directional pan; full, previous, and next extent; identify; find address; scale bar; and print map. Additionally, a feedback tool, help (online user guide), program information, and New Mexico's disclaimer are provided.

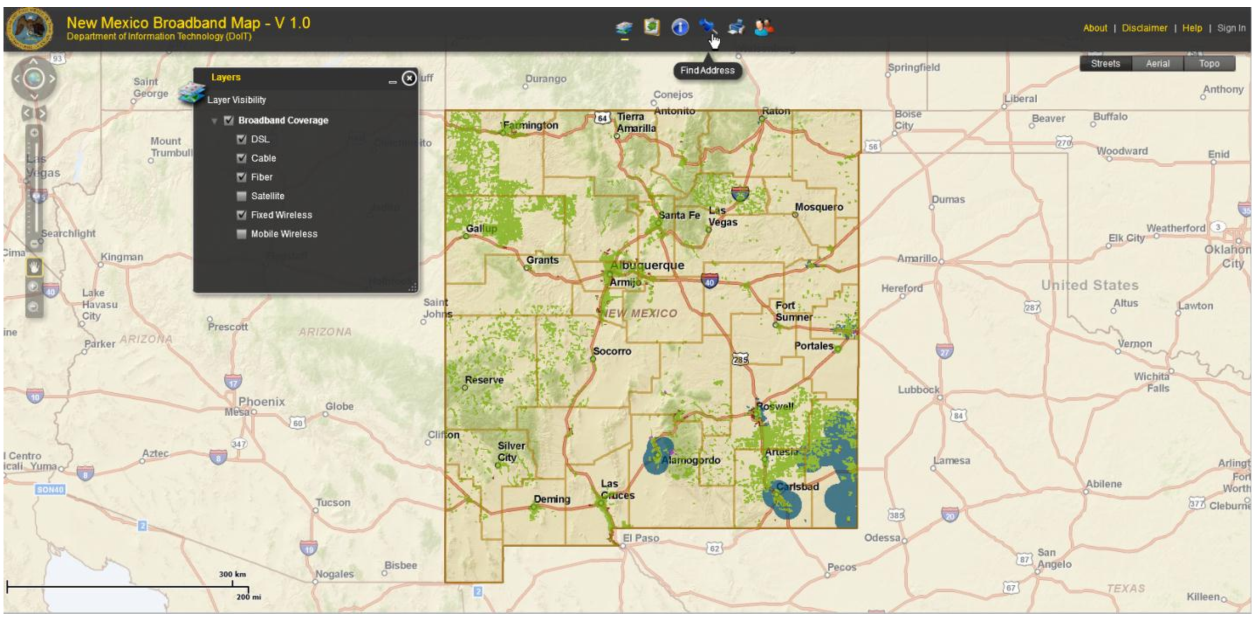

Figure 2 NMBB Program: New Mexico Broadband Map, www.nmbbmapping.org/mapping/

Table of Abbreviations and Acronyms

API	Application Programming Interface
BB	broadband
CAD	Computer-aided Design
CO/RT	Central Office/Rural Terminal
DBA	Doing Business As
DoIT	[NM] Department of Information Technology
DSL	Digital Subscriber Line
EDAC	[UNM] Earth Data Analysis Center
FCC	Federal Communications Commission
FGDC	Federal Geographic Data Committee
FRN	FCC Registration Number
ft	foot
FTP	File Transfer Protocol
GDB, gdb	Geodatabase; Geodatabase file extension
GIS	Geographic Information Systems
HSIP	Homeland Security Information Program
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
ID	[unique] identifier
IE	[Microsoft] Internet Explorer
ISP	Internet Service Provider
NDA	Non-Disclosure Agreement
NM	New Mexico, State of New Mexico
NMBB	New Mexico Broadband Program
NM DoIT	New Mexico Department of Information Technology
NM RCL	New Mexico Road Centerlines
NOFA	Notice of Funding Availability
NTIA	National Telecommunications and Information Administration
PDF, pdf	[Adobe] Portable Document Format and file extension
QA/QC	Quality Assurance/Quality Control
RDP	Remote Desktop Protocol
SBDD	State Broadband Data and Development Program
SFTP	Secure File Transfer Protocol
SHA1, sha1	Secure Hash Algorithm 1
SMB	Server Message Block
sq mi	square mile(s)
SWNOM	Subscriber Weighted Nominal [Speed]
TIGER	[U.S. Census] Topologically Integrated Geographic Encoding and Referencing (system)
TXT, txt	Text file extension
UNM	The University of New Mexico
UNM EDAC	The University of New Mexico Earth Data Analysis Center
UPS	uninterrupted power supply
VM	Virtual Machine
Web	World Wide Web
XLS, xls	Microsoft Excel file extension
ZIP, zip	Zipped file extension

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF NEVADA

CONNECT Nevada®

April 1, 2011

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NEVADA COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Nevada offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Nevada has played in creating such a powerful tool that will surely benefit not just Nevadans, but consumers and businesses nationwide.

Therefore, Connected Nation, as the State Broadband Designated Entity, in partnership with the Nevada Governor's Office and Nevada Broadband Task Force, is pleased to present this submittal of the state of Nevada's State Broadband Data and Development (SBDD) Grant Program, known as Connect Nevada.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Nevada: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Nevada program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Nevada program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability – Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 94.55% of the Nevada provider community, or 52 of 55 total providers. Of the 52 participating providers, 22 supplied an update to their network or coverage area(s), while 29 have reported no change. The remaining provider previously supplied data but was non-responsive in the April 2011 update effort;

therefore its previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. The remaining three providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Nevada principals that all commercially reasonable efforts were made to account for 100% of the known Nevada broadband provider community, pursuant to this semi-annual data update submission.

Connect Nevada has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Nevada conducts field validation efforts; between the October 2010 and this April 2011 data submission 27 (49.09%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Nevada launched a website to create awareness about the initiative. Connectnv.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Nevada website encountered 1,306 unique visits during this reporting period (3,516 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 3 broadband inquiries over this same reporting period (24 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Nevada website and the Connect Nevada Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Nevada mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Nevada has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Nevada Broadband Task Force, outreach was conducted during this data update reporting period by Connect Nevada to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Nevada website. Connect Nevada continues to work in close coordination with statewide associations such as the Nevada System of Higher Education, Nevada State

Superintendent, Nevada State Library and Archives, and Nevada Rural Hospital Partners to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Nevada will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. Additionally, Connect Nevada will continue working closely with members of the Nevada Broadband Task Force to reach CAI associated with their respective sectors. From our work in Connect Nevada, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Nevada efforts, along with an investment of both human and technical resources required, to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Nevada, Connected Nation has previously engaged all federally recognized tribal lands in the area covered by the Connect Nevada SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period Connect Nevada plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connect Nevada understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Nevada program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Nevada, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: NEVADA COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Nevada, working in close coordination with the Nevada Broadband Task Force, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Nevada has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Nevada has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Nevada through ESRI ArcGIS software.

Connect Nevada continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Nevada website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Nevada will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectnv.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_NV_6549

Connect Nevada has worked diligently during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. To date no centralized sources of connectivity data have been located in the state, but we continue outreach to sources that may have possession of this data.

In tandem with these efforts to identify existing data, Connect Nevada continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

In Nevada we are working with the state Superintendent of Public Instruction, Nevada Hospital Association, Nevada System of Higher Education, and the Nevada State Library and Archives. Survey responses have been slow during the last reporting period but each of these organizations is willing to work with us to identify new survey respondents and to continue distribution of information about our project.

Connect Nevada has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Nevada is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a

CAI in Nevada, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Nevada will continue its ongoing work with the Nevada Broadband Task Force and key organization contacts in an effort to raise awareness of this project among CAI. An update on our current data collection efforts and an overview of our data will be provided to the Nevada Broadband Task Force within the next two months. Several members of the Task Force have already expressed interest in elevating their role with data collection, and individualized spreadsheets will be created for these members to assist with this process.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	871	871	871	133	133	130
Libraries	90	90	89	24	22	22
Healthcare	73	73	73	25	32	32
Public Safety	103	103	103	3	3	3
Higher Ed Institutions	59	59	59	43	43	43
Other Government	695	695	695	45	46	46
Other Non-Government	1,304	1,304	1,272	2	2	2
Total	**3,195**	**3,195**	**3,162**	**275**	**281**	**278**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Nevada.

Inventory of Deliverables, Connect Nevada: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
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Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Nevada have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

NEVADA FIELD VALIDATION NARRATIVE

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Nevada on the following providers: A&J Hardy Enterprises d.b.a. Comnet Computer Services and Peak Internet Services, Arizona Nevada Tower Corporation, AT&T, Baja Broadband LLC, CalNeva Broadband LLC, CC Communications, Charter Communications, Clearwire Corporation, Cox Communications, Great Basin Internet Services, High Speed Networks – Mound House LLC, Highlands Wireless Inc., Hot Spot Broadband Inc., KeyOn Wireless, Leap Wireless d.b.a. Cricket License Company LLC, Moapa Valley Telephone Company, Nextweb (Covad), Oasis Online Inc., Performance Computing Internet, Reliance Connects d.b.a. Rio Virgin Telephone & Cablevision, Satview Broadband Ltd., Schatnet Internet LLC, Sprint, United Cable Management, Vegas Wi-Fi Communications LLC, Verizon Wireless, and Yonder Media.

During this reporting period, Connected Nation conducted 48 additional on-site validation tests with A&J Hardy Enterprises d.b.a. Comnet Computer Services and Peak Internet Services, AT&T, Baja Broadband LLC, Clearwire Corporation, Cox Communications, KeyOn Wireless, Leap Wireless d.b.a. Cricket License Company LLC, Moapa Valley Telephone Company, Nextweb (Covad), Reliance Connects d.b.a. Rio Virgin Telephone & Cablevision, Sprint, and Vegas Wi-Fi Communications LLC, and Verizon Wireless.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 27 companies (out of a universe of 54 viable providers) totaling 49.09% within the state of Nevada.

Accuracy and Verification: Methodology - Provider Validation

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 1.08% of Nevada households do not have terrestrial fixed broadband service available, and approximately 0.23%[1] of Nevada households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 7.66% of rural Nevada households do not have terrestrial fixed broadband service

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

available, and approximately 1.69%[3] of rural Nevada households have neither mobile nor fixed broadband service available.[4]

Wireless Methodology

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)

[3] See footnote 1.
[4] See footnote 2.

22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Nevada project has received a total of 3 inquiries (24 grant inception to date). As more inquiries are submitted to Connect Nevada, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumers to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Nevada project launched BroadbandStat on June 3, 2010, and has received a total of 1,054 visits to date, of which 480 occurred this reporting period.

SPEED TEST METHODOLOGY

The 81 speed tests that are represented in the Connect Nevada Speed Test Report during this reporting period (272 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Nevada speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Nevada project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Nevada with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Nevada.

Broadband Provider Log

Complete	66
Non-Responsive/Refused	0
In Progress	8
Count of Datasets by Viable Status	**74**
Total Unique Providers Represented	**55**

Provider Name	Platform	Status	NDA Execution Date	Notes
Arizona Nevada Tower Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/8/2010	
Arizona Nevada Tower Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/8/2010	
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
CC Communications	Fiber	Data Added to Statewide Inventory	6/11/2010	
Cellco Partnership	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Charter Communications Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	
Citizens Telecommunications Company of Ne	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	
High Desert Internet Services	Fixed Wireless	Data Added to Statewide Inventory		
Hot Spot Broadband, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
InfoWest, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
LasVegas.Net LLC	Fixed Wireless	Data Added to Statewide Inventory		
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
Performance Computing Internet	Fixed Wireless	Data Added to Statewide Inventory	3/19/2010	
Schatnet Internet LLC	Fixed Wireless	Data Added to Statewide Inventory		
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
Vegas Wifi Communications LLC	Fixed Wireless	Data Added to Statewide Inventory	4/7/2010	
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
DIECA Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Zayo Bandwidth, LLC	Backhaul	Backhaul Provider Only Processing Complete		
360networks	Backhaul	No Update to Provide	1/19/2010	
Baja Broadband LLC	Cable	No Update to Provide	2/22/2010	
Beehive Telephone Co., Inc. NV	ILEC/CLEC	No Update to Provide	4/5/2010	
Beehive Telephone Co., Inc. NV	Fixed Wireless	No Update to Provide	4/5/2010	
CalNeva Broadband, LLC	Cable	No Update to Provide	4/8/2010	
CC Communications	ILEC/CLEC	No Update to Provide	6/11/2010	
Cellco Partnership	Backhaul	No Update to Provide	12/14/2009	
Cheetah Wireless Technologies, Inc.	Fixed Wireless	No Update to Provide		
Citizens Telecommunications Company of Ne	Backhaul	No Update to Provide	1/22/2010	
Cox Communications Las Vegas, Inc	Cable	No Update to Provide	2/3/2010	
Cox Communications Las Vegas, Inc	Backhaul	No Update to Provide	2/3/2010	
DIECA Communications, Inc.	Fixed Wireless	No Update to Provide	1/19/2010	
ETAN Industries	Cable	No Update to Provide		
Filer Mutual Telephone Company	ILEC/CLEC	No Update to Provide	2/9/2010	
Great Basin Internet Services, Inc.	Fixed Wireless	No Update to Provide	4/6/2010	
High Speed Networks-Mound House, LLC	Fixed Wireless	No Update to Provide		
Highlands Wireless Inc.	Fixed Wireless	No Update to Provide		
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
Lincoln County Telephone System	ILEC/CLEC	No Update to Provide	3/5/2010	
Lincoln County Telephone System	Fiber	No Update to Provide	3/5/2010	
Moapa Valley Telephone	ILEC/CLEC	No Update to Provide	2/22/2010	
Moapa Valley Telephone	Fiber	No Update to Provide	2/22/2010	
Mt. Wheeler Power	ILEC/CLEC	No Update to Provide	4/5/2010	
Mt. Wheeler Power	Fixed Wireless	No Update to Provide	4/5/2010	
Oasis Online, Inc.	Fixed Wireless	No Update to Provide		
Oregon-Idaho Telephone Company	ILEC/CLEC	No Update to Provide	2/25/2010	
Qwest Communications Company, LLC	Backhaul	No Update to Provide	1/4/2010	
Rio Virgin Telephone Co	ILEC/CLEC	No Update to Provide		
Rio Virgin Telephone Co	Fiber	No Update to Provide		
Rural Telephone Company	ILEC/CLEC	No Update to Provide	3/23/2010	
Satview Broadband LTD	Cable	No Update to Provide	1/11/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
tw telecom of nevada, llc	Backhaul	No Update to Provide	4/27/2010	
United Cable Management, Inc.	Cable	No Update to Provide	4/13/2010	
Vegas Wifi Communications LLC	Backhaul	No Update to Provide	4/7/2010	
Wells Rural Electric Company	Fixed Wireless	No Update to Provide	3/1/2010	
XO Communications, LLC	Backhaul	No Update to Provide	6/2/2010	
Yonder Media	Fixed Wireless	No Update to Provide		
Nevada System of Higher Education	Backhaul	No Update Provided - Use Last Submission Data		
ACI, Inc.		Solicited Initial Data		
Air-Internet.com, Inc.		Solicited Initial Data		
Avant Wireless		Solicited Initial Data		

DIECA Communications, Inc.	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Wes Kerr] Provider doesn't offer residential DSL, and the last mile data will not be included in the data submission.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Jess Cary] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Jess Cary] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Oregon-Idaho Telephone Company	Fiber	Other	2/25/2010	[MAR-09-11 Jess Cary] FTTH data is not available and will not be included in the April 2011 submission.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-2011 Jess Cary] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Great Basin Internet Services, Inc.	ILEC/CLEC	General Reseller - Non-NTIA	4/6/2010	
LasVegas.Net LLC	ILEC/CLEC	General Reseller - Non-NTIA		

“White Paper” from *New York* describing Round 3 (Spring, 2011) Data Submission to the NTIA under the SBDD

April 1, 2011

Executive Summary

The Broadband Mapping Team at the New York State Office of Cyber Security is pleased to submit our Round 3 data for the SBDD Program. Our goals for Round 3 were to: 1) obtain the required data elements from all known facilities-based providers of broadband service to end users in the State of New York, and 2) improve the quality of the delivered data through greater emphasis on geospatial verification procedures and the use of additional sources of information in the data verification processes. We believe we have met those goals.

Going into this round of data collection, we had concerns that providers’ interest may have waned and that it could be difficult to retain the current participants. Through hard work and continued emphasis on building partnerships, we retained all but one previous participant and gained six new participants. Our Round 3 data includes data from 100% of known facilities-based (wireline) end user providers and all significant wireless service providers in NYS. We have one small fixed wireless provider who participated in the previous round of data collection who indicated that they did not have the resources to continue with the program. We will seek a solution to bring this provider back in for future rounds.

Overall, we are extremely pleased with the net gain for Round 3 participation!

Although we did not target broadband resellers for Round 3, our delivery includes data from six providers who do not own their own facilities. We anticipate expanding the range of program participants to include more of these resellers in future rounds of data collection. Guidance from the NTIA program office and information sharing from within the SBDD Grantee community will be helpful in guiding these future data collection and mapping efforts.

Another future goal is to identify and work with more fixed wireless providers. Our experience thus far has shown fixed wireless providers to be mostly small, relatively new companies targeting geographic areas where un-served pockets left by wire-line or cellular wireless companies exist. We believe mapping these provider’s serviceable areas is a very important component required to fine tune NYS’s served and un-served boundaries.

Expanding our data verification methods was another area of focus during this round. Just prior to our Round 2 data delivery, we launched a speed test website and the state broadband map. Both now provide crowd-sourced data that were used for verification of the Round 3 provider supplied data. Details of those and other verification procedures are provided in the *Verification* section below.

Our speed test activities and the state broadband map both initially created concerns for some members of our provider community. We took great pains to address all those concerns first through informational webinars and then via in-person meetings with individual providers and the NYS Telco and Cable association leadership. We are happy to report that not only were the concerns satisfactorily addressed, but our relationships with the providers and associations were strengthened in the process.

The remainder of this paper describes our methodology for populating the data transfer model and performing data verification; and provides a summary of our data collection results and goals for Round 4.

Provider Participation Summary Tables:

82	**Total Participating Providers**
69	Wireline Providers
14	Wireless Providers (2 are both Wireless & Wireline)
1	Provider is middle-mile only
39	Providers submitted Middle Mile Data

Technology Type	Wireline Census Block Provider Count	Wireline Service Availability by Census Block	Wireline Street Segment Provider Count	Wireline Service Availability by Street Segment	Wireless Provider Count	Wireless Services by Shapefile	Middle Mile Provider Count	Middle Mile Points
Asymmetric xDSL	44	280,976	36	34,205	0	0	25	1,439
Symmetric xDSL	6	62,947	3	176	0	0	0	0
Other Copper Wireline	7	85,730	5	282	0	0	3	131
Cable Modem - DOCSIS 3.0	7	168,469	5	6,778	0	0	0	0
Cable Modem - Other	13	158,933	12	39,451	0	0	2	8
Optical Carrier/Fiber to the End User	21	109,969	15	2,846	0	0	6	576
Terrestrial Fixed Wireless - Unlicensed	0	0	0	0	7	9	0	0
Terrestrial Fixed Wireless - Licensed	0	0	0	0	1	1	0	0
Terrestrial Mobile Wireless	0	0	0	0	6	20	2	13
Other (middle-mile only)	0	0	0	0	0	0	1	2
TOTAL SUBMISSION	**98**	**867,024**	**76**	**83,738**	**14**	**30**	**39**	**2,169**

Populating the Data Transfer Model:

For Round 3, we continued to receive new data from providers in various formats:

1. **Hard copy/.pdf maps**: digitized/georeferenced maps, aggregated availability to the census block and street segment level
2. **Address locations of availability**: geocoded addresses and aggregated to the census block and street segment level
3. **Census block keys and street segment IDs** (Excel worksheets, text files, and shapefiles): where necessary, converted all census blocks to Census 2000 geography and converted TIGERLine streets to New York State street segment geometry
4. **Shapefiles** of wireless coverage areas: added appropriate attribute information where necessary
5. **Kml files –** some fixed wireless and cellular providers supplied coverage area via kml; added appropriate attribute information where necessary

All (non-ESRI) data were converted to ESRI shapefile format with availability aggregated to the census block and street segment level and with provider attributes added (i.e. Provider Name, DBA Name, Technology, Speeds, etc.). Data from the individual shapefiles were loaded into the data transfer model.

Some providers actively report no changes from the previous round. Other (small area) providers were sent maps of their reported Round 2 availability and asked to confirm that there were no changes. In both of these "no change" situations, previously delivered Round 2 data was loaded in the data transfer model. All data were then verified.

The following fields were added to capture NYS specific information:

1. BBConnectionPoint_MiddleMile
   a. Provider Code – internal use
2. BB_Service_CensusBlock
   a. Suffix_Cont – additional field used in street address
   b. Verification – tracks verification results connected with speed test data
   c. Provider Code –internal use
3. BB_Service_RoadSegment
   a. NYS ID – ID code for each street segment
   b. Suffix_Cont – extra field used in street address
   c. Verification – tracks verification results in connection with speed test data
   d. Provider Code –internal use
4. BB_Service_Wireless
   a. Provider Code –internal use

The following domains were extended to allow for plausible and verified attribute values supplied by providers:

1. Other Copper Wireline Down (30) – code 9
   Other Copper Wireline Up (30) – code 9
2. Cable Modem – DOCSIS 3.0 Down (40) – code 10
   Cable Modem – DOCSIS 3.0 Up (40) – code 10
3. Cable Modem – Other Down (41) – code 10
   Cable Modem – Other Up (41) – code 10
4. Terrestrial Mobile Wireless Down (80) – code 7
   Terrestrial Mobile Wireless Up (80) – code 7
5. SPECTRUM USED – code 10 - Other

Verification:

Automated verification was accomplished via the following methods:

1. Business rules built into the data transfer model (catching problems on the way in)
2. Repeatedly running the NTIA supplied Python script
3. ESRI 'Check Geometry' and 'Fix Geometry' tools

Non-automated verification methods ranged from the very simple to complex, multi-step procedures. They were:

1. Clipping all data to the NYS boundary file

2. Checking for Duplicate: The NTIA Python Script checks for multiple speeds reported by provider & technology on each census block and street segment ID, but it does not check for total duplicate records. In order to check for total duplicate records, we performed the following verification steps:
   a. Created a text column in the street segment and census block feature classes and used the field calculator to concatenate FRN, TRANSTECH, and FULLFIPSID /Street Segment ID on each record.
   b. Summarized the concatenated field to find any records where the COUNT was greater than 1 (indicating a total duplicate record).
   c. Related those >1 COUNT records back to the geodatabase feature class and deleted duplicates.

3. Additional geometry checks: The *Select Layer by Location* tool in ArcGIS was used to check the vertical alignment and area designation of all census blocks loaded in the geodatabase. The parameters of the tool were set to select census blocks in the geodatabase that 'are identical to' a base layer of Census Blocks (2000 vintage) consisting of only ≤ 2 square mile blocks. All census blocks in the geodatabase that vertically aligned with the base layer were selected. The same process was performed on the street segment feature class using a base layer of streets in census blocks greater than 2 square miles.

4. Provider verification: For providers with significant changes from the previous round, we created review maps showing Round 3 availability aggregated to census blocks and street segments. These providers were given at least five days to respond and initiate any changes or corrections. Changes were made based on provider feedback. Changes were documented for future reference.

5. Use of crowd-sourced data:
    a. **NYS Speed Test data points and attributes** were used to verify provider reported availability. The NYS speed test website includes a data collection form which requests:
        i. Street address at which the test was taken
        ii. Service provider
        iii. Service technology

    After satellite provider records and sub-broadband speed records were removed, 4741 records were successfully geocoded and used for verification. Three levels of verification were established for points that fell within areas of reported service availability. They are:

    Code 1 = Provider and technology matched
    Code 2 = Provider matched but technology unknown
    Code 3 = Provider matched but technology is mismatched

    Each census block and street segment availability record involved with this verification activity was assigned one of the above codes. We consider the assignment of these verification codes as the start of our work on the leading practice of establishing record level confidence scale. Further work is planned to create a flexible and informative scale that can be expanded as new data sources and activities are added to our verification workflows.

    b. **FCC speed test records** were used to verify provider reported availability. FCC speed test records lack provider and technology information but we were able to successfully establish the provider via a publically available IP Address search engine (the APNIC Whois Database). Those records were then used to verify provider reported availability in the same manner as was used with the NYS speed test points. Because the technology was not known, the highest verification code assigned was 2 (Provider matched but technology unknown). Here is a statistical summary:

	Number	Percentage
Total Number of FCC Wireline Speed Test Points	59098	N/A
Total Number / Percentage Successfully Geo-coded	30685 / 59098	52%
Total Number / Percentage Successfully IP Searched	21766 / 30685	71%

    c. **NYS Broadband Map feedback:** After receiving an email through the “Is This Correct” link on the NYS broadband map, the details were logged in a tracking spreadsheet and investigated on our map. The address, census block, or street segment was then further investigated in ArcMap using provider submitted data to confirm reported availability. If the availability from the provider submitted data was confirmed, the next step was to use the provider's own website to determine availability.

If available, the public responder's address was used along with address point datasets from New York State and Navteq. In a census block or street segment, addresses were identified at both ends of the bounding features. These addresses were entered into an availability search on the provider's website and the results were logged. In Frontier's case, the address points were used to perform a reverse lookup and identify phone numbers at those addresses. The phone number was then entered on Frontier's site.

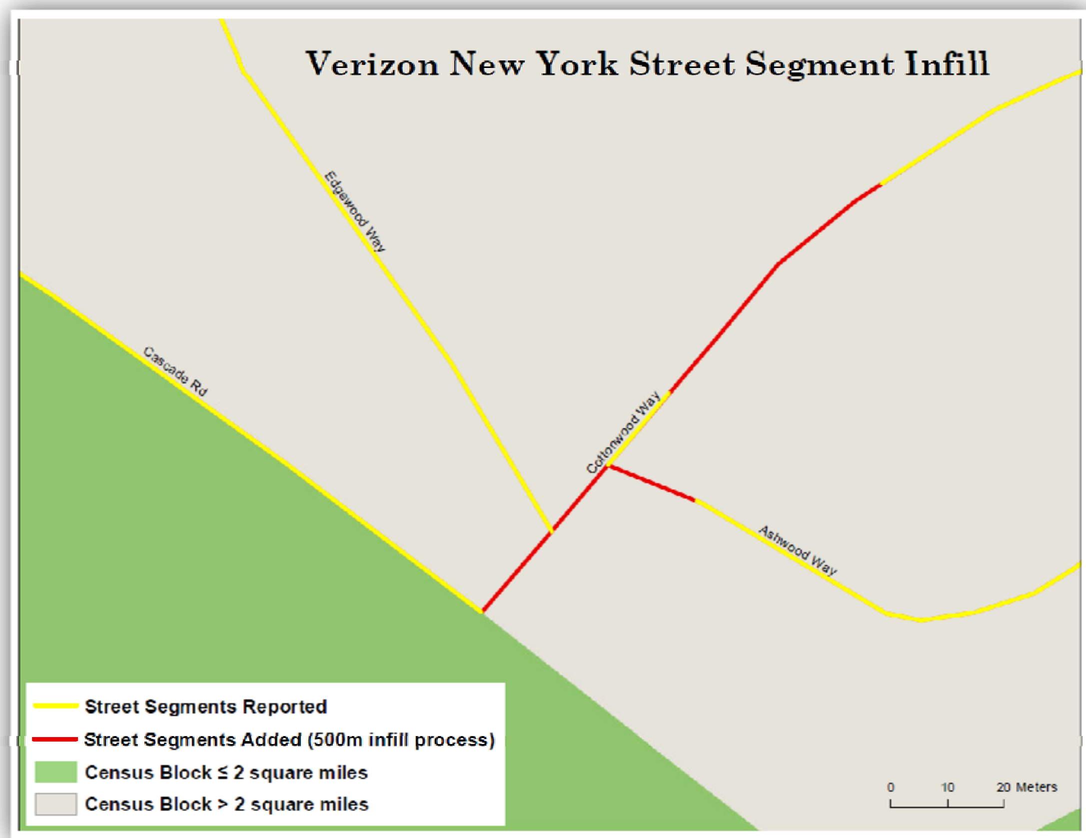
If an address within the block or segment was identified by the provider's site as potentially served, that block or segment retained that provider's coverage on our map. If no addresses within the block or segment were identified as potentially served, we removed coverage for that provider from our map. In all cases, the results were reported back to the originator.

Here are summary statistics for this feedback activity:

- 45 email responses from NYS map
- 37 Blocks, 14 Street Segments questioned
- 9 reported locations were *verified* as having coverage through our process
- No data interpretation/integration errors uncovered: all information that was questioned by public was originally reported by providers
- 40 Blocks or Segments had coverage *removed* after our investigation
- *1 report of no Fairpoint Communication coverage actually resulted in that person getting broadband at their home after Fairpoint's CEO requested they contact him*

6. **Verizon NY (wire-line) specific scrubbing:** Verizon New York submitted data in TIGER/Line street segments 2009 and Census Blocks 2009 as text delimited files.

   Street segments in the original data were highly fragmented and discontinuous in census blocks greater than 2 square miles. An infill process was used to select segments 500 meters or less that fell in between the reported street segments (see image below). Addresses from a sampling of the new street segments were checked through Verizon's website and broadband availability was verified. These segments were added to Verizon's availability and assigned the max advertised speed attributes of the nearest street segment. Street segments that fell outside Verizon's exchange boundary, or fell on a block discontinuous with any other reported blocks were sampled and checked for availability through Verizon's website and subsequently deleted.



Census blocks were converted to 2000 vintage and reapportioned based on the Census 2000 block area distinction. This posed a challenge since there is not a one-to-one area relationship between 2009 and 2000 blocks. To overcome this discrepancy and maintain accuracy, census blocks that were ≤ 2 square miles in the Census 2009 vintage but over 2 square miles in the Census 2000 vintage were assigned street segments in the portion of the block that corresponded to the smaller 2009 block. Census blocks that were greater than two square miles in the Census 2009 vintage but ≤ 2 square miles in the 2000 vintage were assigned the smaller 2000 block. Another issue occurred where 314 Census blocks reported by Verizon fell outside their exchange boundary. Addresses sampled in these blocks were checked for availability through Verizon's website. Through this process, it was verified that there is no Verizon service in these blocks, and the 314 census blocks were deleted.

Round 4 Focus:

While increasing the level of participation and improving the completeness and quality of the overall data will continue to be one of our overarching goals, there are some very specific improvement areas that the NYS Broadband Mapping Team will focus on during Round 4. They are:

1. Further attribution and enhanced spatial accuracy of our Community Anchor Institution (CAI) data: To date, collection of the broadband service attributes for our CAIs remains one of our activities in need

2. Identifying and working with more fixed wireless providers: We believe we have yet to identify some existing providers and new companies will be starting up to fill small pockets of underserved or un-served areas. A number of these small companies that we have contacted thus far have explained that they have very limited human and technical resources and, in many cases, are not able to generate any map-able data on their own. Some have had a consultant generate a propagation model (one time) and that model is now outdated. We intend to work with these providers in order to come up with a solution where we can assist them in mapping their serviceable areas and provide updates as they expand.

3. Adding verification methods: We intend to pursue the use of additional crowd sourced, commercial, and public data source and the aggregated FCC supplied 477 data.

4. Migration to 2010 Census data layers: This will involve the realignment of new Census geography to NYS basemap layers and migrating the previous round's data to Census blocks that have entirely new id numbers.

5. Improvements to the NYS Broadband Map and increasing the number of 'visits': We see our state map as an area where we can provide value to our provider partners. We have already met with some providers to discuss displaying multiple 'speed package' offerings. Time Warner Cable has agreed to work with us to pilot that enhancement. We are also in discussions with CTG in order to have them perform outreach work to increase the visits to the site and specifically encourage visitors to provide feedback regarding the accuracy of the availability data. We already have a detailed verification workflow in place to effectively utilize this data (discussed above in *Verification* section).

6. Further development of a project plan for our address point development work: We are already using address points for geocoding service delivery addresses and for verification work. For Round 4, we envision our use of address points for verification to increase and for their use in enhancing our ability to estimate household availability, underserved areas and uninhabited lands. Needs assessment discussions are already underway with E911 and key government agency stakeholders.

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF OHIO

CONNECT OHIO®

April 1, 2011

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OHIO COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Ohio offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Ohio has played in creating such a powerful tool that will surely benefit not just Ohioans, but consumers and businesses nationwide.

Therefore, as the State Broadband Designated Entity, in partnership with the Ohio Department of Administrative Services, Office of Information Technology, Connect Ohio, a dedicated program of Connected Nation, is pleased to present this submittal of the state of Ohio's State Broadband Data and Development (SBDD) Grant Program required data.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Ohio: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Ohio program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Ohio program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 83.97% of the Ohio provider community, or 110 of 131 total providers. Of the 110 participating providers, 37 supplied an update to their network or coverage area(s), while 64 have reported no change. The remaining 9 represent providers who previously supplied data but were non-responsive in the April

2011 update effort or could not verify coverage areas at the time of this submission; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 21 providers that are not represented in the attached datasets, 11 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect Ohio. The remaining 10 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Ohio principals that all commercially reasonable efforts were made to account for 100% of the known Ohio broadband provider community, pursuant to this semi-annual data update submission.

Connect Ohio has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Ohio conducts field validation efforts. To date, 38 (29.01%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Ohio launched a website to create awareness about the initiative. Connectohio.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Ohio website encountered 19,490 unique visits during this reporting period (65,810 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 305 broadband inquiries over this same reporting period (989 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Ohio website and the Connect Ohio Interactive Mapping Tool (BroadbandStat) that offer citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Ohio mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connect Ohio to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Ohio has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the state of Ohio, outreach was conducted during this data update reporting period by Connect Ohio to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Ohio website. Connect Ohio continues to identify opportunities to work with associations in the state such as the Ohio Geographically Referenced Information Program and the Ohio Public Library Information Network to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Ohio will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Connect Ohio, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Ohio efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Ohio program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Ohio, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: OHIO COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Ohio, working in close coordination with the state of Ohio, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Ohio has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Ohio has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Ohio through ESRI ArcGIS software.

Connect Ohio continues to utilize a customized online survey hosted through SurveyMonkey, with a link on the Connect Ohio website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Ohio will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://www.surveymonkey.com/s_pass.aspx?sm=ROpanKoKAJTZw4y2qnty0g%3d%3d
Password: CAI_OH_3210

Connect Ohio has worked diligently during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. In the last reporting period Connect Ohio reported a statewide geocoded CAI database for approximately 22,000 institutions. Outreach continues to identify broadband connectivity data for these institutions.

In tandem with these efforts to identify existing data, Connect Ohio continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Collecting CAI connectivity data continues to be challenging in the state but Connect Ohio will be leveraging the relationships that have been developed through the Every Citizen Online program to specifically target libraries and higher education institutions in the coming months.

Connect Ohio has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Ohio is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Ohio, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Ohio will continue its ongoing work with the state of Ohio, existing Connect Ohio staff, and key organization contacts in an effort to raise awareness of this project among CAI.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	8,703	8,703	8,703	11	7	5
Libraries	759	759	758	687	588	7
Healthcare	1,959	1,959	1,959	5	5	5
Public Safety	4,157	4,157	4,157	6	4	4
Higher Ed Institutions	609	609	609	12	7	7
Other Government	319	319	319	13	7	7
Other Non-Government	3,626	3,626	3,626	28	19	14
Total	**20,132**	**20,132**	**20,131**	**762**	**637**	**49**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Ohio.

Inventory of Deliverables, Connect Ohio: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.

Appendix A:	1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A:	1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A:	3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A:	4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Ohio have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Ohio Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;

- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Ohio on the following providers: Altius Broadband, Amplex Internet, AT&T, Avolve, Buckeye Cablevision Inc., Cavalier Telephone, Celerity Networks, CenturyLink, Cincinnati Bell Telephone Company LLC, CityNet Fiber, Clearwire Corporation, Computers4U, ConnectLink, Country Connections, Dark Horse Wireless, Databit Solutions, Frontier Communications d.b.a. Citizen's Communications, GMN Wireless, g Wireless Inc., Intelliwave, J-B Nets LLC, Just Micro Digital Services Inc., Level 3 Communications, LightSpeed Technologies, MetaLINK, Mikulski Communications LLC, New Era Broadband LLC, New Knoxville Telephone, R.A.A. Services, Sciotowireless, Southern Ohio Communication Services Inc., StratusWave, Talk America Inc., Telephone Service Company, Time Warner Cable Inc., Verizon Communications, W.A.T.C.H. TV, and Wilkshire Wireless.

During this reporting period, Connected Nation conducted 124 additional on-site validation tests with Amplex Internet, AT&T, Avolve, Celerity Networks, CenturyLink, Cincinnati Bell Telephone Company LLC, CityNet Fiber, Clearwire Corporation, Country Connections, Dark Horse Wireless, Databit Solutions, GMN Wireless, Intelliwave, J-B Nets LLC, New Knoxville Telephone, Telephone Service Company, Time Warner Cable Inc., Verizon Communications, and Wilkshire Wireless.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 38 companies (out of a universe of 131 viable providers) totaling 29.01% within the state of Ohio.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 1.74% of Ohio households do not have terrestrial fixed broadband service available, and approximately 0.48%[1] of Ohio households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 3.81% of rural Ohio households do not have terrestrial fixed broadband service available, and approximately 1.04%[3] of rural Ohio households have neither mobile nor fixed broadband service available.[4]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Ohio project has received a total of 305 inquiries (989 grant inception to date). As more inquiries are submitted to Connect Ohio, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Ohio project launched BroadbandStat on February 24, 2010, and has received a total of 5,528 visits to date, of which 2,200 occurred this reporting period.

Speed Test Methodology

The 2,211speed tests that are represented in the Connect Ohio Speed Test Report during this reporting period (4,999 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Ohio speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Ohio project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Ohio with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Ohio.

Broadband Provider Log

Complete	153
Non-Responsive/Refused	11
In Progress	15
Count of Datasets by Viable Status	**179**
Total Unique Providers Represented	**131**

Provider Name	Platform	Status	NDA Execution Date	Notes
Amplex Internet	Fixed Wireless	Data Added to Statewide Inventory	3/26/2010	
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Avolve, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	
Buckeye Cablevision, Inc.	Cable	Data Added to Statewide Inventory	2/8/2010	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Cequel Communications	Cable	Data Added to Statewide Inventory	12/15/2009	
Cincinnati Bell Telephone Company LLC	Mobile Wireless	Data Added to Statewide Inventory	3/16/2010	
Cincinnati Bell Telephone Company LLC	Fiber	Data Added to Statewide Inventory	3/16/2010	
Cincinnati Communications	BPL	Data Added to Statewide Inventory	1/6/2011	
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
Computers 4 U	Fixed Wireless	Data Added to Statewide Inventory		
Country Connections LLC	Fixed Wireless	Data Added to Statewide Inventory	2/15/2010	
DataBit Solutions	Fixed Wireless	Data Added to Statewide Inventory		
Erie County Cablevision, Inc.	Cable	Data Added to Statewide Inventory	2/8/2010	
Frontier Communications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Hometown Cable Company	Fiber	Data Added to Statewide Inventory	4/15/2010	
Intelliwave, LLC	Fixed Wireless	Data Added to Statewide Inventory		
JB-Nets, LLC	Fixed Wireless	Data Added to Statewide Inventory	4/5/2010	
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
Massillon Cable TV, Inc.	Cable	Data Added to Statewide Inventory	2/9/2010	
MetaLINK Technologies, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/22/2010	
New Knoxville Telephone Company	Fixed Wireless	Data Added to Statewide Inventory	3/12/2010	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
TDS Telecommunications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
Time Warner Cable LLC.	Cable	Data Added to Statewide Inventory	12/21/2009	
Vaughnsville Telephone Company, Inc	ILEC/CLEC	Data Added to Statewide Inventory	12/22/2009	
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
Cincinnati Communications	Backhaul	Backhaul Provider Only Processing Complete	1/6/2011	
Citynet, LLC	Backhaul	Backhaul Provider Only Processing Complete	4/5/2010	
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Com Net, Inc	Backhaul	Backhaul Provider Only Processing Complete		
Covad Communications	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
One Community	Backhaul	Backhaul Provider Only Processing Complete	4/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
US Signal Company, LLC	Backhaul	Backhaul Provider Only Processing Complete	6/17/2010	
YES Learning and Computer Center Inc	Backhaul	Backhaul Provider Only Processing Complete	4/24/2010	
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
Farmers Mutual Telephone Company	Fixed Wireless	Approval for Update Not Received - Use Last Submission Data	12/22/2009	
McLeodUSA Telecommunications Services, Inc.	ILEC/CLEC	Provider Approval Solicited		
One Community	Fixed Wireless	Provider Approval Solicited	4/14/2010	
OmniCity	Fixed Wireless	Partial Data Received		
Bascom Mutual Telephone Company	ILEC/CLEC	Provider Gathering Data	3/22/2010	
Untangled Technology	Fixed Wireless	Provider Gathering Data	5/24/2010	
Armstrong Utilities, Inc.	Cable	No Update to Provide	3/11/2010	
Arthur Mutual Telephone Company	ILEC/CLEC	No Update to Provide	12/22/2009	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Ayersville Telephone Company	ILEC/CLEC	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Cable	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Fiber	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Fixed Wireless	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Backhaul	No Update to Provide	3/22/2010	
Benton Ridge Telephone Company	ILEC/CLEC	No Update to Provide	4/13/2010	
Benton Ridge Telephone Company	Fixed Wireless	No Update to Provide	4/13/2010	
BluSky Wireless	Fixed Wireless	No Update to Provide	2/24/2010	
Bryan Municipal Utilities	Cable	No Update to Provide		
Bryan Municipal Utilities	Fiber	No Update to Provide		
Buckland Telephone Co.	Fiber	No Update to Provide	4/10/2010	
Buckland Telephone Co.	ILEC/CLEC	No Update to Provide	4/10/2010	
Cable Co-op	Cable	No Update to Provide	4/9/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Champaign Telephone Company	Fiber	No Update to Provide		
Champaign Telephone Company	Fixed Wireless	No Update to Provide		
Champaign Telephone Company	ILEC/CLEC	No Update to Provide		
Cincinnati Bell Telephone Company LLC	Cable	No Update to Provide	3/16/2010	
Cincinnati Bell Telephone Company LLC	ILEC/CLEC	No Update to Provide	3/16/2010	
City of Wadsworth Cable	Cable	No Update to Provide	7/19/2010	

Conneaut Telephone Company	Cable	No Update to Provide	12/22/2009	
Conneaut Telephone Company	ILEC/CLEC	No Update to Provide	12/22/2009	
Cox Communications, Inc	Cable	No Update to Provide	1/29/2010	
Cox Communications, Inc	Backhaul	No Update to Provide	1/29/2010	
Coyote Wireless Broadband LLC	Fixed Wireless	No Update to Provide	4/19/2010	
Dark Horse Networks	Fixed Wireless	No Update to Provide	3/15/2010	
Doylestown Telephone Company	Fiber	No Update to Provide	4/14/2010	
Doylestown Telephone Company	Cable	No Update to Provide	4/14/2010	
Doylestown Telephone Company	ILEC/CLEC	No Update to Provide	4/14/2010	
East Cleveland Cable TV	Cable	No Update to Provide	4/13/2010	
FairPoint Communications, Inc.	ILEC/CLEC	No Update to Provide	12/22/2009	
Farmers Mutual Telephone Company	ILEC/CLEC	No Update to Provide	12/22/2009	
Fort Jennings Telephone Company	Fiber	No Update to Provide	4/2/2010	
Fort Jennings Telephone Company	ILEC/CLEC	No Update to Provide	4/2/2010	
g wireless, Inc.	Fixed Wireless	No Update to Provide	3/15/2010	
Gateway Telecom LLC	Fixed Wireless	No Update to Provide	3/22/2010	
Glandorf Telephone Company, Inc.	Cable	No Update to Provide	3/9/2010	
Glandorf Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	3/9/2010	
GMN Wireless Broadband	Fixed Wireless	No Update to Provide	3/15/2010	
Horizon Telcom, Inc.	Fiber	No Update to Provide	3/27/2010	
Horizon Telcom, Inc.	ILEC/CLEC	No Update to Provide	3/27/2010	
Jefferson County Cable, Inc.	Cable	No Update to Provide	2/1/2010	
Kalida Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	3/8/2010	
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
LightSpeed Technologies	Fixed Wireless	No Update to Provide	2/9/2010	
Mango Bay Internet	Fixed Wireless	No Update to Provide	2/23/2010	
McClure Telephone Company	Fiber	No Update to Provide	4/5/2010	
McClure Telephone Company	ILEC/CLEC	No Update to Provide	4/5/2010	
Mechcom Dot Net	Fixed Wireless	No Update to Provide	4/22/2010	
Mediacom Indiana LLC	Cable	No Update to Provide	1/12/2010	
Middle Point Home Telephone Company	ILEC/CLEC	No Update to Provide	1/19/2010	
Mikulski Communications LLC	Fixed Wireless	No Update to Provide	4/13/2010	
Minford Telephone Company	ILEC/CLEC	No Update to Provide	3/3/2010	
New Era Broadband, LLC	Fixed Wireless	No Update to Provide	7/12/2010	
New Knoxville Telephone Company	Backhaul	No Update to Provide	3/12/2010	
New Knoxville Telephone Company	Cable	No Update to Provide	3/12/2010	
New Knoxville Telephone Company	ILEC/CLEC	No Update to Provide	3/12/2010	
New Knoxville Telephone Company	Fiber	No Update to Provide	3/12/2010	
North Coast Wireless Communications	Fixed Wireless	No Update to Provide	4/14/2010	
North West Net, Inc.	Fixed Wireless	No Update to Provide	4/6/2010	
Nova Telephone Company	ILEC/CLEC	No Update to Provide	4/5/2010	
nTelos, Inc.	ILEC/CLEC	No Update to Provide		[JAN-25-2011 Jeff Beebe] Fibernet of Ohio was purchased by nTelos.com.
One Communications Corporation	Backhaul	No Update to Provide	3/18/2010	
Ottoville Mutual Telephone Company	Backhaul	No Update to Provide	12/22/2009	
Ottoville Mutual Telephone Company	ILEC/CLEC	No Update to Provide	12/22/2009	
Qwest Communications Company, LLC	Backhaul	No Update to Provide	1/4/2010	
R.A.A. Services	Fixed Wireless	No Update to Provide	3/12/2010	
Redbird Internet Services	Fixed Wireless	No Update to Provide	3/22/2010	
Ridgeville Telephone Company	ILEC/CLEC	No Update to Provide	3/12/2010	
Rtec Communications, Inc.	Fiber	No Update to Provide	4/13/2010	
Rtec Communications, Inc.	Cable	No Update to Provide	4/13/2010	
S. Bryer Cable TV Corp.	Cable	No Update to Provide	8/16/2010	
SAA Bright.net	Fixed Wireless	No Update to Provide	3/23/2010	
Sciotowireless	Fixed Wireless	No Update to Provide	3/22/2010	
Sherwood Mutual Telephone Association	ILEC/CLEC	No Update to Provide	3/25/2010	
Slane Telecom	Fixed Wireless	No Update to Provide	4/9/2010	
Southern Ohio Communication Services Inc.	Fixed Wireless	No Update to Provide	4/20/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Sycamore Telephone Company	Backhaul	No Update to Provide	12/22/2009	
Sycamore Telephone Company	ILEC/CLEC	No Update to Provide	12/22/2009	
Talk America Inc.	ILEC/CLEC	No Update to Provide		
Talk America Inc.	Backhaul	No Update to Provide		
TDS Telecommunications Corporation	Backhaul	No Update to Provide	1/27/2010	
Telephone Service Company	Cable	No Update to Provide	4/6/2010	
Telephone Service Company	Fiber	No Update to Provide	4/6/2010	
Telephone Service Company	ILEC/CLEC	No Update to Provide	4/6/2010	
The City of Dover	Backhaul	No Update to Provide	4/9/2010	
tw telecom of ohio, llc	Backhaul	No Update to Provide	4/21/2010	
Wabash Mutual Telephone Company	Fiber	No Update to Provide	3/30/2010	
Wabash Mutual Telephone Company	Fixed Wireless	No Update to Provide	3/30/2010	
Wabash Mutual Telephone Company	ILEC/CLEC	No Update to Provide	3/30/2010	
Waldron Communication Company	Backhaul	No Update to Provide	3/19/2010	
Waldron Communication Company	Fixed Wireless	No Update to Provide	3/19/2010	
Wilkshire Communications, Inc.	Fixed Wireless	No Update to Provide	3/16/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Access Ohio Valley, Inc.	Backhaul	No Update Provided - Use Last Submission Data	3/2/2010	
Access Ohio Valley, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/2/2010	
Frontier Communications Corporation	Backhaul	No Update Provided - Use Last Submission Data	1/22/2010	
Jenco Speed Web	Fixed Wireless	No Update Provided - Use Last Submission Data	4/28/2010	
King Office Service, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	4/9/2010	
Nelsonville TV Cable	Cable	No Update Provided - Use Last Submission Data	4/7/2010	

NexGenAccess Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	4/16/2010	
Skymax Broadband	Fixed Wireless	No Update Provided - Use Last Submission Data	2/11/2010	
Verizon Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data	12/14/2009	
WaveLinc	Fixed Wireless	No Update Provided - Use Last Submission Data		
Windstream Communications	ILEC/CLEC	No Update Provided - Use Last Submission Data	1/28/2010	
Windstream Communications	Backhaul	No Update Provided - Use Last Submission Data	1/28/2010	
Connect Link, Inc.	Fixed Wireless	Solicited Initial Data	3/15/2010	
First Communications, LLC	Fiber	Solicited Initial Data		
Insight Communications of Central, Ohio, LLC	Cable	Solicited Initial Data		
Reliance Globalcom Services, Inc.	Backhaul	Solicited Initial Data		
UDatanet	Fixed Wireless	Solicited Initial Data		
Advanced Computer Connections	Fixed Wireless	Refused to Participate		[JAN-25-11 Chip Spann] Jeff Beebe spoke to a provider representative who stated they are not interested in participating. They are focusing on their business-to-business segment and have no intentions to do anything with residential now or in the future.
Bellaire Television Cable Co. Inc.	Cable	Refused to Participate		[FEB-10-11 Chip Spann] Jeff Beebe received an e-mail from a provider representative and was notified that they are not interested in participating at this time.
GLW Broadband	Cable	Refused to Participate		[FEB-18-11 Chip Spann] Provider representative and stated that they do not wish to participate in our mapping program.
Hocking Internet Technologies, Ltd	Fixed Wireless	Refused to Participate	8/12/2010	[FEB-14-11 Heather Delany] Provider representative indicated they are not interested in providing data at this time. Once county is 80% covered will participate. Heather to follow-up.
Just Micro Digital Services, Inc.	Fixed Wireless	Refused to Participate	4/13/2010	[JAN-26-11 Chip Spann] Chip received back-to-back e-mails stating, "Maybe you didn't get the memo. We don't do Connected Nation. Done with that. Sorry, pal. Well, not really sorry." That message was followed by, "Hey, please remove all mapping of our network, by the way. We don't care about it."
Practical Support, Ltd.	Fixed Wireless	Refused to Participate		[JAN-19-11 Chip Spann] Jeff Beebe spoke with a provider representative at Practical Support and it was stated they do not wish to participate.
Safe-t.net	Fixed Wireless	Refused to Participate		[FEB-17-11 Heather Delany] spoke with a provider representative. They would like to work with us, but are not sharing data at this time as they are the only wireless service provider in the area and feel their data could easily be picked out and access points identified for this reason. Refused to participate at this time.
WideOpenWest Ohio, LLC	Cable	Refused to Participate		[MAR-11-10 Terry Holmes] Received voice message from company executive, "I spoke with my counterparts and we will not share information as requested by CN, so you will not be receiving information from WOW." Subsequent attempts to contact this provider have resulted in no response.
Linked Communications, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts between January 16, 2010 and August 2, 2010, four attempts were made during this submission period.
Windjammer Communications, LLC	Cable	Non-Responsive to Multiple Attempts	11/16/2009	In addition to multiple contact attempts between October 27, 2009 and August 11, 2010, five attempts were made during this submission period.
Wireless Intranet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts between March 10, 2010 and August 4, 2010, five attempts were made during this submission period.
Covad Communications	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Wes Kerr] Provider doesn't offer residential DSL, and the last mile data will not be included in the data submission.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Amanda Bentley] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Global Crossing Telecommunications, Inc.	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a provider representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.

Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Amanda Bentley] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Amanda Bentley] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

Oklahoma Broadband Mapping

Data Submission Report

3rd Submission (April 1, 2011)

April 1, 2011

Sanborn
1935 Jamboree Drive
Suite 100
Colorado Springs, CO 80920

3rd Data Submission Report

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1 Introduction

This report is submitted along with the third data submission for the Oklahoma Broadband Mapping Project. This submission includes all data collected so far per the requirements of the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (Docket No. 0660-ZA29) Notice of Funds Availability (NOFA) and formal and informal Clarifications to it. Specifically, it includes broadband data collected from broadband providers and Community Anchor Institutions data compiled from various sources for the State of WA. The State of Oklahoma has retained a mapping contractor, primed by The Sanborn Map Company for doing all work related to the Mapping Grant for this project.

This document is a supplement to the two previous reports submitted with data submissions 1 and 2 on May 1, 2010 and October 1, 2010 respectively. Therefore, it builds on the document provided with those submissions. Rather than repeat the contents of the previous report, this document makes incremental updates on various topics. For this reason, it may be worthwhile to refer to the previous documents, if needed, for more details.

1 Overall Project Status

1.1 DATA COLLECTION

This section details data collection related to NTIA deliverables which include broadband data and community anchor institution data.

1.1.1 Broadband Data

For submission 3, Sanborn started data collection on January 10th 2011 by sending out data update requests and technical data specifications after NTIA did a Webinar announcing final changes for Submission 3. These were sent to a large list of companies which were compiled from FCC 477 list (dated December, 2009) and from a list provided by the Oklahoma UTC. The technical document highlighted the changes from Submission 1 to Submission 2 and requested incremental data only where possible. Sanborn also uploaded the final data for each provider in NTIA format to the Sanborn Provider Portal. The providers were encouraged to use the provider portal and update their information on it. Providers are participating through the use of the provider portal and are getting used to the process.

Although we sent the technical specifications to all the providers (more than those on the FCC 477 list and many that were non-providers earlier including resellers and non-valid providers), we followed up actively with the providers on the 477 list or those who were already participating, and public providers such as PUDs (public utility districts) who were of strategic interest to the State of Oklahoma. This is because most providers outside of the FCC list were found to be non-providers of broadband.

During this round of the data update, many providers who had refused to participate in the program earlier expressed an eagerness to participate. This validates the importance of the program, not only for the purposes of the government, but also for the providers themselves.

In our solicitation for data updates, we told providers that if we didn't hear from them by a certain date, we would default to using their data from Submission 2. However, we still contacted them after the due date a few times but eventually used Submission 2 data if they did not respond.

As with the second submission, we followed the following protocols:

1. We did not collect data from resellers
2. We have not collected data from satellite providers – we are in the process of formulating a strategy to map coverage from satellite providers and anticipate that we will have some coverage for satellite providers in our next delivery to NTIA (Submission 4, due to NTIA on October 1, 2011).

1) Three satellite providers have been identified in Oklahoma – Hughes, Starband, and Wildblue.

3. Affiliates, subsidiaries etc. have been counted as providers. Please note that data for these entities may or may not be reported as a separate FRN if they share the same FRN as their parent company.
4. We have not undertaken any propagation analysis for wireless providers who did not already have their own propagation maps. We are considering doing that for the next submission.

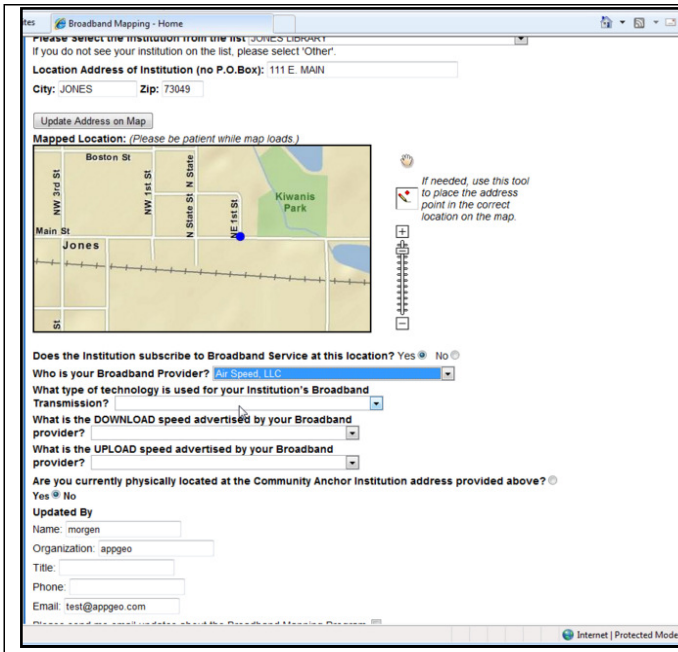
This submission process went smoother than previous submissions. There were a few minor issues that need to be resolved from previous submissions.

1) Spectrum: Larger providers are still not willing to provide separate polygons for different spectrums.
2) Communication with providers: It would help with data collection if NTIA/FCC held an open forum with the providers for changes that are being proposed for that data collection. This should happen before States start data collection and also providing all change information on an NTIA website to the providers so that they are not questioning the credibility of the request from States.
3) Information from NTIA: It would be very helpful to have information on changes in data model, requirements and specifications before the data collection is started. Ideally, in order to meet the next deadline of October 1 (for data good as of June 30, 2011), we would need to send out a data request to providers in the July 1-3 timeframe and giving them 3-4 weeks for preparing data and submitting it to us (given the holidays and the summer, it is important to give providers sufficient time to assimilate all data). Therefore, NTIA would need to get all changes finalized by June 30th so that we can hit the road immediately after that. This lead time allows us to provide more desirable time spans to the providers, and for us and the states to do the right amount of validation. As the process becomes smoother for everyone, we anticipate that this will happen more regularly in the future.

1.1.2 Community Anchor Institutions Data

The community anchor institutions data continues to be crowd-sourced through the online data gathering application created by the Sanborn Team. The State of Oklahoma is doing the PR around this data collection and contacting the relevant agencies to request them to fill in data. This has been a slow process and we are getting to a point of diminishing returns with this effort. The numbers of community anchor institutions that have responded so far is provided below:

Category	Name	Total	Total with Broadband Information in Submission 3
1	School - K through 12	1959	103
2	Library	209	66
3	Medical/healthcare	441	0
4	Public Safety	1793	8
5	University, college, other post-secondary	79	16
6	Other community support - government	489	18
7	Other community support - nongovernmental	15	1



Community Anchor Institution: Crowd sourcing Portal

1.2 DATA PROCESSING

1.2.1 General Overview

In general, the submission 3 processes followed the same basic approach that was used in Submission 1 (s1) and Submission 2 (s2). As mentioned before, the submission 1 and 2 process documentation was included with those submissions and may be worth looking at for details if needed. The following sections outline the modifications made to the initial processing in order to meet the submission 3 requirements as defined by NTIA.

In summary they can be divided into the following three categories:

- Process Modifications
- Reference Data Modifications
- NTIA Submission Data Model Schema Changes

1.2.2 Submission 3: Process Modifications

Based on NTIA feedback and information provided in NTIA webinar sessions, the submission 3 data processing workflow was changed minimally to support the new NTIA submission requirements:

1. All census blocks are mapped based on 2000 census blocks. Any data submitted in 2009 format was converted to 2000 for submission. During processing a 'hybrid' census dataset (2000 IDs with 2009 line work) was used to take advantage of the improved 2009 line work. Prior to submission to NTIA, all features were mapped back to the 2000 census blocks. The Reference Data section below contains additional details.
2. For consistent representation the state road reference data used was 2009 Census Tiger Line IDs (TLIDs). Other data sources (non-TLID features, or 2000 TLID features) were mapped to 2009 TLID features.
3. Overview was removed completely from submission data due to the fact that all maximum advertised up/down speeds are being reported in blocks, roads, and wireless features.
4. Due to our NDA restrictions, address points and last mile points will not be submitted to NTIA. As mentioned before, Qwest requested that their address points be submitted to NTIA for blocks greater than 2 square miles. However, they could not provide the end user category and hence this data was not submitted but reprocessed data (address points reprocessed to street segments) are being submitted.
5. Some providers did not submit middle mile elevation. Wherever possible, we went back to providers to obtain their middle mile elevation information.
6. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were treated as wireless coverage and were delivered as a shape. In cases where a provider served the

same technology and spectrum with different speeds, overlapping areas were removed and the higher speed was assigned.

7. The submission 3 Provider data model is currently based on the NTIA data model as of 1/13/2011.

1.2.3 Submission 3: Reference Data modifications

This section describes the reference data used in submission 3.

BLOCK REFERENCE

For s3, a hybrid block dataset (2000 IDs with 2009 line work) was used to take advantage of the improved 2009 geometry. The data was set up as follows:

- 2009 BlockID suffix is dropped and the blocks are dissolved (by Block ID) to produce data with 2000 BlockIDs and 2009 shape geometry
- Block size (AREA) is calculated combining the 2000 land area (ALAND) and water area (AWATER)
- AREA is converted from square meters to square miles to calculate square mileage (SMI).
- If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.

ROAD REFERENCE

To take advantage of the 2009 geometry improvements, 2009 Tiger Line IDs (TLID) were used for data processing in s3. Any non-2009 TLID (i.e. 2000 TLID or other) submitted by providers were mapped to the 2009 reference data. The data was set up as follows:

- The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:
  - o The 2009 road segment is completely within a hybrid block that is NOT less than 2 square miles
- Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

OVERVIEW REFERENCE

This dataset was dropped completely for this submission.

1.2.3.1 Reference data sources

The following data sources were used as reference data sources for submission 3:

BLOCK REFERENCE DATA: 2009 CENSUS BLOCKS

No changes from previous submission.

ROAD REFERENCE DATA: 2000 CENSUS TIGER LINES

No census 2000 TIGER line data were used for this submission.

ROAD REFERENCE DATA: 2009 CENSUS TIGER LINES
No changes from previous submission

OVERVIEW REFERENCE DATA: 2009 CENSUS COUNTIES
This data has not been included in Submission 3

1.2.4 Submission 3: NTIA Submission Data Model Schema Changes

The data model released on January 13, 2011 contained the following changes from the s2 data model:

- A new field was added to several feature classes called Provider Type
  - Provider Type is “Short Integer” and has domain values of 1, 2, or 3 (1=Broadband Provider, 2=Reseller, 3=other)
  - Most providers are calculated to be “1” (Broadband Provider). In some cases (e.g. State of Oklahoma Public Utility Districts or PUDs), the ProviderType is considered “Other” (value = 3)
- In the CAI feature class, the field BBService has been modified:
  - In S2, if the information was not known, the field was left blank (null)
  - In S3, if we do not have the information, NULL values must be changed to code u (for Unknown) – nulls are not allowed.

- Three new fields have been added to the CAI feature class. Wherever possible, these values have been populated in the CAI data.
  - Public Wifi (Y, N, or U)
  - URL
  - CAIID

1.3 Data Validation

Sanborn has continued to perform the same validation on the data as the previous two submissions and listed below (details in previous reports). Some minor updates to the validation process are discussed below.

1) QC of the data at various steps
2) Spatial checks against public and commercial datasets
    a. For WA, we continued to use the following datasets for validation:
        i. Exchange Boundaries: for DSL boundaries
        ii. MediaPrints: for Cable boundaries
        iii. Speedtest.net data
3) Verification by providers
    a. In this Submission, along with the standard verification by providers using the Provider Portal, we also identified for providers issues that they needed to focus on regarding the findings of our validation team. This was done by sending them a letter that identified issues using screenshots and explaining to them what the error was and then asking them to go fix those errors using the secure provider portal. A sample of a letter is provided in Appendix A in this document. This helps by making this process a little more targeted for the providers and allows them to hone into issues.
4) Speedtest data collection and other data collection for verification
    a. We continue to use speedtest data and community anchor data crowdsourced for validation purposes.
5) Planning workshops and local validation
    a. During this submission, local validation was undertaken by an independent group, the Center for Spatial Analysis at the University of Oklahoma (OU). OU performed an independent survey gathering data points from CAI's and the GIS community for the State of Oklahoma. Within Sanborn's validation process, OU's points were compared against provider's data. Those data points found in question were taken back to the providers for correction. OU is continuing to gather data and this process will be performed throughout Submission 4.

1.3.1 Data Validation Conclusions

We continue to believe that we do not have sufficient information to alter provider data and we have been careful not to do so unless there are obvious errors such as incorrect block numbers, or unidentifiable street segments, etc.
Data validation involves working with providers to improve the data and we are dealing with issues as they arise. This activity continues to be a challenging activity. There is no complete truth sometimes and different pieces of evidence are collected and pieced together to point discrepancies that are explored in more detail. Commercial datasets are of limited value and often self-reported by the companies and subject to the same errors that we get from providers directly, and sometimes

exaggerated by the fact that there are different vintages and resolution and hence the comparison is not easy.   Speed test locations are also sometimes incorrect and similar issues exist with all crowd-sourced data.

There is no absolute truth exists and that data validation cannot change data arbitrarily based on only one evidence or two. Hence it takes a long period of time to fully address a reported issue.

2 Appendices

2.1 Sanborn QC_Validation Letter

March 9, 2011

Broadband Mapping Services
State of Oklahoma

Re: QC and Validation of Provider Data

Dear Provider:

As part of the Broadband Program, the Sanborn Map Co. is performing a QC and validation of the data received from you by comparing your data to publicly and commercially available broadband datasets. This includes exchange boundaries for DSL, MediaPrints for Cable and Fiber and others as deemed necessary. We are also using Speedtest.net data for some speed validations.

If you are receiving this notification, it is because we have found certain issues that need your assistance. Screen shots of the issues are provided below along with a table denoting the issue found. We would appreciate it if you would please review these issues quickly and go to the provider portal and note the correction that needs to be made since we need to finalize your data to be submitted to NTIA.

If you need any further clarification after reviewing the issue, please contact Bridget Marcotte at (503) 228-8708 x 306. Please note: if we do not receive a response from you with what correction needs to be made, Sanborn reserves the right to change the data if needed.

Thank you very much for your assistance providing answers on the issues noted below.

Sincerely,
The Sanborn Broadband Mapping Team

QC and Validation Issue(s) Encountered

Please make all corrections on the provider portal link provided below. For confidentially, your login and passwords were sent during the last submission, in another email.

http://beta.appgeo.com/OklahomaBroadbandProviderPortal/

Issue found:

Issue Category	Description/Screen Shot
Part of the data is extending outside Media Prints boundaries	
Part of the data is	

extending outside of Telephone Exchange boundaries	
Spatial Outliers - data which is off by itself and not consistent with other data spatially	Areas within the red circles are examples of spatial outliers in your data
Independent Validation point showing there is NO service in this area	Block Numbers Affected:
Middle mile has missing/invalid elevation	
Invalid Max Advertised Speeds	

Oregon Broadband Mapping Project

Product Release White Paper

Contact Name Manager: Bryan Conway
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Submitted By: Kristin Rousseau
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Product Specification: Spring 2011 NTIA Data Model
Product/Process: NTIA – April 1st, 2011 Data Deliverable
Dataset Submission QC: NTIA – SBDD_CheckSubmission.py

Document Control

Version	Primary Author(s)	Description	Date Completed
1.0	Kristin Rousseau	Original Draft Document	03/29/11

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.
- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are utilized. Following the initial mapping of providers' coverage area and serviceability claims, additional reviews are performed using the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality review results are tracked by provider / technology type and stored and maintained within a "Validation" table. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
  - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link:
https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

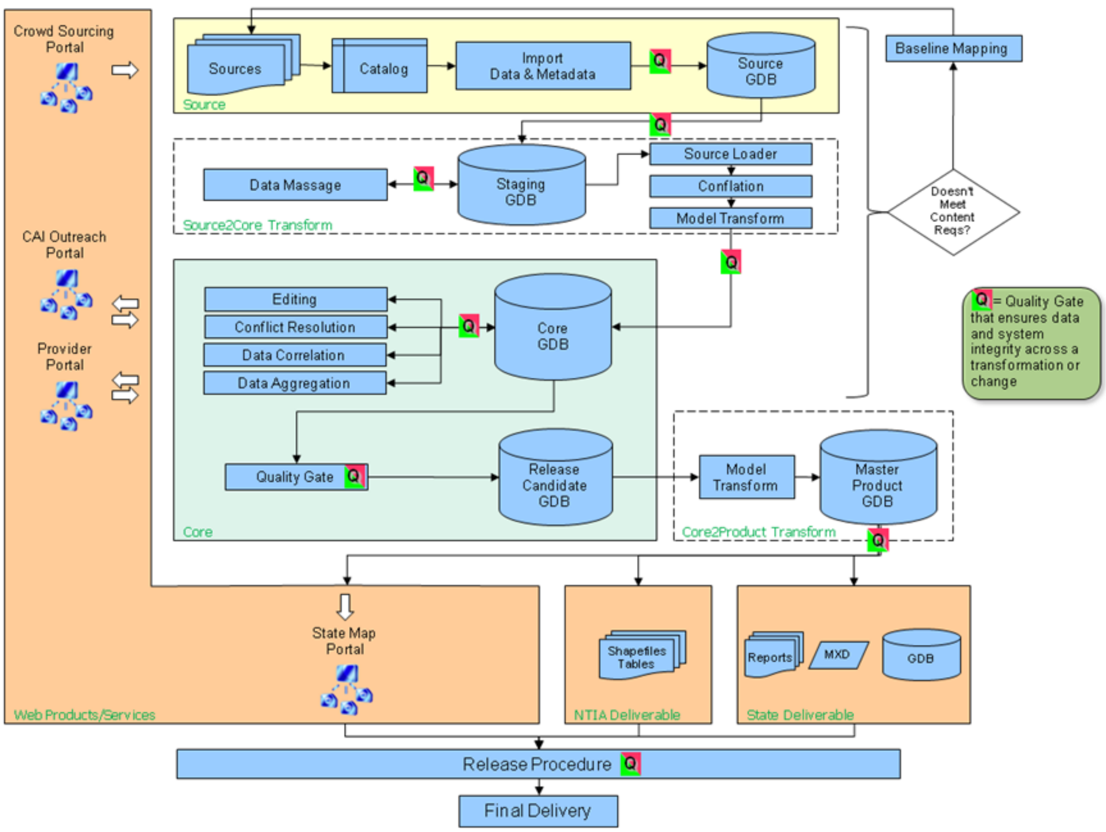
- Longitude values for States outside the lower 48 (any table)

- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is 'No' or 'Unknown'
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.
8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application
2) Regular email
3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email
    a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:
Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

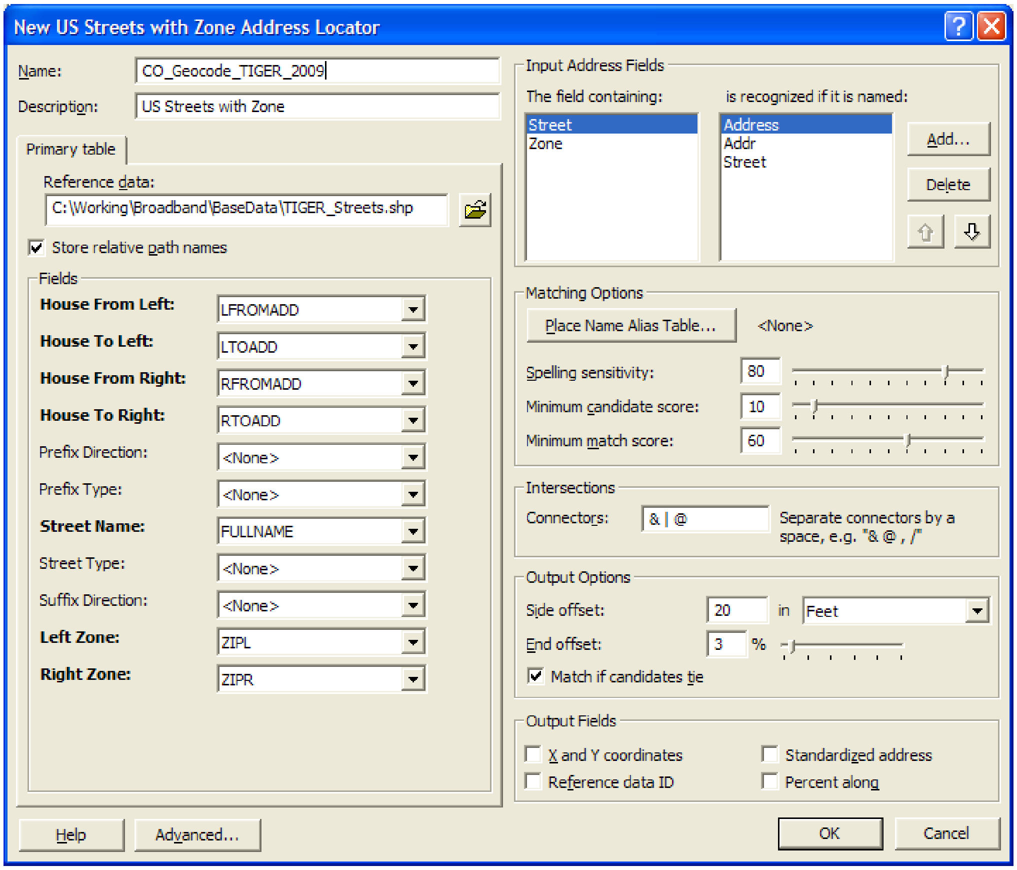
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
   a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
   a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
   b) Select "US Streets with Zone" and press OK.
      i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
   c) Navigate to the TIGER Streets 2009 file and press OK.
   d) Fill in the dialog box as seen below:

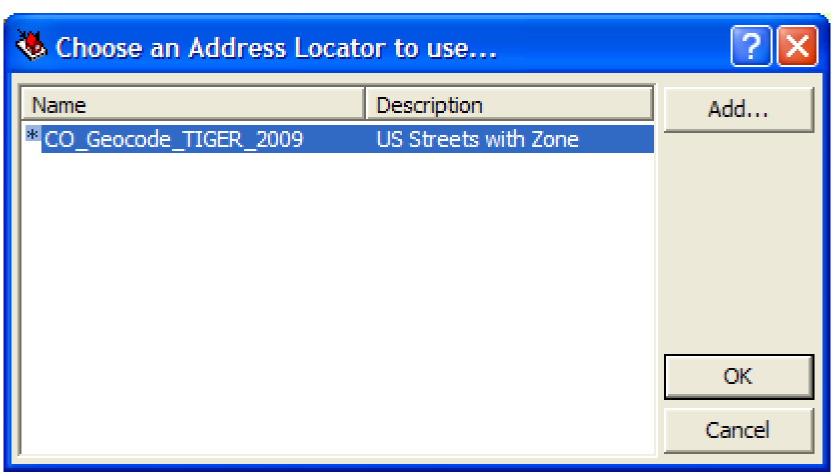


e) Click OK.

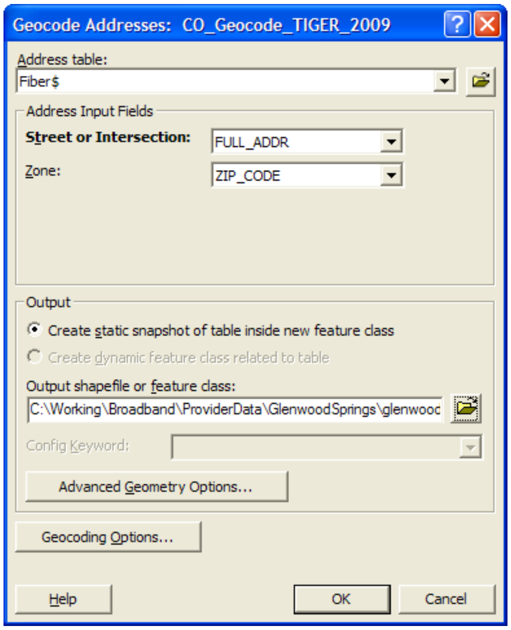
3) Open up ArcMap, and add the Excel spreadsheet with the address information.

4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.

5) Select the appropriate address locator by clicking Add…. then OK.

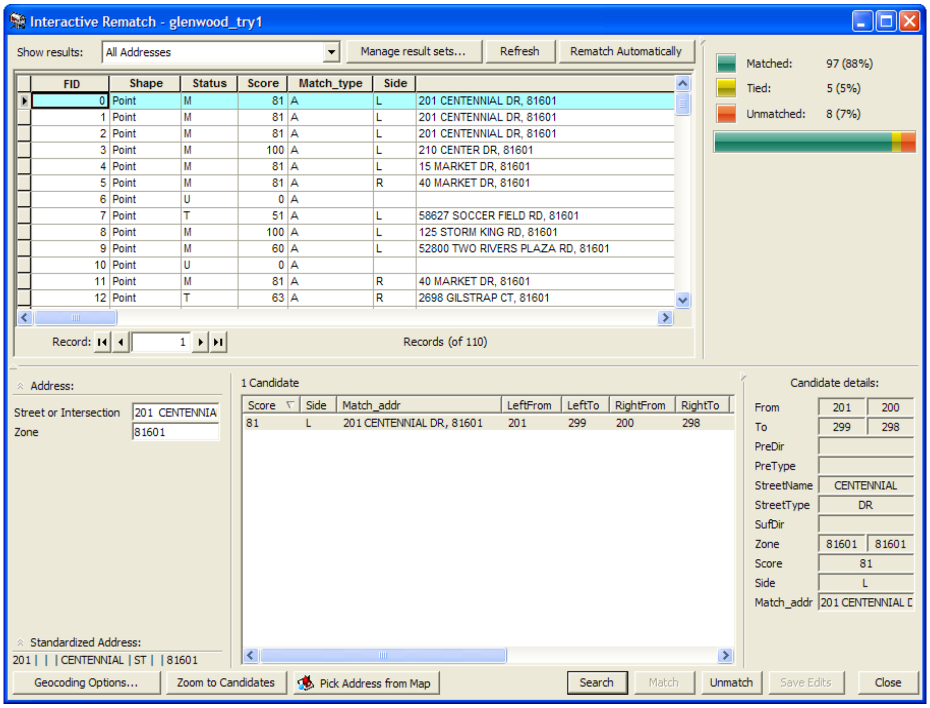


6) Fill out the Geocode Addresses dialog box as shown below:

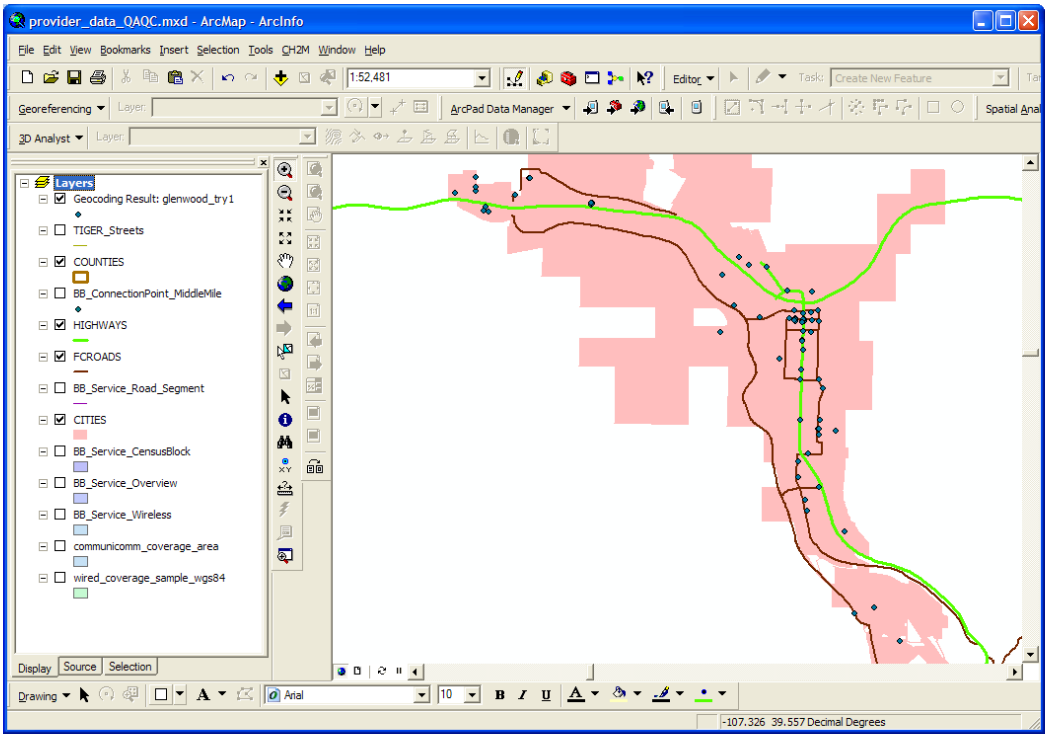


7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.

8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:



12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.

    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.

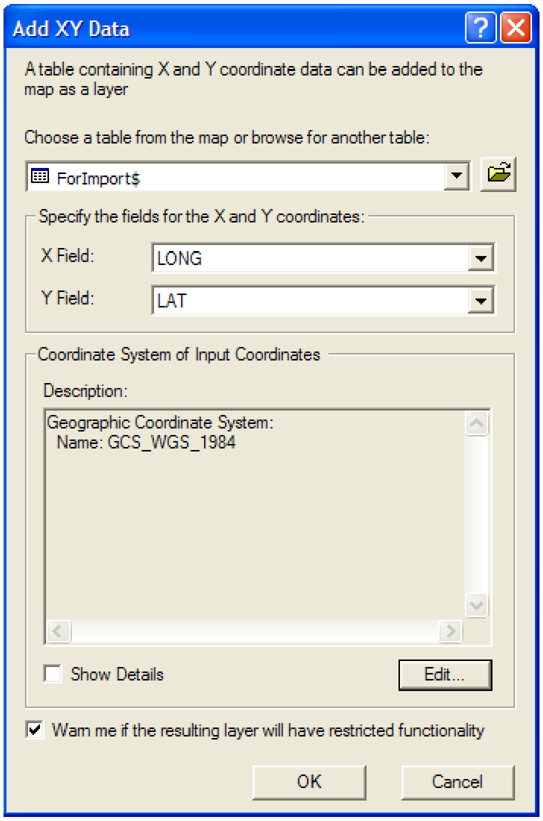
    b. Make sure that XY locations are in decimal degrees.

        i. To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).

        ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open up the Excel worksheet in ArcMap.

3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

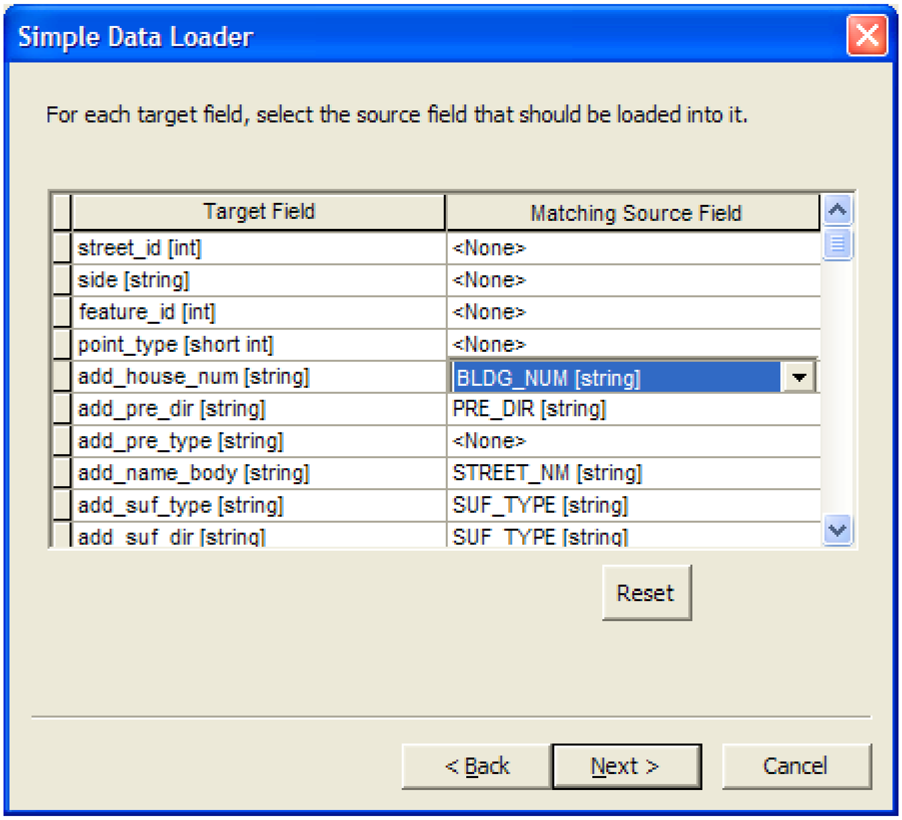
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

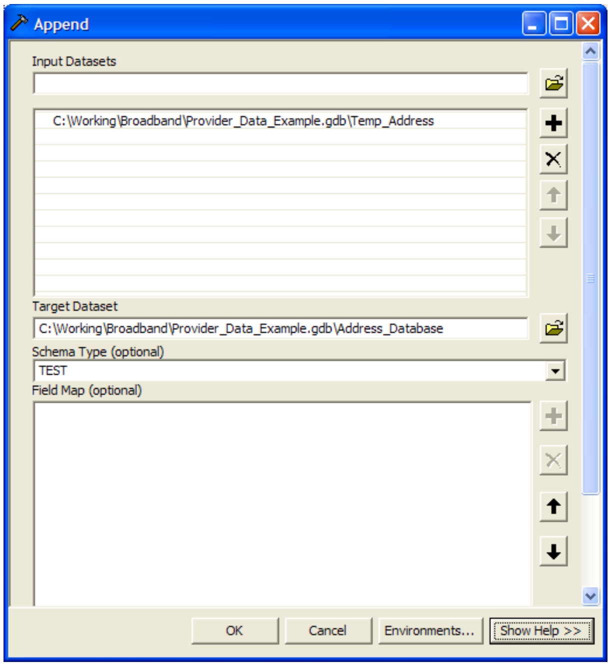
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

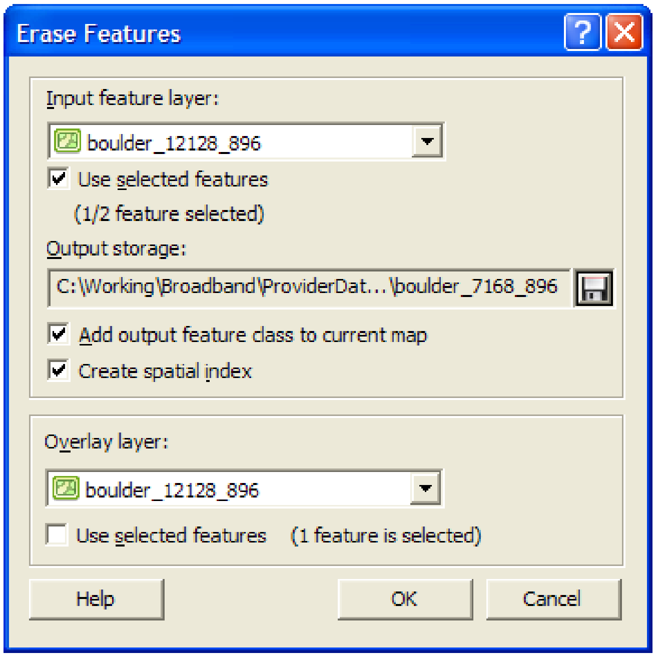


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
    a. <u>Within ArcGIS</u>
        i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
            1. This will save as a DBF table. Keep track of location for future reference.
        ii. Buffer county address point featureclass to 150'.
            1. During buffer command, dissolve on "ad_down"; "ad_up"; "provider"; "dba"; "frn"; "tt"; 'all metadata fields'; "stctyfips". Save as…. county_fastestdown_fastestup.
            2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
            3. Note: these attribute fields are specific to the Point Address database.
        iii. Select the features that represent the lowest speeds
    b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
        i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
        ii. Use the same feature class for Input and Overlay
        iii. Check Use selected features on the Input feature, as seen below.

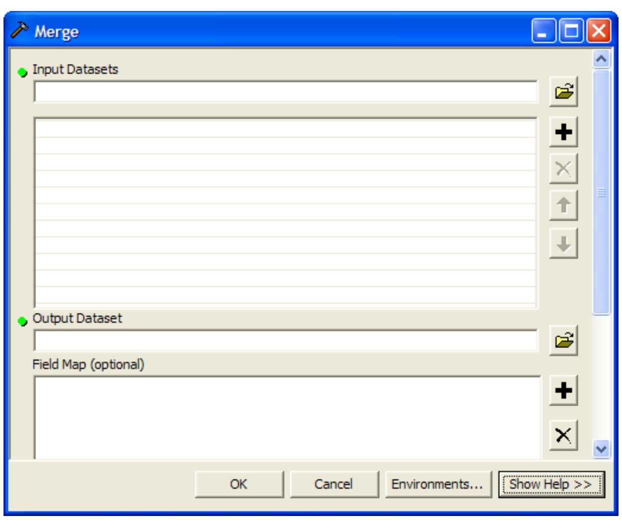
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. <u>Within ArcGIS</u>

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).
iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.
v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

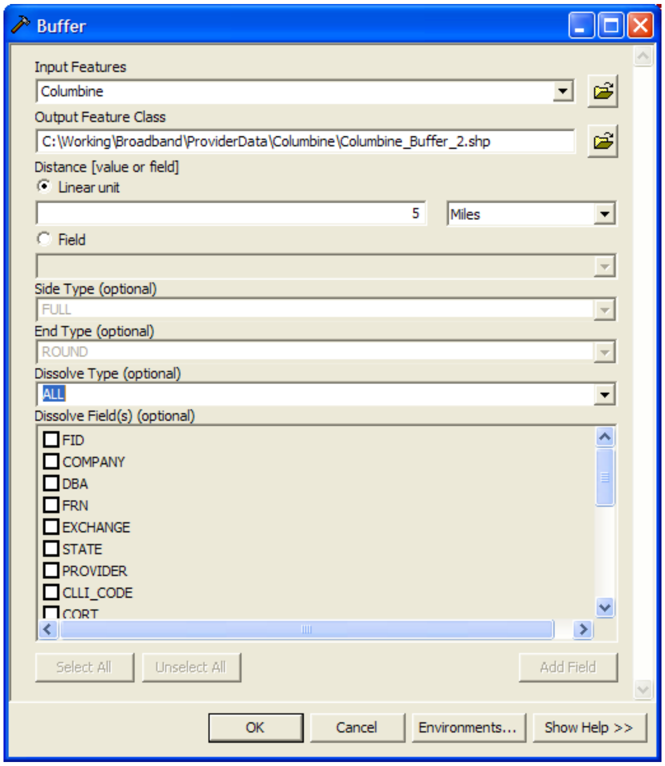
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.6 DSLAM or Central Office Location – GIS Data

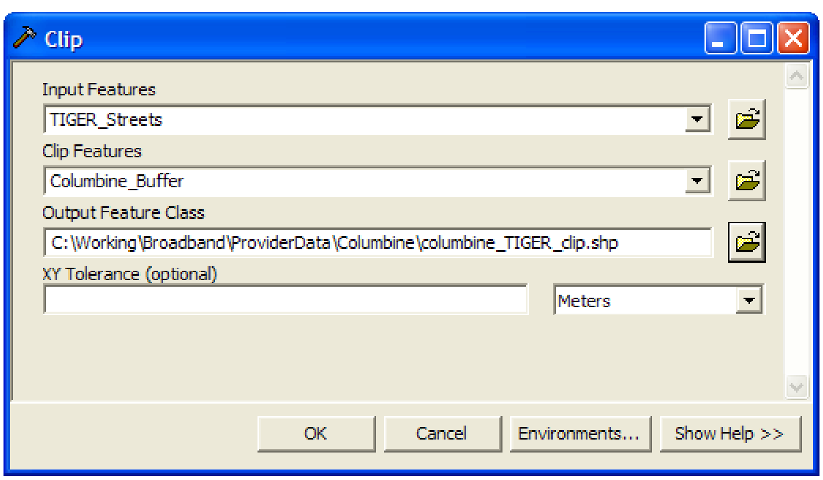
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

1) Buffer the DSLAM/Central Office points feature class
   a) Add the point feature class to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
   c) Set the buffer distance to 5 miles
   d) Set the dissolve type to ALL
   e) Name the output feature class
   f) Typical Buffer tool is seen below:



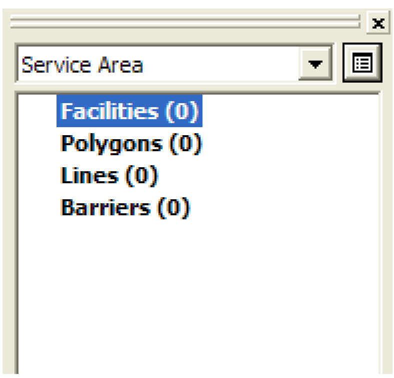
   g) Press OK

2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
   a) Add TIGER street layer to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
   c) Complete the dialog box as seen below:

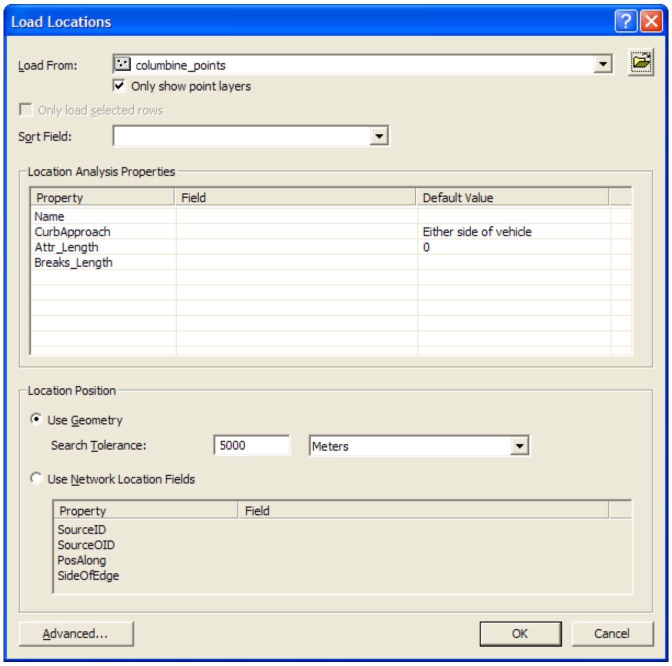


   d) Press OK.

3) Using ArcCatalog and within the file geodatabase:
   a) Right Click and create a new Feature Dataset
      i) For the Feature Dataset settings:
         (1) Name the feature dataset accordingly
         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
         (3) No vertical coordinate system needed
         (4) Leave all x,y,z,m values at default.
         (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
      a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create "New Service Area"
9) Open up the Network Analyst Window by selecting the button.



10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.



11) Press OK.

12) Click the Service Area Properties button

13) For the following tabs change the following properties:

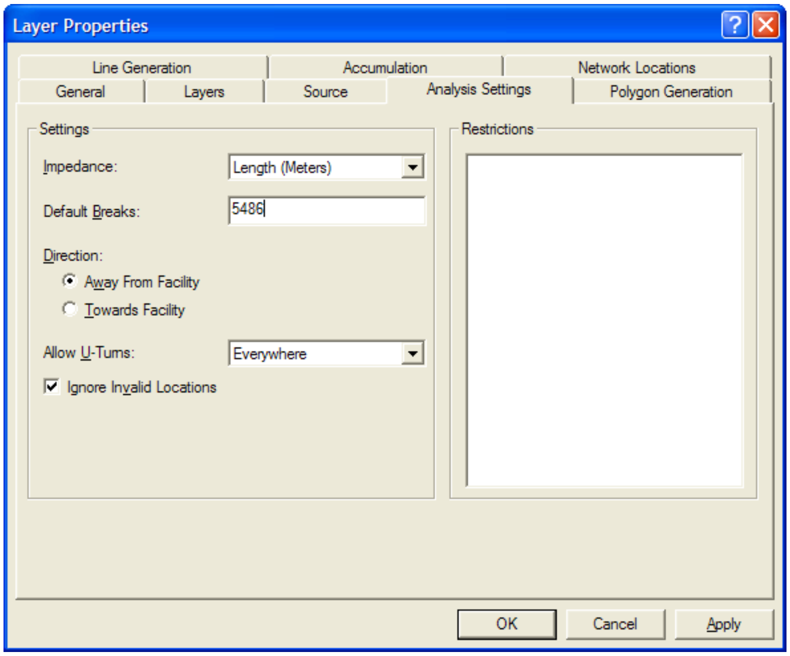
   a) "Polygon Generation" tab

      i) Select "Merge by break value"

      ii) Also disable the Trim Polygons option

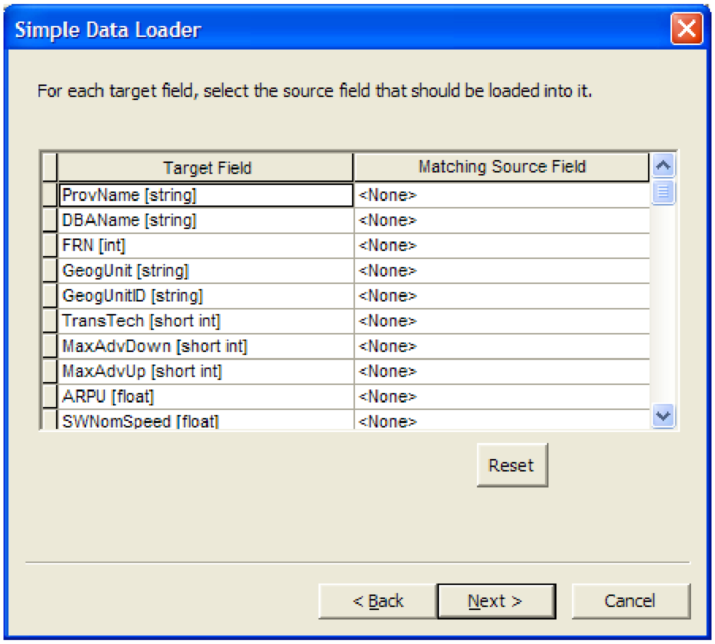
   b) "Analysis Settings" tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the "Default Breaks" location

      i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

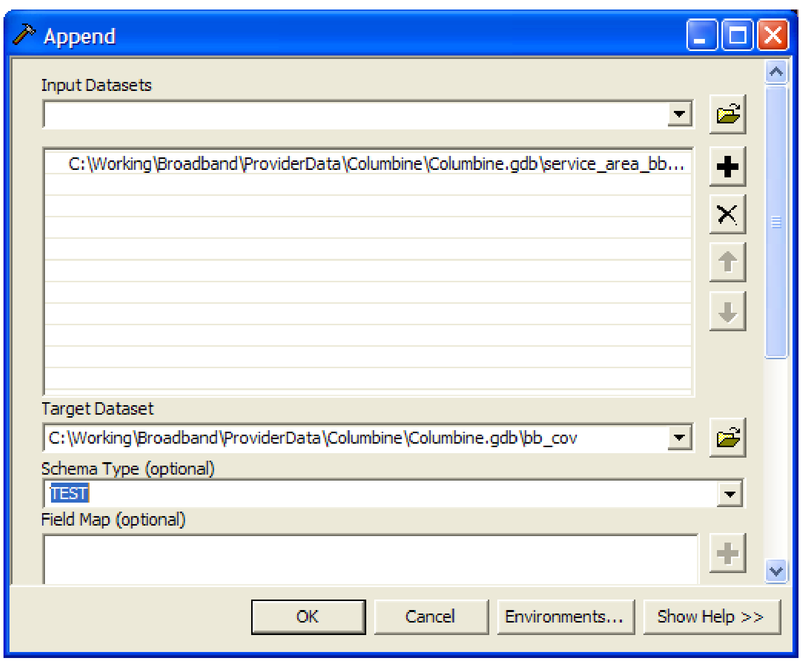
14) On the Network Analyst Toolbar click the “Solve” button  to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
    a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST

21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

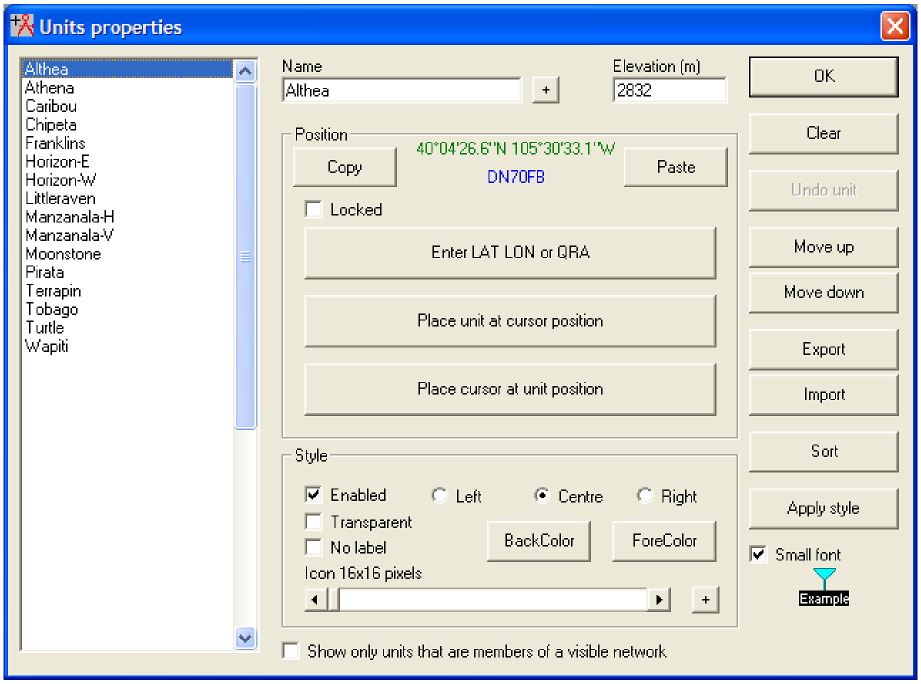
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8.1 Broadcast Tower Location – GIS Data

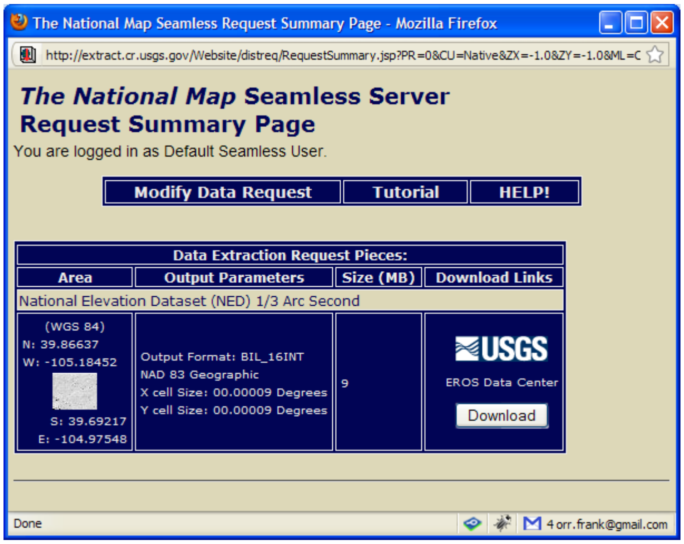
In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



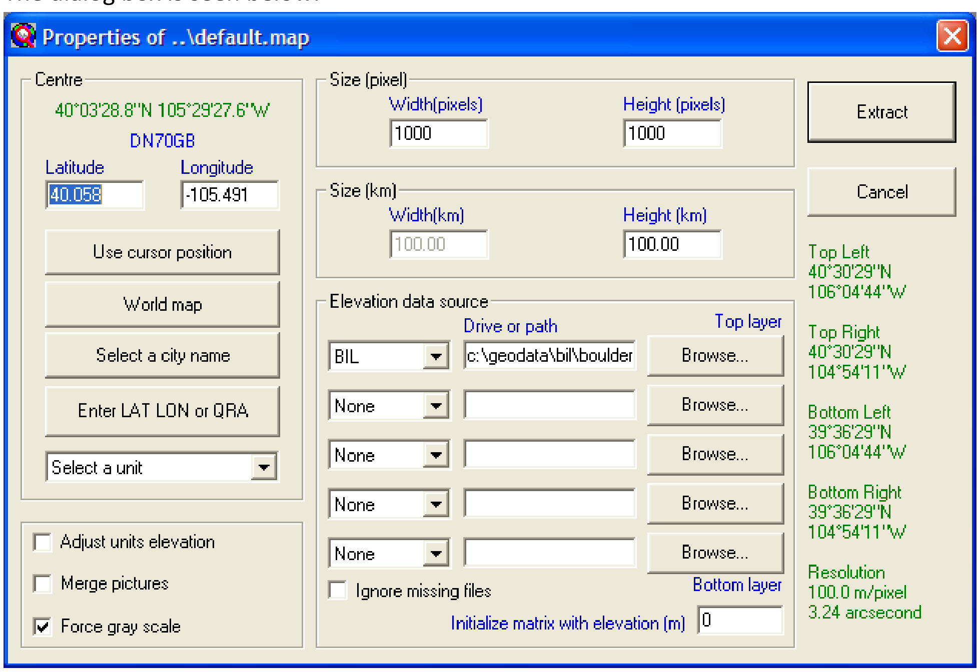
5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
   a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
   b. Zoom to the area of interest and use the Download tools:

   to define the area to download.
   c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:



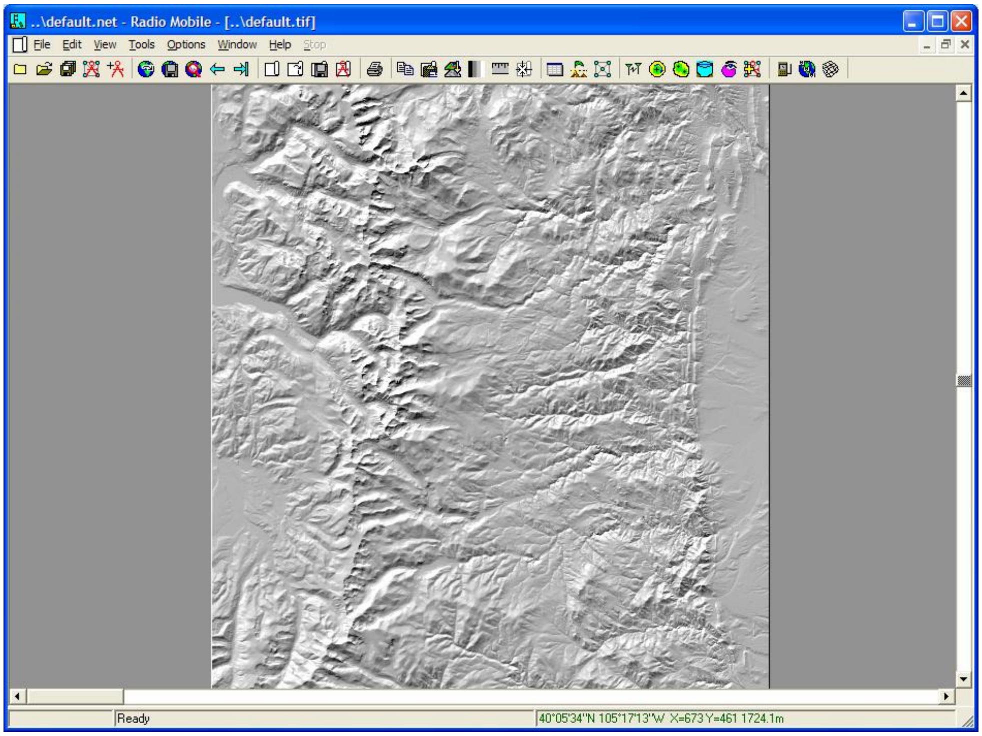
d. Download the data and unzip it.

7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:

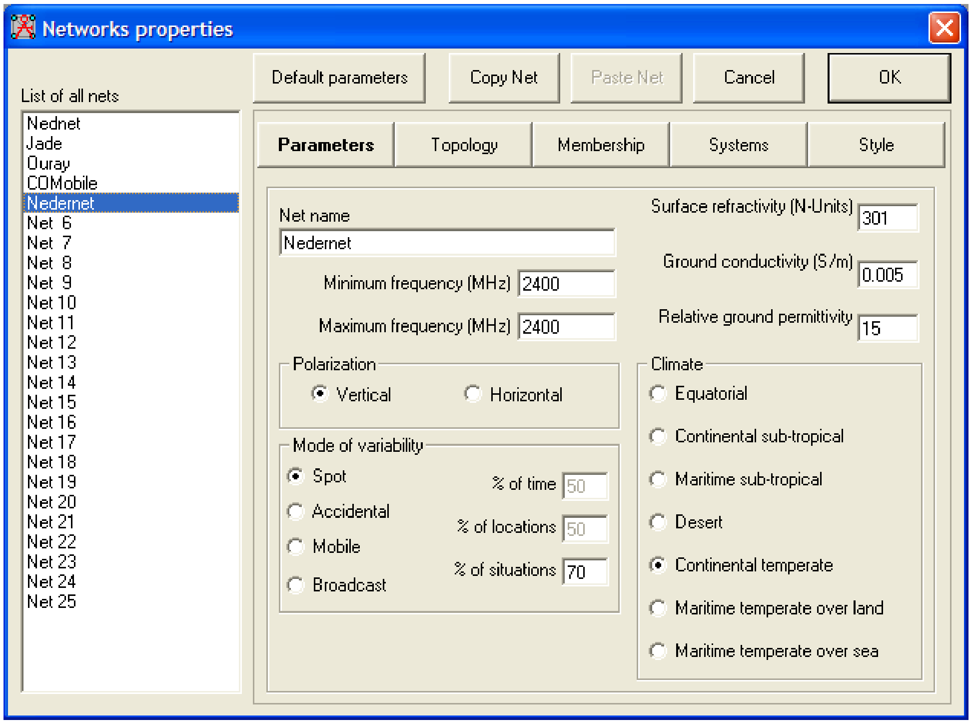


12) Hit Extract.

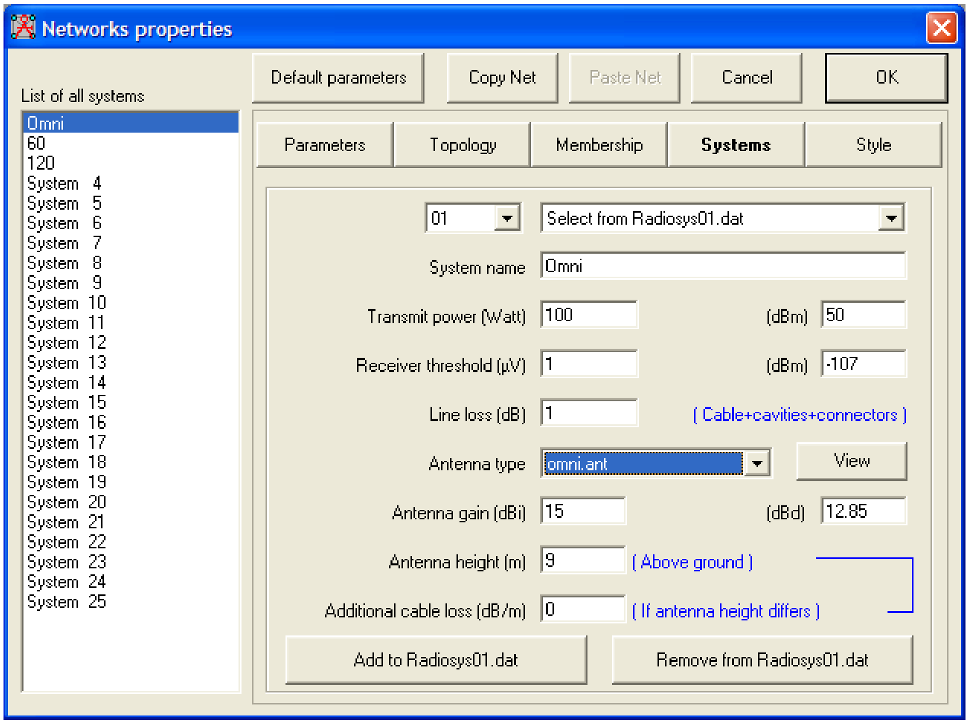
13) The elevation data is render as a hill shade, as seen below:



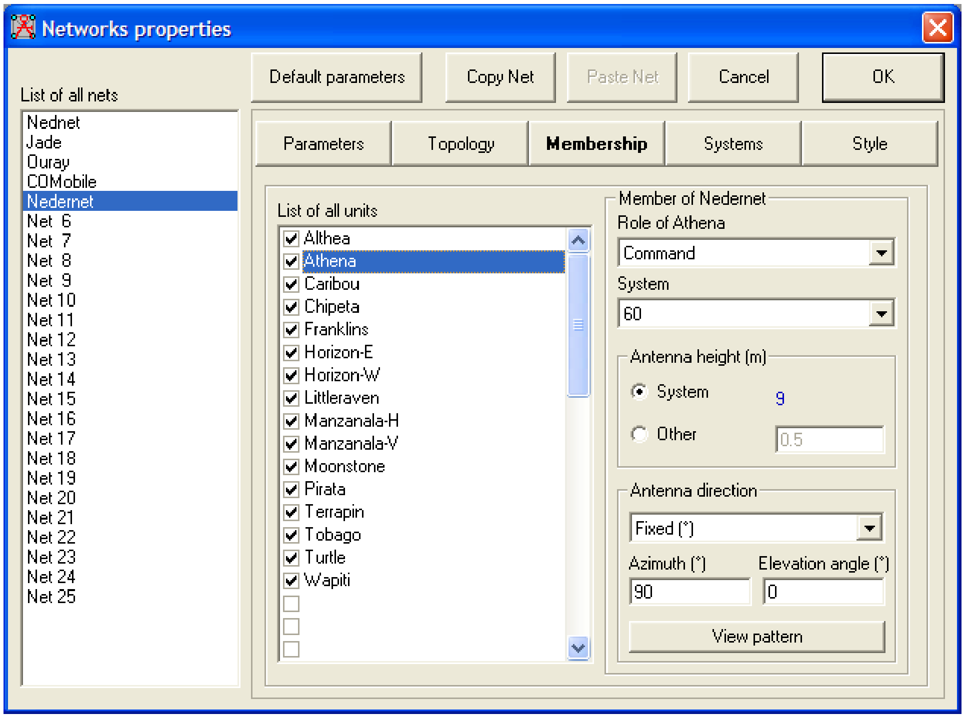
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



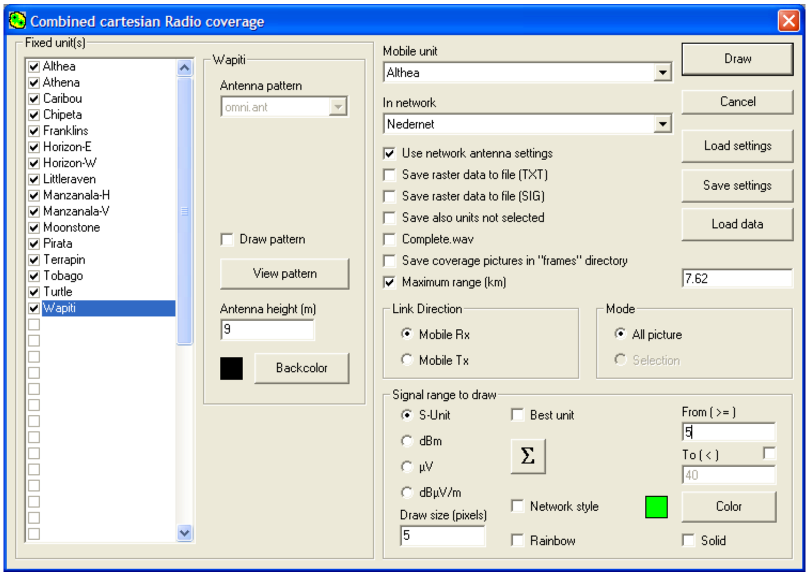
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



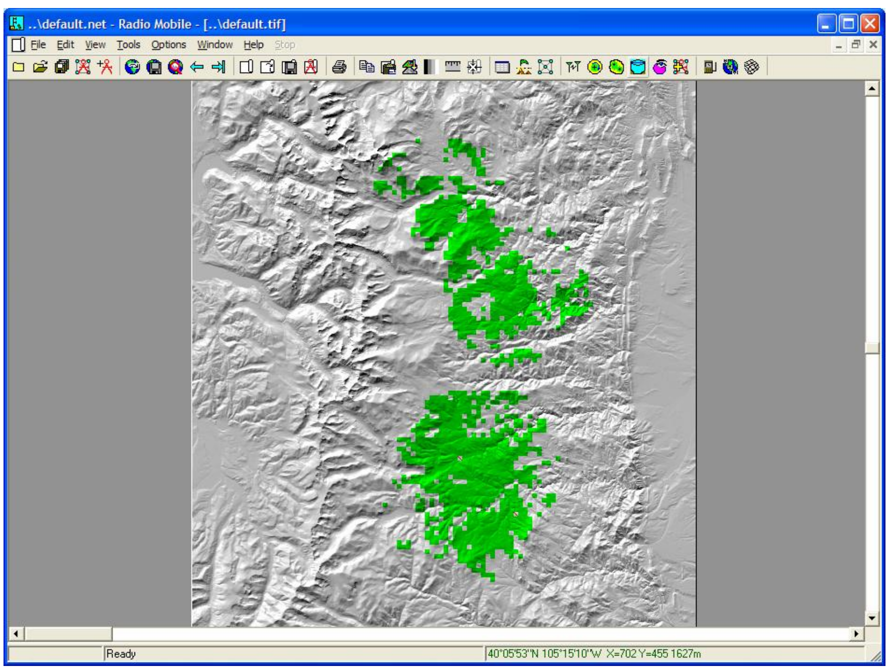
18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:



19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:



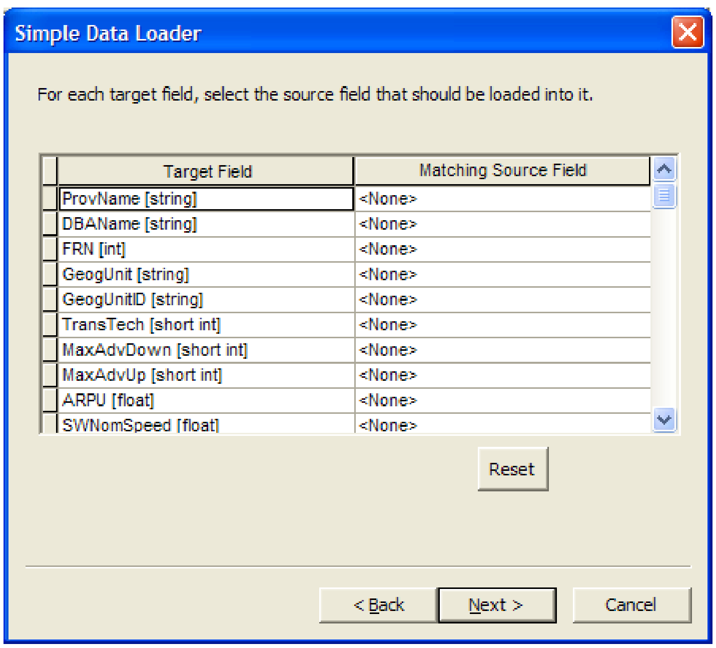
23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.
24) Press Draw.



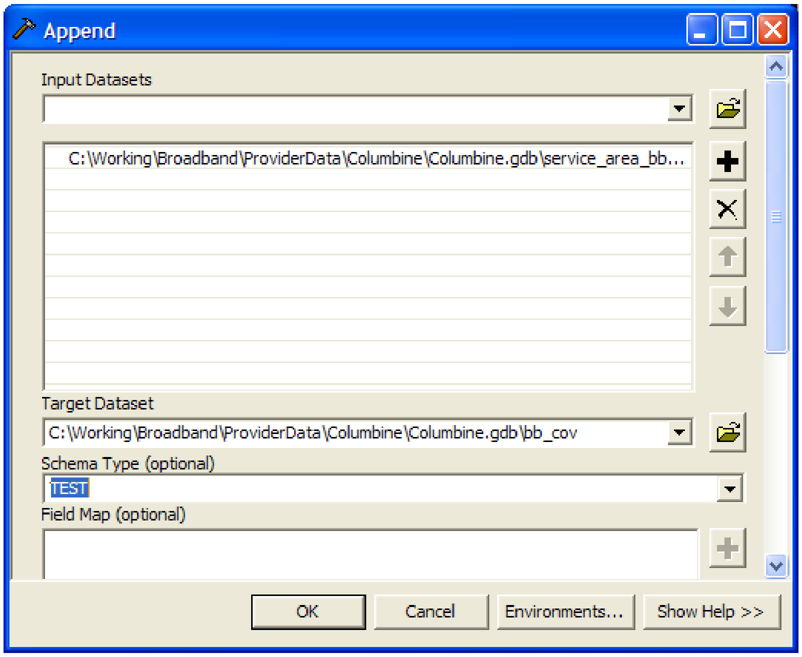
25) Save the resulting image as a TIF by selecting File>Save Picture as.
26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.

28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.
29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.
30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:

31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



    e. Press Next, then Next again, then Finish.
33) In ArcToolBox, go to Data Management Tools>General>Append
34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



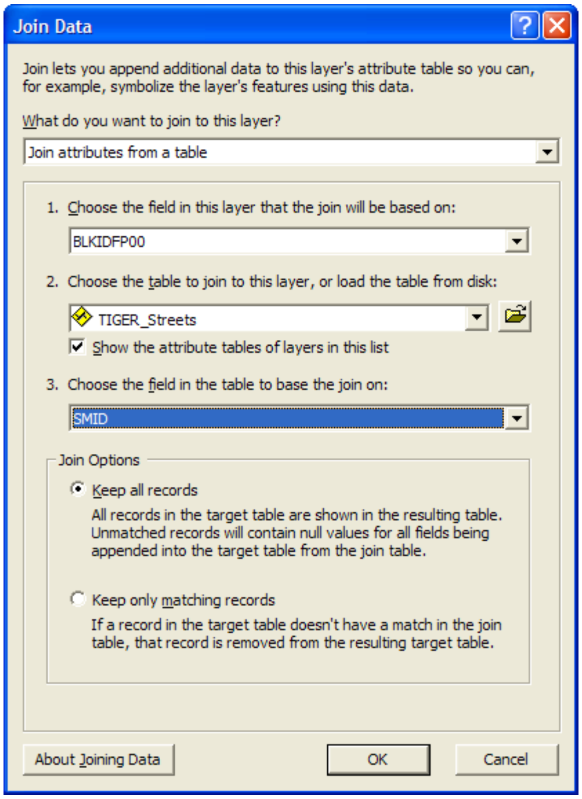
35) Leave the Schema Type as TEST
36) Press OK.
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
      i) Load both data sets into ArcMap
      ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
      iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:



iv) Press OK

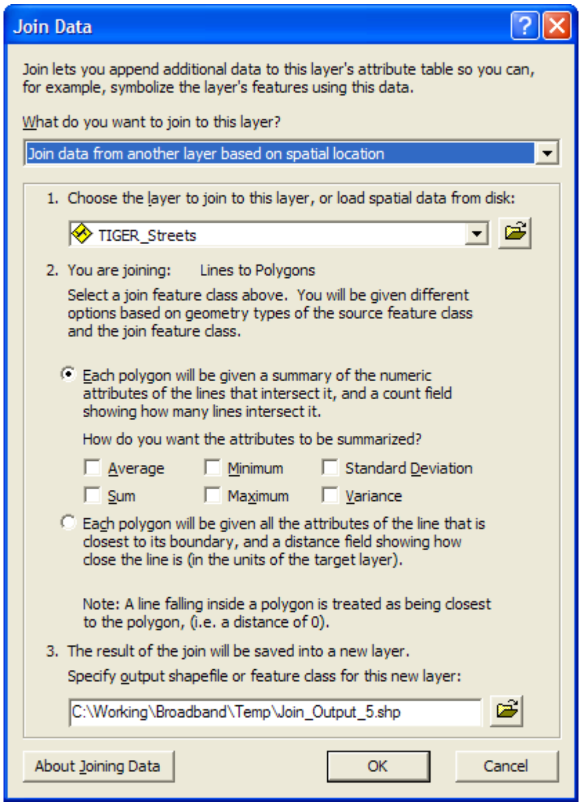
b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID

i) Load both data sets into ArcMap

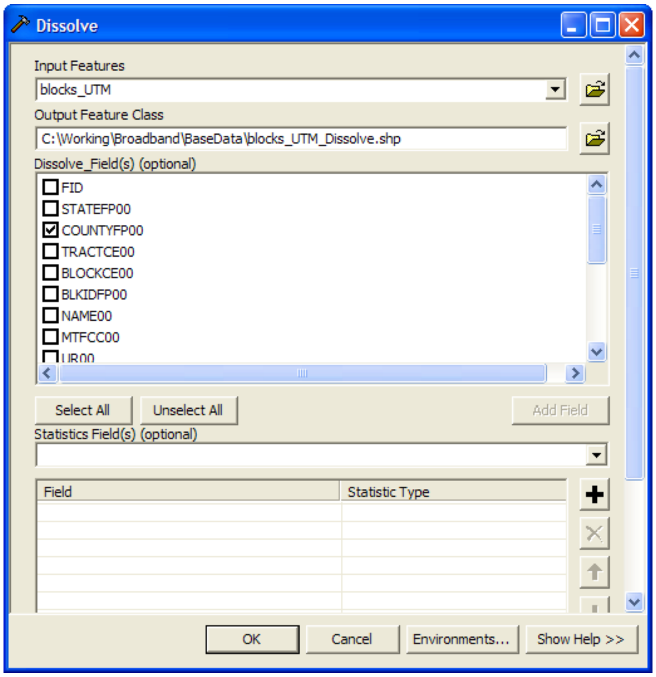
ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join

iii) Select "Join data from another layer based on spatial location" from the dropdown menu

iv) Complete the dialog box as seen below and press OK.



2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
   a) Use the County FIPS code to dissolve by county.
   b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
   c) Complete the Dissolve dialog box as seen below:

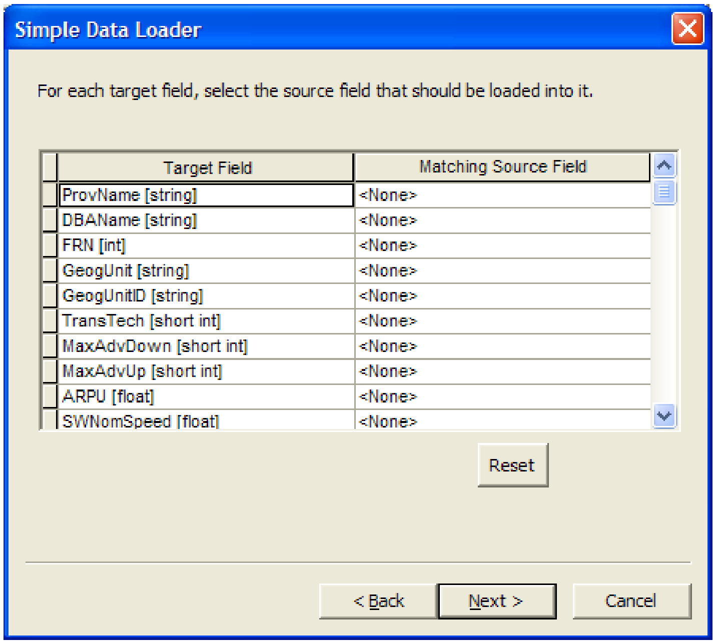


d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

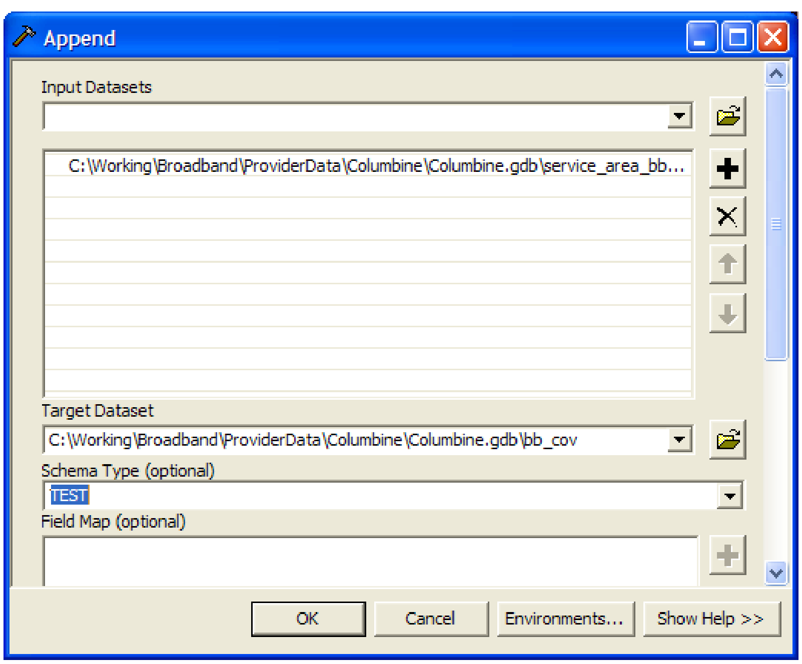
   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST

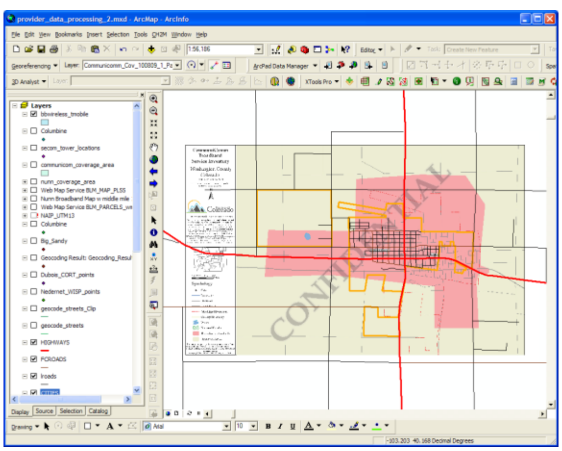
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

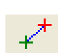
3.5.4 Polygonal Data

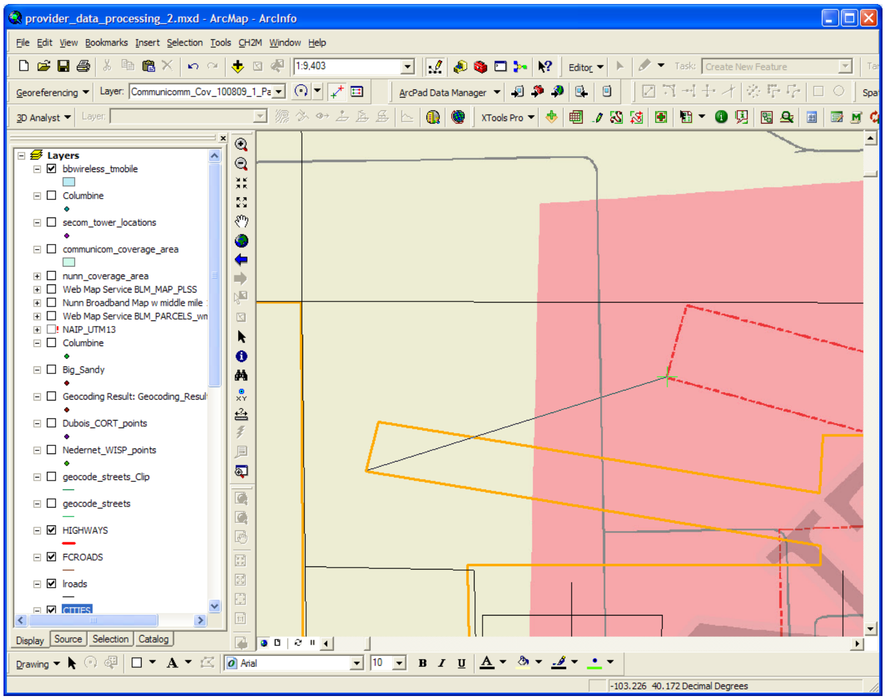
3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
    a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
    a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button  to add control points to the map
9) Use common points in the base data set and the JPG image
    a) For example, find major street intersections, county/city boundaries, etc.
    b) Try to distribute the points more or less in the four corners on the image for the best transformation
10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:



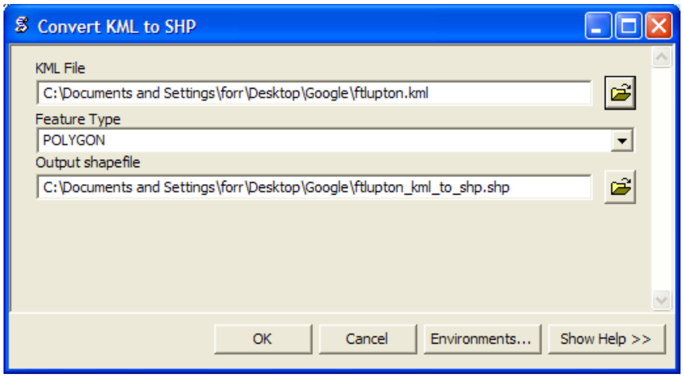
11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
17) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

1) Use a KML to SHP converter to translate file into an ESRI format
2) http://arcscripts.esri.com/details.asp?dbid=15603

3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
   a) To do so, follow the instructions provided above in "Coverage Area – PDF/JPG/Other Image Format."
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to "Create New Feature."
8) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

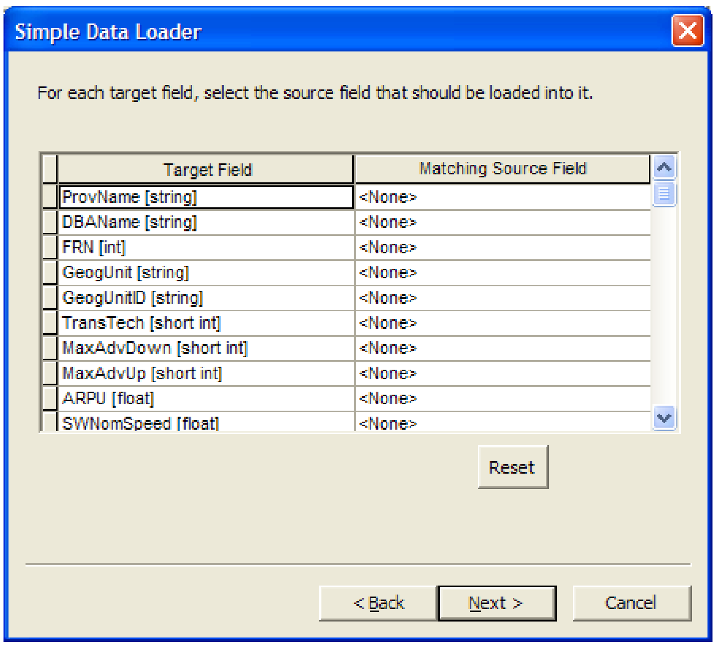
1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.

a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class

b) Press the Add button, hit Next

c) Accept the defaults and hit Next

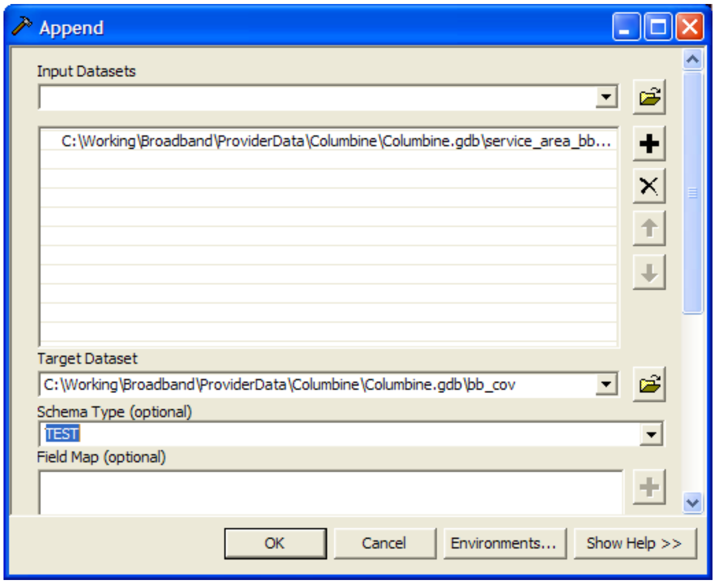
d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

2) In ArcToolBox, go to Data Management Tools>General>Append

3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state "Composite Locator"

- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.

- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.

- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.

- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

- Un-join the county data from the geo-code subscribers list.

- Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

- Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

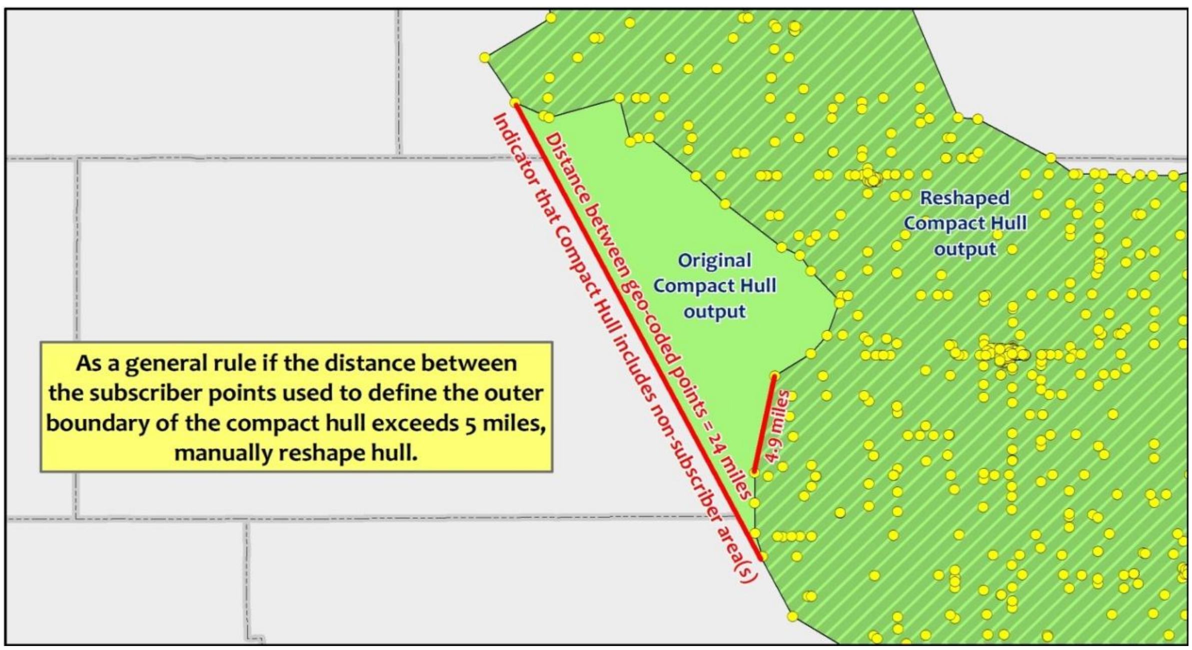


FIGURE 3a- Compact Hull: Manual Resolution Required

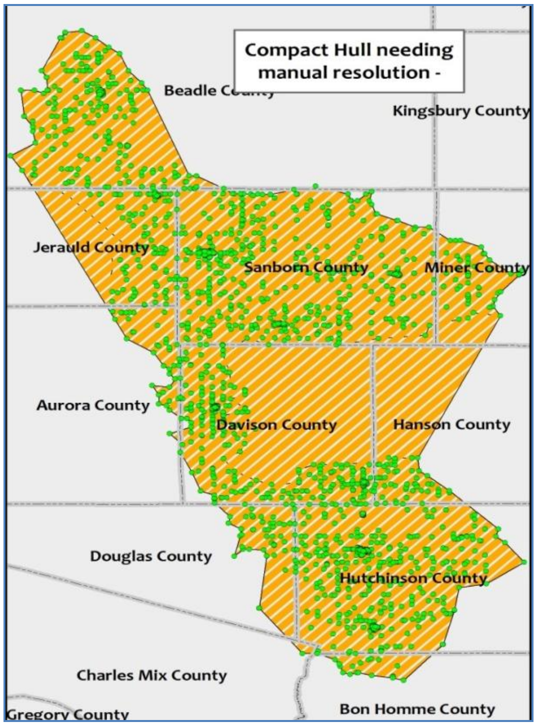
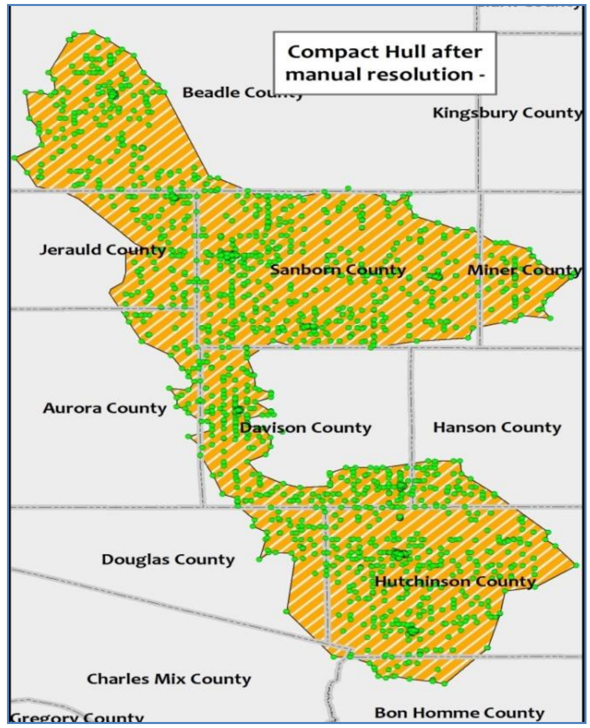


FIGURE 3b- Compact Hull: After Manual Resolution



- To attribute the compact polygon - Perform a "Spatial Join" where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate "stcty_fips" field. Also use the county name field to populate the "BBCov_Name" field.

    - Exceptions is where a provider's coverage is distributed throughout more than one area of any given county where the "BBcov_Name" should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

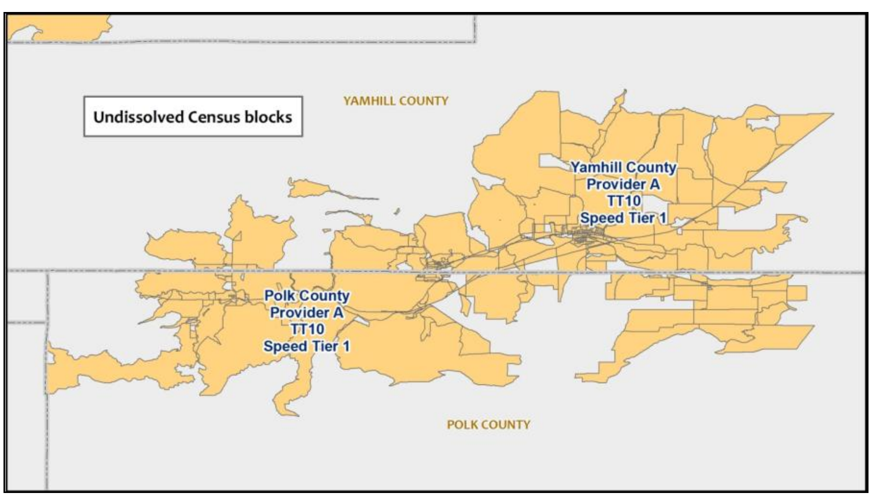


Figure 1: Undissolved census block polygons

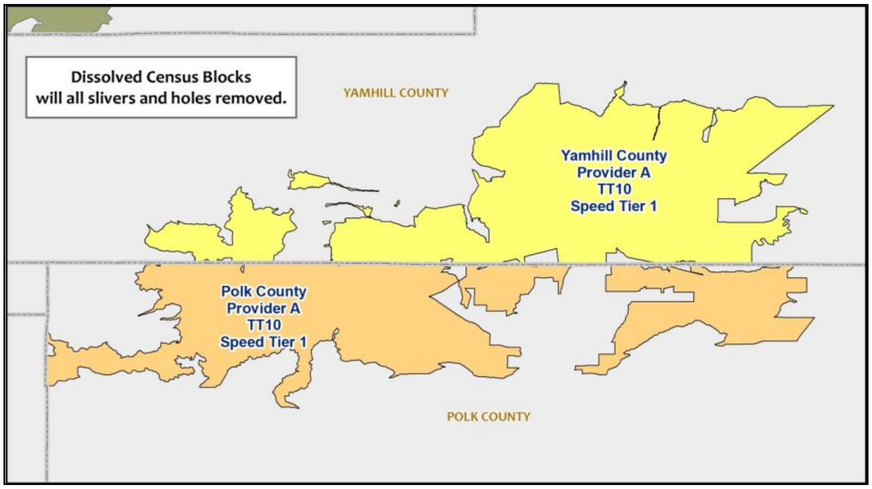
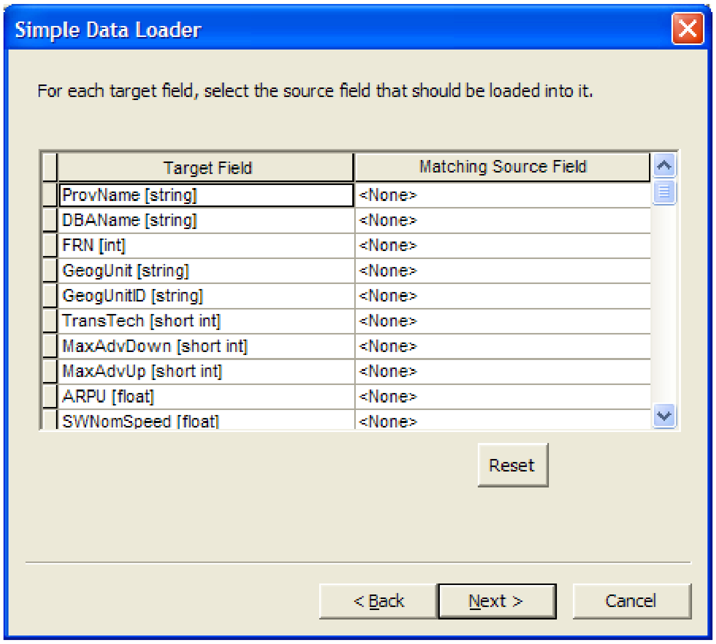


Figure 2: Census block polygons dissolved by county

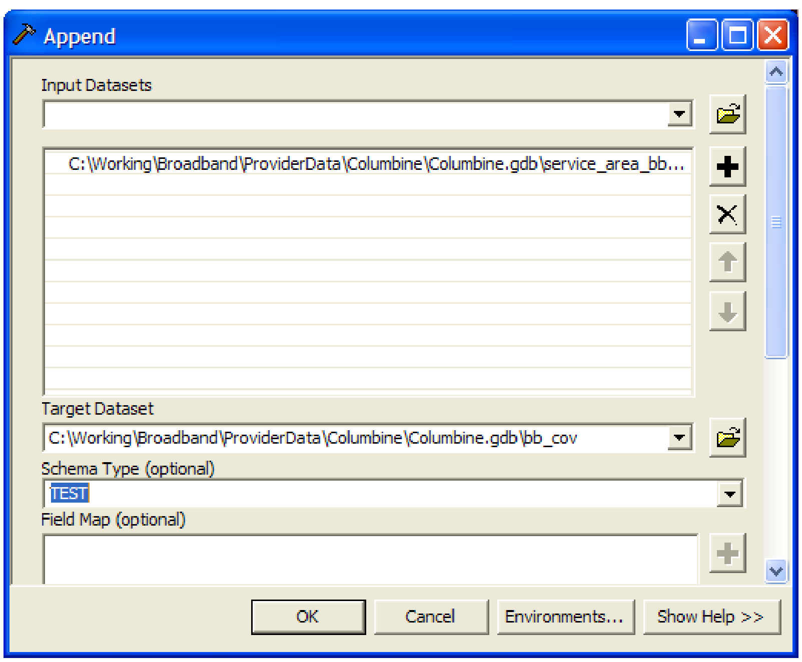
2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
    b. Press the Add button, hit Next
    c. Accept the defaults and hit Next
    d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST

9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

    b. Example of command line:

    <path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:

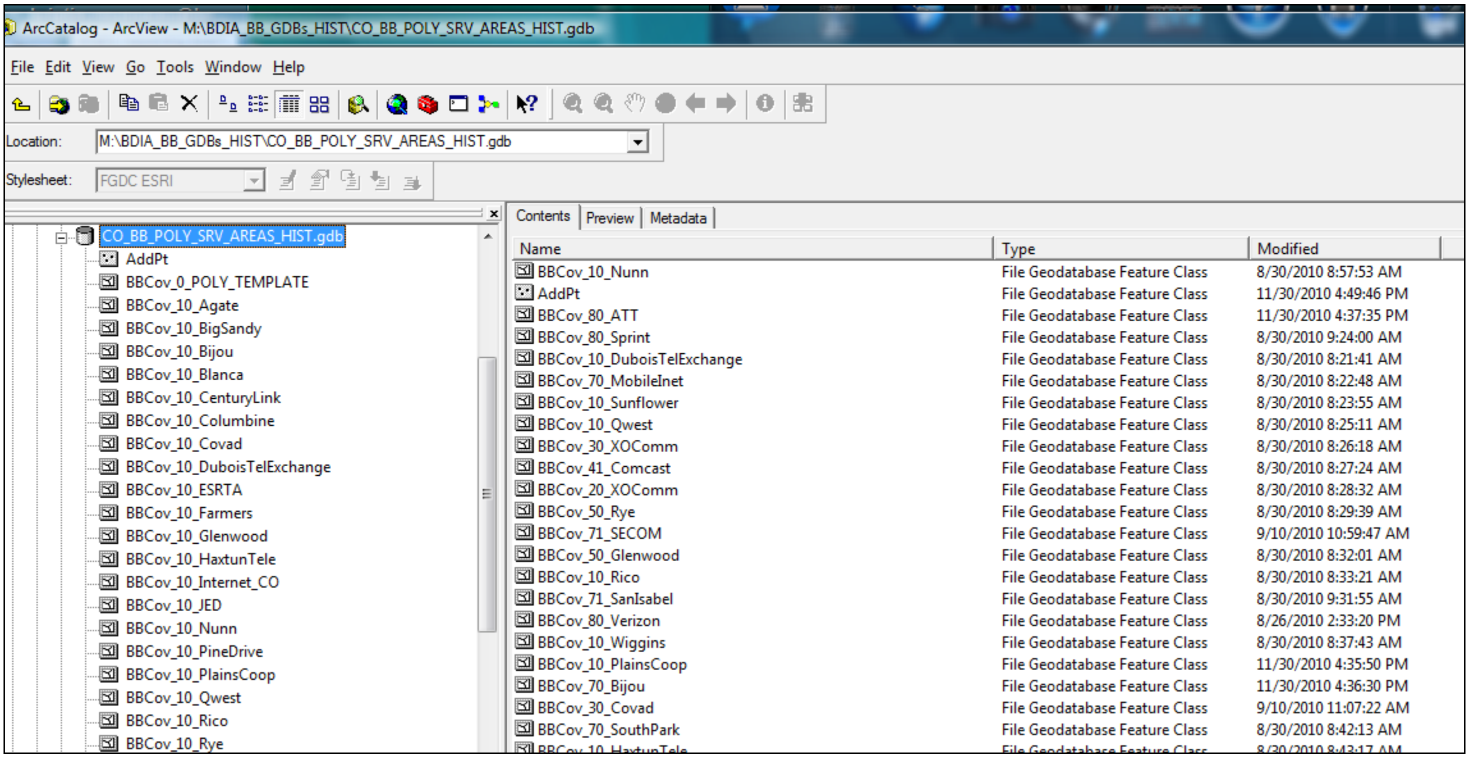
```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb

a. The transactions scripts records changes at a feature level.

b. Below is a screen shot supporting the directory structure of the historical fGDB.



c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:

   i. Commit_by
      1. Records the GIS-Analyst that committed the changes to the historical fGDB.

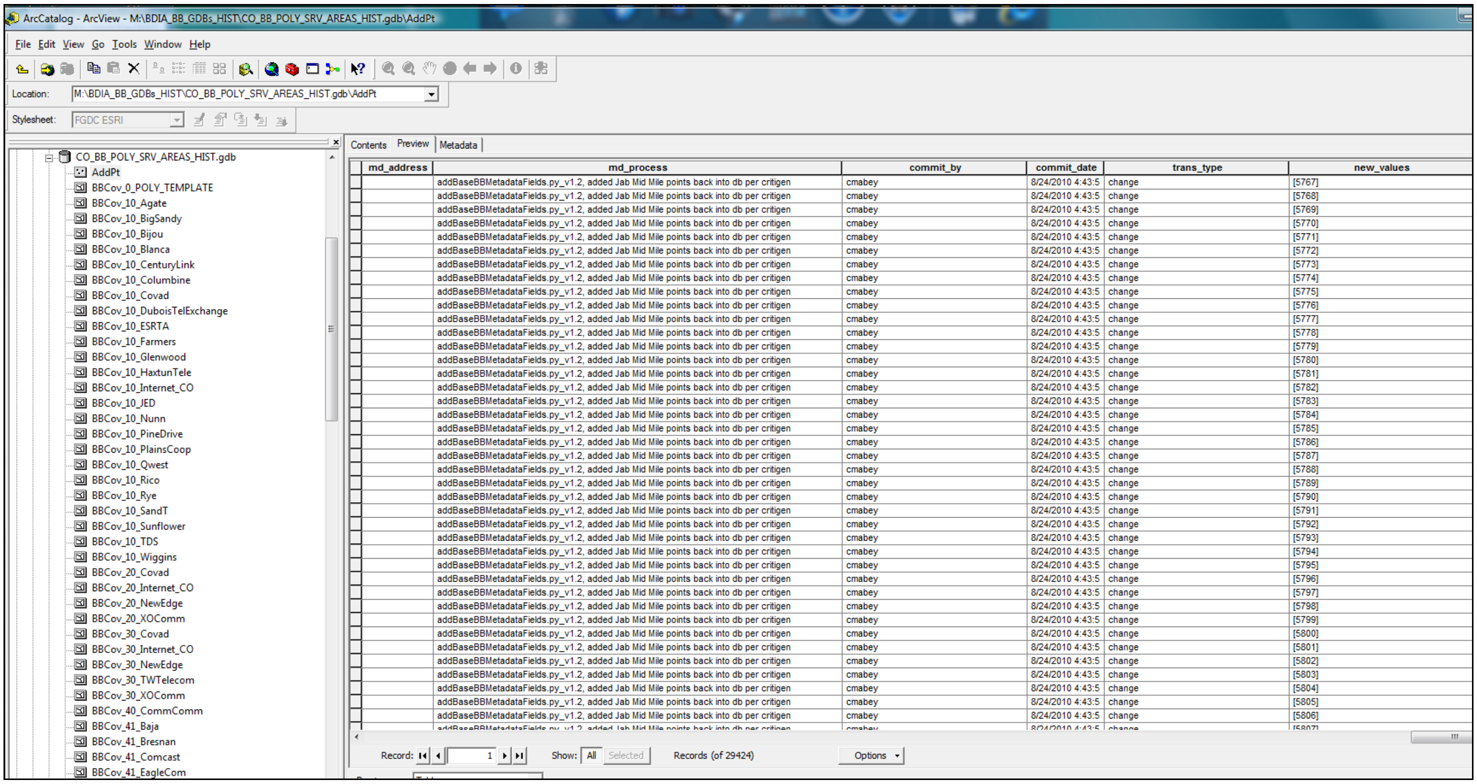
   ii. Commit_date
      1. Records the date and time stamp that the changes were committed.

   iii. Trans_type
      1. This field reflects the type of change recorded.
      2. Categorized by:
         a. Adds/Change/Deletes

   iv. New_values

1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{\text{(speed tier-1 in kbps × no. of tier-1 subscribers) + (speed tier-2 in kbps × no. of tier-2 subscribers) + (etc.)}}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

These obtained or calculated values are used to update the service overview layer. This can be done manually or by creating a table with the provider’s FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer to join to and select Joins and Relates>Join from the dropdown menu. Then navigate to the table to join to and select the join fields from the drop down list. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.

3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)

Name	Alias	Description
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.
This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes. If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.

Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

After the provider has validated its coverage areas, a 3rd party source comparison and analysis is performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments are applied to be reviewed later with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
InfoUSA	Consumer and Business Listings	Community Anchor Institutions Can also be used for demographic information supporting the State websites
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41)
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All findings and results from the above-mentioned validation and verification activities, plus internal peer quality reviews are captured and tracked in a Validation table and form the basis of the confidence value assigned for each provider and then each technology.

The confidence values are as follows:

- 0 = Coverage area has not been reviewed
- 10 = Extremely Low. Single Source QC.
- 20 = Very Low. Needs Additional Validation\Verification
- 30 = Low. Even with Validation\Verification, Coverage is still suspect.
- 40 = Acceptable, confirm with State prior to shipment.
- 50 = Meets requirements to be included in shipment.
- 60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
- 70 = High. Accurate representation of coverage based upon TT.
- 80 = Very High. Multiple validation\verification with most 3rd party sources
- 90 = Extremely High. Multiple validation\verification sources
- 100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C	
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070			Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010			BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010			Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070			CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070			CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070			ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070			Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070			Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070			Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070			Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010			Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070			Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010			Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070			BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010			Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010			Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010			3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010			3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010			Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070			BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070			Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070			People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010			BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070			BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070			BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070			Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010			3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070			BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010			3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070			BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070			SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010			BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010			BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070			BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010			Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010			BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070			Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010			Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070			Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070			QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070			Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010			Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070			Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010			Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070			Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070			BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.
The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories
    - 1: School: K through 12
    - 2: Library
    - 3: Medical/Healthcare
    - 4: Public Safety
    - 5: University/College

            - 6: Other Government
            - 7: Other Community non-government
            - None: Unknown Category
                - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately
    - Reports out the following counts
        - Total CAIs within that category
        - Total CAIs that contain partial BB coverage
            - Contains any of the following information for given CAI:
                - BB Subscriber, Transmission Technology, Speed Down Speed Up
        - Total CAIs that contain full BB coverage
            - Contains <u>all</u> of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
    - Correct names and format of data deliverables
        - BDIA_QC_SUITES (please see below for details)
    - Correct Projections/Datum
        - Manual interaction with product
    - Metadata Present and Correct
        - Manual interaction with product
- Table Structure
    - All required tables included
        - BDIA_QC_SUITES
    - Extraneous tables identified
        - BDIA_QC_SUITES
- Field Structure
    - All fields included
        - BDIA_QC_SUITES
    - Extraneous fields identified
        - BDIA_QC_SUITES
    - Correct field names, types and widths

- BDIA_QC_SUITES

- Field Domains
  - Values in all tables are constrained to the specified values specified
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
  - Identify if all layers have the correct geometric representation
    - Manual review of the BB_ServiceOverview layer
    - Dependent on NTIA and client requirements
- Geographic Extent
  - Product includes the necessary Geography associated with Product?
    - Manual Review - ArcGIS
  - Is there extraneous geography included in Product?
    - Manual Review - ArcGIS
- Completeness
  - Products contain the expected amount of data?
    - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product
    - Provider Validation
    - Verification using 3rd Party Data
    - Verification against reality, where applicable
- Data Regression
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations
- Prior Issues Resolved
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes
  - Have agreed upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium
  - Has the product medium been verified?
    - Manual review
  - All files present
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size
  - Correct location

- Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries
- which_build – this determines the current build and passes information to the configuration scripts

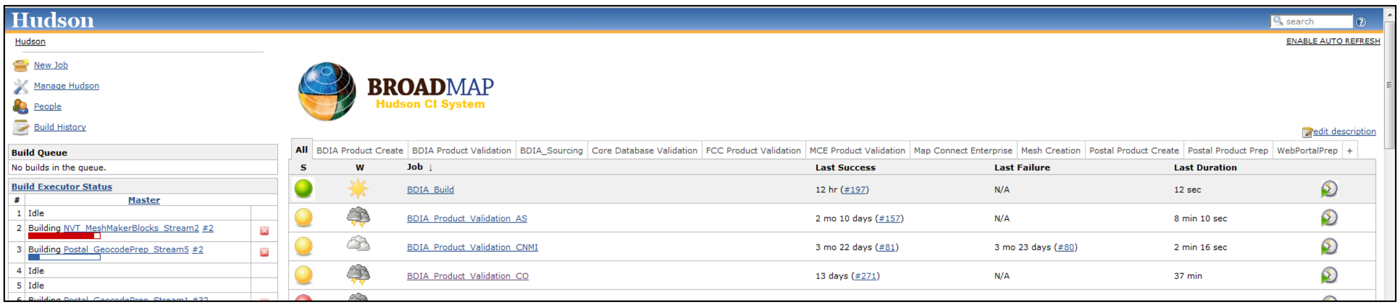
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

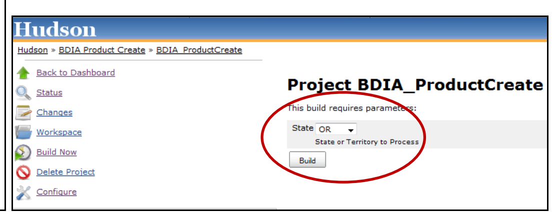
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

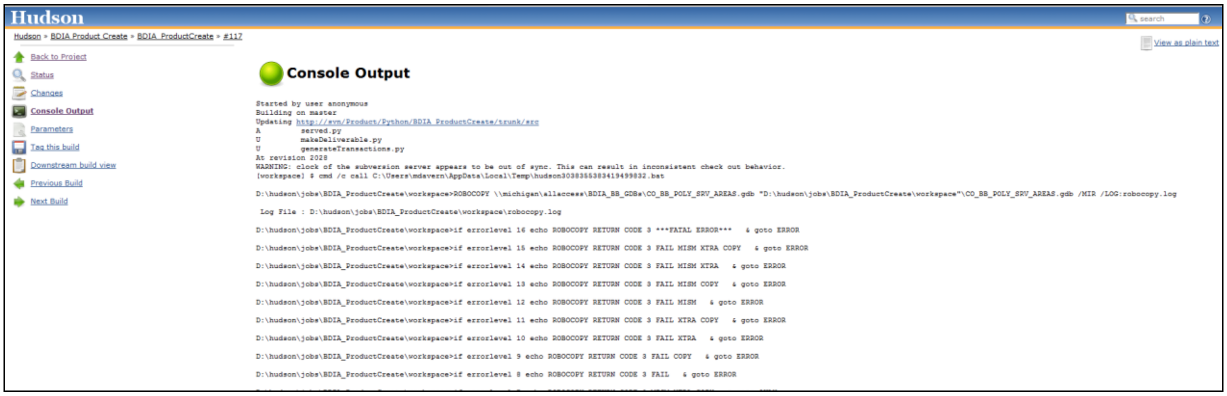
Below is an example of the main page where the type of product build can be selected.



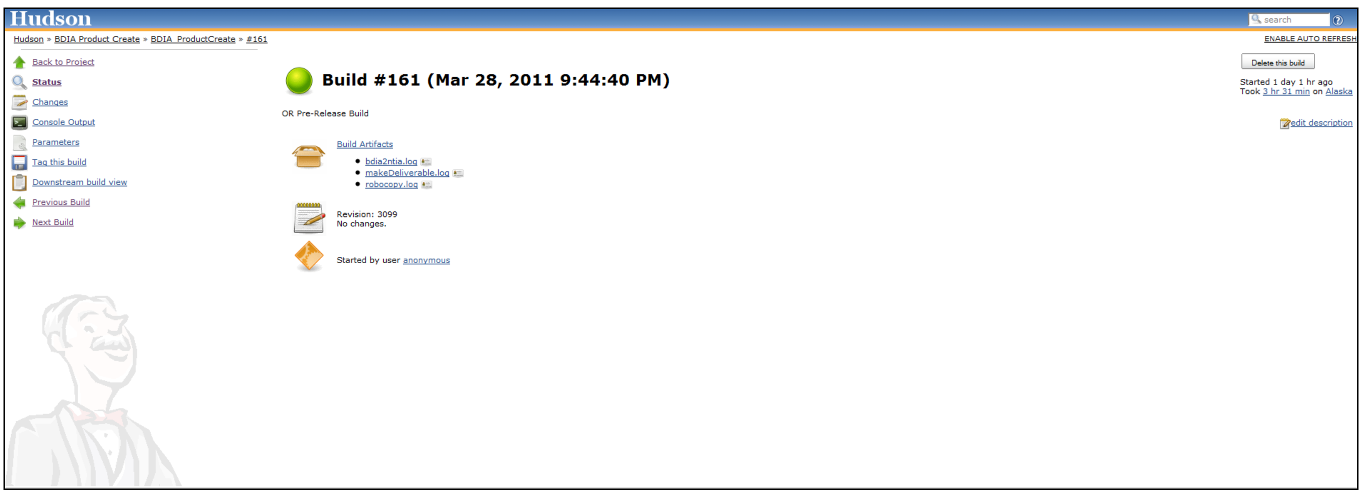
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



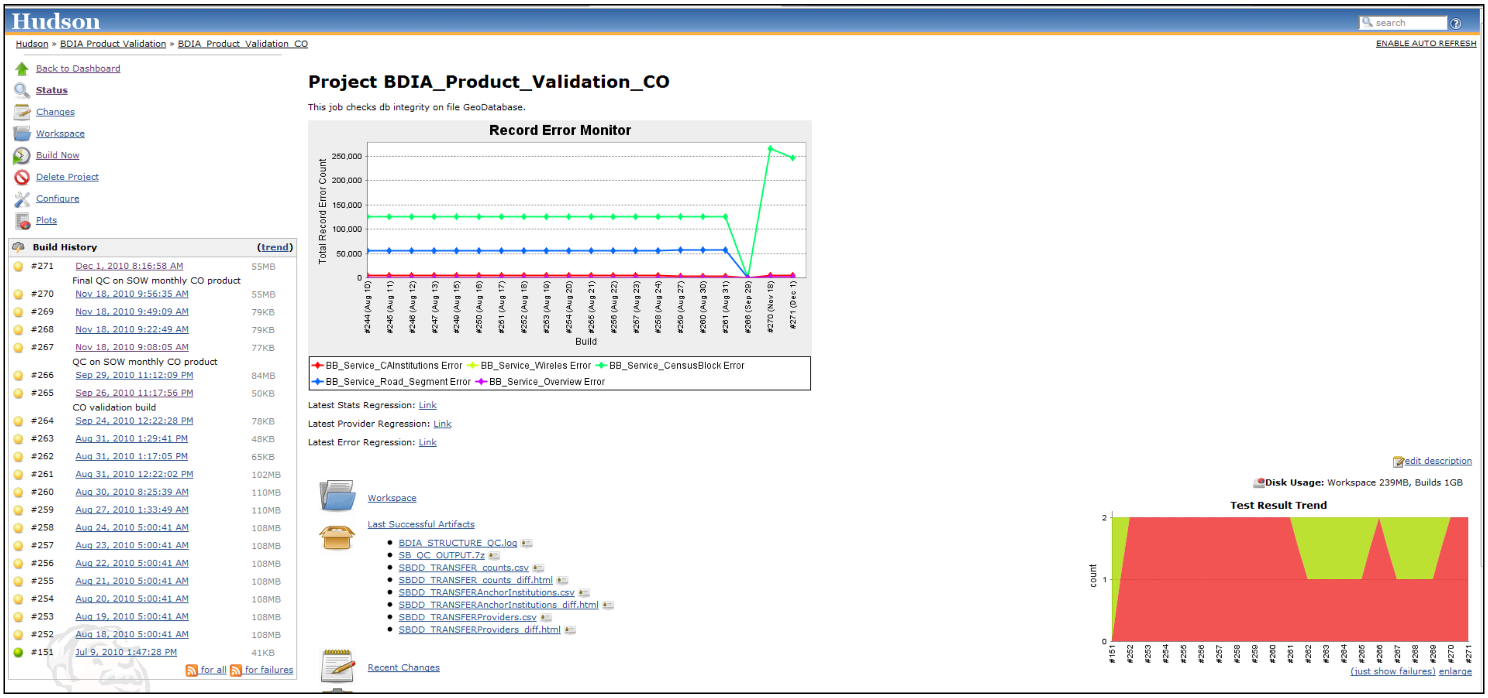
All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



3.10.2 Product Validation and Statistics

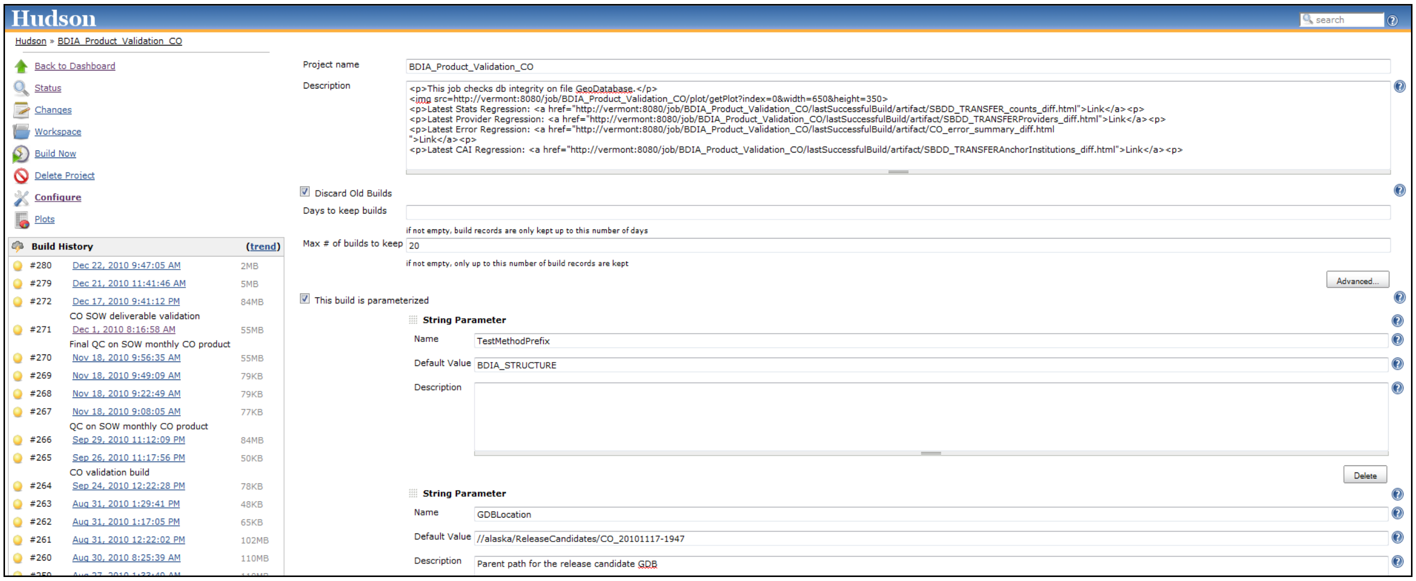
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.
All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

Below is an example of the report provided based on various control points running over a specified time period:



Similar to the Product Create process, all results from the process are maintained:

Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.
Further detail on the Hudson CI System environment can be found by navigating to the following link:
http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson

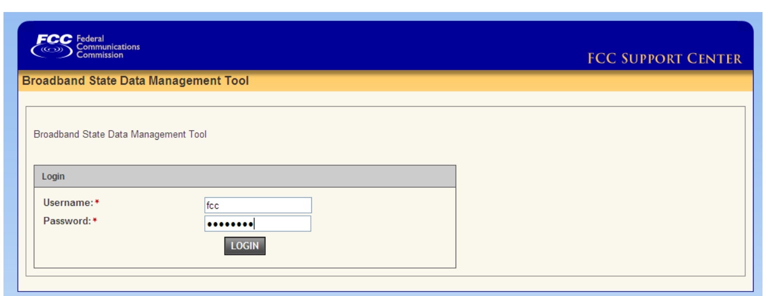


3.11 Product Extract Data Delivery

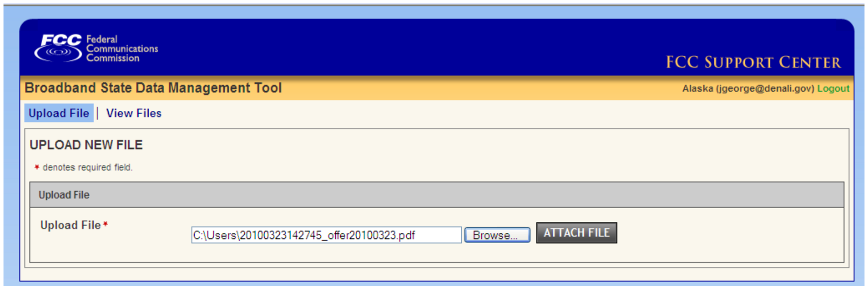
Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

2) NTIA Submittal
   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field
   e) Browse to local file for submission using the ‘Browse’ button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen

g) A receipt of submission is emailed to username e-mail address

DATA DEVELOPMENT & VALIDATION METHODOLOGIES
WHITE PAPER

Commonwealth of Pennsylvania
State Broadband Data and Development (SBDD)
Broadband Mapping Project

NTIA Data Submittal
March 31, 2011

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Introduction

The following sections of this document provide an overview of the process used for the SBDD Broadband Mapping data development for the Commonwealth of Pennsylvania. The following narrative is depicted in Appendix A, Commonwealth of Pennsylvania SBDD Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach

The following outreach procedure provides the framework for communicating with Broadband Service Providers (providers). The primary goals of the outreach approach documented herein are to:

- Promote provider understanding and acceptance of the Broadband Mapping process, results, and benefits
- Clarify NTIA Broadband Mapping requirements
- Facilitate data confidentiality agreements as required
- Minimize the submittal of invalid data
- Enhance provider understanding of the semi-annual update process
- Work with providers to evaluate submittal options to facilitate data submittals

Data Submission Guidelines

Guidelines for the providers' submission of Broadband Mapping Data are documented in the "Data Submission Guidelines". These Guidelines define technical requirements, submission specifications, and coordination and documentation activities.

Pennsylvania Broadband Providers Website

A URL was deployed (http://www.bakergis.com/PABroadbandProvider/) to communicate and distribute NTIA NOFA requirements to providers along with outreach and data submittal materials including:

- NTIA NOFA and subsequent clarification
- Outreach letters to providers
- Draft Non-Disclosure/Data Sharing Agreement
- Quick Start Guides
- Data Submission Guidelines
- Data Transmittal Letter
- Broadband Data Submittal Templates
- Census TIGER Data
- Data Submittal Assistance Contact Information

Outreach Delivery Vehicles

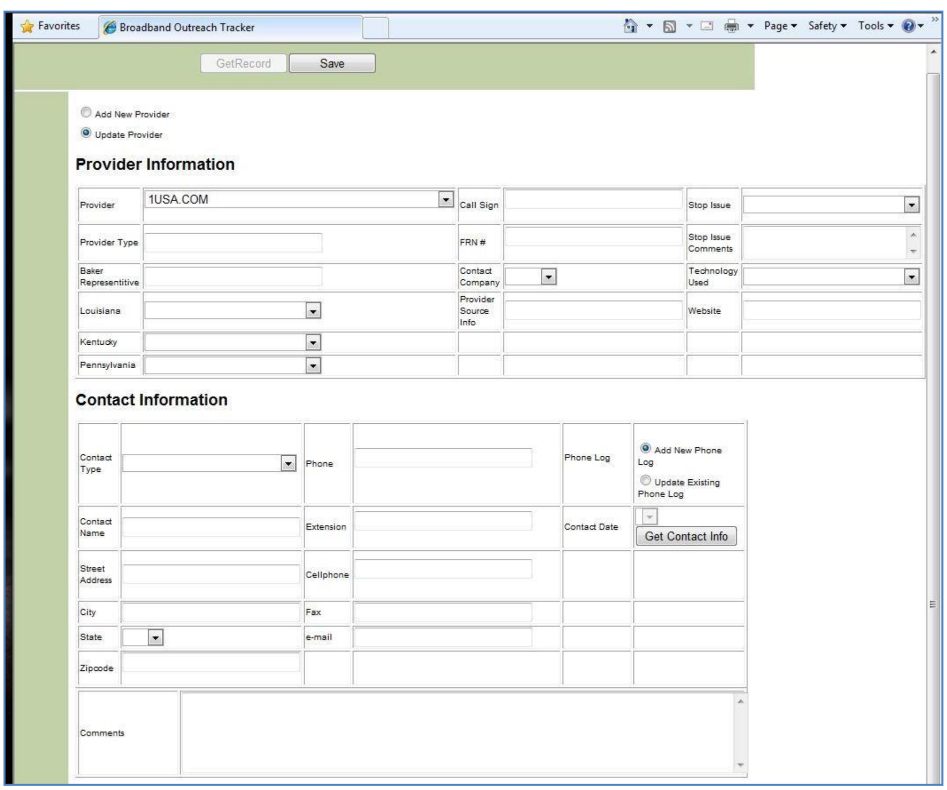
- A State Broadband Mapping Initiative Call for Data letter from the Commonwealth of Pennsylvania Department of Community and Economic Development (DCED) was emailed to all providers in the Commonwealth. This initial provider contact letter described the program and the role of Michael Baker Jr., Inc. (Baker) acting on behalf of the DCED for Broadband Data Collection and Mapping.

- Baker distributed a follow-up letter to all providers describing the data submittal requirements and material and help available to aid with the data submittals.
- Submittal assistance was provided to providers that needed help with data submittals.
- Presentations were conducted with various broadband provider associations to present the data submittal requirements and answer questions.
- Email communication and electronic transfer of data was encouraged to facilitate a faster delivery of data and information.
- A URL was deployed and promoted to distribute outreach material and information concerning the Broadband Mapping Project.
- A secure FTP URL was provided for submittal of broadband data by providers.

Broadband Outreach Tracker Application

The Tracker application (Figure 1) was utilized to collect all correspondence with providers and feedback on the effectiveness of the outreach activities by tracking items such as:

- The number and content of incoming e-mails and letters submitted from the providers
- The number and source of comments, questions, and suggestions made by providers
- The number and source of comments, questions, and suggestions made by attendees at provider meetings and conference calls
- Provider contact information and data submittal status.



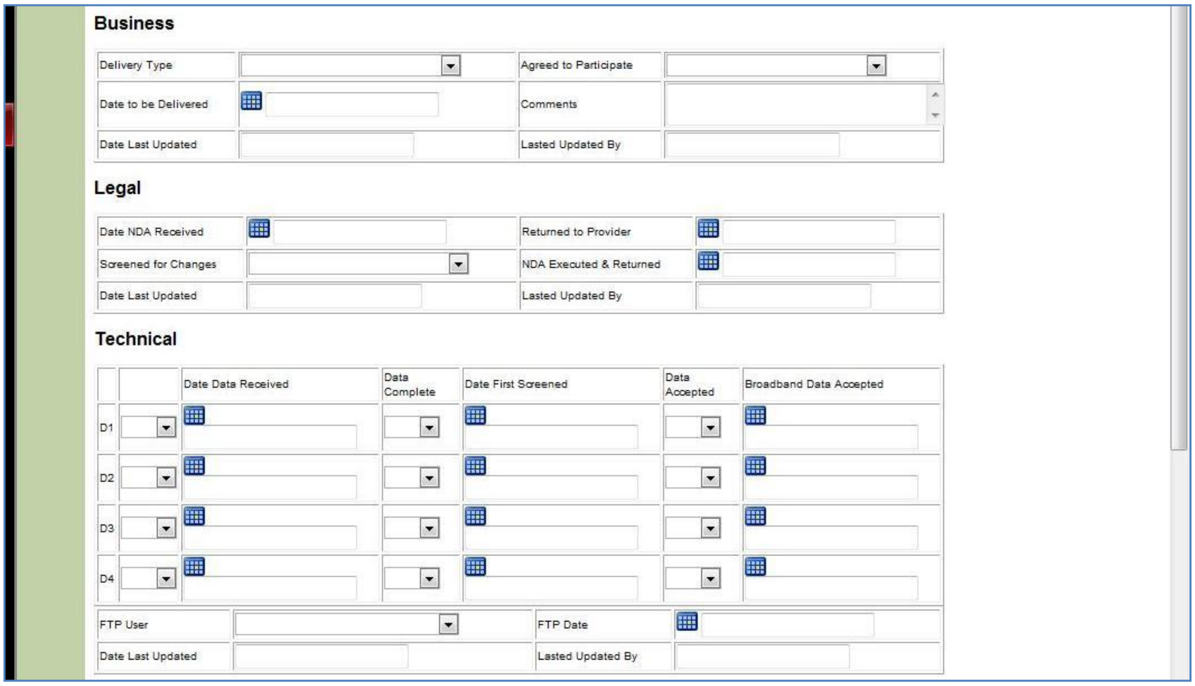


Figure 1 Broadband Outreach Tracker

Provider Submittal Validation

When a data submittal is received from a broadband service provider, it is updated in the Broadband Outreach Tracker and run through an initial validation process to assure that it meets the submittal guidelines.

Validation Checklist

The following items are part of this initial data validation process:

- Verify provider's transmittal letter requested in Data Submission Guideline with is complete and matches submitted data
- Verify the file naming conventions
- Verify each file is machine readable
- Verify data is in the correct GIS or Tabular format/file type
- Verify each field is populated and no empty or NULL values are present for mandatory fields
- Verify all ID (record number points) are unique within the submittal
- Verify all attribute data is formatted according to the submittal guidelines
- Verify topology for all geospatial submissions
- Verify Metadata for all submissions
- Verify the required contact information is included
- Verify adherence to Data Submittal Guidelines (see http://www.bakergis.com/PABroadbandProvider/ to access Data Submittal Guidelines)
  Broadband Service Availability (at least one)
  - Individual Street Addresses (Sec 3.1 & 4.1)

- Census Blocks < 2 sq mi (Sec 3.3 & 4.3)
- Street Segments for Census Blocks > 2 sq mi (Sec 3.2 & 4.2)
- Service Overview (Sec 3.4 & 4.4)
- Polygonal Boundary Area(s) (Sec 3.8 & 4.8)

Middle-mile Points (Sec 3.5 & 4.5)
Community Anchor Institutions (Sec 3.7 & 4.7)
Last Mile Connection Points (Sec 3.6 & 4.6)
WISP Antennas (Sec 4.9)

Data Usability Determination

The validation results are evaluated by the outreach and aggregation persons to determine the usability of the data. If the data meets the submission specifications, it is forwarded on for data aggregation. If it is determined to be unusable, it is returned to the provider for resolution. If the data can be manipulated to get it into a usable format, it is manipulated as required, and then forwarded on for data aggregation.

SBDD Data Development

Data from the providers may be submitted in various formats as defined in the Data Submittal Guidelines, or in some cases unspecified formats may be accepted to help facilitate provider participation. Depending on the format of the submitted data, it is processed through one of the following processes to upgrade it to the NTIA SDBB data standards.

Spatial Data

After validation and any required manipulation of any spatial data submitted by the providers, it is georeferenced and simply loaded into the appropriate NTIA geodatabase feature class.

Address Data Geocoding

If not already in the standard address point template, the provider tabular address data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. ArcGIS geocoding tools are then utilized geospatially locate the address points for the tabular records. Interactive address rematching is performed against two additional street centerline datasets as needed to increase geocoding matching results. The NTIA deliverable is the geocoded address point geodatabase table. The geocoded address points are also subsequently aggregated to the census block or road segment feature class for public web map display.

Census Block Aggregation

If not already in the standard census block template, the provider tabular census block data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The provider tabular census block records are then joined to the geodatabase 2000 U.S. Census Block. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination. The NTIA deliverable is the census block geodatabase table.

If the list of census blocks contains blocks > 2 sq. miles then these blocks are used to select all the 2000 U.S. Census TIGER centerlines that intersect those blocks. The Census Block record data is aggregated to each Road Segment within the Census Block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination.

Road Segment Aggregation

If not already in the standard road segment template, the provider road segment data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. If the provider submittal included graphic centerline segments, these are migrated into the delivery geodatabase along with the linked attribute records. If the provider submittal was tabular road segment records only, they are then joined to the geodatabase 2000 U.S. Census TIGER centerline feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

If the provider road segment data lie within census blocks <= 2 sq. miles then the road segment data is aggregated to the census block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

Overview Data Aggregation

Provider Service Availability Areas submitted for entire county areas are loaded into the NTIA geodatabase Overview table. If not already in the standard template, the provider data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The provider overview records are then joined to the geodatabase 2000 U.S. Census County feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination.

Polygonal Boundary Aggregation/Integration

Providers submitting polygonal service area data are handled in two ways. Wireline Provider data is aggregated to the census block feature class for areas where census blocks <= 2 sq. mi., or road segment feature class for areas where census blocks > 2 sq. mi. Wireless Provider Service Availability Areas submitted by polygonal area are simply loaded into the NTIA geodatabase Poly_Bndry feature class.

Wireline Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Depending on the area, census blocks < or => 2 sq. mi., a selection set of either census blocks or road segments that intersect the polygon boundary is created. The attributed polygon boundary is then joined with census blocks or road segments table to attribute accordingly. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination. The NTIA deliverable is the census block or road segment geodatabase table.

Wireless Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Multiple Poly_Bndry records are created for multiple Trans Tech values for each provider. The NTIA deliverable is the polygon boundary geodatabase table.

Middle/Last Mile Data Integration

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. The NTIA deliverable is the middle or last mile geodatabase table.

Community Anchor Institution Integration

Providers supplied some Community Anchor Institution (CAI) data with the data submittals. But the majority of the data was collected from existing GIS Layers maintained by the Commonwealth of Pennsylvania, outreaching to CAIs through state agencies and their contacts, and having CAIs complete an online survey at http://www.bakerbb.com/pa_institution_survey/.

Provider CAIs

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. Address data is used to geocode locations only when lat/long data is not provided.

Commonwealth CAIs

CAI shapefiles were provided through the Commonwealth's other geospatial efforts. The shapefiles were then exported to the NTIA geodatabase CAI feature class. Various sources for obtaining broadband information for the CAIs were utilized. Various state agencies provided some of the information, i.e. Pennsylvania Department of Education (PDE) provided tabular broadband information for schools, PDE provided tabular broadband information for libraries, Pennsylvania State Police provided tabular broadband information for their facilities. A CAI data survey website was also deployed and the URL distributed by various state agencies to the CAI contacts. Data from all of these sources were then aggregated into the CAI geodatabase table for the NTIA deliverable.

Provider Validation

After data development, service availability maps are generated and submitted to the providers to validate their mapping results. This provides a "sign off" on the interpretation of the submitted data and extends the outreach efforts by providing a visual representation of the data to be delivered to the State and the NTIA.

Types of Provider Maps

Provider maps generally consist of the following types.

Outreach Maps

Often, providers will send data which does not contain all the information needed for a NTIA compliant dataset. In such cases, as an aid to the outreach communication, it may be necessary to produce a map to help the provider locate their service area or verify data they have provided. These maps may take many forms, but generally are of two types:

- General Location Maps – these maps are often produced when the provider does not have a list of address or other standard submittal data and needs help defining their service area. A typical map will show counties, major roads, and towns of the general area the provider has stated as their service area. The intent of the map is to give the provider a way to markup or delineate their service area. If a provider has not provided required attribute information such as Technology of Transmission, Speed Data, etc. then it may be necessary to add a visual clue to this data like an information stamp on the map that they can easily fill out. If the provider sends the map back with a service area boundary, this can then be digitized and sent back to the provider for verification.
- Verification of Provider Supplied Boundaries – these maps are produced when the provider has sent service area boundary information which is confusing or otherwise unclear. Often these are produced when providers send CAD maps, hand drawn maps that need digitization, or lists of zip codes or counties served. A typical map will place the interpreted boundary over a location map so the provider can verify the service area. As with the General Location Map, information stamps or other visual clues may be placed on the map.

Initial Verification Maps

Once the provider data has been processed and the census block and road segment feature classes created, an Initial Verification Map (Figure 2) is produced to give the provider a visual representation of their service area by census block. These maps enable the provider to verify their service area and make changes if necessary. Initial Verification Maps are produced using a set of standards and produced at the highest resolution necessary to convey the map information to the provider. Initial Verification Maps are also produced for Wireless Polygon areas.

Detailed Verification Maps

Providers who have questions about their service areas may request additional information to help clarify issues. In these cases, it may be necessary to create a Detailed Verification Map to highlight the areas in question. Detailed Verification Maps provide the same information as Initial Verification Maps only at a higher resolution. Several maps may be needed to accurately portray an area in question.

Revised Maps

Revised maps take two forms:

- Initial or Detailed Verification Maps which have been annotated or marked-up by the provider
- Outreach produced Initial or Detailed Verification Maps incorporating provider changes

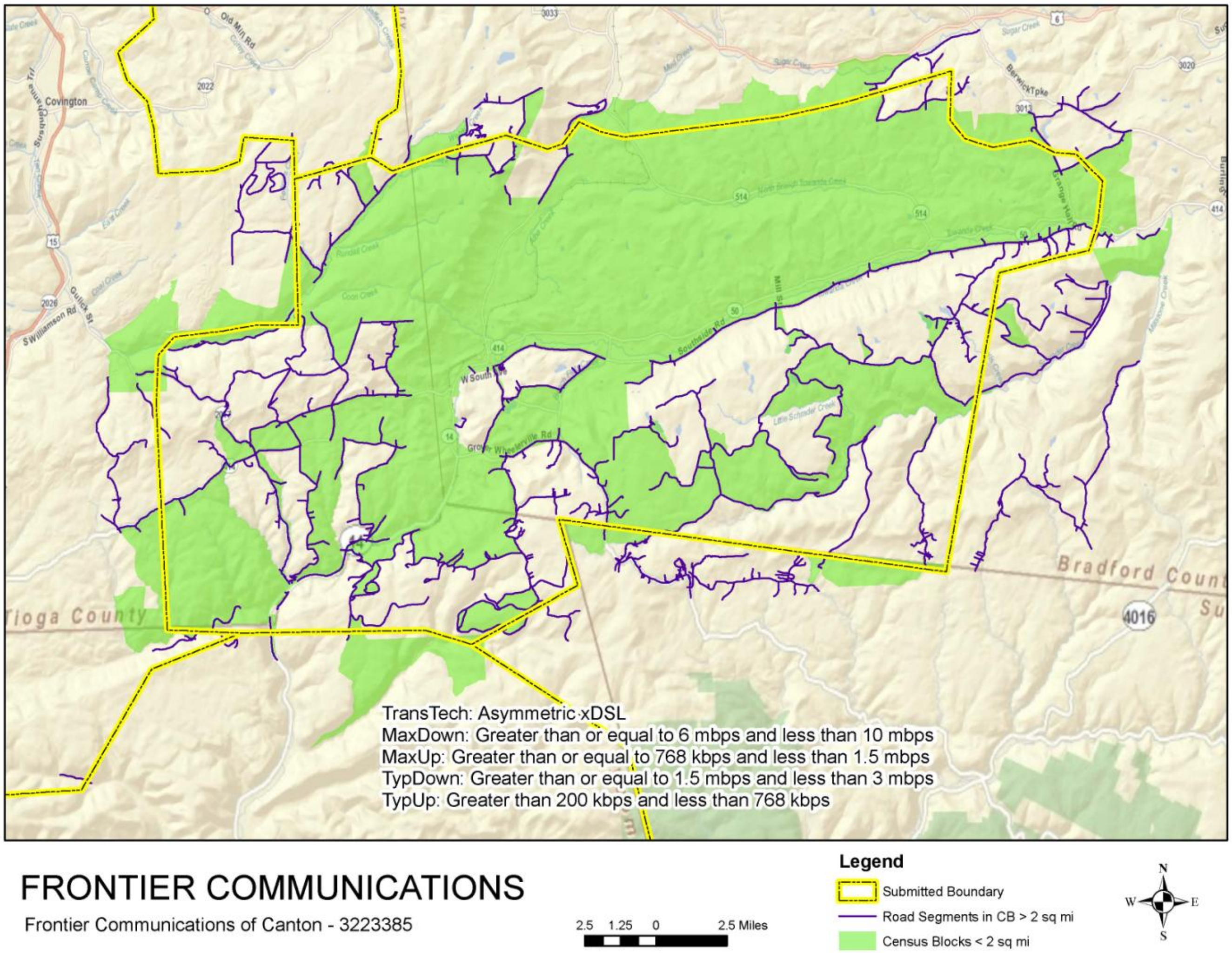


Figure 2 Provider Map

Data Validation

A critical component of the project is the validation of the data submitted by the broadband service providers. Data from various sources, as described in more detail in the following sections, is utilized to develop a level of confidence in the data received from the broadband providers.

Validation Data Set Collection and Development

This validation process employs data sets developed or acquired from different sources as described in the following sections.

Provider Feedback Loop: Maps of completed provider service areas and data are furnished back to the providers for confirmation of the processed/aggregated information. Feedback is integrated into the each provider's dataset.

Telogical Systems Wireline Market Intelligence Data: This commercially available dataset was developed using a methodology that incorporates deep web crawling and additional means, including direct mail harvesting and advertising collaterals (including door to door) to gather cable and telecommunication provider information. This dataset is used as a validation source for wireline provider service area coverage, Technology of Transmission, and Speed.

American Roamer Wireless Market Intelligence Data: This commercially available dataset is used as an independent source to verify information submitted by providers of wireless broadband service. This dataset is used as a validation source for wireless provider service area coverage.

Prior Commonwealth Broadband Mapping Dataset: Under the requirements of the Commonwealth's Act 183 of 2004 legislation, broadband coverage data was previously collected by the Commonwealth. These datasets are used as a validation source for provider service area coverage and Technology of Transmission.

FCC Speed Test: The FCC speed test data includes the IP addresses for each specific speed test conducted. This IP address is queried against a web search engine to determine the provider assigned to that address and is used as a validation source for the provider service coverage and typical speeds.

Fixed Wireless Line of Sight Analysis: Utilizing the existing PAMAP LiDAR for topography generation and determining tower/antennae heights, line of sight analysis is performed to determine areas of reported fixed wireless broadband coverage that is questionable.

Field Data Acquisition: Broadband technicians visited a sampling of census block locations to gather broadband data to be used for validation. The following criteria were taken into account when developing the census block sampling dataset:

- urban vs. rural census block characteristic
- censes block grouping
- land vs. water census block characteristic

The overarching mission of the Federal broadband stimulus program is to expand Broadband service to areas that are currently unserved and underserved. Also, the market intelligence validation sources typically represent some rural, but more urban areas. Thus, our field data collection efforts were targeted more towards the rural areas; split 90% rural, 10% urban.

Additionally, a study by Penn State University (Glasmeier 2002) notes that a large number of census block groups typically fit within any given cable or telephone company service areas. Therefore, our field sample was also based on selection of one census block per block group and a land mass greater than 50% to avoid field visiting areas covered mostly by water. There are a total of 10,387 block groups in PA. Using a statistical sample size calculator based upon the number of block groups in the state and +/- 4% margin of error at a 95% confidence level, the sample size is 568 census block locations statewide. The procedure for selecting the calculated field verification census blocks is provided below.

1. Select one census block per census block group
    a. Convert the census block groups polygon to label points.

   b. Select the census block polygon by doing a spatial selection using census block groups label points.
2. Select from the current selection where the census block land mass is 50% or greater and the block is rural.
3. Export the selected blocks to a new shapefile. This reset the FID for the next step.
4. Select every 2nd, 3rd, 4th, or so on to get the desired number of blocks. Query used to select: MOD("FID",2) = 0. This will select every other record.

The planned census block field locations are shown in Figure 3.

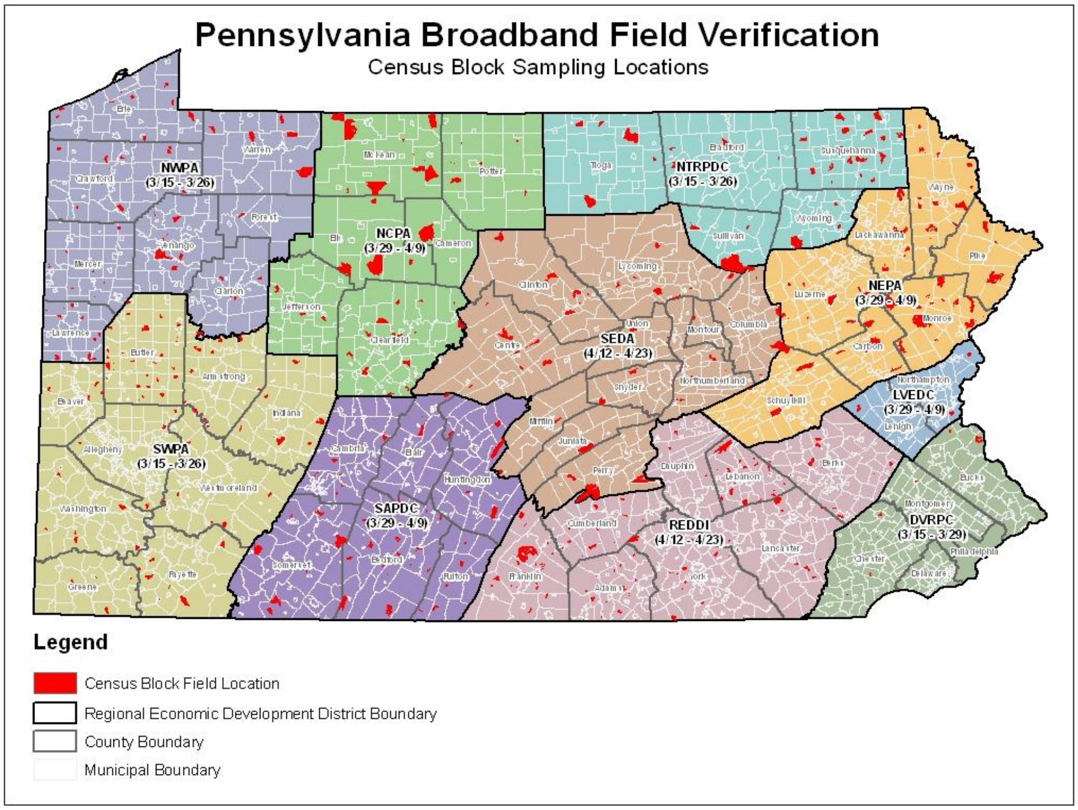


Figure 3 Planned Field Verification Census Block Locations

For each census block in the sample set, broadband technicians collected data using Panasonic Toughbook computers, loaded with MapPoint mapping software, and a customized Microsoft Access data collection form with the ability to automatically import GPS coordinates. The sample census blocks were pre-loaded and directly accessible from MapPoint. Two types of data collection were conducted (infrastructure observation and wireless speed testing) and the results were recorded and linked to the corresponding field location coordinates within the designated sample census block. The information collected by the field broadband technicians includes:

Wireline:

- GPS coordinates
- circuit infrastructure feeding the area (copper, fiber, cable)

- local distribution hut equipment inspection, where allowed/possible
- witness access circuit speed tests, where allowed/possible
- facility elevation (measurement relative to grade), where allowed/possible
- distance from DSLAM measurement where applicable and determine access speed capability with an accuracy within 500ft using mapping software
- collect site pictures

Wireless:

- GPS coordinates
- internet speed test

The map in Figure 4 shows the locations (blue points) of the census block field surveys that were performed.

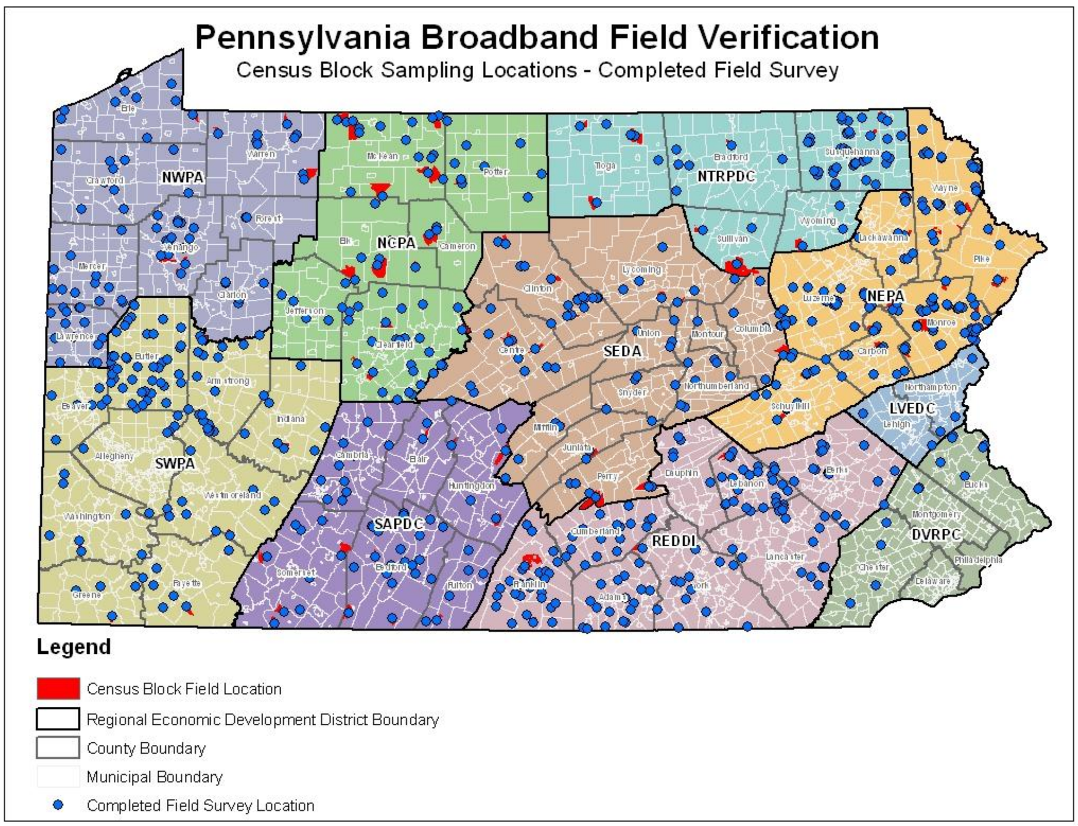


Figure 4 Completed Field Verification Locations

For the 568 census blocks that were visited, 2821 individual wired/wireless data elements were recorded and 3666 pictures were taken at those locations. This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission, middle mile, and wireless speed.

Provider Data Validation Process

Provider Feedback Loop: Feedback received from the providers is visually inspected and integrated directly in the mapping GIS database.

Service Area Validation Data: The Telogical wireline service area data is tabular and contains a separate record for each provider/technology of transmission combination with an associated census block or TIGER road segment, depending on the whether the size of the census block area (=/< or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer wireless service area data is already in and ArcGIS data format. The validation data is then joined to the provider service area data by census block or TIGER road segment ID. Any database records in the provider or validation tables that cannot be joined are output to a separate layer that indicates the areas of discrepancy between the two datasets. The joined tables are then queried to detect any speed discrepancies which are also output to a separate discrepancy layer.

Field Validation Data: The field data are also collected in tabular database format, and represent a specific lat/long spatial location for each record. This data is also exported into an ArcGIS data format, joined to the provider data, queried to validate pertinent attribution. Again, records not joined and/or with detected attribution discrepancies are output to separate GIS layers.

Topology: The ArcGIS Validate Topology Tool is used to flag any topology issues in the broadband data. Flagged issues are reviewed to identify false positives and update true errors as required.

SBDD Check Submission: The NTIA-provided SBDD Check Submission tool is utilized to validate that the deliverable broadband data is consistent with the business logic rules set forth by the NTIA and a passing receipt is provided with the data submittal to NTIA.

Stakeholder Feedback: The state broadband mapping website includes a feedback function. Comments received from stakeholders such as the regional Economic Development Districts and the public are reviewed and used to validate the provider data submissions.

Validation and Confidence Level Reporting

To facilitate validation and confidence level reporting, Baker deployed a validation application called Statistical Evaluation and Assessment System (SEAS), shown in Figure 5, which automatically compares the multiple independent validation datasets against the broadband service provider supplied information. The SEAS application uses statistical methodologies to report the confidence level in the spatial and attribute accuracy of the information. Appendix B shows the validation workflow.

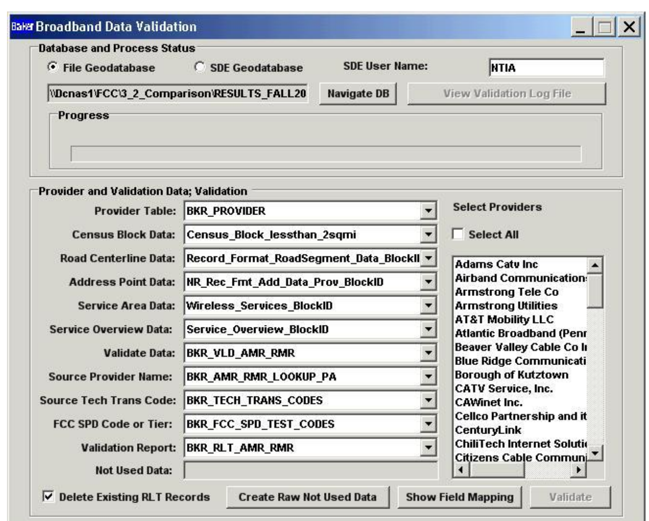


Figure 5 SEAS

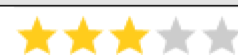
The SEAS comparison is a three-part validation process:

1. Comparison of the collected validation source against the aggregated broadband provider data.
2. Match percentage calculation for each provider reported in the DataPackage.xls, "Provider Table" tab, "Comments" column.
3. Confidence score calculation displayed on the state broadband website.

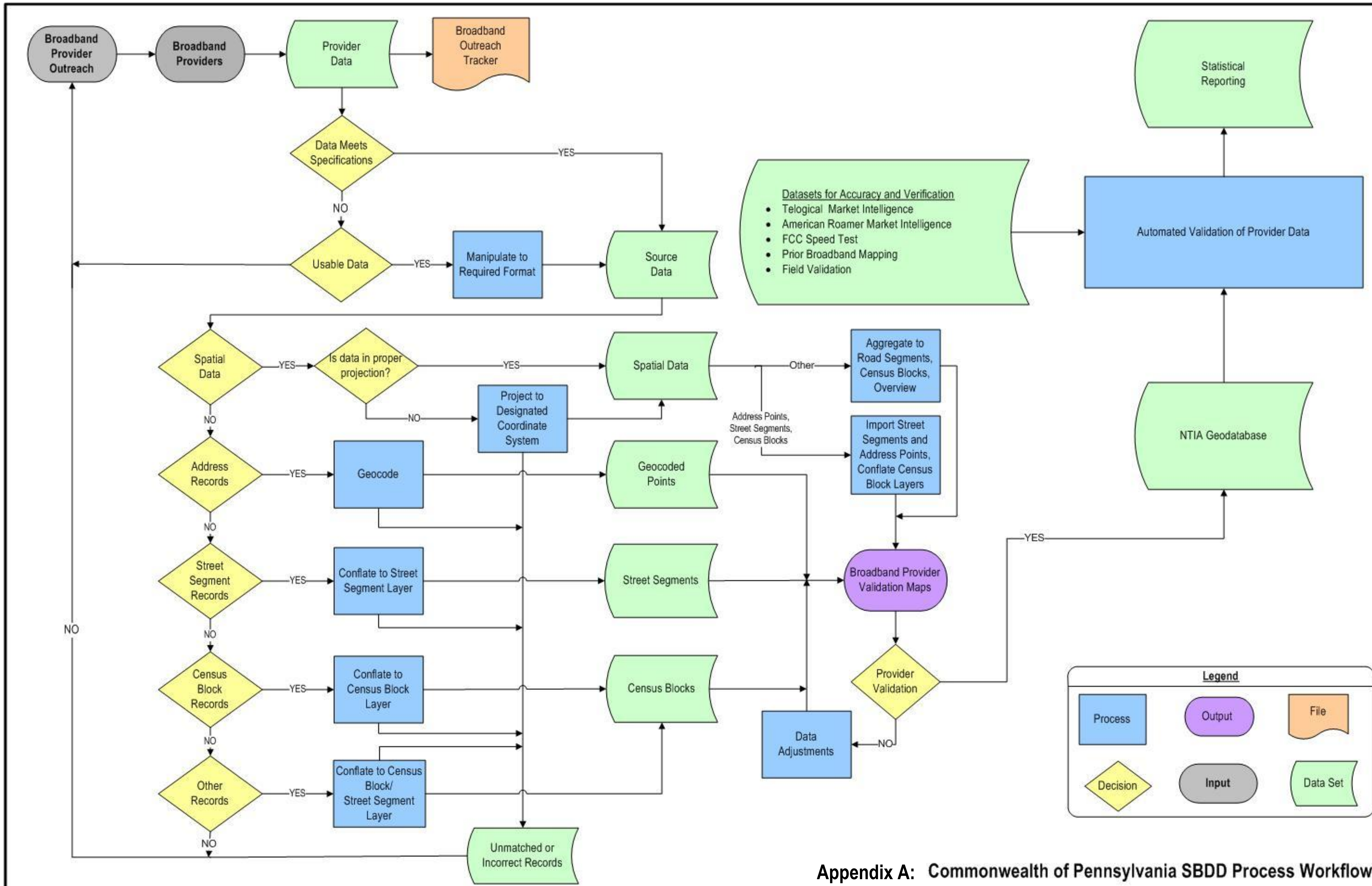
After completing all validation data source collections, SEAS is used to automatically compare the multiple validation datasets against the aggregated broadband data which came from the providers. Through the SEAS accumulation table, it produces a match percentage per broadband service record based upon the number of matches that record has against each validation source. The matched percentage for each record is the result of the total count of the matched validations for the record divided by the total validation source being compared against the record. Validation confidence rating/score is assigned on a scale of 1 to 5 based upon the percentage of validation source matches as per the following score results:

- 1 Star = 0% - 19% Match
- 2 Stars = 20% - 39% Match
- 3 Stars = 40% - 59% Match
- 4 Stars = 60% = 79% Match
- 5 Stars = 80% - 100% Match
- "No Analytics" = No validation source available for that provider

The Commonwealth's public broadband mapping website (www.broadbandinpa.com) is updated with the confidence level results at the record level based upon the queried geographic location and the following shows an example of this representation.

Provider Name	Transmission Technology	Max Download Speed	Max Upload Speed	Confidence Score
AT&T Mobility	Mobile Wireless	Greater than or e…	Greater than or e…	
Verizon	Asymmetric xDSL	Greater than or e…	Greater than or e…	NO ANALYTICS
Comcast	Cable Modem – Other	Greater than or e…	Greater than or e…	

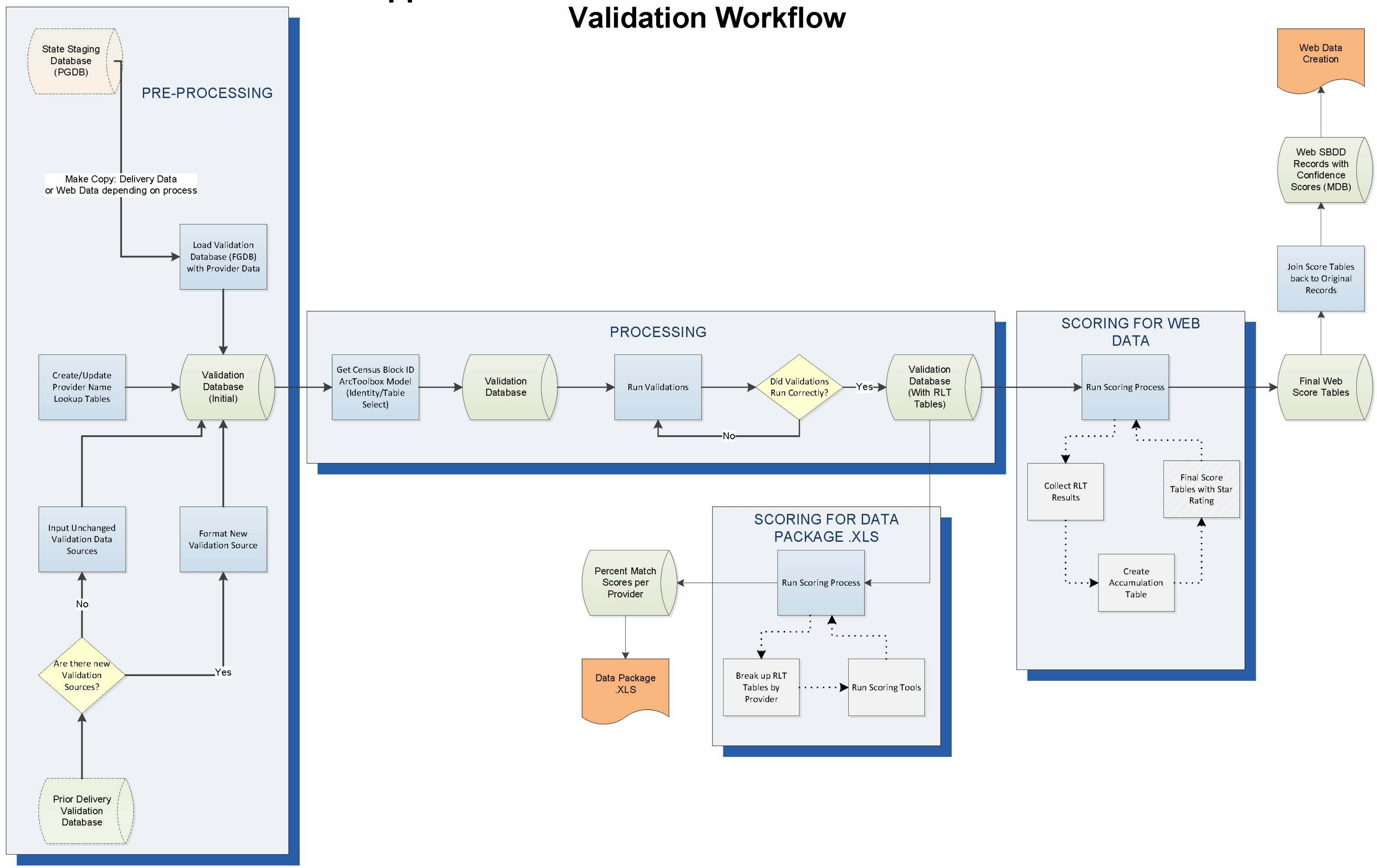
The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.



Appendix A: Commonwealth of Pennsylvania SBDD Process Workflow

October 1, 2010

Appendix B: State Broadband Data Validation Workflow



OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE COMMONWEALTH OF PUERTO RICO

CONNECT PUERTO RICO®

April 1, 2011

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PUERTO RICO COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect Puerto Rico offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Puerto Rico has played in creating such a powerful tool that will surely benefit not just Puerto Ricans, but consumers and businesses nationwide.

Therefore, as the Designated Entity, the Puerto Rico Office of the Chief Information Officer (OCIO), in partnership with Connected Nation, is pleased to present this submittal of the Commonwealth of Puerto Rico's State Broadband Data and Development (SBDD) Grant Program, known as Connect Puerto Rico.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Puerto Rico: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Puerto Rico program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Puerto Rico program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate territory-level broadband mapping data, developing territory-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking territory-wide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 68.42% of the Puerto Rico provider community, or 13 of 19 total providers. Of the 13 participating providers, 6 supplied an update to their network or coverage area(s), while 6 have reported no change. The remaining provider previously supplied data but was non-responsive in the April 2011 update effort; therefore its previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 6 providers that are not represented in the attached datasets, one has remained unresponsive to the numerous attempts at contact by Connect Puerto Rico. The remaining 5 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission. While the broadband provider OneLink has continued to be non-responsive to requests for data and information on its network, an estimated service area is submitted in this dataset based on publicly available information and field validation efforts. Additional information on the methodology used to create and revise the OneLink service area is available in the Field Validation narrative.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Puerto Rico principals that all commercially reasonable efforts were made to account for 100% of the known Puerto Rico broadband provider community, pursuant to this semi-annual data update submission.

Connect Puerto Rico has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Puerto Rico conducts field validation efforts. To date, 11 (57.89%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Puerto Rico launched a website to create awareness about the initiative. Connectpr.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Puerto Rico website encountered 1,846 unique visits during this reporting period, which includes 1,086 visits to the English website and 760 visits to the Spanish website (3,659 total to date for the life of the grant awarded on December 20, 2009, which includes 2,695 to the English website and 964 to the Spanish website). Additionally, this pronounced Web activity netted 16 broadband inquiries over this same reporting period (24 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer initiated actions are facilitated through the Connect Puerto Rico website and the Connect Puerto Rico Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Puerto Rico mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Puerto Rico has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Commonwealth of Puerto Rico, outreach was conducted during this data update reporting period by Connect Puerto Rico to continue identification of existing, centralized sources for CAI connectivity data. Working with the Puerto Rico Office of the Chief Information Officer (OCIO), Connect Puerto was able to secure data from the territory from a variety of CAIs and process this data for inclusion in the upcoming submission. Outreach was coordinated to distribute both an English and Spanish language CAI survey to institutions throughout the territory through multiple methods including a customized online survey available on the Connect Puerto Rico website. Connect Puerto Rico continues to work in close coordination with territory-wide associations such as the Consejo General de Educación, Consejo de Educación de Puerto Rico, and Departamento de Salud - OIAT to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Puerto Rico will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the territory, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. Additionally, Connect Puerto Rico will continue working closely with the OCIO to reach CAI associated with their respective sectors. From our work in Connect Puerto Rico, as well as other states, we recognize the great value of this data to future collaboration efforts within the territory and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Puerto Rico efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Puerto Rico program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great Commonwealth of Puerto Rico, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

cc: Juan Eugenio Rodriguez de Hostos, CIO
Government of Puerto Rico

DATA ACQUISITION: PUERTO RICO COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Puerto Rico, working in close coordination with the Puerto Rico Office of the Chief Information Officer (OCIO), has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Puerto Rico has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Puerto Rico has continued to identify and process CAI data obtained through an ongoing territory-wide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Puerto Rico through ESRI ArcGIS software. One of the challenges that we face in Puerto Rico is the use of a non-standard addressing system. Discussions are ongoing with the OCIO and internal staff to address this issue and report data to NTIA that has not been processed and reported in this submission.

Connect Puerto Rico continues to utilize a customized online survey hosted through SurveyMonkey in both English and Spanish, with a landing page on the Connect Puerto Rico website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the territory. Connect Puerto Rico will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link in both English and Spanish using the following password:

English Survey
http://en.connectpr.org/mapping/Community_Anchor_Institution_Data_Collection.php

Spanish Survey
http://es.connectpr.org/mapa/recopilacion_de_datos__de_instituciones_comunitarias_ancla.php

Password: CAI_PR_2158

Connect Puerto Rico, OCIO, and OCIO consultants CSA Group, have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. Centralized CAI broadband connectivity data was received during this reporting period from the OCIO and has been included in this submission. We will continue to identify data sources that may have this type of data and include it in upcoming submissions as the data is made available.

In tandem with these efforts to identify existing data, Connect Puerto Rico continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Coordination with organizations such as Consejo General de Educación, Consejo de Educación de Puerto Rico, and Departamento de Salud – OIAT are very important to the success of this data collection effort, and we will continue to work closely with these and other agencies to gather connectivity data within Puerto Rico.

Connect Puerto Rico has an ongoing mission to educate CAI throughout the territory on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Puerto Rico is developing an English and Spanish language CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Puerto Rico, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Puerto Rico will continue its ongoing work with OCIO, the CSA group, and key organization contacts in an effort to raise awareness of this project among CAI and overcome the challenges of geocoding, identifying, and securing CAI data within Puerto Rico.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	1,998	1,998	1,689	1,504	1	1
Libraries	154	154	153	3	2	2
Healthcare	621	620	139	0	0	0
Public Safety	308	307	277	24	14	14
Higher Ed Institutions	553	553	88	21	16	16
Other Government	6	6	1	0	0	0
Other Non-Government	1,508	1,448	980	8	5	5
Total	**5,148**	**5,086**	**3,327**	**1,560**	**38**	**38**

SBDD DATA SUBMISSION METHODOLOGY

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the Commonwealth of Puerto Rico.

Inventory of Deliverables, Connect Puerto Rico: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the Commonwealth of Puerto Rico have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the commonwealth rather than submitting the entire boundary of the island as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

PUERTO RICO FIELD VALIDATION NARRATIVE

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the territory using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the territory using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Puerto Rico on the following providers: Aeronet Wireless, AT&T, Critical Hub Networks, Data@ccess, Liberty Cablevision of Puerto Rico, Neptuno Media, San Juan Cable LLC d.b.a. OneLink, Puerto Rico Telephone Company, Sprint, T-Mobile, and Worldnet.

During this reporting period, Connected Nation conducted 81 additional on-site validation tests with Aeronet Wireless, AT&T, Critical Hub Networks, Neptuno Media, San Juan Cable LLC d.b.a. OneLink, Puerto Rico Telephone Company, and Sprint.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 11 companies (out of a universe of 19 viable providers) totaling 57.89% on the island of Puerto Rico.

DATA SUBMISSION OF NON-PARTICIPATING PROVIDER

As part of its ongoing broadband mapping efforts, Connected Nation has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBDD mapping initiative.

The following narrative will discuss the recent data collection activities related to San Juan Cable, LLC (d.b.a. OneLink), a cable television and cable modem provider in the San Juan, Puerto Rico area, explaining how and where CN obtained publicly available data and the "on-the-ground" validation techniques that support the underlying data.

Background

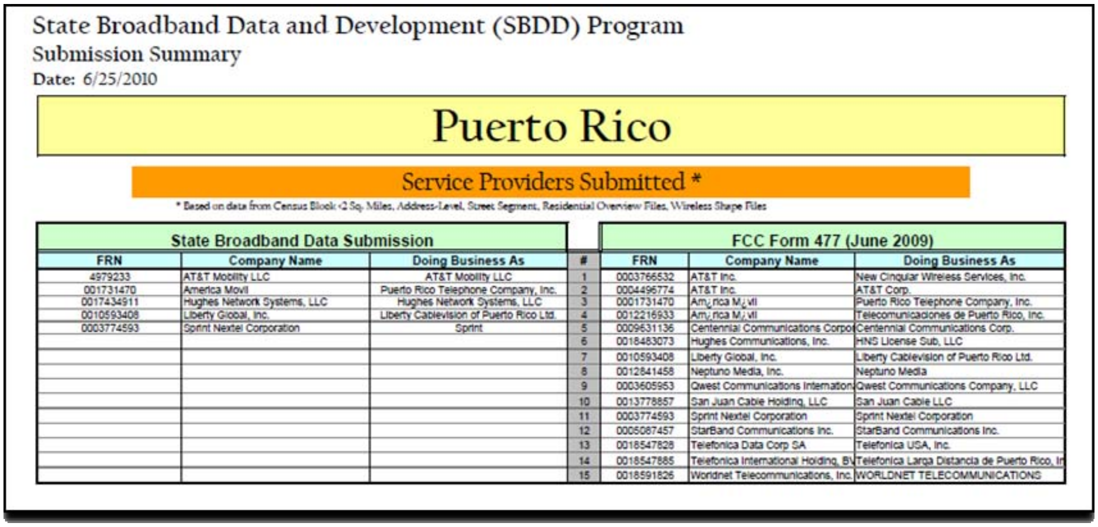
CN staff members attended meetings in Puerto Rico from September 21-25, 2009, for a series of one-on-one provider meetings, which had been scheduled by Maria Pou, Special Assistant to the OCIO, to discuss the SBDD grant program. OneLink was scheduled to attend a meeting on September 24 at 10:00 a.m.; however, no one from their organization arrived (nor did they notify Maria of their intent to cancel). Outreach efforts conducted from September 2009 through September 2010 failed to motivate San Juan Cable, LLC into either responding or participating in the mapping initiative.

The Issue

San Juan Cable, LLC, by its lack of actions, indicated its unwillingness to participate in the island-wide mapping initiative. This surfaced as a problem during the first two stages of mapping and the lack of data for this provider will continue to threaten to skew future research and planning activities under the direction of the OCIO.

Identification of Provider's Legal Name, d.b.a., and FRN

CN began building a file based on anecdotal information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN received information from the Junta Reglamentadora de Telecomunicaciones de Puerto Rico ("JRT") indicating that territory once operated by Adelphia was the same territory now operated by OneLink. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system did not yield results. It was later discovered that the entity of record with the JRT was, in fact, San Juan Cable, LLC. A new search on the FCC CORES site yielded an FRN of 0013778857 and additional contact data. This was later confirmed when NTIA provided CN with a submission summary comparison against FCC Form 477 filers (see graphic below).



State Broadband Data and Development (SBDD) Program
Submission Summary
Date: 6/25/2010

Puerto Rico

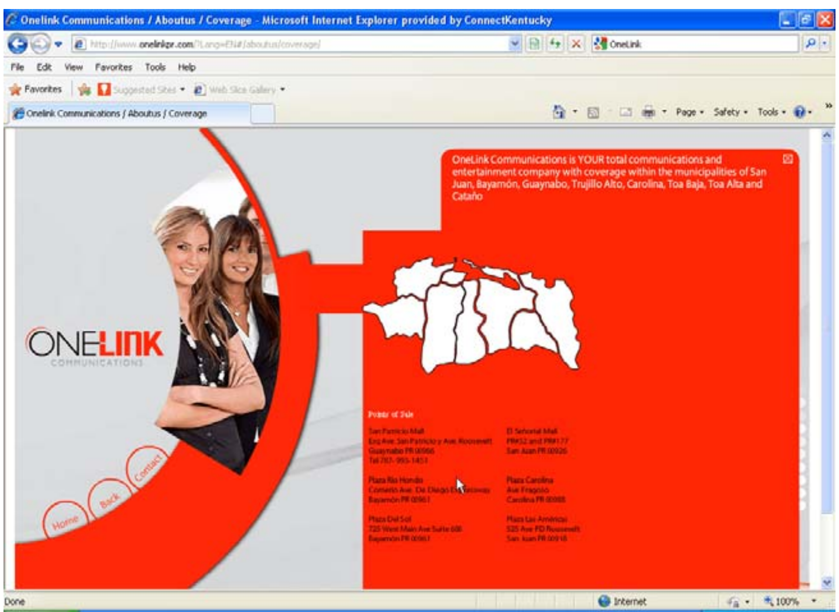
Service Providers Submitted *

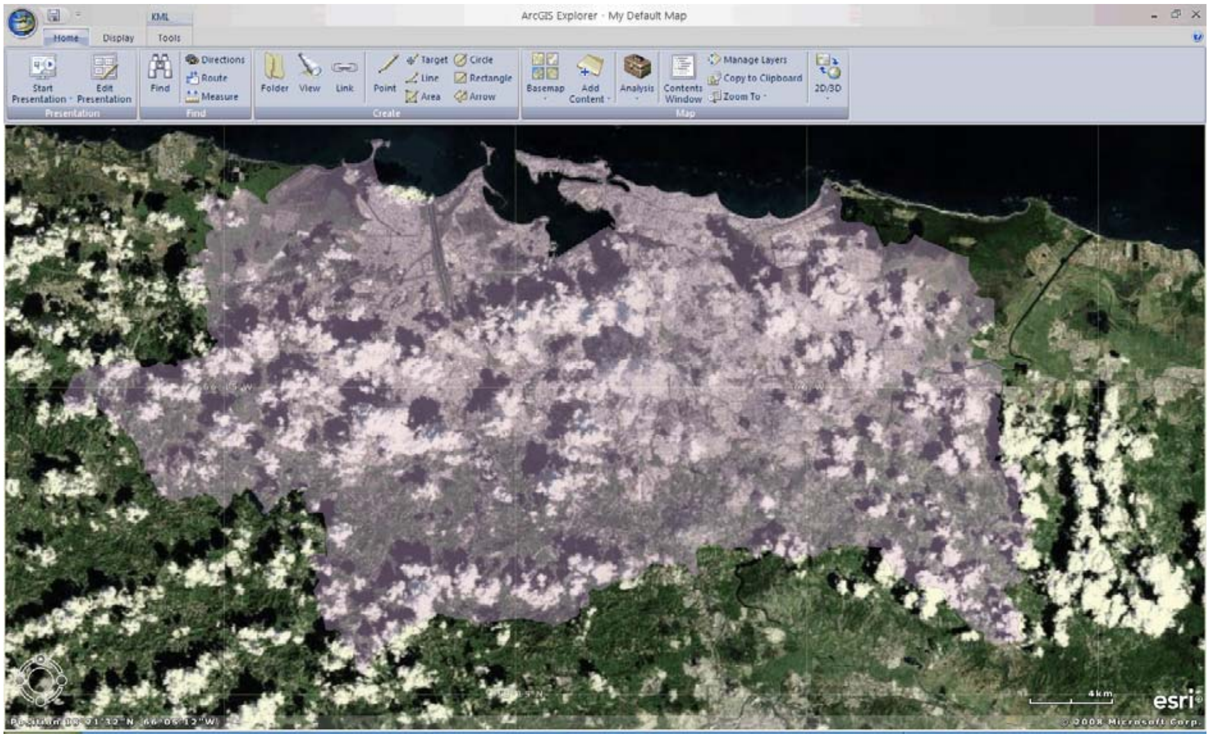
* Based on data from Census Block <2 Sq. Miles, Address-Level, Street Segment, Residential Overview Files, Wireless Shape Files

State Broadband Data Submission				FCC Form 477 (June 2009)		
FRN	Company Name	Doing Business As	#	FRN	Company Name	Doing Business As
4979233	AT&T Mobility LLC	AT&T Mobility LLC	1	0003766532	AT&T Inc.	New Cingular Wireless Services, Inc.
001731470	America Movil	Puerto Rico Telephone Company, Inc.	2	0004496774	AT&T Inc.	AT&T Corp.
0017434911	Hughes Network Systems, LLC	Hughes Network Systems, LLC	3	0001731470	Am¿rica M¿vil	Puerto Rico Telephone Company, Inc.
0010593408	Liberty Global, Inc.	Liberty Cablevision of Puerto Rico Ltd.	4	0012216933	Am¿rica M¿vil	Telecomunicaciones de Puerto Rico, Inc.
0003774593	Sprint Nextel Corporation	Sprint	5	0009631136	Centennial Communications Corpo	Centennial Communications Corp.
			6	0018483073	Hughes Communications, Inc.	HNS License Sub, LLC
			7	0010593408	Liberty Global, Inc.	Liberty Cablevision of Puerto Rico Ltd.
			8	0012841458	Neptuno Media, Inc.	Neptuno Media
			9	0003605953	Qwest Communications Internation	Qwest Communications Company, LLC
			10	0013778857	San Juan Cable Holding, LLC	San Juan Cable LLC
			11	0003774593	Sprint Nextel Corporation	Sprint Nextel Corporation
			12	0005087457	StarBand Communications Inc.	StarBand Communications Inc.
			13	0018547828	Telefonica Data Corp SA	Telefonica USA, Inc.
			14	0018547885	Telefonica International Holding, BV	Telefonica Larga Distancia de Puerto Rico, In
			15	0018591826	Worldnet Telecommunications, Inc.	WORLDNET TELECOMMUNICATIONS

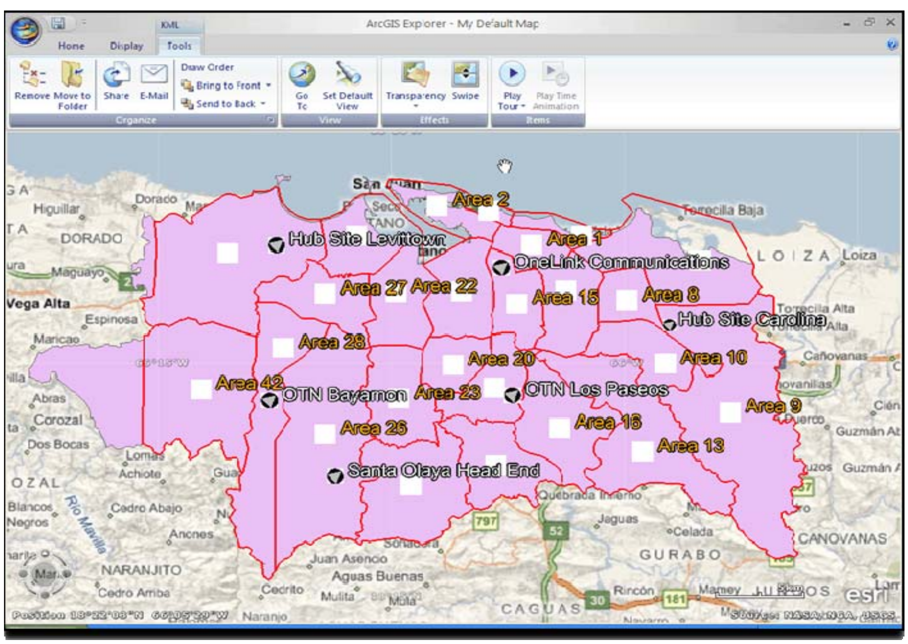
Identification of Provider's Coverage Area

Connected Nation extracted the municipio boundaries from OneLink's publicly available website (see first illustration below) and used the company's published boundaries to create a GIS shapefile (see second illustration below) of the greatest advertised extent of OneLink's service area.





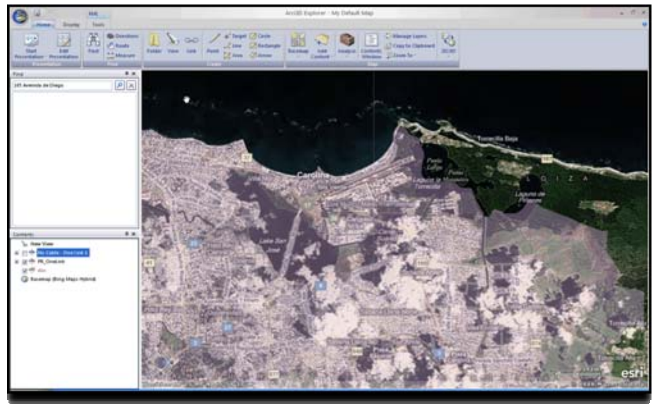
These polygons were then compared against the only shred of data supplied by OneLink during the course of attempted communication (see comparative illustration below). The purple-shaded area was the CN coverage polygon extracted from OneLink's website, and the red outlines illustrate the franchisee boundaries submitted by OneLink.



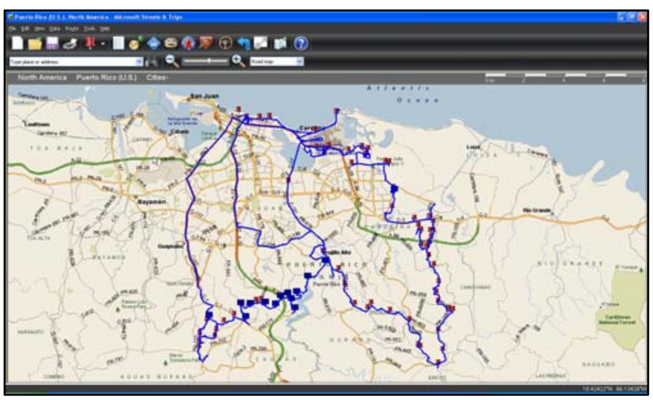
Using this combined coverage polygon as the basis for further investigation, Connected Nation set out on an exploratory "drive test" to determine where cable plant existed and estimate where cable modem likely existed in the greater San Juan area. During the period of February 7-11, 2011, Connected Nation deployed five staff members (all highly trained, former telecommunications operators) to conduct a thorough analysis of OneLink's "alleged" coverage area.

Testing Techniques

Specific quadrants were assigned to each of the validation teams on a daily basis. The goal was to drive through each of the areas and determine the existence (or lack thereof) of CATV plant – whether fiber or coaxial.



Test points were pre-selected and entered into Microsoft Streets & Trips, which also created a GPS-enabled "trace route" of each day's drive testing activities.

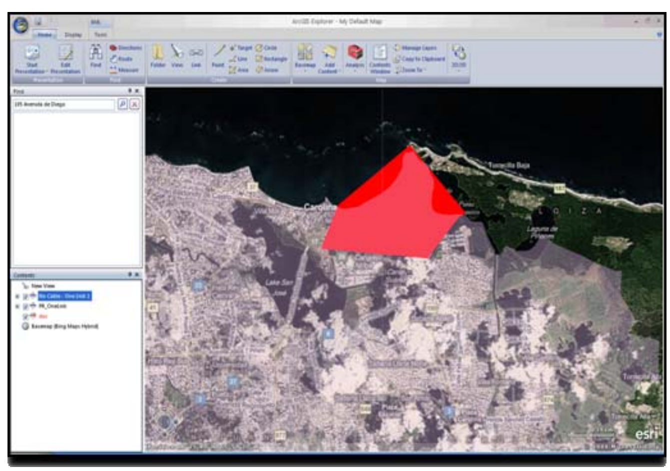


As cable plant was identified, markers were placed within Streets & Trips pinpointing the areas where service was likely to exist.

Connected Nation staff members then proceeded to stop at points along the way and conducted random interviews with residents within the area querying the actual availability of cable modem service.

Based on the lack of visible or traceable cable plant, polygons were created in ArcGIS Explorer to specify the population areas where the Connected Nation staff believed coverage gaps existed.

The illustration on the right represents one such "gap area" identified during the drive test.



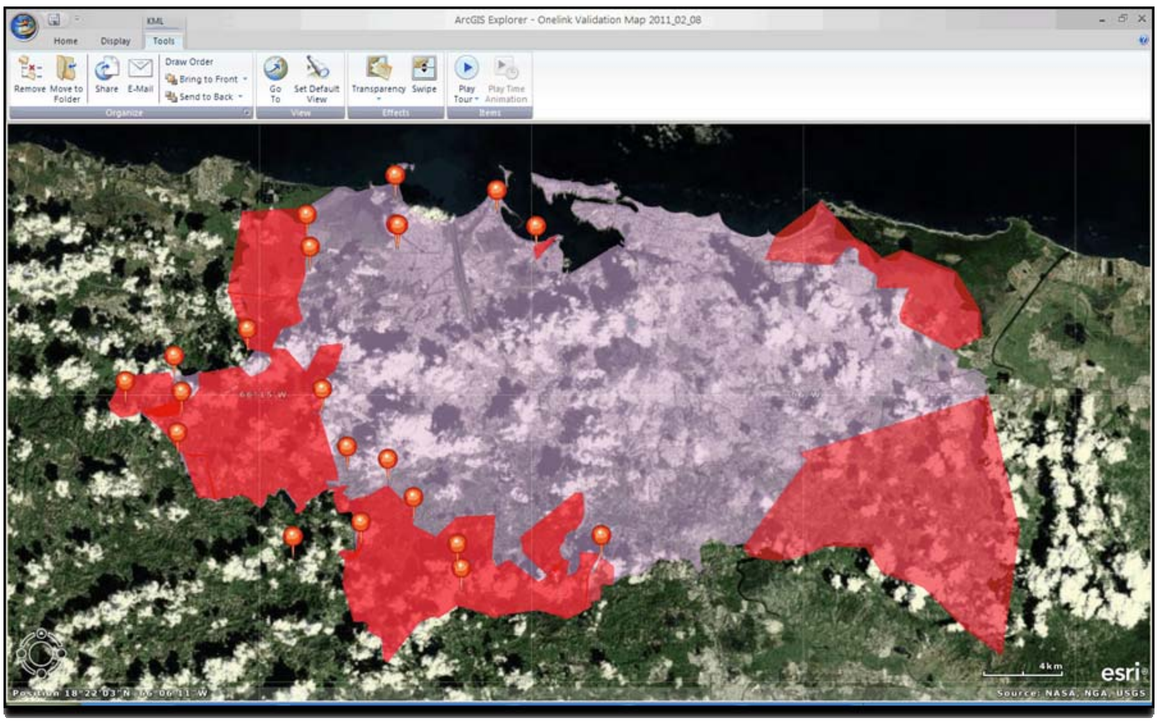
Visual identification of physical CATV plant was relatively easy and straightforward. The Connected Nation team members, many of whom were former CATV operators, found very little difficulty in identifying aerial (above ground) CATV plant or in locating plant that traveled below the earth's surface (underground plant) based simply on looking for specific cable routes.

The image to the left below demonstrates that the Connected Nation team could, in fact, locate aerial plant while the image to the right below demonstrates where CATV plant moved from an aerial design to an underground design. In the picture to the right, the CATV plant moves from a pole to an area where underground vaults or above-ground pedestals could be easily traced and identified.

At the conclusion of this week-long exercise, Connected Nation had driven through several hundred miles of the OneLink franchise area, located above ground and underground plant, visited with and surveyed numerous local residents, obtained collateral material from OneLink's local offices (to determine maximum advertised connection speeds), and created a polygon that illustrates the identified and likely coverage area of OneLink.

Results and Submission for April 2011

As a result of the collection of publicly available information and the on-the-ground validation efforts, Connected Nation is submitting on behalf of the Commonwealth of Puerto Rico, the cable modem broadband service area of OneLink. Without provider participation and support of the SBDD mapping initiative, CN has proceeded with developing a relevant and feasible methodology for collecting and validating the service area of a currently non-participating broadband provider. The image below shows the exact results of the validation efforts in terms of the revisions made to the advertised cable broadband availability in the San Juan area. Polygons in red demonstrate areas where the CN staff reasonably believes "gaps" exist in the franchise area. The remaining purple-shaded areas are included, along with full attributes, in the Puerto Rico broadband data submission for the April 1, 2011, deliverable to NTIA for the SBDD grant program.



Sample OneLink Cable Modem Collateral Material

Accuracy and Verification: Methodology - Provider Validation

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated to an island-wide level, static maps of island-wide and municipality-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 8.18% of Puerto Rico households do not have terrestrial fixed broadband service available, and approximately 0.89%[1] of Puerto Rico households have neither mobile nor fixed broadband service available.[2]

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[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block

Within rural areas of the commonwealth, results derived from provider-validated data indicate that approximately 12.68% of rural Puerto Rico households do not have terrestrial fixed broadband service available, and approximately 1.49%[3] of rural Puerto Rico households have neither mobile nor fixed broadband service available.[4]

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)

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whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state or territory.

[3] See footnote 1.

[4] See footnote 2.

19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the island, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these jurisdictions has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Puerto Rico project has received a total of 16 inquiries (24 grant inception to date). As more inquiries are submitted to Connect Puerto Rico, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumers to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Puerto Rico project launched BroadbandStat on September 17, 2010, and has received a total of 369 visits to date, of which 224 occurred this reporting period.

Speed Test Methodology

The 165 speed tests that are represented in the Connect Puerto Rico Speed Test Report during this reporting period (396 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Puerto Rico speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for municipality-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Puerto Rico project, speed test information is collected throughout the commonwealth. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Puerto Rico with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the Commonwealth of Puerto Rico.

CONNECT PUERTO RICO

Broadband Provider Log

Complete	12
Non-Responsive/Refused	0
In Progress	13
Count of Datasets by Viable Status	**25**
Total Unique Providers Represented	**19**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
Aeronet Wireless Broadband Corp.	Backhaul	Backhaul Provider Only Processing Complete		
Critical Hub Networks	Backhaul	Backhaul Provider Only Processing Complete	9/30/2010	
Neptuno Networks, Inc.	Backhaul	Backhaul Provider Only Processing Complete	4/29/2010	
Claro	ILEC/CLEC	Partial Data Approved	4/23/2010	
Critical Hub Networks	Fixed Wireless	Provider Approval Solicited	9/30/2010	
Puerto Rico Cable Acquisition Company, Inc.	Cable	Provider Approval Solicited	9/27/2010	
Aeronet Wireless Broadband Corp.	Fixed Wireless	Provider Gathering Data		
Claro	Mobile Wireless	Provider Gathering Data	4/23/2010	
Data@ccess Communications	Backhaul	No Update to Provide	9/29/2009	
MCI Communications Services, Inc.	Backhaul	No Update to Provide	12/14/2011	
PREPA Networks Corp	Backhaul	No Update to Provide	4/21/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Sprint Nextel Corporation	Mobile Wireless	No Update to Provide	1/14/2010	
Worldnet Telecommunications inc.	Backhaul	No Update to Provide	4/19/2010	
Liberty Global, Inc.	Cable	No Update Provided - Use Last Submission Data	10/19/2009	
Ayustar Corp	Fixed Wireless	Solicited Initial Data	7/12/2010	
INTECO	Fixed Wireless	Solicited Initial Data		
INTECO	Backhaul	Solicited Initial Data		
Orizon Wireless Corp	Fixed Wireless	Solicited Initial Data	1/28/2011	
Telefonica International Holding, BV	Backhaul	Solicited Initial Data		
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Jess Cary] Satellite data will not be submitted due to additional information being necessary to show where service is available, rather than submitting the entire island boundary as serviceable area.
Onelink Communications	Cable	Other		[FEB-11-11 Chip Spann] Independent of provider participation (or in this case, the lack thereof) the engineering and technical services team has completed the drive testing, validation, data collection of the OneLink system. Data was obtained from the provider's website, collateral material veryfying Max Advertised Speed was obtained at the local office, routes were charted, pictures taken and revisions to coverage polygon created. [MAR-8-2011 Jess Cary] Data will be submitted for April 2011.
T-Mobile USA, Inc.	Backhaul	Other	1/8/2010	[MAR-09-2011 Jess Cary] As of December 31, 2010, T-Mobile offers no backhaul service in Puerto Rico.

Rhode Island
Broadband Mapping Project
April 2011 Data Submission - Summary and Processes

Prepared By:
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BBRI Broadband Rhode Island
An initiative of the RIEDC

RECOVERY.GOV

EA Engineering, Science, and Technology, Inc.

Section A: The Rhode Island Broadband Mapping Team Overview

In support of the national broadband initiatives being undertaken by President Obama and the Federal Government through the American Recovery & Reinvestment Act of 2009 (Recovery Act), Public Law No. 111-5, and the Broadband Data Improvement Act (BDIA), title I of Public Law No. 110-385, 122 Stat. 4096, the Rhode Island Economic Development Corporation (RIEDC), as the entity assigned by Governor Donald Carcieri, has filed to the United States Department of Commerce – National Telecommunications and Information Administration (NTIA) a request for grant funds from the State Broadband Data and Development Grant Program.

Project Description

EA Engineering, Science, and Technology, Inc. (EA), has been selected by RIEDC for the through their Broadband Initiative for Rhode Island (BBRI) to provide a data management and retrieval system for RIEDC. RIEDC and EA entered into a contractual agreement on January 15, 2010 for a base period of 2 (two) years with 3 (three) option years. The work assignment consists of negotiating non disclosure agreements (NDA) with the State's broadband providers, collecting provider broadband data, verifying data submitted, combining and updating data collected, developing and implementing a broadband website with mapping application, and reporting findings to RIEDC and the NTIA.

This program will create a statewide broadband map which will be maintained for five (5) years, that assesses broadband infrastructure in Rhode Island and distinguishes between served, underserved and un-served communities as per the definition specified by NTIA. The data will be made available to the public, with certain restrictions to account for confidentiality of supplier information, through a state website and will also be linked to a Federal Department of Commerce webpage. The goal of this project is to meet the RIEDC's broadband mapping needs and in doing so provide maps and information that will be used to lend guidance and assistance in the planning of future broadband infrastructure development, as well as provide numerous broadband options to the end users.

The BBRI is a comprehensive effort aimed at producing a high level of detailed inventory of broadband services provided to residential, government and business consumers within the State of Rhode Island. The project is not only a Geographical Information Systems (GIS) mission but a project that needs expertise in GIS, contracting and legal issues, Quality Assurance/Quality Control (QAQC), and project management. In order to acquire, collect, process, analyze and display the data that represents these services it was necessary to combine the resources of several professional firms. Each team member provides unique set of strengths and capabilities needed to create the system that is in place. The team is made up of Rhode Island Economic Development Corporation (RIEDC), EA Engineering (EA), University of Rhode Island (URI), Adler Pollock & Sheehan P.C. (AP&S), Eastern Shore Regional GIS Cooperative (ESRGC), and Mapping

& Planning Services (M&PS). The following paragraphs provide information on each team member and their role the project.

The RIEDC is leading the project efforts for the State of Rhode Island (RI). Led by Mr. Stuart Freiman, they oversee all facets of the project and teams involved. The RIEDC coordinates schedules, communicates directly with the National Telecommunications Information Agency (NTIA), reviews and approves all project deliverables, and ensure all project deadlines are met. With their high visibility in the RI business community they are instrumental in arranging meetings between broadband providers and BBRI Team members. The relationship and communication RIEDC has with the State's providers was and continues to be instrumental in making the process of collecting and verifying information from the providers as effortless as possible.

EA is the prime contractor selected to lead the State's data collection, verification, reporting, and mapping efforts. EA has been providing scientific and engineering technical solutions to a wide range of government and industrial clients since 1973. Serving IT and GIS solutions via the web has become a standard business solution for EA's clients. As the prime contractor EA works closely with the RIEDC on all phase of the BBRI project. Included in the work EA has done to date, is the creation of the State's broadband website and mapping application (Digital Atlas). The website provides information on the project, links to related sites, custom mapping capabilities, and user speed test and feedback forms. The site can be viewed at the following address; http://broadband.ri.gov/.

M&PS has been providing GIS consulting services in RI for over 20 years. For the RI Broadband Mapping project, M&PS assisted in the development of a verification and analysis process which is used to perform the QA/QC of the data prior to submitting to the NTIA. Prior to each bi-annual NTIA submittal M&PS uses this process to review and check the data. During this process MP&S checks for positional and attribute accuracy of the data by using a random sampling methodology. The service MP&S provides insures data going to the NTIA is of the highest accuracy and precision. Additional M&PS provides data analysis and static maps displaying the data status at each delivery date.

The GIS laboratory in the URI's Department of Natural Resources is the center of technical expertise in the GIS field for the State of RI. On this project URI manages all GIS data report by EA to the RIEDC. They also serve as an additional tier of QA/QC on the data that is collected and submitted to the NTIA. URI provides technical input to the data processes and the types of maps and data to be displayed on the website. Additionally, several data layers including Community Anchor Institute locations and base map layers being used on the Digital Atlas are provided by URI.

The Eastern Shore Regional GIS Cooperative (ESRGC) is an organization that provides technical support, training, and GIS services to local governments on the Eastern Shore of Maryland. In addition to supporting the BBRI project, ESRGC is leading the broadband mapping efforts for the state of Maryland. For the BBRI project, the ESRGC's provides the project team technical advisor support. They provide guidance on the project's technical approach and peer review support based on knowledge gained from their work in Maryland. ESRGC provided assistance in defining requirements for the QA/QC process, database design, and data verification tasks. The ESRGC provides the Team with a "lessons learned" from the Maryland Broadband project which guided the BBRI Team around common mistakes made on broadband mapping projects.

AP&S is a local RI law firm providing legal advice and representation and has been servicing RI residents and firms for 50 years. The role AP&S plays on this project is providing the necessary legal advice and contracting that is necessary between the RIEDC and the broadband providers. To date, AP&S has brokered the Non-Disclosure Agreements (NDA's) between the RIEDC and 16 broadband providers. These agreements were imperative and had to be in place before any data was submitted by the broadband providers. All provider broadband information that is made public is based on what the NDAs state. AP&S became the State's expert as to what information was legal for the team to make available to the public and modeled the NDAs off of the guidance provided in the NOFA.

Project Contacts

Contact	Project Role	Phone	Email
Rhode Island Economic Development Corp (RIEDC)			
Stuart Freiman	**RIEDC PM**	401-278-9168	sfreiman@riedc.com
Shane White	State GIS Coordinator	401-222-6483	swhite@doa.ri.gov
University of Rhode Island	***URI***		
Greg Bonynge	URI-EDC Director/BBRI Project Liaison	401-874-2180	greg@edc.uri.edu
EA Engineering, Science and Technology (EA)			
Jon Brownstein, Ph.D.	Principal In Charge	410-771-7950	jbrownst@eaest.com
Lou Garcia, PMP	**Project Manager**	410-771-7950	lgarcia@eaest.com
Jason Samus	Senior Technical Review	410-771-7950	jsamus@eaest.com
Brian Lesinski	Senior Technical Advisor	401-736-3440	blesinsk@eaest.com

Joe DeLuca, GISP	Technical Lead	410-771-7950	jdeluca@eaest.com
Chuck Murza	Task Manager	410-771-7950	cmurza@eaest.com
Adler Pollock & Sheehan (APS)			
Alan Shoer, Esq.	Legal Team	401-274-7200	ashoer@apslaw.com
Kristen Sherman, Esq.	Legal Team	401-274-7200	KSherman@apslaw.com
Mapping & Planning Services (M&PS)			
Mary Hutchinson., GISP	Verification Analyst	401-423-3841	mhutch@mappingplanning.com
Eastern Shore Regional GIS Cooperative (ESRGC)			
Michael Scott, Ph.D., GISP	Senior Technical Advisor	410-543-6083	msscott@salisbury.edu

BROADBAND PROVIDER DATA VERIFICATION REPORT
RHODE ISLAND DATA SUBMITTAL #2
MARCH 31, 2011

General Findings:

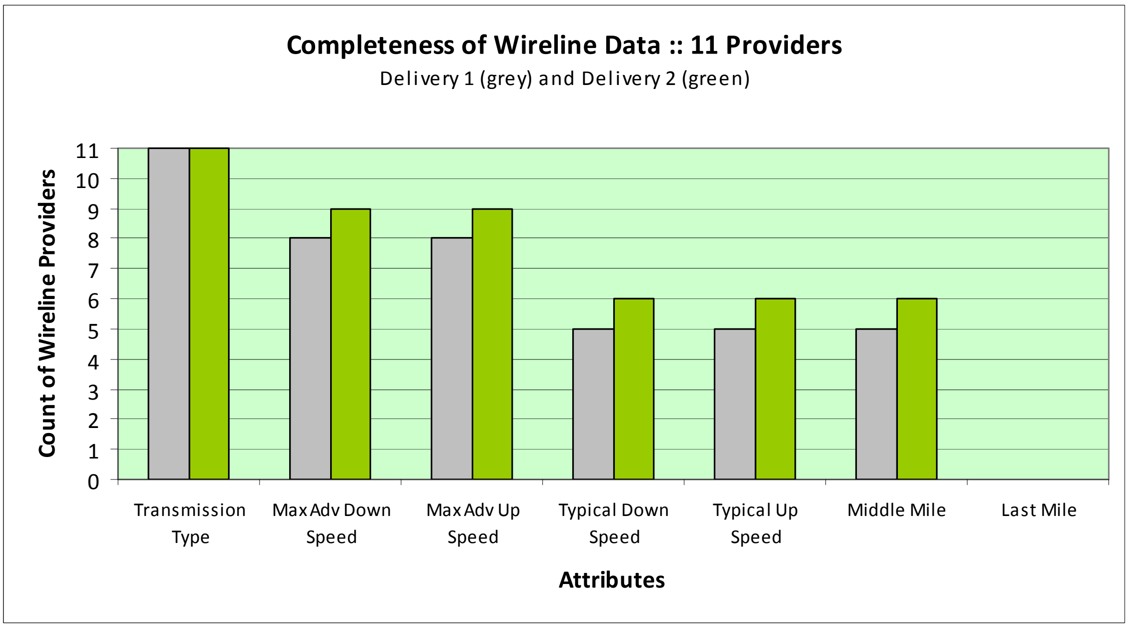
- Rhode Island has extensive broadband coverage from 17 providers using nine different transmission types. There is broadband coverage for the entire state.

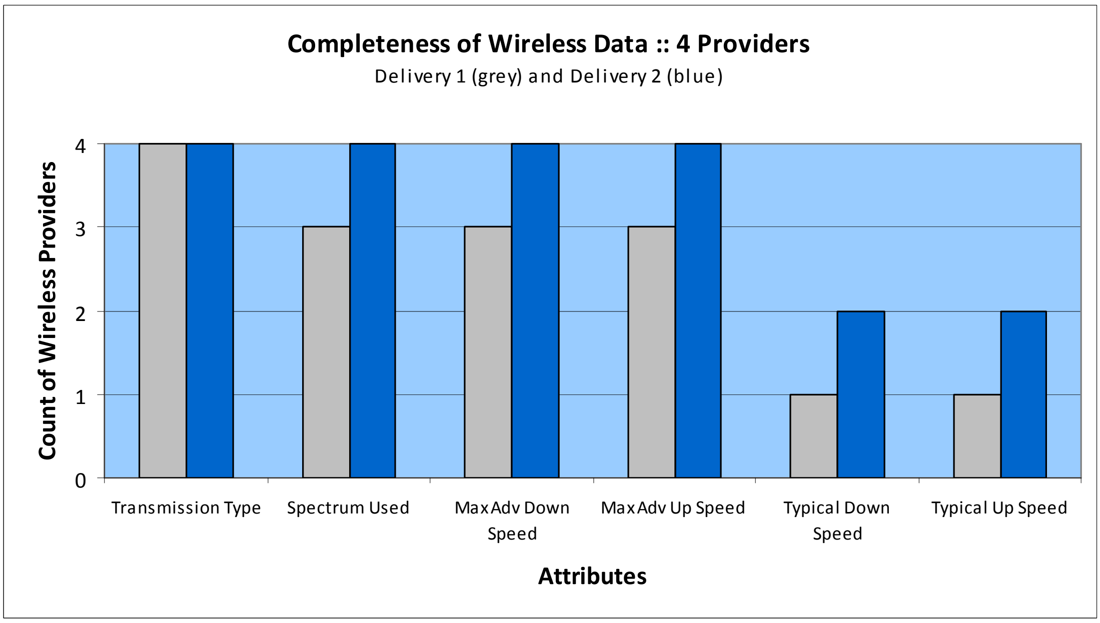
- Broadband availability on a census block basis is summarized in the Figure below:

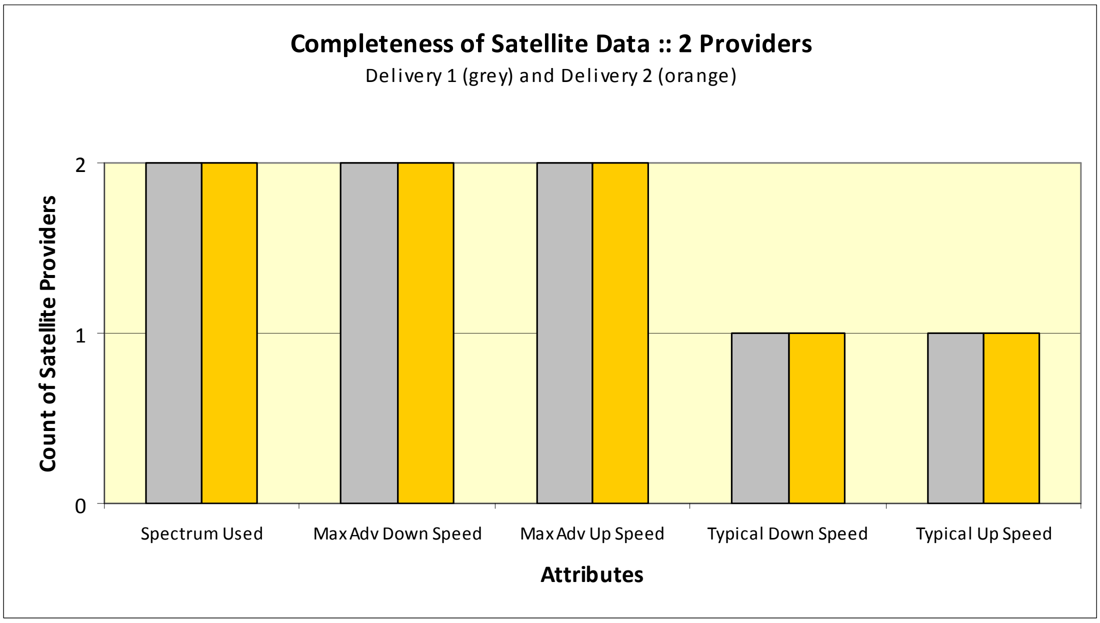
Broadband Availability	Census Blocks	% of Total
Unserved; census block has no access to broadband	6	<1
Underserved: One to Two broadband providers	8	<1
Competitive: Three to Four broadband providers	99	<1
Five to Nine broadband providers	12,786	61
Ten to Twelve broadband providers	8,124	39
Total	**21,023**	**100**

Note: Several of the Provider datasets do not show coverage of some census blocks in Rhode Island coastal waters (for example, the satellite providers). This results in some over-reporting of the availability results at the low end, in particular, the unserved figures. Broadband is defined as being wireline, wireless and satellite service for this table.

- A total of 17 broadband Providers submitted data; 11 wireline and 6 wireless. The completeness of the attributes in the 17 providers' datasets is summarized in the Figures below. (Statistics for NTIA Delivery 1 are included for comparison purposes).







- Middle Mile data was provided by 7 broadband providers. There were a total of 39 facilities (13 owned and 26 leased).
- No Last Mile data was provided by any of the broadband providers.
- A total of 1,115 Community Anchor Institutions are identified. These were verified with available Rhode Island Geographic Information System (RIGIS) datasets and 414 RIEDC and FCC speed tests.

- The RIEDC has collected 2,798 speed tests in 1,158 (5.5%) of the census blocks within the State. These tests are for the period 3/23/10 to 3/14/11. There is a continued growth both in the number and distribution of the RIEDC speed tests.

- A total 1,693 wireline speed tests from FCC are used for the verification. These tests are for the period 3/11/10 to 12/29/10 and cover 871 (4%) of the census blocks within the State. Tests were collected by OOKLA and MLAB.

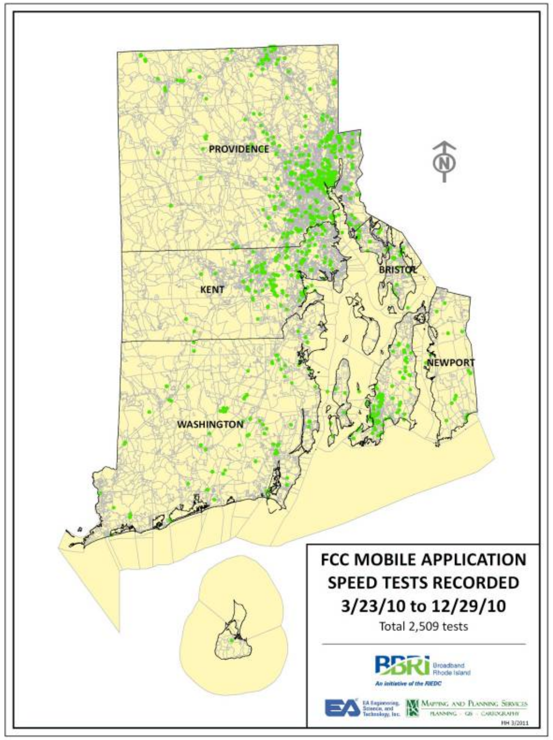
- FCC tests for Mobile Applications (accessing Cellular and WiFi) are also used for the verification. These 2,509 speed tests are recorded for the period 3/11/10 to 12/29/10 and cover 699 (3%) of the census blocks within the State. These tests were all collected by OOKLA.

- The distribution of the three speed tests (RIEDC, FCC and FCC Mobile Applications) are similar and follow population and household patterns across the State. The distribution of the speed tests are shown in the Figures on the following page.

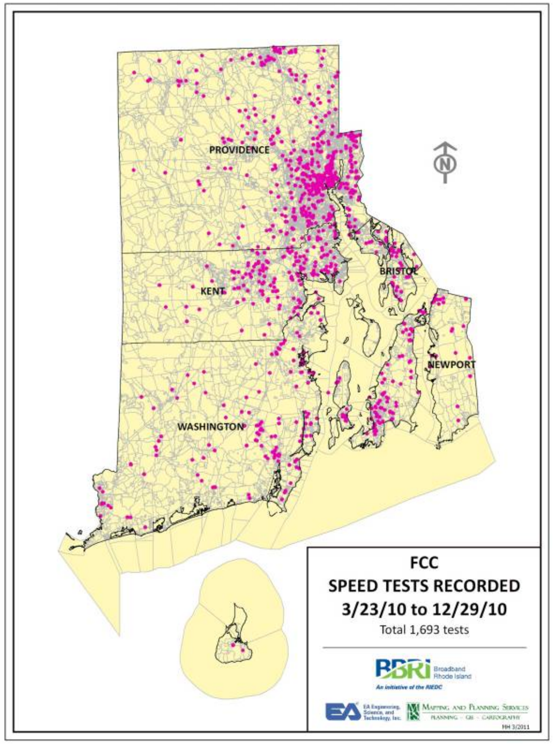
- Road Segment data (for census blocks greater than 2 sq miles) was provided by 1 provider. Service Address data (for census blocks greater than 2 sq miles) was provided by 2 providers. A total of 32 of the 36 census blocks greater than 2 sq. miles thus have road segment and/or service address data.

The Figures below show the distribution of speed tests used for verification purposes.

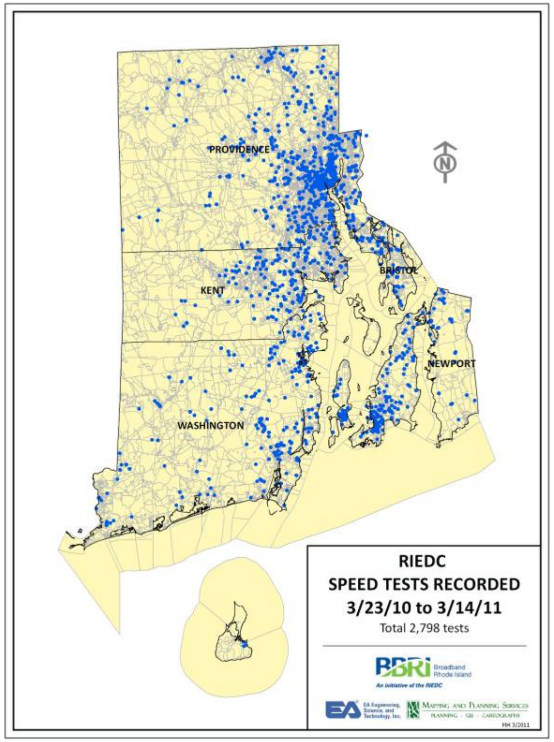
FCC Collected Speed Test - Mobile



FCC Collected Speed Test - Wireline

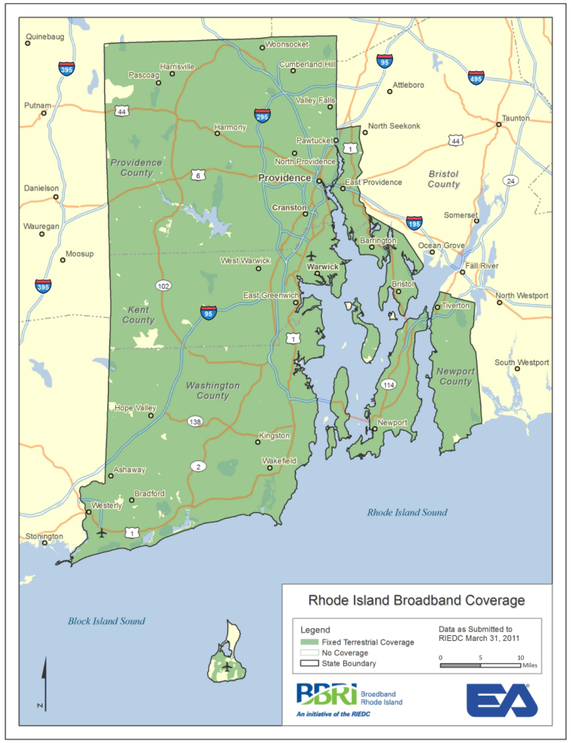


RIEDC Collected Speed Test

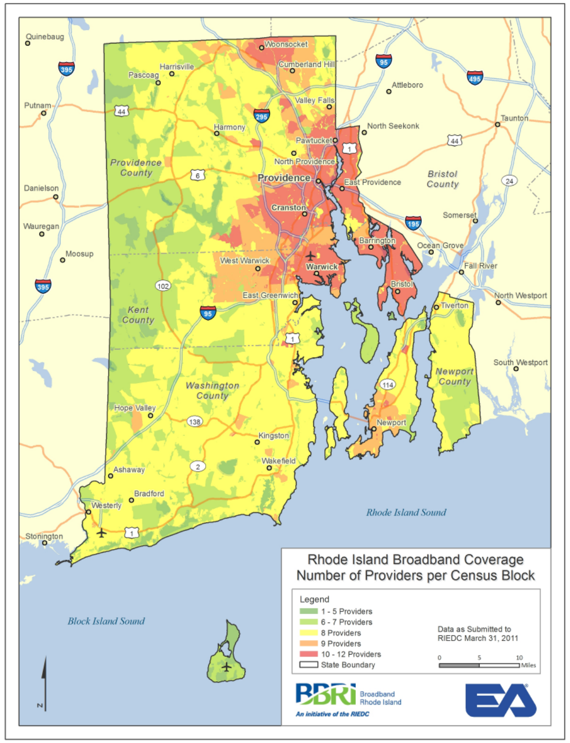


The Figures below display the wireline and wireless coverage areas reported in Rhode Island and the number of providers available per census block.

Rhode Island Broadband Coverage Map

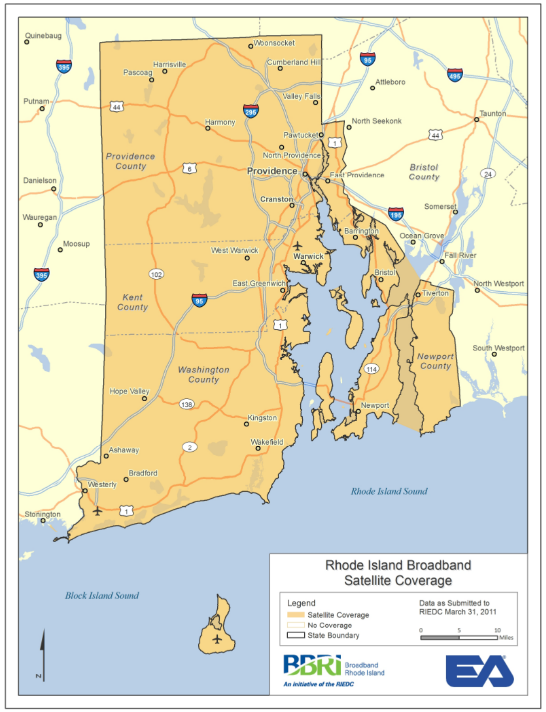


Number of Providers Available Per Census Block

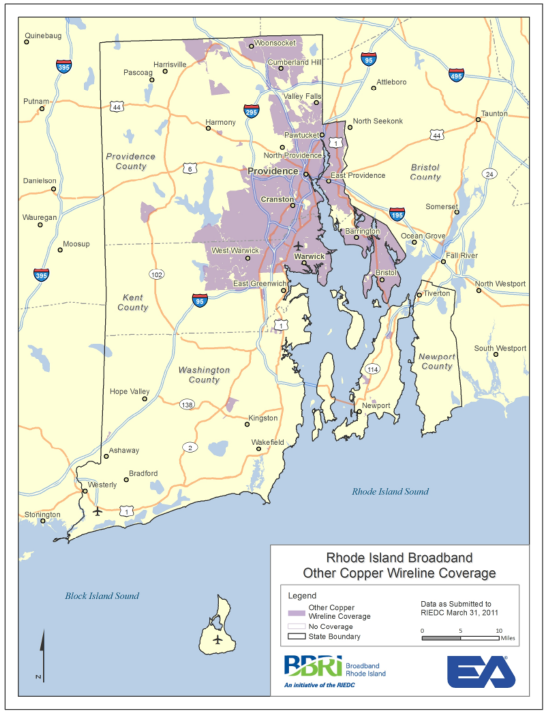


The Figures below display the availability of each technology types offered in Rhode Island.

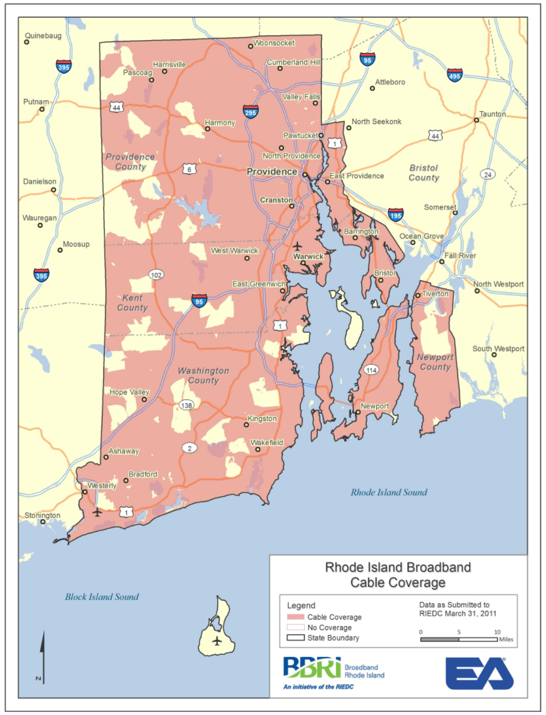
Satellite Coverage



Copper Wireline Coverage

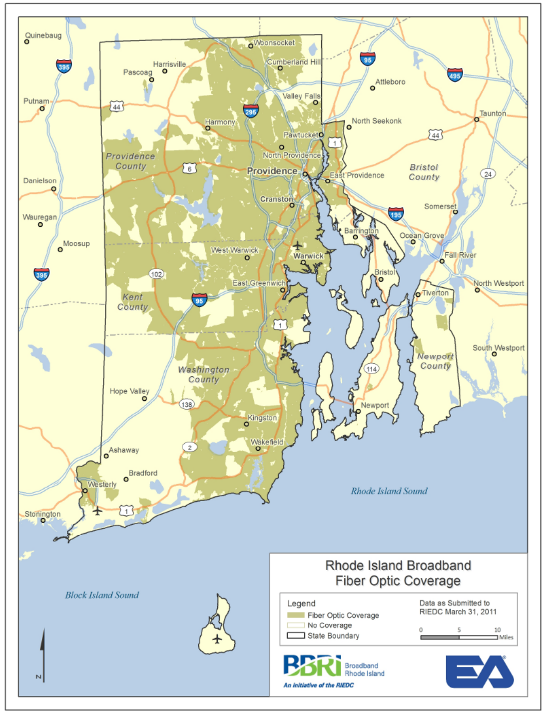


Cable Coverage

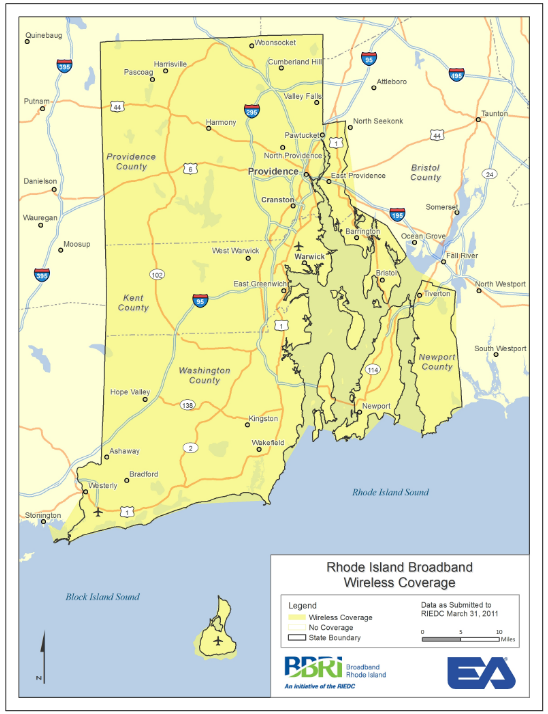


The Figures below display the availability of each technology types offered in Rhode Island.

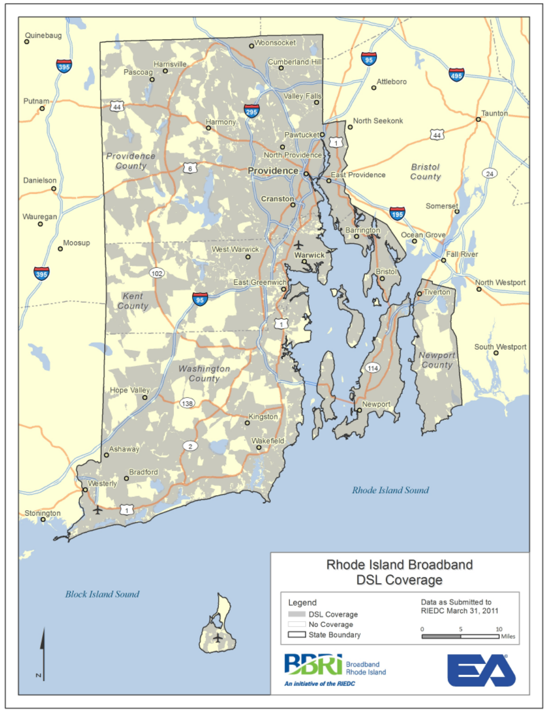
Fiber Optic Coverage



Wireless Coverage



DSL Coverage



Provider Name: AT&T Mobility LLC
DBA: AT&T Mobility LLC

Data Characteristics

FRN:	0004979233
Type of Data Submitted:	Wireless
Census Block Count (unique):	21,008
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
4	3

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types and spectrums reported by provider: 1, with 2 spectrums

Data Verification:

Counties served by provider and number of census blocks with service. A total of 21, 008 census blocks are served.

County	Census Blocks per County
Bristol	949
Kent	3,836
Newport	1,902
Providence	11,246
Washington	3,075

Greatest down/upload speed from Historical [1] speed tests: 9, 8
Greatest down/upload speed from RIEDC [2] speed tests: 7, 5
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [4] Mobile Application speed tests: 7, 3

Count of Historical speed tests: 1,010
Count of RIEDC speed tests: 5
Count of FCC speed tests: 0
Count of FCC Mobile Application speed tests: 26

Speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	15
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	21,008
% of served census blocks confirmed by speed test	<1%

Middle mile facilities outside of reported service area: No middle mile facilities.

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/10
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/10

Provider Name: Broadview Networks, Inc.
DBA: Broadview Networks, Inc.

Data Characteristics

FRN:	0003775285
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	9,015
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	NO
Provided Max Advertised Upload Speed:	NO
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Count	Max Upload Category	Count
10	N/A	8,974	N/A	8,974
20	N/A	3	N/A	3
30	N/A	106	N/A	106

Typical down/upload speeds reported by provider:

Technology	Max Download Category	Count	Max Upload Category	Count
10	4	3	4	3
20	4	1	4	1
30	5	10	5	10

Number of technology transmission types reported by provider: 3

Count of Middle Mile Facilities: 8

Data Verification:

Counties served by provider and number of census blocks with service. A total of 9,015 census blocks are served.

County	Census Block per County
Bristol	4
Kent	1,190
Newport	717
Providence	7,098
Washington	6

Greatest down/upload speed from Historical [1] speed tests: 4, 4
Greatest down/upload speed from RIEDC [2] speed tests: 4, 4
Greatest down/upload speed from FCC [3] speed tests: 4, 4
Greatest down/upload speed from FCC Mobile Application speed tests: No speed tests were taken

Count of Historical speed tests: 64
Count of RIEDC [2] speed tests: 5
Count of FCC [3] speed tests: 2
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

Middle mile facilities outside of reported service area: All are centrally located within the reported census blocks.

%/# of census blocks verified by RIEDC & FCC speed tests:

Confirmation of census block served	7
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	9,015
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/10
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/10

Provider Name: Cellco Partnership
DBA: Verizon Wireless

Data Characteristics

FRN:	0003290673
Type of Data Submitted:	Wireless
Census Block Count:	20,929
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
5	4

Typical down/upload speeds reported by provider: 3, 3

Number of technology of transmission types and spectrums reported by provider: 1, with 3 spectrums

Data Verification:

Counties served by provider and number of census blocks with service. A total of 20,929 census blocks are served.

County	Census Blocks per County
Bristol	948
Kent	3,800
Newport	1,875
Providence	11,241
Washington	3,065

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: 3, 2
Greatest down/upload speed from FCC [3] speed tests: 4,2 and 3, 3
Greatest down/upload speed from FCC Mobile Application [4] speed tests: 7,4 and 6,5

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 6
Count of FCC [3] speed tests: 8
Count of FCC Mobile Applications [4] speed tests: 203

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	25
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	20,929
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/10
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/10

Provider Name: Cogent Communication, Inc.
DBA: Cogent Communication

Data Characteristics

FRN:	0004654042
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	2
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum down/upload speeds reported by provider:

Max Download Category	Count	Max Upload Category	Count
11	2	11	2

Typical down/upload speeds reported by provider: Not Provided

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 2

Data Verification:

Counties served by provider and number of census blocks with service. A total of 2 census blocks are served.

County	Census Blocks per County
Bristol	0
Kent	0
Newport	0
Providence	2
Washington	0

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] Speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: No speed tests were taken

Middle mile facilities outside of reported service area: All are located within the reported census blocks.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	2
% of served census blocks confirmed by speed test	0%

Footnotes:

1. Historical Date Range: 3/23/2009 to 3/22/2010
2. RIEDC Date Range: 3/23/2010 to 3/14/2011
3. FCC Date Range: 3/11/2010 to 12/29/10
4. FCC Mobile Application Date Range: 3/11/2010 to 12/29/10

Provider Name: **CoxCom, Inc.**
DBA: **Cox Communications, Inc.**

Data Characteristics

FRN:	0001524461
Type of Data Submitted:	Census Blocks, Address Points
Census Block Count (unique):	20,229
Service Address Point Count (unique):	3,887)
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	YES

Maximum advertised down/upload speeds reported by provider:

Data Type	Max Download Category	Max Upload Category	Count
Census Blocks	9	5	20,229
Service Address Points	9	5	3,887

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 1

Data Verification:

Counties served by provider and number of census blocks with service (including 31 census blocks with service addresses). A total of 20,229 census blocks are served.

County	Census Blocks per County
Bristol	910
Kent	3,745
Newport	1,739
Providence	10,958
Washington	2,877

Greatest down/upload speed from Historical [1] speed tests: 9, 9 and 10, 6
Greatest down/upload speed from RIEDC [2] speed tests: 11,5 and 9,9
Greatest down/upload speed from FCC [3] speed tests: 9, 5 and 5, 8
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 7, 6

Count of Historical speed tests: 98,305
Count of RIEDC [2] **speed tests**: 1,541
Count of FCC [3] **speed tests:** 784
Count of FCC Mobile Applications [4] **speed tests:** 855

RIEDC and FCC speed tests outside of reported service area: 14 of 3,180 speed tests were recorded outside of the coverage area reported by provider.

Middle mile facilities outside of reported service area: All are located within the reported census blocks.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	1,364
Census blocks served, not reported by provider	12
Total number of served census blocks reported by provider	20,229
% of served census blocks confirmed by speed test	7%

Footnotes:

1. Historical Date Range: 3/23/2009 to 3/22/2010
2. RIEDC Date Range: 3/23/2010 to 3/14/2011
3. FCC Date Range: 3/11/2010 to 12/29/2010
4. FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: DIECA Communications, Inc.
DBA: Covad Communications Company

Data Characteristics

FRN:	0003753753
Type of Data Submitted:	Census Blocks
Census Block Count: (unique)	11,277
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	6	3	3,267
20	5	4	1,578
30	5	5	6,007

Typical down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	6	3	5
20	4	4	1,568
30	5	5	6,003

Number of technology of transmission types reported by provider: 3

Count of Middle Mile Facilities: 1

Data Verification:

Counties served by provider and number of census blocks with service. A total of 11,277 census blocks are served.

County	Census Blocks per County
Bristol	745
Kent	2,767
Newport	1
Providence	7,764
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 9, 3
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 57
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: No speed tests were taken

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	11,277
% of served census blocks confirmed by speed test	0%

Footnotes:
1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Fiber Technologies Networks, LLC.
DBA: FiberTech

Data Characteristics

FRN:	0006797849
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	3
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
7	7	2

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 0

Data Verification:

Counties served by provider and number of census blocks with service. A total of 3 census blocks are served.

County	Census Block s per County
Bristol	0
Kent	1
Newport	0
Providence	2
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 7, 5
Greatest down/upload speed from RIEDC [2] speed tests: 7,4
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 3
Count of RIEDC [2] speed tests: 1
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	1
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	3
% of served census blocks confirmed by speed test	30%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Full Channel TV, Inc.
DBA: Full Channel

Data Characteristics

FRN:	0004973731
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	943
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
6	4	943

Typical down/upload speeds reported by provider: 6, 4

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 1

Data Verification:

Counties served by provider and number of census blocks with service. A total of 943 census blocks are served.

County	Census Blocks per County
Bristol	943
Kent	0
Newport	0
Providence	0
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 10, 3 and 9, 9
Greatest down/upload speed from RIEDC 2010 [2] speed tests: 6, 4
Greatest down/upload speed from FCC 2010 [3] speed tests: 6, 4
Greatest down/upload speed from FCC 2010 [4] Mobile Applications speed tests: 5, 4

Count of Historical speed tests: 1,819
Count of RIEDC [2] speed tests: 7
Count of FCC [3] speed tests: 9
Count of FCC Mobile Applications [4] speed tests: 9

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	15
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	943
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Hughes Network Systems, LLC
DBA: Hughes

Data Characteristics

FRN:	0009559881
Type of Data Submitted:	Satellite
Census Block Count (unique):	20,983
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
5	2

Typical down/upload speeds reported by provider: 5, 1

Number of technology of transmission types reported by provider: 1

Data Verification:

Counties served by provider and number of census blocks with service. A total of 0,983census blocks are served.

County	Census Blocks per County
Bristol	945
Kent	3,834
Newport	1,890
Providence	11,243
Washington	3,071

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Application [4] speed tests: 3, 2

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 2

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	2
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	23,198
% of served census blocks confirmed by speed test	<1%

Footnotes:

5 Historical Date Range: 3/23/2009 to 3/22/2010
6 RIEDC Date Range: 3/23/2010 to 3/14/2011
7 FCC Date Range: 3/11/2010 to 12/29/2010
8 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Level 3 Communications, LLC
DBA: Broadwing

Data Characteristics

FRN:	0003723822
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	2
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Count	Max Upload Category	Count
11	3	11	3

Typical down/upload speeds reported by provider: 11, 11

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 8

Data Verification:

Counties served by provider and number of census blocks with service. A total of 2 census blocks are served.

County	Census Block s per County
Bristol	0
Kent	0
Newport	0
Providence	2
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 4, 4
Greatest down/upload speed from RIEDC [2] speed tests: 4, 4
Greatest down/upload speed from FCC [3] speed tests: 7,5
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 30
Count of RIEDC [2] speed tests: 4
Count of FCC [3] speed tests: 1
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area:
5 of 5 speed tests were recorded outside the coverage area reported by provider

Middle mile facilities outside of reported service area: None of the 8 facilities reported are located within the reported service areas. The closest is within 995 ft, the furthest is 30 miles.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	0
Census blocks served, not reported by provider	4
Total number of served census blocks reported by provider	3
% of served census blocks confirmed by speed test	0%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile App Date Range: 3/11/2010 to 12/29/2010

Provider Name: Light Tower Fiber, LLC
DBA: Light Tower Fiber Networks

Data Characteristics

FRN:	00017625567
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	74
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
11	11	74

Typical down/upload speeds reported by provider: 11, 11

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: **0**

Data Verification:

Counties served by provider and number of census blocks with service. A total of 74 census blocks are served.

County	Census Blocks per County
Bristol	0
Kent	3
Newport	0
Providence	71
Washington	0

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: No speed tests were taken

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	74
% of served census blocks confirmed by speed test	0%

Footnotes:
1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile App Date Range: 3/11/2010 to 12/29/2010

Provider Name: **MegaPath, Inc.**
DBA: **MegaPath**

Note: **Information in this report includes numbers reported by MegaPath (FRN# 0018105601), DSL.net (FRN# 0015321136), and DSLnet Communications (FRN# 0004324851) as they are all owned by MegaPath, Inc.**

Data Characteristics

FRN:	0018105601
Type of Data Submitted:	Census Blocks
Census Block Count:	20
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	4	3	1
20	4	4	4
30	4	4	2
40	5	2	3

Typical down/upload speeds reported by provider: Typical speeds were not reported by MegaPath

Number of technology of transmission types reported by provider: 4

Count of Middle Mile Facilities: **0**

Data Verification:

Counties served by provider and number of census blocks with service. A total of 20 census blocks are served:

County	Census Block per County
Bristol	0
Kent	1
Newport	3
Providence	16
Washington	0

Greatest down/upload speed from Historical [1] speed test: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed test: No speed tests were taken
Greatest down/upload speed from FCC [3] speed test: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed test: 4,4

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed test: 8

RIEDC and FCC speed tests outside of reported service area: 8 of 8 speed tests were reported outside the coverage area reported by provider.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	6
Total number of served census blocks reported by provider	20
% of served census blocks confirmed by speed test	0%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: One Communications Corp.
DBA: One Communications

Data Characteristics

FRN:	0015337702
Type of Data Submitted:	Census Blocks, Address Points
Census Block Count (unique):	515
Service Address Points (unique):	941
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census blocks greater than 2 sq miles:	YES

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
0	5	4	1
0	4	6	2
10	8	8	1
20	8	3	2
20	3	8	1

Typical down/upload speeds reported by provider: Not provided for any of the transmission types

Number of technology of transmission types reported by provider: 3

Total count of Middle Mile facilities: 17

Data Verification:

Counties served by provider and number of census blocks with service. A total of 515 census blocks are served.

County	Census Block per County
Bristol	16
Kent	41
Newport	30
Providence	397
Washington	31

Greatest down/upload speed from Historical [1] speed tests: 5, 5
Greatest down/upload speed from RIEDC [2] speed tests: 8, 8
Greatest down/upload speed from FCC [3] speed tests: 3, 2
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 3, 2

Count of Historical speed tests: 889
Count of RIEDC [2] speed tests: 38
Count of FCC [3] speed tests: 3
Count of FCC Mobile Application [4] speed tests: 3

Speed tests outside of reported service area: 4 of 44 speed tests were reported outside the coverage area reported by the provider.

Middle mile facilities outside of reported service area: All facilities are in the general area of served areas.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	24
Census blocks served, not reported by provider	4
Total number of served census blocks reported by provider	515
% of served census blocks confirmed by speed test	<1%

Footnotes:
1. Historical Date Range: 3/23/2009 to 3/22/2010
2. RIEDC Date Range: 3/23/2010 to 3/14/2011
3. FCC Date Range: 3/11/2010 to 12/29/2010
4. FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Sprint Nextel Corporation
DBA: Sprint

Data Characteristics

FRN:	0003774593
Type of Data Submitted:	Wireless
Census Block Count (unique):	20,115
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
3	2

Typical down/upload speeds reported by provider: 5, 3

Number of technology of transmission types reported by provider: 1, with 2 spectrums

Data Verification:

Counties served by provider and number of census blocks with service. A total of 20,115 census blocks are served.

County	Census Blocks per County
Bristol	949
Kent	3,695
Newport	1,792
Providence	10,915
Washington	2,764

Greatest down/upload speed from Historical [1] speed tests: 6, 3
Greatest down/upload speed from RIEDC [2] speed tests: 5, 3
Greatest down/upload speed from FCC [3] speed tests: 7, 6
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 5, 3

Count of Historical speed tests: 10
Count of RIEDC [2] speed tests: 19
Count of FCC [3] speed tests: 5
Count of FCC Mobile Applications [4] speed tests: 146

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	44
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	20,115
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: T-Mobile USA, Inc.
DBA: T-Mobile

Data Characteristics

FRN:	0006945950
Type of Data Submitted:	Wireless
Census Block Count (unique):	19,679
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category
80	6	4

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1, with 1 spectrum

Total count of Middle Mile facilities: 2

Data Verification:

Counties served by provider and number of census blocks with service. A total of 19,679 census blocks are served.

County	Census Blocks per County
Bristol	943
Kent	3,630
Newport	1,800
Providence	10749
Washington	2,557

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 4, 3

Count of Historical speed tests: 0
Count of RIEDC 2010 [2] speed tests: 0
Count of FCC 2010 [3] speed tests: 0
Count of FCC 2010 Mobile Applications [4] speed tests: 25

RIEDC and FCC speed tests outside of reported service area: 0.

Middle mile facilities outside of reported service area: The two facilities are within the reported service area, though are located within 280 ft of each other.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	17
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	19,679
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Verizon New England Inc.
DBA: Verizon

Data Characteristics

FRN:	0003628971
Type of Data Submitted:	Census Blocks, Road Segments
Census Block Count (unique):	17,846
Road Segment Count (unique):	906
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	NO
Provided Max Advertised Upload Speed:	NO
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	YES
Provided Address Points for census blocks greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	NULL	NULL	14,809
50	NULL	NULL	13,609

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 2

Count of middle mile facilities: 0

Data Verification:

Counties served by provider and number of census blocks with service (inc. 32 census blocks for road segment service data). A total of 17,846 census blocks are served.

County	Census Blocks per County
Bristol	826
Kent	3,368
Newport	1,460
Providence	9,877
Washington	2,315

Greatest down/upload speed from Historical [1] speed tests: 10, 7 and 9, 8
Greatest down/upload speed from RIEDC 2010 [2] speed tests: 9, 6 and 8, 8
Greatest down/upload speed from FCC 2010 [3] speed tests: 9, 4
Greatest down/upload speed from FCC 2010 [4] Mobile Application speed tests: 7, 7

Count of Historical speed tests: 44,322
Count of RIEDC [2] speed tests: 730
Count of FCC [3] speed tests: 327
Count of FCC Mobile Application [4] speed tests: 578

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	635
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	17,846
% of served census blocks confirmed by speed test	4%

Footnotes:
1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 3/14/2011
3 FCC Date Range: 3/11/2010 to 12/29/2010
4 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Provider Name: Wild Blue Communications, Inc.
DBA: Wild Blue Communications, Inc.

Data Characteristics

FRN:	0007843766
Type of Data Submitted:	Satellite
Census Block Count (unique):	20,992
Provided Technology of Transmission:	YES
Provided Spectrum Used:	**YES**
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
4	2

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1, and 1 spectrum

Data Verification:

Counties served by provider and number of census blocks with service. A total of 20,992 census blocks are served.

County	Census Blocks per County
Bristol	948
Kent	3,834
Newport	1,898
Providence	11,237
Washington	3,075

Greatest down/upload speed from Historical [1] speed tests: 4, 1
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Application [4] speed tests: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	20,992
% of served census blocks confirmed by speed test	0%

Footnotes:

5 Historical Date Range: 3/23/2009 to 3/22/2010
6 RIEDC Date Range: 3/23/2010 to 3/14/2011
7 FCC Date Range: 3/11/2010 to 12/29/2010
8 FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Community Anchor Institutions: All categories

Data Characteristics

Type of Data Submitted:	Point
Feature Count:	1,115
Provided Technology of Transmission:	YES, INCOMPLETE (640 of 1,115)
Provided Advertised Downstream Speed:	YES, INCOMPLETE (643 of 1,115)
Provided Advertised Upstream Speed:	YES, INCOMPLETE (1,085of 1,115)
Provided Street Address:	YES, COMPLETE
Provide Public Wifi:	YES, COMPLETE
Provided URL:	NO
Provided CAIID:	YES, INCOMPLETE (759 of 1,115)

Count of Community Anchor Institutions by category:

CAI Category	Count of Features
1 – School K through Grade 12	654
2 - Library	92
3 – Medical/healthcare	55
4 – Public safety	242
5 – Univ., college, other post-secondary	24
6 – Other govt support - govt	44
7 – Other govt support - nongovt	4

Maximum advertised down/upstream speeds reported by institutions:

CAI Category	Max Downstream Category	Count	Max Upstream Category	Count
1	11	1	6	1
2	9	1	9	1
3	10	4	10	4
4	11	1	11	1
5	10	1	10	1
6	7	5	4	5
7	5	1	<Null>	1

Number of technology of transmission types reported by provider: 8

Data Verification:
Greatest down/upload speed from Historical speed test: 10, 10
Greatest down/upload speed from RIEDC [1] speed test: 5, 5
Greatest down/upload speed from FCC [2] speed test: 8, 8
Greatest down/upload speed from FCC Mobile Applications [3] speed tests: 7, 5

Count of RIEDC speed tests: 294
Count of FCC speed tests: 51
Count of FCC Mobile Applications speed tests: 69

Footnotes:

1. RIEDC Date Range: 3/23/2010 to 3/14/2011
2. FCC Date Range: 3/11/2010 to 12/29/2010
3. FCC Mobile Application Date Range: 3/11/2010 to 12/29/2010

Section C: Data Processes and Submission Overview

Submission Summary

The Broadband Rhode Island Mapping Team (BBRI) Team, led by EA Engineering, Science & Technology, Inc. (EA) in its role as primary technical lead for the Rhode Island Broadband Mapping project, contacted 39 facilities-based broadband service providers (BSPs) and received data from 17 providers. An overall summary of the data submission is described below:

39 potential facilities-based broadband service providers were contacted
13 BSPs did not respond
5 BSPs responded but did not provide data
17 BSPs responded and provided data

Of those that provided data:

13 provided only census block information
2 provided census blocks and addresses
1 provided census blocks and road segments
6 provided wireless coverage areas

In addition, 7 of the 17 responsive BSPs provided middle mile infrastructure points

Rhode Island Broadband Mapping Data Processes

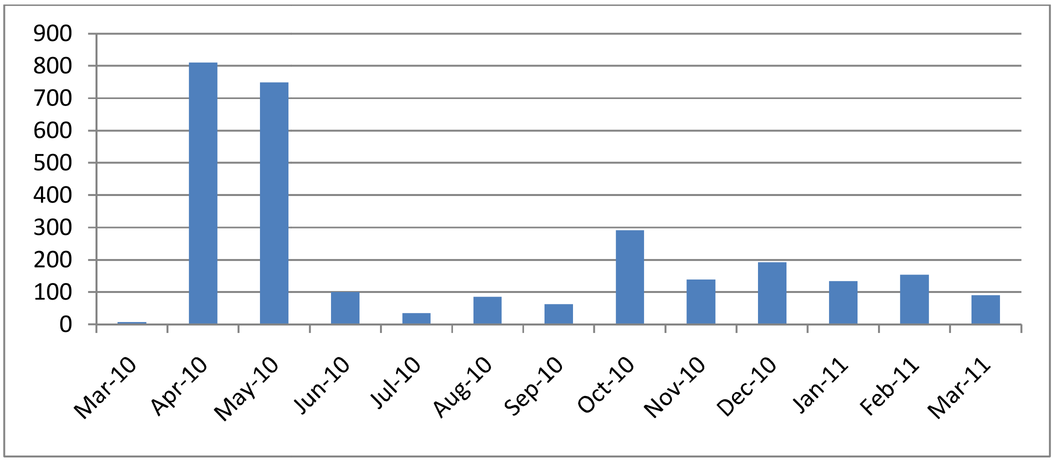
Data Received From Providers – The process begins by receiving data from each provider that offers service in the State of Rhode Island (RI). Broadband data is currently received from 17 broadband service providers within the State who have signed Non-Disclosure Agreements with RIEDC. Once all of the available data is received from a provider it is reviewed and archived in its native format. While the same data is requested from each provider the information often comes in different formats and with missing attribute data. If attributes are missing from the data set the provider is contacted to see if the missing information is available.

Data Evaluated & Processed – The EA project team first gives the data spatial attributes through geocoding to the RI E911 data or by joining the data to the 2000 census block data. (2010 census block data will be used starting with the fall 2011 data submittal). The attribute data is then formatted so that the database can easily be entered in the RI Broadband geodatabase. Speeds reported below broadband levels are removed from the data set and archived. Data that is located in census blocks great than 2 square miles is loaded into either the address or street segment feature classes. All remaining data is loaded into the census block feature class. The data is loaded using ESRI tools and software. The data analysis geodatabase stores the most recent broadband information. Data is extracted from the geodatabase and formated as needed to be used for the State's web map and for biannual NTIA submittals. Data is pulled from the analysis database, formatted to meet the web and NTIA formatting requirements, and loaded into either the NTIA transfer database or the web mapping database using automated FME tools.

- Community Anchor Institute (CAI) Data: The initial list of CAIs were received from URI and populated into the BBRI database. This data was then compared to and updated using 3rd party datasets in order to create the most comprehensive CAI list available for RI. In order to collect the broadband data for the CAIs, the BBRI Team utilized a top down approach. The agencies that oversaw a large number of CAIs such as RINET and OSHEAN were contacted regarding the data collection. CAIs that still had missing attribute data after contacting these agencies were contact directly via phone and email. Once contacted, the CAIs were directed to an online survey. The online survey walked the user through a short questionnaire that collected the required CAI broadband data. At the end of the survey the user was directed to take a speed test in order to help with the data collection and verification process.

Data Verification – Once the data is loaded into the geodatabase the verification process can begin. This process is comprised of several steps to ensure that the actual facilities and services provided to the public match the provider’s data being reported.

- Compared to Available Datasets -
    - Speed test – Using Ookla’s speed test application, EA has been collecting speed test data for the state of RI since March 2010. A breakdown of speed test collected by EA broken out by month can be found in the table below. EA uses both the FCC speed test collected for RI and the speed test collected on the RI broadband website to get a better view of the actual speeds and coverage area providers are offering the public. The speed tests are geocoded and mapped by provider. (FCC speed test providers are identified by the speed test’s IP address) Each provider’s speed test data is compared to their stated coverage area. Discrepancies are noted and reported back to the provider. The provider either gives a reason for the discrepancy or instructs us to modify their coverage area to match the speed test data.



- User feedback - user feedback information is captured by both the FCC and RI's broadband mapping website. This information is reviewed on a case by case basis. Changes are made as needed to the data and reported to the provider, similar to the speed test data update process.

- Best practices for final data quality checks include the review and comparison to 3rd party datasets (such as the FCC's 477 data) with the information received from the providers. The FCC's data is used to check for previously unknown providers, perform spatial analysis and comparisons on the data, and to give a better understanding of our confidence in the data. Since FCC data is broken out by census tract the provider's data must be converted to the tract level in order to perform a full data comparison.

- Spatial Analysis of Coverage Area– Spatial Analysis is performed on each provider's data set. The analysis checks for small areas in populated sections of the state that are surrounded by coverage areas but do not show coverage. These "donut holes" in the data are reviewed and reported to the provider if we feel they have a high probability of actually being covered by the providers' broadband services.

- 3rd Party Verification – A 3rd party Mapping & Planning Services (M&PS) is used to do an independent review and provide a report on the status of each provider's data. These reports summarize the data collected and provide a second review of the verification steps listed above.

Data Analysis – In addition to the data verification steps, a complete summary of each provider's data and static broadband coverage maps are created for RIEDC. These maps are used to analyze existing data availability and plan for future broadband development and outreach projects.

Future Verification Processes To Be Implemented – The following verification processes were utilized for our Spring 2011 submission:

- Street Survey - As part of the expanding need to verify broadband coverage within RI, a street survey pilot project will be performed within a limited set of selected towns. The physical survey will verify the validity of broadband physical facilities coverage presence within these towns. EA will perform the survey via field discernment and location collection utilizing GPS equipment and industry knowledge. Only above ground facilities within rights of way will be captured. Buried facility data will only be collected if a provider and location can be determined without any digging or use of specialized underground location equipment. This pilot project will be completed in the spring of 2011. The additional services (deliverables) to be added for Wireline Coverage Verification Survey are as follows:

  a) A dataset delivered consisting of actual location (X-Y coordinates) of physical plant, i.e. poles, nodes, hubs, etc. and carrier presence by service type (DSL, Coaxial Cable, Fiber, etc.)
  b) Data analysis to consist of test procured data results vs. provider data submitted displayed in comparative reports, maps, and a new data layer within RI geodatabase.

Geodatabase Checks– Once the data is processed and verified the database is checked prior to submittal to the NTIA. This process is comprised of several steps to ensure that the information in the geodatabase is as accurate and complete and possible.

- Visual Checks - These visual checks inspect the data to ensure completeness, accuracy, and engineering logic. The visual inspection process employs random sampling techniques to validate feature placement and attribution. The random sampling is performed in accordance with ANSI standards for attribute inspection.

- Automated Checks – These checks are performed on 100% of the data. ESRI's Production Line Tool Set (PLTS) and the NTIA's QC toolbox are utilized for the automated check of the data. PLTS check for both schema and logical errors in the data. The following checks are performed on the data.

  - Geodatabase Format. Verify that the geodatabase name and feature classes are correct per the corresponding RIEDC data model and NOFA requirements.
  - Coordinate System Errors. Check for proper projection definition.
  - Validity Checks. Verify the attribution fields in the tables and field values fall within the domain specified in the geodatabase.
  - Duplicate Item Values. Verify the uniqueness of attribute values within a user-specified item (such as Feature IDs).

- Invalid Item Values. Check for invalid codes using discrete values and ranges defined in the appropriate domain tables.
- Spatial Logic Checks. Checks the geodatabase to validate minimum size polygons, minimum length lines, and dangles in line feature classes.

- If the geodatabase has passed all tests listed above, and has met the acceptance criteria, the dataset is considered passed and can be processed for delivery to RIEDC and the NTIA. If the geodatabase fails any test and does not meet acceptance criteria, the data is considered failed and will be returned with error reports to the data processing team for correction. Additional follow-up with the providers may be necessary to correct the issue(s). Once edits are completed or exceptions are documented, the geodatabase will be returned to the QC team for an additional sequence of all QC procedures. This process will be repeated until all tests have received a pass status or exceptions have been documented.

Section D: Rhode Island's Current Broadband Mapping Issues

This section lists the issues the BBRI Team has encountered and is currently developing mitigation efforts against. These issues are being reviewed by the BBRI Team in conjunction with other States and the NTIA. Recommended solutions to each issue have been or will be presented to the NTIA when they are available.

1. No last mile information was provided by any providers or resellers for the state of RI. The NTIA has recently stated that a provider is defined as a company that provides broadband service and owns the last mile of infrastructure from which it is provided. All other providers that own middle mile, but not last mile infrastructure, are actually resellers of broadband. Since the state of RI has received no last mile information should all broadband providers in RI be labeled as resellers or unknown?

2. Currently the NTIA requires data at the address or street segment level for census blocks that are greater than 2 square miles in diameter. This is a model that was developed to work for all states. However, in the north east region and RI in particular, the BBRI Team feels that the size standard for reporting at the address and street segment level should be smaller due to the higher density levels of population. The BBRI Team is currently looking into a size standard that would better fit RI.

3. Wireline location data was provided by one or more providers for the state of RI. The current data transfer model only allows for middle mile data to be transferred as point geometry. Therefore, we have no way to transfer this data to the NTIA in the current data transfer model. Similarly, broadband data was provided at the county and metropolitan statistical area levels but did not include providers pricing information. Per the NTIA's instructions, if no pricing information is included then these datasets should not be included in the Service Overview feature class. Therefore the current transfer model has no method of storing or transferring this information. Should the NTIA want this information, the BBRI Team can transfer it in ESRI shapefile format or by adding new feature classes to the transfer model.

4. One or more providers have submitted coverage areas that were not consistent with previous submittals. The BBRI Team was able to identify the error through our existing QA/QC processes and we reported it back to the providers. After reviewing the BBRI Team's comments the providers determined their errors and were able to submit updated and accurate coverage information.

5. The NTIA's National Broadband Map analyzes data based on population information while the RI Broadband Map analyzes data based on geography. When the results of both analysis processes are compared at the county or state level, differences in coverage become apparent. This issue has been identified by providers and the public.

The BBRI Team is looking into ways of standardizing the two processes in order to create more consistency.

6. Speed tests are currently being extensively utilized by the BBRI team. The tests are very good at showing that coverage is available in a given area, but the actual speeds reported vary widely from one test to the next. The speeds are inconsistent even if they are taken at the same location within minutes of one another. Therefore the speed results taken from this test cannot be used to verify or populate provider's typical speeds. Additionally speed test information has not been provided by the NTIA or FCC since January 7, 2011.

7. The NTIA continues to require data to be submitted in 2000 census block format. This data is now over 10 years old and doesn't accurately display the current conditions that exist in RI. The BBRI Team is recommending that the NTIA switch to 2010 census data.

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF SOUTH CAROLINA

CONNECT south carolina®

April 1, 2011

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SOUTH CAROLINA COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connect South Carolina offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect South Carolina has played in creating such a powerful tool that will surely benefit not just South Carolinians, but consumers and businesses nationwide.

Therefore, Connected Nation as the State Broadband Designated Entity, in cooperation with South Carolina's broadband provider community and state based partners, is pleased to present this submittal of the state of South Carolina's State Broadband Data and Development (SBDD) Grant Program, known as Connect South Carolina.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect South Carolina: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect South Carolina program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect South Carolina program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of 84% of the South Carolina provider community, or 42 of 50 total providers. Of the 42 participating providers, 21 supplied an update to their network or coverage area(s), while 18 have reported no change. The remaining 3 represent providers who previously supplied data but were non-responsive in the April

2011 update effort or could not verify coverage areas at the time of this submission; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 8 providers that are not represented in the attached datasets, 4 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connect South Carolina. The remaining 4 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect South Carolina principals that all commercially reasonable efforts were made to account for 100% of the known South Carolina broadband provider community, pursuant to this semi-annual data update submission.

Connect South Carolina has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect South Carolina conducts field validation efforts. To date, 20 (40%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect South Carolina launched a website to create awareness about the initiative. Connectsc.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect South Carolina website encountered 3,436 unique visits during this reporting period (6,325 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 36 broadband inquiries over this same reporting period (72 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect South Carolina website and the Connect South Carolina Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect South Carolina mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect South Carolina has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the state of South Carolina, outreach was conducted during this data update reporting period by Connect South Carolina to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect South Carolina website. Connect South Carolina continues to work diligently in the state to identify statewide entities such as the South Carolina Association of Counties, the State Library of South Carolina, and the South Carolina Department of State Information Technology to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect South Carolina will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in South Carolina, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect South Carolina efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of South Carolina, Connected Nation has previously engaged all federally recognized tribal lands in the area covered by the Connect South Carolina SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period Connect South Carolina plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connect South Carolina understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connect South Carolina program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of South Carolina, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: SOUTH CAROLINA COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect South Carolina, working in close coordination with the state of South Carolina, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect South Carolina has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect South Carolina has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect South Carolina through ESRI ArcGIS software.

Connect South Carolina continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect South Carolina website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect South Carolina will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectsc.org/mapping_&_research/Community_Anchor_Institution_Data_Collection.php
Password: CAI_SC_3266

Connect South Carolina has worked diligently during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. The South Carolina Division of State Information Technology operates a statewide broadband network for CAI throughout the state serving schools, hospitals, and libraries. Relevant data from this network is currently being extracted from the state database and Connect South Carolina will be reporting this data in the next reporting submission. Additionally, we are investigating potential sources for public safety sector data in the state and identifying how we can secure this data for the next reporting submission.

In tandem with these efforts to identify existing data, Connect South Carolina continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. The process to form partnerships with these key contacts has been slow to develop in South Carolina, but ongoing efforts are being made to introduce the CAI project to these contacts and ask for their assistance. Connect South Carolina expects to see a large increase in survey results in the coming months leading up to the next reporting period across all CAI categories.

Connect South Carolina has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect South

Carolina is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in South Carolina, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect South Carolina will continue its ongoing work with the state of South Carolina and key organizations such as the South Carolina Division of State Information Technology in an effort to raise awareness of this project among CAI.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	1,537	1,537	1,537	5	5	5
Libraries	191	191	191	15	15	16
Healthcare	115	115	115	0	0	0
Public Safety	446	446	446	7	7	6
Higher Ed Institutions	71	71	71	9	9	9
Other Government	50	50	50	43	39	39
Other Non-Government	1	1	1	1	1	1
Total	**2,411**	**2,411**	**2,411**	**80**	**76**	**76**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of South Carolina.

Inventory of Deliverables, Connect South Carolina: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of South Carolina have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within Census Blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

South Carolina Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in South Carolina on the following providers: Almega Cable, AT&T, Atlantic Broadband, Chester Telephone Company, Clearwire Corporation, Comporium Communications, Electronics Service Company of Hamlet LLC, Fairfield Communications, Farmers Telephone Cooperative Inc., FTC Communications, Home Telephone Company Inc., NTInet Inc., PBT Communications, Pee Dee Net, Pee Dee Online, Sprint, Time Warner Cable Inc., T-Mobile, tw telecom, and Verizon South Inc.

During this reporting period, Connected Nation conducted 14 additional on-site validation tests with AT&T, Clearwire, Sprint, T-Mobile, and Verizon.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 20 companies (out of a universe of 50 viable providers) totaling 40% within the state of South Carolina.

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 4.23% of South Carolina households do not have terrestrial fixed broadband service available, and approximately 0.35%[1] of South Carolina households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 5.8% of rural South Carolina households do not have terrestrial fixed broadband service available, and approximately 0.49%[3] of rural South Carolina households have neither mobile nor fixed broadband service available.[4]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect South Carolina project has received a total of 36 inquiries (72 grant inception to date). As more inquiries are submitted to Connect South Carolina, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumers to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect South Carolina project launched BroadbandStat on May 21, 2010, and has received a total of 2,580 visits to date, of which 2,566 occurred this reporting period.

Speed Test Methodology

The 126 speed tests that are represented in the Connect South Carolina Speed Test Report during this reporting period (319 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect South Carolina speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect South Carolina project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect South Carolina with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of South Carolina.

Broadband Provider Log

Complete	95
Non-Responsive/Refused	6
In Progress	12
Count of Datasets by Viable Status	**113**
Total Unique Providers Represented	**50**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Charter Communications	Cable	Data Added to Statewide Inventory	12/15/2009	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory		
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
Farmers Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Farmers Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	1/22/2010	
Farmers Telephone Cooperative, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/22/2010	
Farmers Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Frontier Communications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Home Telephone Company, Inc.	Cable	Data Added to Statewide Inventory	1/22/2010	
Horry Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Horry Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	1/22/2010	
Horry Telephone Cooperative, Inc.	Cable	Data Added to Statewide Inventory	1/22/2010	
Horry Telephone Cooperative, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/22/2010	
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
Northland Communications	Cable	Data Added to Statewide Inventory		
Skyrunner, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
TDS Telecommunications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
Time Warner Cable LLC.	Cable	Data Added to Statewide Inventory	12/21/2009	
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	
Verizon South Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
West Carolina Communications, LLC	Fiber	Data Added to Statewide Inventory	1/22/2010	
Comporium Communications	Backhaul	Backhaul Provider Only Processing Complete	1/25/2010	
Comporium Communications	Backhaul	Backhaul Provider Only Processing Complete	1/25/2010	
Comporium Communications	Backhaul	Backhaul Provider Only Processing Complete	1/25/2010	
Horry Telephone Cooperative, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/22/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
TDS Telecommunications Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/27/2010	
Comporium Communications	ILEC/CLEC	Approval for Update Not Received - Use Last Submission Data	1/25/2010	
Comporium Communications	ILEC/CLEC	Approval for Update Not Received - Use Last Submission Data	1/25/2010	
Comporium Communications	ILEC/CLEC	Approval for Update Not Received - Use Last Submission Data	1/25/2010	
Family View CableVision	Cable	Partial Data Received		
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Atlantic Broadband	Cable	No Update to Provide	2/3/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Chesnee Communications	Cable	No Update to Provide	1/25/2010	
Chesnee Communications	ILEC/CLEC	No Update to Provide	1/25/2010	
Chester Telephone Company	ILEC/CLEC	No Update to Provide	1/25/2010	
Chester Telephone Company	Backhaul	No Update to Provide	1/25/2010	
Comporium Communications	Cable	No Update to Provide	1/25/2010	
Comporium Communications	Fiber	No Update to Provide	1/25/2010	
Comporium Communications	Fixed Wireless	No Update to Provide	1/25/2010	
Comporium Communications	Mobile Wireless	No Update to Provide	1/25/2010	
Comporium Communications	ILEC/CLEC	No Update to Provide	1/25/2010	
Comporium Communications	Cable	No Update to Provide	1/25/2010	
Comporium Communications	Cable	No Update to Provide	1/25/2010	
Comporium Communications	Cable	No Update to Provide	1/25/2010	
Comporium Communications	Fiber	No Update to Provide	1/25/2010	
Comporium Communications	Fiber	No Update to Provide	1/25/2010	
Comporium Communications	Fiber	No Update to Provide	1/25/2010	
Comporium Communications	Cable	No Update to Provide	1/25/2010	
DeltaCom, Inc.	Backhaul	No Update to Provide	2/16/2010	
Electronics Service Company of Hamlet, LLC	Fixed Wireless	No Update to Provide	3/24/2010	
Fairfield Communications	Cable	No Update to Provide	1/25/2010	
Fairfield Communications	Fiber	No Update to Provide	1/25/2010	
Fairfield Communications	Backhaul	No Update to Provide	1/25/2010	
Farmers Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/22/2010	
Farmers Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/22/2010	
Hargray Communications Group, Inc.	Cable	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Fiber	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	ILEC/CLEC	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Backhaul	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Cable	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	ILEC/CLEC	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Backhaul	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Backhaul	No Update to Provide	1/25/2010	

Home Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Fiber	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Backhaul	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Cable	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Fiber	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Backhaul	No Update to Provide	1/22/2010	
NTInet, Inc	Fixed Wireless	No Update to Provide	2/9/2010	
Palmetto Rural Telephone Cooperative	ILEC/CLEC	No Update to Provide	1/22/2010	
Palmetto Rural Telephone Cooperative	ILEC/CLEC	No Update to Provide	1/22/2010	
Pee Dee Net	Fixed Wireless	No Update to Provide	2/23/2010	
Pee Dee Online	Fixed Wireless	No Update to Provide	2/24/2010	
Piedmont Rural Telephone Cooperative	ILEC/CLEC	No Update to Provide	1/28/2010	
Piedmont Rural Telephone Cooperative	Mobile Wireless	No Update to Provide	1/28/2010	
Sandhill Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	1/25/2010	
Sandhill Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/25/2010	
Southern Coastal Cable	Cable	No Update to Provide	6/30/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
tw telecom of south carolina, llc	Backhaul	No Update to Provide	4/26/2010	
Verizon South Inc.	Backhaul	No Update to Provide	12/14/2009	
West Carolina Communications, LLC	ILEC/CLEC	No Update to Provide	1/22/2010	
West Carolina Communications, LLC	Backhaul	No Update to Provide	1/22/2010	
West Carolina Communications, LLC	ILEC/CLEC	No Update to Provide	1/22/2010	
Advanced Technology Group	Backhaul	No Update Provided - Use Last Submission Data	1/14/2010	
MetroCast Communications	Cable	No Update Provided - Use Last Submission Data		
Windstream Communications	ILEC/CLEC	No Update Provided - Use Last Submission Data	1/20/2010	
Windstream Communications	Backhaul	No Update Provided - Use Last Submission Data	1/20/2010	
Aero Networks, LLC		Solicited Initial Data	11/22/2010	
Countrywide Wireless		Solicited Initial Data		
Birch Communications, Inc.	Backhaul	Refused to Participate		[JAN-11-11 Jill Lindgren] Provider has chosen not to participate. The main concern was more with the fact he does not want to divulge the information publicly on his speeds or coverage area.
Birch Communications, Inc.	ILEC/CLEC	Refused to Participate		[JAN-11-11 Jill Lindgren] Provider has chosen not to participate. The main concern was more with the fact he does not want to divulge the information publicly on his speeds or coverage area.
MainStreet Wireless		Refused to Participate		[FEB-01-11 Jill Lindgren] Received e-mail from provider that they are not interested in participating.
Knology of South Carolina, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 18, 2009 and August 24, 2010, six attempts were made during this submission period.
Knology of South Carolina, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 18, 2009 and August 24, 2010, six attempts were made during this submission period.
US LEC of South Carolina	Backhaul	Non-Responsive to Multiple Attempts		Five contact attempts were made between August 31, 2010 and February 22, 2011.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Matthew Brunt] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Global Crossing Telecommunications, Inc	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a Provider Representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.
Hargray Communications Group, Inc.	Fiber	Other	1/25/2010	[MAR-09-11 Matthew Brunt] Although recorded below, we never received fiber coverage for Hargray, Inc. Only received fiber for Bluffton Telephone Company.
Hargray Communications Group, Inc.	Fiber	Other	1/25/2010	[MAR-09-11 Matthew Brunt] We never actually received fiber coverage for Hargray Telephone Company. Only received fiber for Bluffton Telephone Company.
Home Telephone Company, Inc.	ILEC/CLEC	Other	1/22/2010	[MAR-07-11 Matthew Brunt] CLEC DSL data was never received and does not appear to have ever been in service.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Matthew Brunt] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Time Warner Cable LLC.	Backhaul	Other	12/21/2009	[MAR-04-11 Matthew Brunt] Previous middle mile data submission for South Carolina did not include any middle mile points within the state. Provider status adjusted accordingly.
West Carolina Communications, LLC	Backhaul	Other	1/22/2010	[MAR-23-11 Dawn Clark] This subsidiary does

WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Matthew Brunt] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Horry Telephone Cooperative, Inc.	Fiber	Inactive - No Longer in Business	1/22/2010	[FEB-03-11 Daryl Coffey] The provider states that HTC Communications no longer exists, and all services should now list the cooperative as the provider; sent notes to GIS
Horry Telephone Cooperative, Inc.	Mobile Wireless	Inactive - No Longer in Business	1/22/2010	[FEB-03-11 Daryl Coffey] The provider states that HTC Communications no longer exists, and all services should now list the cooperative as the provider
Horry Telephone Cooperative, Inc.	Backhaul	Inactive - No Longer in Business	1/22/2010	[FEB-03-11 Daryl Coffey] The provider states that HTC Communications no longer exists, and all services should now list the cooperative as the provider
Horry Telephone Cooperative, Inc.	ILEC/CLEC	Inactive - No Longer in Business	1/22/2010	[FEB-03-11 Daryl Coffey] The provider states that HTC Communications no longer exists, and all services should now list the cooperative as the provider
Horry Telephone Cooperative, Inc.	Cable	Inactive - No Longer in Business	1/22/2010	[FEB-03-11 Daryl Coffey] The provider states that HTC Communications no longer exists, and all services should now list the cooperative as the provider

South Dakota

Broadband Mapping Project
Product Release White Paper

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1 Overview

The following describes the Data Gathering, Data Integration, Data Validation and Verification and Quality Control processes utilized to create the Broadband Mapping Project's April 1st, 2011 data submission.

To support various levels of technical and program knowledge, this white paper supplies both a high level summary and a detailed process review.

2 High Level Review

2.1 Data Gathering - Providers

Broadband Service Area, Middle Mile Aggregation Points and Broadband Service Overview
The collection of Broadband Service areas, Middle Mile Aggregation points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and Maintain an Inventory of Broadband Providers through research and State inputs.
- Update Provider Material that describes the data requirements and logistics for data transfer.
- Update NDA for use in project, where applicable
- Maintain multiple protocols for the provider to submit data, including SFTP technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project
    - Broadband data required to support the product data model
    - Submission protocols available
    - Capability to validate how the supplied data is aggregated

- Download/receive Provider Data
- Establish a repeatable process with Provider. Maintain Provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.)

2.2 Data Gathering - Community Anchor Institution (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through Data Mining, research, and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable ready format.
- Continue engagement with non-responsive institutions.

2.3 Data Integration Process

The data integration and processing mechanisms currently utilized allow for multiple types of inputs and results in a standardized output that meets the NTIA deliverable requirements. This process is flexible to support data model changes and project requested enhancements.

- Receive inputs from Providers via submission protocols, upload into Sourcing Database and catalog with provider information.
- Review Provider supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area based feature for coverage in Staging Database).
- Apply broadband attribution to CP, Apply metadata to CP
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete. Following completion of CP creation, process steps within Data Validation & Verification occur
    - Process coverage area to build the required NTIA data model layers

- Process CAI data input into internal standardized format, as mentioned above under CAI Create Product Deliverable based on NTIA and State-level requirements.
- Following the creation of the product, process steps within Data Validation & Verification occur

2.4 Data Validation & Verification

To ensure the data collected and processed is accurate and comprehensive, a holistic approach has been developed to further validate and verify the data. Following the initial mapping of providers' coverage area and serviceability claims, the project team uses the following methods:

- **Third-Party Data Verification:** Visually and programmatically compare the coverage against third-party data.
  Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

- **Broadband Provider Validation – Provider Portal Application:** Providers were trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data.

  All provider change requests go through the Data Integration Process and a review with the provider to complete validation.

- **Confidence Values:** All Verification, Validation, and manual quality reviews are tracked by provider and then by technology type, which is then stored and maintained within a "Validation" table. A confidence value is assigned based on the collected information to highlight provider coverage areas that require further investigation and enhancements.

2.5 Quality Control

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are as follows:

- Format Correctness
- Table & Field Structure
- Valid Values
  - Including default values, where applicable
- Geographic Extent and Topology Errors

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified from NTIA.

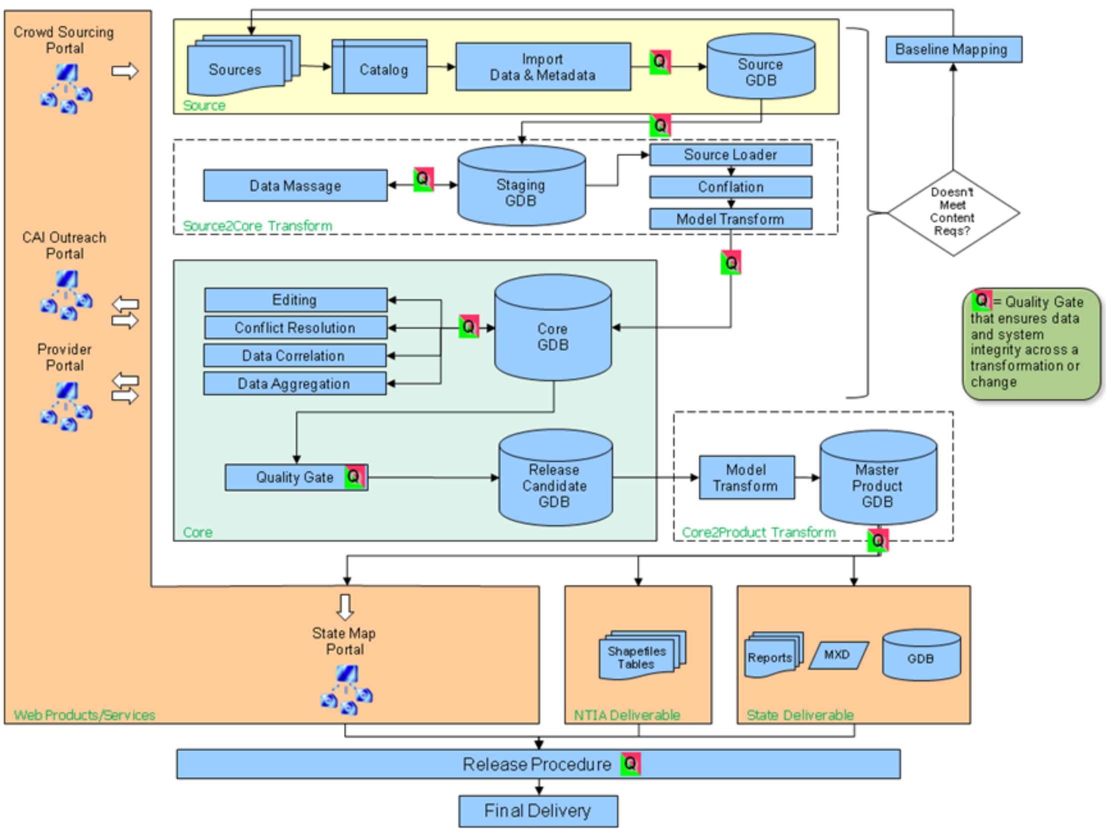
Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 at the following link:
https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions

- Longitude values for States outside the lower 48 (any table)
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is 'No' or 'Unknown'
- Overview MaxAdDown, MaxAdUp if 100% of record level data has MaxAdDown or MaxAdUp populated

3 Detailed Process Review

Below is a detailed review of the data collection, integration and quality control points along the broadband data gathering and mapping process.

Diagram of overall process:



3.1 Provider Outreach

For the April 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The Provider Portal web application was released and training webinars held so providers could use this application to submit changes to and/or validate their current coverage area(s).

Data was also collected from the providers via e-mail and SFTP, depending on their comfort level to submit data in time for the April 1st deadline.

In support the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

3.2 Outreach Materials

The original provider packet sent via email to the providers included the following documents and files:

1) Letter from the State inviting them to participate in the program
2) Copy of the non-disclosure agreement (NDA)
3) Copy of the Mapping NOFA from the NTIA
4) Copy of the NOFA Clarification from the NTIA
5) Broadband service address example file in CSV format
6) Word document describing service address example file
7) Broadband service block example file in CSV format
8) Word document describing service block example file
9) Broadband service street example file in CSV format
10) Word document describing service street example file
11) Broadband subscriber example file in CSV format
12) Word document describing subscriber example file
13) Broadband wireless coverage area sample shapefile
14) Word document describing wireless coverage area sample shapefile
15) Instructions for downloading, installing, and using the WinSCP secure FTP application

3.3 Outreach Process

The provider outreach process is comprised of the following general steps:

1) Send the provider package and introduction letter to the main point of contact for the provider
2) Follow up with email and call to verify that the main point of contact is correct.
3) If necessary, discuss the NDA further and resolve any redlines.
4) Once the correct primary contact is established, set up a call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
5) If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative) mark them as such on the provider tracking sheet. These providers will be escalated to the state for further action.
6) As the providers are collecting the required data, provide instruction on downloading, installing, and using the WinSCP secure FTP application, if required.
7) Arrange with the providers to transfer the data in whatever way they are comfortable. Some providers will find regular email acceptable. Others will want to use the secure FTP application.
8) After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete data sets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

3.4 Data Collection

3.4.1 Data Transfer Procedures

There are three primary ways data is collected from providers. These are:

1) Secure FTP using the WinSCP application
2) Regular email
3) Mail

3.4.2 Initial Data Review and Quality Assurance

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the secure FTP site or email
    a. If emailed, place copy of original data set in the appropriate provider folder on the secure FTP site
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

Note: The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

3.5 Data Ingestion

3.5.1 Data Ingestion Overview

The following outlines the process steps taken based on the type of input supplied by the data provider:

Point Data

- Subscriber location
- DSLAM location
- Central Office location
- Broadcast Tower location

Linear Information

- TIGER street segments

Polygonal Information

- Census Blocks
- Coverage Area

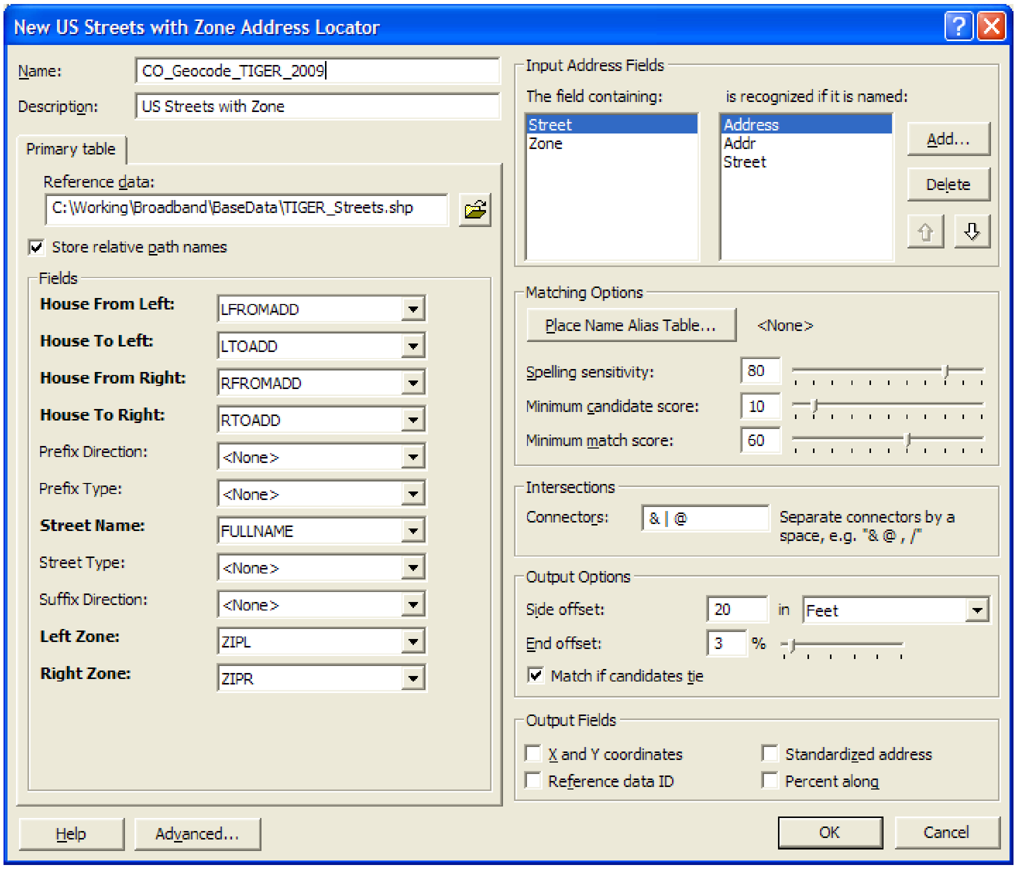
Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim data set that is then processed using the **makeDeliverable.py** Python scrip to create the MapConnect data layers that will be delivered to the state and, ultimately, to the NTIA. Following are the detailed instructions used in this process.

3.5.2 Point Data

3.5.2.1 Subscriber Location – Address Data

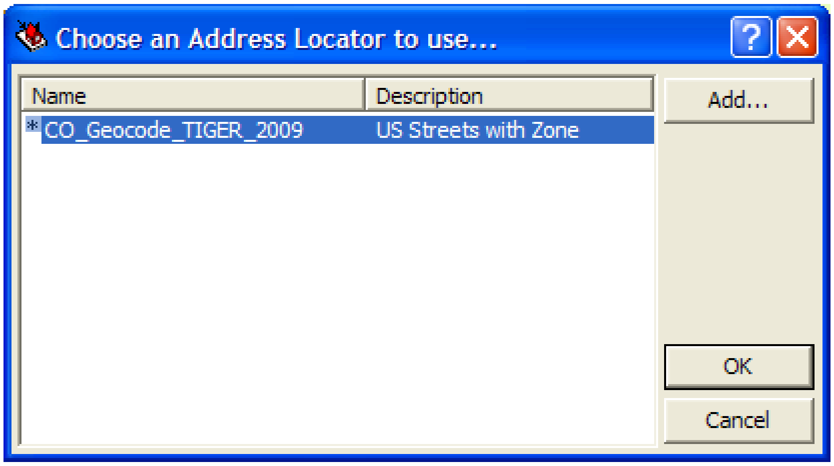
In the event that the data provider supplies subscriber address data the following actions occur:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
   a) Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional, and post-modifier concatenated together), city, state, ZIP.
2) Configure the ArcGIS geocoding tool to use the TIGER 2009 streets dataset
   a) In ArcCatalog, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting New>Address Locater from the dropdown menu.
   b) Select "US Streets with Zone" and press OK.
      i) Note: It is likely that multiple Address Locators will have to set up to handle the variety of provider address data received.
   c) Navigate to the TIGER Streets 2009 file and press OK.
   d) Fill in the dialog box as seen below:

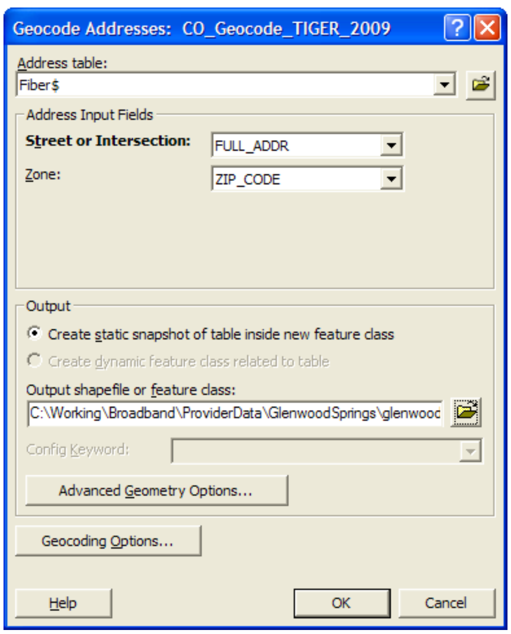


e) Click OK.

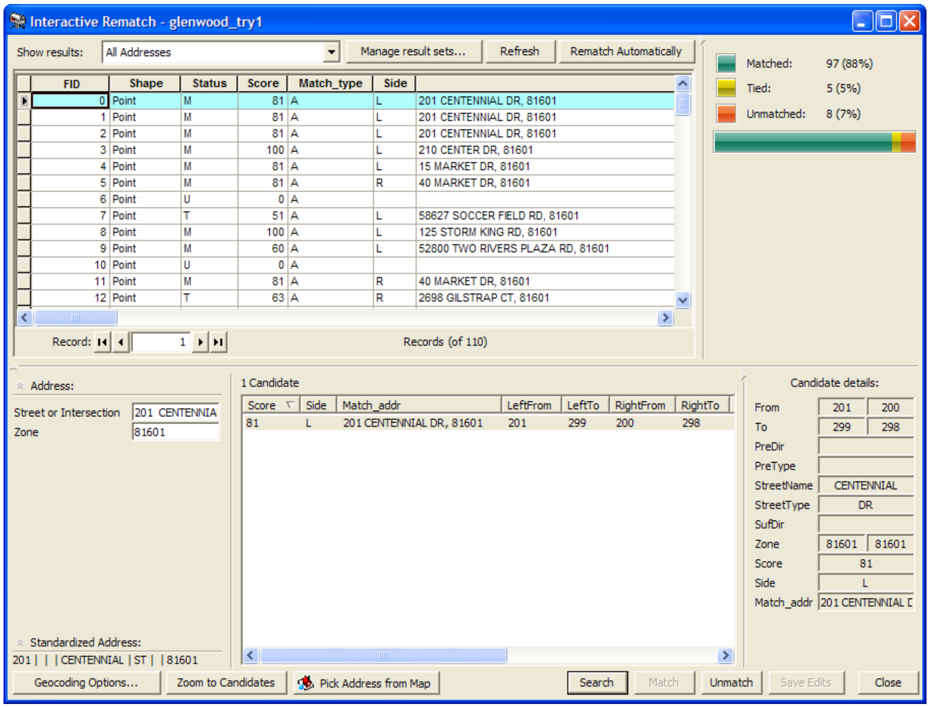
3) Open up ArcMap, and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.
5) Select the appropriate address locator by clicking Add…. then OK.



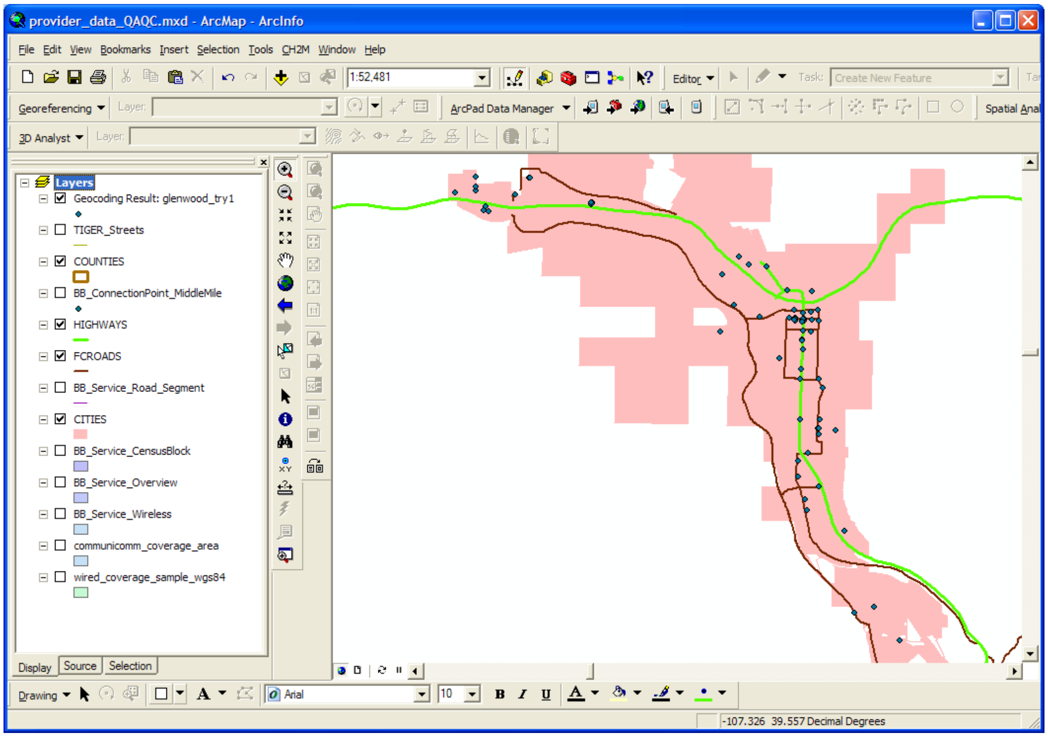
6) Fill out the Geocode Addresses dialog box as shown below:



7) Geocode the list in batch mode using the geocode service set up in Step 2 above, accepting all the default parameters.
8) Review results.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data as seen below:

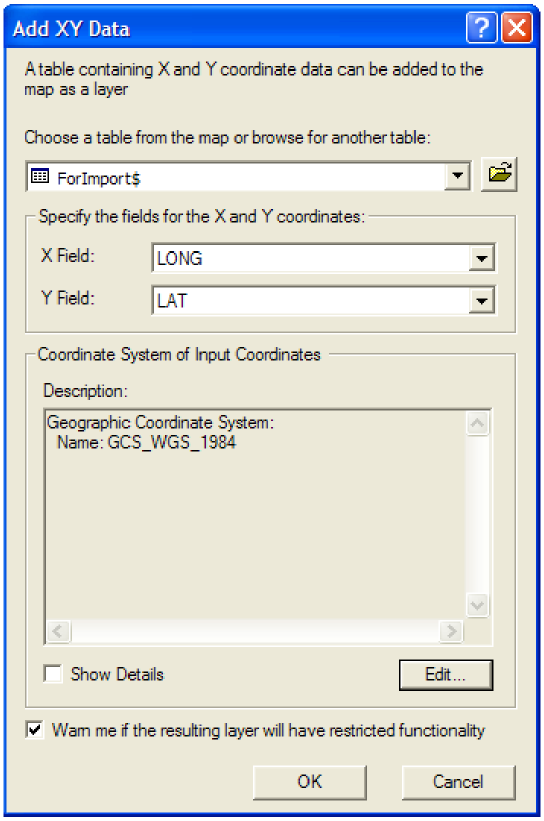


12) Follow the steps detailed in Subscriber Location – GIS Data below

3.5.2.2 Subscriber Location – XY Data

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can easily be opened using ArcMap.
    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make sure there are no merged cells.
    b. Make sure that XY locations are in decimal degrees.
        i. To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees us the following formula: DD + (MM/60) + (SS.SSS/3600).
        ii. Note: if XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.
2) Open up the Excel worksheet in ArcMap.
3) From the menu bar, select Tools>Add XY Data…



4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and press OK.

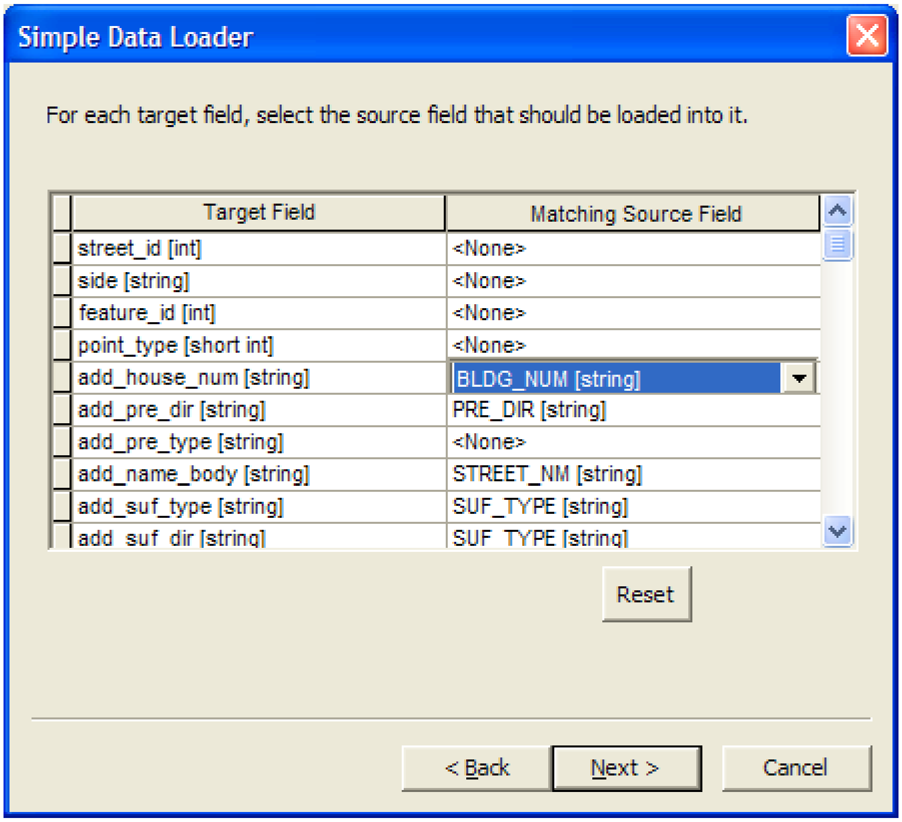
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting Data>Export Data… from the dropdown menu.

6) Follow the steps detailed in Subscriber Location – GIS Data below.

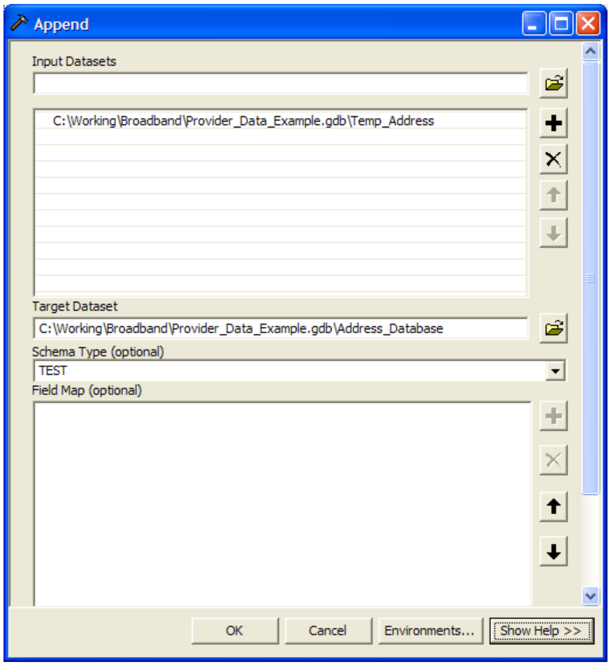
3.5.2.3 Subscriber Location – GIS Data

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog, right-click on the empty feature class and select Load from the dropdown menu.
3) Navigate to the provider address GIS data set and then map the attribute fields accordingly, as seen in general below:

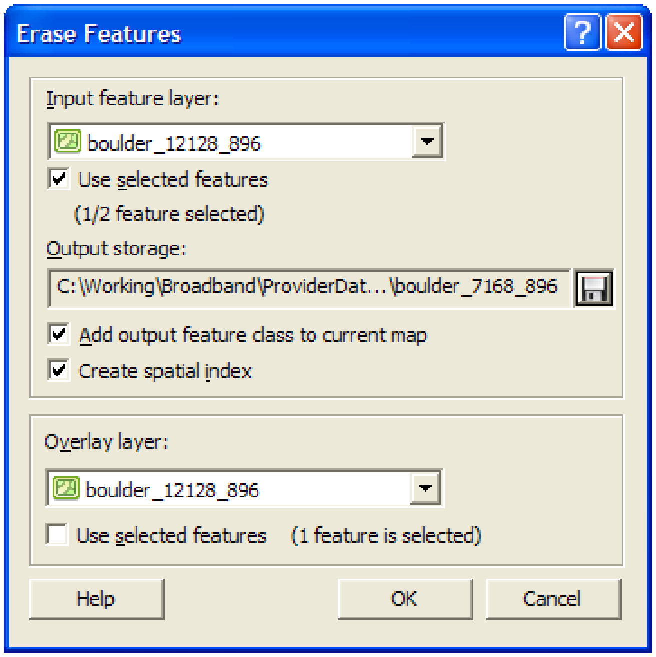


4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you will now append that data to the overall Point Address database.
5) In ArcToolbox, use the Append command (*Data Management Tools>General> Append)* to add the features into the overall Point Address database, as seen in general below:



6) Since the data is already in the Point Address database schema, there is no n need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
    a. <u>Within ArcGIS</u>
        i. Summarize download and upload speeds [first,last] to determine all speeds available for county.
            1. This will save as a DBF table. Keep track of location for future reference.
        ii. Buffer county address point featureclass to 150'.
            1. During buffer command, dissolve on "ad_down"; "ad_up"; "provider"; "dba"; "frn"; "tt"; 'all metadata fields'; "stctyfips". Save as.... county_fastestdown_fastestup.
            2. (Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up)
            3. Note: these attribute fields are specific to the Point Address database.
        iii. Select the features that represent the lowest speeds
    b. <u>Using XtoolsPro (*http://www.xtoolspro.com/*)</u>
        i. In the XTools Pro toolbar, select XTools Pro>Layer Operations>Erase Features
        ii. Use the same feature class for Input and Overlay
        iii. Check Use selected features on the Input feature, as seen below.

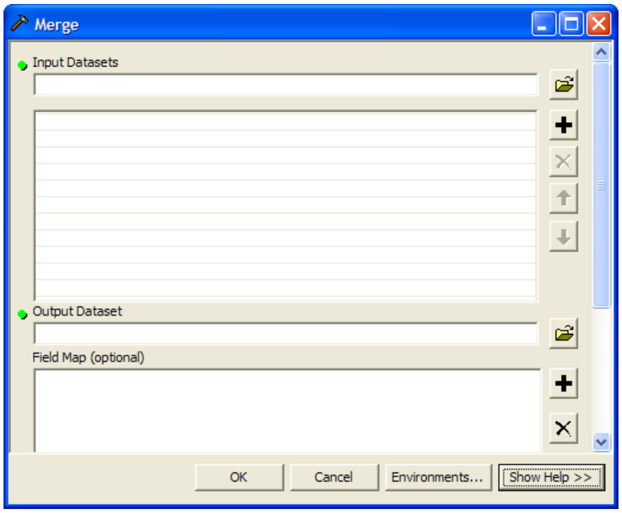
iv. Repeat and erase slowest speeds one speed at a time. Saving each new feature class as the next slowest speed, using the same naming convention as above. A general example is seen below:



c. <u>Within ArcGIS</u>

i. Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

ii. Merge individual speed feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge). The dialog box is seen below:



iii. Merge individual county feature classes together using the Merge command in ArcToolbox (Data Management Tools>General>Merge).

iv. Since the county files are all in the same schema, do NOT alter the Field Map portion of the command interface.

v. When all the county files are merged together into one dataset, use the Append command in ArcToolbox *(*Data Management Tools>General>Append) to add the features to the bb_cov interim data set. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

3.5.2.4 DSLAM or Central Office Location – Address Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

3.5.2.5 DSLAM or Central Office Location – XY Data

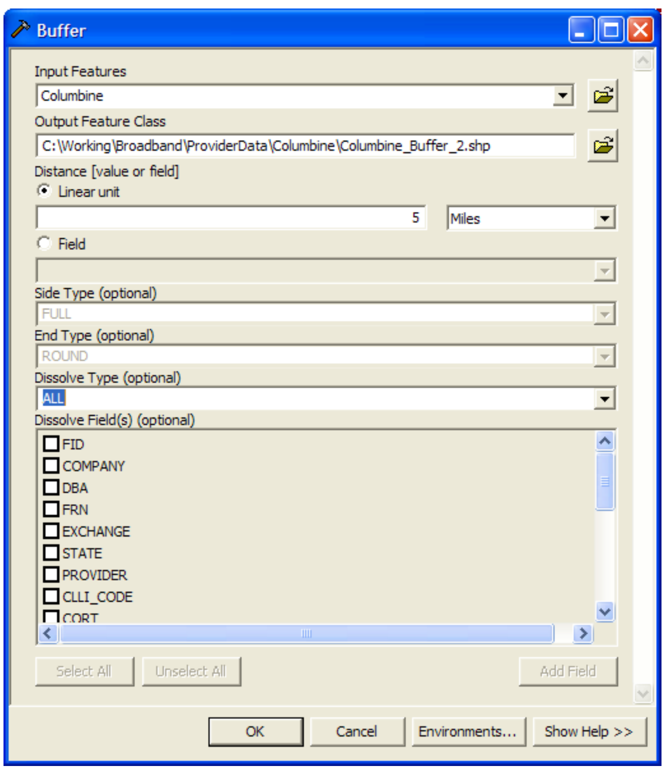
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in DSLAM or Central Office Location – GIS Data below.

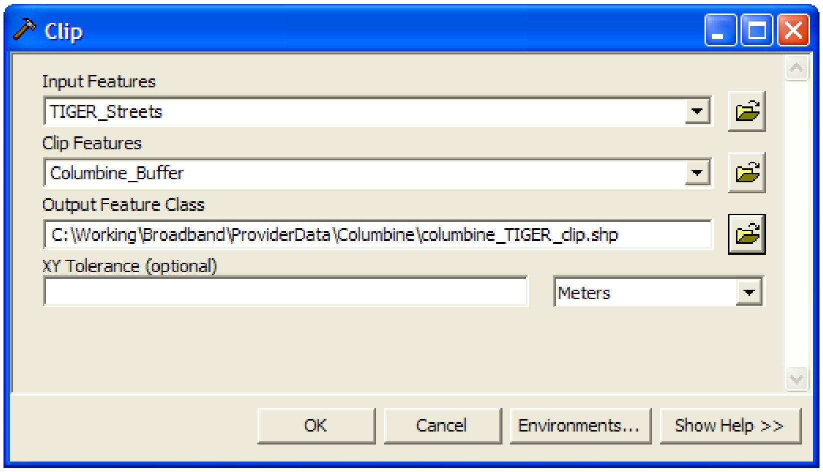
3.5.2.6 DSLAM or Central Office Location – GIS Data

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data please follow the steps below:

1) Buffer the DSLAM/Central Office points feature class
   a) Add the point feature class to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Proximity>Buffer
   c) Set the buffer distance to 5 miles
   d) Set the dissolve type to ALL
   e) Name the output feature class
   f) Typical Buffer tool is seen below:

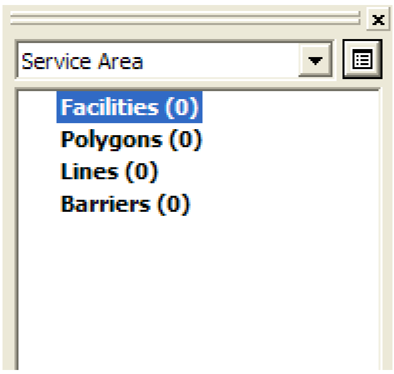


   g) Press OK
2) Use the resulting buffer feature class to clip the TIGER street layer (as described earlier):
   a) Add TIGER street layer to ArcMap
   b) Open up ArcToolbox and go to Analysis Tools>Extract>Clip
   c) Complete the dialog box as seen below:

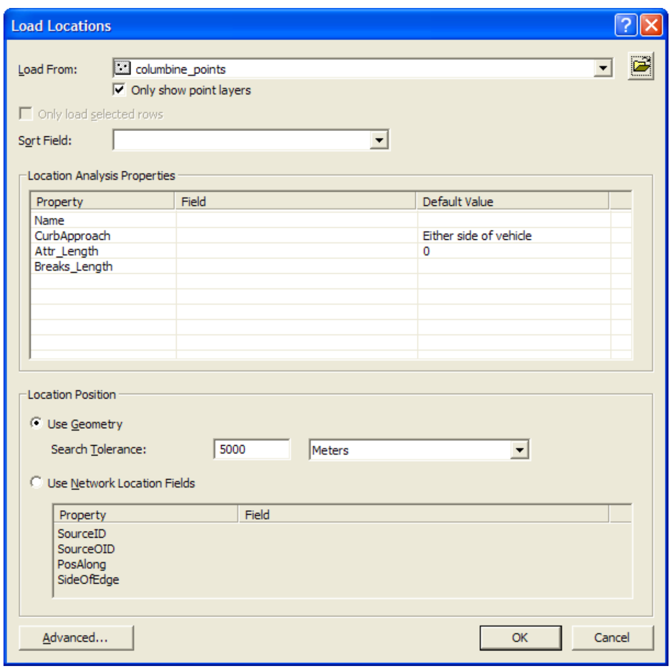


   d) Press OK.

3) Using ArcCatalog and within the file geodatabase:
   a) Right Click and create a new Feature Dataset
      i) For the Feature Dataset settings:
         (1) Name the feature dataset accordingly
         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER street layer by selecting Import and navigating to the location of that feature class
         (3) No vertical coordinate system needed
         (4) Leave all x,y,z,m values at default.
         (5) Press Finish
4) Import previously created street feature class into new Feature Dataset
5) Right-click Feature Dataset and create new Network Dataset – accept all default setting for the Network Dataset
   a) Note: the Network Analyst extension must be turned on
6) In ArcMap Turn on the Network Analyst Toolbar by going to View>Toolbars>Network Analyst
7) Add the Network Dataset created in Step 5 to ArcMap
8) Using Network Analyst Toolbar drop down – create “New Service Area”
9) Open up the Network Analyst Window by selecting the  button.



10) Right click Facilities layer, select Load Locations, and navigate to the DSLAM/Central Office facilities feature class.



11) Press OK.

12) Click the Service Area Properties button 

13) For the following tabs change the following properties:

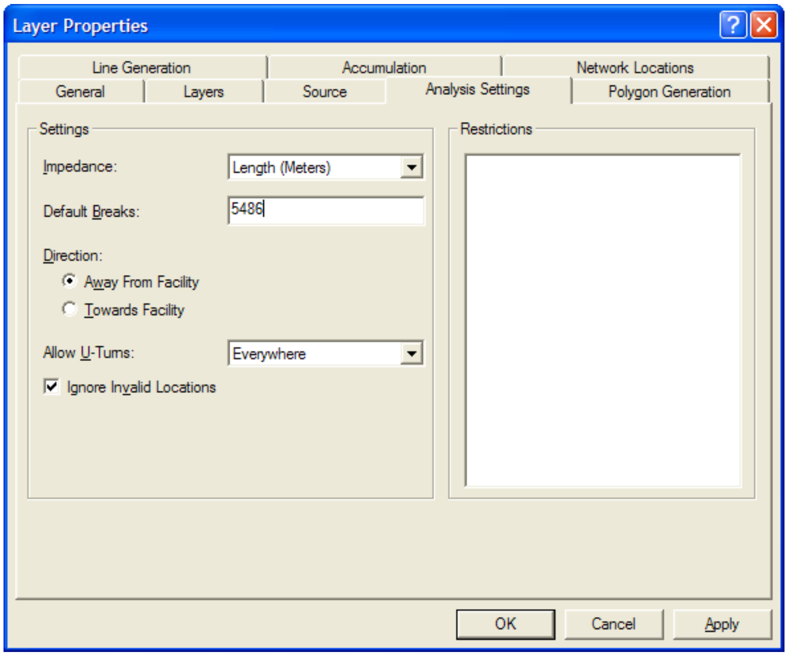
a) "Polygon Generation" tab

i) Select "Merge by break value"

ii) Also disable the Trim Polygons option

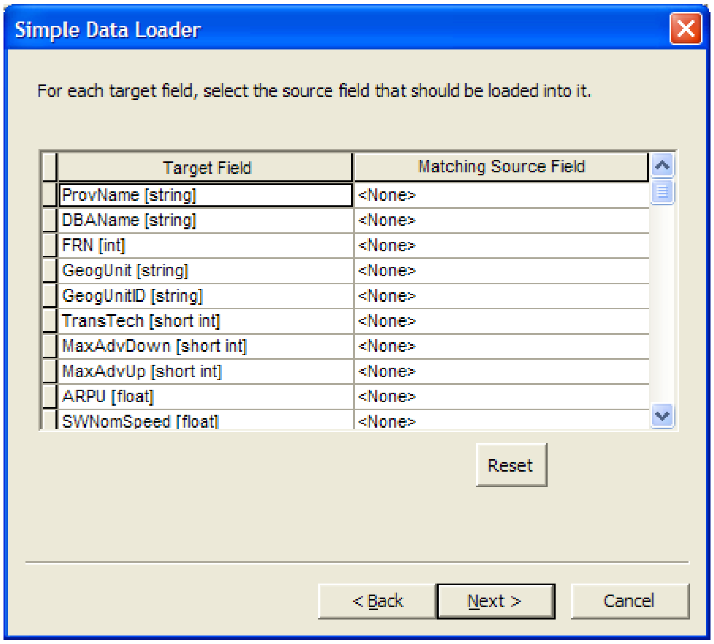
b) "Analysis Settings" tab – using and converting the specified DSLAM buffer distance from feet to meters – input buffer distance value in meters into the "Default Breaks" location

i) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance



c) Click OK.

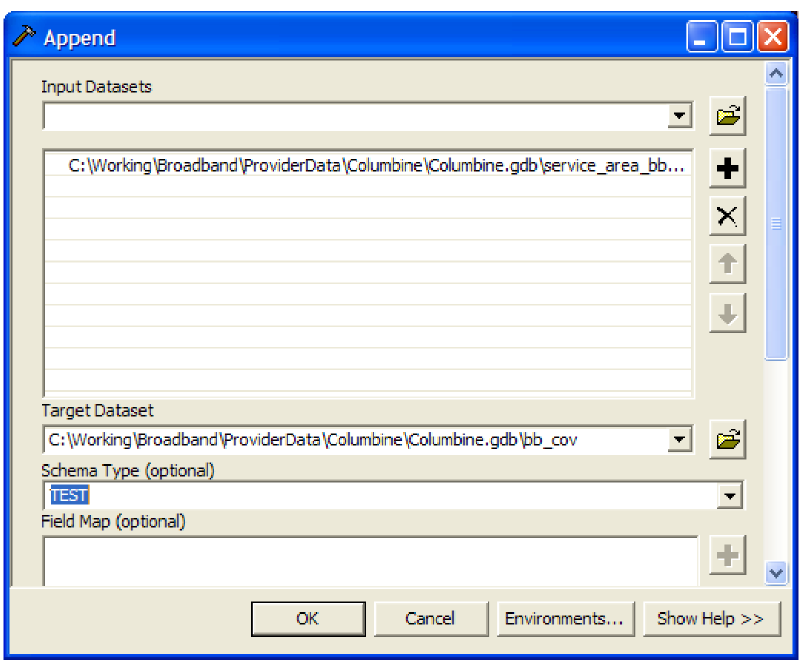
14) On the Network Analyst Toolbar click the "Solve" button to create service area polygons.
15) Right-click on the created service are polygon in the layer list, and select Data>Export Data from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier
17) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in Step 16 into it.
    a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
    b) Press the Add button, hit Next
    c) Accept the defaults and hit Next
    d) Do NOT attempt to map any fields, as seen below:



e) Press Next, then Next again, then Finish.

18) In ArcToolBox, go to Data Management Tools>General>Append

19) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



20) Leave the Schema Type as TEST
21) Press OK.
22) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.2.7 Broadcast Tower Location – Address Data

In the event that the provider supplies wireless broadcast tower location address data please follow the steps below:

1) Follow the process for geocoding points in Subscriber Location – Address Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

3.5.2.8 Broadcast Tower Location – XY Data

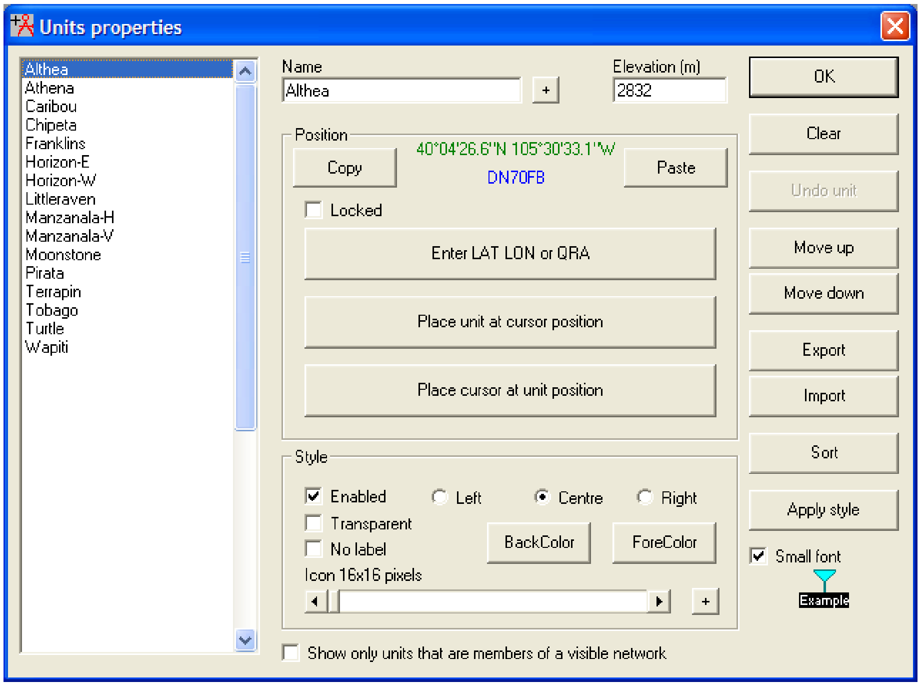
In the event that the provider supplies wireless broadcast tower location XY data please follow the steps below:

1) Follow the process for creating points from XY data in Subscriber Location – XY Data, above.
2) Follow the steps detailed in Broadcast Tower Location – GIS Data below.

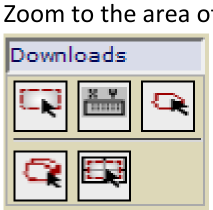
3.5.2.8.1 Broadcast Tower Location – GIS Data

In the event that the provider supplies wireless broadcast tower location GIS data please follow the steps below:

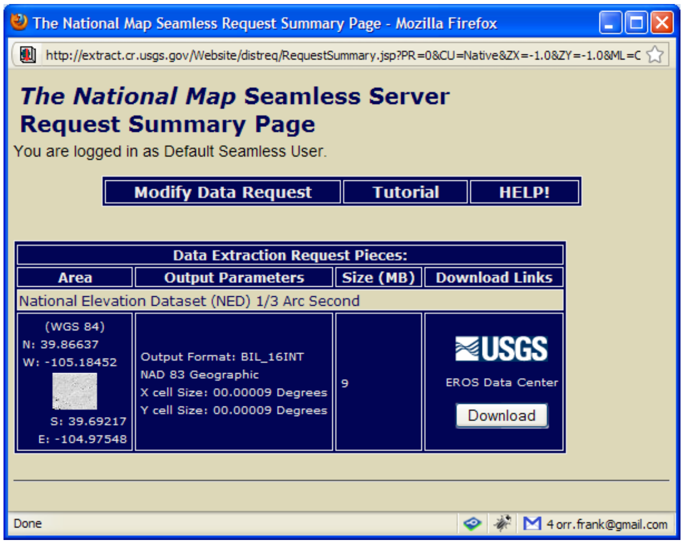
1) Download the required software (Radio Mobile) from the website: http://www.cplus.org/rmw/english1.html
2) Install the software according to the standard directions, found here: http://www.cplus.org/rmw/download/download.php?S=1
3) Open up the application
4) Load the broadcast tower location and elevation information by selecting File>Unit properties. The following dialog box appears:



5) Add in the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. I f available, use the Import button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (http://seamless.usgs.gov/) and download elevation data sufficient to contain the tower locations.
   a. At least the 1/3" NED data is needed. Select this by clicking the Download button in the upper right of the web site and checking the box nect to 1/3 " NED.
   b. Zoom to the area of interest and use the Download tools:

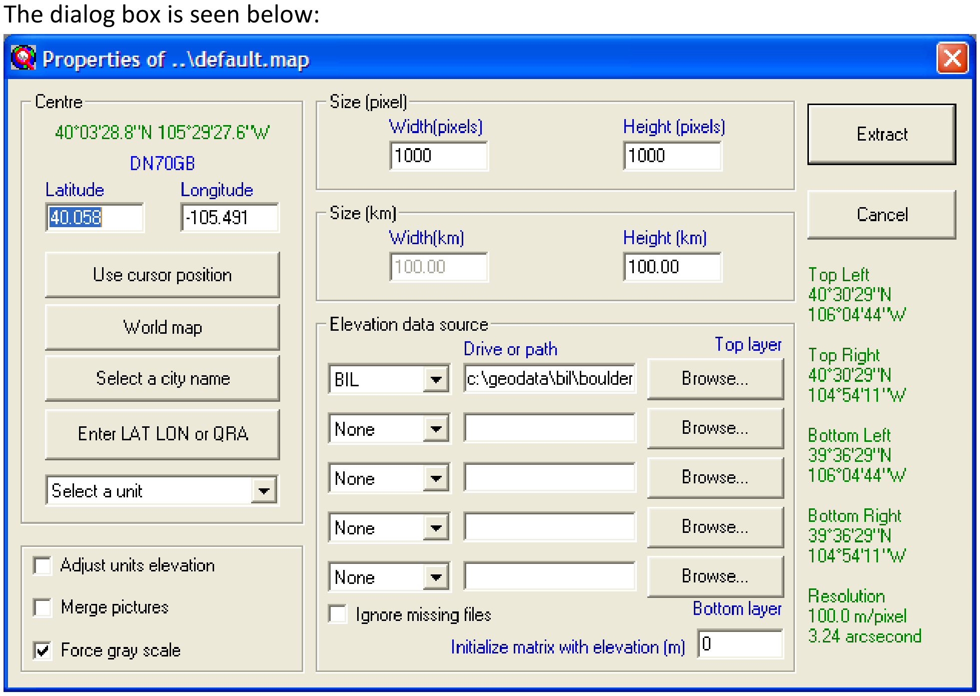


   to define the area to download.
   c. Click the Modify Data Request button to request the data in BIL_16INT format, not ESRI GRID, as seen below:

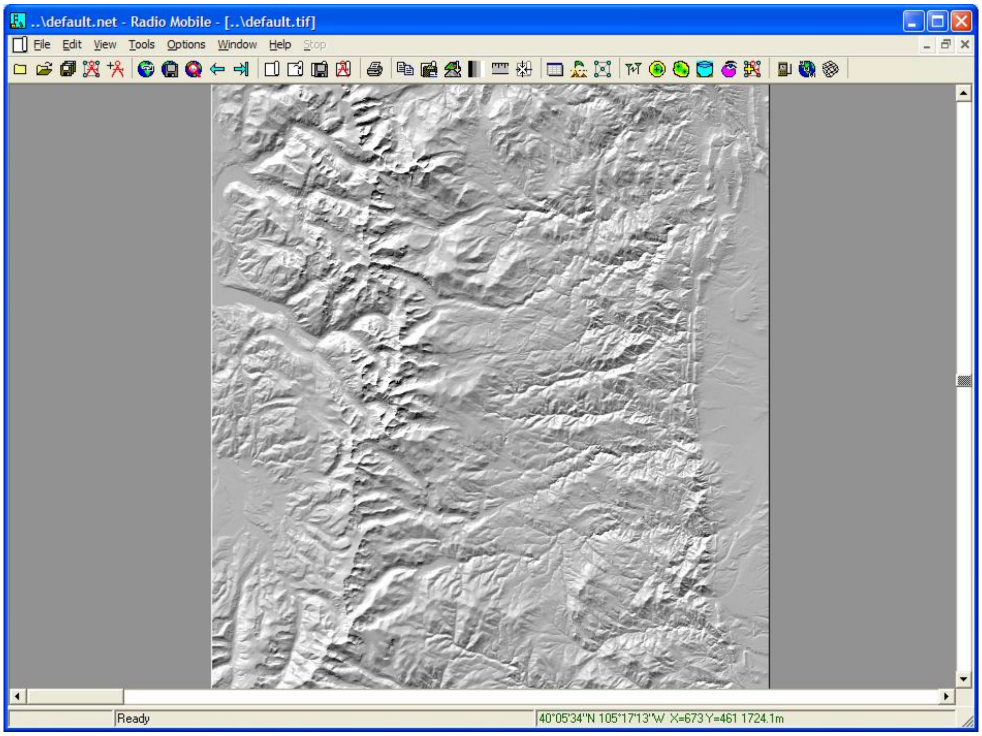


d. Download the data and unzip it.

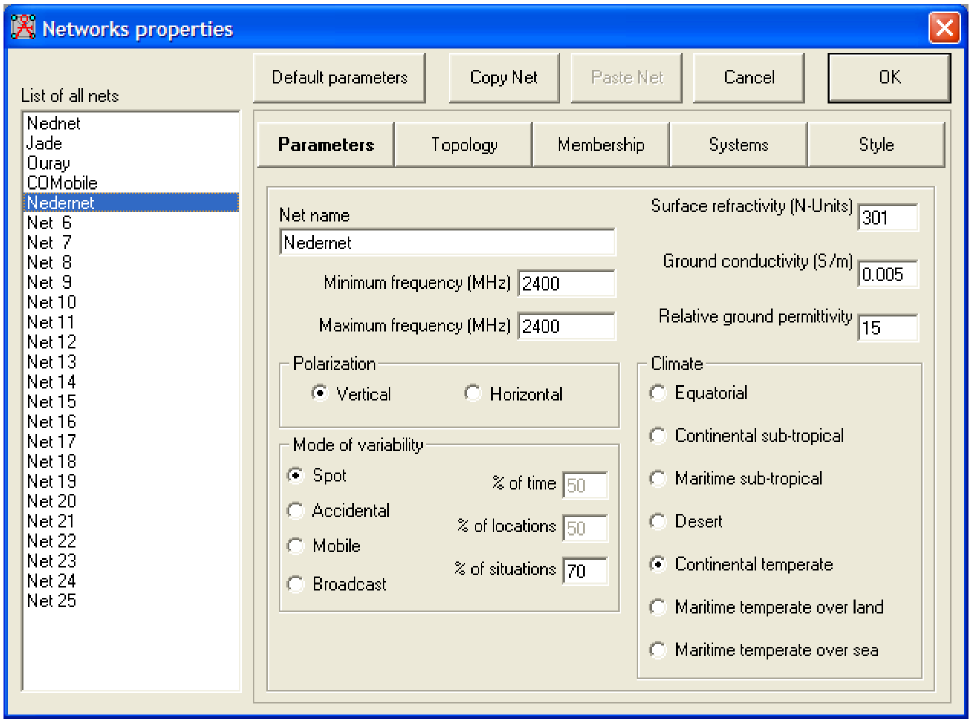
7) Select File>Map Properties to define the map
8) Enter in a latitude and longitude in the center of the tower locations
9) Set the size (in pixels) and the size (in kilometers) of the map
10) Set the directory path leading to the BIL elevation data just downloaded
11) The dialog box is seen below:



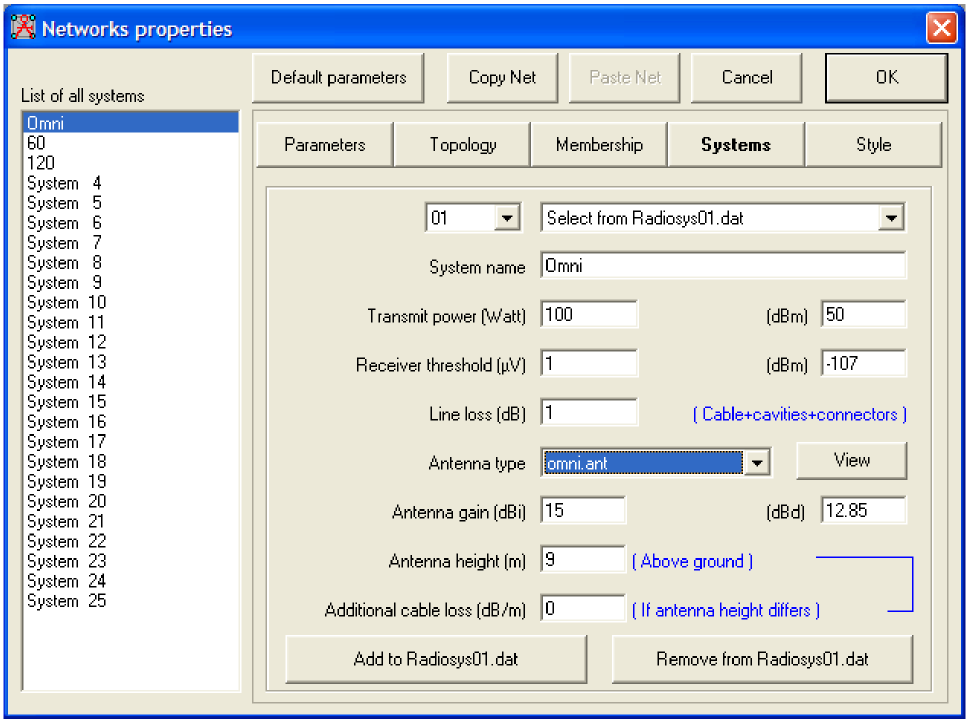
12) Hit Extract.
13) The elevation data is render as a hill shade, as seen below:



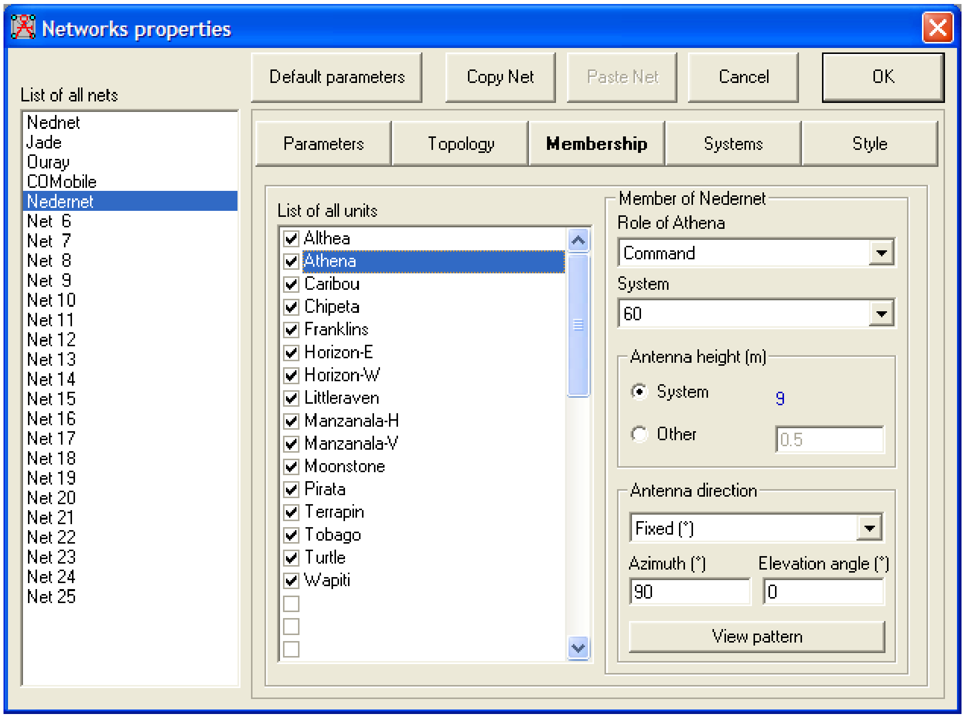
14) Select File>Network properties from the main menu
15) Create a new network and enter in the frequency range under the Parameters tab, as seen below:



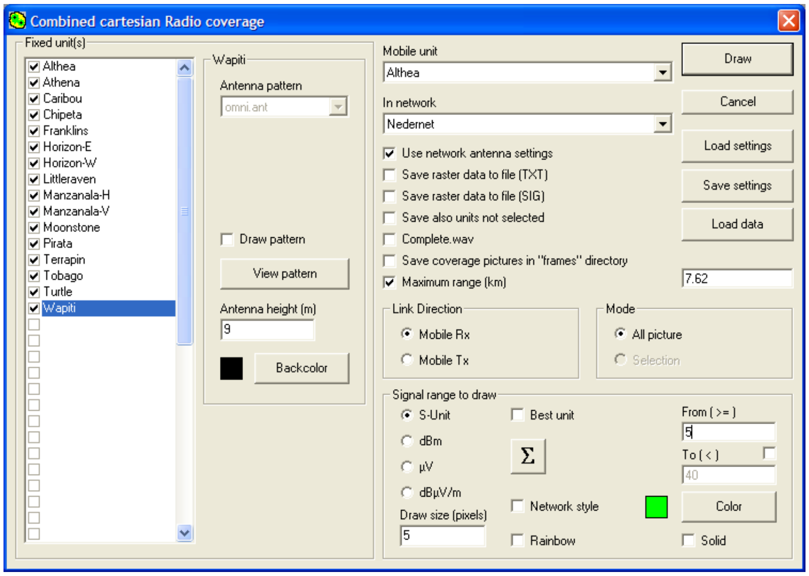
16) Leave all the other values as they appear, and select the Systems tab
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height, and line loss, as seen below:



18) Now click on the Membership tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as seen below:

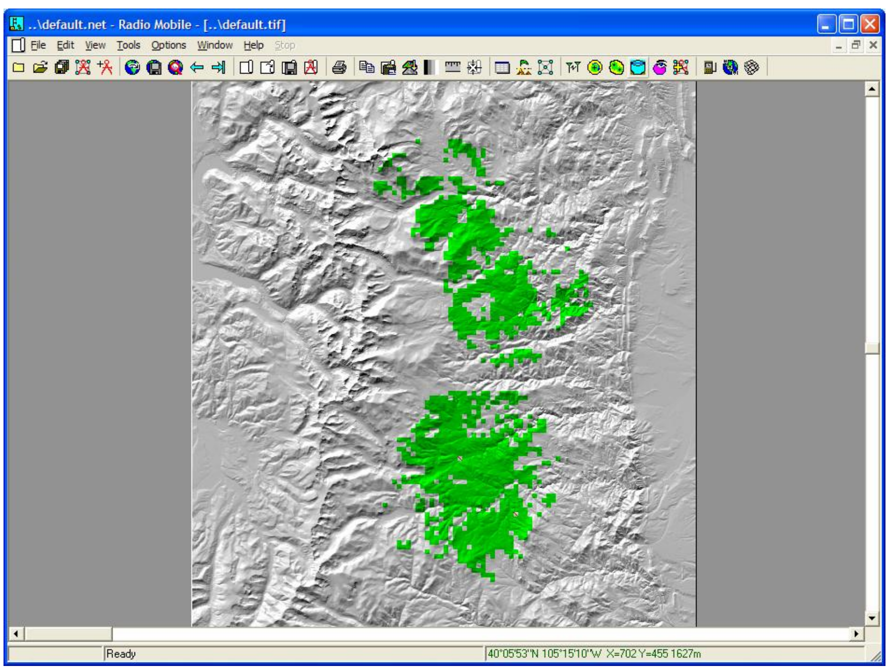


19) Press OK.
20) Select Tools>Radio Coverage>Combined Cartesian from the main menu
21) Complete the dialog box as seen below, providing the Maximum Range from the highest tower beam radius supplied by the provider.
22) Set the Pixel Size at 5 (experiment depending on the area covered to get the right level of granularity) as seen below:



23) Set the signal range to draw to S-Unit and type 5 in the From (>=) box.

24) Press Draw.



25) Save the resulting image as a TIF by selecting File>Save Picture as.

26) Open ArcMap and load the BIL elevation data you used in Radio Mobile.

27) Load the TIF image you created and georeference it using the corners of the BIL data.

a. The corners of the data can be seen in the TIF image.

28) Follow the georeferencing directions from the Coverage Area – PDF/JPG/Other Image Format section below.

29) Use the Georeferencing Toolbar to Update the Georeferencing for the TIF data set.

30) In ArcToolbox, select Data Transformations>From Raster>Raster to Polygon and input the georeferenced TIF you just created as seen below:

31) Open the resulting polygon feature class up for editing using the Editing toolbar in ArcMap and clean up as necessary.

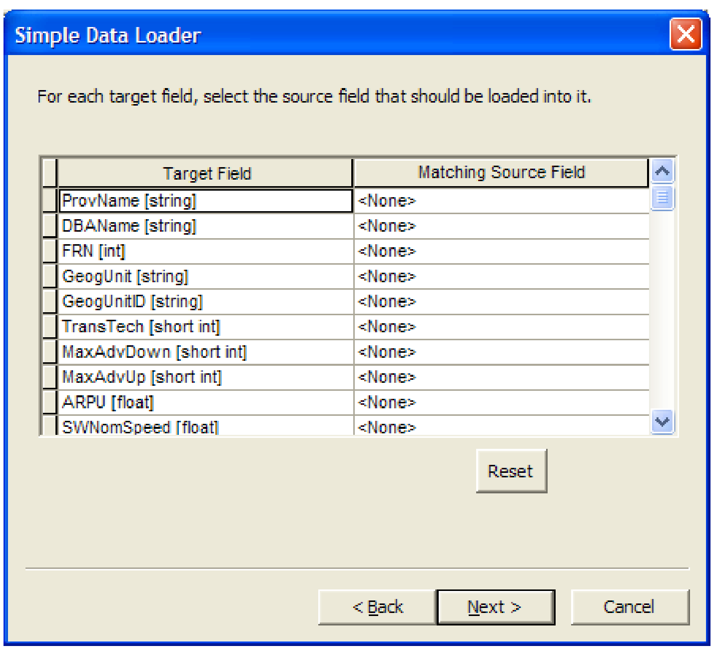
32) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

   a. Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class

   b. Press the Add button, hit Next

   c. Accept the defaults and hit Next

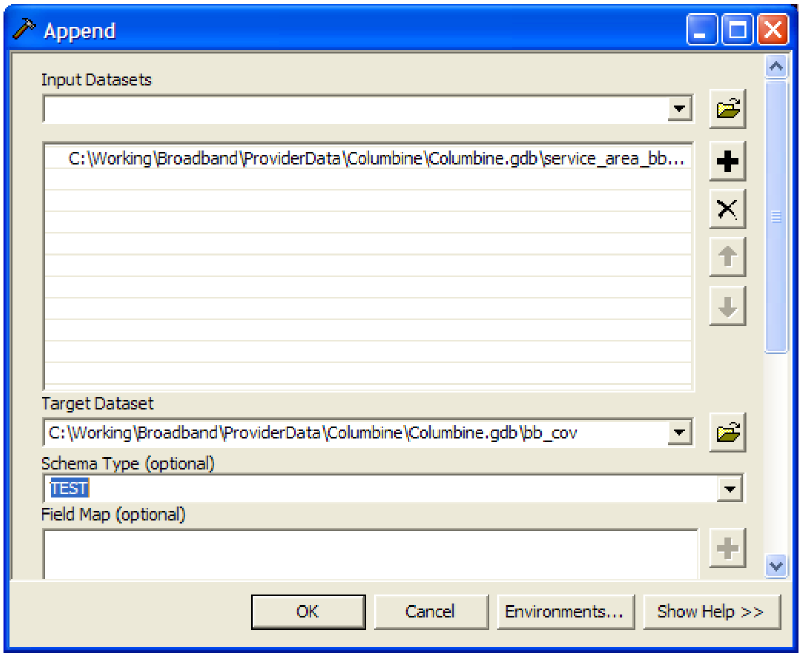
   d. Do NOT attempt to map any fields, as seen below:



   e. Press Next, then Next again, then Finish.

33) In ArcToolBox, go to Data Management Tools>General>Append

34) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



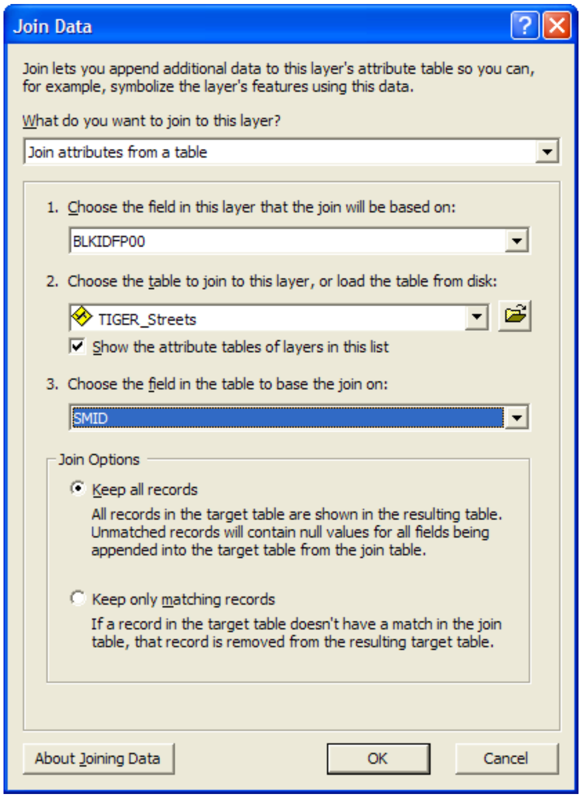
35) Leave the Schema Type as TEST
36) Press OK.
37) In ArcMap, open up bb_cov for editing and manually input associated attribution.

3.5.3 Linear Data

3.5.3.1 TIGER Street Segments – List, Spreadsheet, or GIS Data

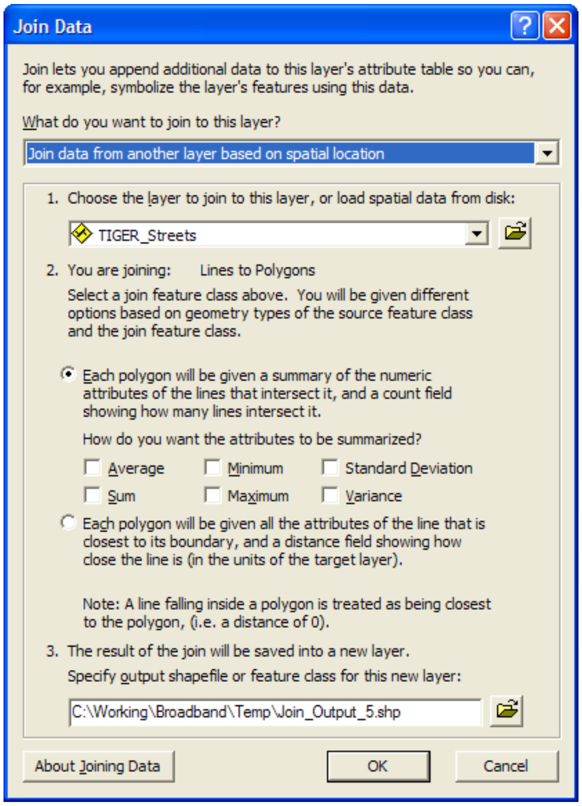
In the event that the provider supplies TIGER street segments in list or spreadsheet format please follow the steps below:

1) Join TIGER road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
    a) If the TIGER data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID
        i) Load both data sets into ArcMap
        ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
        iii) In the dialog box, select the TIGER road segments data and the proper attribute fields for joining, as seen below:

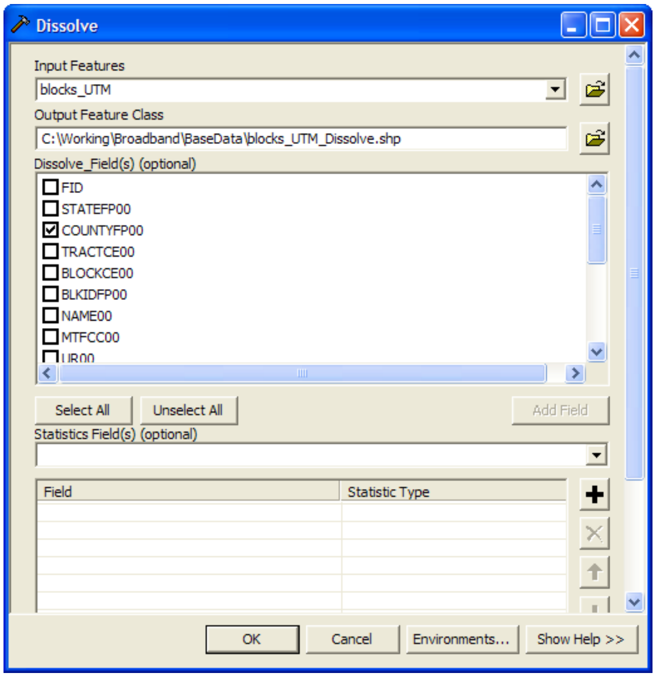


iv) Press OK

b) If the data provided is a list containing TLIDs, then join to the TIGER line data using the TLID, and use a spatial join to associate the TIGER segment with the coterminous block based on the block ID
   i) Load both data sets into ArcMap
   ii) In the layer list, right-click on the 2000 census block feature class and select Joins and Relates>Join
   iii) Select “Join data from another layer based on spatial location” from the dropdown menu
   iv) Complete the dialog box as seen below and press OK.



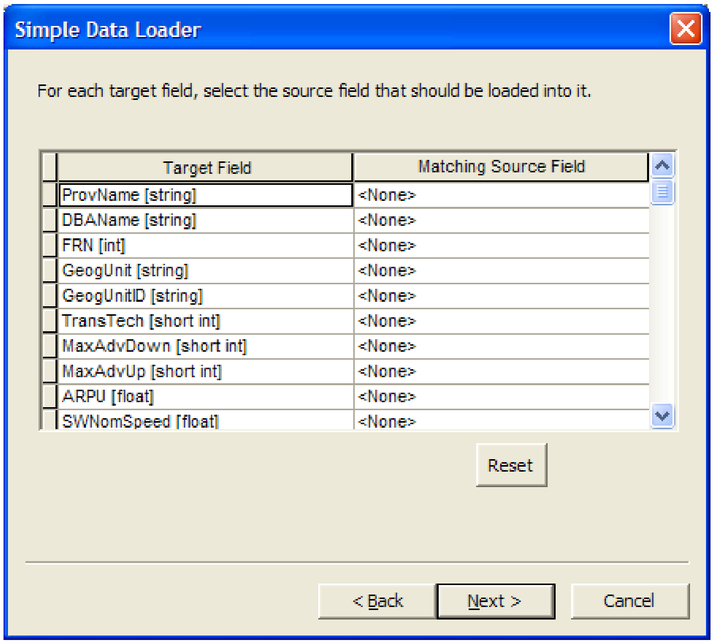
2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular state then dissolve sub-selections of census blocks for each county.
    a) Use the County FIPS code to dissolve by county.
    b) In ArcToolbox, select Data Management Tools>Generalization>Dissolve
    c) Complete the Dissolve dialog box as seen below:



d) Press OK.

4) For each dissolved region, open up the feature class for editing using the Editing tool in ArcMap and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap, see http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf

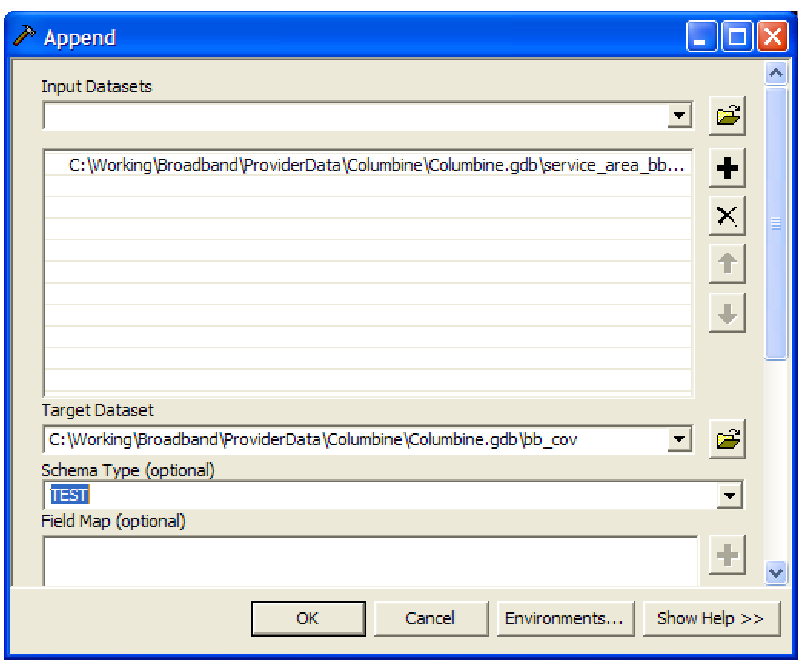
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a) Right-click on the empty feature class, select Load>Load data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



a) Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append

7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



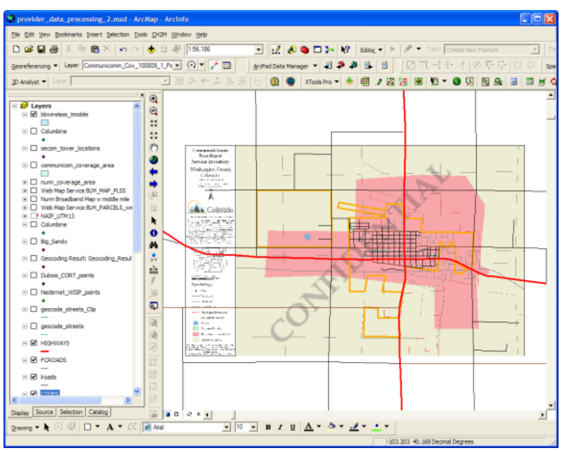
8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution if necessary.

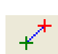
3.5.4 Polygonal Data

3.5.4.1 Coverage Area – PDF/JPG/Other Image Format

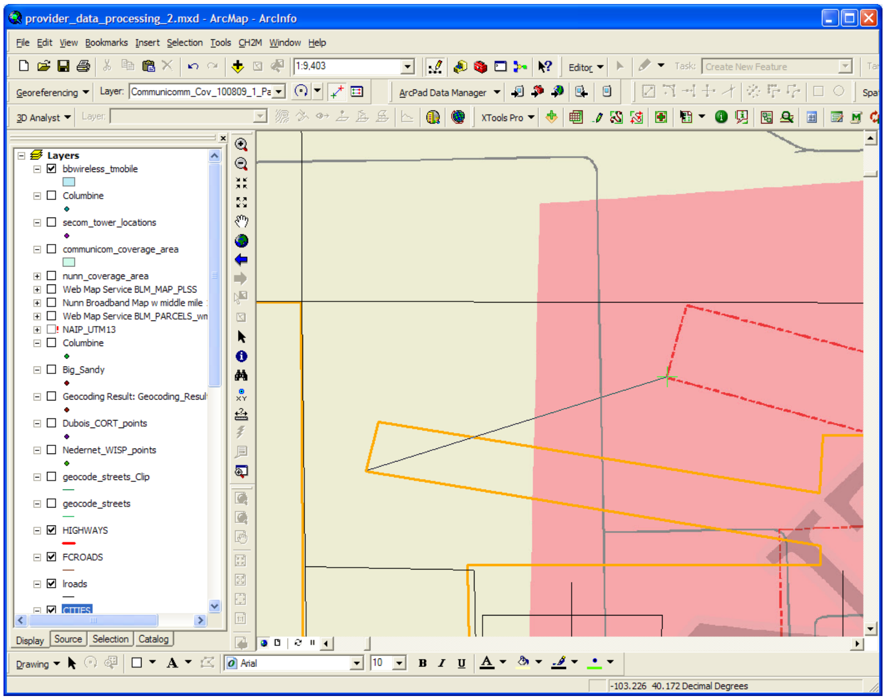
In the event that the provider supplies coverage area data in some image format such as PDF or JPG format please follow the steps below:

1) If in PDF format, open in Adobe Acrobat and Save As… JPG format.
2) Open up the JPG image in ArcMap.
3) Add the required basemap vector data for georeferencing.
    a) This will generally be either the CDOT data or TIGER data
4) Change the coordinate system of the data frame to the desired end coordinate system
5) Zoom to the general location of the JPG map image
    a) This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open up the Georeferencing toolbar by selecting View>Toolbars>Georeferencing from the main menu bar.
7) Using the Georeferencing toolbar, select Fit to Display, results seen below:



8) Use the Control Point button  to add control points to the map
9) Use common points in the base data set and the JPG image
    a) For example, find major street intersections, county/city boundaries, etc.
    b) Try to distribute the points more or less in the four corners on the image for the best transformation

10) Click on the location on the image first, then click on the corresponding location on the vector data base map, as in the image below:

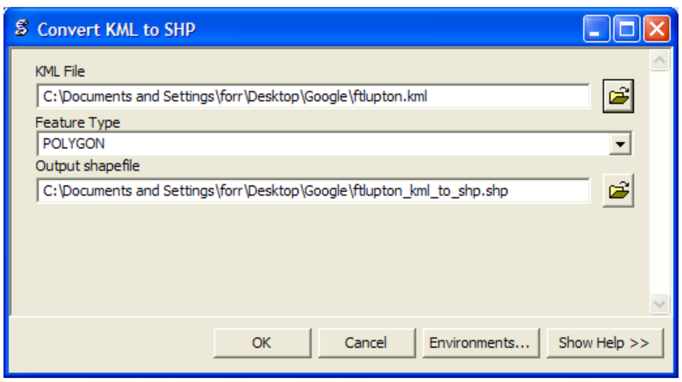


11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.
    a) Note: The transformation may take up to four points, although sometimes only two are necessary.
13) When satisfied with the transformation, select Update Georeferencing from the Georeferencing toolbar dropdown.
    a) This will create a “world” file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap.
16) Using the Editor Toolbar, select Start Editing. Set the Task: to “Create New Feature.”
17) Use the Sketch Tool to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.2 Coverage Area – KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format please follow the steps below:

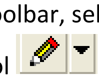
1) Use a KML to SHP converter to translate file into an ESRI format
2) http://arcscripts.esri.com/details.asp?dbid=15603
3) Download the script and follow the provided instructions for installing it in ArcToolbox.
4) Double-click on the script in ArcToolbox and navigate to the location of the KML file, as seen below:



5) Add the new shapefile to ArcMap. Repeat for all KML files provided.
6) Follow the steps detailed in Coverage Area – GIS Data below.

3.5.4.3 Coverage Area – CAD Data

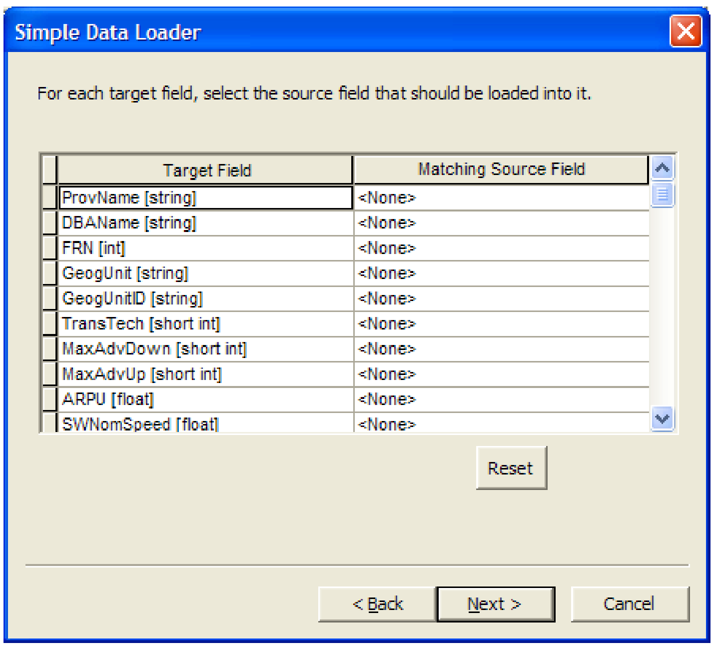
In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) Transform the CAD dataset into an ESRI format
2) http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary to use ArcMap to georeference the CAD data to a known coordinate system first.
   a) To do so, follow the instructions provided above in “Coverage Area – PDF/JPG/Other Image Format.”
5) In ArcCatalog, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap.
7) Using the Editor Toolbar, select Start Editing. Set the Task: to “Create New Feature.”
8) Use the Sketch Tool  to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in Coverage Area – GIS Data below.

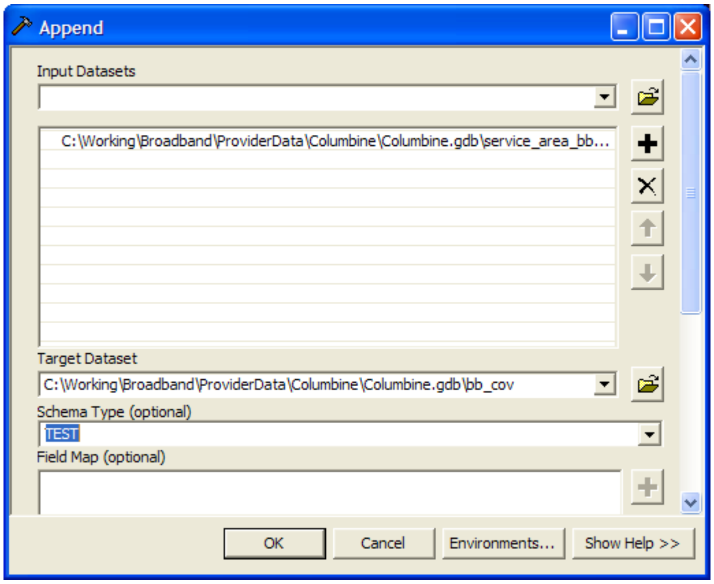
3.5.4.4 Coverage Area – GIS Data

In the event that the provider supplies coverage area data in GIS format please follow the steps below:

1) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a) Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
   b) Press the Add button, hit Next
   c) Accept the defaults and hit Next
   d) Do NOT attempt to map any fields, as seen below:



   e) Press Next, then Next again, then Finish.
2) In ArcToolBox, go to Data Management Tools>General>Append
3) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



4) Leave the Schema Type as TEST
5) Press OK.
6) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.5.4.5 Compact Polygon From Subscriber Points

- Geo-code address list using latest state "Composite Locator"

- Verify that your geo-coded file has only one TT (Technology Type). If not export individual geo-coded layers for each Technology Type.

- For each TT check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

- Clean your geo-coding results - remove any points that geo-code to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e. fall in correct City and Zip.

- Perform spatial join between county polygons (using stcnyfips field) and the cleaned geo-coded subscriber points, in order to carry the county name and stcnty fips.

- Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.

- Un-join the county data from the geo-code subscribers list.

- Create Compact Polygon using cleaned geo-coded layer or sub-selection of using – XtoolsPro – ConvexHull-DetailedHull option. A sub-selection of geo-coded points will be used in areas where more than one polygon will need to be created for one provider's service area.

- Evaluate output Hull carefully – looking for areas that should not be covered by hull polygon.

    - If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.

    - When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geo-coded points. See figure 2 and 3 for an example.

FIGURE 2- Compact Hull: Manual Resolution Required

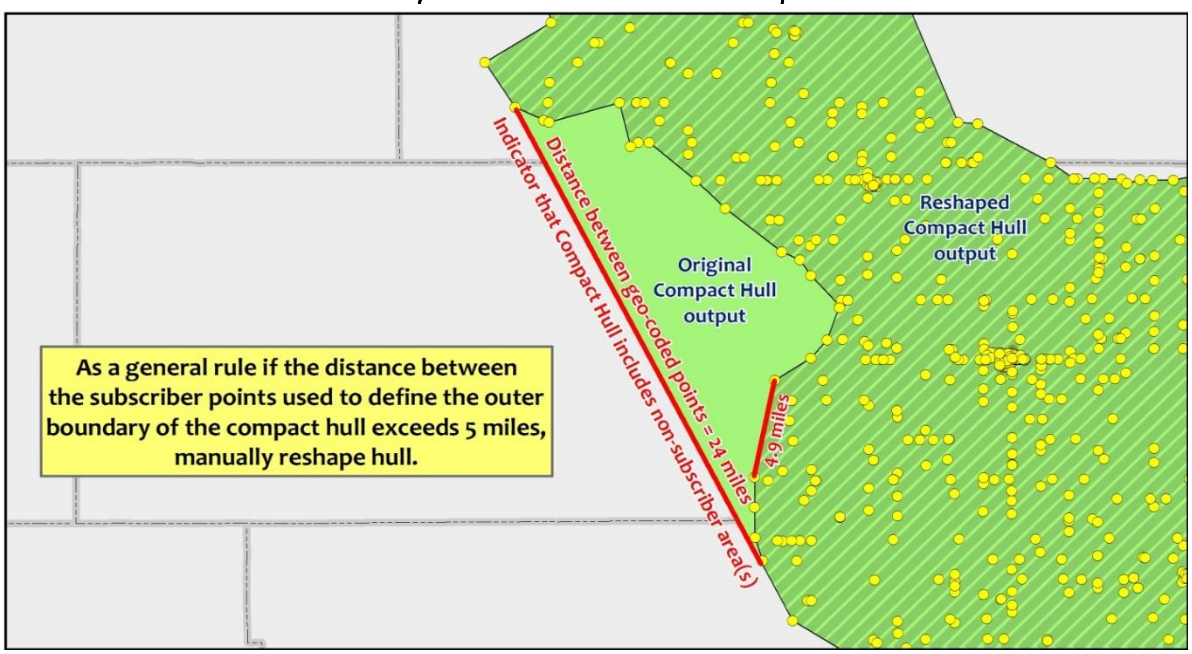


FIGURE 3a- Compact Hull: Manual Resolution Required

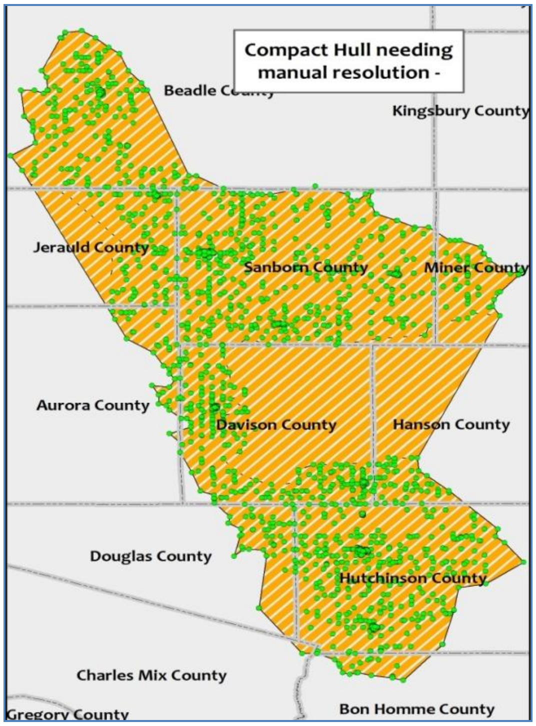
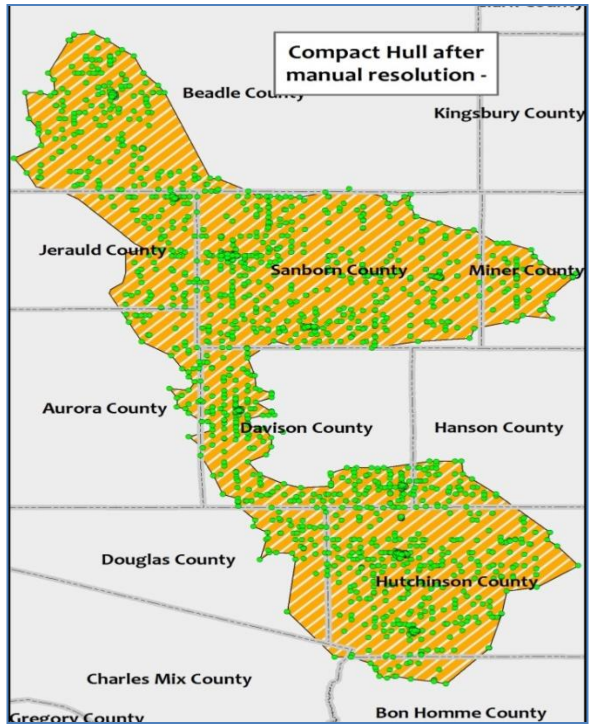


FIGURE 3b- Compact Hull: After Manual Resolution



- To attribute the compact polygon - Perform a "Spatial Join" where your Target Feature Class is the compact polygon and the Join Feature Class is your geo-coded point layer. Export compact hull with joined attributes and name file appropriately.

- Append attributed compact polygon to BroadBand TT template Feature Class and if required manually input any provider attribution that may not have carried over in the append process.

- Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate "stcty_fips" field. Also use the county name field to populate the "BBCov_Name" field.

    - Exceptions is where a provider's coverage is distributed throughout more than one area of any given county where the "BBcov_Name" should be populated using an appropriate city or other logical name based on geographical location.

- Export/Load into appropriate BB TT model Dataset.

3.5.4.6 Census Blocks – List or Spreadsheet

In the event that the provider supplies census block data in a list or spreadsheet, please follow the steps below:

1) Ensure block polygons supplied by the provider are 2000 currency
2) If other currency, convert to 2000 currency before proceeding
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID
    b. You will now have two blocks that equate to one block in the 2000 block geometry
    c. Delete duplicate block IDs, retaining the higher service tier in each case
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap and select Joins and Relates>Join from the drop down menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The Join dialog box and process can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.
6) Follow the steps in Census Blocks – GIS Data below.

3.5.4.7 Census Blocks – GIS Data

In the event that the provider supplies census block GIS data please follow the steps below:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as require attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county then select Data Management Tools>Generalization>Dissolve in ArcToolbox and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The dissolve dialog box can be seen above in the TIGER Street Segments – List, Spreadsheet, or GIS Data section.

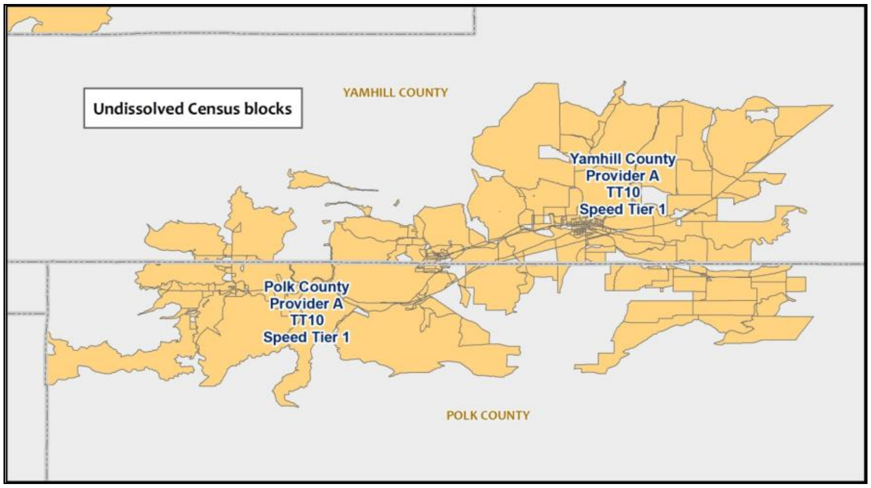


Figure 1: Undissolved census block polygons

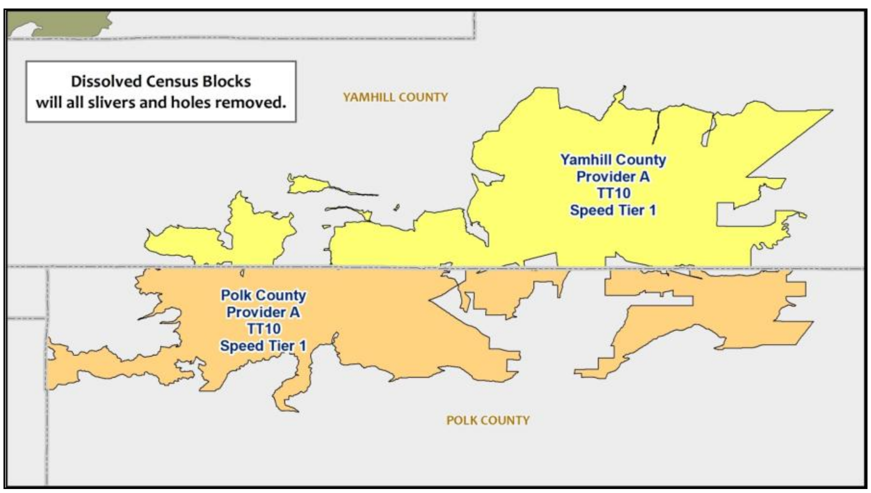
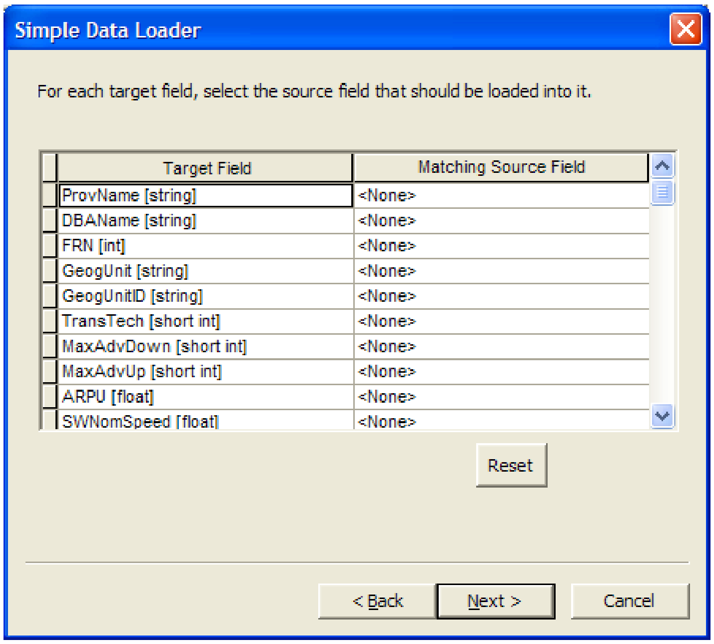


Figure 2: Census block polygons dissolved by county

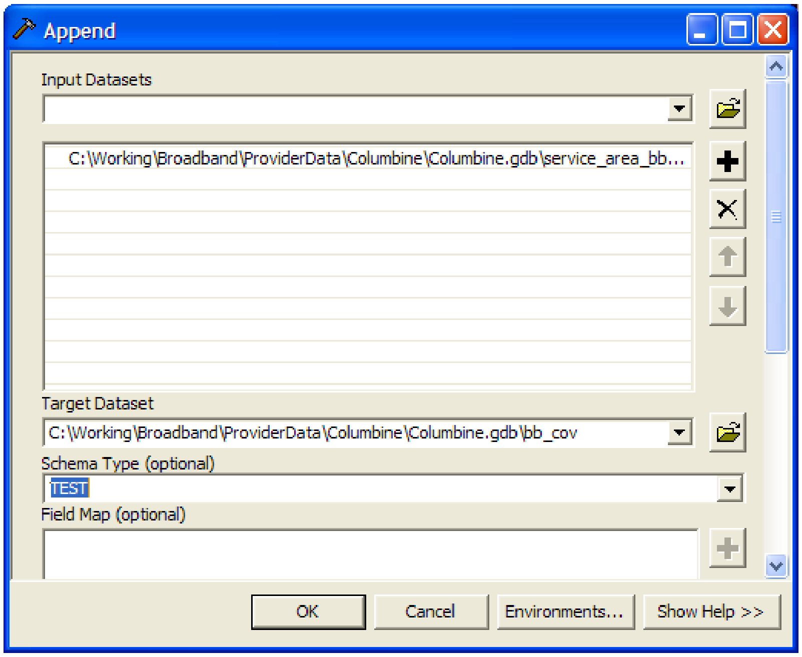
2) For each dissolved region use the Editing toolbar in ArcMap to remove unnecessary slivers and other small holes.
3) In ArcToolbox, select Data Management Tools>General>Merge and merge the processed polygons together into single layer.
4) The merged census blocks will need to have the subscriber's "frn" field added and populated.
5) In ArcCatalog, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.

a. Right-click on the empty feature class, select Load>Load Data from the dropdown menu and navigate to the location of the service area feature class
b. Press the Add button, hit Next
c. Accept the defaults and hit Next
d. Do NOT attempt to map any fields, as seen below:



e. Press Next, then Next again, then Finish.

6) In ArcToolBox, go to Data Management Tools>General>Append
7) Append the formerly empty feature class to bb_cov, completing the dialog box as seen below:



8) Leave the Schema Type as TEST
9) Press OK.
10) In ArcMap, open up bb_cov for editing and manually input associated attribution, if necessary.

3.6 Metadata Transactions

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes are recorded.

Below outlines the steps taken to run transactions on the updated Core database:

1. Open a command line window and run generateTransactions.py
    a. Usage: generateTransactions.py [Core fGDB] [Staging Environment fGDB]

    b. Example of command line:

<path>generateTransactions.py <path>ST_BB_POLY_SRV_AREAS.gdb <path>ST_BB_POLY_SRV_AREAS.gdb

2. Below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

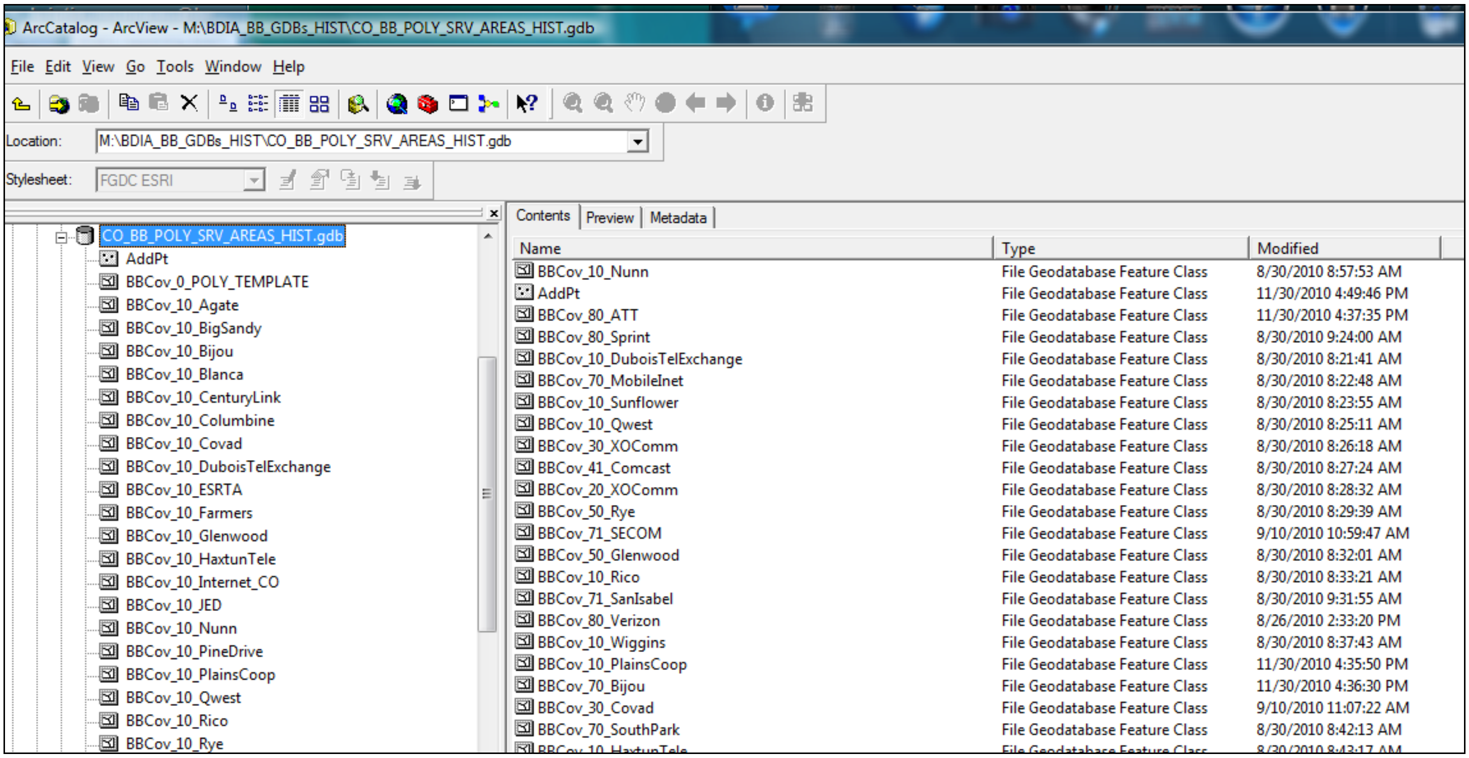
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3. After process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb
    a. The transactions scripts records changes at a feature level.
    b. Below is a screen shot supporting the directory structure of the historical fGDB.



c. Attribution associated with each added/removed/changed features is tracked, including the following additional columns appended to the end of each:

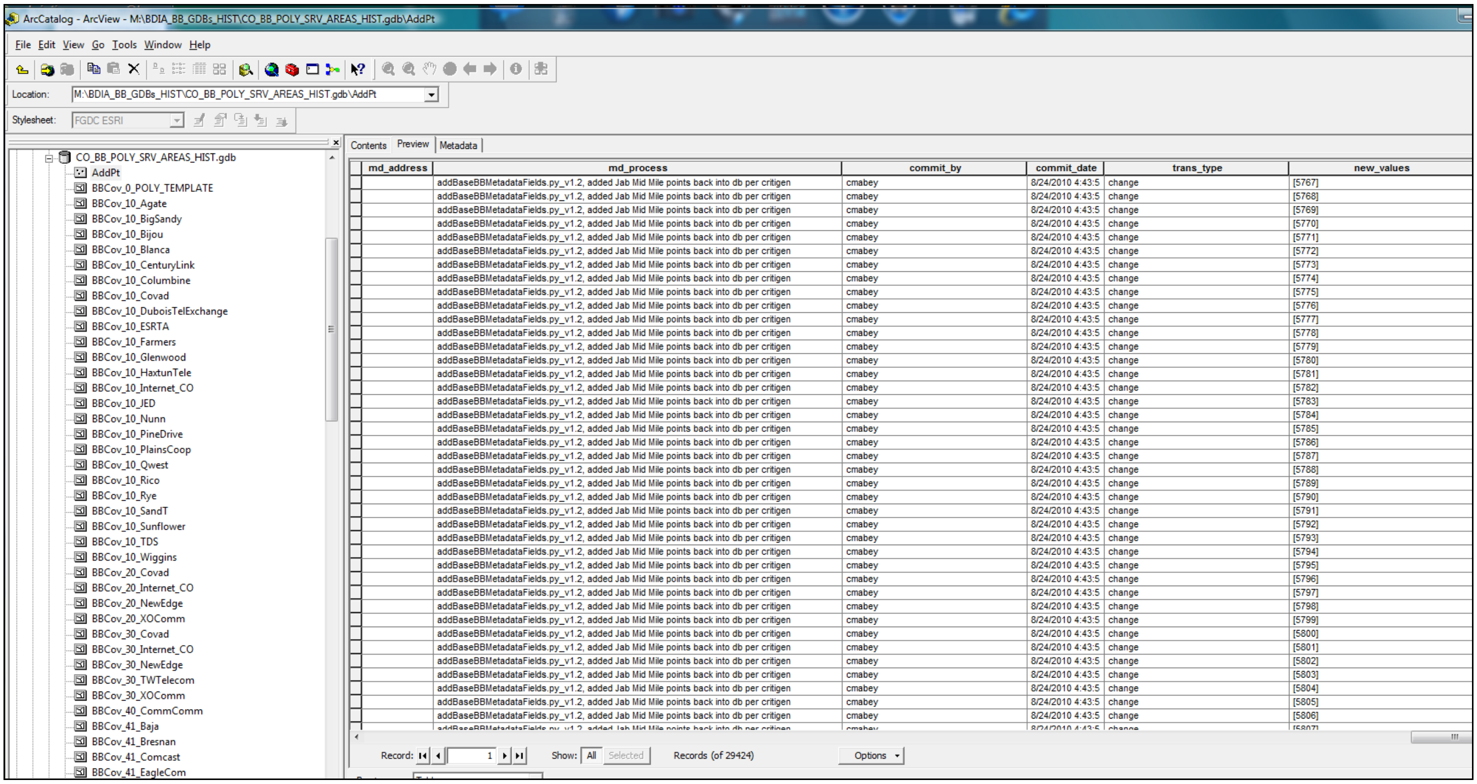
   i. Commit_by
      1. Records the GIS-Analyst that committed the changes to the historical fGDB.

   ii. Commit_date
      1. Records the date and time stamp that the changes were committed.

   iii. Trans_type
      1. This field reflects the type of change recorded.
      2. Categorized by:
         a. Adds/Change/Deletes

   iv. New_values
      1. Records the new values when a change was completed on a feature. Example: Name or speed change

d. MD_Process is also transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



3.7 Data Processing

3.7.1 Data Processing Overview

The following items outline the actions required to process the service provider data further to meet the NTIA requirements.

- Weighted Nominal Speed
- Middle Mile
- Broadband Coverage Template

3.7.2 Weighted Nominal Speed

The weighted nominal speed is populated one of the following two ways:

3.7.2.1 Subscriber Data Supplied by Provider

Where we are supplied with subscriber speed information by the data provider, we use the following formula from the NOFA:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips
2) Transmission technology type
3) Subscriber tiers

3.7.2.2 Value Supplied by Provider

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula.

When these values have been obtained or calculated, they are used to update the service overview layer. This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap. To Join, right-click on the layer you would like to join to and select Joins and Relates>Join… from the dropdown menu. Then navigate to the table you want to join and select the join fields from the drop down lists. Then open up the source table (the table in ArcMap) and right-click on the header of the Average Weighted Speed field and select Calculate Field from the drop down menu. Use the value of the average weighted speed from the joined table.

3.7.3 Middle Mile

Middle mile information is generally provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in Subscriber Location – Address Data.

2) If the data is supplied with associated XY coordinates, follow the process outlined above in Subscriber Location – XY Data.
3) Once the data is in GIS format, use the Append (Data Management Tools>General>Append) command in ArcToolbox to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

3.7.4 Broadband Coverage Template

Below is the description of the fields within the BB_Cov layer, which is the interim data set that is used to create the final product deliverable.

Name	Alias	Description
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)

Name	Alias	Description
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source id's from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma separated list of source id's used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/timethat this feature was last edited
md_process	MD_PROCESS	Metadata: Comma separated list of processed used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value = 1 (New 04/11 Model)

3.7.5 Verification and Validation

3.7.5.1 Provider Validation – Provider Portal/PDF Map Review

Following the collection and aggregation of provider data, the data is then validated by the provider to ensure the data aggregated is an accurate representation of their coverage area and supporting broadband information. This is completed through the Provider Portal web application, which is a secure interactive map displaying their coverage areas and allows the user to validate, submit feedback or request changes. If changes are requested, then the features on the portal are then updated and an automatic request is sent to the provider to complete the validation effort.

For some providers that did not use the Provider Portal, a PDF was sent displaying their coverage map and validation was then completed via e-mail notification.

3.7.5.2 Provider Verification – 3rd Party Source Review

Once the provider has validated their coverage areas, a 3rd party source comparison and analysis is then performed. Where anomalies or discrepancies are identified, a 'SCAN' point is dropped and descriptive comments applied so they can later be reviewed with the provider.

During the provider review, the map is displayed along with the 'SCAN' points and potential refinement is completed based on input from the Provider.

3rd Party Sources Utilized

3rd Party Source Name	Source Type	Verification Type
InfoUSA	Consumer and Business Listings	Community Anchor Institutions Can also be used for demographic information supporting the State websites
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41)
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80)

3.7.5.3 Assigning Confidence Values

All efforts from the above-mentioned validation and verification activities, plus internal peer quality reviews are combined and tracked in a Validation table. Based on the results of this analysis, a confidence value is assigned for each provider and then each technology.

The confidence values are as follows:

- 0 = Coverage area has not been reviewed
- 10 = Extremely Low. Single Source QC.
- 20 = Very Low. Needs Additional Validation\Verification
- 30 = Low. Even with Validation\Verification, Coverage is still suspect.
- 40 = Acceptable, confirm with State prior to shipment.
- 50 = Meets requirements to be included in shipment.
- 60 = Moderate. Meets NTIA/State's standards, representative of Technology Type (TT)
- 70 = High. Accurate representation of coverage based upon TT.
- 80 = Very High. Multiple validation\verification with most 3rd party sources
- 90 = Extremely High. Multiple validation\verification sources
- 100 = Perfect. Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities

This Validation table is then maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation.

Example of the Validation table:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

3.7.6 Community Anchor Institution (CAI) Data

3.7.6.1 Data Collection

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied was also ingested into the data deliverable.
Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs, address and broadband data.

The state-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data; service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increase submission of this data. Additional promotion to CAIs to utilize the CAI portal will be needed to increase this data for subsequent deliverables.

3.7.6.2 Institution Data

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is below:

1) If the data is provided in Excel or some similar format:

a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.

b. Standardize the address format as defined in the staging CAI database

c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the Add XY Data tool in ArcMap to create a spatial data layer.

d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.

   i. Institutions that do not geocode based on the TIGER 2009 data set will have to be manually located using Google Maps, Google Earth, or some other information source.

2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the Calculate Geometry tool to populate them, using the WGS 84 coordinate system.

3) Using ArcCatalog, load the new data into the staging CAI database.

4) This database is ready for the makeDeliverable.py script to process the information into the final state and NTIA deliverables.

3.7.6.3 Community Anchor Institution (CAI) Portal Updates

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage, and speed test data.

Information collected from the CAI Portal is then ingested into the overall inventory and will later be compared against the provider coverage areas mapped for any potential discrepancies.

3.8 Product Extract

3.8.1 Python Scripts

The following sections make use of Python scripts. In general, to use a Python scrip, you must have Python installed on your computer. To download the latest version of Python, go to http://www.python.org/download/ and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the Process Operation and Monitoring section of this document. This was a process improvement activity so all processes can be monitored, controlled and contain historical tracking on each process.

3.8.2 Product Extract Process

Note: specific Python scripts are called out in red font in the sections below.

The MapConnect product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim data sets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI)
    - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

Due to a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in the case a comparison is later desired or a request is made to revert back to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to **NATL_Broadband_Map.**

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is only populated if data cannot be provided at a more granular level.
- **BB_Service_Address**
  - **Represents broadband availability for service address points.** Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7 - 10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- **NATL_Broadband_Topology**
  - Supports basic topology quality checking. Example: No CAI's or Middle Mile points outside of the state boundary

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what's placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

3.8.3 Product Statistics

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics
  - Collects all provider information, listing by Provider Name
  - Provides output of FRN
  - Counts the number of features supported within the following layers:
    - Census Block
    - Street Segment
    - Max Upstream
    - Wireless Services
    - Infrastructure Points
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics
  - Breaks CAI down to the 8 categories
    - 1: School: K through 12
    - 2: Library

- 3: Medical/Healthcare
- 4: Public Safety
- 5: University/College
- 6: Other Government
- 7: Other Community non-government
- None: Unknown Category
  - In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAI's are categorized accurately
- Reports out the following counts
  - Total CAIs within that category
  - Total CAIs that contain partial BB coverage
    - Contains any of the following information for given CAI:
      - BB Subscriber, Transmission Technology, Speed Down Speed Up
  - Total CAIs that contain full BB coverage
    - Contains all of the above-mentioned BB information for given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files can then be inspected to ensure that there are the expected number of CAIs and providers for every release.

3.9 Quality Assurance

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase, and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports, previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format
  - Correct names and format of data deliverables
    - BDIA_QC_SUITES (please see below for details)
  - Correct Projections/Datum
    - Manual interaction with product
  - Metadata Present and Correct
    - Manual interaction with product
- Table Structure
  - All required tables included
    - BDIA_QC_SUITES
  - Extraneous tables identified
    - BDIA_QC_SUITES
- Field Structure
  - All fields included

        - BDIA_QC_SUITES
    - Extraneous fields identified
        - BDIA_QC_SUITES
    - Correct field names, types and widths
        - BDIA_QC_SUITES
- Field Domains
    - Values in all tables are constrained to the specified values specified
        - This action is accomplished via BDIA_QC_SUITES and manual review of the product
        - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation
    - Identify if all layers have the correct geometric representation
        - Manual review of the BB_ServiceOverview layer
        - Dependent on NTIA and client requirements
- Geographic Extent
    - Product includes the necessary Geography associated with Product?
        - Manual Review - ArcGIS
    - Is there extraneous geography included in Product?
        - Manual Review - ArcGIS
- Completeness
    - Products contain the expected amount of data?
        - Manual review of product stats relative to weekly State reports and defined expectations.
- Accuracy
    - Product meets the stated accuracy requirements for the deliverable?
        - Sampling procedure to manually review source material to resulting product
        - Provider Validation
        - Verification using 3rd Party Data
        - Verification against reality, where applicable
- Data Regression
    - Any unexplainable data loss or change?
        - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product
- Confidentiality
    - Any unauthorized confidential information included in the delivery?
        - Review of NDAs and delivery expectations
- Prior Issues Resolved
    - Have expected internal issues been resolved?
        - Manual review of data against previous product release notes
    - Have agreed upon customer issues been resolved?
        - Manual review of data against previous product release notes, status report and client feedback
- Delivery Medium

- Has the product medium been verified?
  - Manual review
- All files present
  - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size
- Correct location
  - Manual review – confirmation of SFTP link, username and password

3.9.1 QC Suite

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

3.9.1.1 Configuration

These scripts establish the configuration for the test_BDIAProductGDB script which is the core of the QC Suite.

- update_test_config
- active_config
- config_PROCESS01_automated
- config_PROCESS01_manual
- set_active_config

3.9.1.2 Libraries

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

- bb_unittest_fixture
- bbcov_structure
- BC_XmlWriter
- file_folder
- search_and_replace
- unittst_fixture
- validate_BB_DB
- validate_BB_GDB
- xmlrunner_gui

3.9.1.3 QC Suite

This is the core script for performing automated QA/QC on the interim and final data deliverables.

- test_BDIAProductGDB

3.9.1.4 Other

These scripts perform other functions detailed below:

- test_runner – this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries

- which_build – this determines the current build and passes information to the configuration scripts

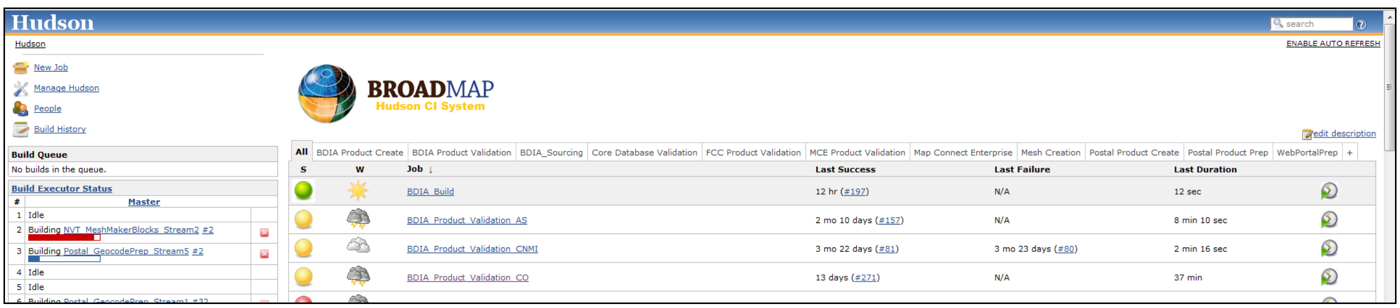
3.10 Process Operation and Monitoring

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

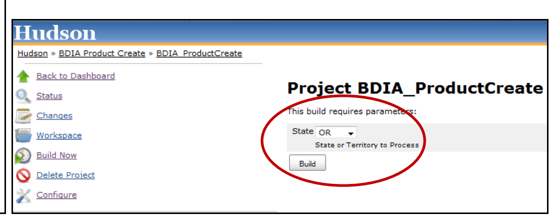
Below are examples of the product create, product validation, product statistics and monitoring processes which are managed within the BroadMap Hudson CI-System. All of the above-mentioned python scripts, with the exception of metadata transactions script, are run via this system.

3.10.1 BDIA Product Create

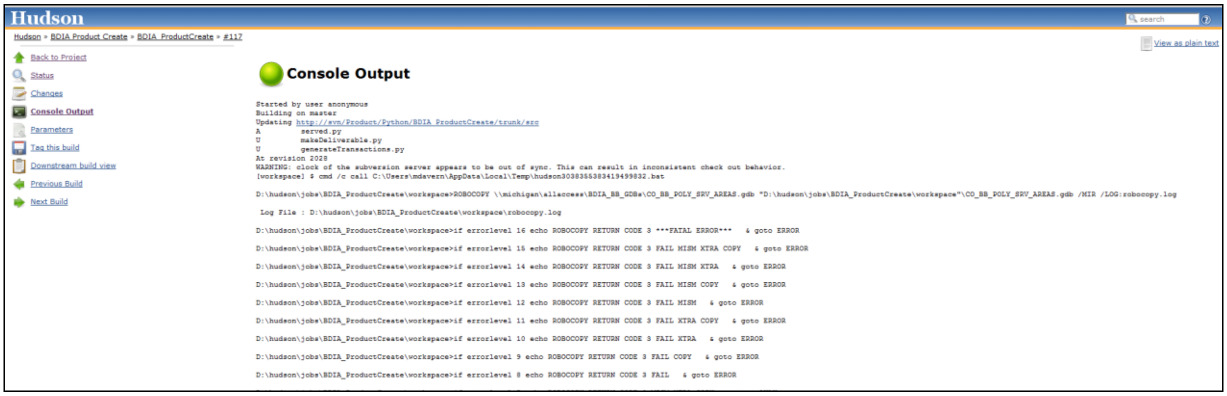
Below is an example of the main page where the type of product build can be selected.



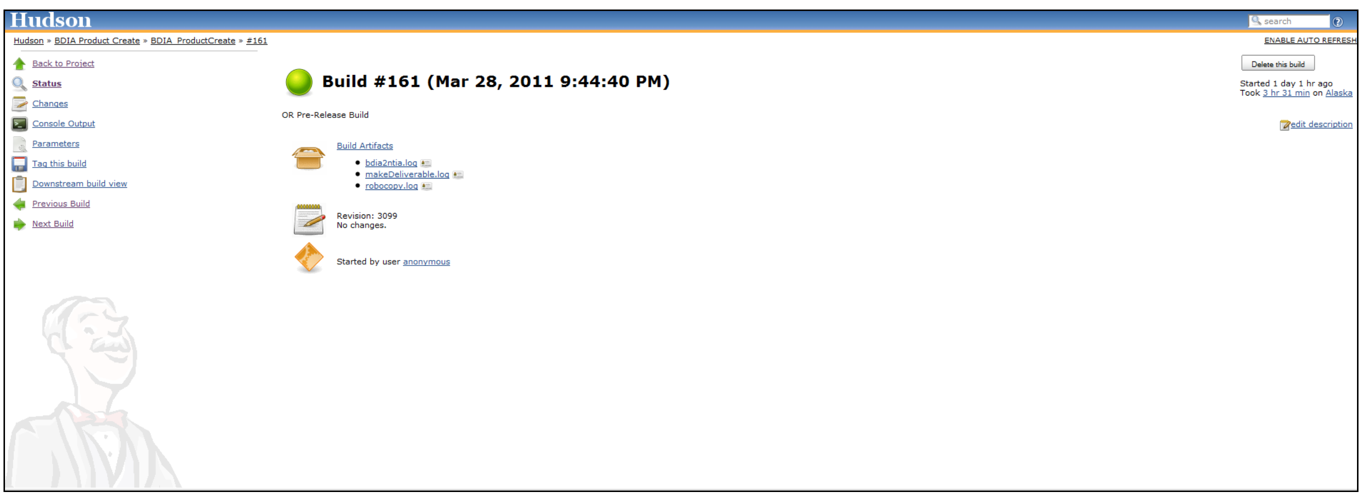
Selecting based on the type of process that will be initiated.



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

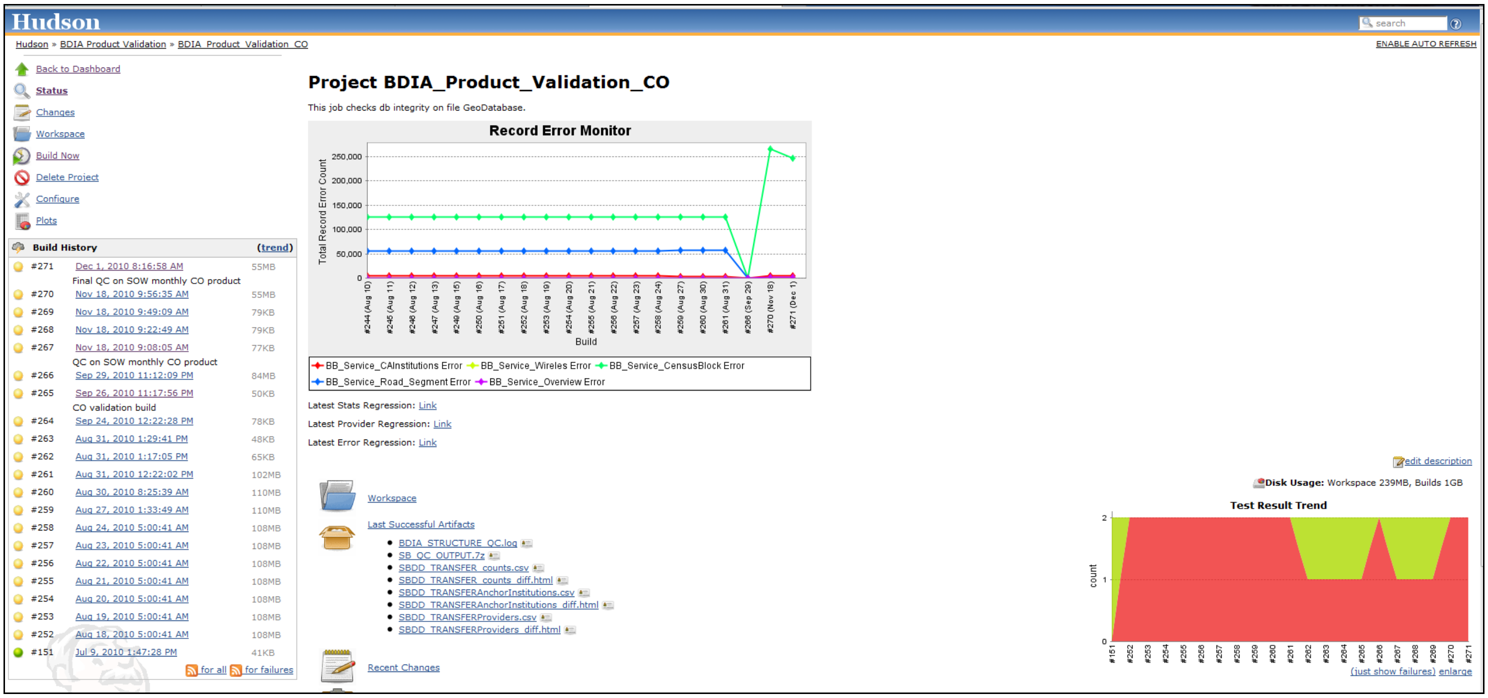


3.10.2 Product Validation and Statistics

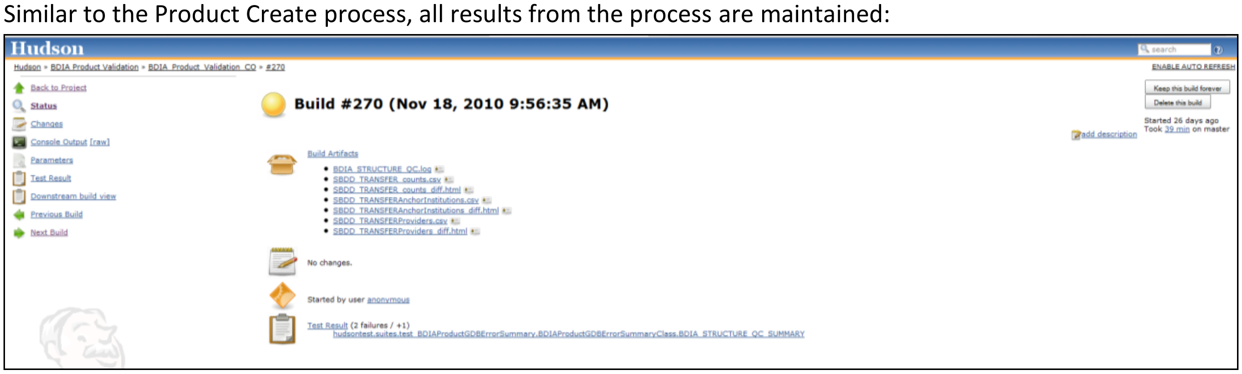
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check allowing the identification of errors due to project status/completeness verses project correctness. Example: Typical Speeds populated.

Below is an example of the report provided based on various control points running over a specified time period:

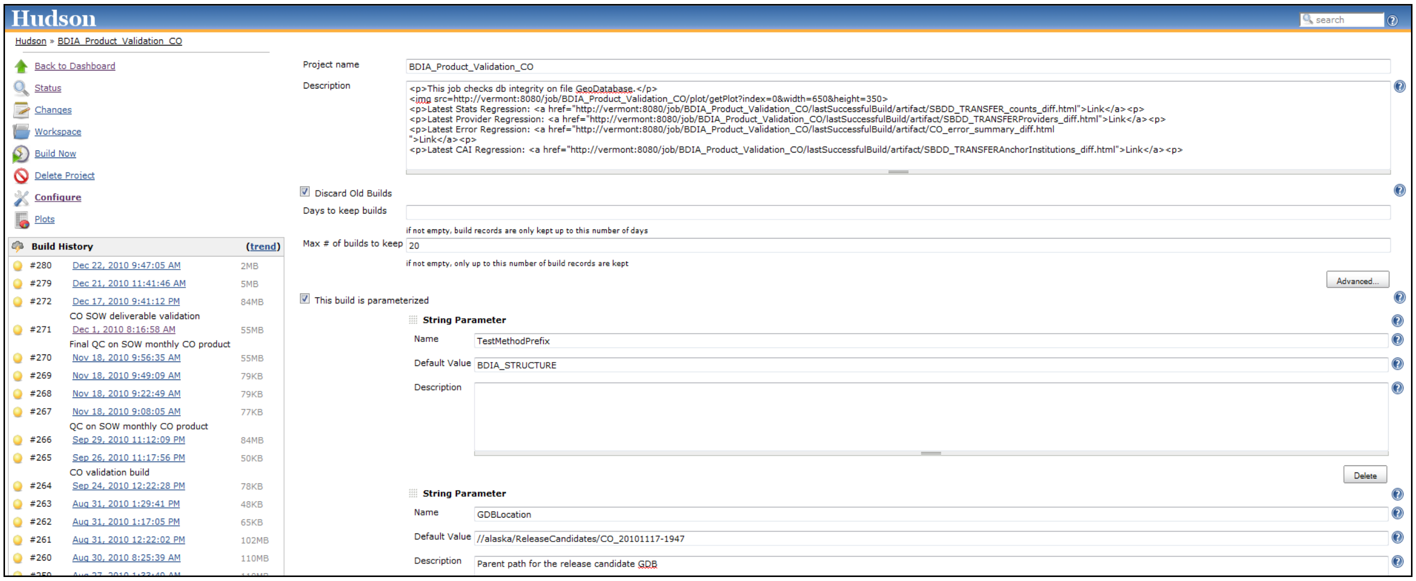


Similar to the Product Create process, all results from the process are maintained:



Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes.

Further detail on the Hudson CI System environment can be found by navigating to the following link: http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



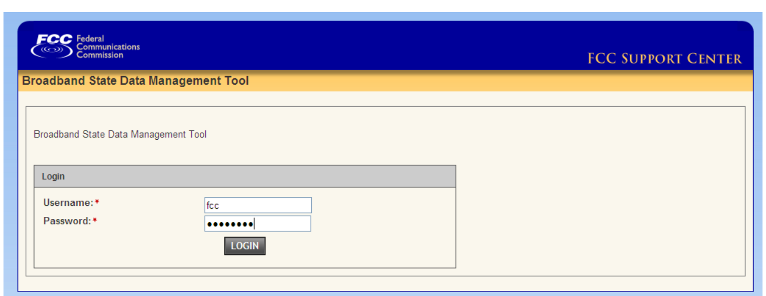
3.11 Product Extract Data Delivery

Product delivery for MapConnect Broadband is handled two ways, depending on client requirements:

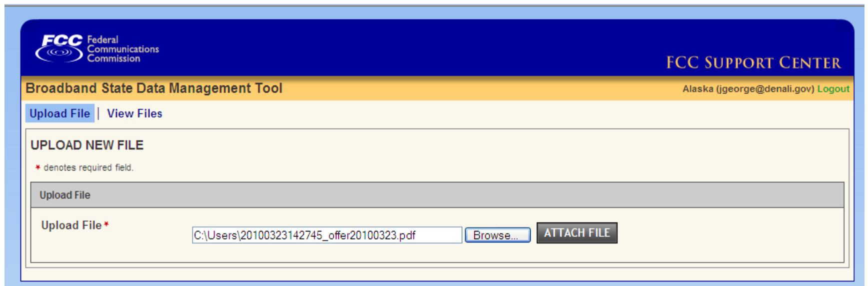
1) State Submittal
   a) Data is submitted via SFTP site
   b) Product Release Notes and QC Test Report accompanies the delivery

2) NTIA Submittal

   a) Directions for using the NTIA State Broadband Data file submission tool
   b) Go to the following WWW web site: https://esupport.fcc.gov/statedata
   c) Enter your username and password as provided to you from the NTIA program administrator.



   d) Click in Upload a file field
   e) Browse to local file for submission using the 'Browse' button. Select file then select ATTACH FILE.



f) Logout / Receipt using the Logout button in the Top Right of the screen

g) A receipt of submission is emailed to username e-mail address

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF TENNESSEE

CONNECTED Tennessee

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April 1, 2011

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TENNESSEE COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

It is with highest regard that the collective stakeholders of Connected Tennessee offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation, Connected Tennessee's parent organization, and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connected Tennessee has played in creating such a powerful tool that will surely benefit not just Tennesseans, but consumers and businesses nationwide.

Therefore, Connected Tennessee, as the State Broadband Designated Entity, in partnership with the Department of Finance and Administration's Office for Information Resources and Department of Economic and Community Development among other agencies, is pleased to present this submittal of the State of Tennessee's State Broadband Data and Development (SBDD) Grant Program, known as Connected Tennessee.

These artifacts should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connected Tennessee: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road

		Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connected Tennessee program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connected Tennessee program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 86.67% of the Tennessee provider community, or 78 of 90 total providers. Of the 78 participating providers, 27 supplied an update to their network or coverage area(s), while 47 have reported no change. The remaining 4 represent providers who previously supplied data but were non-responsive in the April 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 12 providers that are not represented in the attached datasets, 7 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connected Tennessee. The remaining 5 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connected Tennessee principals that all commercially reasonable efforts were made to account for 100% of the known Tennessee broadband provider community, pursuant to this semi-annual data update submission.

Connected Tennessee has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connected Tennessee conducts field validation efforts. To date, 30 (33.33%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connected Tennessee launched a website to create awareness about the initiative. Connectedtennessee.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connected Tennessee website encountered 6,241 unique visits during this reporting period (27,071 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 380 broadband inquiries over this same reporting period (1,263 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer initiated actions are facilitated through the Connected Tennessee website and the Connected Tennessee Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connected Tennessee mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connected Tennessee has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the State of Tennessee, outreach was conducted during this data update reporting period by Connected Tennessee to continue identification of existing, centralized sources for CAI connectivity data. During this reporting period Connected Tennessee secured data from the NetTN network. NetTN provides broadband service to state agencies, local governments, institutions of higher education, K-12 schools, libraries, eHealth, 911, and non-profits throughout the State of Tennessee. Additionally, outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connected Tennessee website. During this reporting period Connected Tennessee has continued to utilize the contacts of statewide associations and partners to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connected Tennessee will continue to build upon these relationships over the coming months to collect data and raise awareness of this project.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connected Tennessee will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. From our work in Tennessee, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connected Tennessee efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connected Tennessee program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great State of Tennessee, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Michael L. Ramage
Executive Director
Connected Tennessee

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: TENNESSEE COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connected Tennessee, working in close coordination with the State of Tennessee, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connected Tennessee has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connected Tennessee has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connected Tennessee through ESRI ArcGIS software.

Connected Tennessee continues to utilize a customized online survey on the Connected Tennessee website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connected Tennessee will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link:
http://www.connectedtennessee.org/broadband_landscape/community_anchor_institution_survey.php

Connected Tennessee has worked diligently during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. Through our partnership with the State of Tennessee, an existing statewide CAI broadband network was identified and the data has been included in this reporting submission. The NetTN network database includes over 1,800 complete connectivity data points for CAI in all sectors. More information about this network can be found on the NetTN website, http://www.nettn.net/Home.aspx.

In tandem with these efforts to identify existing data, Connected Tennessee continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Connected Tennessee has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connected Tennessee is developing a CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Tennessee, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data specifically for public safety and healthcare CAI. Connected Tennessee will continue its ongoing work with the State of Tennessee and key organization contacts in an effort to raise awareness of this project among CAI.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	2,396	2,396	2,396	760	760	759
Libraries	259	259	259	231	231	231
Healthcare	825	825	825	113	112	112
Public Safety	742	742	738	257	101	101
Higher Ed Institutions	317	317	316	156	160	104
Other Government	1,262	1,262	1,261	1,181	1,141	1,140
Other Non-Government	164	164	163	72	69	69
Total	**5,965**	**5,965**	**5,958**	**2,770**	**2,574**	**2,516**

SBDD DATA SUBMISSION METHODOLOGY

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the State of Tennessee.

Inventory of Deliverables, Connected Tennessee: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the State of Tennessee have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Tennessee Field Validation Narrative

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Tennessee on the following providers: Ardmore Telephone Company Inc., AT&T, Beasley Wireless, Ben Lomand Rural Telephone Cooperative Inc., Big River, Cellular South Inc., Clearwire Corporation, Columbia Power & Water Systems, CRU Enterprises, DotSpot Wireless, ECSIS.Net, Frontier Communications Corporation, High Country Online, Jackson Energy Authority, Ken-Tenn Wireless LLC, Leap Wireless International Inc., Millington Telephone Company, NetEase, NewWave Communications, Planet Connect Internet, QuickRelay Wireless Communications, Sprint. TEC of Jackson Inc., T-Mobile USA Inc., Trenton Cable TV Company, U.S. Cellular, UltraNet, Verizon Communications Inc. and Xpansion Networks.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 30 companies (out of a universe of 90 viable providers) totaling 33.33% within the State of Tennessee.

Accuracy and Verification: Methodology - Provider Validation

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 4.94% of Tennessee households do not have terrestrial fixed broadband service available, and approximately 0.42%[1] of Tennessee households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 9.07% of rural Tennessee households do not have terrestrial fixed broadband service available, and approximately 0.83%[3] of rural Tennessee households have neither mobile nor fixed broadband service available.[4]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connected Tennessee project has received a total of 380 inquiries (1,263 grant inception to date). As more inquiries are submitted to Connected Tennessee, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connected Tennessee project launched BroadbandStat on February 10, 2010, and has received a total of 5,729 visits to date, of which 1,063 occurred this reporting period.

SPEED TEST METHODOLOGY

The 2,269 speed tests that are represented in the Connected Tennessee Speed Test Report during this reporting period (7,149 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connected Tennessee speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connected Tennessee project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connected Tennessee with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the State of Tennessee.

CONNECTED Tennessee
THE TRAIL TO INNOVATION®

Broadband Provider Log

Complete	92
Non-Responsive/Refused	10
In Progress	10
Count of Datasets by Viable Status	**112**
Total Unique Providers Represented	**90**

Provider Name	Platform	Status	NDA Execution Date	Notes
Ardmore Telephone Company Inc	ILEC/CLEC	Data Added to Statewide Inventory	2/16/2010	
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
Ben Lomand Rural Telephone Coop., Inc.	Fiber	Data Added to Statewide Inventory	10/21/2009	
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Charter Communications Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
ECSIS.NET	Fixed Wireless	Data Added to Statewide Inventory	10/29/2009	
Electric Power Board for the City of Chattanooga	Fiber	Data Added to Statewide Inventory		
Fayetteville Public Utilities	Cable	Data Added to Statewide Inventory		
Frontier Communications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/22/2010	
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
MidSouth Satellite, LLC	Fixed Wireless	Data Added to Statewide Inventory	7/7/2010	
Millington CATV, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	10/19/2009	
Millington CATV, Inc.	Cable	Data Added to Statewide Inventory	10/19/2009	
Monster Broadband, Inc.	Fixed Wireless	Data Added to Statewide Inventory	11/6/2009	
Planet Connect Internet	Fixed Wireless	Data Added to Statewide Inventory		
Rural Tennessee Wireless Broadband (RTWB)	Fixed Wireless	Data Added to Statewide Inventory	2/15/2011	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
TDS Telecommunications Corporation	ILEC/CLEC	Data Added to Statewide Inventory	1/27/2010	
TDS Telecommunications Corporation	Fiber	Data Added to Statewide Inventory	1/27/2010	
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
Zito Midwest LLC	Cable	Data Added to Statewide Inventory	2/17/2011	[JAN-19-11 Daryl Coffey] Zito Midwest purchased Galaxy Cable.
DIECA Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
MidSouth Satellite, LLC	Backhaul	Backhaul Provider Only Processing Complete	7/7/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
TDS Telecommunications Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/27/2010	
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
NTCH, Inc.	Mobile Wireless	Provider Gathering Data		
TELE-PAGE Inc.	Fixed Wireless	Provider Gathering Data	1/26/2010	
Access Cable Television, Inc.	Cable	No Update to Provide		
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Aurora Cable TV	Cable	No Update to Provide	3/12/2010	
Beasley Wireless	Fixed Wireless	No Update to Provide	1/19/2010	
Ben Lomand Rural Telephone Coop., Inc.	ILEC/CLEC	No Update to Provide	10/21/2009	
Bledsoe Telephone Cooperative Inc	ILEC/CLEC	No Update to Provide	1/20/2010	
BreezeAir.net	Fixed Wireless	No Update to Provide	8/17/2010	
Bristol Tennessee Essential Services	Fiber	No Update to Provide	9/1/2010	
Celina Cable Communications, Inc.	Cable	No Update to Provide	1/15/2010	
Cellular South, Inc.	Mobile Wireless	No Update to Provide	4/12/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Columbia Power & Water Systems	Cable	No Update to Provide		
CRU Enterprises, Inc.	Fixed Wireless	No Update to Provide	2/4/2010	
DeKalb Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	2/24/2010	
DeltaCom, Inc.	Backhaul	No Update to Provide	2/16/2010	
ETC Communications, LLC	Cable	No Update to Provide	10/14/2009	
High Country Online LLC	Fixed Wireless	No Update to Provide	3/4/2010	
Highland Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/14/2010	
iGiles/DotSpot.Net	Fixed Wireless	No Update to Provide	2/25/2010	
Info-Ed Inc	Fixed Wireless	No Update to Provide	2/9/2010	
InfoStructure Inc.	Cable	No Update to Provide	10/2/2009	
Iris Networks	Backhaul	No Update to Provide	1/5/2010	
Jackson Energy Authority	Fiber	No Update to Provide	3/17/2010	
James Cable LLC	Cable	No Update to Provide	1/11/2010	
Ken-Tenn Wireless, L.L.C.	Fixed Wireless	No Update to Provide	1/25/2010	
Loretto Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	3/16/2010	
Mediacom Southeast LLC	Cable	No Update to Provide	1/12/2010	
Morristown Utilities Commission	Fiber	No Update to Provide	3/25/2010	
NetEase	Fixed Wireless	No Update to Provide	2/3/2010	
NewWave Communications	Cable	No Update to Provide	10/13/2009	
North Central Communications	ILEC/CLEC	No Update to Provide	2/5/2010	
OnWav, Inc.	Fixed Wireless	No Update to Provide	3/15/2010	
Pickwick Cablevision, Inc.	Cable	No Update to Provide		
Pulaski Electric System	Fiber	No Update to Provide	12/30/2009	
Skyline Telephone Membership Corporation	ILEC/CLEC	No Update to Provide	2/2/2010	
Skyline Telephone Membership Corporation	Backhaul	No Update to Provide	2/2/2010	

Softek, Inc.	Fixed Wireless	No Update to Provide	1/14/2010	
Spirit Broadband	Cable	No Update to Provide	3/29/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Surfmore.Net, Inc.	Fixed Wireless	No Update to Provide	1/25/2010	
TEC of Jackson, Inc	ILEC/CLEC	No Update to Provide	7/29/2010	
TEC of Jackson, Inc	ILEC/CLEC	No Update to Provide	7/29/2010	
TEC of Jackson, Inc	ILEC/CLEC	No Update to Provide	7/29/2010	
TEC of Jackson, Inc	Backhaul	No Update to Provide	7/29/2010	
TEC of Jackson, Inc	Backhaul	No Update to Provide	7/29/2010	
TEC of Jackson, Inc	Backhaul	No Update to Provide	7/29/2010	
Trenton TV Cable Company	Cable	No Update to Provide		
Tullahoma Utilities Board	Fiber	No Update to Provide		
tw telecom of tennessee, llc	Backhaul	No Update to Provide	3/31/2010	
Twin Lakes Telephone Cooperative Corporation	ILEC/CLEC	No Update to Provide	1/14/2010	
Ultranet High-Speed Internet	Fixed Wireless	No Update to Provide	2/23/2010	
Wave2Wave Communications Inc.	Backhaul	No Update to Provide	4/28/2010	
West Kentucky Rural Telephone Coop Corp Inc	ILEC/CLEC	No Update to Provide	1/7/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Clarksville Department of Electricity	Fiber	No Update Provided - Use Last Submission Data		
OrbWireless.net	Fixed Wireless	No Update Provided - Use Last Submission Data		
QuickRelay Wireless Communications	Fixed Wireless	No Update Provided - Use Last Submission Data		
United Telephone Company, Inc. - TN	ILEC/CLEC	No Update Provided - Use Last Submission Data	2/25/2010	
Verizon Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data	12/14/2009	
TNets Internet	Fixed Wireless	Solicited Initial Data		
United Telephone Company, Inc. - TN	Fiber	Solicited Initial Data	2/25/2010	
Wisper, LLC	Fixed Wireless	Solicited Initial Data	2/22/2011	
ABG Wireless, LLC	Fixed Wireless	Refused to Participate		[FEB-14-11 Deanna Ward] Provider representative indicated that they did not want to participate.
Birch Communications, Inc.	ILEC/CLEC	Refused to Participate		[JAN-11-11 Jill Lindgren] Provider has chosen not to participate. The main concern was more with the fact he does not want to divulge the information publicly on his speeds or coverage area.
Birch Communications, Inc.	Backhaul	Refused to Participate		[JAN-11-11 Jill Lindgren] Provider has chosen not to participate. The main concern was more with the fact he does not want to divulge the information publicly on his speeds or coverage area.
TNWEB, LLC	ILEC/CLEC	Refused to Participate		[FEB-03-11 Deanna Ward] E-mail received from provider asking not to be contacted again.
TNWEB, LLC	Fixed Wireless	Refused to Participate		[FEB-03-11 Deanna Ward] E-mail received from provider asking not to be contacted again.
Trinity Communications LLC	Cable	Refused to Participate		[FEB-16-11 Alyson Sumerford] Contacted provider by phone and was told, "put so much time into this last year and provided no fruits for my business. I have bigger things to worry about right now."
Endless Sphere Technology	Fixed Wireless	Non-Responsive to Multiple Attempts	2/17/2010	In addition to multiple contact attempts made between January 21, 2010 and September 1, 2010, six attempts were made during this submission period.
Knology of Tennessee, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 18, 2009 and August 24, 2010, five attempts were made during this submission period.
Knology of Tennessee, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 18, 2009 and August 24, 2010, six attempts were made during this submission period.
US LEC of Tennessee Inc.	Backhaul	Non-Responsive to Multiple Attempts		Five contact attempts were made between August 31, 2010 and February 22, 2011.
DIECA Communications, Inc.	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Wes Kerr] Provider doesn't offer residential DSL, and the last mile data will not be included in the data submission.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Ashley Littell] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Global Crossing Telecommunications, Inc.	Backhaul	Other		[FEB-17-11 Wes Kerr] Received word from a provider representative that they still have a Network Security agreement with several Federal agencies and cannot provide data at this time.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Ashley Littell] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Ashley Littell] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF TEXAS

CONNECTED TEXAS®

April 1, 2011

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TEXAS COVER LETTER

April 1, 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

The collective stakeholders of Connected Texas offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers to achieve smarter investments and develop targeted state and local broadband policies and programs. We are proud of the role that Connected Texas has played in creating such a powerful tool that will surely benefit not just Texans but consumers and businesses nationwide.

Therefore, as the State Broadband Designated Entity, and in partnership with the state of Texas, please accept this submission from Connected Nation on behalf of the state of Texas' State Broadband Data and Development (SBDD) Grant Program, known as Connected Texas.

This submission should be found to be compliant with the April 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connected Texas: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles

Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connected Texas program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

The Connected Texas program is pleased to submit this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 77.84% of the Texas provider community, or 144 of 185 total providers. Of the 144 participating providers, 65 supplied an update to their network or coverage area(s), while 74 have reported no change. The remaining 5 represent providers who previously supplied data but were non-responsive in the April 2011 update effort or could not verify coverage areas at the time of this submission; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 41 providers that are not represented in the attached datasets, 34 have either refused to participate in the voluntary program or have remained unresponsive to the numerous attempts at contact by Connected Texas. The remaining 7 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission.

As the Broadband Provider Roster and attached methodology documentation will attest, it is the collective opinion of the Connected Texas principals that all commercially reasonable efforts were made to account for 100% of the known Texas broadband provider community, pursuant to this semi-annual data update submission.

Connected Texas has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connected Texas conducts field validation efforts. To date, 103 (55.68%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connected Texas launched a website to create awareness about the initiative. Connectedtx.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connected Texas website encountered 5,155 unique visits during this reporting period, which includes 5,040 visits to the English website and 115 visits to the Spanish website (29,609 total to date for the life of the grant awarded on January 1, 2010, which includes 29,362 to the English website and 247 to the Spanish website). Additionally, this pronounced Web activity netted 66 broadband inquiries over this same reporting period (429 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer initiated actions are facilitated through the Connected Texas website and the Connected Texas Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connected Texas mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connected Texas has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Texas Department of Agriculture, outreach was conducted during this data update reporting period by Connected Texas to continue identification of existing, centralized sources for CAI connectivity data. Outreach was coordinated to distribute the CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connected Texas website. Connected Texas also partnered this reporting period with the Texas Department of Agriculture's Regional Field Team Staff to raise awareness in their communities about this initiative and distribute our survey. Connected Texas continues to work in close coordination with statewide associations such as the Texas State Library and Archives Commission, Commission on State Emergency Communication, and Department of Information Resources to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connected Texas will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the state, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. Additionally, Connected Texas will continue working closely with members of the Texas Broadband Task Force to reach CAI associated with their respective sectors. From our work in Texas, as well as other states, we recognize the great value of this data to future collaboration efforts within the state and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connected Texas efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Texas, Connected Nation has previously engaged all federally recognized tribal lands in the area covered by the Connected Texas SBDD grant and reported that outreach as part of past submissions. Throughout the next reporting period Connected Texas plans to engage directly with these tribal communities and will also conduct affirmative outreach with Native American tribal organizations that are active within the area. Connected Texas understands the connectivity challenges facing these tribes, and we have identified a need to include their data as part of our upcoming submissions.

The Connected Texas program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Texas, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Data Acquisition: Texas Community Anchor Institutions

In this third reporting period of the SBDD, Connected Texas, working in close coordination with the Texas Department of Agriculture, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connected Texas has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connected Texas has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connected Texas through ESRI ArcGIS software.

Connected Texas continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connected Texas website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connected Texas will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link using the following password:
http://connectedtx.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_TX_7933

Connected Texas and the Texas Department of Agriculture have worked closely during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. We have identified two sources of existing CAI connectivity data in the state. The TEX-AN network is a state-managed network serving state agencies, some universities and schools, as well as a few counties and cities, and the Austin Metropolitan Network serves most state agencies within Austin. Data from both of these networks is still being extracted by the Texas Department of Information Resources and Connected Texas will be reporting this data in the next reporting submission.

In tandem with these efforts to identify existing data, Connected Texas continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Key CAI contacts throughout the state are working with Connected Texas to distribute the survey, and work continues with the Texas Department of Agriculture's Regional Development Teams to reach CAI within their regions.

Connected Texas has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connected Texas is developing a CAI newsletter to be distributed quarterly beginning in March 2011. The newsletter will highlight a CAI in Texas, encourage institutions to share their data, and highlight the National Broadband Map. This newsletter will also be provided to the Regional Development Teams for distribution in their regions throughout the state.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connected Texas will continue its ongoing work with the Texas Department of Agriculture and key organization contacts in an effort to raise awareness of this project among CAI. Additionally, the Texas Broadband Task Force will be briefed at an upcoming meeting on the CAI project and will be made aware of the challenges we have faced it the state with collecting this data. The Task Force members will be provided information with how they can assist with outreach and promotion over the coming months.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	10,604	10,600	10,600	74	67	68
Libraries	1,135	1,135	1,135	99	254	96
Healthcare	868	868	867	76	159	78
Public Safety	2,907	2,907	2,871	252	539	250
Higher Ed Institutions	419	419	419	81	83	30
Other Government	703	703	702	446	61	27
Other Non-Government	0	0	0	0	0	0
Total	**16,636**	**16,632**	**16,594**	**1,028**	**1,163**	**549**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state or territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Texas.

Inventory of Deliverables, Connected Texas: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Texas have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the state, rather than submitting the entire boundary of the state as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

Texas Field Validation Narrative

Connected Nation focused a portion of their time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Texas on the following providers: Alenco Communications Inc., Allegiance Communications, AT&T, AwesomeNet Inc., Basin 2 Way Radio Inc., Basin Broadband, Big Bend Telephone, BordertoBorder, Broadband Data Services of Texas LLC, Broadcomm, Cable One Inc., Cameron Telephone Company LLC, Cap Rock Telephone Cooperative Inc., Central Texas Cable Partners Inc., Central Texas Telephone Cooperative Inc., CenturyLink, Cequel Communications, Clearwire Corporation, Coleman County Telephone Cooperative Inc., Colorado Valley Telephone Cooperative Inc., Comcast Cable Communications LLC, Community Telephone Company Inc., Consolidated Communications, Cumby Telephone Cooperative Inc., DC Texas.Net, Dell Telephone Cooperative Inc., Digitex.com, Dot11 Networks, East Texas DSL, Eastex Telephone Cooperative Inc., ECTISP, ELC Internet Services Inc., Electra Telephone Company, Element Networks LLC, eNet, ERF Wireless, ETAN Industries, ETS Cablevision Company Inc., Ganado Telephone Company, GEUS, Gower Computer Support Inc., Grande Communications, Grayson CableRocket LLC, Greasy Bend Ventures Inc., GTEK Communications, Guadalupe Valley Communications Systems, GVEC.net, Hill Country Telephone Cooperative Inc., JAB Wireless Inc., KeyOn Communications Inc., La Ward Telephone Exchange Inc., Lake Livingston Telephone Company, Leap Wireless International Inc., Live Air Networks, Livingston Telephone Company Incorporated, Maverick Internet, McDonald Group, Mid-Plains Rural Telephone Cooperative Inc., NetWest Online Inc., Neu Ventures Inc., Nortex Communications, North Texas Broadband LLC, North Texas Cellular Inc., Northland Communications, NTS Communications, Panhandle Telephone Cooperative Inc., Partnership Broadband Inc., Phantom Wave, Poka Lambro Telephone Cooperative Inc., Presidio Community Wireless Network, Promptwireless LLP, Qwest Communications, RB3 LLC, Ridgewood Cable, Rioplex, Riveria Telephone Company Inc., Rock Solid Internet and Telephone, Santa Rosa Telephone Cooperative Inc., Smithville System, South Plains Telephone Cooperative Inc., Southeast Arkansas Telephone Cooperative Inc., Southwest Texas Telephone Company, Speed of Light Broadband Inc., Sprint, Stelera Wireless LLC, Surf-Side Net, Taylor Telephone Cooperative, Texas Broadband Inc., Texas CellNet, Texas Wireless Internet, Texhoma Wireless, Tier One Converged Networks Inc., Time Warner Cable Inc., TISD, T-Mobile USA Inc., Totelcom Communications LLC, tw telecom, Valley Telephone Cooperative Inc., Verizon Southwest Inc., Wes-Tex Telecommunications Ltd., Wharton County Electric Cooperative Inc., Windstream Communications, and XIT Telecommunications & Technology Ltd.

During this reporting period, Connected Nation conducted 13 additional on-site validation tests with AT&T, Big Bend Telephone, BordertoBorder, Broadcomm, Presidio Community Wireless Network, Rioplex, Southeast Arkansas Telephone Cooperative Inc., and Valley Telephone Cooperative Inc.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 103 companies (out of a universe of 185 viable providers) totaling 55.68% within the state of Texas.

Accuracy and Verification: Methodology - Provider Validation

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 3.15% of Texas households do not have terrestrial fixed broadband service available, and approximately 0.3%[1] of Texas households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 9.76% of rural Texas households do not have terrestrial fixed broadband service available, and approximately 0.96%[3] of rural Texas households have neither mobile nor fixed broadband service available.[4]

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet.
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem.

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the state, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connected Texas project has received a total of 66 inquiries (429 grant inception to date). As more inquiries are submitted to Connected Texas, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connected Texas project launched BroadbandStat on June 16, 2010, and has received a total of 13,536 visits to date, of which 1,779 occurred this reporting period.

SPEED TEST METHODOLOGY

The 1,025 speed tests that are represented in the Connected Texas Speed Test Report during this reporting period (5,271 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connected Texas speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connected Texas project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connected Texas with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Texas.

Broadband Provider Log

Complete	233
Non-Responsive/Refused	37
In Progress	19
Count of Datasets by Status	**289**
Total Unique Providers Represented	**185**

Provider Name	Platform	Status	NDA Execution Date	Notes
Alenco Communications, Inc.	Fiber	Data Added to Statewide Inventory	11/17/2009	
AT&T Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/16/2009	
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
AwesomeNet, Inc.	Fixed Wireless	Data Added to Statewide Inventory		
Basin 2 Way Radio, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/14/2010	
C. T. Cube	Fixed Wireless	Data Added to Statewide Inventory	4/22/2010	
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	
Cap Rock Telephone Cooperative, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/4/2010	
Celltex Networks, LLC	Fixed Wireless	Data Added to Statewide Inventory		
CenturyLink	ILEC/CLEC	Data Added to Statewide Inventory	12/4/2009	
Charter Communications	Cable	Data Added to Statewide Inventory	12/15/2009	
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	
Coleman County Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/10/2010	
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	
Community Telephone Company, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/10/2010	
Consolidated Communications	ILEC/CLEC	Data Added to Statewide Inventory	11/30/2009	
CTX Unwired	Fixed Wireless	Data Added to Statewide Inventory	2/14/2011	
Cumby Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	3/5/2010	
DCTexas.Net	Fixed Wireless	Data Added to Statewide Inventory	6/15/2010	
Dot 10 Wireless	Fixed Wireless	Data Added to Statewide Inventory		
Eastex Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory		
Eccentrix Technologies, LLC	Fixed Wireless	Data Added to Statewide Inventory	3/30/2010	
Element Networks, LLC	Fixed Wireless	Data Added to Statewide Inventory	5/14/2010	
ENMR Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	4/22/2010	
ERF Wireless	Fixed Wireless	Data Added to Statewide Inventory		
Five Area Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/8/2010	
Gower Computer Support, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/14/2011	
GTEK Communications	Fixed Wireless	Data Added to Statewide Inventory	5/24/2010	
Guadalupe Valley Communications Systems	Fiber	Data Added to Statewide Inventory	11/23/2009	
Guadalupe Valley Communications Systems	ILEC/CLEC	Data Added to Statewide Inventory	11/23/2009	
GVEC.net	Fixed Wireless	Data Added to Statewide Inventory	2/25/2010	
Helmsco, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/15/2010	
Hi Speed Wireless	Fixed Wireless	Data Added to Statewide Inventory	2/22/2011	
IGN-LPG Enterprises L.L.C.	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	
Industry Tel. Co.	ILEC/CLEC	Data Added to Statewide Inventory	11/6/2009	
JAB Wireless, Inc.	Fixed Wireless	Data Added to Statewide Inventory	6/14/2010	
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	
Maverick Internet	Fixed Wireless	Data Added to Statewide Inventory	6/4/2010	
Mid-Plains Rural Tel. Co-op. Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/5/2010	
Mid-Plains Rural Tel. Co-op. Inc.	Fiber	Data Added to Statewide Inventory	3/5/2010	
Millennium Telcom, LLC	Fixed Wireless	Data Added to Statewide Inventory	8/26/2010	
Neu Ventures, Inc.	Fixed Wireless	Data Added to Statewide Inventory	6/17/2010	
Nortex Communications	Cable	Data Added to Statewide Inventory	2/12/2010	
Nortex Communications	Fiber	Data Added to Statewide Inventory	2/12/2010	
Nortex Communications	ILEC/CLEC	Data Added to Statewide Inventory	2/12/2010	
Nortex Communications	Fixed Wireless	Data Added to Statewide Inventory	2/12/2010	
North Texas Cellular, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/22/2010	
Northland Communications	Cable	Data Added to Statewide Inventory	8/19/2010	
Poka Lambro Telephone Cooperative, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/15/2010	
Poka Lambro Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	2/15/2010	
RB3, LLC	Fixed Wireless	Data Added to Statewide Inventory	10/23/2009	
RB3, LLC	Cable	Data Added to Statewide Inventory	10/23/2009	
Ridgewood Cable	Fixed Wireless	Data Added to Statewide Inventory		
Rock Solid Internet & Telephone	Fixed Wireless	Data Added to Statewide Inventory	2/14/2011	
South Plains Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	3/15/2010	
South Plains Telephone Cooperative, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	3/15/2010	
Speed of Light Broadband, Inc.	Fixed Wireless	Data Added to Statewide Inventory	11/3/2009	
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	
Stelera Wireless, LLC	Mobile Wireless	Data Added to Statewide Inventory		
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
Texas CellNet	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	
TGN Cable	Cable	Data Added to Statewide Inventory	5/20/2010	
Time Warner Cable LLC.	Cable	Data Added to Statewide Inventory	12/21/2009	
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	
Verizon Southwest, Inc.	ILEC/CLEC	Data Added to Statewide Inventory	12/14/2009	
Verizon Southwest, Inc.	Fiber	Data Added to Statewide Inventory	12/14/2009	
Verizon Southwest, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	
WEHCo Video	Cable	Data Added to Statewide Inventory		
Wharton County Electric Cooperative, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/15/2010	
Windstream Communications	ILEC/CLEC	Data Added to Statewide Inventory	1/19/2010	
XIT Telecommunications & Technology, Ltd.	Fiber	Data Added to Statewide Inventory	3/2/2010	
XIT Telecommunications & Technology, Ltd.	ILEC/CLEC	Data Added to Statewide Inventory	3/2/2010	
Zito Midwest, LLC	Cable	Data Added to Statewide Inventory	2/17/2011	[JAN-19-11 Daryl Coffey] Zito Midwest purchased Galaxy Cable.
Alenco Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	11/17/2009	

CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
Cogent Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Covad Communications	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Mid-Plains Rural Tel. Co-op. Inc.	Backhaul	Backhaul Provider Only Processing Complete	3/5/2010	
South Plains Telephone Cooperative, Inc.	Backhaul	Backhaul Provider Only Processing Complete	3/15/2010	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Zayo Bandwidth, LLC	Backhaul	Backhaul Provider Only Processing Complete		
Cequel Communications	Cable	Approval for Update Not Received - Use Last Submission Data	12/15/2009	
McleodUSA Telecommunications Services, Inc.	ILEC/CLEC	Provider Approval Solicited		
C. T. Cube	ILEC/CLEC	Provider Gathering Data	4/22/2010	
Consolidated Communications	Fiber	Provider Gathering Data	11/30/2009	
Star-NET Online Systems	Fixed Wireless	Provider Gathering Data		
360networks	Backhaul	No Update to Provide	1/19/2010	
AirBand Communications, Inc.	Backhaul	No Update to Provide	3/29/2010	
Aledo Broadband	Fixed Wireless	No Update to Provide	3/26/2010	
Aledo Broadband	Backhaul	No Update to Provide	3/26/2010	
Alenco Communications, Inc.	ILEC/CLEC	No Update to Provide	11/17/2009	
Alenco Communications, Inc.	Fixed Wireless	No Update to Provide	11/17/2009	
Allegiance Communications	Cable	No Update to Provide	2/4/2010	
Argon Technologies	Fixed Wireless	No Update to Provide		
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Big Bend Telephone Company, Inc.	Backhaul	No Update to Provide	3/10/2010	
Big Bend Telephone Company, Inc.	Fiber	No Update to Provide	3/10/2010	
Big Bend Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	3/10/2010	
Blossom Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	3/26/2010	
Border to Border Communications, Inc.	ILEC/CLEC	No Update to Provide		
Brazoria Telephone Company	Cable	No Update to Provide	6/17/2010	
Brazoria Telephone Company	ILEC/CLEC	No Update to Provide	6/17/2010	
Broadband Data Services of Texas, LLC	Fixed Wireless	No Update to Provide	4/29/2010	
Broadcomm.US	Fixed Wireless	No Update to Provide	3/9/2011	
Cameron Telephone Company, LLC	Backhaul	No Update to Provide	3/18/2010	
Cameron Telephone Company, LLC	ILEC/CLEC	No Update to Provide	3/18/2010	
Cap Rock Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/4/2010	
Cap Rock Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/4/2010	
Cap Rock Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/4/2010	
Central Texas Cable Partners, Inc.	Cable	No Update to Provide	2/22/2010	
Central Texas Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/2/2010	
Central Texas Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/2/2010	
Cequel Communications	Backhaul	No Update to Provide	12/15/2009	
Charter Communications	Backhaul	No Update to Provide	12/15/2009	
Coleman County Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/10/2010	
Colorado Valley Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/9/2010	
Colorado Valley Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/9/2010	
Community Telephone Company, Inc.	Backhaul	No Update to Provide	3/10/2010	
Connextions Telcom	Fiber	No Update to Provide	3/2/2011	
Connextions Telcom	ILEC/CLEC	No Update to Provide	3/2/2011	
Cumby Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/5/2010	
Dell Telephone Cooperative, Inc.	Backhaul	No Update to Provide	4/6/2010	
Dell Telephone Cooperative, Inc.	Fiber	No Update to Provide	4/6/2010	
Dell Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	4/6/2010	
Dell Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	4/6/2010	
Digitex.com	Fixed Wireless	No Update to Provide	5/25/2010	
Digitex.com	Backhaul	No Update to Provide	5/25/2010	
ECTISP	Fixed Wireless	No Update to Provide		
ELC Internet Services, Inc.	Fixed Wireless	No Update to Provide	3/4/2011	
Electra Telephone Company	ILEC/CLEC	No Update to Provide	11/24/2009	
eNet	Fixed Wireless	No Update to Provide		
ENMR Telephone Cooperative, Inc.	Backhaul	No Update to Provide	4/22/2010	
ENMR Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	4/22/2010	
ETAN Industries	Cable	No Update to Provide		
ETS Cablevision Co., Inc.	Cable	No Update to Provide	10/30/2009	
ETS Cablevision Co., Inc.	Fiber	No Update to Provide	10/30/2009	
Farm to Market Broadband LP	Fixed Wireless	No Update to Provide	4/16/2010	
Five Area Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/8/2010	
Ganado Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	11/16/2009	
GEUS	Cable	No Update to Provide		
Gilmer Cable Television Company, Inc.	Cable	No Update to Provide	6/18/2010	
Grande Communications Network LLC	Cable	No Update to Provide	3/31/2010	
Grayson CableRocket, LLC	Cable	No Update to Provide	6/15/2010	
Greasy Bend Ventures, Inc.	Fixed Wireless	No Update to Provide	8/16/2010	
GTEK Communications	Backhaul	No Update to Provide	5/24/2010	
Guadalupe Valley Communications Systems	Cable	No Update to Provide	11/23/2009	
GVEC.net	Backhaul	No Update to Provide	2/25/2010	
Hill Country Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/9/2011	
Hill Country Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/9/2011	
Hill Country Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/9/2011	
James Cable, LLC	Cable	No Update to Provide	1/11/2010	
James Cable, LLC	Fixed Wireless	No Update to Provide	1/11/2010	
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
La Ward Telephone Exchange, Inc.	ILEC/CLEC	No Update to Provide	11/16/2009	
Lake Livingston Telephone Company	ILEC/CLEC	No Update to Provide	11/20/2009	
Livingston Telephone Company Incorporated	ILEC/CLEC	No Update to Provide	2/25/2010	
Livingston Telephone Company Incorporated	Backhaul	No Update to Provide	2/25/2010	
Maverick Internet	Backhaul	No Update to Provide	6/4/2010	
McDonald Group	Cable	No Update to Provide	3/5/2010	
Millennium Telcom, LLC	Cable	No Update to Provide	8/26/2010	
Millennium Telcom, LLC	ILEC/CLEC	No Update to Provide	8/26/2010	
Millennium Telcom, LLC	Fiber	No Update to Provide	8/26/2010	
NetWest Online, Inc.	Fixed Wireless	No Update to Provide	2/23/2010	
Neu Ventures, Inc.	Backhaul	No Update to Provide	6/17/2010	
Neu Ventures, Inc.	Cable	No Update to Provide	6/17/2010	

Nextlink Wireless, Inc.	Backhaul	No Update to Provide	2/12/2010	
Nortex Communications	Backhaul	No Update to Provide	2/12/2010	
North Texas Broadband, LLC	Cable	No Update to Provide	3/1/2010	
North Texas Telephone Company	ILEC/CLEC	No Update to Provide	11/30/2009	
NTS Communications	ILEC/CLEC	No Update to Provide		
NTS Communications	Fiber	No Update to Provide		
Our-Town Internet Service	Fixed Wireless	No Update to Provide	3/31/2010	
Panhandle Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	12/7/2009	
Panhandle Telephone Cooperative, Inc.	Cable	No Update to Provide	12/7/2009	
Panhandle Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	12/7/2009	
Peoples Communication, Inc.	ILEC/CLEC	No Update to Provide	3/4/2010	
Peoples Communication, Inc.	Backhaul	No Update to Provide	3/4/2010	
Poka Lambro Telephone Cooperative, Inc.	Fiber	No Update to Provide	2/15/2010	
Poka Lambro Telephone Cooperative, Inc.	Backhaul	No Update to Provide	2/15/2010	
Promptwireless, LLP	Fixed Wireless	No Update to Provide	4/27/2010	
Pulsestream Internet Services	Backhaul	No Update to Provide		
Rhino Communications	Fixed Wireless	No Update to Provide		
Rioplex Wireless LTD	Fixed Wireless	No Update to Provide	3/3/2010	
Riviera Telephone Company, Inc.	Backhaul	No Update to Provide	3/11/2010	
Riviera Telephone Company, Inc.	ILEC/CLEC	No Update to Provide	3/11/2010	
Santa Rosa Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/9/2010	
Santa Rosa Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/9/2010	
Santa Rosa Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/9/2010	
Santa Rosa Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/9/2010	
SmartBurst, LLC	Fixed Wireless	No Update to Provide	8/4/2010	
Smithville System	Fixed Wireless	No Update to Provide	6/17/2010	
Southwest Arkansas Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/19/2010	
Southwest Arkansas Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	1/19/2010	
Southwest Texas Telephone Company	Fixed Wireless	No Update to Provide	3/3/2010	
Tatum Telephone Company	ILEC/CLEC	No Update to Provide	11/24/2009	
Taylor Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/11/2010	
Taylor Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/11/2010	
Taylor Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/11/2010	
Texas Broadband, Inc.	Fixed Wireless	No Update to Provide	5/12/2010	
Texas Wireless Internet	Fixed Wireless	No Update to Provide	5/14/2010	
Texhoma Wireless	Fixed Wireless	No Update to Provide	3/8/2011	
Tier One Converged Networks, Inc.	Fixed Wireless	No Update to Provide	3/24/2010	
Time Warner Cable LLC.	Backhaul	No Update to Provide	12/21/2009	
TISD	Fixed Wireless	No Update to Provide	4/19/2010	
Totelcom Communications, LLC	Fixed Wireless	No Update to Provide	11/30/2009	
Totelcom Communications, LLC	ILEC/CLEC	No Update to Provide	11/30/2009	
tw telecom of texas, llc	Backhaul	No Update to Provide	3/10/2010	
US Cable Corp.	Cable	No Update to Provide	5/20/2010	
Valley Telephone Cooperative, Inc.	Backhaul	No Update to Provide	11/24/2009	
Valley Telephone Cooperative, Inc.	Fiber	No Update to Provide	11/24/2009	
Valley Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	11/24/2009	
Valley Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	11/24/2009	
Verizon Southwest, Inc.	Backhaul	No Update to Provide	12/14/2009	
Versalink Enterprises, LLC	Cable	No Update to Provide	5/11/2010	
Wes-Tex Telecommunications, Ltd.	Backhaul	No Update to Provide	3/1/2010	
Wes-Tex Telecommunications, Ltd.	Fixed Wireless	No Update to Provide	3/1/2010	
Wes-Tex Telecommunications, Ltd.	Cable	No Update to Provide	3/1/2010	
Wes-Tex Telecommunications, Ltd.	ILEC/CLEC	No Update to Provide	3/1/2010	
West Texas Rural Telephone Cooperative, Inc.	Cable	No Update to Provide	3/31/2010	
West Texas Rural Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/31/2010	
West Texas Rural Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/31/2010	
West Texas Rural Telephone Cooperative, Inc.	ILEC/CLEC	No Update to Provide	3/31/2010	
Wharton County Electric Cooperative, Inc.	Backhaul	No Update to Provide	4/15/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Basin Broadband, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/23/2010	
CIT Broadband	Fixed Wireless	No Update Provided - Use Last Submission Data		
East Texas DSL	Fixed Wireless	No Update Provided - Use Last Submission Data	5/25/2010	
ETEX Communications, LP	ILEC/CLEC	No Update Provided - Use Last Submission Data	2/25/2010	
ETEX Communications, LP	Fiber	No Update Provided - Use Last Submission Data	2/25/2010	
ETEX Communications, LP	Backhaul	No Update Provided - Use Last Submission Data	2/25/2010	
Southwest Texas Telephone Company	ILEC/CLEC	No Update Provided - Use Last Submission Data	3/3/2010	
Southwest Texas Telephone Company	Backhaul	No Update Provided - Use Last Submission Data	3/3/2010	
Windstream Communications	Backhaul	No Update Provided - Use Last Submission Data	1/19/2010	
Phonoscope Enterprises Group, LLC	Cable	Solicited Initial Data	5/20/2010	
Phonoscope Enterprises Group, LLC	Backhaul	Solicited Initial Data	5/20/2010	
Presidio Community Wireless Network	Fixed Wireless	Solicited Initial Data		
Reliance Globalcom Services, Inc.	Backhaul	Solicited Initial Data		
Texas Communications	Fixed Wireless	Solicited Initial Data		
Texas Communications	ILEC/CLEC	Solicited Initial Data		
AMA TechTel	Fixed Wireless	Refused to Participate		[FEB-01-11 David Coffey] Representative stated they would not participate as long as the "big boys" were involved (ATT, Verizon, etc.). I told him I would call him again in about six months to see if he had changed his mind. He did thank me for calling and keeping them in mind.
Anvil Communications	Fixed Wireless	Refused to Participate		[JAN-14-11 Dwayne Goodman] Spoke directly to a company representative. He still refuses to participate saying that he doesn't need marketing help and doesn't feel there is a benefit.
Broadwaves	Fixed Wireless	Refused to Participate		[FEB-16-11 Daryl Coffey] Spoke with the provider who said "I don't care to be on there...right now, at least."
Buford Media Group	Cable	Refused to Participate		[JAN-19-11 Daryl Coffey] Sent an e-mail to which the provider responded saying "We are still not interested at this time."

Cybercom Corporation	Fixed Wireless	Refused to Participate		[JAN-05-11 David Coffey] Attempted to telephone representatives of the company to invite them to participate in the Texas broadband mapping initiative. I spoke with an associate that stated that they were still not interested in participating with the initiative.
ELP Networks, Inc.	Fixed Wireless	Refused to Participate		[JAN-05-11 David Coffey] Spoke with owner who conveyed that he is contemplating selling his fixed wireless operations. He stated he would wait to send in documentation until he decided what he was going to do. If he does not sell he would consider joining the program this fall. Right now he has no interest with participation.
Fiberlight, LLC	Backhaul	Refused to Participate	4/20/2010	[FEB-24-11 Dwayne Goodman] A company representative responded to the 2010 outreach process refusing to provide backhaul information; the company sees no reason to give up confidential information. The company has been non-responsive to the April 2011 submission requests; therefore, it is assumed the refusal status still stands.
Gecko Inter.net	Fixed Wireless	Refused to Participate		[JAN-14-11 Dwayne Goodman] Spoke to a company representative indicating the management still does not have any interest to participate with the broadband mapping project.
Internet America Wireless Internet Access	Fixed Wireless	Refused to Participate		[JAN-14-11 Dwayne Goodman] A company representative has been non-responsive to voicemails and e-mails. Left voicemail indicating if a call is not returned, an assumption will be made that his position of "Refusal to Participate" still stands as noted for the October 2010 map release.
SOS Communications	Fixed Wireless	Refused to Participate		[JAN-24-11 David Coffey] Received an e-mail from SOS stating, "We do not want to participate. Don't bother us anymore."
Terral Telephone Company	Fixed Wireless	Refused to Participate		[FEB-16-11 David Coffey] Spoke with company representative who stated that she had spoken with her boss about submitting data and he declined at this time. She stated that they were a very small organization and didn't have the time. I told her we would work with her to gather the necessary information. She stated that we would talk before the next updates and they would try to participate but for now they were declining to participate. For this time period we will list the company as 'Refused to Participate.'
Twilight Communications	Fixed Wireless	Refused to Participate		[FEB-16-11 David Coffey] Spoke with company representative who stated that they were in the process of negotiating the possible sale of the company. He said he had filled in some of the data but was reluctant to submit anything due to the possible sale. He stated that if he did not sell he would submit the data to us for the next update in October. We will list him 'Refused to Participate' at this time.
Xanadoo, LLC		Refused to Participate		[FEB-17-11 Wes Kerr] A provider representative sent a message that they will not be participating, as they have determined that they do not have the resources necessary.
281 Communications, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 9, 2009 and September 20, 2010, five attempts have been made during this submission period.
Bee Creek Communications	Fixed Wireless	Non-Responsive to Multiple Attempts	5/21/2010	In addition to multiple contact attempts made between September 9, 2009 and August 9, 2010, four attempts have been made during this submission period.
Centrovision	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between October 26, 2009 and August 6, 2010, six attempts have been made during this submission period.
Centrovision	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between October 26, 2009 and August 6, 2010, six attempts have been made during this submission period.
CKS Wireless, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between February 10, 2010 and August 12, 2010, four attempts were made during this submission period.
East Texas Broadband	Fixed Wireless	Non-Responsive to Multiple Attempts		Ten contact attempts were made between July 7, 2010 and February 18, 2011.
East Texas Cable Co.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contacts made between January 22, 2010 and September 20, 2010, three attempts were made during this submission period.
East Texas Wifi	Fixed Wireless	Non-Responsive to Multiple Attempts		Ten contacts were made between July 7, 2010 and February 18, 2011.

Hometown Computing	Fixed Wireless	Non-Responsive to Multiple Attempts		In addtion to multiple contact attempts made between September 10, 2009 and August 11, 2010, six attempts were made during this submission period.
Indian Creek Internet Services	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 13, 2010, seven attempts were made during this submission period.
Liquid Stone Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 12, 2010, five attempts were made during this submission period.
LSCWeb.Com	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 5, 2010, four attempts were made during this submission period.
Medicine Park Telephone Company	Backhaul	Non-Responsive to Multiple Attempts		Two contact attempts were made between January 31, 2011 when the provider was identified and February 11, 2011.
Pathwayz Communications, Inc.	ILEC/CLEC	Non-Responsive to Multiple Attempts		Fourteen contact attempts were made between February 17, 2010 and January 13, 2011.
Pathwayz Communications, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		Fourteen contact attempts were made between February 17, 2010 and January 13, 2011.
Sterling Cable	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 10, 2010, six attempts were made during this submission period.
Sterling Cable	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 10, 2010, six attempts were made during this submission period.
Telecom Cable, LLC	Cable	Non-Responsive to Multiple Attempts		Eight contact attempts were made between October 27, 2009 and February 22, 2011.
TWIN Wireless, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 11, 2010, 12 attempts were made during this submission period.
VRFuturenet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 11, 2010, eleven attempts were made during this submission period.
Western Broadband	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 10, 2010, nine attempts were made during this submission period
WesTex Connect Internet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 4, 2010, 10 attempts were made during this submission period.
Windjammer Communications, LLC	Cable	Non-Responsive to Multiple Attempts	11/16/2009	In addition to multiple contact attempts made between October 27, 2009 and August 11, 2010, six attempts were made during this submission period.
Zeecon/Wireless Internet, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between September 10, 2009 and August 10, 2010, 10 attempts were made during this submission period.
Aledo Broadband	ILEC/CLEC	No Update to Provide	3/26/2010	[MAR-23-11 Dawn Clark] Provider does not offer DSL.
Covad Communications	ILEC/CLEC	Other	1/19/2010	[FEB-18-11 Sarah Finne] Provider does not offer residential DSL. They submitted business data, so we will only submit their backhaul data to NTIA.
Digital Passage	Fixed Wireless	Other		[FEB-27-11 Dwayne Goodman] Owner of Digital Passage acquired Urnet late year 2010. Previous owner of Urnet forwarded April 2011 data submission requests to Digital Passage. On January 10, 2011 contacted Digital Passage owner directly to present the Connected Texas broadband inventory project and to receive approval of continued carriage of Urnet coverage within the state broadband inventory map. Skeptical comments were made during the initial conversation. Owner indicated he would review all material as time permits and make a decision of participation. Since that time frame the owner of Digital Passage has been non-responsive to voice mails and e-mails.
DISH Network Corporation	Satellite	Other	1/27/2010	[MAR-09-11 Sarah Finne] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Sarah Finne] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

Pulsestream Internet Services	Fixed Wireless	Other		[JAN-01-11 Dawn Clark] This provider is selected as "Other" status because they do not provide fixed wireless residential service. However they do offer backhaul services so they are remaining "viable."
Rock Solid Internet & Telephone	Backhaul	Other	2/14/2011	[FEB-08-11 Sarah Finne] Backhaul record was added in error; provider does not offer.
Rock Solid Internet & Telephone	ILEC/CLEC	Other	2/14/2011	[MAR-23-11 Dawn Clark] Provider does not offer DSL.
Wes-Tex Telecommunications, Ltd.	Fiber	Other	3/1/2010	[MAR-31-11 Dawn Clark] Provider does not have fiber service.
WildBlue Communications, Inc.	Satellite	Other	1/8/2010	[MAR-09-11 Sarah Finne] Satellite data will not be submitted due to additional information being necessary to show where service is available in the state, rather than submitting the entire state boundary as serviceable area.

About the Utah Broadband Project's Map & Data

The Utah Broadband Project Interactive Map website is a joint project of the Utah Public Service Commission, Governor's Office of Economic Development, and Department of Technology Services.

The Utah Broadband Interactive Map was developed and is hosted by the Utah Automated Geographic Reference Center (AGRC) utilizing data complied by the Project from broadband providers and public sources, including Utah's State Geographic Information Database (SGID) which is utilized extensively for locating addresses, locating geographic places, and displaying background maps.

Please report any problems with this web page, the Utah Broadband Interactive Map, or relating to broadband availability in Utah to broadband@utah.gov.
This page contains the following sections:

- Additional Utah Broadband Maps and Resources
- Map Goals
- Map Data Description
- Map Data Validation
- Map Data Verification
- Map Disclaimer
- Map and Data Update Log

Additional Utah Broadband Maps and Resources
In addition to the Utah Broadband Map interactive map website, additional broadband map products are available that depict availability, speed, and technology in Utah. At present these include maps of highest available speed, available technology, and community anchor institution maps that depict school, health center, government office, and emergency response station facilities and the internet access at these locations.

Map Goals

The map attempts to provide consumers, community leaders, and broadband providers with a comprehensive map-based view of non-confidential data complied by the Utah Broadband Project. This information can be used to support:

- ***Consumer and Business Decision Support:***
  - What provider options and performance are available at a specified locations?
  - What locations is broadband service available from a provider of interest (a current provider, for example)?
  - Does the broadband map accurately reflect available services?
- ***Community Leader Decision Support:***
  - How does broadband service compare in an area of interest with other parts of the state?
  - Where are un- or under-served areas for which the expansion of broadband service or performance should be targeted?
  - Does the broadband map accurately reflect available services?
- ***Broadband Providers Decision Support:***
  - Where are opportunities to expand service and performance?
  - Does the broadband map accurately reflect available services?

Map Data Description

The Utah Broadband Project's Fall 2010 submission to the NTIA/FCC State Broadband Data and Development (SBDD) program includes both confidential and non-confidential data relating to service availability and infrastructure for over 40 broadband providers. Non-confidential data depicts broadband availability, speed, and technology for wireless service provision as service area polygons and, for wireline provision, as service areas and address points aggregated to a census block level in urban and rural settled areas and along road segments in rural and exurban areas where census blocks are greater than 2 square miles in size. Additionally, provider-submitted middle and last mile infrastructure data and pre-aggregation address-level wireline service information were submitted to the SBDD program as confidential data.

The locations of community anchor institutions, such as schools, libraries, government offices, health and human service provision locations, and public safety facilities were also collected and submitted. Where possible, speed and service technology are indicated, especially for those institutions that receive broadband service from the Utah Education Network, the State of Utah Department of Technology Services, or the Utah Telehealth Network and those organizations that report this information to the State Library.

The State of Utah and its provider engagement contractor, International Research Council (of Mesa, Arizona) developed program communication packets, worked to develop NDAs where necessary, and provided engagement and technical assistance to providers regarding the submission guidelines and process.

- Participating providers list

Map Data Validation

The Utah Broadband Project submission was in the data structure outlined in the National Broadband Map Data Transfer Model (NBMDTM) v1.0.1. In order to submit data in this format, all provider data submissions were transformed to this data structure and loaded into an ESRI File Geodatabase. The project worked with provider data in many formats including customer and 'buildings-passed' addresses and address ranges in spreadsheet, text file, and geographic information system formats. Census blocks, pdf maps, computer assisted design (CAD) data files, and public-facing websites showing provider service areas were also translated into NBMDTM compliant formats.

Aerial photography, address location services, census block geometry, and road segment geometry used for broadband service mapping and quality control of the data are from public domain resources in Utah's State Geographic Information Database (SGID) maintained by the Utah Automated Geographic Reference Center and funded and supported by the State of Utah general fund, the Utah 911 Committee, and partnering local, state and federal agencies.

Additionally, in cases where providers were only able to provide last-mile infrastructure locations, terrain modeling was used to generate wireless coverage data and network distance modeling was used to form DSL provision areas using the street network as a surrogate for the broadband delivery system's wire network.

Due to time constraints, validation work was somewhat limited to the work to translate provider data submissions into the NBMDTM and its list of coded values and other attribute specifications. In subsequent submissions, the Project will incorporate automated procedures developed by the FCC to ensure that project data conforms to the evolving NBMDTM.

Map Data Verification

Utah feels strongly the best verification resource is a continued relationship with participating providers and the display of availability and speed data through the state broadband interactive map. Along these lines, Utah prepared provider feedback packages including a CD containing the providers NBMDTM transformed data, pdf overview maps of the providers service area by download speed, submission record counts, transformation process notes (including problem areas), and suggestions on how to improve the data quality and/or how to make subsequent submissions easier.

Utah also compared data submitted to the American Roamer and Media Print Cable Boundaries data and to the Public Service Commission's telecommunications territory boundaries. In preparation for the release of the Utah Broadband Map, project staff is holding interactive review sessions with providers to review service area data together via online meetings and a preview version of the map. These sessions are targeted to providers where further clarification is deemed necessary.

Utah has also experimented with mapping and analysis of FCC speed test data and terrain analysis of statewide satellite coverage claims.

Map Disclaimer

Broadband service availability and characteristics are depicted as derived from data assembled by the Utah Broadband Project. Data sources include biannual broadband service provider submissions and publicly available sources. Data has been modified, where necessary, to meet broadband mapping standards set by the National Telecommunications and Information Administration (NTIA). Broadband service availability is displayed per NTIA specifications which include technology and speed categories and the aggregation of non-wireless service availability information to either U.S. Census blocks (where smaller than 2 sq. miles) or road segments.

Speeds shown are the 'maximum advertised' for the geographic features depicted, and must exceed 0.768 Mbps download and 0.2 Mbps upload (NTIA broadband definition) to be included. Actual speeds may vary within and along census blocks and roads, due to the granularity and currency of the data, technological limitations, and service plan limitations. Users of the site are encouraged to inquire directly to providers for current service availability and speed.

All information presented on the Utah's interactive broadband map is for general reference purposes only and may contain errors and omissions. The State of Utah makes no warranty with respect to information available, express or implied, including but not limited to the fitness for use for a particular purpose.

The Utah Broadband Project welcomes your comments (broadband@utah.gov).

Commonwealth of Virginia

Center for Innovative Technology

Virginia Information Technology Agency
- Virginia Geographic Information Network

Virginia Tech Center for Geospatial Information Technology

NATIONAL BROADBAND MAPPING PROJECT

SPRING 2011 SUBMISSION - VIRGINIA

A summary of processing steps necessary to move broadband provider submission into the NTIA SBDD data model.

Summary of Virginia Submission

The Virginia Center for Innovative Technology (CIT) was designated by the Governor as the primary point of contact for all Commonwealth of Virginia participation in the National Broadband Mapping Project. The CIT assembled a team consisting of the Virginia Information Technology Agency's (VITA) Virginia Geographic Information Network (VGIN) and the Virginia Tech Center for Geospatial Information Technology (CGIT) to review, process, normalize and submit the information outlined in the Notice of Funds Availability (NOFA) establishing the National Broadband Map.

The spring 2011 submission is the third submission of data to the National Telecommunications and Information Administration (NTIA). The submission includes data from 44 Broadband Service Providers (BSP) delivered in various formats ranging from GIS shape files to text files detailing broadband availability. Of the 44 broadband providers included, 24 submitted updated service information for this submission. To provide a complete snapshot of broadband availability in Virginia, the fall 2010 submission data was carried forward for the remaining 20 broadband providers.

A summary of the spring 2011 submission data includes:

Census Blocks provided with availability information	190115
Street Segments provided with availability information	100501
Addresses provided with availability information	85481
Wireless Broadband providers providing availability polygons	14
Middle Mile Points provided	490

A review of the 24 broadband providers providing updates in the VA Broadband mapping effort for the spring 2011 indicates:

- 10 broadband providers provided only addresses
- 19 broadband providers provided both census blocks and road segment ranges
- 4 broadband providers provided only wireless information
- 5 broadband providers provided only census blocks
- 2 non-wireless broadband providers provided GIS data

All broadband providers participating provided speed information for census block, road centerline segment, or addresses.

VGIN Base Map Data

VGIN maintains a series of statewide feature classes that were used to support the National Broadband Mapping Project.

Address Points - VGIN maintains a statewide address point feature class that is updated quarterly using locality address submissions. This statewide address point database is used to generate a Point Address Geocoding Service.

Road Centerlines (RCL) – VGIN maintains a statewide road centerline feature class that is updated quarterly using locality centerline submissions. This road centerline database contains address range information when it is provided by the locality. The RCL database is used to generate a Linear Geocoding Service.

Navteq – VGIN maintains a subscription to the Navteq road centerline database in addition to the statewide road centerline database. This subscription provides a third geocoding service available to the broadband mapping project.

2000 Census Blocks – VGIN maintains a statewide inventory of 2000 Census geometry that is available to the broadband mapping project for location and presentation of broadband data.

Broadband provider Data Location Processing

All broadband provider processing was accomplished using VGIN statewide mapping initiatives as a basis. Broadband providers reported data in one of four formats: Polygon service areas; Census Blocks Served; Addresses Served; and Road Segments Served. Each of these reporting formats was handled differently.

Wireless Service Area Polygon Reporting – Service Area Polygons were reported by Wireless Broadband providers and required little processing to be included in the NTIA SBDD data model. Typical inclusion processes included attribute validation and use of the ESRI Simple Data Loader or Copy and Paste.

Census Block Reporting – Broadband providers reporting broadband availability on a census block basis submitted it in list form a majority of the time. These lists came in the form of spreadsheets and text files. These lists were normalized into spreadsheets and the attributes joined to the VGIN 2000 Census Block feature class. The resulting broadband provider specific staging database was validated for attributes and added to the NTIA SBDD data model.

Point Address Reporting - Broadband providers reporting broadband availability in a service address basis submitted it in list form in a majority of cases. These lists were submitted in the form of spreadsheets or text files. Once converted to spreadsheets, the address lists were geocoded using VGINs three tiered geocoding process. Addresses are first geocoded against the statewide address database. Any service addresses that are not matched on the first pass are rerun using the statewide road centerline geocoder. At this point, a majority of the addresses able to be located have been placed. Any remaining service addresses are geocoded against the Navteq database as a final attempt to generate a location.

Road Segment Address Reporting – Broadband providers reporting broadband availability using a road segment basis submitted it in a list form in a majority of cases. These lists were normalized into a series of spreadsheets for that were either used in joining to census features or geocoded using the VGIN road centerline database. Any broadband provider submitted road segment data that remained not located was rerun using the Navteq database to generate a final location.

Broadband Provider Staging Databases

To support the processing of broadband provider information separately, a broadband provider specific geodatabase was created. This geodatabase was an empty shell of the NTIA SBDD Database to maintain all topological and attribute constraints and validations. Each broadband provider's data was processed completely independent of all other broadband providers, allowing broadband providers to move through the process at different rates. This also allowed the correction of any data problems specific to broadband providers without affecting the entire submission database. Once the broadband provider data was processed to a point that it fully conformed to the NTIA SBDD data model, it was included in the Virginia submission for quality control and subsequent delivery.

Batch Calculation & Additional Processing

For data reported as service addresses, several fields were required that could be calculated in batch. The FULLFIPSID was calculated to the address points by spatially joining points to the census blocks. Latitude and Longitude were calculated in ArcCatalog using the calculate geometry function.

About half of the broadband providers who participated in the spring 2011 NTIA submittal provided Middle mile data. Resultantly, the processing and aggregation of a middle mile data set was done outside of standard broadband provider data processing.

Address Points, Road Centerlines, Census blocks, and Wireless Service polygons were processed as broadband provider data was received although middle mile information was a post processing step. To create middle mile event data, the broadband providers that provided the information to CIT and VGIN generally included latitude and longitude of the facility and these values were used in ArcGIS with the add XY function. After points were brought into ArcGIS, data was exported into a separate feature class and values were calculated based on information the broadband provider provided.

Broadband Provider Specific Processing

The following Broadband Providers submitted CIT data for the Spring 2011 NTIA submission. It is assumed that the participating Broadband providers provided entire coverage data as opposed to updates only unless otherwise noted. Included are the methods used in updating the Virginia Broadband map data:

AT&T
Provider Name: AT&T Mobility, LLC
DBA Name: AT&T Mobility, LLC
FRN: 0004979233

AT&T provided CIT and VGIN Geospatial data in the form of a coverage area shape file. Inside the shape file was only one field which represented the U.S. State of the coverage area so in order to apply the NTIA specific information, additional documentation included by AT&T was used to update the attributes. The GIS shape file was loaded into a staging Geodatabase feature class and fields were edited where pertinent. This data was then loaded into the reporting database.

Century Link
Provider Name: AT&T Mobility, LLC
DBA Name: AT&T Mobility, LLC
FRN: 0004979233

Century Link provided CIT and VGIN Geospatial data in the form of road centerlines and census blocks. Middle mile and subscriber weighted speed were also included. A new personal Geodatabase was created to represent the staging of this broadband provider for the spring 2011 release. Inside of the staging database a road centerline feature class and census block polygon feature class were imported from the NTIA packaging data model. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 1, 2011), the road lines provided by Century Link were used in a select by location analysis. The Virginia Road Centerlines were selected if the Century Link provided lines were within 5 meters and then exported to a new feature class. All values inside the Century Link roads were then spatially joined to the selected VA RCL and attributes were conflated and loaded to staging model feature class. This iteration of the roads was loaded into the reporting database.

Century Link also provided geospatial data in the form of census blocks less than two square miles. These values were joined to the 2000 TIGER data by FULLFIPSID and output to new features in order to make sure the census geography provided to NTIA was sufficient. Since the data associated to the blocks were named similarly to the NITA model data, they were loaded into a staging census block feature class then into the SBDD data model.

Charter
Provider Name: Charter Communications Inc.
DBA Name: Charter Communications Inc.
FRN: 0017179383

Charter provided CIT and VGIN Geospatial data in the form of road centerlines and census blocks. A new personal Geodatabase was created to represent the staging of this broadband provider for the spring 2011 release. Inside of the staging database a road centerline feature class and census block polygon feature class were imported from the NTIA packaging data model. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 1, 2011), the centerline data provided by Charter were used in a select by location analysis. The Virginia RCL was selected if the Charter GIS lines were within 5 meters and then exported to a new feature class. All values inside the Charter roads were then spatially joined to the selected VA RCL and attributes were conflated and loaded to a staging model feature class. This iteration of the roads was loaded into the reporting database.

Charter also provided geospatial data in the form of census blocks less than two square miles. These values were joined to the 2000 TIGER data by FULLFIPSID and output to new features in order to make sure the census geography provided to NTIA was sufficient. Since the data associated to the blocks were named similarly to the NITA model data, they were loaded into a staging census block feature class then into the SBDD data model.

Sprint
Provider Name: Sprint Nextel Corporation
DBA Name: Sprint
FRN: 0003774593

Sprint provided CIT and VGIN Geospatial data in the form of a coverage area shape file. Middle mile and subscriber weighted speed were also included. Inside the shape file were two records but the shape file structure had all of the fields needed to load into the NTIA model therefore no additional information was needed. The GIS shape file was loaded into the staging Geodatabase feature class and FRN information was scrubbed to match the NTIA number reporting format. This data was then loaded into the reporting database.

Verizon Wireless
Provider Name: Verizon Wireless
DBA Name: Verizon Wireless
FRN: 0003290673

Verizon Wireless provided CIT and VGIN Geospatial data in the form of two coverage area shape files; one representing EVDO statewide and another showing LTE in the Northern Virginia Region. The EVDO was gridded into 883 individual polygons with the same speed so the data was exported into a staging feature class and was merged into a single polygon. The LTE data showed a 4G core and 4G borders. These were the same transmission technology and speed according to Verizon so the two "4G" polygons were exported to a staging feature class and merged together. These two newly created merged polygon feature classes with different spectrums were loaded into the staging Geodatabase feature class and FRN information was scrubbed to match the NTIA number reporting format. This data was then loaded into the reporting database.

Time Warner Cable
Provider Name: Time Warner Cable
DBA Name: Time Warner Cable
FRN: 0013430244

Time Warner Cable provided CIT and VGIN Geospatial data in the form of road centerlines and census blocks. They also provided a text file for blended average speeds and based on the values it was assumed this was their pricing spreadsheet. A new personal Geodatabase was created to represent the staging of this broadband provider. Inside of the staging database a road centerline feature class and census block polygon feature class were imported from the NTIA packaging data model. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 1, 2011), the centerline data provided by Time Warner were used in a select by location analysis. The Virginia RCL was selected if the Time Warner GIS lines were within 5 meters and then exported to a new feature class in the staging database. Features did not need to be spatially joined since Time Warner did not provide Typical Up/Down data and their Max Advertised values were all the same for each segment. Values were manually calculated in the staging feature class of selected roads. This iteration of the roads was loaded into the reporting database.

Time Warner also provided geospatial data in the form of census blocks less than two square miles. These values were joined to the 2000 TIGER data by FULLFIPSID and output to new features in order to make sure the census geography provided to NTIA was sufficient. Since the data associated to the blocks were named similarly to the NITA model data, they were loaded into a staging census block feature class then into the SBDD data model.

Verizon Wireline
Provider Name: Verizon Virginia, Inc.
DBA Name: Verizon Virginia, Inc.
FRN: 0002073203

Verizon Wireline provided CIT and VGIN text files for census blocks, road segments, pricing, and speed availability by region. A new personal Geodatabase was created to represent the staging of this broadband provider. The text files were imported to excel files and then imported into ArcGIS to in order to keep a single working environment. The regional speed data was used in the creation of a boundary layer based on the census locality boundaries in Virginia and merged based on speeds across Virginia provided in the text data.

The road segment data that Verizon Wireline provided did have a TLID which represented the unique ID of Tiger Road Centerlines so the values were joined to Tiger data and output to a new feature class. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 1, 2011), the joined & converted road centerline data provided by Verizon Wireline was used in a select by location analysis. The Virginia RCL was selected if the extracted Verizon Wireline GIS lines were within 5 meters and then were exported to a new feature class in the staging database. Features were spatially joined to the Verizon generated Tiger lines in order to apply Transmission Technology. Verizon did not supply CIT & VGIN with Typical Downstream/Upstream values but did provide maximum advertised values in the speed text file which was converted to GIS polygons. Select by locations were performed and road centerlines were calculated based on their location to the created boundary data. This iteration of the roads was loaded into the reporting database.

Verizon Wireline also provided census blocks less than two square miles. The spreadsheet they used supplied the full FIPS id to use in a join. The original table had values which showed that this broadband provider is using newer census block geography than the requested NTIA data so the table was joined to the 2000 TIGER data by FULLFIPSID and all join match values were kept, all values not matched were left out based on ArcGIS join commands. The joined block features were output to new a new feature class based on the associated TIGER 2000 data in order to make sure the census geography provided to NTIA was sufficient. The census table provided by Verizon Wireless did not have Max Advertised speeds so the created boundary layer for speed was used in selecting areas which matched the advertised speed to the staging block feature class. After this data was checked in a staging census block feature class, it was then loaded into the SBDD data model.

Cox

Provider Name: CoxCom Inc.
DBA Name: Cox Communications
FRN: 0001524461

Cox provided CIT and VGIN text file updates of advertised speed and subscriber weighted speed. Addresses & road segments from the fall 2010 submittal were reused in conjunction with the updates. A new personal Geodatabase was created to represent the staging of this broadband provider. The text files were imported to excel files and then imported into ArcGIS to in order to keep a single working environment. The regional speed data was used in the creation of a boundary layer based on cellular market area boundaries since speeds were reported by Cox in this format. In the staging geodatabase, feature classes from the NTIA model were imported for Address Points, Road Centerlines, and Census Blocks.

The address level data spreadsheets from the fall 2010 were imported into the staging geodatabase and were geocoded based on the most recent VA address point geocoding service and were output to a new data set. All unmatched or tied geocoded results were then exported to an additional table and re-geocoded based on the VA Road Centerline geocoding service. The geocoded RCL point data was spatially joined to the first quarter of 2011 VA Road Centerline data in order to place features in a linear feature class. Both address point and road centerline data were loaded to their staging feature class and then loaded to the SBDD data model.

Cox also provided data from fall 2010 in the form of text files for census blocks less than two square miles which were processed for the fall 2010 submission. Since the data associated to the blocks were named similarly to the NITA model data, they were loaded into a staging census block feature class and checked against current FRN information as well as the newly created speed feature class. After these were checked for updates, they were then loaded into the SBDD data model.

Level 3
Provider Name: Level 3 Communications, LLC
DBA Name: Level 3 Communications, LLC
FRN: 0003723822

Level 3 Communications provided CIT and VGIN text files of customer addresses. A new personal Geodatabase was created to represent the staging of this broadband provider. The text files were imported to excel files and then imported into ArcGIS to in order to keep a single working environment. The addresses were geocoded based on the most recent VA address point geocoding service and were output to a new data set. All unmatched or tied geocoded results were then exported to an additional table and re-geocoded based on the VA Road Centerline geocoding service. The geocoded RCL points were spatially joined to the first quarter of 2011 VA Road Centerline data in order to place the point features in a linear feature class. Both address point and road centerline data were loaded to their staging feature class and then loaded to the SBDD data model.

Covad
Provider Name: DIECA Communications, Inc.
DBA Name: Covad Communications Company
FRN: 0003753753

Covad provided CIT and VGIN text files for census blocks, road segments, and speed availability by region. A new personal Geodatabase was created to represent the staging of this broadband provider. The text files were imported to excel files and then imported into ArcGIS to in order to keep a single working environment. The regional speed data was used in the creation of a boundary layer based on the census locality boundaries in Virginia and merged based on speeds across Virginia provided in the text data.

Covad provided text files for census blocks less than two square miles. The data provided used supplied the full FIPS id to use in a join so the table was joined to the 2000 TIGER data by FULLFIPSID and all joined values were kept. The joined block features were output to new a new feature class based on the associated TIGER 2000 GIS data in order to make sure the census geography provided to NTIA met their requirements. The census table provided by Covad did not have Max Advertised speeds so the created boundary layer for speed was used in selecting areas which matched the advertised speed to the staging block feature class. After this data was checked in a staging census block feature class, it was then loaded into the SBDD data model.

The road segment data that Covad provided did have TLID to join to the tiger lines so the data was joined to Tiger GIS line data and output to a new feature class. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 1, 2011), the joined & converted road centerline provided by Covad were used in a select by location analysis. The Virginia RCL was selected if the Covad GIS lines were within 5 meters and then exported to a new feature class in the staging database. Features were spatially joined to Covad lines in order to attach Transmission of Technology and Typical speeds. Select by locations were performed and Max Advertised values for road centerlines were calculated based on their location to the created boundary data. This iteration of the roads was loaded into the reporting database.

Shentel
Provider Name: Shentel Cable Company
DBA Name: Shentel
FRN: 0018024075

Shentel provided CIT and VGIN a single excel file which included census blocks and road segments inside the same spreadsheet as well as a tab in this spreadsheet which showed advertised speed by region. A new personal Geodatabase was created to represent the staging of this broadband provider. Many of the roads Shentel included in the spreadsheet had TLID so these were exported into their own spreadsheet as well as their own Geodatabase table. Another spreadsheet was created where only census block data was present in the initial spreadsheet and this was imported into ArcGIS as its own table. Finally, all other roads that did not have a block associated to it were exported as their own spreadsheet and geodatabase table. The regional speed data available in the Shentel spreadsheet was used in the creation of a boundary layer based on the census locality boundaries in Virginia and merged based on speeds across Virginia provided in the text data.

The road segments that Shentel provided which had TLID were joined to the tiger lines and output to a new feature class. In order to provide the Road Centerline data in

Virginia's geometry (VBMP RCL Quarter 1, 2011), the joined & converted road centerline provided by Shentel were used in a select by location analysis. The Virginia RCL were selected if the Shentel TLID GIS lines were within 5 meters and then exported to a new feature class in the staging database. The speed polygon data was used in calculating maximum advertised values. Output Virginia line features were spatially joined to Shentel lines in order to attach Transmission of Technology and Typical speeds. This iteration of the roads was loaded into the reporting database.

Road address ranges that were inside the original spreadsheet from Shentel that did not have TLID did have census block ID and street name. The census block ID and Street name fields were concatenated to create a string to use in joining. The census block values for these roads were joined to the census block GIS data and were output to a feature class in order to create a maximum potential area of interest boundary of segments. The entire VA Road Centerline data from Quarter 1 of 2011 were clipped to these polygons. The clipped RCL values then were spatially joined to the blocks in order to get full FIPS block ID attached to the road centerline. Once these values were added to the clipped RCL data, the census block ID that was newly added to the roads were concatenated with the Street name. This concatenation in the clipped RCL data was joined with the original concatenation of the table. All GIS features that matched were kept and output to a separate feature class using the NTIA model structure. The speed polygon data which was created originally was used in calculating maximum advertised values for these segments and once the values were calculated, this iteration of the roads was loaded into the reporting database.

Shentel data which only had census blocks less than 2 square miles contained the full FIPS id and was used in joining to the 2000 TIGER data by FULLFIPSID. All joined values were kept. The joined block features were output to new a new feature class based on the associated TIGER 2000 GIS data in order to make sure the census geography provided to NTIA met their requirements. After this data was checked in a staging census block feature class, it was then loaded into the SBDD data model.

NTELOS Wireline
Provider Name: Various
DBA Name: Various
FRN: Various

NTELOS provided CIT and VGIN text file updates addresses and census blocks, along with speed information by region. A new personal Geodatabase was created to represent the staging of this broadband provider. The text files for census blocks and speed were imported to excel files and then imported into ArcGIS in order to keep a single working environment. Since the addresses were updates only, data from the spring/fall submission by NTELOS were merged in a separate excel file to create an "all address" spreadsheet. This was imported to ArcGIS as a geodatabase table. The regional speed data was used in the creation of a boundary layer based on locality boundaries since speeds were reported by NTELOS in this format. In the staging geodatabase, feature classes from the NTIA model were imported for Address Points, Road Centerlines, and Census Blocks.

The combined address data was imported into the staging geodatabase for NTELOS wireline as a table and the values were geocoded based on the most recent VA address point geocoding service and were output to a new data set. All unmatched or tied geocoded results were then exported to an additional table and re-geocoded based on the VA Road Centerline geocoding service. The Road geocoding point data was spatially joined to the first quarter of 2011 VA Road Centerline data in order to place the resultant point features in a linear feature class. Both address point and road centerline data were loaded to their staging feature class and then loaded to the SBDD data model.

NTELOS data for census blocks less than 2 square miles contained the full FIPS id and were used in joining to the 2000 TIGER data by FULLFIPSID. All joined values were kept. The joined block features were output to new a new feature class based on the associated TIGER 2000 GIS data in order to make sure the census geography provided to NTIA met their requirements. After this data was checked in a staging census block feature class, it was then loaded into the SBDD data model.

T-Mobile
Provider Name: T-Mobile USA, Inc.
DBA Name: T-Mobile
FRN: 0006945950

T-Mobile provided CIT and VGIN Geospatial data in the form of two coverage area shape files as well as text files which described the data. Inside the shape files was not enough information to decipher the NTIA specific information so the text data was used to populate the data. The GIS shape file was loaded into a staging Geodatabase feature class and fields were edited where pertinent. This data was then loaded into the reporting database.

Cricket
Provider Name: Leap Wireless International, Inc.
DBA Name: Cricket Communications, Inc.
FRN: 0002963528

Cricket provided CIT and VGIN Geospatial data in the form of a coverage area shape file. Inside the shape file was one record and the shape file structure had all of the fields needed to load into the NTIA model therefore no additional information was needed. The GIS shape file was loaded into the staging Geodatabase feature class and FRN information was scrubbed to match the NTIA number reporting format. This data was then loaded into the reporting database.

MGW Networks
Provider Name: MGW Networks, LLC
DBA Name: MGW Networks, LLC
FRN: 0019225366

MGW Networks provided CIT and VGIN an excel file of customer addresses. A new personal Geodatabase was created to represent the staging of this broadband provider and the excel information was imported as a new Geodatabase table in order to keep a single working environment in ArcGIS. The address data was geocoded based on the most recent VA address point geocoding service and were output to a new data set. All unmatched or tied geocoded results were then exported to an additional geodatabase table and re-geocoded based on the VA Road Centerline geocoding service. The Road geocoding point data was spatially joined to the first quarter of 2011 VA Road Centerline data in order to place point features to their related linear feature class. Data was then joined and imported to a road centerline feature class which matched the NTIA model. Data was massaged and then loaded to the SBDD data model.

Northern Neck WIFI
Provider Name: Northern Neck Wireless Internet Services, LLC
DBA Name: Northern Neck Wireless Internet Services, LLC
FRN: 0017338054

Northern Neck WIFI provided CIT and VGIN an excel file of customer addresses. A new personal Geodatabase was created to represent the staging of this broadband provider and the excel information was imported as a new Geodatabase table in order to keep a single working environment in ArcGIS. The address data was geocoded based on the most recent VA address point geocoding service and were output to a new data set. All unmatched or tied geocoded results were then exported to an additional geodatabase table and re-geocoded based on the VA Road Centerline geocoding service. The Road geocoding point data was spatially joined to the first quarter of 2011 VA Road Centerline data in order to place features in a linear feature class. Data was then joined and imported to a road centerline feature class which matched the NTIA model. Data was massaged and then loaded to the SBDD data model. One challenge faced with Northern Neck WIFI was the fact that it is a wireless broadband provider and the only way to accurately report the data provided to VGIN was to placed it into Addresses Point as well as Road Centerline features. Although there is spectrum information for this broadband provider, the current features did not allow it to be used at this point in time. **CIT/VGIN will work with broadband provider in future submissions to provide data in conformance with NTIA model.**

TDS Telecom
Provider Name: Various
DBA Name: TDS Telecom
FRN: Various

TDS Telecom provided CIT and VGIN text files of customer addresses as well as middle mile and pricing information. A new personal Geodatabase was created to represent the staging of this broadband provider and the text files were imported to excel and then imported as a new Geodatabase table in order to keep a single working environment in ArcGIS. The address data was then geocoded based on the most recent VA address point geocoding service and was output to a new data set. All unmatched or tied geocoded results were then exported to an additional geodatabase table and re-geocoded based on the VA Road Centerline geocoding service. The Road geocoding point data was spatially joined to the first quarter of 2011 VA Road Centerline data in order to place features in a linear feature class. Data was then joined and imported to a road centerline feature class which matched the NTIA model. Data was massaged and then loaded to the SBDD data model.

Comcast
Provider Name: Comcast Cable Communications, LLC
DBA Name: Comcast
FRN: 0004441663

Comcast provided CIT and VGIN update text files for census blocks and addresses as well as speed based on region so for them to be usable in a GIS environment, they were converted to excel files. A new personal Geodatabase was created to represent the staging of this broadband provider. Comcast did not provide entire data sets so delta staging feature classes were created in the process. All features were loaded into individual geodatabase tables and based on joins; exceptions were created in order to show all available coverage using census blocks and address ranges. The regional speed data available in the Comcast text file spreadsheet was used in the creation of a boundary layer based on the census locality boundaries in Virginia and merged based on speeds across Virginia provided in the text data.

The census block data less than 2 square miles which represented coverage areas by Comcast did contain the full FIPS id of each census block. This information was used in joining to the 2000 TIGER data by FULLFIPSID. All joined values were kept and the joined block features were output to a new feature class based on the associated TIGER 2000 GIS data in order to make sure the census geography provided to NTIA met the requirements. This data was imported into a staging feature class and to calculate Max Advertised Values, the speed regional polygon data was used in creating select by locations. After this data was populated in the staging census block feature class, it was then loaded into the SBDD data model.

Road address ranges that were provided by Comcast did not have TLID in them and therefore could not be used to create selections without some additional data manipulation. Inside the original spreadsheet from Comcast, roads did have census block ID and street name. The census block ID and Street name fields were concatenated to create a string to use in joining. The census block values for these roads were joined to the census block GIS data and were output to a feature class in order to create a maximum potential area of interest boundary for road segments. The entire VA Road Centerline data from Quarter 1 of 2011 were clipped to these block polygons. The clipped RCL values then were spatially joined to the blocks in order to get full FIPS block ID attached to the clipped road centerline based on area of interest for these select blocks. Once the block values were added to the clipped RCL data, the census block ID that was added to the roads were concatenated with the street name. This concatenation in the clipped RCL data was joined with the original concatenation of the table. All GIS features that matched were kept and output to a separate feature class using the NTIA model structure. The speed polygon data which was created originally was used in calculating maximum advertised values for these segments and once the values were calculated, this iteration of the roads was loaded into the reporting database.

MBC
Provider Name: Mid-Atlantic Broadband Cooperative
DBA Name: MBC
FRN: 0019765304

MBC provided CIT and VGIN GIS shape files of points where their addresses served were available as well as several other GIS shape file which did not pertain to the NTIA mapping initiative. A new personal Geodatabase was created to represent the staging of this broadband provider and the address data was exported to a Geodatabase table in order to keep a single working environment in ArcGIS. The address data was then geocoded based on the most recent VA address point geocoding service and was output to a new data set. All unmatched or tied geocoded results were then exported to an additional geodatabase table and re-geocoded based on the VA Road Centerline geocoding service. The Road geocoding point data was spatially joined to the first quarter of 2011 VA Road Centerline data in order to place the point features in a linear feature class. Data was then joined and imported to a road centerline feature class which matched the NTIA model. Data was massaged and then loaded to the SBDD data model.

Participating Broadband Providers who did not submit updates

The following broadband providers are participating in the SBDD program but did not indicate having updates for the spring 2011 submission. The fall 2010 submission data for the broadband providers was included in the spring 201 reporting database.

Broadband Provider	FCC Registration Number
Bugg's Island Telecommunications	0002031698
Burke's Garden Telephone Company, Inc.	0004942819

Citizens Telephone Cooperative	0004381422
Citizens Cablevision Inc.	0009485343
Highland Telephone Cooperative	0004318846
MetroCast	0018547471
Nelson Cable	0000900287
New Hope Telephone Cooperative	0002071579
NextLink	0014286934
NTELOS Wireless	Various
BVU OptiNet	0006823991
Peoples Fairpoint	0002071116
RoadStar Internet	0013445358
Scott County Telephone Cooperative	0002069862
The Wired Road	0020153854
VMMicro	0018713800
XO	0006275945

Additional Broadband Provider data sets used in reporting data

Community Anchor Institution information

Virginia Tech held speed tests in order to get download and upload speeds for Community Anchor institutions. NTIA requested that the data model not be changed so unfortunately speed data was not reported since VT had the typical upload and download speeds populated. The requested attributes were advertised upload and download speeds; the broadband providers who provided service to the Anchor institutions in Virginia were unreported in many categories therefore advertised speeds were unavailable to report.

Middle Mile

If middle mile data was provided by the participating broadband provider, this was converted into a Geodatabase table in the providing broadband provider's staging Geodatabase. All appropriate fields were added in order to load data spatially. This information was exported to an access database and then exported to comma delimited text for the non spatial middle mile reporting feature class.

Pricing

If nominal weighted subscriber speed was available from a broadband provider, the data was placed into an Access database which followed the format of requested text output information from NTIA. It was then output to a requested tab delimited text file for the release.

Speed based on CMA/MSA/RSA

If speed was available by cellular market area or MSA/RSA and provided to CIT and VGIN, this information was placed into an Access database which followed the format of requested text output information from NTIA. It was then output to a requested tab delimited text file for the release. This category of reporting was least provided by broadband providers.

Validation and Quality Control

The data included in the NTIA SBDD data model was quality controlled using the topology included in the model as well as the python script provided by NTIA. The topology was validated using ESRI ArcGIS Topology validation tools and any errors were fixed using standard ESRI processing techniques.

The attribution included in the Virginia submission was validated using the NTIA provided Python Script SBDD_CheckSubmission.py. The script was run repeatedly against the data sets until all attribute errors were identified and corrected. The script was altered by VGIN to limit each run to only one feature class to speed processing. Once each feature class was run successfully, the entire script was enabled and run in its entirety against the Virginia submission. This final check ran without identifying any errors.

The output of the final run is shown below:

NOTES - RJO
TRANS_TECH test failure in Address and Road_Segment is valid because of Wirless Vendor that submited Point and line data rather than polygon coverage areas.
FAILED tests in CAI points are valid because of no Transmission Technology identified.

```
* ---------------------------------------------------------------------------
* Data Submission Reciept
* CheckSBDDSubmission.py
* Created on: 3/23/2011
* Created by: VA
* State Broadband Data Development Program
* NTIA / FCC
* ---------------------------------------------------------------------------

**********************************************************************************
*****                                                        *****
*****                                                        *****
*****                Submission Reciept File                 *****
*****            Check below for any FAILED Statements       *****
*****                                                        *****
*****                                                        *****
**********************************************************************************

*Check Layer: LastMile
     Geometry PASSED:  Layer has 0 records.
     Field Check:    passed    LastMile_PROVNAME values are good
     Field Check:    passed    LastMile_DBANAME values are good
     Field Check:    passed    LastMile_FRN values are good
     Field Check:    passed    LastMile_OWNERSHIP values are good
     Field Check:    passed    LastMile_BHCAPACITY values are good
     Field Check:    passed    LastMile_BHTYPE values are good
     Field Check:    passed    LastMile_LATITUDE values are good
     Field Check:    passed    LastMile_LONGITUDE values are good
     Field Check:    passed    LastMile_ELEVFEET values are good
     Field Check:    passed    LastMile_STATEABBR values are good
     Field Check:    passed    LastMile_FULLFIPSID values are good
```

**Check Layer: MiddleMile*
Geometry PASSED: Layer has 490 records.
Field Check: passed MiddleMile_PROVNAME values are good
Field Check: passed MiddleMile_DBANAME values are good
Field Check: passed MiddleMile_FRN values are good
Field Check: passed MiddleMile_OWNERSHIP values are good
Field Check: passed MiddleMile_BHCAPACITY values are good
Field Check: passed MiddleMile_BHTYPE values are good
Field Check: passed MiddleMile_LATITUDE values are good
Field Check: passed MiddleMile_LONGITUDE values are good
Field Check: passed MiddleMile_ELEVFEET values are good
Field Check: passed MiddleMile_STATEABBR values are good
Field Check: passed MiddleMile_FULLFIPSID values are good

**Check Layer: Address*
Geometry PASSED: Layer has 85481 records.
Field Check: passed Address_PROVNAME values are good
Field Check: passed Address_DBANAME values are good
Field Check: passed Address_FRN values are good
Field Check: passed Address_ADDRESS values are good
Field Check: passed Address_BLDGNBR values are good
Field Check: passed Address_STREETNAME values are good
Field Check: passed Address_CITY values are good
Field Check: passed Address_STATECODE values are good
Field Check: passed Address_ZIP5 values are good
Field Check: passed Address_LATITUDE values are good
Field Check: passed Address_LONGITUDE values are good
Field Check: passed Address_ENDUSERCAT values are good
Field Check: FAILED Address_TRANSTECH has UNEXPECTED VALUES
Field Check: passed Address_MAXADDOWN values are good
Field Check: passed Address_MAXADUP values are good
Field Check: passed Address_SpeedNotBB values are good
Field Check: passed Address_OneSpeedAndNotTheOther values are good
Field Check: passed Address_TYPICDOWN values are good
Field Check: passed Address_TYPICUP values are good
Field Check: passed Address_SpeedCheck values are good

**Check Layer: CAInstitutions*
Geometry PASSED: Layer has 1684 records.
Field Check: passed CAInstitutions_ANCHORNAME values are good
Field Check: passed CAInstitutions_ADDRESS values are good
Field Check: passed CAInstitutions_BLDGNBR values are good
Field Check: passed CAInstitutions_STREETNAME values are good
Field Check: passed CAInstitutions_CITY values are good
Field Check: passed CAInstitutions_STATECODE values are good
Field Check: passed CAInstitutions_ZIP5 values are good
Field Check: passed CAInstitutions_CAICAT values are good
Field Check: passed CAInstitutions_BBSERVICE values are good
Field Check: passed CAInstitutions_DBANAME values are good
Field Check: FAILED CAInstitutions_TRANSTECH has UNEXPECTED VALUES
Field Check: passed CAInstitutions_MAXADDOWN values are good
Field Check: passed CAInstitutions_MAXADUP values are good
Field Check: FAILED CAInstitutions_SpeedNotBB has UNEXPECTED VALUES
Field Check: passed CAInstitutions_OneSpeedAndNotTheOther values are good
Field Check: passed CAInstitutions_FULLFIPSID values are good

**Check Layer: CensusBlock*
Geometry PASSED: Layer has 190115 records.
Field Check: passed CensusBlock_PROVNAME values are good
Field Check: passed CensusBlock_DBANAME values are good
Field Check: passed CensusBlock_PROVIDER_TYPE values are good
Field Check: passed CensusBlock_FRN values are good
Field Check: passed CensusBlock_STATEFIPS values are good
Field Check: passed CensusBlock_COUNTYFIPS values are good
Field Check: passed CensusBlock_TRACT values are good
Field Check: passed CensusBlock_BLOCKID values are good
Field Check: passed CensusBlock_FULLFIPSID values are good
Field Check: passed CensusBlock_TRANSTECH values are good
Field Check: passed CensusBlock_MAXADDOWN values are good

Field Check: passed CensusBlock_MAXADUP values are good
Field Check: passed CensusBlock_SpeedNotBB values are good
Field Check: passed CensusBlock_OneSpeedAndNotTheOther values are good
Field Check: passed CensusBlock_TYPICDOWN values are good
Field Check: passed CensusBlock_TYPICUP values are good
Field Check: passed CensusBlock_SpeedCheck values are good
Speed Tier Record Check PASSED

**Check Layer: Overview*
Geometry PASSED: Layer has 0 records.
Field Check: passed Overview_PROVNAME values are good
Field Check: passed Overview_DBANAME values are good
Field Check: passed Overview_FRN values are good
Field Check: passed Overview_GEOUNITTYPE values are good
Field Check: passed Overview_STATECOUNTYFIPS values are good
Field Check: passed Overview_TRANSTECH values are good
Field Check: passed Overview_MAXADDOWN values are good
Field Check: passed Overview_MAXADUP values are good
Field Check: passed Overview_SpeedNotBB values are good
Field Check: passed Overview_OneSpeedAndNotTheOther values are good
Field Check: passed Overview_STATEABBR values are good
Field Check: passed Overview_SpeedCheck values are good

**Check Layer: RoadSegment*
Geometry PASSED: Layer has 100501 records.
Field Check: passed RoadSegment_PROVNAME values are good
Field Check: passed RoadSegment_DBANAME values are good
Field Check: passed RoadSegment_PROVIDER_TYPE values are good
Field Check: passed RoadSegment_FRN values are good
Field Check: passed RoadSegment_ADDMIN values are good
Field Check: passed RoadSegment_ADDMAX values are good
Field Check: passed RoadSegment_STREETNAME values are good
Field Check: passed RoadSegment_CITY values are good
Field Check: passed RoadSegment_STATE values are good
Field Check: passed RoadSegment_ZIP5 values are good
Field Check: FAILED RoadSegment_TRANSTECH has UNEXPECTED VALUES
Field Check: passed RoadSegment_MAXADDOWN values are good
Field Check: passed RoadSegment_MAXADUP values are good
Field Check: passed RoadSegment_SpeedNotBB values are good
Field Check: passed RoadSegment_OneSpeedAndNotTheOther values are good
Field Check: passed RoadSegment_TYPICDOWN values are good
Field Check: passed RoadSegment_TYPICUP values are good
Field Check: passed RoadSegment_SpeedCheck values are good

**Check Layer: Wireless*
Geometry PASSED: Layer has 14 records.
Field Check: passed Wireless_PROVNAME values are good
Field Check: passed Wireless_DBANAME values are good
Field Check: passed Wireless_FRN values are good
Field Check: passed Wireless_TRANSTECH values are good
Field Check: passed Wireless_MAXADDOWN values are good
Field Check: passed Wireless_MAXADUP values are good
Field Check: passed Wireless_SpeedNotBB values are good
Field Check: passed Wireless_OneSpeedAndNotTheOther values are good
Field Check: passed Wireless_TYPICDOWN values are good
Field Check: passed Wireless_TYPICUP values are good
Field Check: passed Wireless_STATEABBR values are good
Field Check: passed Wireless_SpeedCheck values are good

During processing VGIN identified two issues with the NTIA provided Python script. In order to complete the requirements of the submission, the script had to be altered slightly and those changes are detailed below.

1. The Last Mile and Middle Mile feature class defines the attribute ELEVFEET to identify the elevation of the Last/Middle Mile point provided by the broadband providers. If the SBDD data model, the default value is -9999. The Python script contained a query string

"***ELEVFEET Is Null OR ELEVFEET < 0***" which was causing every record using the -9999 default value to fail. VGIN changed the query string to read "***ELEVFEET Is Null OR (ELEVFEET < 0 and ELEVFEET <> -9999)"*** which allowed records using the default value to pass the validation check.

2. Two Wireless broadband providers reported service territory using Points and Lines rather than Polygon features. This cause the TTRANS_TYPE field to be populated with a value that did not pass the validation check for WIRELESS technology. VGIN and CIT will work with these broadband providers in future submissions to deliver their information in a format that is compatible with the SBDD data model.

Issues/Considerations

Cellular Market Area reporting

There were several cases where Cellular Market Area (CMA) coverage was used in reporting speed tiers. A CMA shapefile was located online and loaded into SDE for processing. The features used had CMA id number and CMA name and this information was spatial joined to blocks, streets, and addresses where pertinent.

Several major providers submitted a census blocks less than two square miles and road segment ranges although left the upload and download speeds out. The information for maximum advertised for up and download speed was provided in a separate spreadsheet and referenced speeds by cellular market area (CMA). A CMA shapefile was downloaded and used potential census block information and this contained reference information to other spreadsheets. The advertised download and upload speeds were provided by cellular market area. The road centerline information was then spatially joined to this updated table as well as the address points to get the speed information.

Data version issues & future processing

Several broadband providers reported blocks in 2008 geography so block FIPS id did not join from the provided block spreadsheet to the statewide block file. Since these changes reported no results when joining, the column where block was reported was formatted to allow only the exact amount of characters for the block FIPS id to be equal from the provider to the feature selected. This seemed to be the cause of why some blocks were reported in the less than two square mile feature class but their geometry was actually more than two from 2000.

Broadband providers who reported address level data only did not have any additions or subtractions done to their reported data. It was geocoded directly and results were loaded into the master data set wholesale so one thing that may be done or at least need to be looked at for the next submission is where these broadband providers report addresses that fall in blocks less than two square miles. There may be many cases where these broadband providers actually need a block placed in the report instead of centerlines and points. This may reduce the amount of total address points and road segments submitted as well as increase the individual coverage area for a broadband provider if we do leave out features that sit on top of these polygons.

With further analysis of road name and address range data provided by broadband providers, many roads had null values for address range high and low as well as the street name. This was problematic when attempting to select by attributes since only data yielded results for segments where this information was populated.

Also, further analysis of the data may show which centerline source broadband providers are using. Geocoding data may be a step that is only needed for address data only in the future and not needed for ranges if the census data can be utilized for a geographic feature.

Methodology Paper

United States Virgin Islands Territory

State Broadband Data and Development Program

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State Broadband Data and Development Program
Methodology Paper

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PREFACE

This technical paper has been prepared by Stratum Broadband, LLC, as part of a consulting services engagement with the United States Virgin Islands Territory (USVI). The engagement covers support services provided to the USVI as part of a broadband mapping and planning project funded by the National Telecommunications Administration (NTIA) as part of the America Reinvestment and Recovery Act (ARRA) of 2009.

Purpose

This technical paper documents the process that has been used to collect and publish information regarding broadband availability in the Territory.

Scope

The State Broadband Data and Development Program (SBDD) follows guidelines for implementation as promulgated in the Notice of Funds Availability (NOFA) Docket No. 0660-ZA29. The Technical Appendix of the NOFA and the associated Clarification document provide a data model for reporting findings and definition for the data elements.

The SBDD program seeks to document information regarding certain institutions in the Territory representing government, education, libraries, public safety, and healthcare. In addition to identifying these institutions, information profiling their existing utilization of broadband service is being collected. The collection and reporting process can be found in the Community Anchor Institutions (CAI) section.

The SBDD program also seeks to document the general availability of broadband service throughout the Territory. The data is drawn directly from providers of broadband services within the Territory and from public sources. In addition to documenting advertised services, the SBDD Program seeks to validate the information collected using available means. Lastly, the SBDD Program expects an effort will be made by the Territory to verify to what extent advertised services are actually reaching the consumer.

Document Organization

This document is organized into the following sections:

Section 1, Background - This section provides some insight regarding the physical and political environment of the Territory that has some bearing on the strategy and tactics employed in carrying out the intent of the program.

Section 2, Community Anchor Institutions - This section describes the approach used to identify, qualify, collect, and document data regarding institutions classified as Anchor Institutions.

Section 3, Service Providers - This section documents the process of identifying, qualifying, and collecting data from providers of broadband service to consumers in the Territory.

Section 4, Verification - This section describes activities already undertaken or planned to verify the data reported for the project.

Acronyms

This document uses the following acronyms:

ARRA	America Reinvestment and Recovery Act
FIPS	Federal Information Processing Standards
NTIA	National Telecommunications Administration
NOFA	Notice of Funds Availability
SBDD	State Broadband Data and Development Program
USVI	United States Virgin Islands Territory
UVI	University of the Virgin Islands
viNGN	Virgin Islands Next Generation Network
VIPFA	Virgin Islands Public Finance Authority
VIWAPA	Virgin Islands Water and Power Authority

1. BACKGROUND

This section provides some insight regarding the physical and political environment of the Territory that has some bearing on the strategy and tactics employed in carrying out the intent of the program.

1.1. Geography

The USVI is comprised of a group of islands some 70 miles east of San Juan, Puerto Rico. The Territory has a total population of about 108,000 residents. Most of the population resides on St. Thomas and St. Croix, the two largest islands. St. Croix is about 40 miles due south of St. Thomas. The third island of St. John is located 2 miles east of St. Thomas and is the site of a US National Park which occupies more than half of the land area on the island. A fourth island known as Water Island is located in the harbor of Charlotte Amalie on St. Thomas. It is the smallest island with fewer than 600 residents. US Census Bureau record keeping overlays the three largest islands with the notion of county. The FIPS codes for USVI “counties” are:

78010 – St. Croix

78020 – St. John

78030 – St. Thomas

Water Island is included in FIPS 78030 (St. Thomas). The Territory government does not recognize or use the term county.

1.2. Government

The government of the USVI is made up of three branches: Executive, Legislative, and Judiciary. The Executive branch includes the Governor, Lt Governor and the Cabinet. The Cabinet is comprised of 26 department heads. The Territory is represented at the Federal level by an elected member of the US House of Representatives.

The Department of Education operates thirty-four K-12 schools in the Territory. There is one four year university, the University of the Virgin Islands (UVI), with campuses on St. Thomas and St. Croix.

There are full service hospitals on each of the two large islands and medical service facilities on St. John.

While the head of government is on St. Thomas, many of the departments maintain administrative facilities on both St. Thomas and St. Croix due to the physical separation of the Caribbean Sea between them. The government structure also includes organizational entities known as Authorities. These include the Public Finance Authority, Virgin Islands Next Generation Network, Virgin Islands Water and Power Authority, and the Virgin Islands Port Authority.

1.2.1. Public Finance Authority – Office of Economic Opportunity (VIPFA/OEO)

The Public Finance Authority, Office of Economic Opportunity is the named awardee for the SBDD Program Grant.

1.2.2. Virgin Islands Next Generation Network (viNGN)

The Virgin Islands Next Generation Network is a public-private corporation established to construct and operate a Territory-wide wholesale fiber-optic network. The Territory is the recipient of an ARRA BTOP grant intended to fund the construction of this network.

The Public Finance Authority has delegated authority to manage fulfillment of the State Broadband Data and Development to viNGN.

1.2.3. Virgin Islands Water and Power Authority (VIWAPA)

Virgin Islands Water and Power Authority is the government operated water and electric power utility of the Virgin Islands. It is a public private corporation which operates electric generation facilities and electric power distribution in the Territory. VIWAPA also operates water desalinization and distribution facilities. VIWAPA has contributed rights of way, underground conduit, and poles that will support deployment of the viNGN optical fiber wholesale broadband network.

During the planning portion of the SBDD project, VIWAPA contributed Computer Aided Design (CAD) files of pole locations to the SBDD project.

1.3. Special Conditions

During the course of collection and validation of information, there were a few conditions that influenced the process.

1.3.1. Geocoding Constraints

The US Census Bureau Tiger Line records for Census 2000 data do not provide any street segment data for the USVI. Street names in the USVI are meaningful only within the context of historic land areas referred to as "estates." This land management structure is a carry-over from earlier governance of the islands by Denmark. The USVI became a US possession as the result of its purchase from the government of Denmark in 1917. Land parcel ownership records are currently maintained in this estate format.

When interviewing service providers, we found that service location identification, which is typically based on street addressing, is virtually nonexistent in provider record keeping. Billing is almost exclusively directed to post office boxes. Where physical plant service locations are recorded, they are generally defined by reference to known landmarks.

The Lt. Governor's office includes a GIS organization which has been guiding a collaborative effort among all Territory departments to share available geodata in a common structure. The Virgin Islands Geospatial Information Council (VIGIC) is engaged with Federal agencies, such as the US Geological Survey, as well. There is currently a project underway to plan for conversion to geocoded street addressing system over the next two to four years.

1.3.2. Internet Exchange Service Availability

All terrestrial service providers rely on submarine cable based data services from Florida for telephone and broadband data services. The cables are operated by AT&T (St. Thomas) or Global Crossing (St. Croix).

Communication services between the islands of St. Thomas and St. Croix is available by submarine cable service leased from AT&T in 45Mbps increments. Communication services between St. Thomas and St. John is available by submarine fiber cable operated by the VIWAPA.

1.3.3. Non Terrestrial Service Providers

Wireless mobile broadband service providers use licensed spectrum and operate radios in the Territory for 3G services. They merchandise end user equipment through local retails stores or authorized dealers. Except for local dealer advertising, services are advertised on national broadband sites including general coverage maps. The business operations for national providers are not located in the Territory.

Ground station equipment for consumers is available from at least two satellite providers through dealers located on St. Thomas. These dealers will travel to the other islands to effect installation.

2. COMMUNITY ANCHOR INSTITUTIONS

This section provides information regarding the collection and classification of data pertaining to Community Anchor Institutions (CAIs).

2.1. Data Gathering

CAIs are comprised of schools, libraries, medical and healthcare providers, public safety entities, institutions of higher education, and other community support organizations and entities. The NTIA has asked that these CAIs be categorized according to the codes shown in Table 2-1.

Table 2-1 Community Anchor Institution Category Codes

Category Code	Category
1	School – K through 12
2	Library
3	Medical/healthcare
4	Public safety
5	University, college, other post-secondary
6	Other community support – government
7	Other community support – nongovernmental

While most CAIs fall into obvious classification, some decisions are required where the NOFA does not directly address certain situations. These exceptions for the USVI are summarized in Table 2-2.

Table 2-2 Community Anchor Institutions Categorization Decisions

Categorization Exception	Categorization Decision
Adult Education geared toward GED-level learning	Included with Code 1: Learning at the K-12 level
Private preschool programs that include Kindergarten	Included with Code 1: Though main focus of institution is pre-K, a qualifying program is offered
V.I. Department of Education administrative offices and facilities	Included with Code 6: Since these facilities are not used for actual education of students, it seems they are community support – government
Single private medical offices	Not included: Individual medical offices do not seem to fall into the notion of community support
Buildings housing many private medical offices	Included with code 3: Most of these multi-practice buildings have association with public healthcare facilities and house a significant number of healthcare providers.
Other community support – nongovernmental	Included with code 7: It was decided to limit this category to established community, learning, and recreation centers, as well as nationally recognized youth clubs.
Co-located CAI	A certain number of CAIs are co-located in common municipal or other buildings. In these situations it was determined that co-located CAI falling under a common department or authority would be considered a single CAI. In cases where the CAIs were of different departments of authorities, they would be considered separate CAIs.

The bulk of the initial CAI list was generated from a Google Earth (kml) layer file obtained by Stratum Broadband from the engineering department of the VIWAPA. VIWAPA maintains a location-based list of most public and private institutions on the islands for planning and service purposes. Due to the size of the Territory, it was practical to supplement this list of potential CAIs with data culled from public sources, such as the local phone book and standard web searches.

Data regarding broadband service at each identified CAI is being collected by Stratum Broadband and the newly created Virgin Islands Next Generation Network (viNGN), the USVI Territory grantee, through a CAI outreach program designed to benefit both the SBDD and the Broadband Technology Opportunities Program (BTOP). This program includes paper surveys distributed at meetings for the CAIs run by viNGN and the Territorial governor, online surveys at vingn.com, and personal contacts with information technology directors of the various institutions. As of April 1, 2011, a determination of broadband service subscription has been made at approximately 10% of the 324 CAI locations. It is projected that by October 1, 2011, this number will be at 75% or higher.

2.2. Data Validation and Processing

There are three main points of validation and processing for the CAI data: location, data format normalization, and broadband service subscription.

2.2.1. Location

Validation of CAI locations is made difficult in the Territory by the absence of a consistent addressing convention and by the unavailability of geocoding resources. These concerns are being addressed currently by a project under the direction of the Office of the Lieutenant Governor. This data will be used as it becomes available.

In lieu of geocoding resources, a week-long program was undertaken by Stratum Broadband and VIWAPA to verify the location of each identified CAI. Latitude and longitude values were taken using a standard retail Garmin Zumo model 550 with WAAS enabled at a location as close to the building entrance as practical. As a result, all reported CAI locations have been visually confirmed by Stratum Broadband, and most GPS readings are within 50 yards of the physical building entrance on the street side.

All CAI locations were verified using ESRI ArcMap Topology tools to fall within the state boundaries.

2.2.2. Data Format Normalization

There are two main issues with normalizing the data formats for reporting to the NTIA. The first issue is with CAI naming conventions, and the second issue is with consistent street addressing.

The NTIA has asked that the name of each CAI be unique. While this is satisfied in many cases by using the formal name of the CAI facility, there are a number of cases, particularly in the public safety and other community support – government categories, where formal facility names are not unique. For example, a government department may have an office on each of the three islands, each bearing only the name of the department. Table 2-3 summarizes the general naming conventions used for each CAI category code.

Table 2-3 Community Anchor Institution Naming Conventions

Code	Category	Naming Convention ([ ] denotes used as needed)
1	School – K through 12	Formal name [- geographic name]
2	Library	Formal name
3	Medical/healthcare	Formal name [- geographic name]
4	Public safety	Formal name [- geographic name]
5	University, college, other post-secondary	Formal name [- geographic name]
6	Other community support – government	Department [-facility name[- geographic name]
7	Other community support – nongovernmental	Formal name [- geographic name]

The second data format normalization issue is due to the non-conventional and non-consistent addressing scheme used to identify street addresses in the USVI. Where verifiable, the publicly advertised (by phone book and/or web site) address was used.

There seems to be two main schemes for designating a street address. The collected street address data also showed combinations and variations of these two main schemes.

1. Building Number, Street Name, City, State, ZIP code
2. Parcel Number, Estate, Island, State, ZIP code

Scheme 1 maps very closely with the addressing format requested by the NTIA and addresses conforming to this scheme required no further processing.

For addresses not conforming to Scheme 1, the conversions shown in Table 2-4 were used where applicable.

Table 2-4 Non-conventional Address Mapping

Non-conventional Address Part	NTIA Address Field
Parcel Number	Building Number
Estate	STREET NAME
Island	CITY

About 40% of the addresses have no obvious analog to the Building Number. In these cases the Building Number field was reported as “N/A.”

2.2.3. Broadband Service Subscription

To this point in time, there have been no attempts to validate broadband service subscription at the CAI locations. CAI representatives are reporting the speeds according to their contracts with the various providers. In cases where a CAI may have more than one broadband connection, the higher speed connection is reported. It is hoped that a future activity will involve collecting of speed test data from a number of CAIs to validate a sampling of the reported speeds.

2.3. Reporting Summary

For the Spring 2011 NTIA reporting period, Stratum Broadband identified 324 CAIs. Table 2-5 summarizes the breakdown by category. Subscription to broadband service has been identified in about 10% of the total number of CAIs. Of those whose broadband subscription status is known, 47% have internet access at qualifying speeds.

Table 2-5 Community Anchor Institution Breakdown by Category

Code	Category	Count	% of Total
1	School – K through 12	82	25
2	Library	7	2
3	Medical/healthcare	19	6
4	Public safety	42	13
5	University, college, other post-secondary	4	1
6	Other community support – government	133	41
7	Other community support – nongovernmental	37	11

3. SERVICE PROVIDERS

This section describes the identification, collection, and processing of data related to broadband service providers operating in the USVI.

3.1. Data Gathering

The NOFA defines available broadband service in the following words:

> *Broadband service is "available" to an end user at an address if a broadband service does, or could, within a typical service interval (7 to 10 business days) without an extraordinary commitment of resources, provision two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (kbps) downstream and at least 200 kbps upstream to the end user at the address*

For practical purposes of classification, this statement was interpreted into a set of rules to determine what qualifies as broadband service in the USVI. An Internet service provider is considered to offer qualifying broadband service if the following requirements are met:

1. **Provider offers two-way data transmission to the Internet for end users in a geographical area within the USVI.** This rule was used to exclude two companies who provide internal network services targeted only to the hospitality industry and who, as part of their network services, resell internet connections from facility-based providers. They do not offer broadband service generally to end users in a geographic region. It is possible that this restriction may be altered in future reports to allow these companies to appear as resellers.

2. **Provider publicly advertises Internet service levels of at least 768 kbps downstream and 200 kbps upstream.** This rule was used to exclude all dial-up services and a number of Terrestrial Fixed Wireless and DSL service offerings. However, no wireless or DSL providers were excluded by this rule since all offer at least one service level meeting the minimum speed standards.

3. **Provider must be able to provision the service to the end user within a typical service interval of 7-10 business days.** This rule excluded a number of traditional copper wireline services, as well as a number of high bandwidth point-to-point business service offerings.

While not used to determine broadband service qualification, the question was raised whether both residential and business offerings should be considered when determining the maximum advertised speeds. In general, the business offerings include speed tiers above those offered to residential customers with an often quite significant increase in pricing structure. The concern is that a resident or small business owner may view the National Broadband Map and see that 5 Mbps service is available at his location, but find out from the providers that one must be able and willing to pay a significant monthly fee ($500-$1000) that is impractical for a typical household or small business. Conversely, if reported speeds were limited to residential offerings, the medium and large businesses would not find useful information on the National Broadband Map. Ultimately, since no clear language in the NOFA or various clarifications provided by the NTIA could be used to exclude a service level based on price or target market, it was decided to include the qualifying business offerings when determining the maximum advertised speed levels.

In total eight providers, offering nine qualifying broadband services, were identified. The Table 3-1 shows a breakdown of qualifying services by transmission type. Of the eight identified providers, four are local providers operating mostly in the USVI. The remaining four are national cellular or satellite providers.

Table 3-1 Qualifying Services by Transmission Type

Code	Transmission Type	Qualifying Services
10	Asymmetric xDSL	1
60	Satellite	2
70	Terrestrial Fixed Wireless - Unlicensed	1
71	Terrestrial Fixed Wireless - Licensed	2
80	Terrestrial Mobile Wireless	3
	Total	9

3.2. Data Collection

Collection of service provider data has mostly been facilitated through leveraging of personal contacts with each of the providers. The relatively small number of providers in the USVI makes this approach feasible. Initial contacts among the local providers were made during stakeholder meetings convened by the Territorial Government in the early planning phases.

Subsequently, Stratum Broadband personnel have met with each provider to explain the purposes of the SBDD program, to detail the information required, and to address concerns of confidentiality of proprietary data.

Before data could be collected from the local providers, Non-Disclosure Agreements (NDAs) were negotiated. One unique and common concern addressed in the NDA was that infrastructure information (last mile, middle mile, and backhaul) should only be known by Stratum Broadband and not be shared with the Territorial government agencies involved in the project. The issue being that of information in the hands of government officials becomes subject to requests for public data.

The data collected for the national carriers was all done from public sources, such as web sites and FCC licensing data, as well as personal contact with local resellers of the service. No NDAs were negotiated with these national providers, nor has Stratum Broadband yet been able to identify suitable contacts within the national providers to confirm the data collected. No infrastructure data is known for these national providers.

3.2.1. Infrastructure Data

Each local provider agreed to share information with Stratum Broadband about the qualifying services under the established NDA. Spreadsheets detailing the required data were prepared and emailed to the appropriate contact for each provider. Completed spreadsheets, along with supporting information, were delivered to Stratum Broadband by email. Generally, more details about the network infrastructure were given to Stratum Broadband than the NDA permitted to be disclosed to the NTIA. Particularly, information detailing location, technology, or capacity of last mile and middle mile nodes were useful in adjudging the reasonableness of claimed availability areas, but were not reported in full.

3.2.2. Broadband Availability Areas

Each provider of qualifying service presents a unique situation regarding the designation of areas of availability. Stratum Broadband worked with each provider to collect the data necessary to present an acceptable representation of the actual area of availability. Table 3-2 summarizes the data collected from each provider for use in determining availability areas.

Table 3-2 Summary of Collected Availability Area Data

Provider	Service Type	Source	Type of Data
AT&T Mobility	Mobile Wireless	web site	GIF file from national coverage tool
Broadband VI	Fixed Wireless	Google Earth file	Hand-drawn polygon of area where no coverage, locations of access radios
Choice Communications	Fixed Wireless	GeoTiff file	Output of RF propagation tool
Choice Communications	Mobile Wireless	web site	GIF file from national coverage tool
HughesNet	Satellite	email	Experience of local reseller
Innovative PowerNet	Asymmetric xDSL	spreadsheet	Locations of DSLAM access nodes
SmartNet	Fixed Wireless	spreadsheet	Locations of access radios
Sprint Mobile	Mobile Wireless	web site	GIF file from national coverage tool
StarBand	Satellite	email	Experience of local reseller

3.3. Data Validation and Processing

3.3.1. Infrastructure Data

In general, network infrastructure is difficult to validate and must be assumed to be truthfully reported. Stratum Broadband has made an effort to spot check some location claims of access and middle mile points through direct visual inspection of facilities, such as a wireline central office or radio antenna, and public records, such as FCC licensing records. Stratum Broadband has found no evidence that would make the reported infrastructure data come under suspicion.

Spreadsheets containing the location data for the various provider infrastructure networks were imported into separate ESRI data layers as XY data for each provider. Locations serving end users were considered to be access nodes and are classified as “last mile.” Locations that aggregate data from two or more access nodes are classified as “middle mile.” Some middle mile points are also last mile points.

This infrastructure data is mostly used to validate the reasonableness of broadband availability areas. However, some of the middle mile data, as permitted by the agreements with the providers, is reported to the NTIA during the semi-annual data submissions. In no case does a provider permit the reporting of last mile points or of middle mile backhaul capacity. In some instances, a provider may request that the locations of certain middle mile points be omitted. The reported data, therefore, is mostly just the geographic locations of a subset of the actual middle mile points and cannot be considered to be a full representation of the network infrastructure for any given provider.

Table 3-3 summarizes the number of middle mile points reported for each qualifying service.

Table 3-3 Summary of Middle Mile Points by Service

Provider	Technology	Count of Middle Mile Points Reported
AT&T Mobility	Mobile Wireless	0
Broadband VI	Fixed Wireless	18
Choice Communications	Fixed Wireless	2
Choice Communications	Mobile Wireless	0
HughesNet	Satellite	0
Innovative PowerNet	Asymmetric xDSL	6
SmartNet	Fixed Wireless	4
Sprint Mobile	Mobile Wireless	0
StarBand	Satellite	0

3.3.2. Broadband Availability Area

Due to the unique data made available by the providers to determine the area of availability, each qualifying service will be treated individually in this section. In all cases, service availability has been restricted to land areas, though it should be noted that all wireless services are, in fact, available in some portion of the waters surrounding the USVI.

3.3.2.1. AT&T Mobility (Terrestrial Mobile Wireless)

The sources for both coverage and spectrum are collected from public data available through the AT&T web site and the FCC Universal Licensing System. The coverage polygon was hand drawn by Stratum Broadband to approximate the advertised 3G coverage map available on the national AT&T wireless web site. The spectrum data is a best guess based on the spectrums owned by AT&T Mobility in the USVI matched against the specifications of the data-capable phones available through local AT&T Mobility resellers.

The data here should be considered preliminary and is likely to be adjusted significantly by the Round 4 submission in October 2011.

3.3.2.2. Broadband VI (Terrestrial Fixed Wireless)

Broadband VI (BBVI) uses unlicensed spectrum and does not maintain RF propagation maps of coverage area. However, BBVI engineers have extensive practical knowledge of BBVI service availability. BBVI provided hand-generated polygons representing where coverage is not available. These polygons were merged with a polygon layer representing the land area of the USVI. The result was a polygon with holes where BBVI has determined it does not serve. This polygon represented the claimed area of availability.

This polygon was visually compared to the location and direction of each BBVI access radio, as well as topological features of the islands, to judge the reasonableness of the claimed coverage. Small modifications were made manually to this polygon by Stratum Broadband in areas where topological features would likely block signal from known access tower locations.

This data is likely a close representation of the internet service provided by BBVI.

3.3.2.3. Choice Communications (Terrestrial Fixed Wireless)

The source of this data feature was provided by Choice Communications (Choice) during the collection of data prior to the Round 1 submission in April, 2010. Choice has been unwilling to provide further data. Stratum Broadband has found no public evidence that the data has changed significantly since that time.

The coverage polygon is the result of using standard ESRI tools to convert a rasterized TIFF file, generated by Choice using RF propagation tools, into an ESRI shapefile. The coverage polygon was smoothed to eliminate subparts of less than approximately one-eighth square miles. No special validation was done since the source data was used by internal Choice engineers to manage its network. The spectrum data was provided by Choice engineers.

This data set should be considered to be highly accurate with the caveat that the data is aged.

3.3.2.4. Choice Communications (Terrestrial Mobile Wireless)

Choice began offering a "4G" mobile internet service in late Fall 2010. Choice declined to provide data concerning this service. All data is approximated from publicly available information. The coverage polygon was hand-drawn to approximate the coverage represented in a GIF image on the Choice web site. The spectrum data is a best guess based on the spectrums owned by Choice in the USVI.

This data should be considered preliminary and approximate.

3.3.2.5. HughesNet (Satellite)

Coverage for this satellite provider has been approximated to encompass the entirety of the major land areas of the USVI. This decision was made based on the anecdotal information provided by the local reseller who believes service is available in all parts of the territories, despite the fact that quality of service does vary in certain areas. This data will be refined by the Round 4 submission in October of 2011.

The data in this feature should be considered preliminary and approximate.

3.3.2.6. Innovative PowerNet (Asymmetric xDSL)

Innovative DSL service availability is reported at the census block level. Due to limited Road Segment data in the 2000 Census geographic data for the USVI, the availability of broadband in the six census blocks greater than two square miles is reported with the census block data. Additionally, only census blocks with land area greater than zero have been considered.

The availability of DSL service from Innovative was derived by Stratum Broadband based on the locations of Innovative DSLAMs (access nodes). Working under the industry-accepted assumption that DSL service can reasonably be provisioned to end points less than approximately 12,000 line-feet from a DSLAM, Stratum Broadband drew circular buffers, with radius of 12,000 feet, around each. To further refine the actual areas of reasonable availability, Stratum Broadband manually made modifications to each circle where appropriate, based on data layers of roads and utility pole locations to better approximate points within a distance of 12,000 line feet from each DSLAM.

Census blocks intersecting the derived coverage polygon were determined to have access to this DSL service. The resulting collection of census blocks was trimmed to exclude any census blocks having no land area. Census blocks with zero population were retained.

This data is likely a close representation of the Internet service provided by Innovative.

3.3.2.7. SmartNet (Terrestrial Fixed Wireless)

SmartNet does not maintain RF propagation maps of coverage area. However, SmartNet engineers have provided hand-generated polygons representing where coverage is available. This claimed coverage area was compared to the location and direction of each SmartNet access radio, as well as to topological features of the islands, to judge the reasonableness of the claimed coverage. Small modifications were made by Stratum Broadband where it seemed appropriate.

This data is likely a close representation of the internet service provided by SmartNet.

3.3.2.8. Sprint Mobile (Terrestrial Mobile Wireless)

The sources for both coverage and spectrum are collected from public data available through the Sprint Mobile web site and the FCC Universal Licensing

System. The coverage polygon was hand drawn by Stratum Broadband to approximate the advertised 3G coverage map available on the national Sprint Mobile wireless web site. The spectrum data is a best guess based on the spectrums owned by Sprint Mobile in the USVI matched against the specifications of the data-capable phones available through local Sprint Mobile resellers.

The data here should be considered preliminary and is likely to be adjusted significantly by the Round 4 submission in October 2011.

3.3.2.9. Starband Communications (Satellite)

Coverage for this satellite provider has been approximated to encompass the major land areas of the USVI. This decision was made based on the anecdotal information provided by the local reseller who believes service is available in all parts of the territories, despite the fact that quality of service does vary in certain areas. This data will be refined by the Round 4 submission in October of 2011.

The data in this feature should be considered preliminary and approximate.

3.4. Reporting Summary

As of December 31, 2010, eight broadband service providers were offering a total of nine different qualifying broadband services in the USVI. Table 3-4 summarizes each service including the percent coverage of each service by land area, households, and population.

Table 3-4 Summary of Qualifying Broadband Services

Provider	Technology	Max Down*	Max Up*	% Land Area	% Households	% Population
AT&T Mobility	Mobile Wireless	3	2	99.1	98.4	98.6
Broadband VI	Fixed Wireless	4	4	90.8	91.2	92.0
Choice Communications	Fixed Wireless	3	2	51.8	54.5	56.3
Choice Communications	Mobile Wireless	4	3	86.2	95.5	96.0
HughesNet	Satellite	5	3	99.8	98.8	98.9
Innovative PowerNet	Asymmetric xDSL	3	2	91.4	99.2	99.2
SmartNet	Fixed Wireless	4	3	62.0	85.4	87.1
Sprint Mobile	Mobile Wireless	3	2	69.8	89.1	90.1
StarBand	Satellite	3	2	99.8	98.8	98.9

* **2** = 200 kbps – 768 kbps, **3** = 768 kbps – 1.5 Mbps, **4** = 1.5 Mbps – 3.0 Mbps, **5** = 3.0 Mbps – 6.0 Mbps

4. VERIFICATION

This section describes activities already undertaken or planned to verify the data reported for the project.

4.1. Community Anchor Institutions

At the outset of the project, more than 90% of the 321 identified CAIs were visited to verify their existence, clarify naming, verify addressing (as available), and establish geo location (GPS collection of Latitude and Longitude coordinates). The geo coordinates were plotted to verify reasonableness by observation.

An on-going effort by viNGN and Stratum Broadband continues to reach out to CAIs by on-line survey and telephone as needed to collect and verify broadband service delivery technology type and performance.

4.2. Service Providers

Efforts have been made to ensure the inclusion of all eligible service providers in the collection and reporting. This has included searches of the FCC Universal Licensing System, web searches, media searches, such as Yellow Pages, and newspapers.

A further source would be the use of data gathered from FCC Form 477 submissions as authorized FCC Order 10-71. We anticipate completing service provider validation using this source during 2011.

4.3. Speed Testing

Speed testing, operated by the USVI as part of this program, will be used to document representative levels of broadband data rates wherever possible. Speed test information reported from outside services such as the FCC will be monitored and rationalized where possible to compliment project office results.

4.3.1. FCC Sponsored

The FCC is making some data available as part of an agreement with national services by OOKLA and MLabs. The expectation was that data would be shared at regular monthly intervals, but that has not been the experience so far. When attempting to use the data, we have found the process of determining the location of the originating request to be difficult and without enough location precision to be meaningful.

4.3.2. USVI Project Office Sponsored

Our planned deployment of project office sponsored speed testing has been delayed a number of times while project office administrative issues are sorted out. The planned implementation will provide for user-initiated speed testing to a common (not provider specific) point in an effort to normalize the user experience while also capturing user location to the nearest Census Tract or "Estate" boundary. This assumes user cooperation in selecting their geographic location on an interactive map before initiating the speed test.

4.4. Surveys

Surveys are being used to collect information directly from an end user, whether they are residents, businesses, or CAIs.

4.4.1. Community Anchor Institutions

The Office of the Governor has held a series of meetings with department heads of the government and other enterprises that make up the CAI database. These meetings provided an opportunity to present written survey forms to participants to solicit information regarding broadband service capabilities. This also provided an opportunity to solicit telephone contact information to the technical resource in each institution who would be responsible for the broadband service arrangements. Data collected in this exchange is being entered directly into a project geodatabase maintained for the project.

The project office has also launched an on-line interactive survey with the expectation that new information will be derived. This will require some effort to guide CAI organizations to the survey site.

4.4.2. Businesses

The project office has launched an on-line interactive survey in hopes of collecting broadband service usage information directly from enterprises in the Territory. This will require some effort to guide enterprises in locating the on-line survey site.

4.4.3. End Users

The project office has launched an on-line interactive survey in hopes of collecting broadband service usage information directly from end users in the Territory. This will require some effort to guide visitors in locating the on-line survey site.

4.5. Performance Probe

The plan for operating a performance probe has been available from the beginning of the project. Sorting out the details of funding and implementation has delayed the launch to date. A commercial software product is necessary to conduct this sort of verification.

The technique requires the cooperation of testers willing to host a probe agent on their home computer system. The goal is to identify up to 200 users to participate in the program. User participation as a volunteer would be solicited while visiting the Territory Broadband Map site. Volunteers would be screened by the program office and selected by the geographic location of their system. This selection process is necessary to assure a suitable distribution across the geography of the Territory. The test results can be quite reliable assuming a participation sample of 200 end users.

A central server manages the entire process of installing the probe client on the volunteer's system. Other than accepting the client installer on to his system, no further user participation is required. The central server configures the client to initiate a test at regular intervals 24 hours a day and 7 days a week. The server at the central site is responsible for storing the results of each test along with the identity of the client. The results are collected in a proprietary database at the managing server. Periodically, results are exported to relational database using a standard API provided by the probe system vendor. The individual results are analyzed and then aggregated to provide performance reporting.

With this automated testing, we can establish the "busy hour" while also establishing "typical" speeds.

Project History: Vermont's Broadband Mapping Initiative (BMI) is a collaborative broadband data collection and verification effort involving partners from the public, private and academic sectors participating as the Vermont Broadband Mapping Team. The BMI is supported by grant funds provided under the National Telecommunications and Information Administration's (NTIA) State Broadband Data and Development Program (SBDD).

In November 2009 the Vermont Broadband Mapping Team (BMT) initiated the creation and development of a comprehensive and verified geographic inventory of broadband service availability in the State of Vermont. Landline and wireless services (fixed and mobile) were mapped using information from the providers and other sources. The broadband mapping information collected and verified through this effort is supporting the broadband development objectives identified in the RUS Broadband Initiatives Program (BIP) and NTIA's Broadband Technology Opportunities Program (BTOP) in Vermont. Most importantly, the geographic inventory will further refine our understanding of the location of "unserved" and "underserved" areas in the state, thereby supporting targeted future investments in these areas.

The BMT includes the following organizations: Vermont Department of Public Service, the Vermont Telecommunications Authority, the Center for Rural Studies at the University of Vermont, Vermont's Enhanced 9-1-1 Board and the Vermont Center for Geographic Information. The BMT is also supported by private sector contractors.

Summary of Deliverables: The BMT's second broadband data submission (April 1st, 2011) includes broadband information as of December 31st, 2011 (VT_Package_April1_2011_v1.zip). The data complies with the NTIA NOFA requirements and SBDD data model (FGDB) specifications as of 1/13/2011. A detailed description of each dataset is available in the ./metadata folder included with the deliverable package.

Data Development Methodology: A variety of data source and data collection methods were used to identify the characteristics and geographic extent of broadband service in Vermont. Here is a quick breakdown

- **Cable:** Mapped to street/street-segment level
- **DSL:** Mapped as polygons (usually Exchange areas) or address points (list of addresses submitted by provider).
- **Fiber Optic:** Mapped as address points (list of address submitted by provider)
- **Fixed Wireless (WISP):** Mapped as polygons (propagation maps prepared by independent contractor using data provided by WISPs)
- **Mobile Wireless:** Mapped as polygons (data submitted by provider)
- **Satellite:** Mapped as polygons (data submitted by provider). Providers of satellite-based broadband services claimed that they covered the entire state.

The cable, DSL, fiber optic, and fixed wireless (WISP) layers were "intersected" with Vermont's E911 address point layer to determine broadband availability at the address-level. This information was then intersected with Vermont's 2000 Census Block layer to calculate availability at the block level. The April 1st, 2011 deliverable includes Census block-level data for Census Blocks less than or equal to 2 sq miles, and address level data for Census blocks greater than 2 sq miles.

Mobile wireless and satellite-based broadband polygons were submitted by providers to VCGI. They were formatted to match NTIA specification, but otherwise forwarded as-is.

Vermont's broadband providers submitted data which was used to populate a table listing maximum advertised and typical speeds by Metropolitan Statistical & Rural Service Areas (Cellular Market Areas). This information was used to populate the speed information contained in the submitted broadband, including speed information at the census block level. In numerous cases providers did not submit typical speed information.

The initial list of Community Anchor Institutions (CAIs) was derived from existing data sources including the VT Critical Facilities Database and Public Libraries Survey from the Institute of Museum and Library Services. Community Anchor Institutions include schools, libraries, medical facilities, public safety facilities, universities and colleges, and other community facilities such as town halls/offices. An email and hard-copy mailing was sent to every institution in the list. They were asked to fill out an online survey. Follow-up emails and phone calls were made to increase the response rate. The data delivered to the NTIA includes all CAIs, but only includes broadband information for a subset. Additional broadband institutions will be added as their information becomes available.

Data Review: No formal confidence interval for provider data submissions has been established. Vermont is waiting for clarification from the NTIA on this. However, each provider submitted dataset is evaluated against a minimum standard or expectation of quality. If the data submission is identified by the VT Dept of Public Service as not credible based upon their experience, it is not included in the inventory. If a provider creates a data submission that cannot be parsed or, resolved, we contact the provider to try and work out a method of submission that can be used. There were some unusable submissions for the December 31st, 2010 dataset. In some cases this resulted in the provider not being represented in the data, in other cases it resulted in the use of their previous submission (June 30, 2010). These are documented in the DataPackage.xlsx file.

Feedback Loops: Each broadband provider that supplies broadband service data in some manner to the VT broadband data inventory is given the option to view a final version of their data submission as it will be represented in the NTIA delivery. However, very few providers have asked for a copy of the final version of their data submission for review. Some smaller providers have asked for, and received, a hardcopy map or digital map graphic (PDF) of their coverage area. All of the providers that requested to see what was being submitted to NTIA representing their coverage area received either a copy of the data, a hardcopy map or digital map graphic in accordance with their preference.

Data Verification Methodology: The BMT used the data from a phone survey conducted by the UVM Center for Rural Studies (CRS) to verify the broadband maps. Respondents were asked to indicate whether they had broadband at their residence, and were asked to provide their address. The addresses were geocoded (mapped to a lat/long coordinate), then used to evaluate the "accuracy" of the broadband coverage data. A summary of the findings will be available by April 15th, 2011. This information will be forwarded to the NTIA at that time.

Conclusion: Vermont's Broadband Mapping Team is pleased to deliver a robust broadband availability inventory to the NTIA. We are confident that it meets the specifications outlined in the NTIA SBDD NOFA. The broadband data and maps will help Vermonters refine their understanding of "un-served" and "underserved" areas of the state, thereby supporting targeted future investments in these areas.

Washington Broadband Mapping

Data Submission Report

3rd Submission (April 1, 2011)

April 1, 2011

Sanborn
320 Miller Avenue
Suite 80
Ann Arbor MI 48103

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1 Introduction

This report is submitted along with the third data submission for the Washington Broadband Mapping Project. This submission includes all data collected so far per the requirements of the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (Docket No. 0660-ZA29) Notice of Funds Availability (NOFA) and formal and informal Clarifications to it. Specifically, it includes broadband data collected from broadband providers and Community Anchor Institutions data compiled from various sources for the State of WA. The State of Washington has retained a mapping contractor, primed by The Sanborn Map Company for doing all work related to the Mapping Grant for this project.

This document is a supplement to the two previous reports submitted with data submissions 1 and 2 on May 1, 2010 and October 1, 2010 respectively. Therefore, it builds on the document provided with those submissions. Rather than repeat the contents of the previous report, this document makes incremental updates on various topics. For this reason, it may be worthwhile to refer to the previous documents, if needed, for more details.

1 Overall Project Status

1.1 DATA COLLECTION

This section details data collection related to NTIA deliverables which include broadband data and community anchor institution data.

1.1.1 Broadband Data

For submission 3, Sanborn started data collection on January 19th 2011 by sending out data update requests and technical data specifications after NTIA did a Webinar announcing final changes for Submission 3. These were sent to a large list of companies which were compiled from FCC 477 list (dated December, 2009) and from a list provided by the Washington UTC. The technical document highlighted the changes from Submission 1 to Submission 2 and requested incremental data only where possible. Sanborn also uploaded the final data for each provider in NTIA format to the Sanborn Provider Portal. The providers were encouraged to use the provider portal and update their information on it. Many providers participated through this process very effectively and most are getting used to this process.

Although we sent the technical specifications to all the providers (more than those on the FCC 477 list and many that were non-providers earlier including resellers and non-valid providers), we followed up actively with the providers on the 477 list or those who were already participating, and public providers such as PUDs (public utility districts) who were of strategic interest to the State of Washington. This is because most providers outside of the FCC list were found to be non-providers of broadband.

During this round of the data update, many providers who had refused to participate in the program earlier expressed an eagerness to participate. This validates the importance of the program, not only for the purposes of the government, but also for the providers themselves.

In our solicitation for data updates, we told providers that if we didn't hear from them by a certain date, we would default to using their data from Submission 2. However, we still contacted them after the due date a few times but eventually used Submission 2 data if they did not respond.

As with the second submission, we followed the following protocols:

1. We did not collect data from resellers
2. We have not collected data from satellite providers – we are in the process of formulating a strategy to map coverage from satellite providers and anticipate that we will have some coverage for

satellite providers in our next delivery to NTIA (Submission 4, due to NTIA on October 1, 2011).

    1) Three satellite providers have been identified in Washington – Hughes, Starband, and Wildblue.

3. Affiliates, subsidiaries etc. have been counted as providers. Please note that data for these entities may or may not be reported as a separate FRN if they share the same FRN as their parent company.
4. We have not undertaken any propogation analysis for wireless providers who did not already have their own propagation maps. We are considering doing that for the next submission.
5. On the directive from the State and based on the strategic interests of the State, we worked hard to get more Public Utility Districts (PUDs) in Washington to participate in the program. As previously noted, PUDs are public entities at the County level that lay broadband infrastructure connecting to the end users (i.e. such as fiber to the homes) but are not allowed to sell directly to the customers. Broadband service is provided by resellers using the infrastructure owned by the PUDs at speeds that the market is capable of bearing. However, since our contract scope does not include collecting reseller data (in some cases there can be more than 20 resellers on a single PUD infrastructure), such areas would go unreported and consequently shown as unserved on the maps. These are also rural areas and areas where other providers are not operating and hence it is critical for the State to map these providers' service area. For this reason, we collected the data from the PUD. Furthermore, there is legislation in circulation in the Washington Legislature that could make PUDs serve directly to customers and hence it is important to identify their service area on the map. **Contrary to previous submission, in this submission, the NTIA data model allows such providers to be reported on the map through the use of domain code 3 (others) in the field documenting the Type of Provider**. We plan on putting PUDs on the WA State Interactive Broadband Map with a note that they would need to visit the PUD site to find out the list of resellers who can provider retail service to them.
6. In Submission 2, we provided address level data for one provider (Qwest). However, the data did not include information on end user category. Therefore, in the Data Receipt package from NTIA, we were informed that the data was rejected. In this submission, we checked with Qwest and they are unable to provide the End User Category for address points as this is not a piece of information that they track. Therefore, for Submission 3, we decided to not submit the address level data for this provider. In both Submission 2 and Submission 3, we provide the street segments and census block data representing the address points. Therefore, this does not impact the service availability.

This submission process went smoother than previous submissions. There were a few minor issues that need to be resolved from previous submissions.

1) Spectrum: Larger providers are still not willing to provide separate polygons for different spectrums.
2) Communication with providers: It would help with data collection if NTIA/FCC held an open forum with the providers for changes that are being proposed for that data collection. This should happen before States start data collection and also providing all change information on an NTIA website to the providers so that they are not questioning the credibility of the request from States.
3) Information from NTIA: It would be very helpful to have information on changes in data model, requirements and specifications before the data collection is started. Ideally, in order to meet the next deadline of October 1 (for data good as of June 30, 2011), we would need to send out a data request to providers in the July 1-3 timeframe and giving them 3-4 weeks for preparing data and submitting it to us (given the holidays and the summer, it is important to give providers sufficient time to assimilate all data). Therefore, NTIA would need to get all changes finalized by June 30th so that we can hit the road immediately after that. This lead time allows us to provide more desirable time spans to the providers, and for us and the states to do the right amount of validation. As the process becomes smoother for everyone, we anticipate that this will happen more regularly in the future.

1.1.2 Community Anchor Institutions Data

The community anchor institutions data continues to be crowd-sourced through the online data gathering application created by the Sanborn Team. The State of Washington is doing the PR around this data collection and contacting the relevant agencies to request them to fill in data. This has been a slow process and we are getting to a point of diminishing returns with this effort. The numbers of community anchor institutions that have responded so far is provided below:

Category	Name	Total	Total with Broadband Information in Submission 2
1	School - K through 12	2295	1769
2	Library	350	350
3	Medical/healthcare	132	49
4	Public Safety	1707	104
5	University, college, other post-secondary	219	179

6	Other community support - government	343	32
7	Other community support - nongovernmental	344	11

1.2 DATA PROCESSING

1.2.1 General Overview

In general, the submission 3 processes followed the same basic approach that was used in Submission 1 (s1) and Submission 2 (s2). As mentioned before, the submission 1 and 2 process documentation was included with those submissions and may be worth looking at for details if needed. The following sections outline the modifications made to the initial processing in order to meet the submission 3 requirements as defined by NTIA.

In summary they can be divided into the following three categories:

- Process Modifications
- Reference Data Modifications
- NTIA Submission Data Model Schema Changes

1.2.2 Submission 3: Process Modifications

Based on NTIA feedback and information provided in NTIA webinar sessions, the submission 3 data processing workflow was changed minimally to support the new NTIA submission requirements:

1. All census blocks are mapped based on 2000 census blocks. Any data submitted in 2009 format was converted to 2000 for submission. During processing a 'hybrid' census dataset (2000 IDs with 2009 line work) was used to take advantage of the improved 2009 line work. Prior to submission to NTIA, all features were mapped back to the 2000 census blocks. The Reference Data section below contains additional details.
2. For consistent representation the state road reference data used was 2009 Census Tiger Line IDs (TLIDs). Other data sources (non-TLID features, or 2000 TLID features) were mapped to 2009 TLID features.
3. Overview was removed completely from submission data due to the fact that all maximum advertised up/down speeds are being reported in blocks, roads, and wireless features.
4. Due to our NDA restrictions, address points and last mile points will not be submitted to NTIA. As mentioned before, Qwest requested that their address points be submitted to NTIA for blocks greater than 2 square miles. However, they could not provide the end user category and hence this data was not submitted but reprocessed data (address points reprocessed to street segments) are being submitted.
5. Some providers did not submit middle mile elevation. Wherever possible, we went back to providers to obtain their middle mile elevation information.
6. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were treated as wireless coverage and were delivered as a shape. In cases where a provider served the

same technology and spectrum with different speeds, overlapping areas were removed and the higher speed was assigned.

7. The submission 3 Provider data model is currently based on the NTIA data model as of 1/13/2011.

1.2.3 Submission 3: Reference Data modifications

This section describes the reference data used in submission 3.

BLOCK REFERENCE

For s3, a hybrid block dataset (2000 IDs with 2009 line work) was used to take advantage of the improved 2009 geometry. The data was set up as follows:

- 2009 BlockID suffix is dropped and the blocks are dissolved (by Block ID) to produce data with 2000 BlockIDs and 2009 shape geometry
- Block size (AREA) is calculated combining the 2000 land area (ALAND) and water area (AWATER)
- AREA is converted from square meters to square miles to calculate square mileage (SMI).
- If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.

ROAD REFERENCE

To take advantage of the 2009 geometry improvements, 2009 Tiger Line IDs (TLID) were used for data processing in s3. Any non-2009 TLID (i.e. 2000 TLID or other) submitted by providers were mapped to the 2009 reference data. The data was set up as follows:

- The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:
  - The 2009 road segment is completely within a hybrid block that is NOT less than 2 square miles
- Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

OVERVIEW REFERENCE

This dataset was dropped completely for this submission.

1.2.3.1 Reference data sources

The following data sources were used as reference data sources for submission 3:

BLOCK REFERENCE DATA: 2009 CENSUS BLOCKS

No changes from previous submission.

ROAD REFERENCE DATA: 2000 CENSUS TIGER LINES

No census 2000 TIGER line data were used for this submission.

ROAD REFERENCE DATA: 2009 CENSUS TIGER LINES
No changes from previous submission

OVERVIEW REFERENCE DATA: 2009 CENSUS COUNTIES
This data has not been included in Submission 3

1.2.4 Submission 3: NTIA Submission Data Model Schema Changes

The data model released on January 13, 2011 contained the following changes from the s2 data model:

- A new field was added to several feature classes called Provider Type
    - Provider Type is "Short Integer" and has domain values of 1, 2, or 3 (1=Broadband Provider, 2=Reseller, 3=other)
    - Most providers are calculated to be "1" (Broadband Provider). In some cases (e.g. State of Washington Public Utility Districts or PUDs), the ProviderType is considered "Other" (value = 3)
- In the CAI feature class, the field BBService has been modified:
    - In S2, if the information was not known, the field was left blank (null)
    - In S3, if we do not have the information, NULL values must be changed to code u (for Unknown) – nulls are not allowed.

- Three new fields have been added to the CAI feature class. Wherever possible, these values have been populated in the CAI data.
    - Public Wifi (Y, N, or U)
    - URL
    - CAIID

1.3 Data Validation

Sanborn has continued to perform the same validation on the data as the previous two submissions and listed below (details in previous reports). Some minor updates to the validation process are discussed below.

1) QC of the data at various steps
2) Spatial checks against public and commercial datasets

a. For WA, we continued to use the following datasets for validation:
    i. Exchange Boundaries: for DSL boundaries
    ii. MediaPrints: for Cable boundaries
    iii. Speedtest.net data

3) Verification by providers
    a. In this Submission, along with the standard verification by providers using the Provider Portal, we also identified for providers issues that they needed to focus on regarding the findings of our validation team. This was done by sending them a letter that identified issues using screenshots and explaining to them what the error was and then asking them to go fix those errors using the secure provider portal. A sample of a letter is provided in Appendix A in this document. This helps by making this process a little more targeted for the providers and allows them to hone into issues.
4) Speedtest data collection and other data collection for verification
    a. We continue to use speedtest data and community anchor data crowdsourced for validation purposes.
5) Planning workshops and local validation
    a. In this submission, we have tried very hard to incorporate and address feedback from planning workshops and local outreach conducted by State of Washington. We talked with several providers which resulted either in a better explanation of their service area or in alteration of their service. For example, feedback from DIS and other providers resulted in a serious change in service area for Cascade and in another instance, Charter provided some clarification on why their area is correct and we continue to work to resolve these issues. This is going to be an ongoing activity in the next months to come.

1.3.1 Data Validation Conclusions

We continue to believe that we do not have sufficient information to alter provider data and we have been careful not to do so unless there are obvious errors such as incorrect block numbers, or unidentifiable street segments, etc.

Data validation involves working with providers to improve the data and we are dealing with issues as they arise. This activity continues to be a challenging activity. There is no complete truth sometimes and different pieces of evidence are collected and pieced together to point discrepancies that are explored in more detail. Commercial datasets are of limited value and often self-reported by the companies and subject to the same errors that we get from providers directly, and sometimes exaggerated by the fact that there are different vintages and resolution and hence the comparison is not easy.   Speed test locations are also sometimes incorrect and similar issues exist with all crowd-sourced data.

There is no absolute truth exists and that data validation cannot change data arbitrarily based on only one evidence or two. Hence it takes a long period of time to fully address a reported issue.

2 Appendices

2.1 Sanborn QC_Validation Letter

March 9, 2011

Broadband Mapping Services
State of Washington

Re: QC and Validation of Provider Data

Dear Provider:

As part of the Broadband Program, the Sanborn Map Co. is performing a QC and validation of the data received from you by comparing your data to publicly and commercially available broadband datasets. This includes exchange boundaries for DSL, MediaPrints for Cable and Fiber and others as deemed necessary. We are also using Speedtest.net data for some speed validations.

If you are receiving this notification, it is because we have found certain issues that need your assistance. Screen shots of the issues are provided below along with a table denoting the issue found. We would appreciate it if you would please review these issues quickly and go to the provider portal and note the correction that needs to be made since we need to finalize your data to be submitted to NTIA.

If you need any further clarification after reviewing the issue, please contact Bridget Marcotte at (503) 228-8708 x 306. Please note: if we do not receive a response from you with what correction needs to be made, Sanborn reserves the right to change the data if needed.

Thank you very much for your assistance providing answers on the issues noted below.

Sincerely,
The Sanborn Broadband Mapping Team

QC and Validation Issue(s) Encountered

Please make all corrections on the provider portal link provided below. For confidentially, your login and passwords were sent during the last submission, in another email.

http://beta.appgeo.com/WahingtonBroadbandProviderPortal/

Issue found:

Issue Category	Description/Screen Shot
Part of the data is extending outside Media Prints boundaries	
Part of the data is	

extending outside of Telephone Exchange boundaries	
Spatial Outliers - data which is off by itself and not consistent with other data spatially	Areas within the red circles are examples of spatial outliers in your data
Independent Validation point showing there is NO service in this area	Block Numbers Affected:
Middle mile has missing/invalid elevation	
Invalid Max Advertised Speeds	

State Broadband Data and Development Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised March 31, 2011

CostQuest Associates

LinkAMERICA Alliance

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Overview

The following documentation provides an overview of how the third required data set was collected and processed for the State Broadband Data and Development Program (SBDDP) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested modifications based upon NTIA guidance
    a. Inclusion of satellite, changes to service overview table, FRN verification process
4. Consumer Feedback, Crowd Sourcing and Social Media campaigns.
5. Development and posting of a Technical Standards document.

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods

As anticipated, the SBDD program continues to mature and evolve. Technical leadership and strong guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices.   Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the October 1, 2011 “Round 2” submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early January 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines associated with each round. Where necessary, we execute new NDAs with providers. In “Round 3”, this effort continued on a daily basis until we reached our final data submission deadline on February 18, 2011.   After February 18, we continued to work with providers who were not able to meet the deadline. In most cases were able to “crash” our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 3 only providers who

responded in the last two weeks of March were excluded from the final dataset. Data from those providers will be updated this summer and included in our Round 4 submission.

Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program's aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Three. We've also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in Round 1 or 2, they were giving an additional opportunity to do so in Round 3. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA's, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA's were individually negotiated to address specific provider concerns. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since two prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 3. This allowed us to provide two response options to providers. The first was for them to review PDF check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

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[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers like Megapath, New Edge Networks, American Fiber. These providers seem to resell and/or provision within their own network opportunistically. In this submission we begin to bring them into the analysis as a provider type "other". As the inclusion of this category isn't our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 3 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New Providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in Rounds 1 & 2, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning Providers: While many Broadband providers submitted datasets in Rounds 1 & 2, many of those submissions did not contain 100% of the requested data. To help identify gaps, and to make the Round 3 submission process as simple as possible, every Round 2 survey was reviewed for completeness, as well as accuracy and formatting compliance. Notes were made regarding gaps, and specific instructions were developed for providers in Round 3. These instructions not only explained what data was missing, but also provided directions on how to include that information in the Round 3 submission.

Check maps were also developed to show each provider how their service area would be displayed on the resulting interactive state map. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 3 survey in early January 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice by telephone or e-mail during the months of January and February. The initial data submission deadline was set for February 18, but, as previously noted, we continued to accept “straggler” submissions well into March.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of “known providers”. We believe the vast majority of those we were unable to reach were small wireless providers who have simply ceased to exist[2].

[2] The complete list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 3, given the data vintage of December 31, 2010, we began this process immediately after the New Year. The last submissions were accepted in mid-March, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBDD program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- GeoResults Telecom Research Data. This data was used to help estimate the Broadband services likely provided to certain classes of Community Anchor Institutions (CAI).

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBDD program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

a. Geographic Data Files
    i. US Census TIGER data[4]
b. Sources that helped isolate providers, identity management or provider service areas
    i. NECA Tariff 4
    ii. State produced exchange boundaries
    iii. Carrier produced wirecenter boundaries
    iv. FCC 477 provider filers
    v. FCC Coals reports (321/325)
    vi. FCC FRN API lookup tool
    vii. FCC/FAA Antenna Registration System
    viii. FCC FRN Lookup Tool (plain text search)
    ix. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
    i. USAC Grant lookup tool
    ii. USAC High-Cost FCC Filing Appendices
    iii. HRSA data warehouse
    iv. NCES data lookup
    v. State managed lists of schools (K-12), post-secondary institutions and libraries
    List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section below.

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[4] Census data were derived from < http://www2.census.gov/cgi-bin/shapefiles2009/state-files?state=01>, Census 2000 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas. Finally, licensed data from Georesults were used to derive estimates of Broadband connectivity for hospitals within the Anchor Institution category. The actual value from Georesults was not used, but our estimate is modeled from their input data. We also use the name and address as provided by the State data provider, not Georesults.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities, the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a fairly traditional telephone survey approach, focused on the consumer market. In addition, we are currently advancing our crowd sourcing process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are summarized below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBDDP grant was in place. Subsequent consumer surveys funded by the SBDDP grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming. These surveys will be repeated after two years to establish and evaluate trends. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for internet users and one for non-users. The telephone survey approach allows us to reach the non-internet user group as well as the current internet user. A secondary online approach is also used to augment input from current internet users. For non-users, the surveys help determine why they don't have or don't use Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their

daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the consumer survey in Wyoming was designed to produce results relevant to the state's seven Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBDDP's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBDDP program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific internet use in specific communities (i.e., regions).

The 2010 surveys were launched in July 2010 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. The surveys were closed on November 30, 2010. Telephone surveys were completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers (e.g., 80,000 random Wyoming residence telephone numbers were acquired as the foundation for the Wyoming survey). Mobile phones were not included in the initial surveys. Upon evaluation of the survey statistics, an auxiliary survey was executed to ensure younger groups (i.e., age 18 – 25) were adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market (age 18 – 25) was surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics point to the complexity of the telephone-based survey process. Survey volume achieved statistical validity ranging from a 95% confidence level and a ± 1.7% margin of error for the statewide data in Wisconsin to a 95% confidence level and a ± 3% margin of error for Wyoming's statewide data. Most regions in the 3 states have a 95% confidence level with a ± 5% margin of error.

Call volume and disposition is summarized in the chart below

BROADBAND MARKET RESEARCH - ID, WI, WY - FALL 2010

	TOTAL		IDAHO		WISCONSIN		WYOMING	
TOTAL RECORDS CALLED & % OF STUDY	106,592	100%	22,144	100%	57,445	100%	27,004	100%
NO ANSWER	53,507	50%	11,974	54%	25,886	45%	15,647	58%
TOTAL DEAD NUMBERS	23,962	22%	4,529	20%	14,611	25%	4,822	18%
HARD REFUSALS	9,304	9%	1,728	8%	6,048	11%	1,528	6%
QUALIFIED REFUSAL	643	1%	101	0%	403	1%	139	1%
BUSY	3,652	3%	754	3%	1,903	3%	995	4%
ANSWERING MACHINE	6,385	6%	1,314	6%	3,388	6%	1,683	6%
NON-WORKING NUMBER	5,072	5%	943	4%	2,983	5%	1,147	4%
CLAIMS PREVIOUS INTERVIEW	113	0%	16	0%	68	0%	29	0%
NON-RESIDENTIAL	454	0%	104	0%	239	0%	110	0%
LANGUAGE BARRIER	1,003	1%	223	1%	562	1%	218	1%
OTHER PHONE PROBLEMS - FAX/MODEM	907	1%	205	1%	500	1%	202	1%
PORTED NUMBER	272	0%	68	0%	149	0%	54	0%
BREAK OFF - SCREENER	556	1%	103	0%	301	1%	153	1%
TERM Q3 - UNDER 18	122	0%	22	0%	65	0%	36	0%
		99%		100%		99%		99%
TOTAL COMPLETES	5,758	5%	1,080	5%	3,420	6%	1,259	5%
AVG Completion Time (minutes)	**16**		**15.8**		**15.4**		**16.1**	

As noted above, the telephone survey process represented in the statistics above was augmented by providing online access to the survey. Participation in the online survey was promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, this was a long survey. As noted above, the survey averaged sixteen minutes across the three states. While this clearly contributed to the number of survey call attempts that were required to reach the level of statistical validity, it was not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBDDP efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use YouTube, LinkedIn, Facebook and Twitter to support our work. YouTube and LinkedIn postings are used to promote awareness. As noted above, we were able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we are currently engaged in two specific social media tests (in Alabama) to gauge how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising. For example, with a fairly limited 'following' a single Facebook post aimed at driving traffic to the online speed test, had 282 impressions (i.e., the number of times the post was viewed), which contributed to an increase in 71 more visits to the Facebook page generally, and a volume of 60 hits (over a three day

period) on the web site page that hosts the speed test. Our normal volume of speed test page hits is in the neighborhood of 7 or 8 per day (vs. the average of 20 per day experienced during this test). Preliminary data suggests that about half these page hits resulted in a speed test being executed.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and budgetary constraints allow. It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us take advantage of increasing specialization and proficiency with certain types of data and management responsibilities. In this submission, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

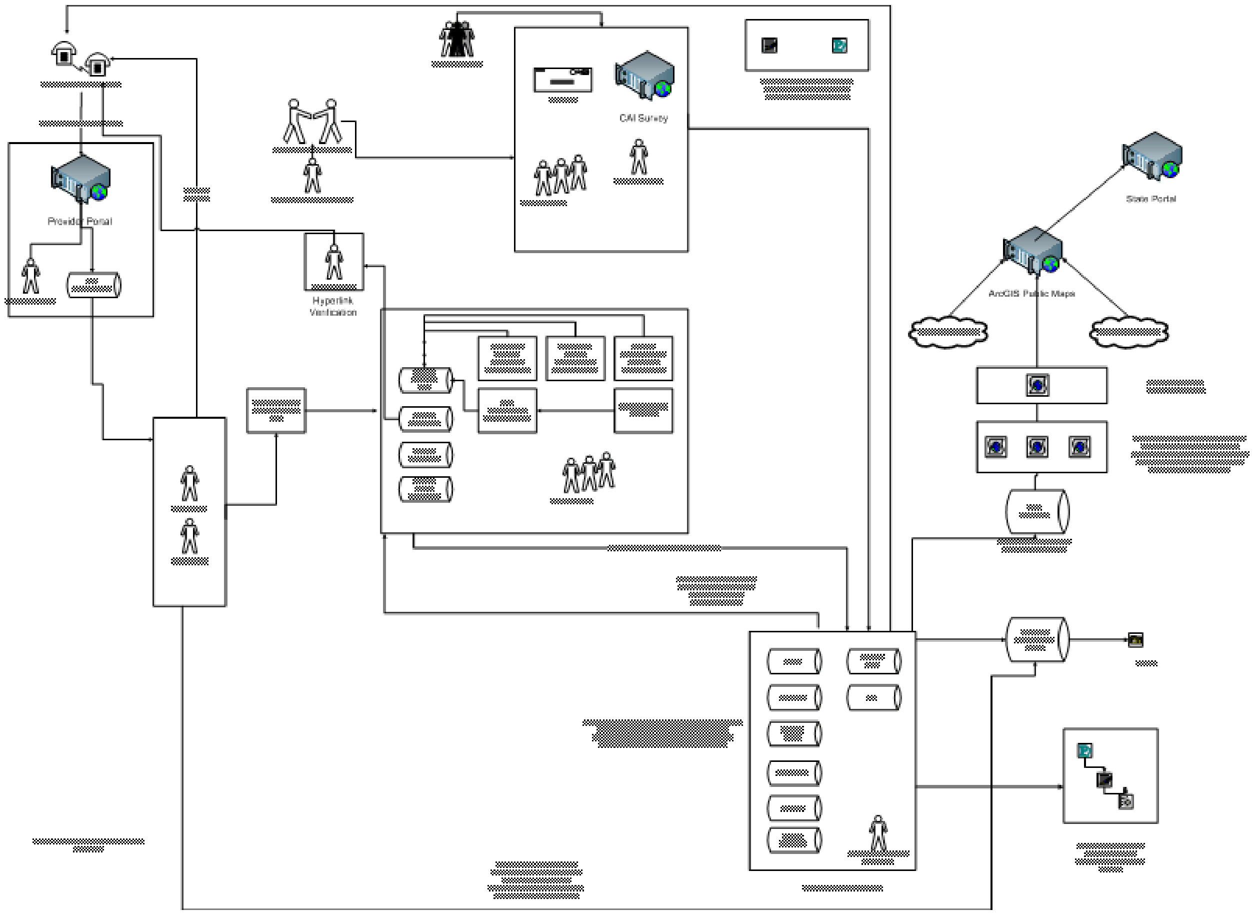


Figure 1--SBDD Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- Provider and network ownership certainty

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2000) of 2.00 or less square miles
2. Covered Street Segments (2000) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the georeferenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

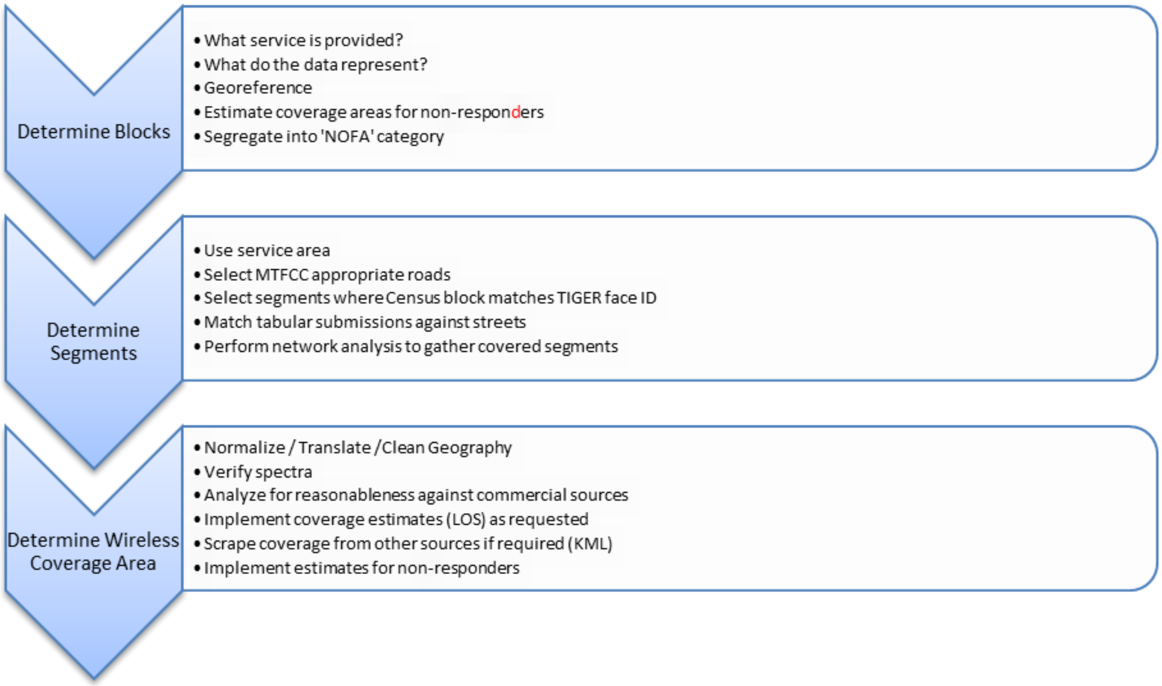


Figure 2-Broadband Coverage Process

Impact of Program Change

There were four important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 3.

The first was the development of a "provider match" submission metric whereby the grantee's complete list of known providers in the state is compared against lists from third party sources. The provider match specification was discussed on a webinar prior to the release of the national map. Although, to this date, there has been no clarification on how this metric is established or exactly how it will be used. We have invested significant resources to support an internal process to compare our provider lists with several additional sources. This has been manifest in at least three ways.

Within our provider verification process we work to derive a state level match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context.

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify,

or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to receiving Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as Provider Type "other". Our sense is Provider Type "other" will continue to expand in the fourth submission as we pull in more providers who are facilities-based and reseller.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this "other" provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or Microwave link despite the fact that the hospital next to them in the same Census block can get this service.

The final set of changes was a second verification check against reported FRNs. As NTIA is stressing the importance of this attribute, we increased its visibility in our Check Map process. FRN is now listed on both the tabular verification report and the provider PDF map. Beyond this increased visibility we had an analyst verify each FRN in our system against the FCC API[9], as well as FCC textual search[10]. Because the FRN is not an identity management tool, we are unsure if the FRNs we've included are those desired by NTIA, but we have at the very least, verified the existence of the FRN via the FCC system.

Trends in Provider Supplied Data

With this third submission we take note of three important trends.

First, with larger providers, we are seeing an increase in data stability relative to earlier submissions. In informal discussions, several providers have noted changes and stabilization in internal data processes. The firms have invested internal resources in stabilizing this data feed.

We see this reflected in very stable counts of Census Blocks and road segments. This does not mean that complex problems like segment identification or dispersion in data have been 'fixed'. It does mean that the format and methods to produce inputs for NTIA are increasingly stable.

Second we note that several providers have been particularly concerned with an appropriate identification of Maximum Advertised speeds. In some cases this involves identification of very small areas (sometimes below the level of a Census block) and appropriate assignment to technology of transmission and maximum advertised speed tiers. In other cases, questions arise regarding maximum advertised speeds that could be sold based upon network design, but that are not generally "advertised" or otherwise stated to the general public.

[9] http://reboot.fcc.gov/developer/frn-conversions-api
[10] https://fjallfoss.fcc.gov/coresWeb/simpleSearch.do

Third when comparing submission three results relative to submission two it is important to recall the inclusion of much new data within the Provider Type “other” category. This change does not necessarily reflect a change in the size of the market, rather it reflects new data coming into the analysis and segregated into a distinct category..

Coverage Geoprocessing Methods

The next section discusses how data were geo-referenced and geoprocessed given a particular submission format.

In most cases, in Round 3 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[11]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to “belong” is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[11] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

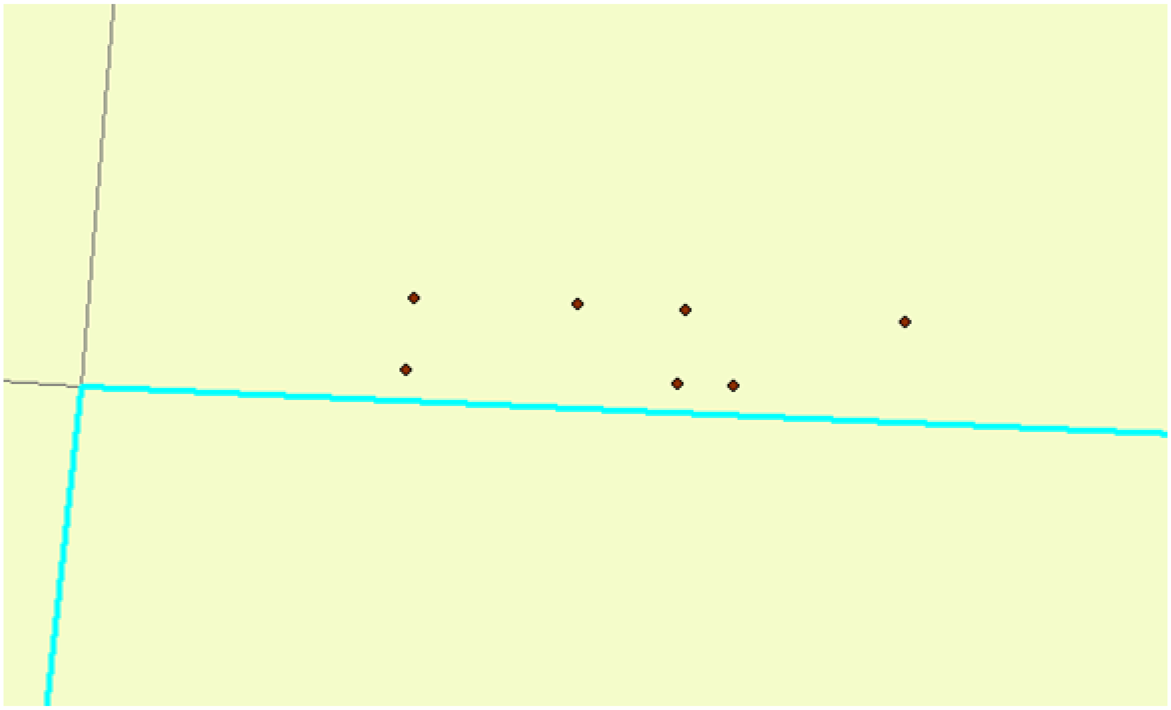


Figure 3-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

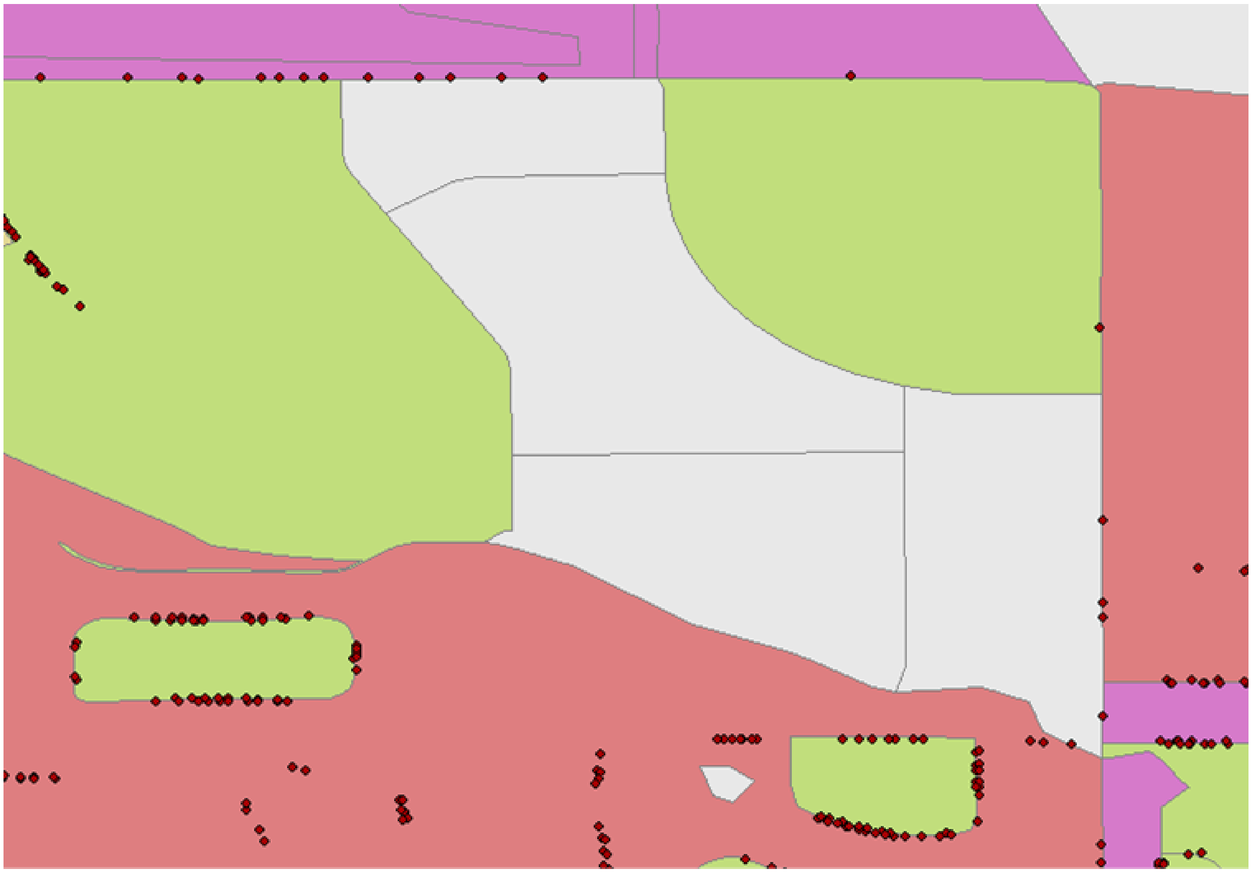


Figure 4-Block Coverage

For this reason, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas. Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate – specifically in areas where the coverage is attributed.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

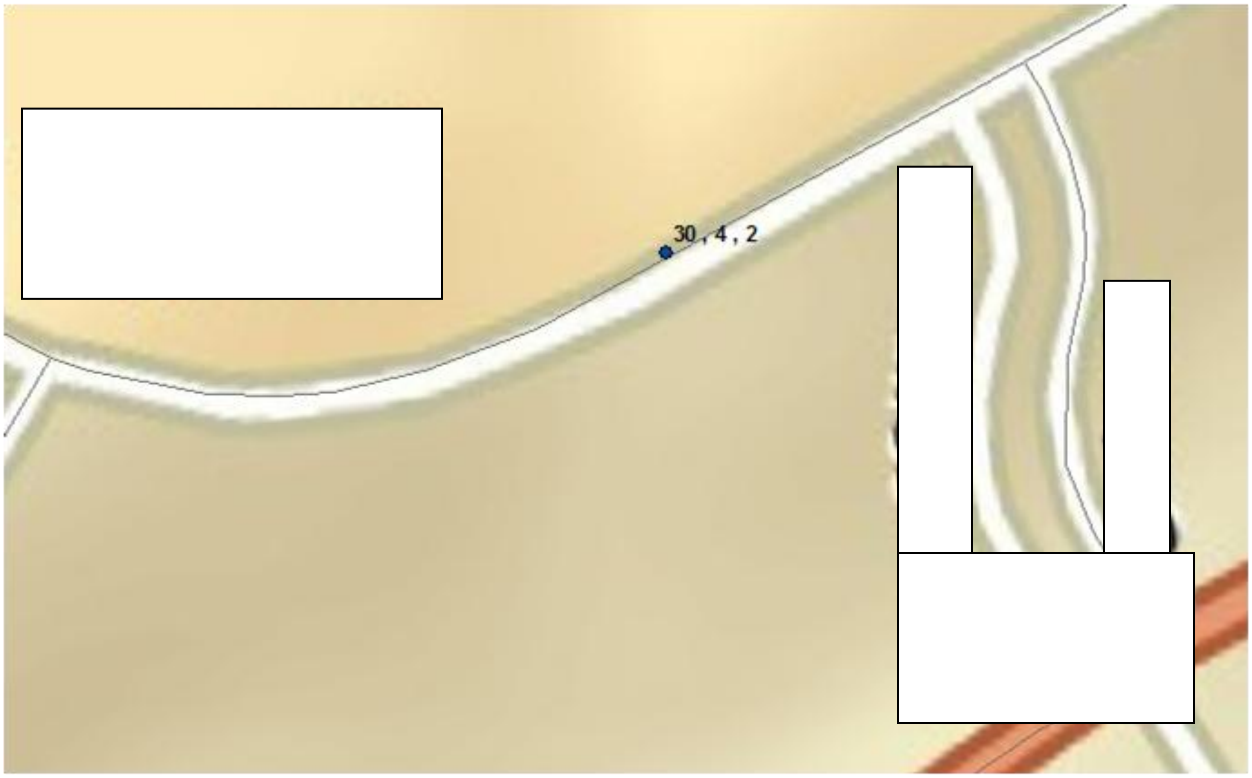


Figure 5-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a situation comparable to customer point level submission in that we have most of the network footprint captured.

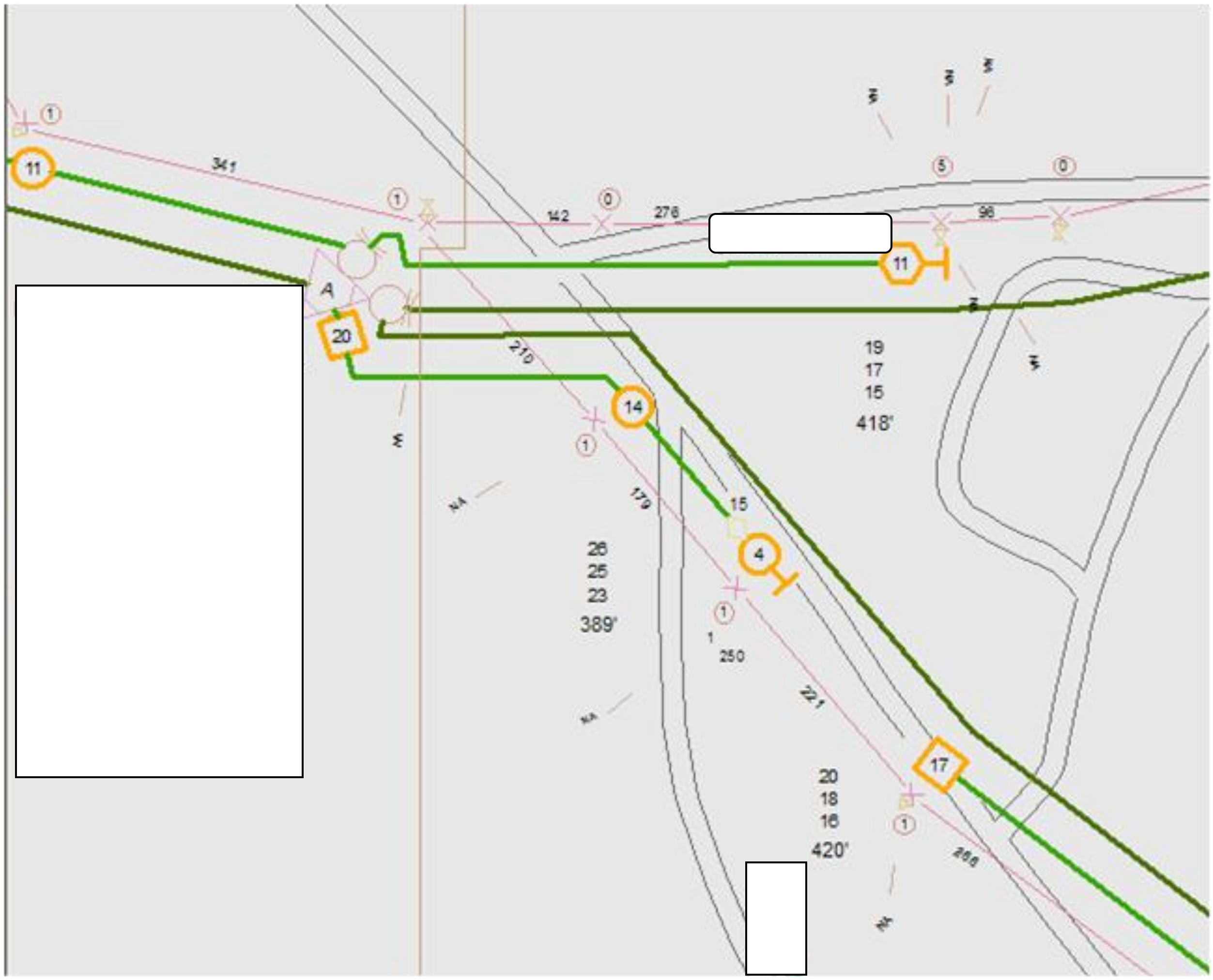


Figure 6-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our team had geo-registered the image into an approximate position. In this case, the boundary streets

were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

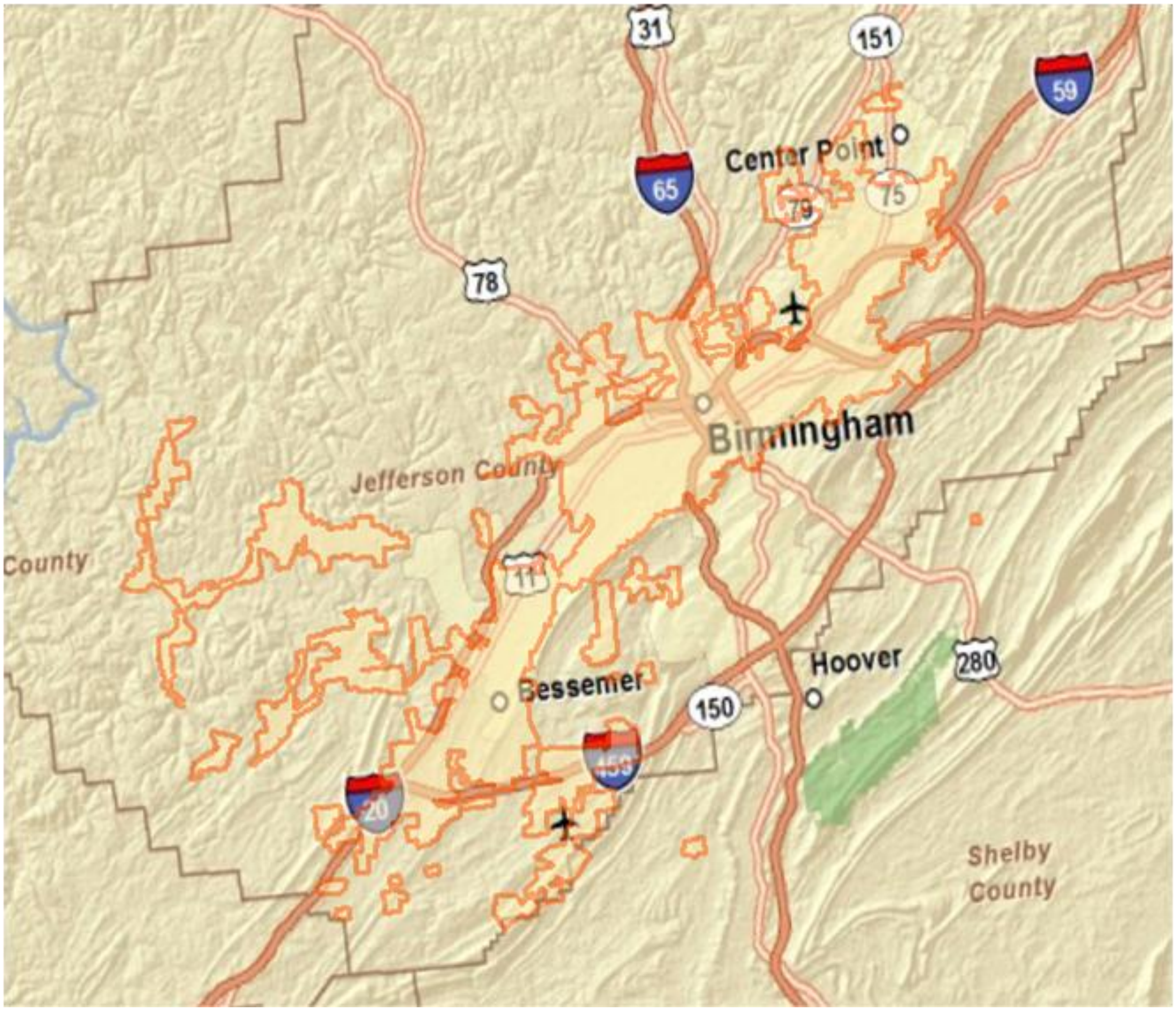


Figure 7-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with a provider to derive service areas based upon point plant data. In these cases we were given a primary serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

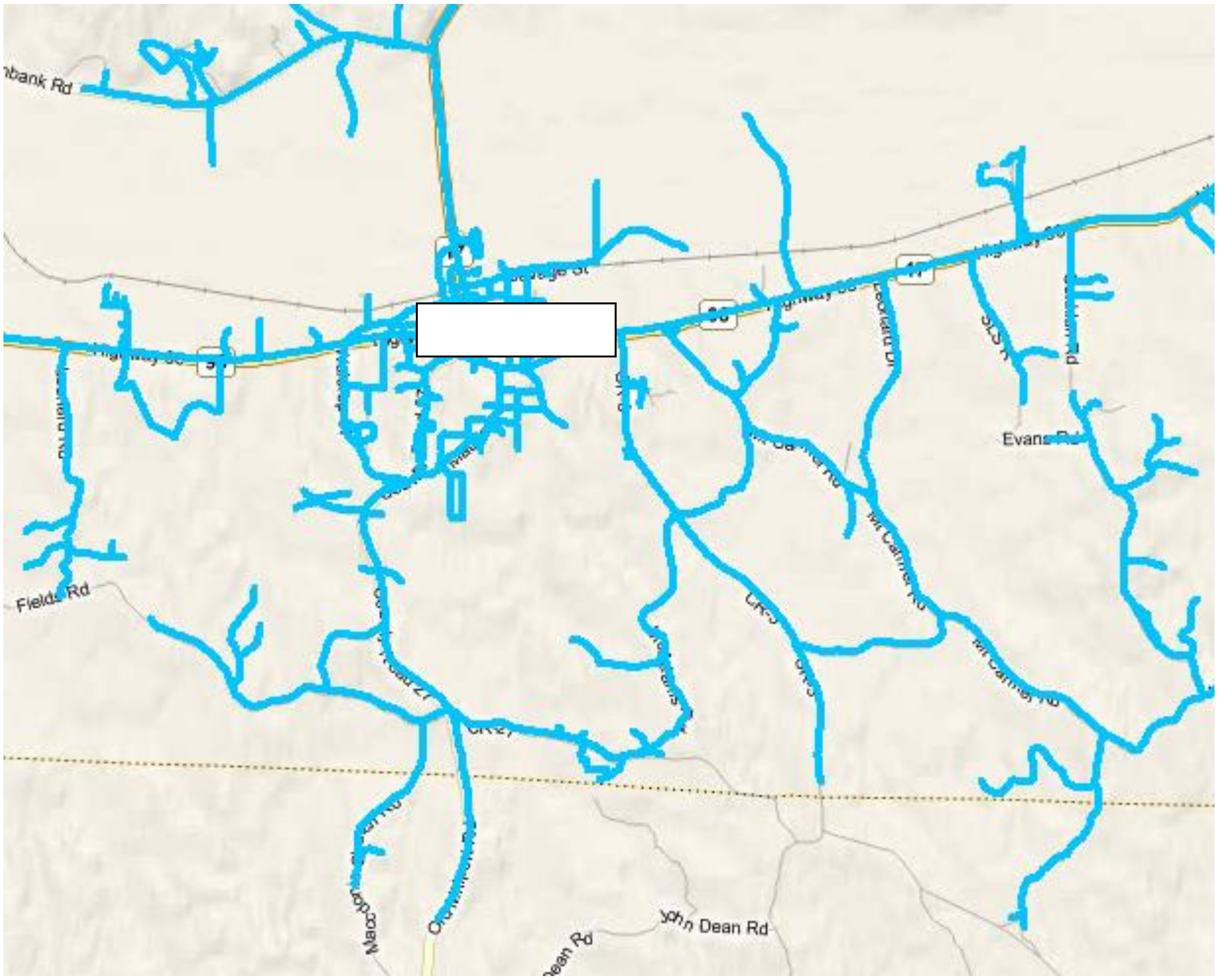
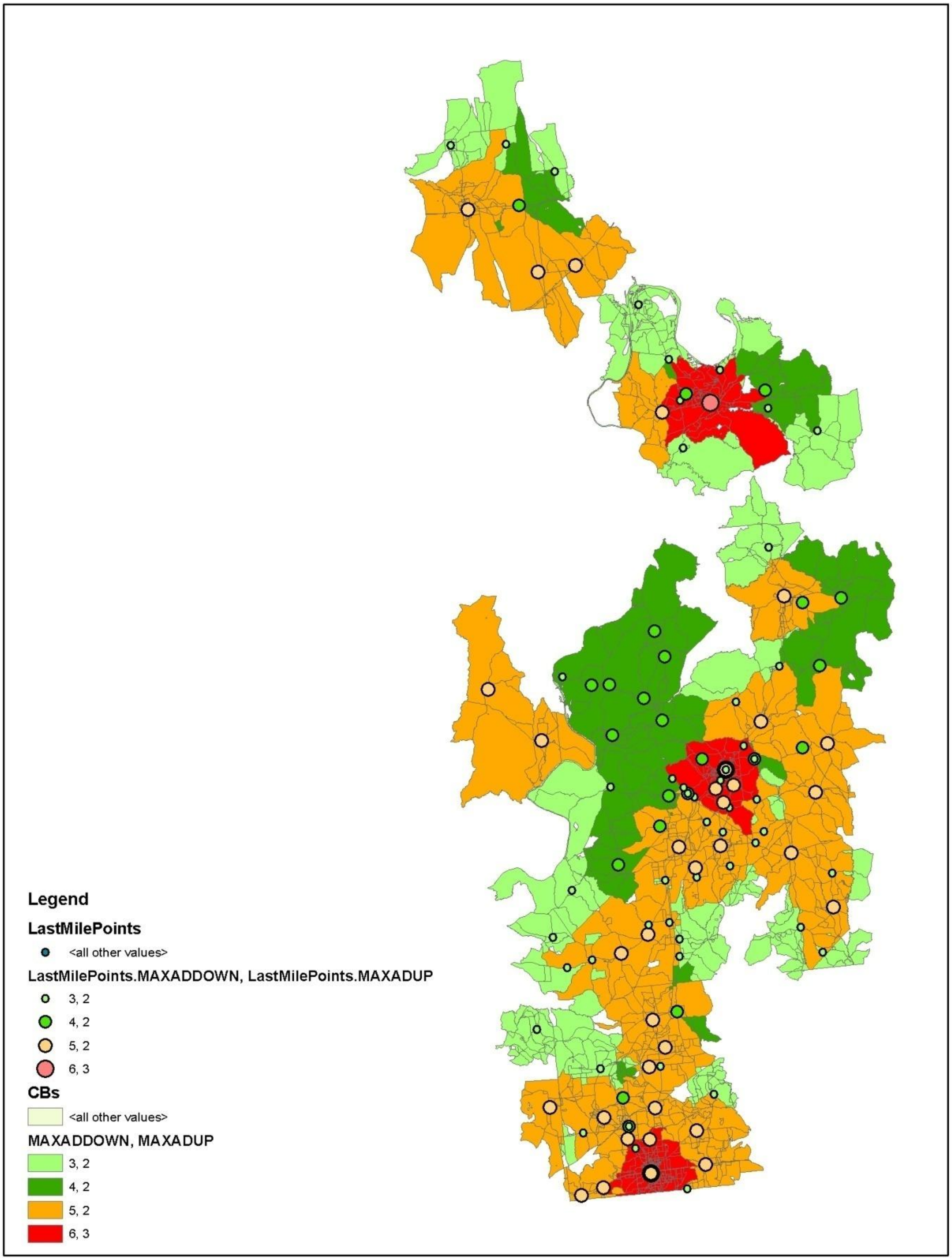


Figure 8-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In Rounds 2 and 3 -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[12]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[12]Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level below a Block and did not get picked up within a spatial query).

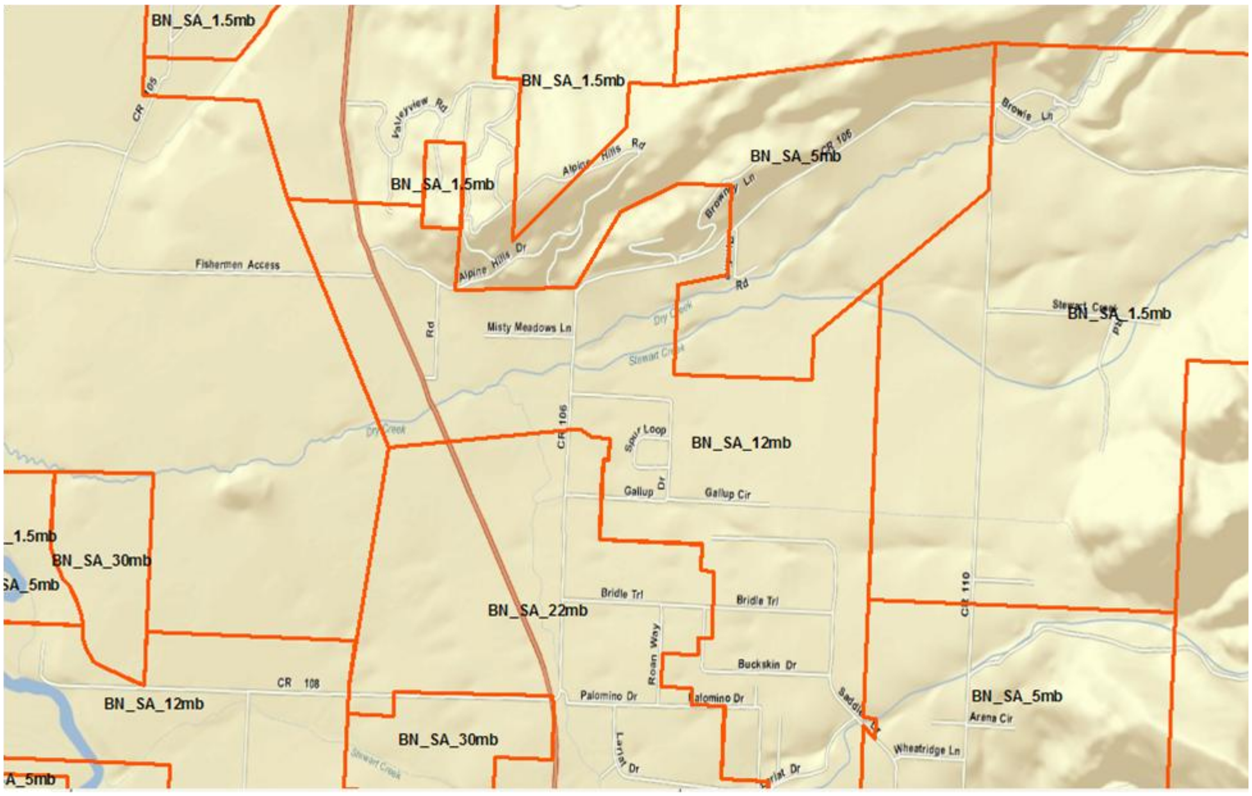


Figure 9-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without.
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[13]

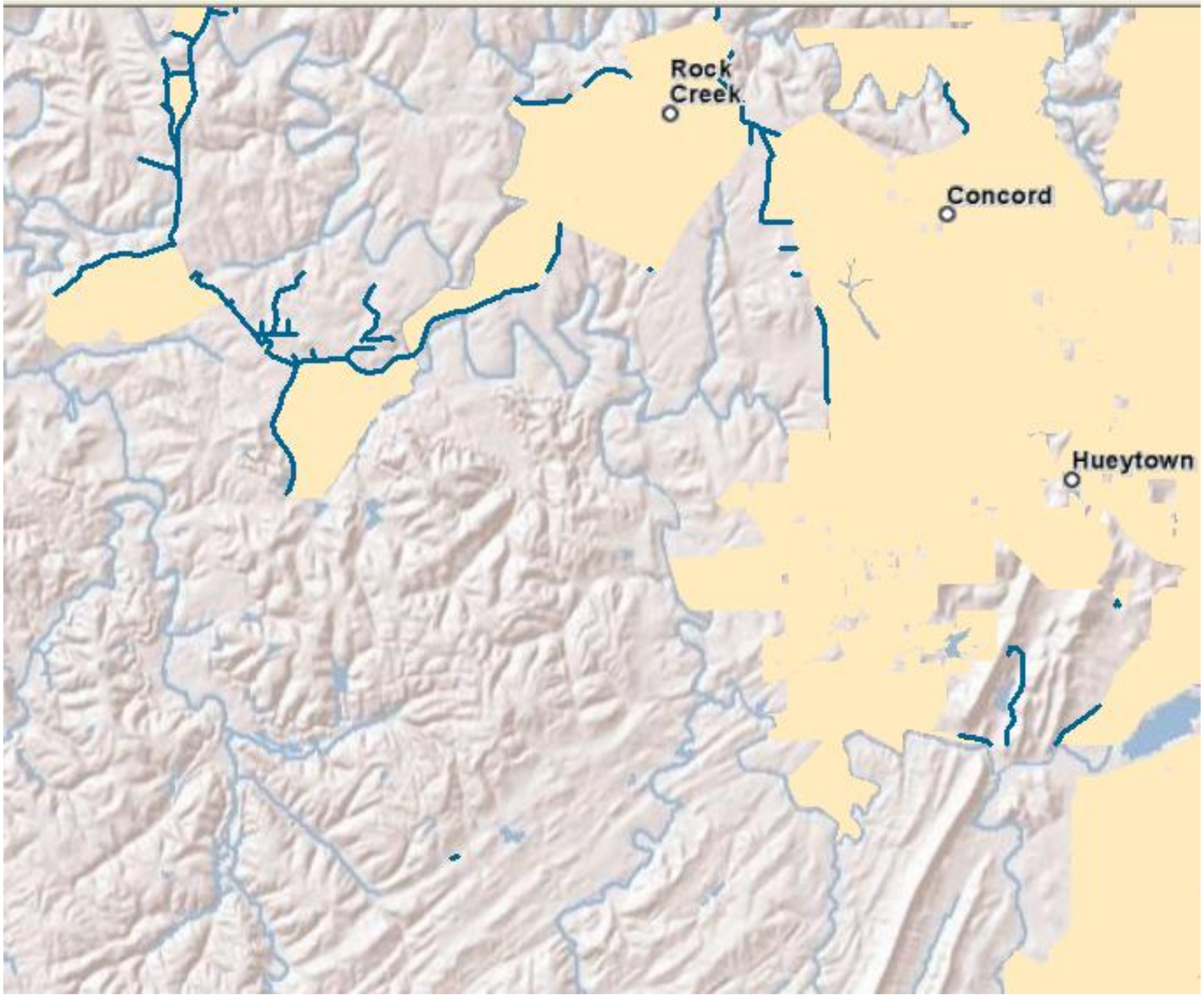


Figure 10-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2009 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[13] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

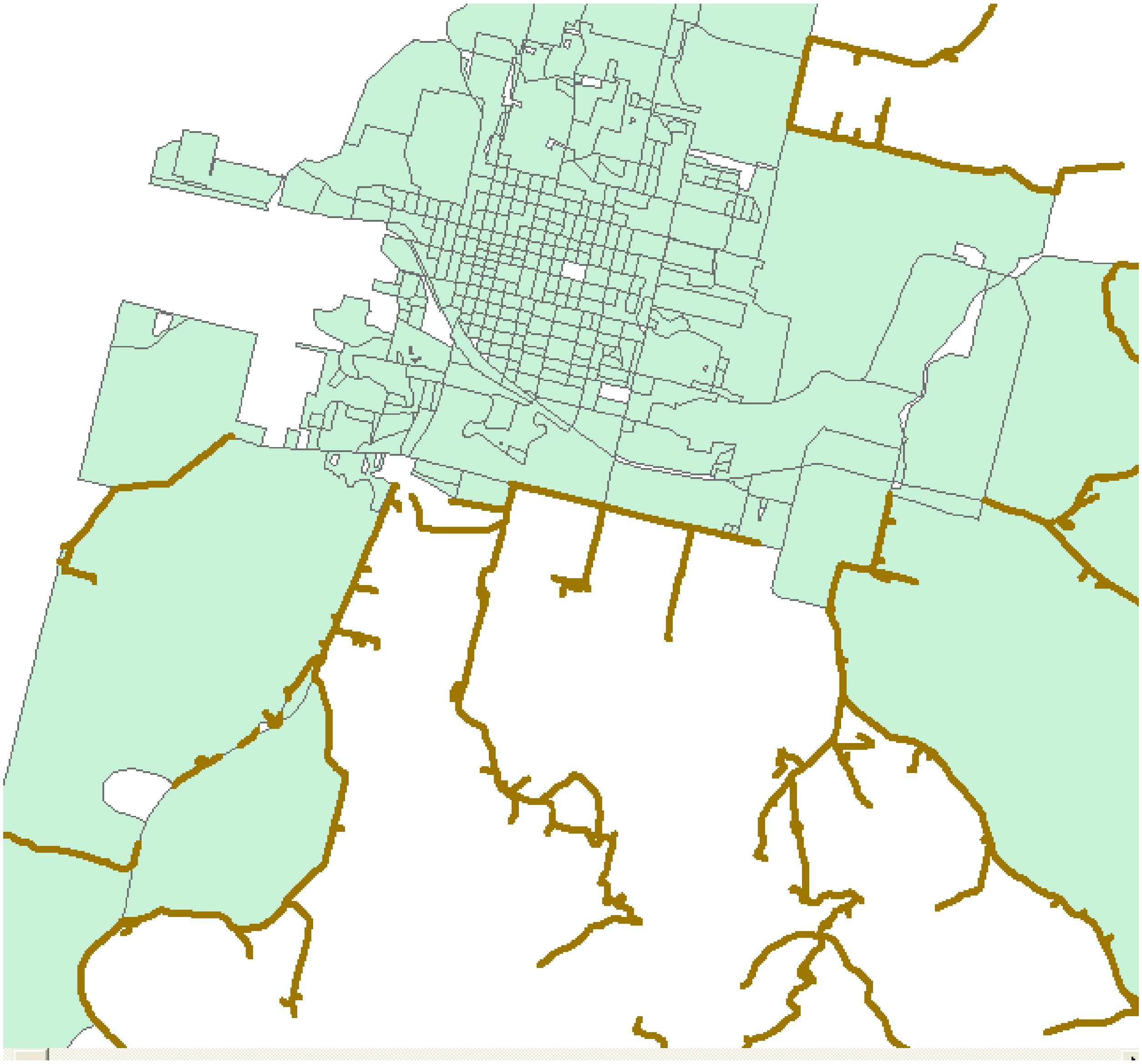


Figure 11-Provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

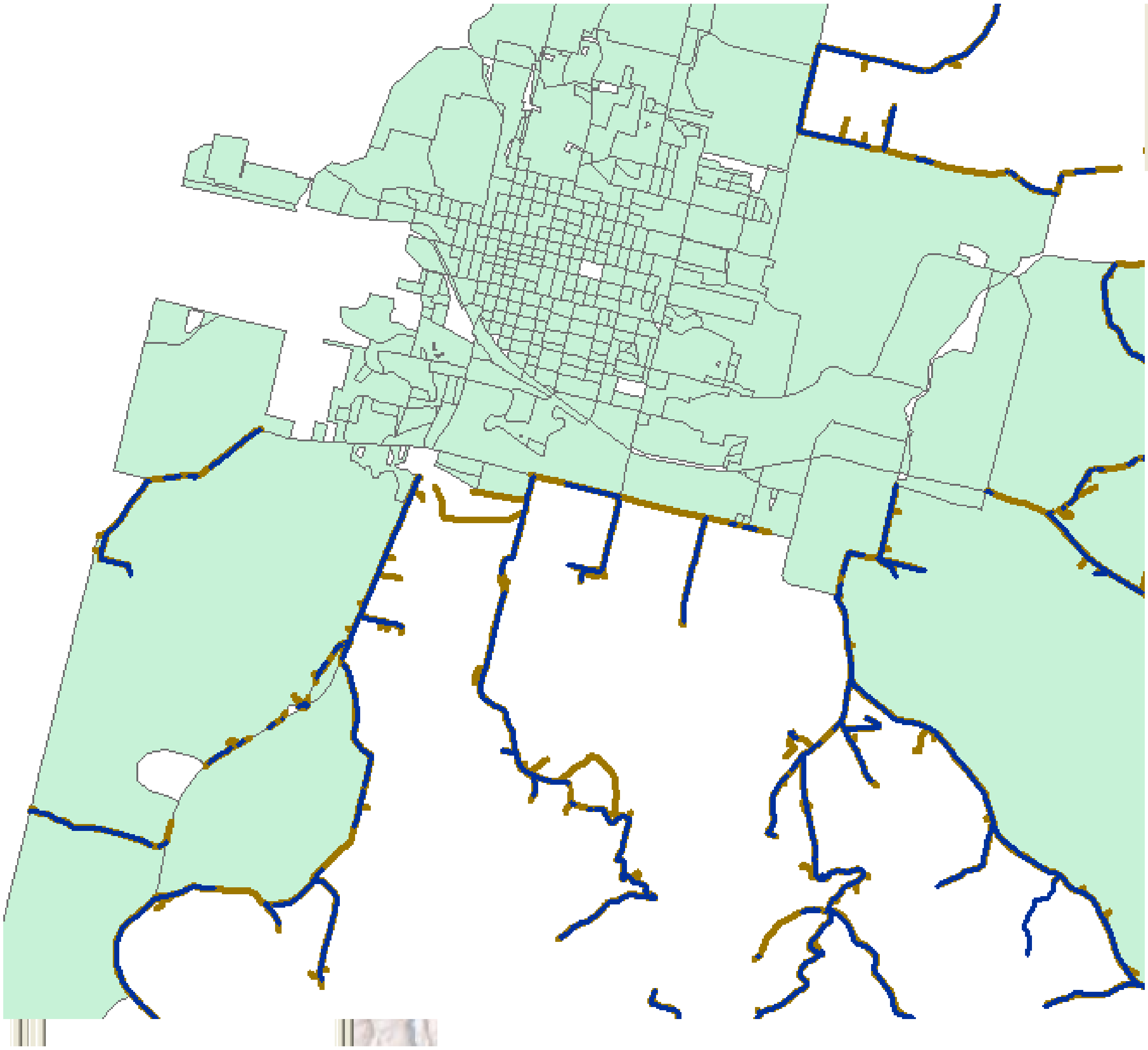


Figure 12-Provider submitted segments in gold, selected TIGER 2009 in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2009 road segments (MTFCC like 'S%') that face (CB = CBLeft2000 or CB = CBRight2000) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGERroads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by ProviderID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[14]

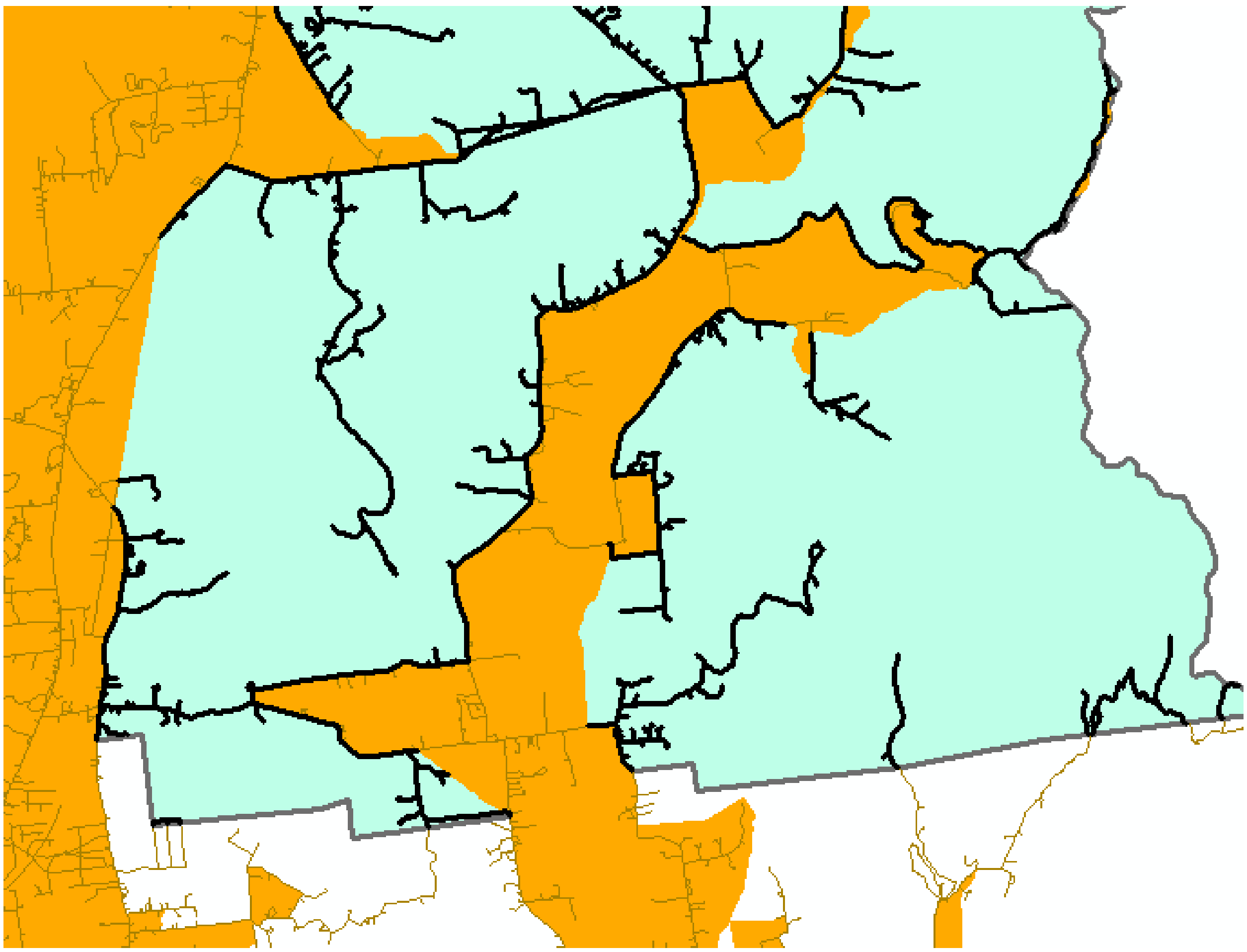


Figure 13-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[15]

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[14] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

In this submission LinkAMERICA made an aggressive effort to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 3 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[15] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we have hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBDD formats. Some of our WISP submissions have taken over 12 hours to normalize into SBDD formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[16]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

[16] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information. From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned.

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[17] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[18]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to scrape coverage maps. When these maps were available, we georeferenced them and tried to use the outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[19]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't

[17] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[18] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

[19] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[20]

In circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBDD planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we

[20] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations.

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that has strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBDD planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaging in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Further, the team continues to rely on the notion of Internet Intensity Zones. As the Broadband coverage information is developed, if we do not have definitive connectivity information from other sources (e.g. a phone survey, web survey, listing provided by a facility owner) in this study, those Anchor points that fall into an existing area of SBDD Broadband coverage will not be left out or submitted with NULL values. Rather, the adjacent coverage area will be the first estimate of Broadband coverage for

the facility. The use of an estimate allows the site to come into the analysis and learn a bit about the accessibility of that facility, but it also frees resources to examine those anchor points that are more dispersed and likely under/un-served. The team will conduct targeted surveys to discover connectivity and, more importantly, applications in use at prioritized CAIs.[21]

We close this section with a figure that we hope reinforces our CAI process.

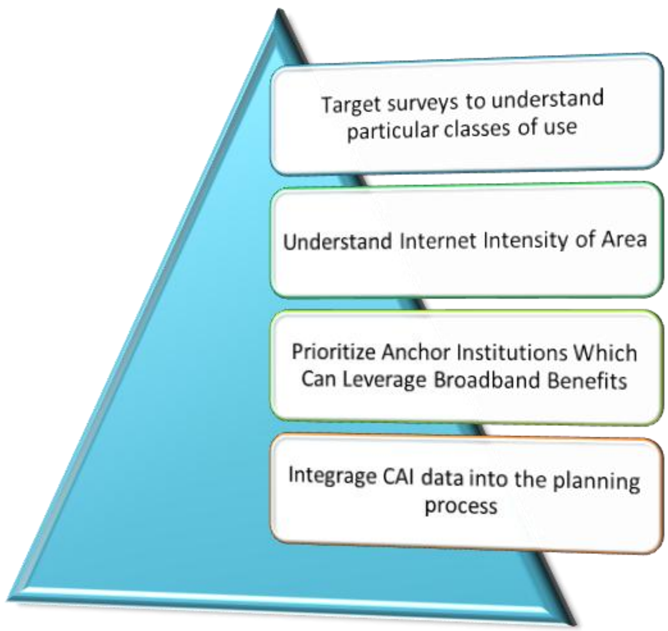

Figure 14-Anchor Institution Process

Recall from our first submission analysis, in most cases, CAI points are clustered and on average less than 1 ¾ miles away from one another. Relying on The First Law of Geography[22], this likely means that the Broadband accessibility is very comparable for CAIs that are close together. We believe this means Broadband accessibility may be less about connectivity than it is about the ability of a CAI to afford, successfully adopt and utilize Broadband to support its mission. Therefore, an important part of where SBDD mapping and planning come together understands what Broadband is used for, potential barriers to adoption, and how it is an essential component in a planning region's investment scenario.

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[21] We track internally those features with Broadband connectivity defined via an estimate but within the current transfer data model we lack a mechanism to propagate that information to NTIA. Appendix One expands upon our thoughts regarding a series of audit fields in the transfer database which would be helpful to inform downstream users regarding the source of data or use of estimates.

[22] http://en.wikipedia.org/wiki/Tobler's_first_law_of_geography. We are attaching connectivity based upon the highest speed wireline provider in that block. This provides a ceiling for what can be obtained, although the CAI may not be purchasing this level of service based upon needs, budget, mission, etc..

Anchor Institution Survey

During the third submission period we began a survey process to both verify received connectivity information and garner additional connectivity information from CAIs. As with WISPS we wanted to aggressively target and improve this data section.

The process began with the Round 2 CAI list. Again, we prioritized schools, libraries and healthcare institutions. A small team made outgoing phone calls to discover relevant contact names. In Wisconsin, we were able to gather about 150 email addresses based upon 440 calls. There were only 14 refusals.

While one team worked on improving the contact list, a second team designed and developed a simple online survey system called CAVS (Community Anchor Verification Survey).

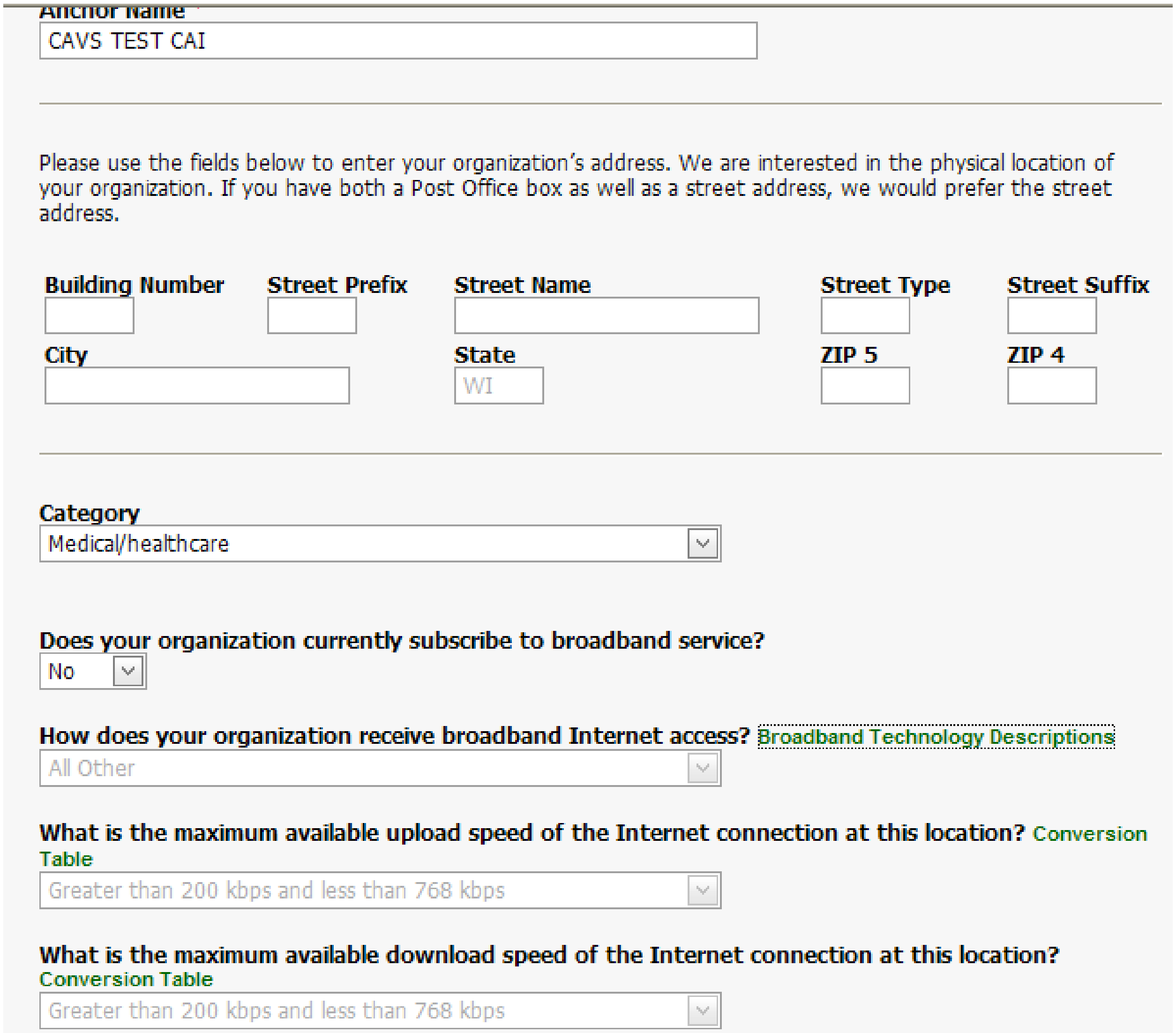

Figure 15--CAVS Screen

Users were invited into the CAVS system by the receipt of a postcard with an organization specific code printed on the mailing label. Beyond the questions shown above, there was a second page to the survey dealing with use of Broadband. Those results are directed to the planning teams.

The table below summarizes outgoing contact activities by state. This includes both a post card as well as for some organizations in which we had contact information a follow up phone call.

States	Post Card	Calls
WI*	2033	75
ID	1059	259
WY	345	30
AL	1640	14

As of 3/16, verification[23] statistics were as follows:

State	Verified / Total Records	Percent Verified
AL	72/2137	3.3%
ID	172/1596	10%
WI[24]	1187/3945	30%
WY	169/796	21%

We are keeping the survey open after the Round 3 submission to NTIA and will continue to collect data. In Alabama we have also begun to use resources from the planning teams to make outgoing calls and better target the surveys.

Clearly this survey was resource intensive but it did yield an increase in verified, rather than estimated, CAI data. We are unsure if we can sustain it in the next submission, but is has proven to yield new information.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

[23] We say a record is verified when it has been opened by the CAVS test user. It means at least one field was modified.

[24] In Wisconsin several large school districts supplied files with connectivity information; we performed a bulk update in these cases. We attribute it to the survey as the survey triggered this response.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submission, we are using public domain sources of information for public safety-category 4. The vast majority of these locations are estimated with respect to connectivity. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[25] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," but the bandwidth is estimated based upon the number of channels purchased. We also had difficulty obtaining both the upstream and downstream channel capacities. In large part, we made the speeds symmetrical, but this is an assumption on our part.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP code.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what it is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[26]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

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[25] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

[26] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the question was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[27]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider_Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[28] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied

[27] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[28] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, Provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the Provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information. It also involves a validation with supplied speeds.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The

second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the “islands” of coverage isolated by significant distance from other covered areas. This is the opposite of the Internet Intensity Zone notion discussed in the Community Anchor Institution section. In other words, Broadband Internet likely doesn’t exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

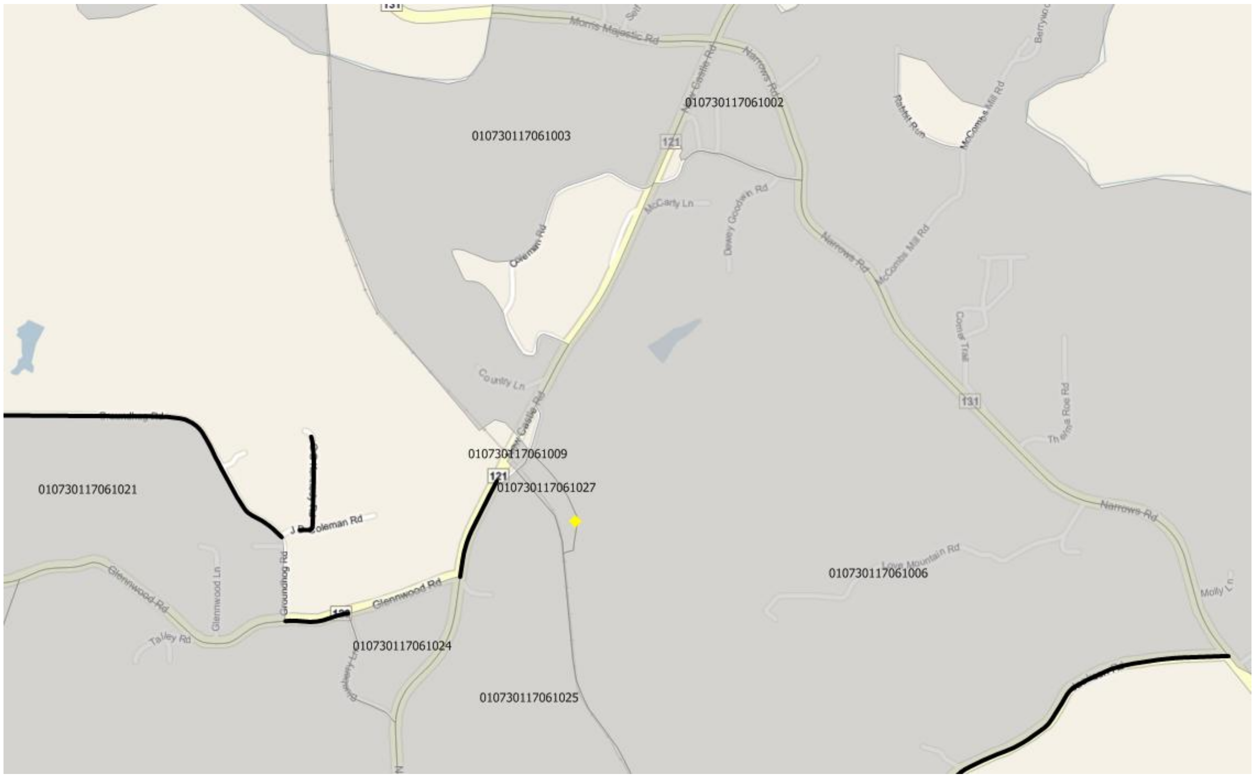

Figure 16--Sub block variation

Because the SBDD program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

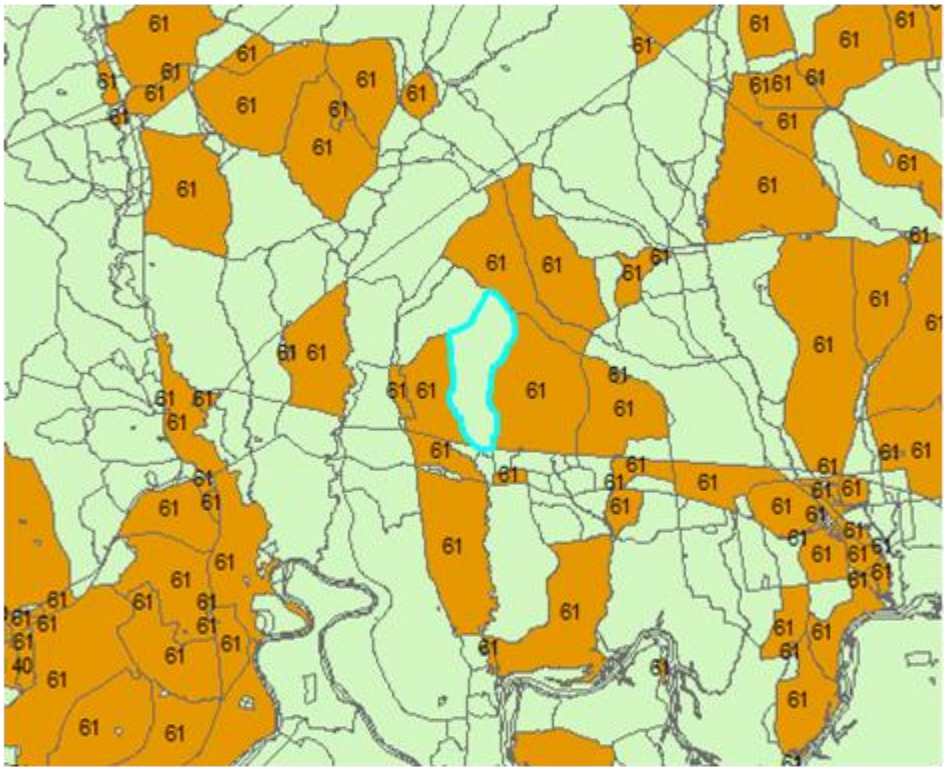

Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example, at a somewhat larger scale, shows where an interpolation process requires some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

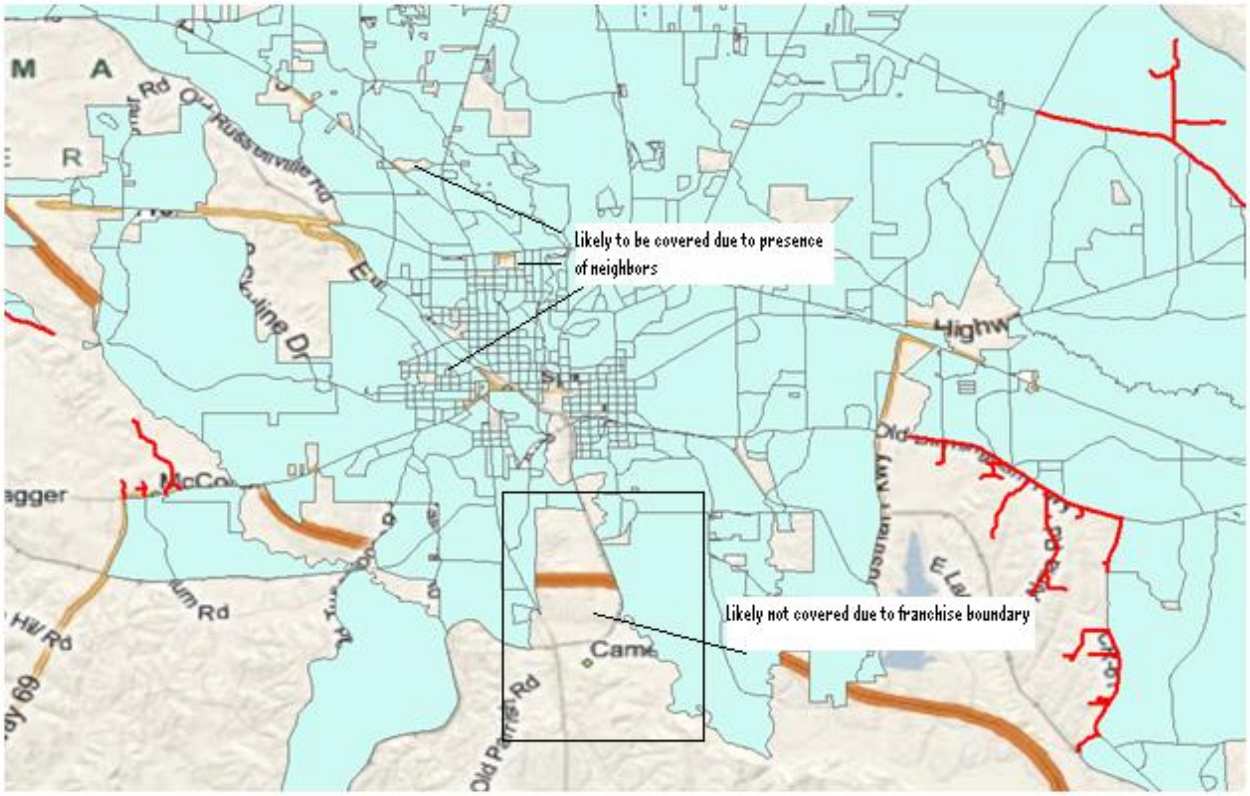

Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

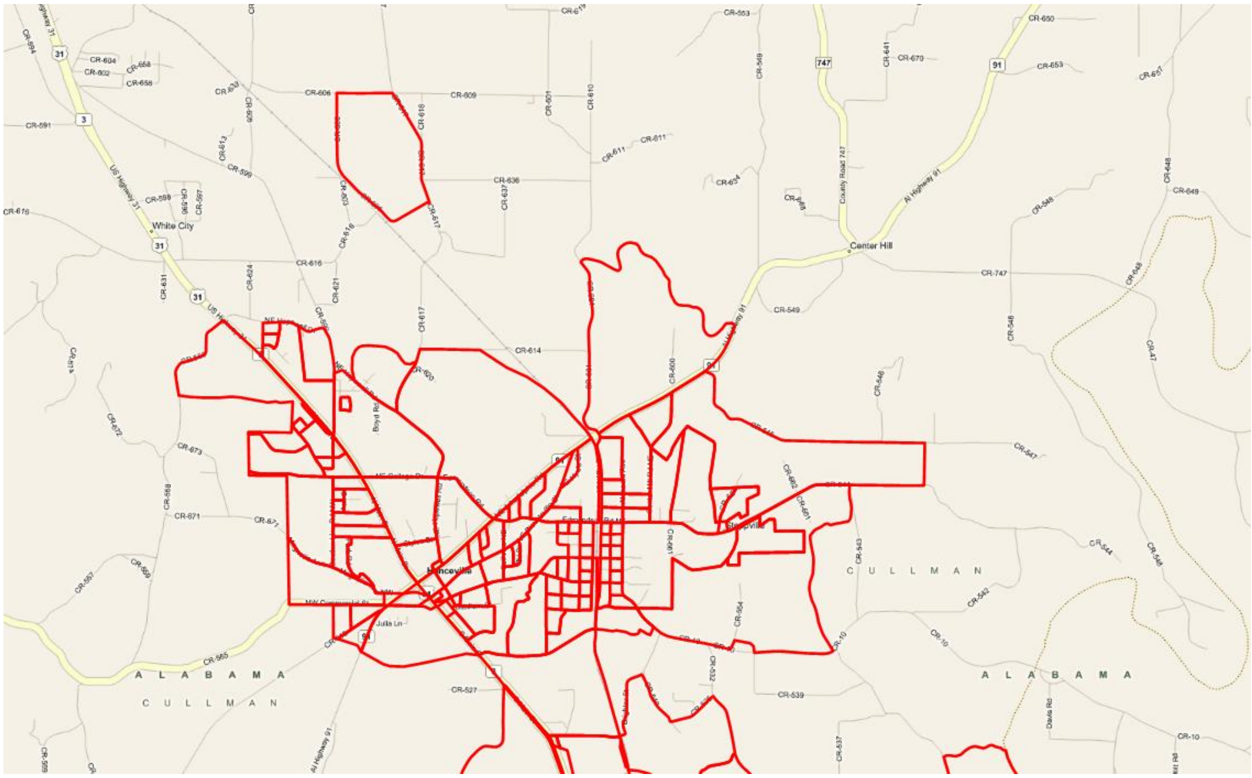

Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the second round, they received both a tabular data summary and a mapped output. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the April, 2011 Round 3 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from

this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

Now that our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBDD data model. As an example, consider the figure below.

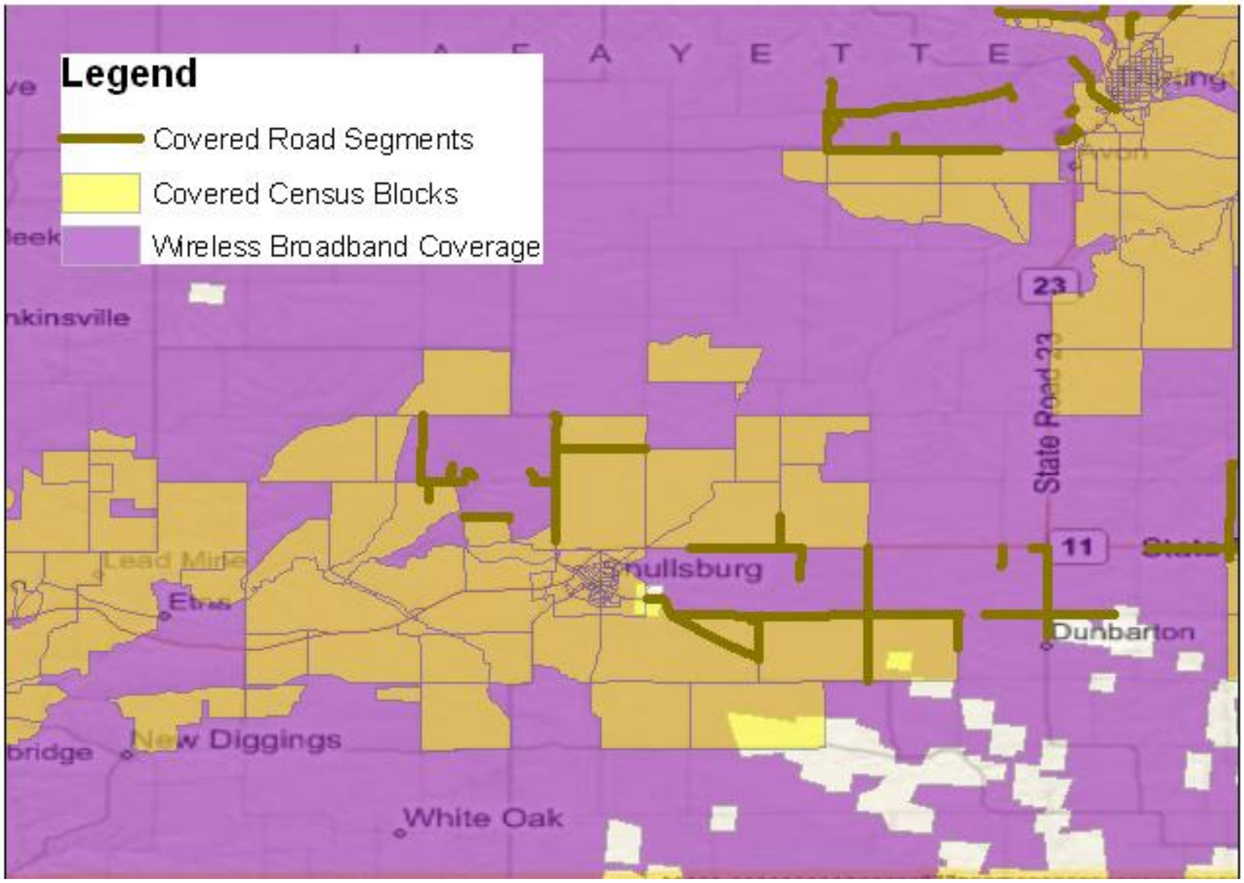

Figure 21--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of COLR Obligations

Wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300'. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

National Broadband Map Experiences

When the National Broadband Map launched, our phones began to ring.

Responding to a number of provider inquiries as well as emails from citizens provided some insights. It also illustrated that we now bear a second dimension of external verification. That is, we must be prepared to respond to people who are confused by apparent inconsistencies between the State and National Broadband Maps[29].

The case below, based upon a call we received, illustrates some interesting intersections between the State and NBM.

In this example a Citizen called inquiring about the difference in results between the National Broadband Map and our State of Alabama map. The issue in question was coverage at his home. The Alabama map showed he had coverage at his home, but the National Broadband Map said he did not.

In the image below, the green dot represents the geocoded location of his home. Based upon imagery, the geocode is quite accurate. The olive colored polygon represents a covered Census block less than or equal to 2.0 square miles. The Census block shows coverage by a number of wireline providers.

The geocoded point is about 170' from this covered Census block.

[29] We have a similar concern regarding textual data extracts. We may translate our SBDD submission into covered Census Blocks in a way that is different from NTIA.

Figure 22-NBM Covered Census block example

In the next image, covered TIGER road segments are shown in green. It is important to note how far the TIGER road centerlines are from the actual roads in the subdivision. It appears the geocoded point is reflecting more recent and more accurate road centerlines, placing the green dot at the correct location. Since the SBDD data is submitted in terms of TIGER 2000 the road on our map shows up about 100-200 ft away from where that road is located today.

As mentioned previously, however, our online maps buffer road segments to 300 feet on either side of the road centerline. In this case then, our state map buffer is large enough to return valid service providers for this green dot. The NBM, on the other hand, does not appear to buffer segments or the edges of census Blocks and will not return providers for this location. Our intent in this example is not to criticize the national map; rather, it is to illustrate that we may inadvertently make trade-offs between false positives and false negatives, differently.

This case illustrates several important tensions between the data as we present it to NTIA, map it ourselves and because of how it may be viewed within NBM context. A lack of agreement on how to handle these inconsistencies in the source data and differences in mapping approaches may cause consumer confusion.

The issues seem to come down to this

> a) How do you (or can you) handle the impact of time when roads move between TIGER versions or between TIGER and other road products? In this case, online map road traces will not show up in the right area.

b) Given the inconsistencies between TIGER geometry used in submission and underlying roadbases used for geocoding online, how do you (or should you) insulate the viewer from the inconsistencies. There appears to be a strong likelihood that TIGER judges a particular point to be in a larger than 2.00 sq mile Census block while that same location could be in a small block area in the online view.

c) How much tolerance should be introduced when returning a list of valid providers? Is it better to error on gathering too many providers or too few?

d) Since the NBM gathers feedback based upon its representation of coverage, how can/how should this crowd sourced feedback influence data presented in a different manner elsewhere?

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

Most carriers submitting Census level information provided 2000 Blocks. A few provided 2009 or alternative (TeleAtlas, possibly) Blocks. Especially with the need to derive segment geographies, we would prefer to message the providers a specific Census standard—but we'd like to be consistent with other Grantees so as to minimize work from the provider community. As of now, that standard is Census 2000. If NTIA anticipates using Census 2010 for Fall 2011 collection, it would be helpful to message that as soon as possible.

Also there seem to be several methods by which providers are calculating the area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband Providers not Meeting the NOFA "Provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband Provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[30]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how

[30] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the Provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband Provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[31]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn’t forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn’t a consistent method used to derive Broadband coverage. Some providers appear to be using a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data

[31] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the Provider_Type is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on Provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy of other base layers. Although we may be trading off absolute accuracy, our standard has been to conflate data to TIGER 2000 Blocks and TIGER 2009 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to December 31, 2010. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network

types (why is wireline down at the block when wireless is half the state, etc.). Finally we are also noting a significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to an anticipated geographic deliverable also increases the complexity of the effort.

Change Management Process

One thing that is becoming clear is that a change management process that is consistent between the data provider and NTIA is needed. In this light, publication of the current data transfer model beyond the PBWorks community would also be helpful. Many providers are designing their data extracts with the NOFA in mind and the NOFA structures have been supplemented in the current model.

Finally, it would be helpful, as early in the next cycle as possible, to know what Census Block vintage we are expected to deliver to NTIA. It would also be very helpful to maintain a stable geographic base for the next deliverable so that the basis of verification doesn't change.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.

5. In tables with mandatory Zip5 (Service Address), if the End_User_Zipcode was not available, we have inserted ‘00000’
6. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category.
7. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
8. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL).
9. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems.

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users

West Virginia Geological and Economic Survey
West Virginia Office of GIS Coordination

State Broadband Mapping Methodology

For the State of West Virginia, April 2011

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Overview

This documentation gives a summary of the data collection, normalization and verification processes used by the State of West Virginia for the April 2011 data submission to the National Telecommunication and Information Agency's (NTIA) in accordance with the State Broadband Data Development (SBDD) program.

Purpose

This documentation was developed to illustrate the processes used during the data collection, normalization and verification processes. The information within this document will provide a background to the development of the provider list and data request, and specific issues encountered by West Virginia with regard to data collection, normalization and validation**.**

Data Sources

Provider List

The provider list for the third round of data collection was begun during the first round of data collection. For this round, the list was regenerated to include any new providers within the state. The list was created by contacting the West Virginia Cable Telecommunications Association, the West Virginia Public Services Commission and the West Virginia Broadband Deployment Council. This information was compiled then compared to a list from the Federal Communiations Commission (FCC). Providers were then contacted using contact information provided by the FCC's public information search web tool. Providers who were contacted during the first round of data were contacted again through the same name and address. If a provider contacted during the first round had given more detailed contact information for a specific individual, those individuals were contacted instead of the contact provided by the FCC.

Provider Data Request

Elements identified in the Notice of Funds Availability (NOFA) Technical Appendix were requested from providers. If a provider was unable to fulfill such requirements, the West Virginia Geological and Economic Survey (WVGES) worked with those providers to gather the necessary data in an alternative approach.

Data Gathering

This component of the project was heavily reliant on working with service providers to obtain data. Providers were originally mailed the Data Request and then follow up phone calls and e-mails were made to remind providers of due dates. After data was received, the data was normalized per NTIA standards and placed into the provided geodatabase. We continued to operate under the same assumption as used in the first round of data gathering. We let the data "speak for itself" and did not make any grand assumptions or estimates in the interest of maintaining clean and accurate data.

Coverage Information

Data was derived and normalized into 4 formats in accordance with the data model:

- Census blocks (2000) of 2 or less square miles
- Street Segments (2000) of census blocks greater than 2 square miles
- Address Level (geocoded point data)
- Wireless Area (shapefile)

The normalization procedures were as follows:

1. Determine service being provided – what technologies are being used to provide the service
2. Understand data/determine how to process – determine which feature class in the geodatabase data belongs
3. Georeferencing/geocoding necessary data – georeferencing data for Wireless Area coverage and other service area maps as well as geocoding address level data
4. Segregating data into NOFA compliant formats – completely filling in geodatabase fields as well as making sure topology is correct
5. QA/QC – verification and validation of data

Geocoding Issues

The West Virginia Statewide Addressing and Mapping Board (SAMB) information is not yet completed across all of the counties in West Virginia, leaving areas within the State without complete or verified address information. This led to low geocoding match rates of provider supplied information, especially in rural areas, throughout the data normalization workflows. For some of these areas, additional broadband coverage processes were used to derive coverage estimates as described in the next section.

Additional Data Processing Techniques

Because of geocoding inconsistencies in certain areas of the State, some provider address information could not be mapped and other data processing techniques had to be implemented to create broadband coverage estimates. In cases where Digital Subscriber Line Access Multiplexer (DSLAM) points were able to be provided as well, broadband coverage was mapped by loading the DSLAM points into ESRI's Network Analyst. For this processing, the West Virginia State Addressing and Mapping Board (SAMB) street centerlines were used as the source roads. DSLAM points were loaded into the facilities point feature class of the service area template using a 1000 ft snapping tolerance to help locate points to nearest roadway. Any point still not connecting to the road network were viewed and manually linked to the road network. Processing was run to create segment lines for each point and to create a detailed polygon area around each street segment area for each point. A 15000 ft distance parameter was used and no impedances were placed on the streets.

Once the process was run, the created segment lines and polygon areas were linked to the original DSLAM point attribute table and exported from the analyst dataset into standalone polygon and line feature classes. These two feature classes were then clipped to the provided Wire Center Boundaries. These coverage areas were then used to select covered census blocks and street segments for the data submission. Final broadband coverage estimates were reviewed with the provider prior to final submission.

Another unique processing issue occurred when providers submitted address-level fixed wireless data which would produce error through the new data model. As per discussion with NTIA, the unlicensed fixed wireless points were plotted, then buffered out to 800 feet. A shapefile was created and moved to the Wireless feature class within the geodatabase.

FRN Number Discrepancies

Discrepancies between Round 2 and Round 3 data submissions were noticed concerning FCC Registration Numbers (FRN). Effected providers were contacted directly to clear up these issues. FRNs that were loaded into the database come from direct contact with providers.

Community Anchor Institutions

Data was collected and verified by the West Virginia Division of Homeland Security. Existing datasets were used and modified to include the most recent broadband information, including upstream and downstream speeds. Some information was collected through contacts at other state agencies, phone calls and e-mails. The SAMB information website was used to verify locations. Letters were sent to hospitals and nursing homes asking for their broadband information as well.

Because of the change in domains in the geodatabase regarding the Broadband field allowing unknown values, there are fewer records for this round of data. Records that did not have information in the Broadband field were deleted. There were 2,355 Community Anchor Institutions in the Round 2 data submittal. For this round, only 1,715 Community Anchors are being submitted.

Validation and verification

Throughout all of the data gathering and data preparation processes for each data submission the data verification has been continuous and has evolved based on the evolution of the data model. The focus has been on getting complete data from all providers and assuring that all data can be processed into the required data model for submission. Where providers did not submit data in acceptable formats for data normalization into NOFA formats or where they did not submit complete data or any data at all, there has been continued focus on working with the providers by the WVGES to continue to improve the source information being provided. Data verification and validation is an on-going, long term process that will continue to evolve throughout the broadband data development program. With this third data submission being a much more complete broadband coverage across the State because of additional data supplied by providers, additional data verification methods, beyond what has been implemented to date, will be evaluated to continue to refine the map, where applicable, prior to the next data submission in the fall of 2011.

Validation Processes

Data validation begins within the data collection process to determine if the data submission by providers is formatted in a way that can be normalized into the NOFA formats required. Where data is deemed incomplete or in non-conforming standards, the WVGES staff reached back out to providers, as necessary to improve the data submissions. Over each round of data preparation the formats for the updates being collected has improved.

Quality assurance and quality control has been a big focus of the data validation of the submittals to assure that the required data fields are populated properly, that data fields are populated with values that follow the data model rules. As the data model has evolved over each round of data submission these QA/QC checks have been modified to include the changes in fields, values, domains, etc that are being required for submission.

Validation methods employed include the following:

- Ensuring all applicable providers' datasets are propagated forward to each round of data collection
- Verifying that all required fields are populated with valid values, and default values are used when appropriate. This includes:
  - Speeds valid for the technologies reported
  - Latitude/longitude coordinates fall within an acceptable range, given the state boundaries
  - The relationships between Maximum and Typical, and Downstream and Upstream speeds are valid
  - Service reported at the block level is done using blocks of the appropriate size (less than two square miles)
  - Speeds and technologies reported per provider are consistent between blocks and segments
  - Administrative information (Provider Name, DBA Name, FRN) is consistently reported per provider in each populated feature class.

Outreach to Providers

To further ensure the providers' broadband footprints would be accurately represented in data submissions, "check maps" depicting each respective provider's served small Census Blocks and segments located in large blocks were distributed back to providers. Providers were requested to either approve their check maps as-is, or submit additional changes if their coverage was not accurately represented. Any modifications received as a result of this effort were incorporated into the Round 3 submission and these provider review 'check maps' will continue to be sent to providers during each subsequent data submission.

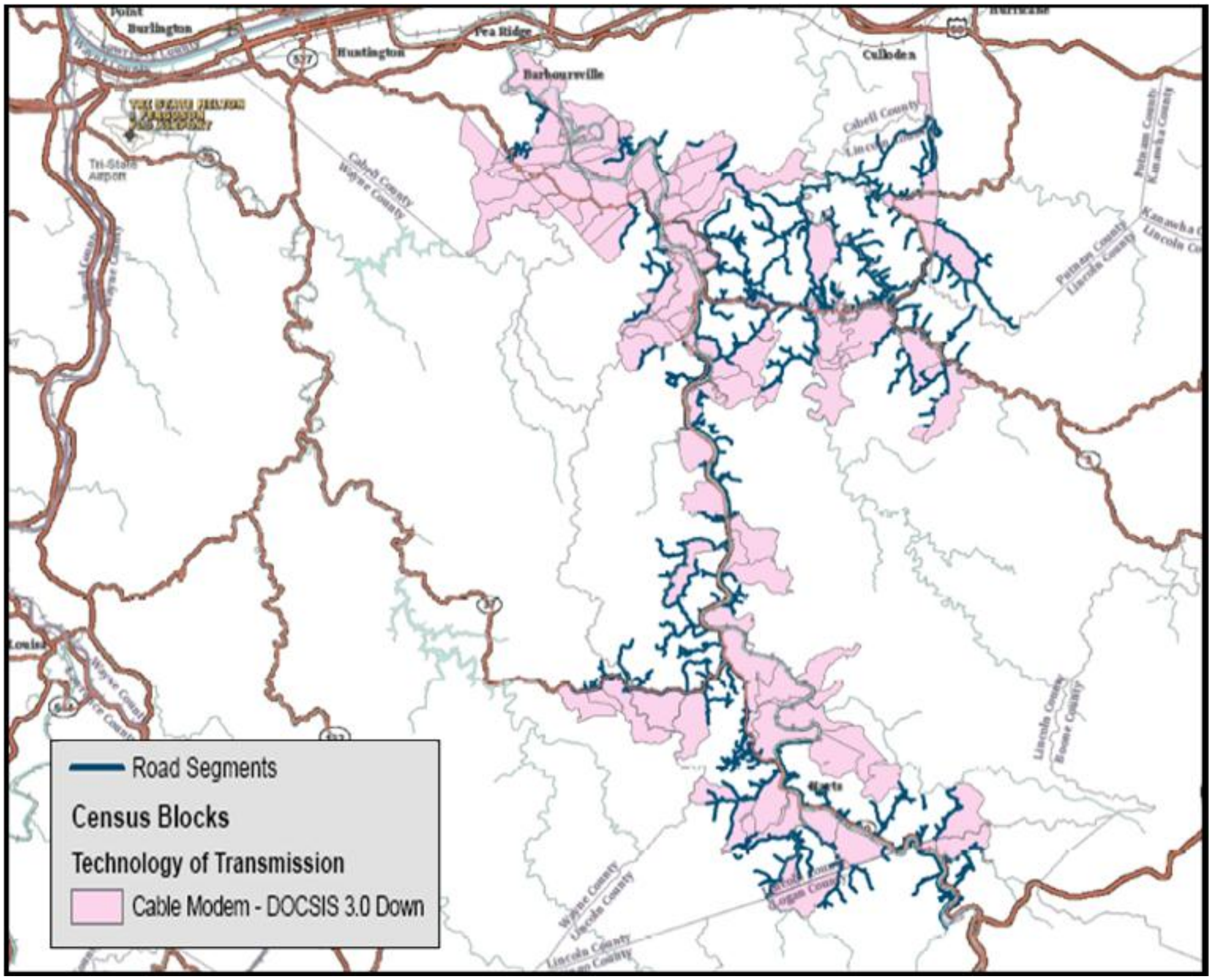

Figure 1 – Example of a portion of a provider check map

The validation process for the April 1, 2011 submission also includes the use of the Python scripts for validation provided by NTIA.

Third Party Datasets

As data collections and data normalization processes progressed, additional validation was conducted using commercially available datasets. The following commercially available datasets were used as a reference for the specific technologies that their data represented.

- American Roamer datasets
- TeleAtlas Exchange boundaries
- Media Prints Cable boundaries

These datasets were used primarily as a validation source for provider service coverage.

State Broadband Interactive Map

The State of West Virginia is preparing to release an interactive broadband mapping web site in April 2011. The web site will provide consumers the opportunity to review broadband availability across the State. The web application will also have the functionality for consumers and citizens using the state broadband map web application to submit comments and feedback. The information gathered from that feedback will be reviewed as more potential source information for validation and determining confidence levels of the broadband coverage across the regions of the State. By comparing comments supplied by consumers about broadband availability to the broadband coverage, trends could be recognized where potential inconsistencies in the existing broadband map could exist. This could delineate the need for further focused validation or verification in specific areas that could refine the broadband coverage information for future data submissions.

West Virginia will also incorporate any feedback or statistics from any speed test results, potentially supplied in the future by the NTIA, to compare to the existing broadband coverage. Again this could assist in determining if there are any trends or patterns in the information that could be an additional tool for prioritizing areas where more refined verification and validation might need to occur.

Future Steps for Validation

Future plans for data validation will include establishing confidence levels to assign to broadband coverage based on comparisons with other source information collected such as feedback from crowd sourcing results from state broadband map and national broadband map. Confidence rankings will be used to prioritize any areas where additional verification techniques might be used such as consumer and business surveys.

With the broadband map for the third data submission representing a much higher percentage of broadband coverage across the State because of additional data collected from providers, further validation of that data will also be reviewed at a regional level. By working with regional planning and economic development councils to review the existing broadband mapping at a regional level, additional validation and verification of the information for the fall 2011 data submission will be undertaken on a regional basis.

Also throughout the broadband data development program, as addressing information from the State Addressing and Mapping Board's addressing datasets are continually updated, address point information from providers will continually be re-verified prior to each submission to NTIA to improve geocoding results and refine the broadband coverage areas.

Providers

Non-Responsive Providers

Names of providers who were non responsive will be passed along to the WV GIS Coordinators Office to be contacted further.

Atlantic Broadband LLC

DBA: Atlantic Broadband, LLC
FRN: 0009596883
This provider was contacted 8 times. Data was not provided by the April submittal date. Further attempts at data gathering will be made in the next round of data collection.

Zayo Group, LLC
DBA: Zayo Bandwidth Central, LLC
FRN: 0009727512
This provider was contacted 8 times. Data was not provided by the April submittal date. Further attempts at data gathering will be made in the next round of data collection.

Skyweb, Inc
DBA: SKYWEB Inc.
FRN: 0018516799
This provider was contacted 8 times. Data was not provided in time to meet the April deadline.

Helicon Cable Holdings, LLC
DBA: Jet Broadband WV, LLC
FRN: 0014413835
Merged with another broadband provider.

Satellite Providers

Data requests sent to Satellite providers were met with the response of "We provide to the entire state." Attempts made at gathering more detailed data sets were unsuccessful for this round of data collection. Further attempts will be made for the next round of data collection.

Hughes Communications, Inc.
DBA: HNS Licensuse Sub, LLC
FRN: 0018483073
Detailed data was not provided by the April submittal data. Further attempts at data gathering will be made in the next round of data collection.

StarBand Communications Inc.
DBA: StarBand Communications Inc.
FRN: 0005087457
Detailed data was not provided by the April submittal data. Further attempts at data gathering will be made in the next round of data collection.

WildBlue Communications, Inc.
DBA: WildBlue Communications, Inc.
FRN: 0007843766
Detailed data was not provided by the April submittal data. Further attempts at data gathering will be made in the next round of data collection.

Providers that Submitted Data

Provider Name	DBA Name	FRN
Armstrong Holdings, Inc.	Armstrong Telephone Company - Northern Division	0004311528
Armstrong Holdings, Inc.	Armstrong Telephone Company-WV	0004379731
Armstrong Holdings, Inc.	Armstrong Utilities, Inc.	0003765617
AT&T Inc	New Cingular Wireless Services, Inc.	0003766532
Broadview Networks Holdings, Inc.	Broadview Networks Holdings, Inc.	0010296853
Cequel Communications, LLC	Suddenlink Communications	0015784663
Citizens Communications Company	Frontier Communications Corporation	0003576352
City of Philippi	City of Phillipi	0001984244
Comcast Corporation	Comcast Cable Communications Inc.	0003768165
Community Antenna Service, Inc.	Community Antenna Service Inc.	0004966131
Deutsche Telekom AG	T-Mobile USA, Inc.	0006945950
DSL.net, Inc.	DSLnet Communications, LLC	0004324851
Gateway Telecom, LLC	Gateway Telecom LLC	0018536623
Hardy Telecommunications, Inc.	Hardy Telecommunications Inc	0002008043
Hardy Telecommunications, Inc.	Hardy Telecommunications,Inc CLEC	0013169313
Hickory Tech Corporation	Enventis Telecom Inc.	0008394322
Inter Mountain Cable, Inc.	Inter-Mountain Cable Inc	0001789080
Inter Mountain Cable, Inc.	Mikrotec CATV, LLC	0014471288
JB-Nets	JB-Nets	0016474868
Leap Wireless International, Inc.	Cricket Communications, Inc.	0002963528
Level 3 Communications, LLC	Level 3 Communications, LLC	0003723822
Level 3 Communications, LLC	Broadwing Communications, LLC	0008599706
LightEdge Solutions, Inc	LightEdge Solutions, Inc.	0015546443
Metropolitan Telecommunications Holding Company	Metropolitan Telecommunications Holding Company	0009806019
Micrologic, Inc.	Micrologic, Inc.	0018675256
New Edge Holding Company	New Edge Network, Inc.	0003720471
NTELOS, Inc.	NTELOS Communications Inc.	0004342762
NTELOS, Inc.	West Virginia PCS Alliance, L.C.	0002049328
Otelco Inc.	War Acquisition Corp	0018657858
Qwest Communications International, Inc.	Qwest Communications Company, LLC	0003605953
Shenandoah Telecommunications Company	Shentel Cable Company	0018024075
Sprint Nextel Corporation	Sprint Nextel Corporation	0003774593
Spruce Knob Seneca Rocks Telephone, Inc.	Spruce Knob Seneca Rocks Telephone, Inc.	0004337002
TelAtlantic, Inc.	West Side Telecommunications	0002009405
TelAtlantic, Inc.	Communications Plus, Inc.	0009281262

Time Warner Cable LLC	Time Warner Cable LLC	0013430244
TW Telecom inc.	tw telecom holdings inc.	0014942668
Verizon Communications Inc.	Cellco Partnership	0018506568
Verizon Communications Inc.	Verizon Business Global LLC	0010856284
Verizon Communications Inc.	Verizon West Virginia Inc.	0002011278
Visual Link Internet LLC	Visual Link Internet LLC	0017645813

Table 1 – Providers That Have Submitted Data for SBDD Program

State Broadband Data and Development Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised March 31, 2011

CostQuest Associates

LinkAMERICA Alliance

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Overview

The following documentation provides an overview of how the third required data set was collected and processed for the State Broadband Data and Development Program (SBDDP) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested modifications based upon NTIA guidance
    a. Inclusion of satellite, changes to service overview table, FRN verification process
4. Consumer Feedback, Crowd Sourcing and Social Media campaigns.
5. Development and posting of a Technical Standards document.

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods

As anticipated, the SBDD program continues to mature and evolve. Technical leadership and strong guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices. Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the October 1, 2011 "Round 2" submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early January 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines associated with each round. Where necessary, we execute new NDAs with providers. In "Round 3", this effort continued on a daily basis until we reached our final data submission deadline on February 18, 2011. After February 18, we continued to work with providers who were not able to meet the deadline. In most cases were able to "crash" our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 3 only providers who

responded in the last two weeks of March were excluded from the final dataset. Data from those providers will be updated this summer and included in our Round 4 submission.

Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program's aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Three. We've also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in Round 1 or 2, they were giving an additional opportunity to do so in Round 3. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA's, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA's were individually negotiated to address specific provider concerns. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since two prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 3. This allowed us to provide two response options to providers. The first was for them to review PDF check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

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[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers like Megapath, New Edge Networks, American Fiber. These providers seem to resell and/or provision within their own network opportunistically. In this submission we begin to bring them into the analysis as a provider type "other". As the inclusion of this category isn't our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 3 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New Providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in Rounds 1 & 2, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning Providers: While many Broadband providers submitted datasets in Rounds 1 & 2, many of those submissions did not contain 100% of the requested data. To help identify gaps, and to make the Round 3 submission process as simple as possible, every Round 2 survey was reviewed for completeness, as well as accuracy and formatting compliance. Notes were made regarding gaps, and specific instructions were developed for providers in Round 3. These instructions not only explained what data was missing, but also provided directions on how to include that information in the Round 3 submission.

Check maps were also developed to show each provider how their service area would be displayed on the resulting interactive state map. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 3 survey in early January 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice by telephone or e-mail during the months of January and February. The initial data submission deadline was set for February 18, but, as previously noted, we continued to accept “straggler” submissions well into March.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of “known providers”. We believe the vast majority of those we were unable to reach were small wireless providers who have simply ceased to exist[2].

[2]The complete list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 3, given the data vintage of December 31, 2010, we began this process immediately after the New Year. The last submissions were accepted in mid-March, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBDD program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- GeoResults Telecom Research Data. This data was used to help estimate the Broadband services likely provided to certain classes of Community Anchor Institutions (CAI).

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBDD program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

a. Geographic Data Files
    i. US Census TIGER data[4]
b. Sources that helped isolate providers, identity management or provider service areas
    i. NECA Tariff 4
    ii. State produced exchange boundaries
    iii. Carrier produced wirecenter boundaries
    iv. FCC 477 provider filers
    v. FCC Coals reports (321/325)
    vi. FCC FRN API lookup tool
    vii. FCC/FAA Antenna Registration System
    viii. FCC FRN Lookup Tool (plain text search)
    ix. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
    i. USAC Grant lookup tool
    ii. USAC High-Cost FCC Filing Appendices
    iii. HRSA data warehouse
    iv. NCES data lookup
    v. State managed lists of schools (K-12), post-secondary institutions and libraries List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section below.

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[4] Census data were derived from < http://www2.census.gov/cgi-bin/shapefiles2009/state-files?state=01>, Census 2000 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas. Finally, licensed data from Georesults were used to derive estimates of Broadband connectivity for hospitals within the Anchor Institution category. The actual value from Georesults was not used, but our estimate is modeled from their input data. We also use the name and address as provided by the State data provider, not Georesults.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities, the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a fairly traditional telephone survey approach, focused on the consumer market. In addition, we are currently advancing our crowd sourcing process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are summarized below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBDDP grant was in place. Subsequent consumer surveys funded by the SBDDP grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming. These surveys will be repeated after two years to establish and evaluate trends. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for internet users and one for non-users. The telephone survey approach allows us to reach the non-internet user group as well as the current internet user. A secondary online approach is also used to augment input from current internet users. For non-users, the surveys help determine why they don't have or don't use Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their

daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the consumer survey in Wyoming was designed to produce results relevant to the state's seven Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBDDP's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBDDP program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific internet use in specific communities (i.e., regions).

The 2010 surveys were launched in July 2010 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. The surveys were closed on November 30, 2010. Telephone surveys were completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers (e.g., 80,000 random Wyoming residence telephone numbers were acquired as the foundation for the Wyoming survey). Mobile phones were not included in the initial surveys. Upon evaluation of the survey statistics, an auxiliary survey was executed to ensure younger groups (i.e., age 18 – 25) were adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market (age 18 – 25) was surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics point to the complexity of the telephone-based survey process. Survey volume achieved statistical validity ranging from a 95% confidence level and a $\pm$ 1.7% margin of error for the statewide data in Wisconsin to a 95% confidence level and a $\pm$ 3% margin of error for Wyoming's statewide data. Most regions in the 3 states have a 95% confidence level with a $\pm$ 5% margin of error.

Call volume and disposition is summarized in the chart below

BROADBAND MARKET RESEARCH - ID, WI, WY - FALL 2010

	TOTAL		IDAHO		WISCONSIN		WYOMING	
TOTAL RECORDS CALLED & % OF STUDY	106,592	100%	22,144	100%	57,445	100%	27,004	100%
NO ANSWER	53,507	50%	11,974	54%	25,886	45%	15,647	58%
TOTAL DEAD NUMBERS	23,962	22%	4,529	20%	14,611	25%	4,822	18%
HARD REFUSALS	9,304	9%	1,728	8%	6,048	11%	1,528	6%
QUALIFIED REFUSAL	643	1%	101	0%	403	1%	139	1%
BUSY	3,652	3%	754	3%	1,903	3%	995	4%
ANSWERING MACHINE	6,385	6%	1,314	6%	3,388	6%	1,683	6%
NON-WORKING NUMBER	5,072	5%	943	4%	2,983	5%	1,147	4%
CLAIMS PREVIOUS INTERVIEW	113	0%	16	0%	68	0%	29	0%
NON-RESIDENTIAL	454	0%	104	0%	239	0%	110	0%
LANGUAGE BARRIER	1,003	1%	223	1%	562	1%	218	1%
OTHER PHONE PROBLEMS - FAX/MODEM	907	1%	205	1%	500	1%	202	1%
PORTED NUMBER	272	0%	68	0%	149	0%	54	0%
BREAK OFF - SCREENER	556	1%	103	0%	301	1%	153	1%
TERM Q3 - UNDER 18	122	0%	22	0%	65	0%	36	0%
		99%		100%		99%		99%
TOTAL COMPLETES	5,758	5%	1,080	5%	3,420	6%	1,259	5%
AVG Completion Time (minutes)	**16**		**15.8**		**15.4**		**16.1**	

As noted above, the telephone survey process represented in the statistics above was augmented by providing online access to the survey. Participation in the online survey was promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, this was a long survey. As noted above, the survey averaged sixteen minutes across the three states. While this clearly contributed to the number of survey call attempts that were required to reach the level of statistical validity, it was not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBDDP efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use YouTube, LinkedIn, Facebook and Twitter to support our work. YouTube and LinkedIn postings are used to promote awareness. As noted above, we were able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we are currently engaged in two specific social media tests (in Alabama) to gauge how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising. For example, with a fairly limited 'following' a single Facebook post aimed at driving traffic to the online speed test, had 282 impressions (i.e., the number of times the post was viewed), which contributed to an increase in 71 more visits to the Facebook page generally, and a volume of 60 hits (over a three day

period) on the web site page that hosts the speed test. Our normal volume of speed test page hits is in the neighborhood of 7 or 8 per day (vs. the average of 20 per day experienced during this test). Preliminary data suggests that about half these page hits resulted in a speed test being executed.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and budgetary constraints allow. It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us take advantage of increasing specialization and proficiency with certain types of data and management responsibilities. In this submission, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

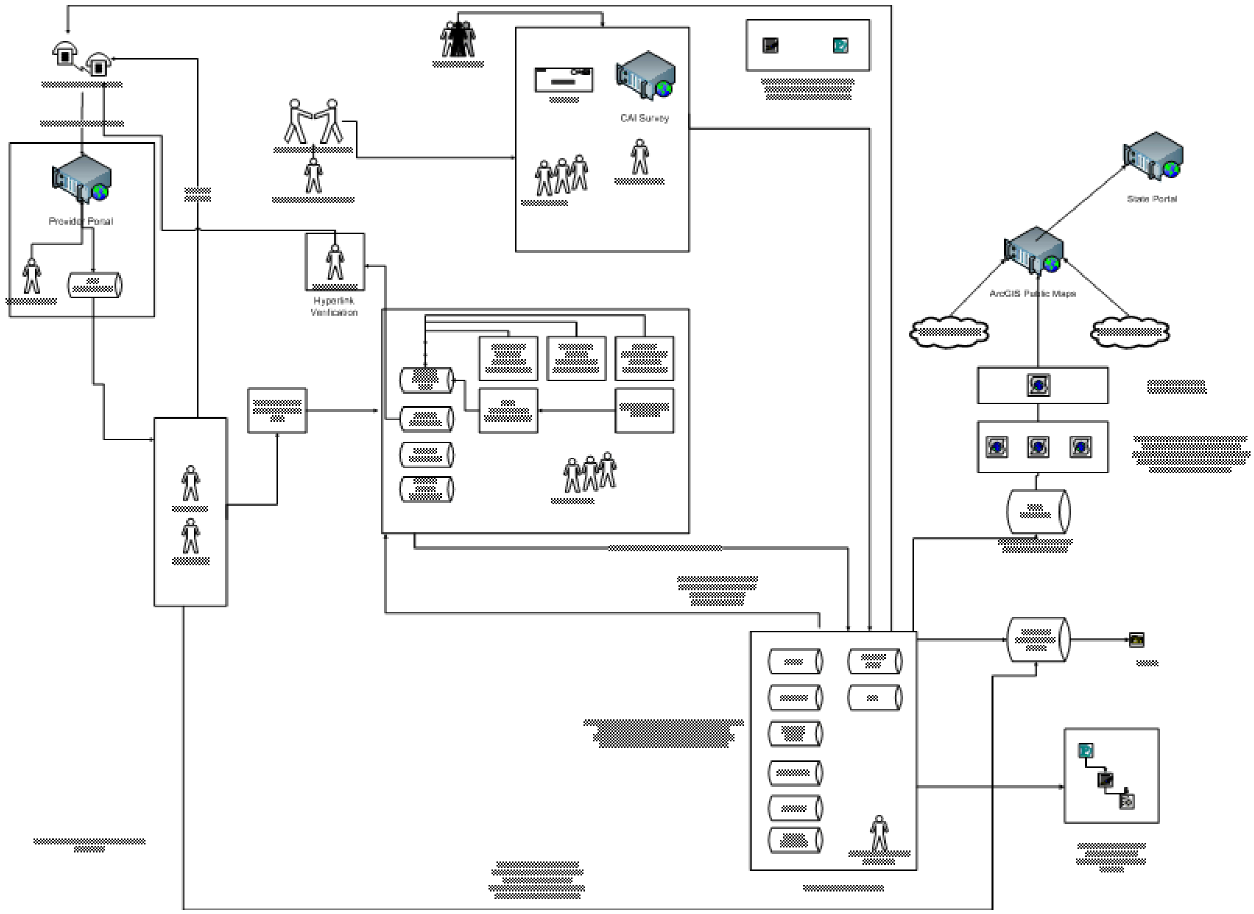

Figure 1--SBDD Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- Provider and network ownership certainty

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2000) of 2.00 or less square miles
2. Covered Street Segments (2000) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the georeferenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

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[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

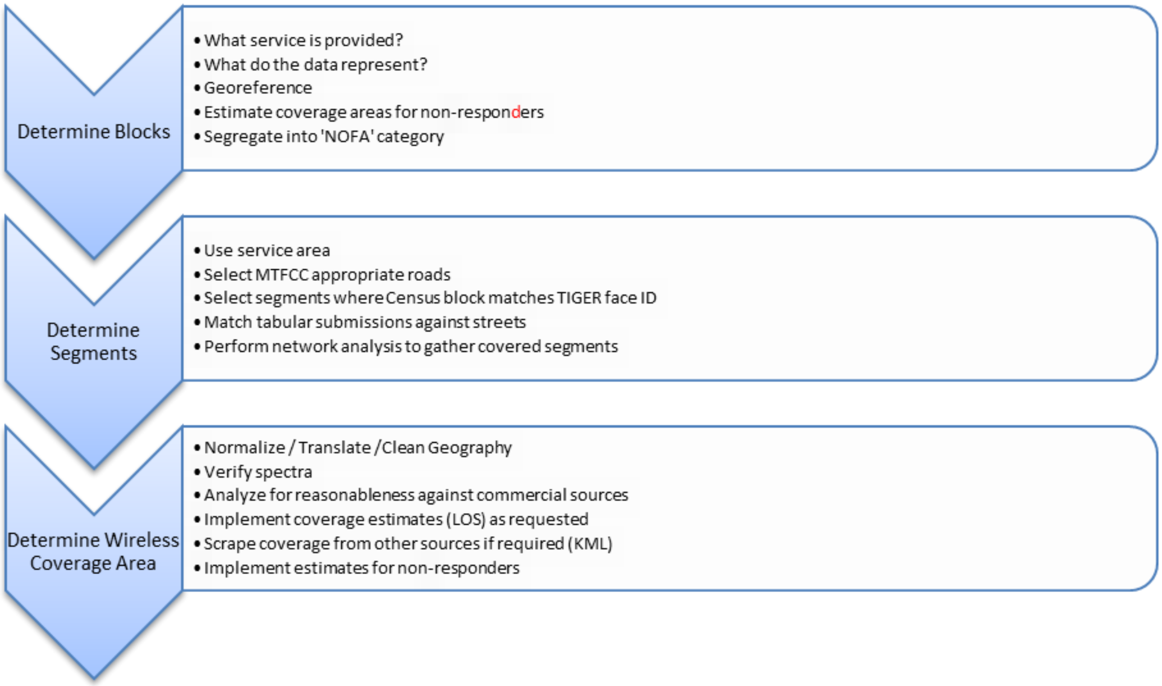


Figure 2-Broadband Coverage Process

Impact of Program Change

There were four important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 3.

The first was the development of a "provider match" submission metric whereby the grantee's complete list of known providers in the state is compared against lists from third party sources. The provider match specification was discussed on a webinar prior to the release of the national map. Although, to this date, there has been no clarification on how this metric is established or exactly how it will be used. We have invested significant resources to support an internal process to compare our provider lists with several additional sources. This has been manifest in at least three ways.

Within our provider verification process we work to derive a state level match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context.

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify,

or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to receiving Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as Provider Type "other". Our sense is Provider Type "other" will continue to expand in the fourth submission as we pull in more providers who are facilities-based and reseller.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this "other" provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or Microwave link despite the fact that the hospital next to them in the same Census block can get this service.

The final set of changes was a second verification check against reported FRNs. As NTIA is stressing the importance of this attribute, we increased its visibility in our Check Map process. FRN is now listed on both the tabular verification report and the provider PDF map. Beyond this increased visibility we had an analyst verify each FRN in our system against the FCC API[9], as well as FCC textual search[10]. Because the FRN is not an identity management tool, we are unsure if the FRNs we've included are those desired by NTIA, but we have at the very least, verified the existence of the FRN via the FCC system.

Trends in Provider Supplied Data

With this third submission we take note of three important trends.

First, with larger providers, we are seeing an increase in data stability relative to earlier submissions. In informal discussions, several providers have noted changes and stabilization in internal data processes. The firms have invested internal resources in stabilizing this data feed.

We see this reflected in very stable counts of Census Blocks and road segments. This does not mean that complex problems like segment identification or dispersion in data have been 'fixed'. It does mean that the format and methods to produce inputs for NTIA are increasingly stable.

Second we note that several providers have been particularly concerned with an appropriate identification of Maximum Advertised speeds. In some cases this involves identification of very small areas (sometimes below the level of a Census block) and appropriate assignment to technology of transmission and maximum advertised speed tiers. In other cases, questions arise regarding maximum advertised speeds that could be sold based upon network design, but that are not generally "advertised" or otherwise stated to the general public.

[9] http://reboot.fcc.gov/developer/frn-conversions-api
[10] https://fjallfoss.fcc.gov/coresWeb/simpleSearch.do

Third when comparing submission three results relative to submission two it is important to recall the inclusion of much new data within the Provider Type “other” category. This change does not necessarily reflect a change in the size of the market, rather it reflects new data coming into the analysis and segregated into a distinct category..

Coverage Geoprocessing Methods

The next section discusses how data were geo-referenced and geoprocessed given a particular submission format.

In most cases, in Round 3 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[11]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to “belong” is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[11] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

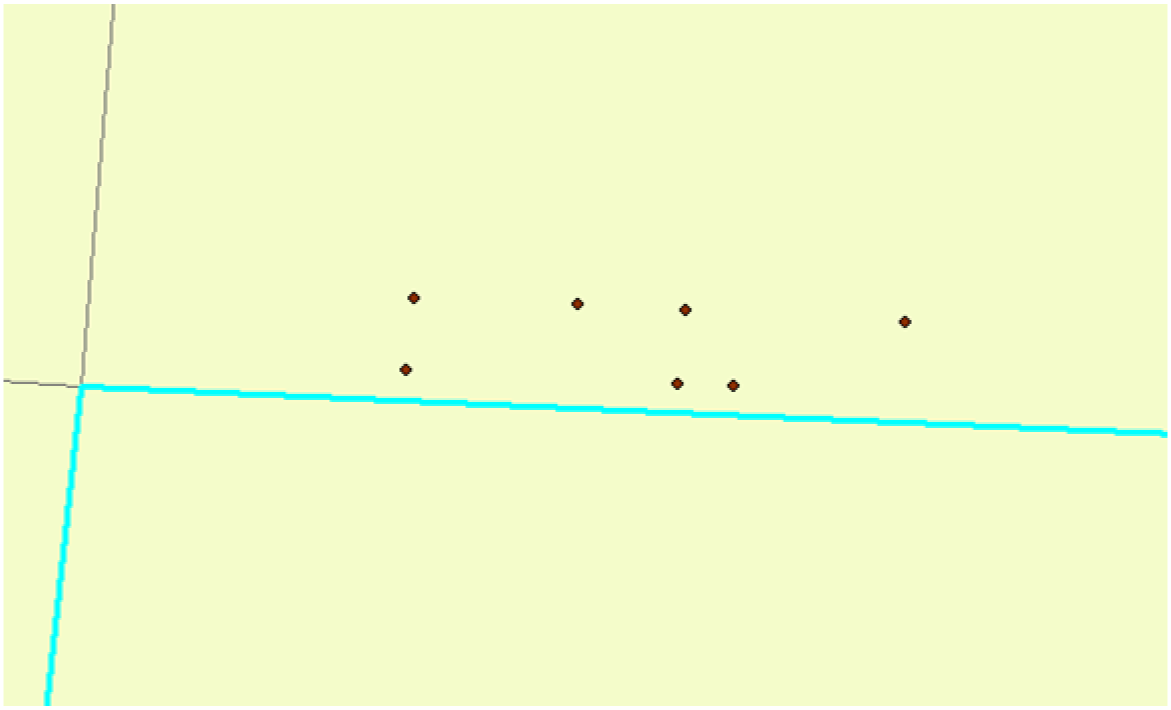


Figure 3-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

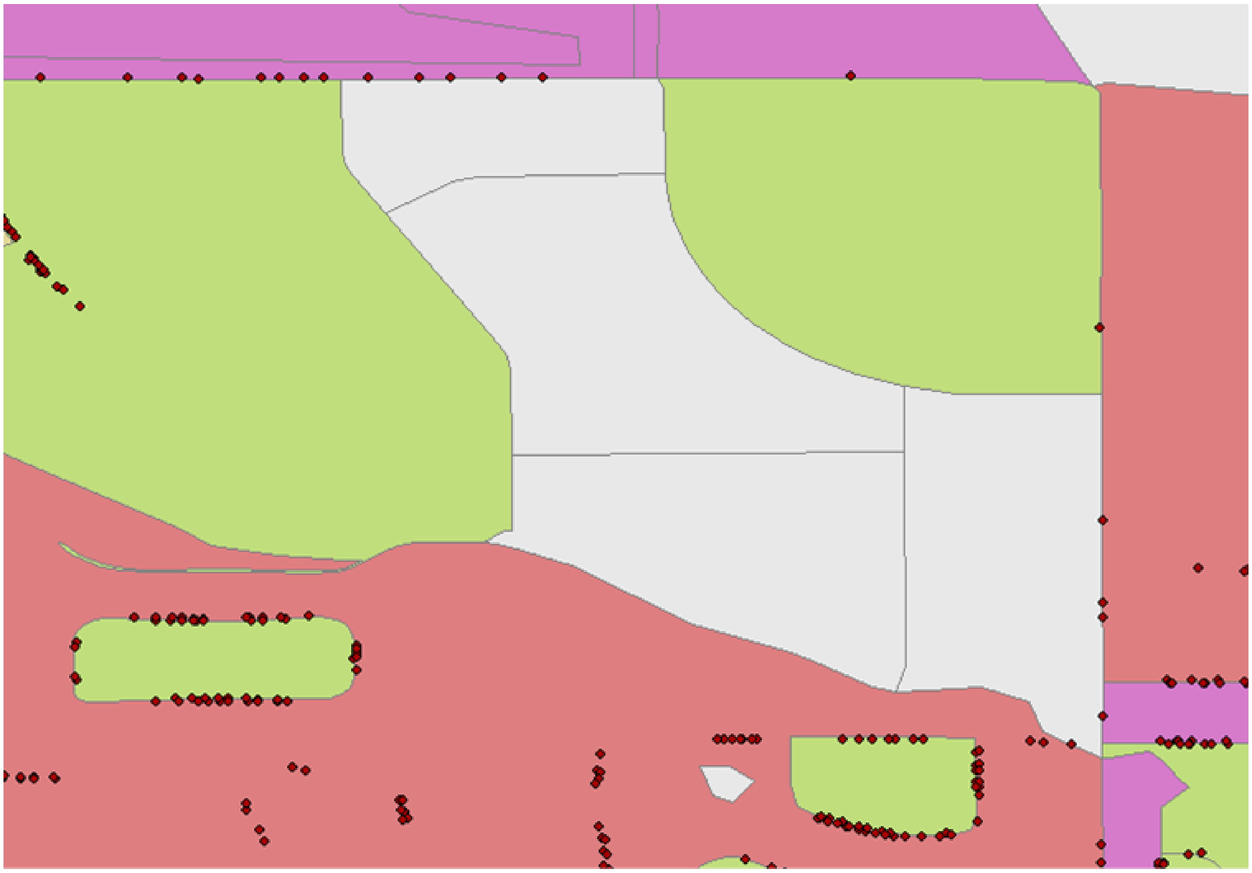


Figure 4-Block Coverage

For this reason, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas. Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate – specifically in areas where the coverage is attributed.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

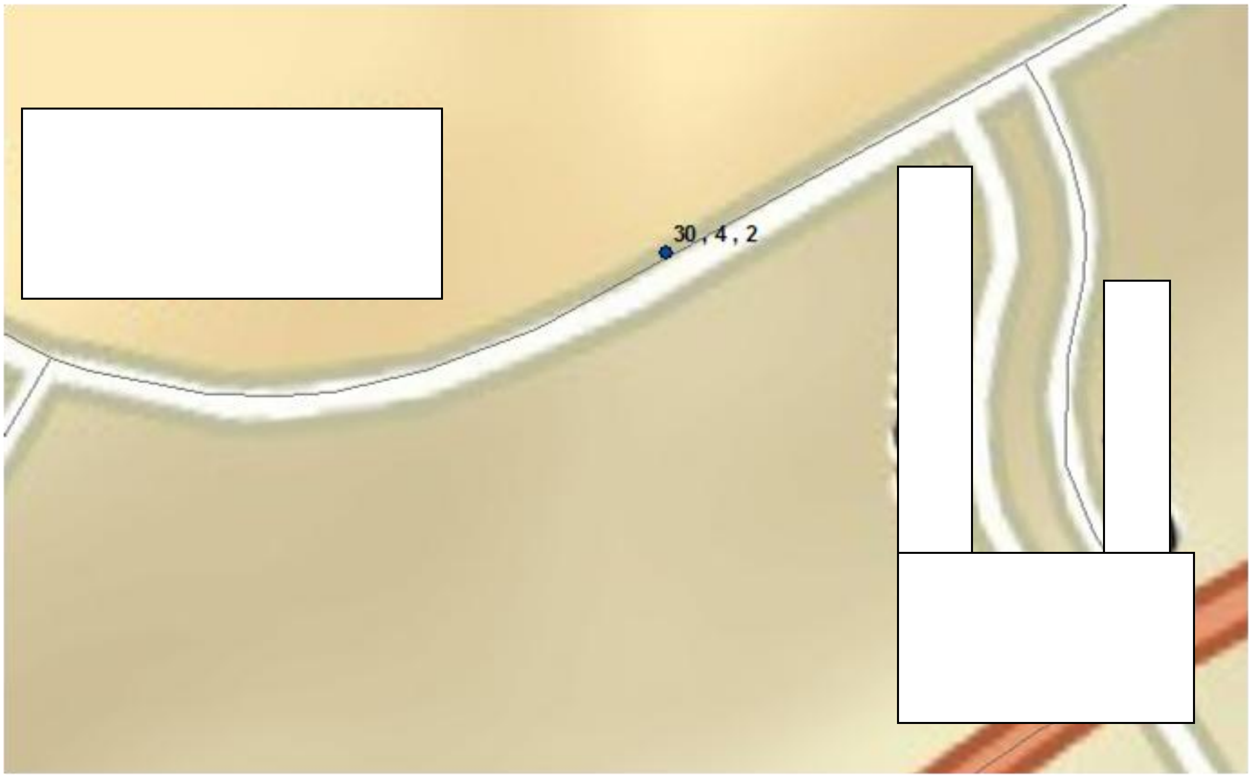


Figure 5-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a situation comparable to customer point level submission in that we have most of the network footprint captured.

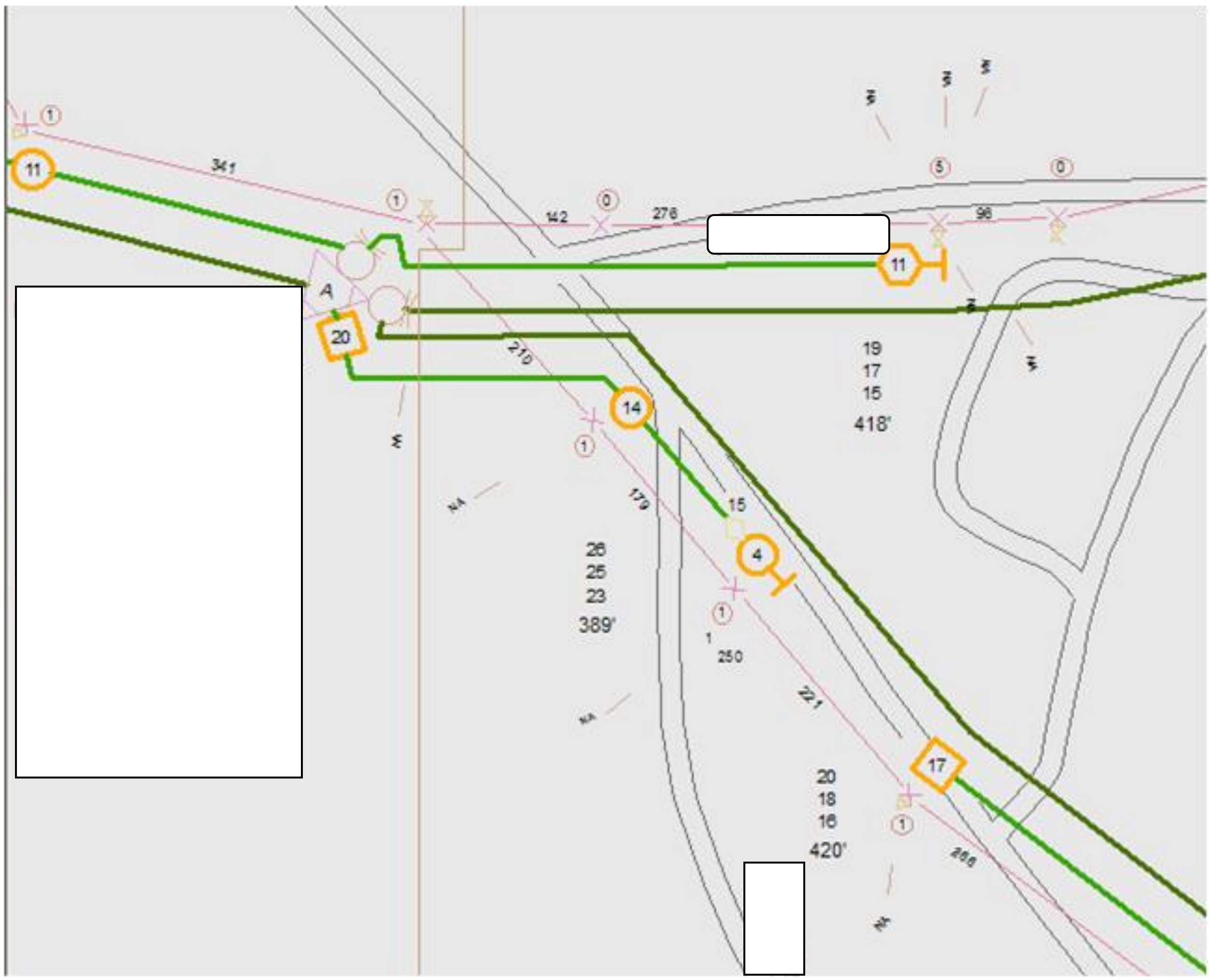


Figure 6-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our team had geo-registered the image into an approximate position. In this case, the boundary streets

were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

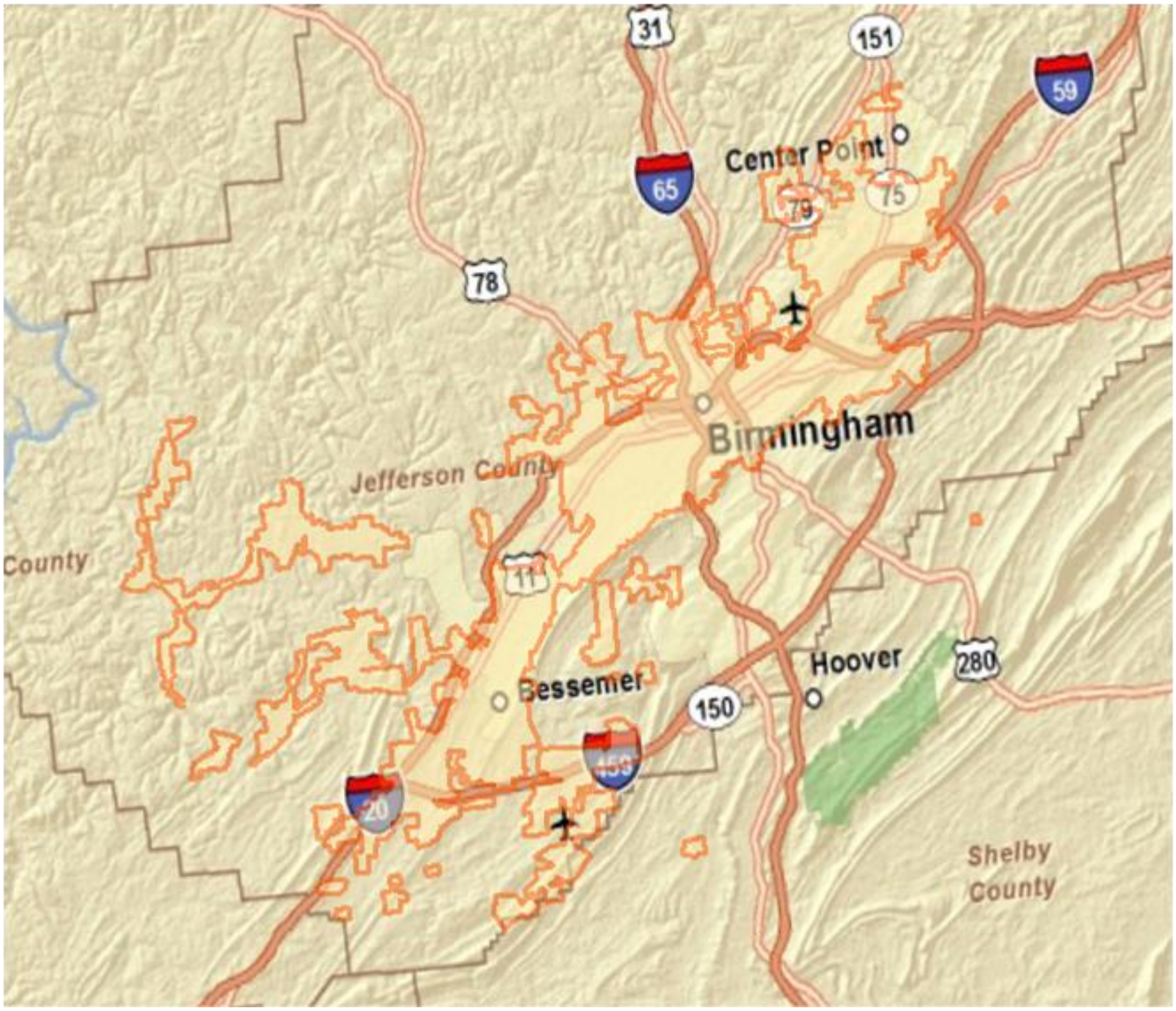


Figure 7-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with a provider to derive service areas based upon point plant data. In these cases we were given a primary serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

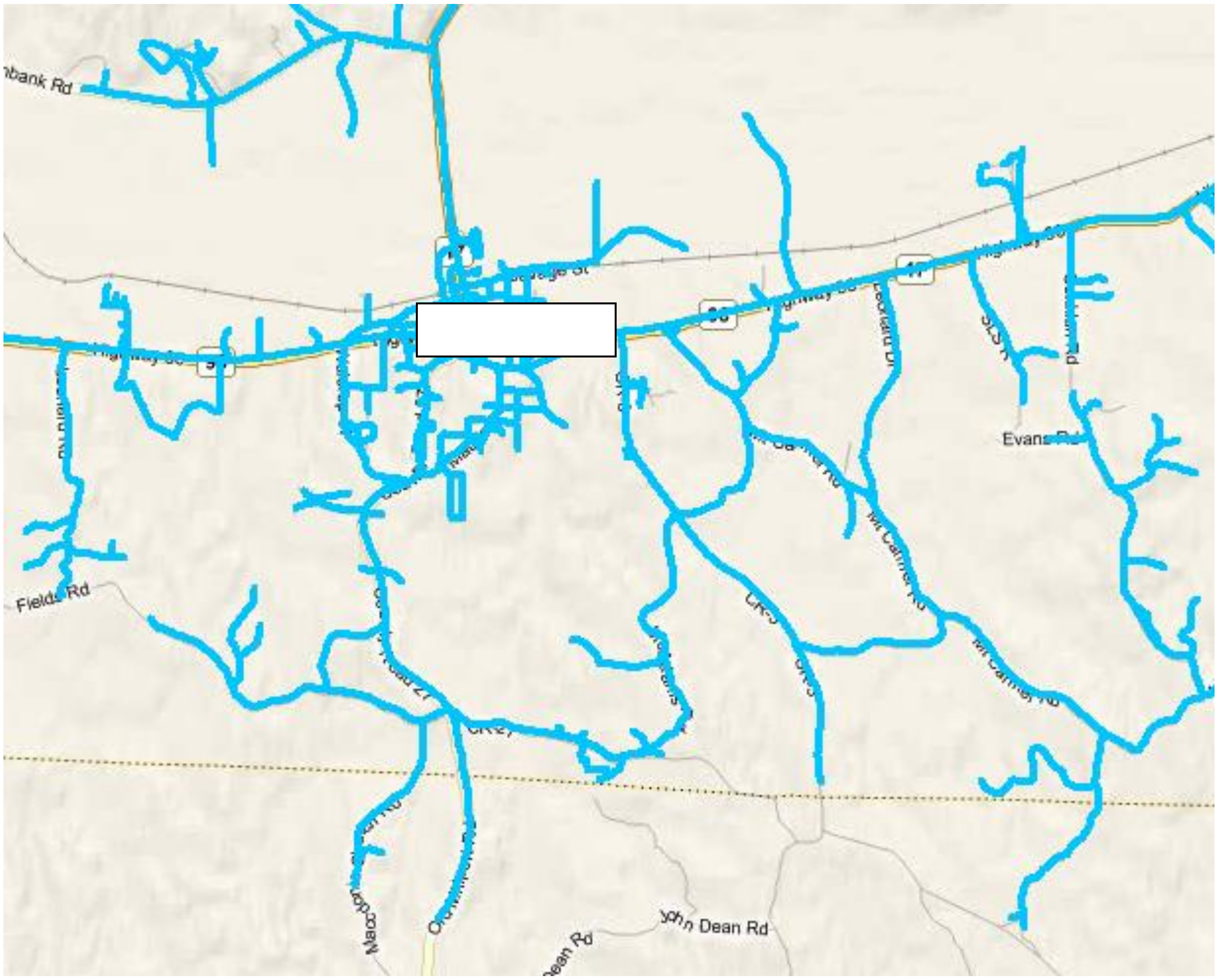
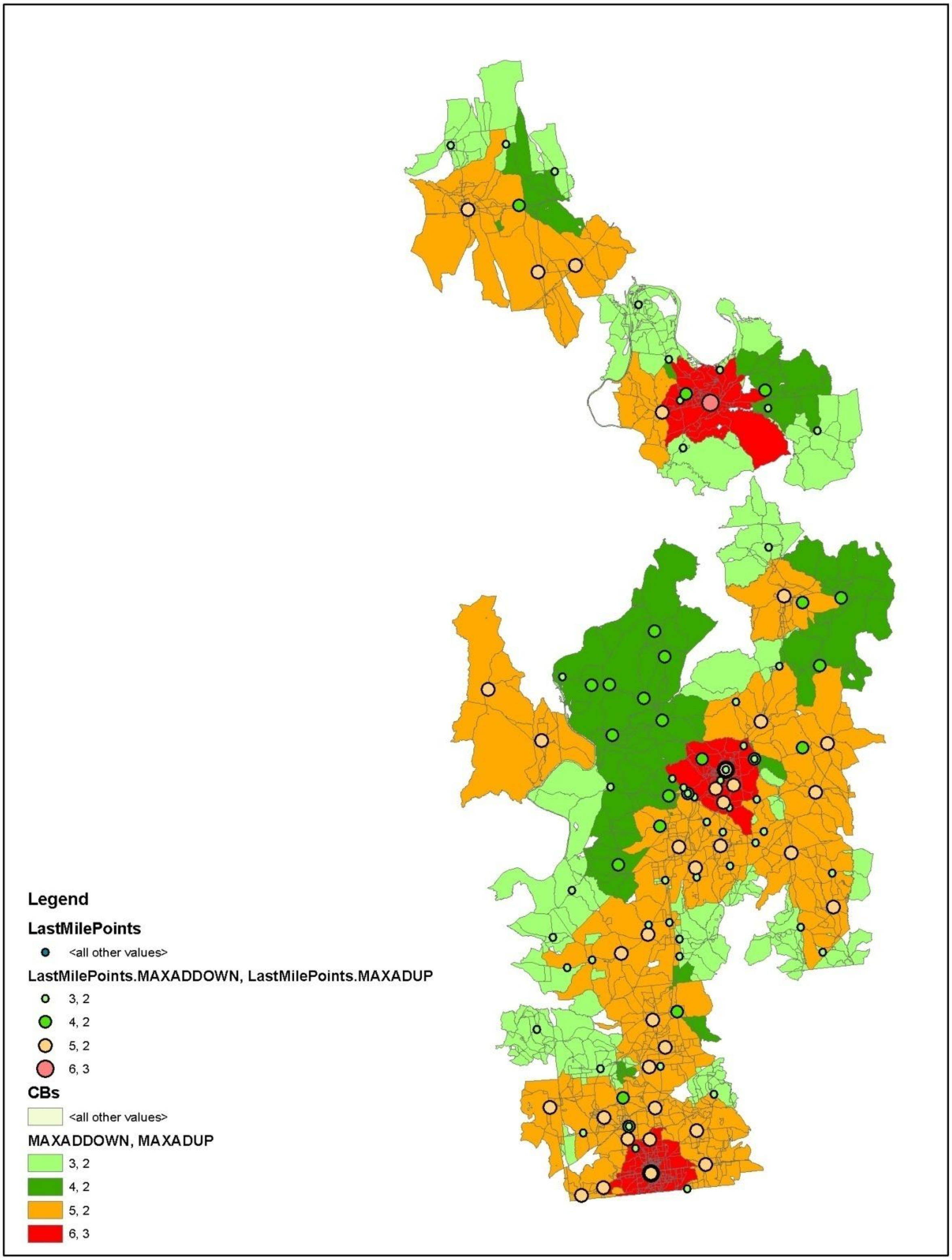


Figure 8-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In Rounds 2 and 3 -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[12]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[12]Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level below a Block and did not get picked up within a spatial query).

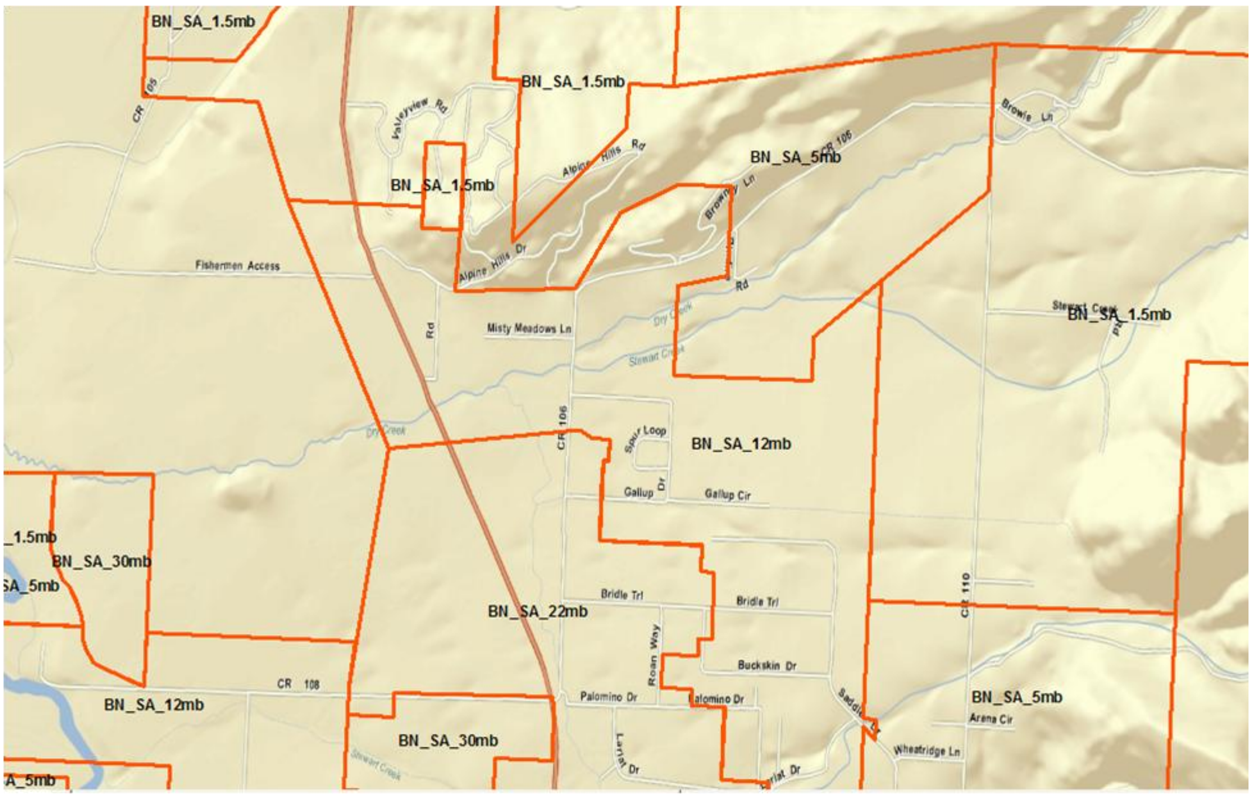


Figure 9-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without.
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider’s street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[13]

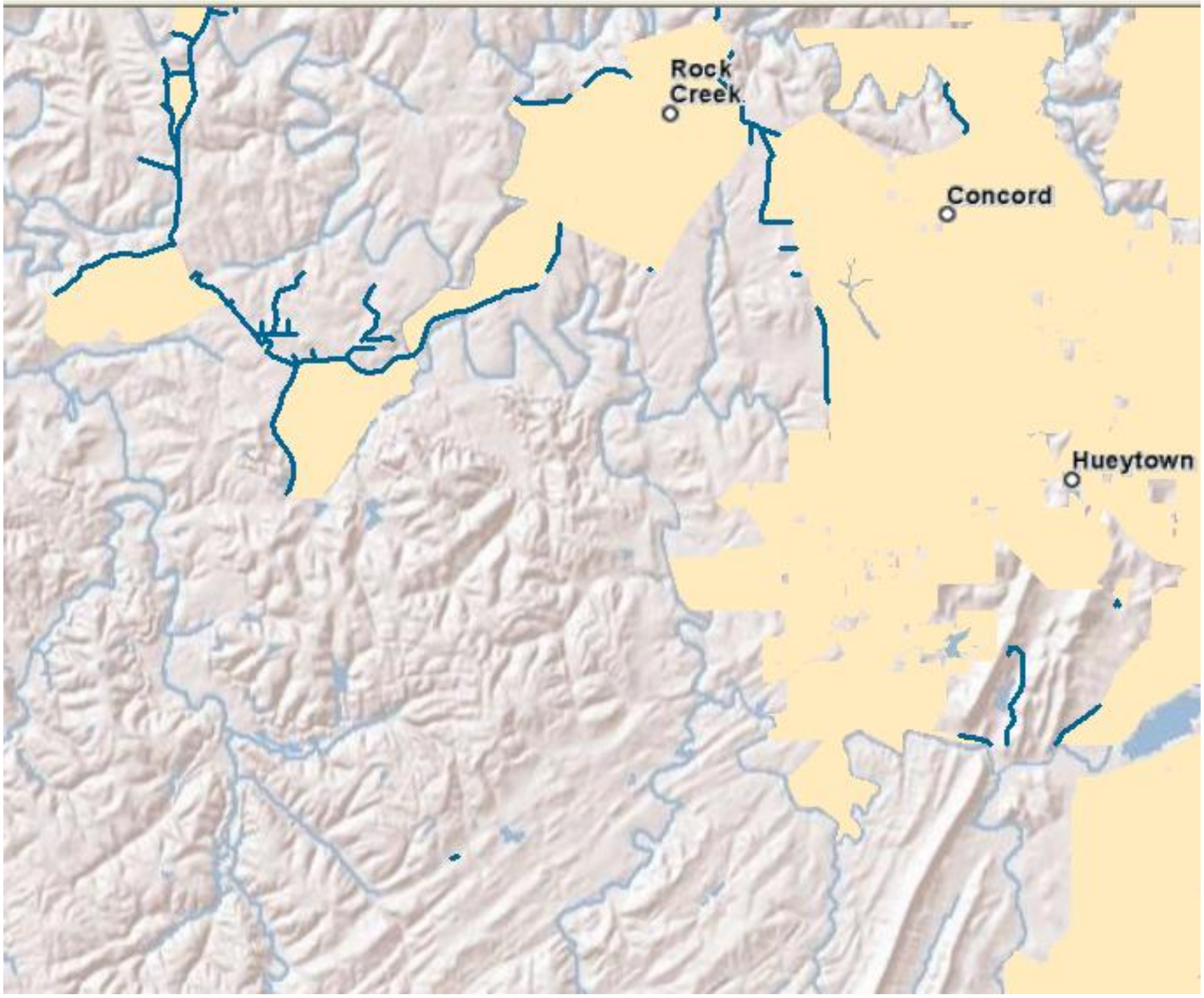


Figure 10-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2009 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[13] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

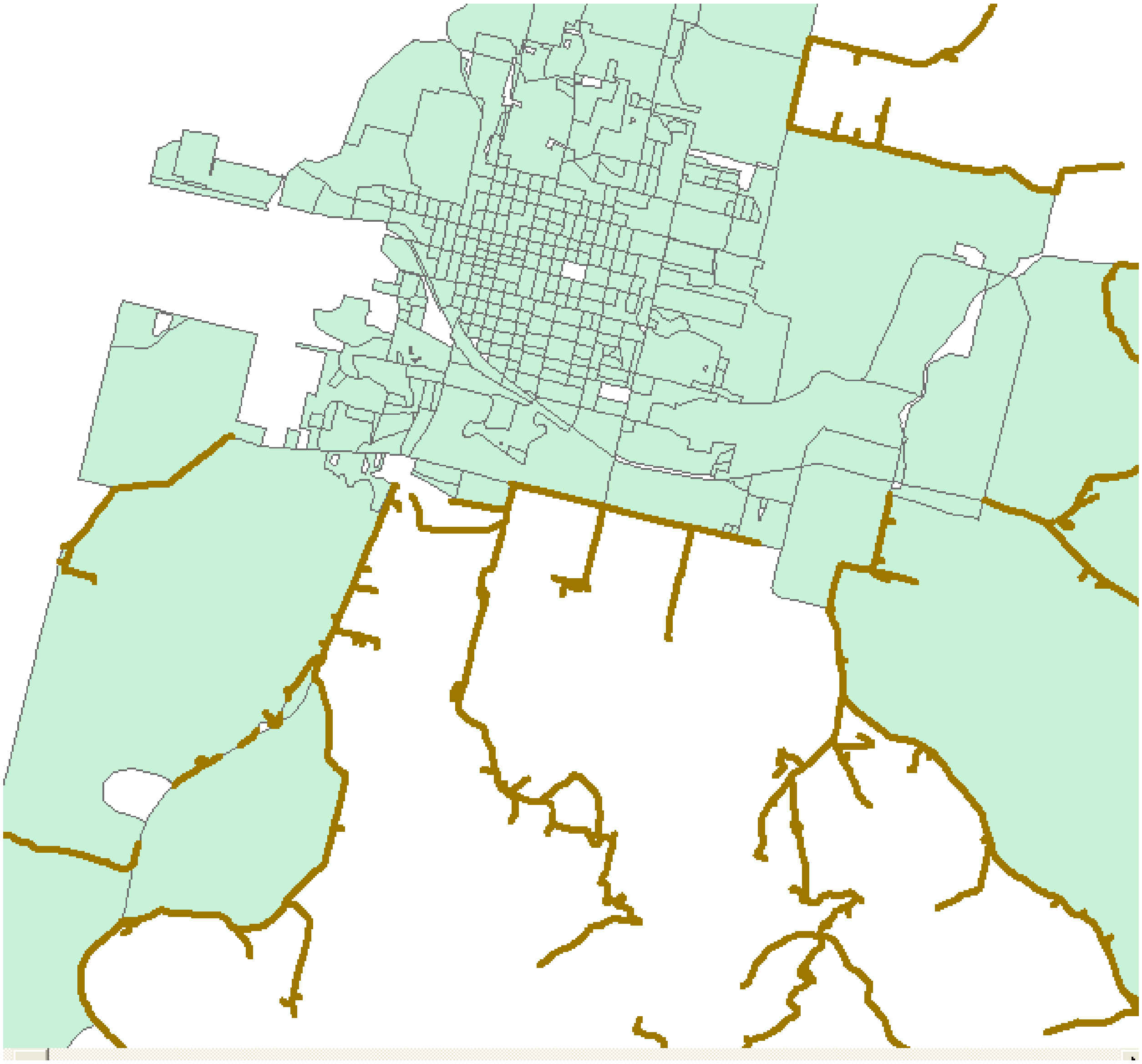


Figure 11-Provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

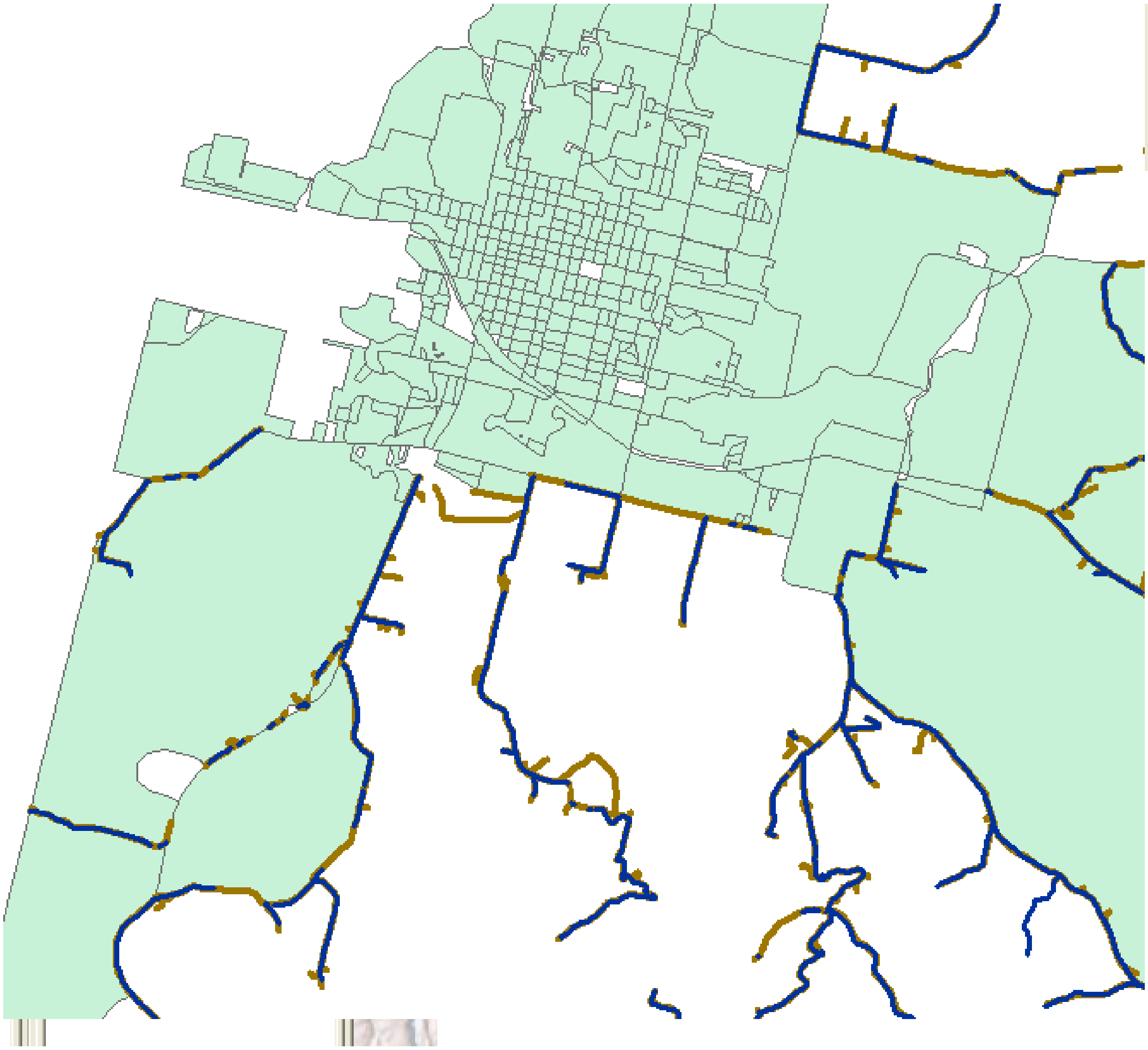


Figure 12-Provider submitted segments in gold, selected TIGER 2009 in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2009 road segments (MTFCC like 'S%') that face (CB = CBLeft2000 or CB = CBRight2000) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGERroads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by ProviderID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[14]

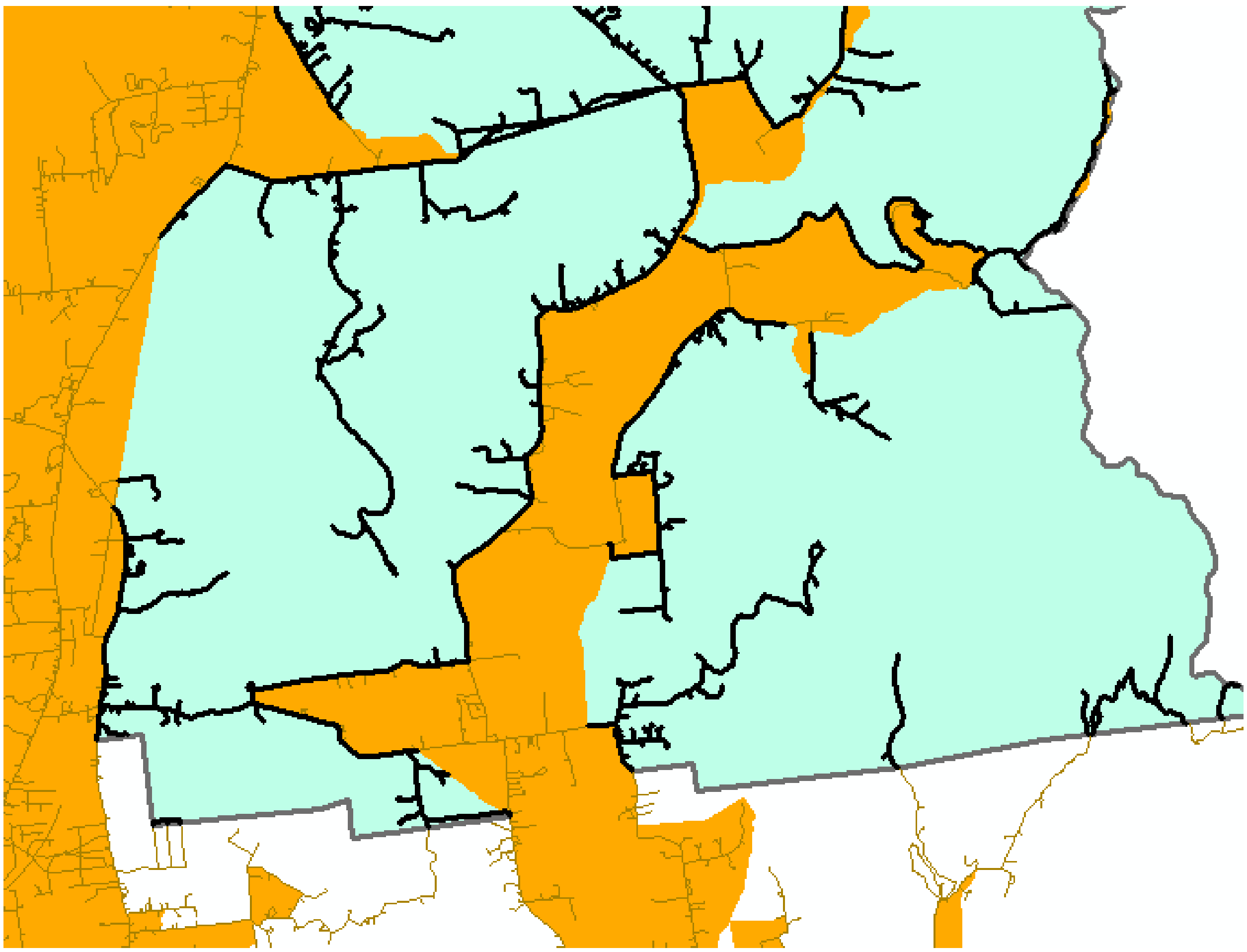


Figure 13-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[15]

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[14] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

In this submission LinkAMERICA made an aggressive effort to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 3 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[15] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we have hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBDD formats. Some of our WISP submissions have taken over 12 hours to normalize into SBDD formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[16]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

[16] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information. From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned.

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[17] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[18]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to scrape coverage maps. When these maps were available, we georeferenced them and tried to use the outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[19]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't

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[17] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[18] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

[19] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[20]

In circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBDD planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we

[20] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations.

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that has strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBDD planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaging in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Further, the team continues to rely on the notion of Internet Intensity Zones. As the Broadband coverage information is developed, if we do not have definitive connectivity information from other sources (e.g. a phone survey, web survey, listing provided by a facility owner) in this study, those Anchor points that fall into an existing area of SBDD Broadband coverage will not be left out or submitted with NULL values. Rather, the adjacent coverage area will be the first estimate of Broadband coverage for

the facility. The use of an estimate allows the site to come into the analysis and learn a bit about the accessibility of that facility, but it also frees resources to examine those anchor points that are more dispersed and likely under/un-served. The team will conduct targeted surveys to discover connectivity and, more importantly, applications in use at prioritized CAIs.[21]

We close this section with a figure that we hope reinforces our CAI process.

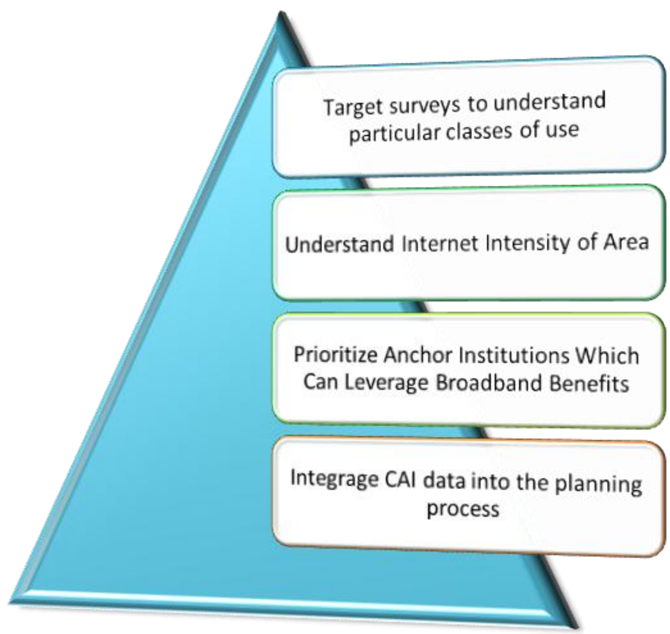

Figure 14-Anchor Institution Process

Recall from our first submission analysis, in most cases, CAI points are clustered and on average less than 1 ¾ miles away from one another. Relying on The First Law of Geography[22], this likely means that the Broadband accessibility is very comparable for CAIs that are close together. We believe this means Broadband accessibility may be less about connectivity than it is about the ability of a CAI to afford, successfully adopt and utilize Broadband to support its mission. Therefore, an important part of where SBDD mapping and planning come together understands what Broadband is used for, potential barriers to adoption, and how it is an essential component in a planning region's investment scenario.

[21] We track internally those features with Broadband connectivity defined via an estimate but within the current transfer data model we lack a mechanism to propagate that information to NTIA. Appendix One expands upon our thoughts regarding a series of audit fields in the transfer database which would be helpful to inform downstream users regarding the source of data or use of estimates.

[22] http://en.wikipedia.org/wiki/Tobler's_first_law_of_geography. We are attaching connectivity based upon the highest speed wireline provider in that block. This provides a ceiling for what can be obtained, although the CAI may not be purchasing this level of service based upon needs, budget, mission, etc..

Anchor Institution Survey

During the third submission period we began a survey process to both verify received connectivity information and garner additional connectivity information from CAIs. As with WISPS we wanted to aggressively target and improve this data section.

The process began with the Round 2 CAI list. Again, we prioritized schools, libraries and healthcare institutions. A small team made outgoing phone calls to discover relevant contact names. In Wisconsin, we were able to gather about 150 email addresses based upon 440 calls. There were only 14 refusals.

While one team worked on improving the contact list, a second team designed and developed a simple online survey system called CAVS (Community Anchor Verification Survey).

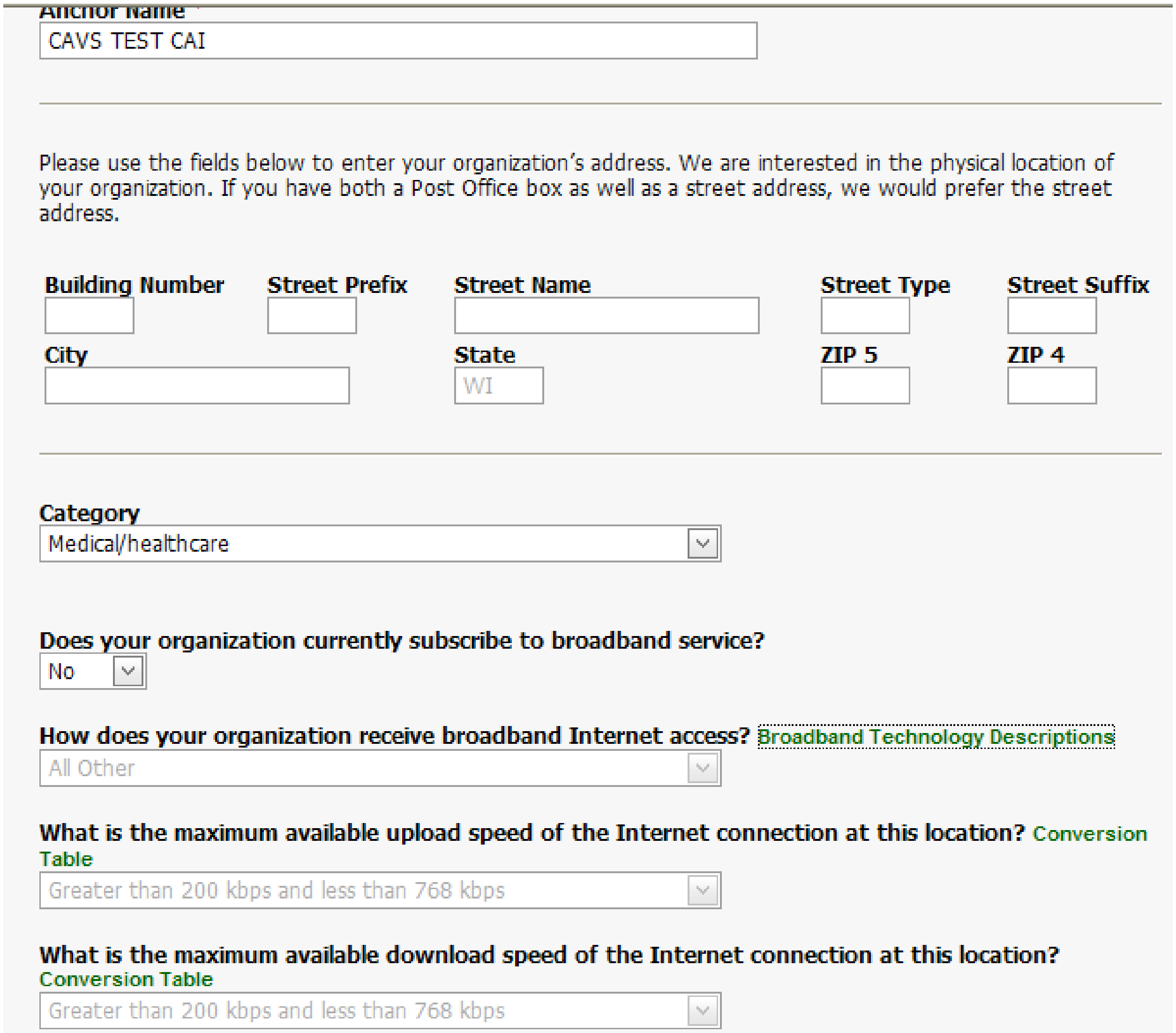

Figure 15--CAVS Screen

Users were invited into the CAVS system by the receipt of a postcard with an organization specific code printed on the mailing label. Beyond the questions shown above, there was a second page to the survey dealing with use of Broadband. Those results are directed to the planning teams.

The table below summarizes outgoing contact activities by state. This includes both a post card as well as for some organizations in which we had contact information a follow up phone call.

States	Post Card	Calls
WI*	2033	75
ID	1059	259
WY	345	30
AL	1640	14

As of 3/16, verification[23] statistics were as follows:

State	Verified / Total Records	Percent Verified
AL	72/2137	3.3%
ID	172/1596	10%
WI[24]	1187/3945	30%
WY	169/796	21%

We are keeping the survey open after the Round 3 submission to NTIA and will continue to collect data. In Alabama we have also begun to use resources from the planning teams to make outgoing calls and better target the surveys.

Clearly this survey was resource intensive but it did yield an increase in verified, rather than estimated, CAI data. We are unsure if we can sustain it in the next submission, but is has proven to yield new information.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

[23] We say a record is verified when it has been opened by the CAVS test user. It means at least one field was modified.

[24] In Wisconsin several large school districts supplied files with connectivity information; we performed a bulk update in these cases. We attribute it to the survey as the survey triggered this response.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submission, we are using public domain sources of information for public safety-category 4. The vast majority of these locations are estimated with respect to connectivity. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[25] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," but the bandwidth is estimated based upon the number of channels purchased. We also had difficulty obtaining both the upstream and downstream channel capacities. In large part, we made the speeds symmetrical, but this is an assumption on our part.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP code.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what it is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[26]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

[25] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.
[26] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the question was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[27]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider_Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[28] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied

[27] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[28] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, Provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the Provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information. It also involves a validation with supplied speeds.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The

second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the "islands" of coverage isolated by significant distance from other covered areas. This is the opposite of the Internet Intensity Zone notion discussed in the Community Anchor Institution section. In other words, Broadband Internet likely doesn't exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

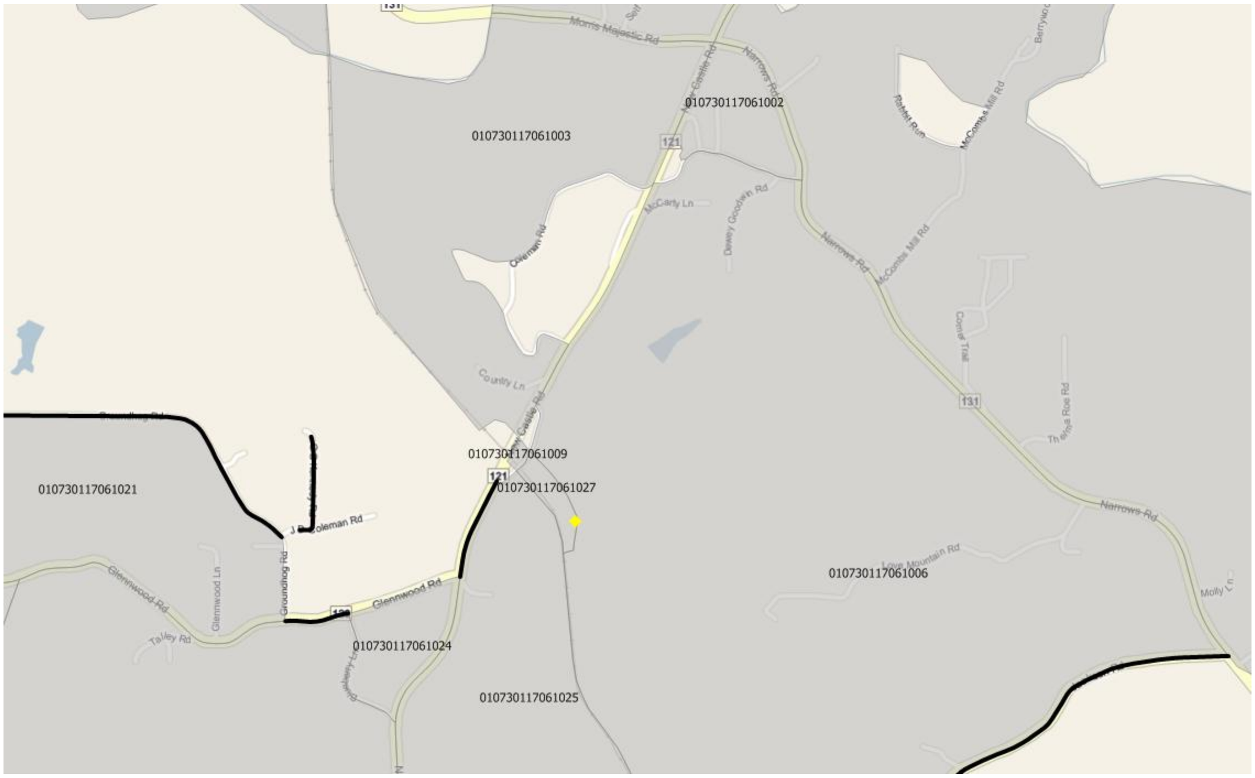

Figure 16--Sub block variation

Because the SBDD program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

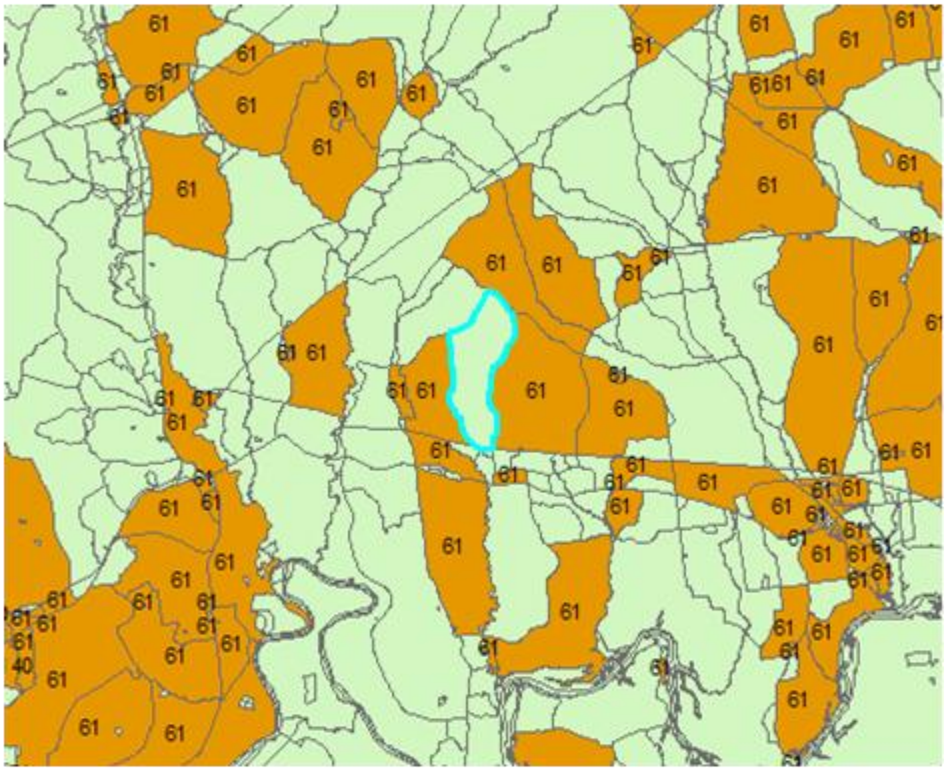

Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example, at a somewhat larger scale, shows where an interpolation process requires some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

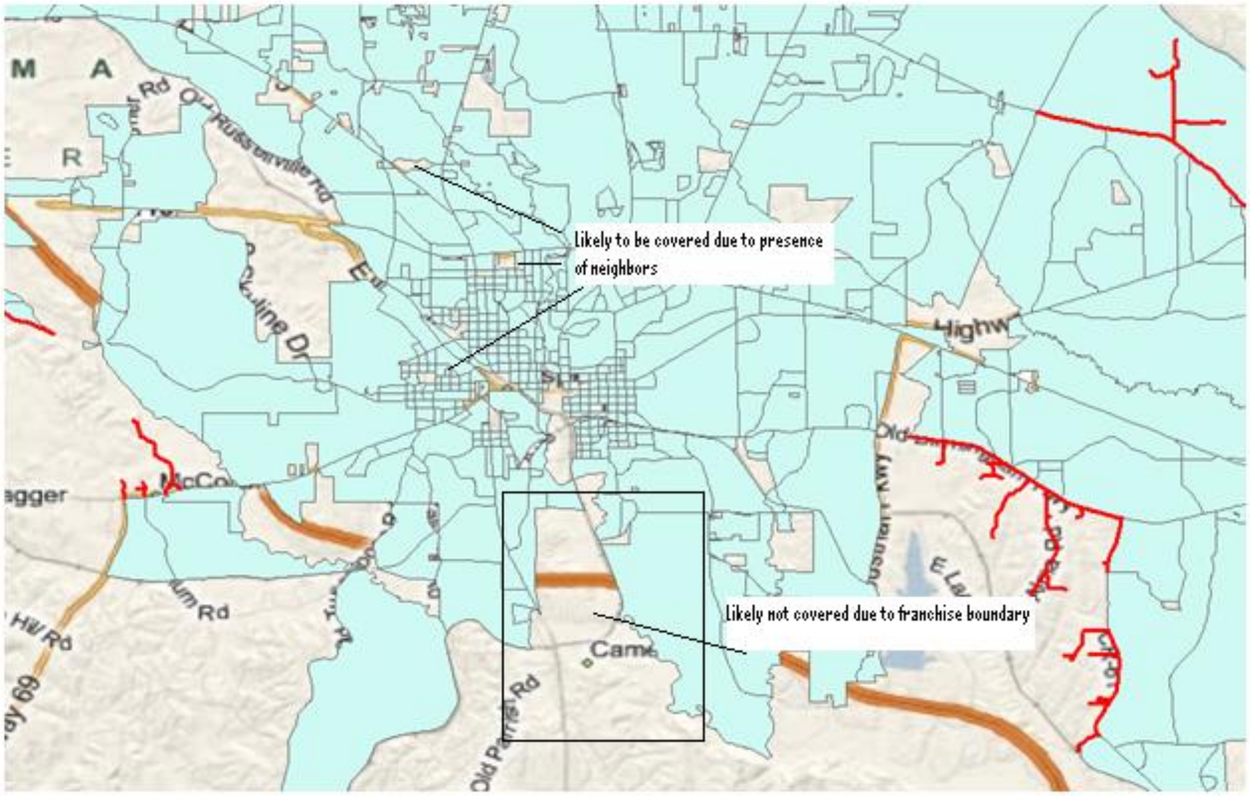

Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

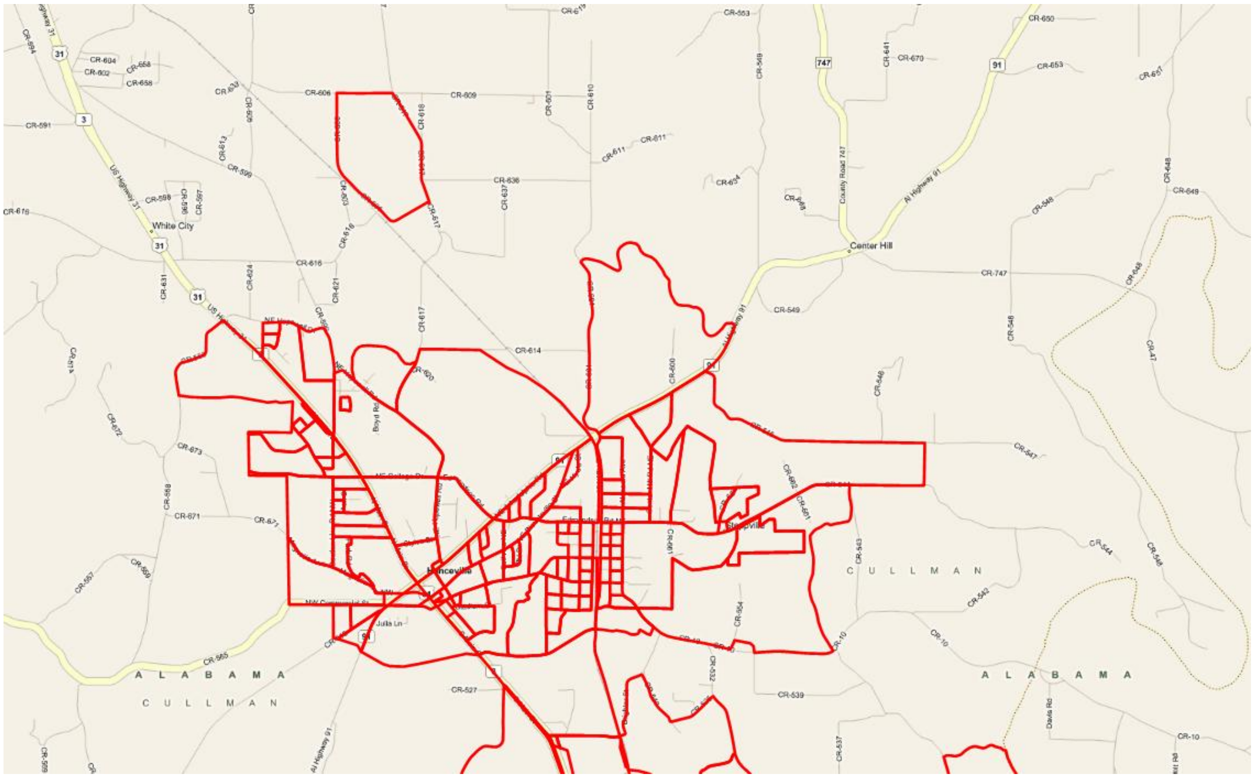

Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the second round, they received both a tabular data summary and a mapped output. Prior to releasing the “check maps” to providers, we had a team of analysts visually inspect each provider’s coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the April, 2011 Round 3 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from

this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

Now that our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBDD data model. As an example, consider the figure below.

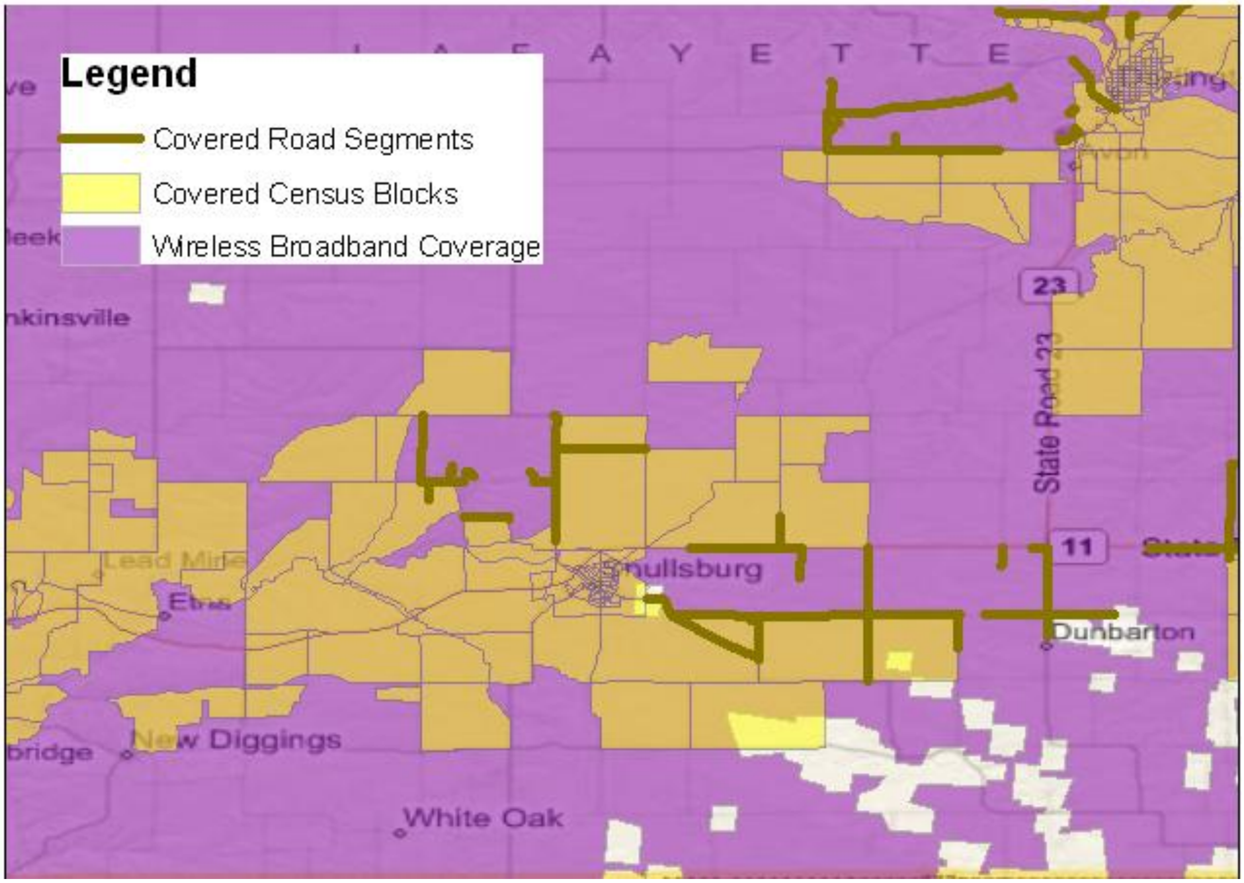

Figure 21--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of COLR Obligations

Wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300'. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

National Broadband Map Experiences

When the National Broadband Map launched, our phones began to ring.

Responding to a number of provider inquiries as well as emails from citizens provided some insights. It also illustrated that we now bear a second dimension of external verification. That is, we must be prepared to respond to people who are confused by apparent inconsistencies between the State and National Broadband Maps[29].

The case below, based upon a call we received, illustrates some interesting intersections between the State and NBM.

In this example a Citizen called inquiring about the difference in results between the National Broadband Map and our State of Alabama map. The issue in question was coverage at his home. The Alabama map showed he had coverage at his home, but the National Broadband Map said he did not.

In the image below, the green dot represents the geocoded location of his home. Based upon imagery, the geocode is quite accurate. The olive colored polygon represents a covered Census block less than or equal to 2.0 square miles. The Census block shows coverage by a number of wireline providers.

The geocoded point is about 170' from this covered Census block.

[29] We have a similar concern regarding textual data extracts. We may translate our SBDD submission into covered Census Blocks in a way that is different from NTIA.

Figure 22-NBM Covered Census block example

In the next image, covered TIGER road segments are shown in green. It is important to note how far the TIGER road centerlines are from the actual roads in the subdivision. It appears the geocoded point is reflecting more recent and more accurate road centerlines, placing the green dot at the correct location. Since the SBDD data is submitted in terms of TIGER 2000 the road on our map shows up about 100-200 ft away from where that road is located today.

As mentioned previously, however, our online maps buffer road segments to 300 feet on either side of the road centerline. In this case then, our state map buffer is large enough to return valid service providers for this green dot. The NBM, on the other hand, does not appear to buffer segments or the edges of census Blocks and will not return providers for this location. Our intent in this example is not to criticize the national map; rather, it is to illustrate that we may inadvertently make trade-offs between false positives and false negatives, differently.

This case illustrates several important tensions between the data as we present it to NTIA, map it ourselves and because of how it may be viewed within NBM context. A lack of agreement on how to handle these inconsistencies in the source data and differences in mapping approaches may cause consumer confusion.

The issues seem to come down to this

a) How do you (or can you) handle the impact of time when roads move between TIGER versions or between TIGER and other road products? In this case, online map road traces will not show up in the right area.

b) Given the inconsistencies between TIGER geometry used in submission and underlying roadbases used for geocoding online, how do you (or should you) insulate the viewer from the inconsistencies. There appears to be a strong likelihood that TIGER judges a particular point to be in a larger than 2.00 sq mile Census block while that same location could be in a small block area in the online view.

c) How much tolerance should be introduced when returning a list of valid providers? Is it better to error on gathering too many providers or too few?

d) Since the NBM gathers feedback based upon its representation of coverage, how can/how should this crowd sourced feedback influence data presented in a different manner elsewhere?

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

Most carriers submitting Census level information provided 2000 Blocks. A few provided 2009 or alternative (TeleAtlas, possibly) Blocks. Especially with the need to derive segment geographies, we would prefer to message the providers a specific Census standard—but we'd like to be consistent with other Grantees so as to minimize work from the provider community. As of now, that standard is Census 2000. If NTIA anticipates using Census 2010 for Fall 2011 collection, it would be helpful to message that as soon as possible.

Also there seem to be several methods by which providers are calculating the area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband Providers not Meeting the NOFA "Provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband Provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[30]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how

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[30] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the Provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband Provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement?   In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[31]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn’t forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn’t a consistent method used to derive Broadband coverage. Some providers appear to be using a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data

[31] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the Provider_Type is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on Provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy of other base layers. Although we may be trading off absolute accuracy, our standard has been to conflate data to TIGER 2000 Blocks and TIGER 2009 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to December 31, 2010. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network

types (why is wireline down at the block when wireless is half the state, etc.). Finally we are also noting a significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to an anticipated geographic deliverable also increases the complexity of the effort.

Change Management Process

One thing that is becoming clear is that a change management process that is consistent between the data provider and NTIA is needed. In this light, publication of the current data transfer model beyond the PBWorks community would also be helpful. Many providers are designing their data extracts with the NOFA in mind and the NOFA structures have been supplemented in the current model.

Finally, it would be helpful, as early in the next cycle as possible, to know what Census Block vintage we are expected to deliver to NTIA. It would also be very helpful to maintain a stable geographic base for the next deliverable so that the basis of verification doesn't change.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.

5. In tables with mandatory Zip5 (Service Address), if the End_User_Zipcode was not available, we have inserted '00000'
6. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category.
7. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
8. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL).
9. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems.

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users