



DATA DEVELOPMENT & VALIDATION METHODOLOGIES WHITE PAPER

Commonwealth of Pennsylvania State Broadband Initiative (SBI) Broadband Mapping Project

**NTIA Data Submittal
October 1, 2013**

Baker

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Introduction

The following sections of this document provide an overview of the process used for the SBI Broadband Mapping data development for the Commonwealth of Pennsylvania. The following narrative is depicted in Appendix A, Commonwealth of Pennsylvania SBI Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach Results

As a result of the outreach to broadband providers and investigating whether an internet service provider (ISP) fits the definition of a broadband provider as per the NOFA, the following is a summary of our findings:

- 310 Total Investigated ISPs
- 121 Total Confirmed Broadband Service Providers (unique Provider/DBAs combinations)
- 105 Broadband Service Providers who Supplied Data (unique Provider/DBAs combinations)
- 28 Total Confirmed Broadband Service Resellers
- 4 Broadband Service Resellers who Supplied Data

Attachment C, Master Outreach List, contains additional provider information.

Broadband Provider Outreach Procedure

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.

A secure Broadband Provider Data Update Webportal was deployed for providers to redline/update their service coverage, rather than supply their updated coverage for the semi-annual data updates.

Inclusion of Resellers

With the request for data current as of December 31, 2011, resellers are being included in all of the outreach, data collection, data aggregation, and verification tasks. The following outreach form has been developed to secure the proper information and to minimize the resource commitment required by the reseller.

BROADBAND SERVICE PROVIDER INFORMATION	
<i>***Please fill out one form per DBA and / or Technology of Transmission***</i>	
Provider Name:	
Doing Business As (DBA) Name (if applicable):	
FCC Registration Number (FRN) (if applicable):	
Website Address:	
Do you own transmission equipment, including middle mile, for your service area or for any part? (Termed 'Broadband Primary Provider' in FAQ's)	<input type="checkbox"/> Yes <input type="checkbox"/> No
If you answered Yes, please indicate this coverage area by county, municipality, or zip code and a map will be provided for you to further define your coverage area.	
If you answered No, please indicate the Carriers you contract with to provide your company's broadband coverage. (Termed 'Broadband Reseller' in FAQ's)	
Do you resell broadband services for the entire area of each carrier above?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If No, then please indicate your reseller coverage area(s) by county, municipality, or zip codes and a map will be provided for you to further define your reseller coverage area:	
Technology of Transmission: (one per form)	
<input type="checkbox"/> Asymmetric xDSL (ADSL)	<input type="checkbox"/> Symmetric xDSL (SDSL)
<input type="checkbox"/> Cable Modem - DOCSIS 3.0	<input type="checkbox"/> Other Copper Wireline
<input type="checkbox"/> Cable Modem - Other	<input type="checkbox"/> Optical Carrier / Fiber to the End User
<input type="checkbox"/> Terrestrial Fixed Wireless - Unlicensed	<input type="checkbox"/> Terrestrial Fixed Wireless - Licensed
<input type="checkbox"/> Terrestrial Mobile Wireless	<input type="checkbox"/> Electric Power Line
<input type="checkbox"/> Satellite	<input type="checkbox"/> Other
Speed Tiers: What is the Maximum Broadband advertised speed ?	
Maximum Advertised Downstream Speed	<input type="checkbox"/> Greater than 768 kbps and less than 1.5 mbps
	<input type="checkbox"/> Greater than 1.5 mbps and less than 3 mbps
	<input type="checkbox"/> Greater than 3 mbps and less than 6 mbps
	<input type="checkbox"/> Greater than 6 mbps and less than 10 mbps
	<input type="checkbox"/> Greater than 10 mbps and less than 25 mbps
	<input type="checkbox"/> Greater than 25 mbps and less than 50 mbps
	<input type="checkbox"/> Greater than 50 mbps and less than 100 mbps
	<input type="checkbox"/> Greater than 100 mbps and less than 1 gbps
Maximum Advertised Upstream Speed	<input type="checkbox"/> Greater than or equal to 1 gbps
	<input type="checkbox"/> Less than or equal to 200 kbps
	<input type="checkbox"/> Greater than 200 kbps and less than 768 kbps
	<input type="checkbox"/> Greater than 768 kbps and less than 1.5 mbps
	<input type="checkbox"/> Greater than 1.5 mbps and less than 3 mbps
	<input type="checkbox"/> Greater than 3 mbps and less than 6 mbps
	<input type="checkbox"/> Greater than 6 mbps and less than 10 mbps
	<input type="checkbox"/> Greater than 10 mbps and less than 25 mbps
	<input type="checkbox"/> Greater than 25 mbps and less than 50 mbps
	<input type="checkbox"/> Greater than 50 mbps and less than 100 mbps
	<input type="checkbox"/> Greater than 100 mbps and less than 1 gbps
	<input type="checkbox"/> Greater than or equal to 1 gbps

Figure 1 Reseller Outreach/Interview Form

Secure Broadband Provider Data Update Webportal

A secure web-based application for broadband service providers has been deployed to simplify and automate the semi-annual process for collecting and verifying data. The webportal provides an easy-to-use map redlining tool for updating a provider broadband service area and attributes. It is expected that the simplification and automation of the data collection process will increase participation and improve the timeliness of provider response, data accuracy and consistency. Providers are being encouraged to utilize this tool but data is still being accepted through other means and formats.



Figure 2 Provider Data Update Webportal Entry Page

The View/Edit Coverage Map functions via secure login/password and secured map services limit broadband providers to see and edit only their own data. Picklists of valid database attributes eliminate entry errors and create consistency. It also contains a workflow from initial provider input, saving of a provider's work-in-progress, provider formally submitting edits, aggregation into the master geodatabase, soliciting provider approval of aggregated data, and final approval of the edit.

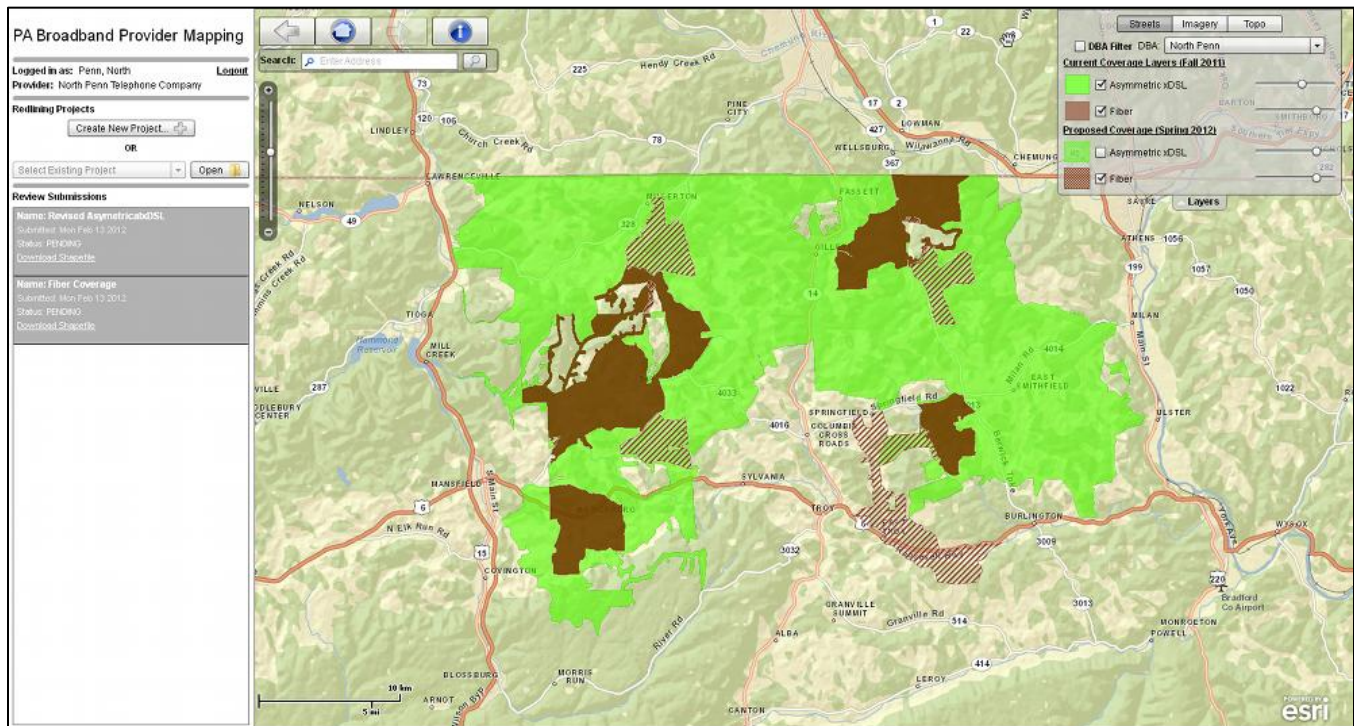


Figure 3 Provider Data Update Webportal –View/Edit Coverage Map Environment

Broadband Outreach Tracker Application

The Tracker application is 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.

The screenshot displays three overlapping windows from the Broadband Outreach Tracker application.

Provider Outreach Tracker - Verizon Pennsylvania & Verizon North (Main Window):

- State:** PA
- Provider Name:** Verizon Pennsylvania & Verizon North
- FRN:** 0003273505
- Provider Type:** Active Provider
- Technology Type:** 10 - Asymmetric xDSL; 50 - Optical Carrier/Fiber to the End U
- Website:**
- Comment:**
- Created at:** 6/26/2012 9:55 AM by Kammer, Richard
- Last modified at:** 6/26/2012 10:55 AM by Kammer, Richard
- Buttons:** Edit Item, Manage Permissions, Delete Item, Manage, Actions
- Table:**

Contact Type	Contact Name
Business	Keefe Clemons
Technical	Laura Shine
- Buttons:** Add New Contact...
- Table:**

Submission Round	Date Received	Submission Type	Date Approved
R1 (Jan 2010 - Apr 2010)	4/9/2010	Entire	
R2 (Jun 2010 - Oct 2010)	9/2/2010	Entire	
R3 (Jan 2010 - Apr 2011)	2/16/2011	Entire	
R4 (Jun 2011 - Oct 2011)	8/1/2011	Entire	
R5 (Jan 2012 - Apr 2012)	2/3/2012	Entire	
R6 (Jun 2012 - Oct 2012)	7/31/2012	Entire	
- Buttons:** Add New Status...
- Table:**

Topic	Date	Provider Contact
-------	------	------------------
- Message:** There are no items to show in this view of the "POT Communication Log" list. To add a new item, click "New".

POT Contact Info - Keefe Clemons (Pop-up Window):

- Provider ID:** 522
- Contact Type:** Business
- Contact Name:** Keefe Clemons
- Email:** keefe.b.clemons@verizon.com
- Phone:** 212-321-8136
- Fax:**
- Address:** 140 West St., 27th Floor
- City:** New York
- State:** NY
- Zip:** 10007
- Buttons:** ShowMe, View, Version History, Alert Me, Edit Item, Manage Permissions, Delete Item, Manage, Actions

POT Communication Log - New Item (Pop-up Window):

- Buttons:** Save, Cancel, Paste, Copy, Spelling, Commit, Clipboard, Spelling
- Topic:** Broadband Data Outreach
- Date:** 9/21/2012
- Communication Type:** Telephone
- Provider Contact:** Keefe Clemons
- BB Team:** Vicki Munn
- Log:**

The provider has approved the aggregated data posted to the PA Broadband Data Update Portal.
- Buttons:** Save, Cancel

Figure 4 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.

SBI 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 SBI 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 2010 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 2010 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 2010 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 2010 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 $\Rightarrow 2$ 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, and 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.

USAC -CAI Web Scraping

To enhance the CAI inventory, a web scraping tool has been developed to automatically query the USAC public website, <http://www.slforms.universalservice.org/DRT/Default.aspx>, in a batch mode and extract school and library CAI data for Pennsylvania. This extracted information supplements the CAI data collected by the other methods.

Typical Speeds from Other Sources

Because not all providers are submitting the typical speed attribution with their data, a method to fill in the missing information has been developed using other sources. The method utilizes speed test data supplied through the FCC speed test information as well as from other speed test data that we are independently collecting. Business rules have been established so quality and realistic typical speeds are produced. The end result is a more complete data submittal to NTIA.

Propagation Modeling

Fixed wireless broadband transmission is a diverse technology. Service may be transmitted over licensed and unlicensed spectrum, and delivered by larger corporate or smaller LLC business entities, many of which serve rural areas of the State. This diversity has resulted in varying levels of SBI participation including Providers that have:

- participated,
- refused to participate,
- wished to participate but lack adequate capabilities and/or tools, or
- supplied data of marginal accuracy

The NTIA's supplemental grant funding has provided the means to generate propagation models to supplement and validate the above scenarios. In addition, the NTIA has identified fixed wireless service coverages with unusual shapes for state grantee analysis.

To facilitate development of propagation mapping, additional tower/antenna information is being requested from fixed wireless broadband providers. For those providers not responding to requests for required tower/antenna information, an attempt is made to gather the information through 3rd party sources and field investigation. The Provider, 3rd party and/or field data is processed using Terrain Analysis Package (TAP) software to develop propagation models. Maps of the resultant propagation study are sent to the fixed wireless providers for their feedback on the propagation model produced for their company.

Data Verification Summary

Pennsylvania's broadband mapping project employs a multi-prong approach to ensure the provider data is accurate and complete.

In summary, the project employs the following validation methodologies and resources:

- Provider Validation
- Data Validation via Market Intelligence Sources
- Data Validation Using State Supplied Data Points
- Field Validation
- Wireless Coverage Analysis
- Topology Validation
- Automated Validation Processing
- Confidence Level/Statistical Modeling
- SBDD Check Submission

➤ Stakeholder Validation

The remainder of this verification section describes the various methods in greater detail.

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 5) 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

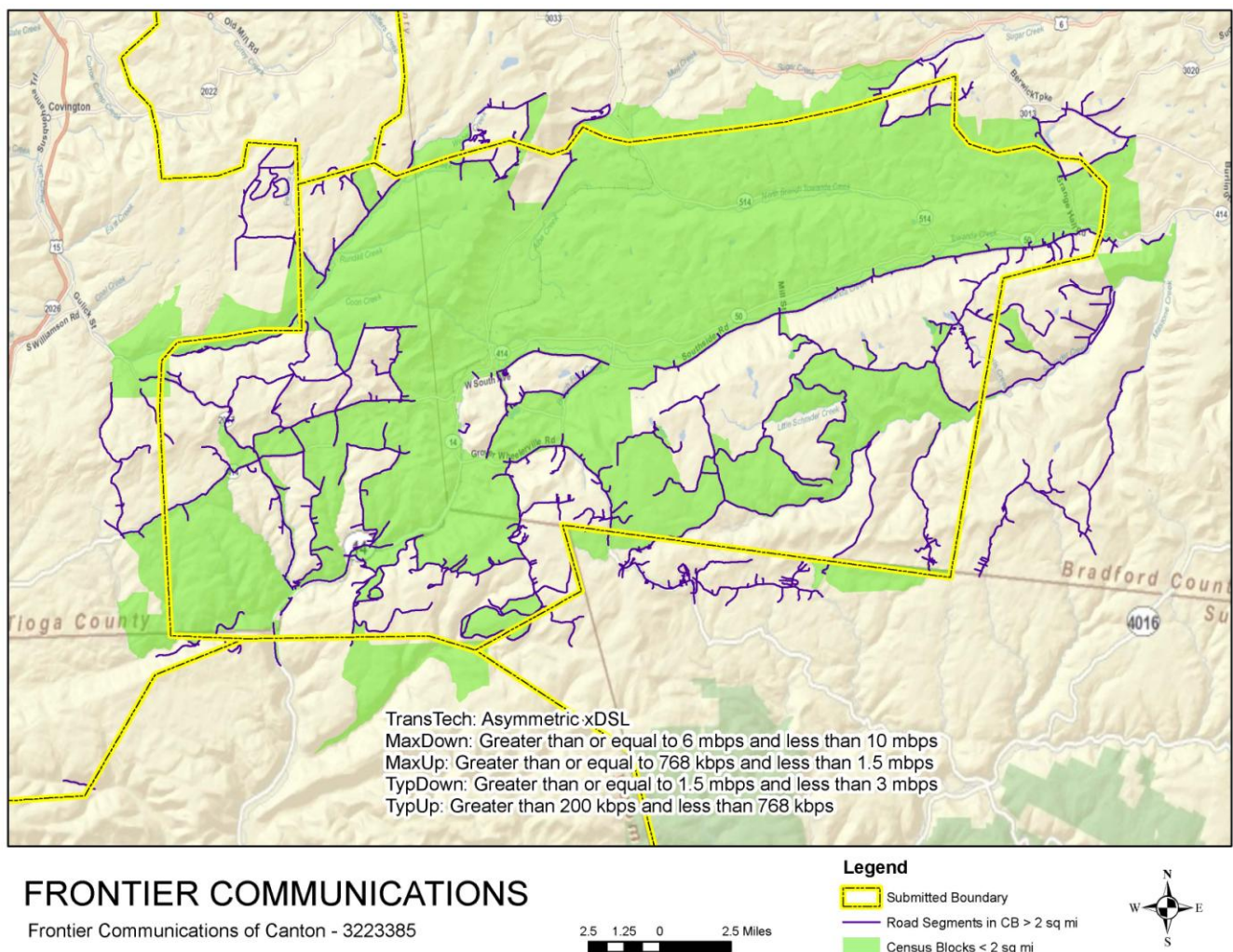


Figure 5 Provider Map

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
- census 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.

- Select one census block per census block group
- Convert the census block groups polygon to label points.
- Select the census block polygon by doing a spatial selection using census block groups label points.
- Select from the current selection where the census block land mass is 50% or greater and the block is rural.
- Export the selected blocks to a new shapefile. This reset the FID for the next step.
- Select every 2nd, 3rd, 4th, or so on to get the desired number of blocks. Query used to select: $\text{MOD}(\text{"FID"}, 2) = 0$. This will select every other record.

The planned census block field locations are shown in Figure 6.

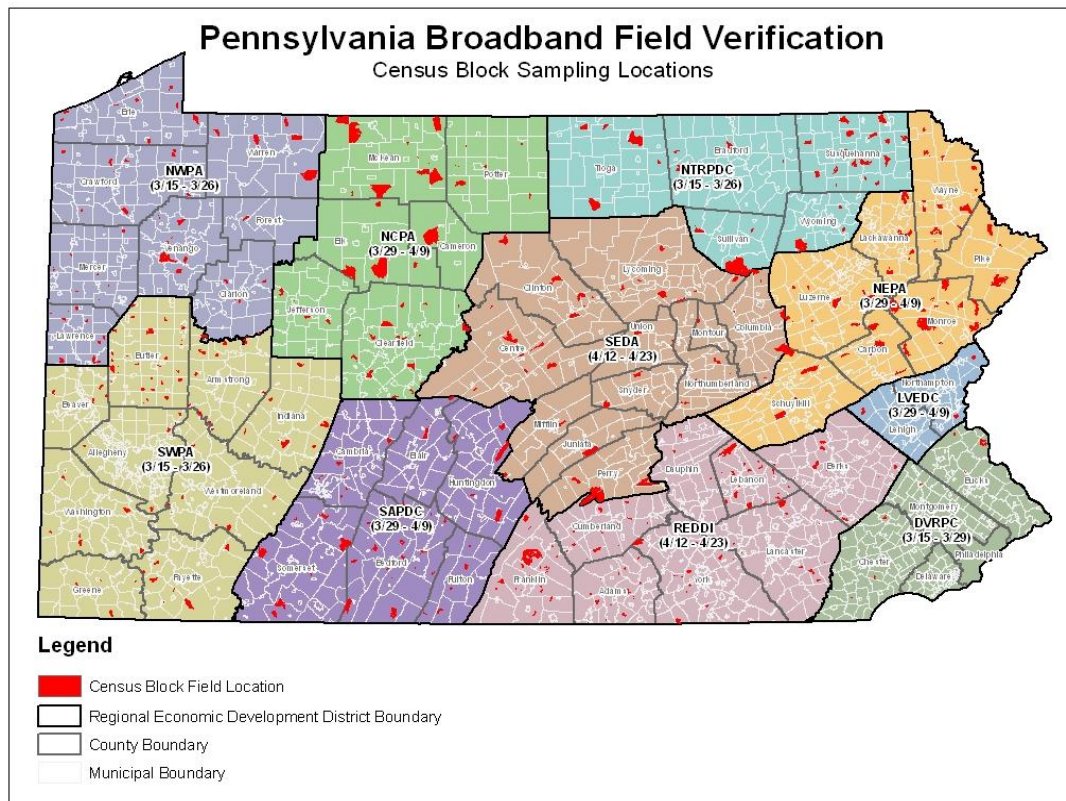


Figure 6 Planned Field Verification Census Block Locations

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 7 shows the locations (blue points) of the census block field surveys that were performed.

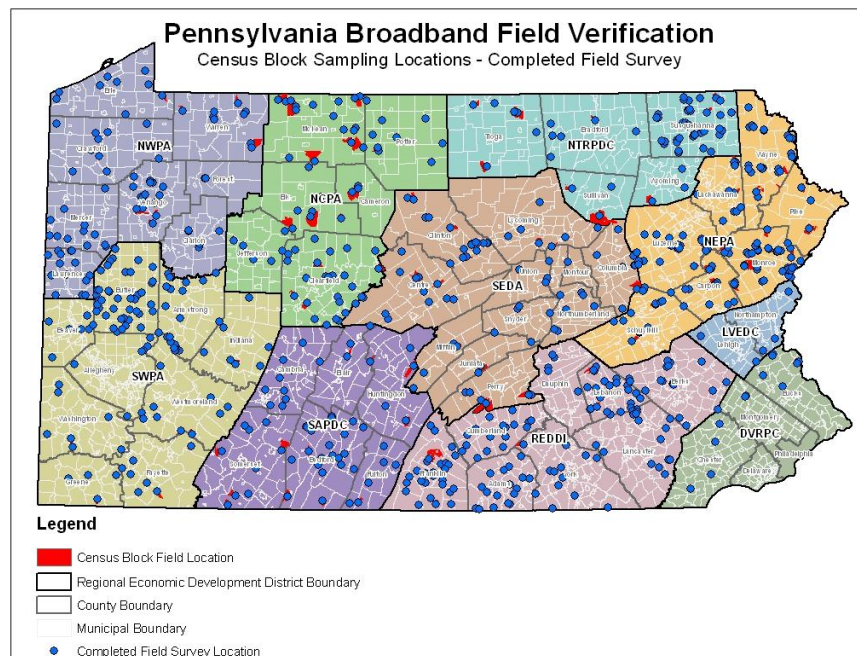


Figure 7 Completed Field Verification Locations

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 (\leq or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer wireless service area data is already in an 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.

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.

SBI Check Submission: The NTIA-provided SBI 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) which automatically compares the multiple independent validation datasets against the broadband service providers' 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.

The SEAS comparison is a three-part validation process:

- Comparison of the collected validation source against the aggregated broadband provider data.



Figure 8 SEAS

- Match percentage calculation for each provider reported in the DataPackage.xls, “Provider Table” tab, “Comments” column.
- 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...	

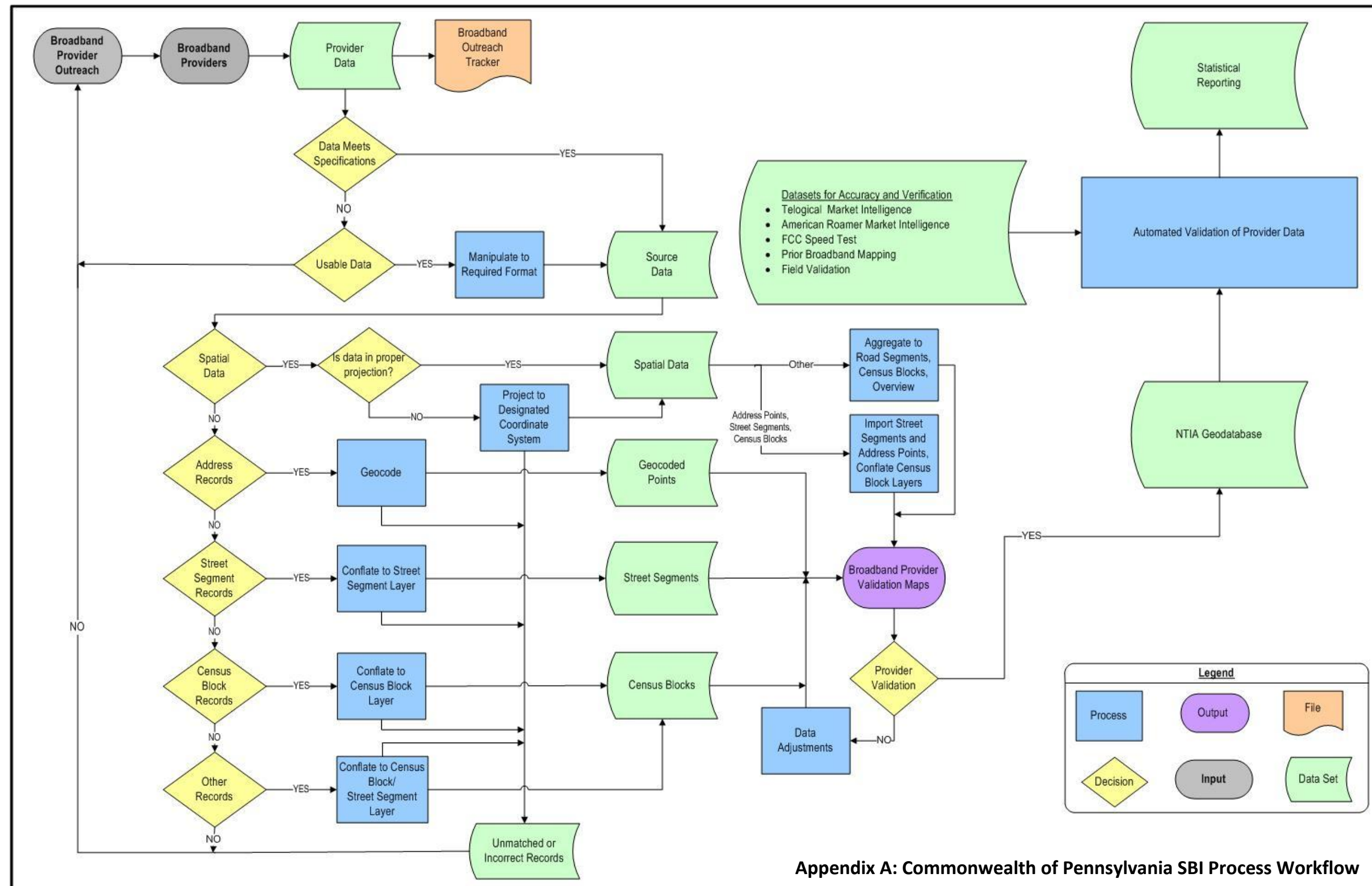
The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.

Low Confidence Provider Feedback

Provider data which is assigned a low confidence (1 or 2 stars) through the SEAS process is communicated back to the provider through a feedback loop. Generally, the low confidence feedback and reconciliation is a continuous refinement process and usually occurs between update cycles. The goal is to provide this feedback through the Provider Data Update Webportal via a web connection that is available and rolled out to providers in January 2012.

Changes and Corrections Documentation

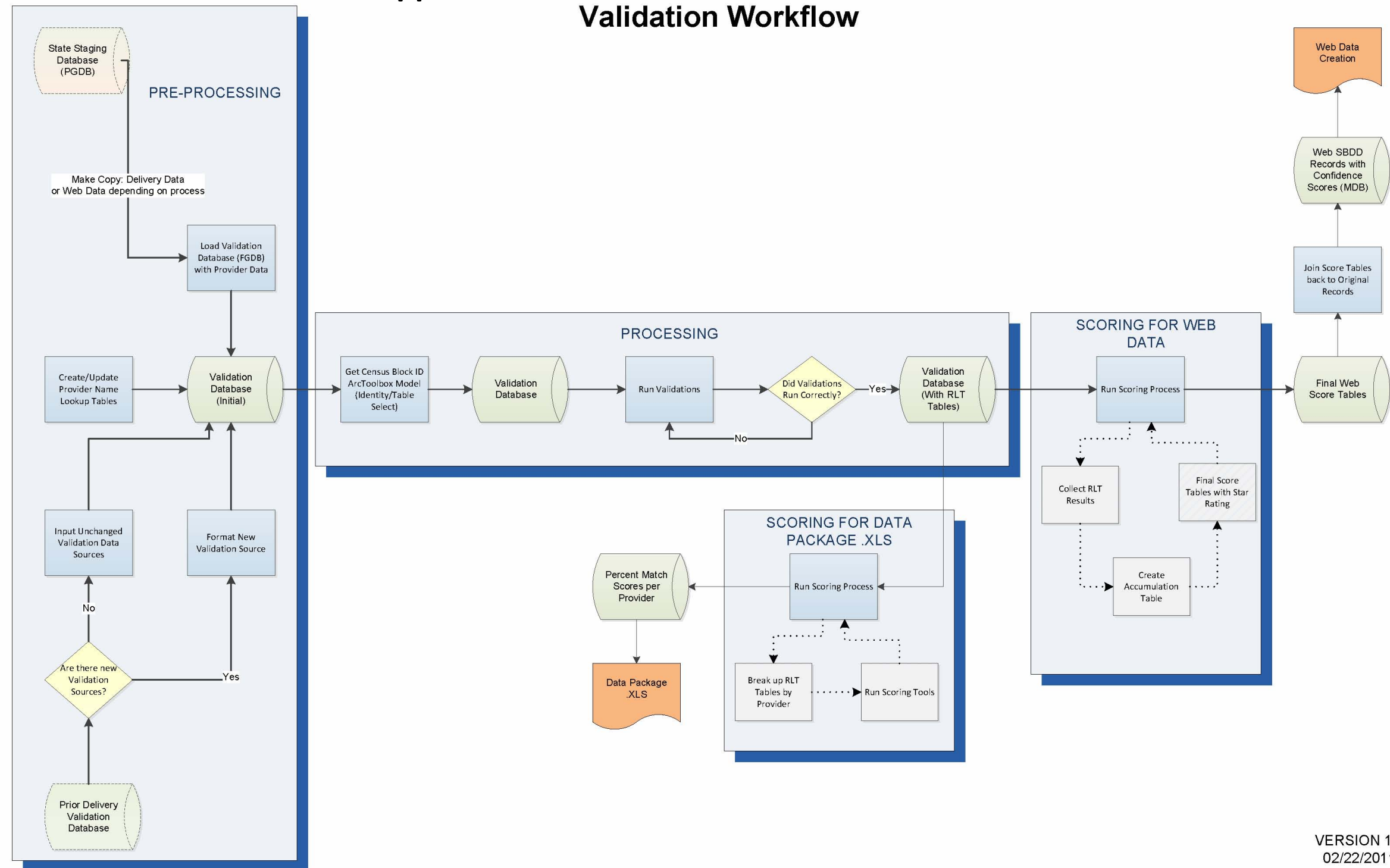
With each semi-annual NTIA data submittal, changes and corrections documentation is provided. Significant changes in a provider's status or data, corrections to previously supplied data, providers supplying data for the first time, etc. are specified by Provider name in the Changes and Corrections document.



Appendix A: Commonwealth of Pennsylvania SBI Process Workflow

October 1, 2010

Appendix B: State Broadband Data Validation Workflow



VERSION 1.1
02/22/2011

Appendix C: Master Outreach List

Filing Company DBA	Filing Company Name	Status
1USA.COM	1USA.COM	Not a Broadband Provider or Reseller
21st Century Resoration & SLS		Not a Broadband Provider or Reseller
2s Graphic Design Inc.		Not a Broadband Provider or Reseller
A P Wireless		Not a Broadband Provider or Reseller
AboveNet	AboveNet	Not a Broadband Provider or Reseller
ACC Business	Affiliate of AT&T	Other
Access Northeast	Access Northeast	Not a Broadband Provider or Reseller
Adams Cable Service	Adams Catv Inc	Provider
Advanced Mobile Group		Not a Broadband Provider or Reseller
Airespring, Inc.	Airespring, Inc.	Reseller
AllCoNet		Not a Broadband Provider or Reseller
AllTel Wireless		Potential
ALs Satellite	ALs Satellite	Reseller
Alteva Communications	Alteva Communications	Not a Broadband Provider or Reseller
Altius Broadband	Altius Broadband	Not a Broadband Provider or Reseller
American Digital Online Services, Inc. (ADOS)		Not a Broadband Provider or Reseller
American Telecharge, Inc.		Potential
American Telephone Company LLC	American Telephone Company LLC	Not a Broadband Provider or Reseller
Antietam Cable	Antietam Cable	Not a Broadband Provider or Reseller
Armstrong Telephone - North (Duke Center)	Armstrong Tele Co	Provider
Armstrong Telephone- PA (Clinton Area)	Armstrong Tele Co	Provider
Armstrong Utilities	Armstrong Utilities	Provider
AT&T Corp, Inc.	AT&T Corp, Inc.	Provider
AT&T Mobility LLC	AT&T Mobility LLC	Provider
Atlantic Broadband	Atlantic Broadband (Penn), LLC	Provider
BackWoods Wireless	BackWoods Wireless	Provider
Bandwidth.com		Not a Broadband Provider or Reseller
BCN Telecom, Inc.		Potential
Beacon Technologies	Beacon Technologies	Other
Beaver Valley Cable	Beaver Valley Cable Co Inc.	Provider
Bedford.net		Not a Broadband Provider or Reseller
Bentleyville Cable TV (now Fairpoint Communications)		Provider
Bentleyville Communications Corporation	FairPoint Communications	Provider
BetterWorld Telecom, LLC		Potential
Blue Devil Cable	Blue Devil Cable TV, Inc.	Provider
Blue Ridge Communications	Blue Ridge Communications	Provider
Bluegrass Cellular		Potential

Filing Company DBA	Filing Company Name	Status
Borough of Kutztown	Lantek	Provider
Broad Sky Networks	Broad Sky Networks	Provider
Broadband National		Potential
Broadband.com		Not a Broadband Provider or Reseller
Broadstar, LLC		Potential
Broadview Networks Holdings, Inc.	Broadview Networks Holdings, Inc.	Potential
Broadvox		Potential
Brockway TV Inc	Brockway TV Inc	Provider
Budget Phone, Inc.	Budget Prepay, Inc.	Not a Broadband Provider or Reseller
BullsEye Telecom, Inc.	BullsEye Telecom, Inc.	Not a Broadband Provider or Reseller
BurstNET		Not a Broadband Provider or Reseller
Buytelco, Inc.		Not a Broadband Provider or Reseller
C Spire Wireless		Potential
Cablesat		Not a Broadband Provider or Reseller
CABLEVISION	CSC HOLDINGS, INC	Provider
Cambria Connected		Not a Broadband Provider or Reseller
Canton Telephone Company		Not a Broadband Provider or Reseller
CATV Service	CATV Service, Inc.	Provider
Cavalier Telephone LLC	Cavalier Telephone LLC	Not a Broadband Provider or Reseller
CAWinet	CAWinet, Inc.	Provider
Cellular One of NEPA (Northeast Pennsylvania)	Affiliate of Verizon Wireless	Other
CenturyLink	CenturyTel, Inc.	Provider
Charter Internet		Not a Broadband Provider or Reseller
ChiliTech Internet Solutions, Inc.	ChiliTech Internet Solutions, Inc.	Provider
CIMCO Communications, Inc.	CIMCO Communications, Inc.	Not a Broadband Provider or Reseller
Cincinnati Bell Inc.		Not a Broadband Provider or Reseller
Cinergy Communications		Not a Broadband Provider or Reseller
Citizens Cable Communications	Citizens Cable Communications	Provider
Citizens of Kecksburg	Citizens of Kecksburg	Provider
Citynet Holdings, LLC	Citynet Holdings, LLC	Not a Broadband Provider or Reseller
Clarity Connect, Inc.	Clarity Connect, Inc.	Provider
Clear.com	Clearwire Corporation	Provider
Clearview Partners	Clearview Partners	Not a Broadband Provider or Reseller
Coaxial Cable TV Corp	Coaxial Cable TV Corp	Provider
Cogent Communications, Inc.	Cogent Communications, Inc.	Provider
Comcast	Comcast Cable Communications, LLC.	Provider
Commonwealth of Pennsylvania	Office of Public Safety Radio Services	Provider
Community TV Systems Inc	Community TV Systems Inc	Not a Broadband Provider or Reseller

Filing Company DBA	Filing Company Name	Status
Computer Central	Computer Central	Not a Broadband Provider or Reseller
Computer Solutions, Inc.		Reseller
Consolidated Communications	Consolidated Communications	Provider
Conterra Ultra Broadband, LLC	Conterra Ultra Broadband Holdings, Inc.	Provider
CONXX	CONXX	Not a Broadband Provider or Reseller
Cooperative Communications, Inc.		Potential
Country Cable TV		Not a Broadband Provider or Reseller
Covista Communications, Inc.		Not a Broadband Provider or Reseller
Cpudirect Networks, LLC	Cpudirect Networks, LLC	Not a Broadband Provider or Reseller
Cricket Communications, Inc.	Leap Wireless International, Inc.	Provider
CTI Networks, Inc.		Potential
cyberMIND		Not a Broadband Provider or Reseller
Cyberonic Internet Communications, Inc.		Other
Data Network Solutions	Business Automation Technologies, Inc.	Potential
DataJack		Potential
DBSi	DBSi	Provider
DCT Telecom Group, Inc.		Potential
Delmarva T1		Not a Broadband Provider or Reseller
DEPOSIT TELEPHONE COMPANY, INC.	TDS TELECOM	Provider
Detwiler Communications Inc	Detwiler Communications Inc	Not a Broadband Provider or Reseller
Digital Connections, Inc.		Not a Broadband Provider or Reseller
DirecTV	DirecTV	Not a Broadband Provider or Reseller
DISH	DISH	Not a Broadband Provider or Reseller
Diversified	Broadband Dynamics, LLC	Potential
Double Dog	Double Dog	Provider
Drizzle		Other
DSCI Corporation		Potential
DSL Extreme		Potential
DSLBroker.com		Not a Broadband Provider or Reseller
DSLOPTIONS		Potential
Dubois Communications Inc	Dubois Communications Inc	Not a Broadband Provider or Reseller
Ducom, Inc.	Ducom, Inc.	Not a Broadband Provider or Reseller
DynaLink Communications, Inc.		Potential
EA Media	EA Media	Not a Broadband Provider or Reseller
EagleZip.com	EagleZipCom LLC	Provider
Earthlink		Potential
East Palestine Internet	East Palestine Internet	Not a Broadband Provider or Reseller
Easton Telecom Services		Not a Broadband Provider or Reseller

Filing Company DBA	Filing Company Name	Status
EasyStreet Online Services		Potential
Eduro Networks, LLC	Eduro Networks, LLC	Not a Broadband Provider or Reseller
Entelegant Solutions, Inc.		Not a Broadband Provider or Reseller
Ernest Communications, Inc.		Other
Evenlink	Evenlink	Provider
Fibertech	Fiber Technologies Networks, L.L.C.	Provider
First Telecom Services, LLC	First Telecom Services, LLC	Provider
Fisk Internet Services, LLC	Affiliate of Getwireless.net, Inc.	Other
FreedomPop		Potential
Frontier Communications	Frontier Communications	Provider
Frontier Communications of Breezewood	Frontier Communications	Provider
Frontier Communications of Canton	Frontier Communications	Provider
Frontier Communications of Oswayo	Frontier Communications	Provider
FSN Broadband LP		Not a Broadband Provider or Reseller
Full Service Computing Corp	Full Service Computing Corp	Potential
Full Service Network		Potential
Gap CableTV	Gap CableTV	Provider
Getwireless.net, Inc.	Getwireless.net, Inc.	Provider
Global Crossing North America, Inc	Global Crossing North America, Inc	Not a Broadband Provider or Reseller
Granite Telecommunications, LLC		Not a Broadband Provider or Reseller
Graybar Utility		Not a Broadband Provider or Reseller
Ground Control		Not a Broadband Provider or Reseller
Hancock Telephone Co	Hancock Telephone Co	Provider
Hans Cedardale Satellite Inc.	Hans Cedardale Satellite Inc.	Reseller
Herr Cable	Herr Cable	Not a Broadband Provider or Reseller
Hickory Telephone Company	Hickory Telephone Company	Provider
Hometown Utili-com	Borough of Kutztown	Provider
Hotwire Communications, Ltd.	Hotwire Communications, Ltd.	Not a Broadband Provider or Reseller
HughesNet	Hughes Communications, Inc.	Provider
Hydrosoft Internet	Hydrosoft Internet	Provider
ICDC Wireless Inc.	ICDC Wireless Inc.	Provider
ICON Technologies Inc.	ICON Technologies Inc.	Potential
Immix Wireless	Keystone Wireless, LLC	Not a Broadband Provider or Reseller
In the Stix Broadband, LLC	In the Stix Broadband, LLC	Provider
Indigo Wireless		Potential
Innernet, Inc.	Innernet, Inc.	Provider
Interglobe Communications, Inc.		Potential
Interlync Internet Sevices, Inc.	Interlync Internet Sevices, Inc.	Provider

Filing Company DBA	Filing Company Name	Status
International Broadband Electric Communications, Inc. (IBEC, Inc)		Not a Broadband Provider or Reseller
Internet Communications Inc.		Not a Broadband Provider or Reseller
IPNS		Reseller
Ironton Telephone Co	Ironton Telephone Co	Provider
ISP 1		Not a Broadband Provider or Reseller
JB Cable	JB Cable	Not a Broadband Provider or Reseller
Jefferson County Cable	Affiliate of Blue Devil CABLE TV, Inc.	Other
Juno Online Services, Inc.		Reseller
KCnet	Keystone Community Network, Inc.	Provider
KINBER	KINBER	Provider
King Street Wireless		Not a Broadband Provider or Reseller
Kuhn Communications	Kuhn Communications	Provider
Lackawaxen Telephone Co	Lackawaxen Telephone Co	Provider
Lantek	Lantek	Provider
LaunchNet		Potential
Laurel Highland Telephone Company	Laurel Highland Telephone Company	Provider
Layer Four Solutions, LLC		Potential
Leap Wireless International, Inc.	Leap Wireless International, Inc.	Not a Broadband Provider or Reseller
Level 3 Communications, LLC	Level 3 Communications, LLC	Provider
LightEdge Solutions, Inc.	LightEdge Solutions, Inc.	Not a Broadband Provider or Reseller
Line Systems, Inc.	Line Systems, Inc.	Not a Broadband Provider or Reseller
LocalNet Corp		Potential
Lumos Networks	Lumos Networks	Potential
MAHANOEY & MAHANTANGO TELEPHONE COMPANY	TDS TELECOM	Provider
Marianna and Scenery Hill Telephone Company	FairPoint Communications	Provider
Master Vision Cable		Potential
Matrix Business Tech	Matrix Business Tech	Potential
Matrix Telecom, Inc. (TRINSIC, powered by Matrix)		Not a Broadband Provider or Reseller
MediaFLO	Qualcomm	Not a Broadband Provider or Reseller
MegaPath Corporation	MegaPath Corporation	Provider
Meriplex Communciations, Ltd	Meriplex Communciations, Ltd	Potential
Metrocast Cablevision	Metrocast Cablevision	Provider
MetroCast Communications	Gans Communications, LP	Provider
Metropolitan Telecommunications	Metropolitan Telecommunications	Not a Broadband Provider or Reseller
Milestone Communications Inc.	Milestone Communications Inc.	Not a Broadband Provider or Reseller
Millheim TV Transmission Company	Millheim TV Transmission Company	Not a Broadband Provider or Reseller

Filing Company DBA	Filing Company Name	Status
MTT First	MTT First	Not a Broadband Provider or Reseller
Navpoint Internet	Navpoint Internet	Provider
Near You Networks	Near You Networks	Not a Broadband Provider or Reseller
NEP Datavision	Affiliate of The North-Eastern Pennsylvania Telephone Company	Other
NEPAwireless	NEPAdate.com Ventures, LLC	Not a Broadband Provider or Reseller
NET Connection		Not a Broadband Provider or Reseller
Netcarrier Telecom, Inc.	Netcarrier Telecom, Inc.	Provider
Netconex	Netconex	Provider
NetZero, Inc.		Reseller
New Edge Network, Inc.	EarthLink Business	Reseller
New Edge Network, Inc.	New Edge Holding Company	Reseller
Nitel, Inc.	Nitel, Inc.	Not a Broadband Provider or Reseller
Nittany Media, Inc.	Nittany Media, Inc.	Provider
Noroc Broadband	Noroc Broadband LLC	Provider
North Penn	North Penn	Provider
One Communications	One Communications	Provider
One-Stop Communications of PA Inc.		Not a Broadband Provider or Reseller
OpenRange Communications	OpenRange Communications	Not a Broadband Provider or Reseller
Optical Telecommunications Inc.		Not a Broadband Provider or Reseller
PaCLEC Corporation	PaCLEC Corporation	Provider
PAETEC Communications, Inc.	PAETEC Communications, Inc.	Not a Broadband Provider or Reseller
Palmerton Telephone Co	Palmerton Telephone Co	Provider
PAOnline	PAOnline	Not a Broadband Provider or Reseller
Pencor Services, Inc.	Affiliate of Blue Ridge Communications	Other
Pennswoods.net		Not a Broadband Provider or Reseller
Pennsylvania Cable Network		Potential
Pennsylvania Telephone Co	Pennsylvania Telephone Co	Provider
PenTeleData Limited Partnership I	PenTeleData Limited Partnership I	Not a Broadband Provider or Reseller
Phoenix Cable Incorporated	Phoenix Cable Incorporated	Not a Broadband Provider or Reseller
Pitcairn Cable	Pitcairn Cable	Provider
PNG Telecommunications		Not a Broadband Provider or Reseller
Prescient Worldwide		Other
Presque Isle Technology Solutions		Not a Broadband Provider or Reseller
PulseNet	PulseNet	Potential
Purecom		Potential
Pymatuning Indep. Tel. Company	Pymatuning Indep. Tel. Company	Provider
QCOL, Inc	QCOL, Inc	Provider
Qwest Communications Company, LLC	Qwest Communications International	Not a Broadband Provider or Reseller

Filing Company DBA	Filing Company Name	Status
Raystown Wireless	Raystown Wireless	Provider
RCN and RCN Business Services	RCN Telecom Services of Philadelphia, Inc.	Provider
RCN and RCN Business Services	RCN Telecom Services, Inc.	Provider
RealLinx	RealLinx	Not a Broadband Provider or Reseller
Reliable ISP Solutions "RISP"		Reseller
Reliance Globalcom Services, Inc.	Reliance Globalcom Services, Inc.	Not a Broadband Provider or Reseller
Retel TV Cable	Retel TV Cable	Not a Broadband Provider or Reseller
Satellite Internet Broadband	Satellite Internet Broadband	Reseller
SCR Online		Not a Broadband Provider or Reseller
Self Service America, discount ISP		Not a Broadband Provider or Reseller
Service Electric Cable TV, Inc.	Service Electric Cable TV, Inc.	Provider
Service Electric Cablevision, Inc.	Service Electric Cablevision, Inc.	Provider
Shen-Heights TV Associates, Inc.	Shen-Heights TV Associates, Inc.	Provider
Shentel	Affiliate of Sprint	Other
Sidera Networks	Sidera Networks, LLC	Provider
SignalPoint Communications, Inc.	SignalPoint Telecommunications Corp	Provider
Skycasters	Skycasters, LLC	Provider
SkyPacket Networks		Potential
SkywayUSA	Skyway	Not a Broadband Provider or Reseller
Smoothstone IP Communications	Smoothstone IP Communications	Provider
Snip Link LLC	Snip Link LLC	Not a Broadband Provider or Reseller
Somerfield Cable TV		Not a Broadband Provider or Reseller
South Canaan Telephone Company	South Canaan Telephone Company	Provider
Southside TV	Southside TV	Not a Broadband Provider or Reseller
Sprint	Sprint Nextel Corporation	Provider
Stage 2 Networks, LLC		Not a Broadband Provider or Reseller
StarBand Communications Inc.	StarBand Communications Inc.	Provider
StarLinX Technical Services	StarLinX Technical Services	Provider
StarTec Global Communications	StarTec Global Communications	Not a Broadband Provider or Reseller
Steel City Broadband		Not a Broadband Provider or Reseller
Sti Wireless	Sti Wireless	Provider
Sting Communications	Sting Communications	Provider
SUGAR VALLEY TELEPHONE COMPANY	TDS TELECOM	Provider
Sunset Net		Not a Broadband Provider or Reseller
SureWire Internet		Not a Broadband Provider or Reseller
Susquehanna Communications	Affiliate of Comcast Cable Communications, LLC	Other
Telefonica USA		Not a Broadband Provider or Reseller

Filing Company DBA	Filing Company Name	Status
Telefonica USA, Inc.	Telefonica Data Corp SA	Not a Broadband Provider or Reseller
Telegia		Potential
Tele-Media	Tele-Media Company of Zion, LLC	Provider
Telnes Broadband	Telnes Broadband	Provider
Telovations, Inc.		Not a Broadband Provider or Reseller
The North-Eastern Pennsylvania Telephone Company	The North-Eastern Pennsylvania Telephone Company	Provider
Time Warner Cable	Time Warner Cable LLC	Provider
T-Mobile	T-Mobile USA, Inc.	Provider
TOAST.net	TOAST.net	Reseller
Towerstream Corporation	Towerstream Corporation	Provider
Tracon Telecom		Not a Broadband Provider or Reseller
Transbeam Inc.	Transbeam Inc.	Potential
tw telecom inc.	tw telecom inc.	Not a Broadband Provider or Reseller
TWR Communications		Not a Broadband Provider or Reseller
U.S. Cellular	U.S. Cellular	Potential
UHP Wireless Networks		Not a Broadband Provider or Reseller
United Online (NetZero/Juno)		Potential
UNSI	UNSI	Provider
USA Choice Internet	USA Choice Internet Services Company, LLC	Provider
USA Digital Communications	USA Digital Communications	Not a Broadband Provider or Reseller
Valley Cable Systems	Valley Cable Systems	Not a Broadband Provider or Reseller
Venus Telephone Corporation	Venus Telephone Corp.	Provider
Verizon Pennsylvania Inc.	Verizon Pennsylvania Inc.	Provider
Verizon Wireless	Cellco Partnership and its Affiliated Entities	Provider
ViaSat, Inc.	ViaSat, Inc.	Provider
Virtuallycheap Internet Services		Potential
Ward Communications	Ward Communications	Not a Broadband Provider or Reseller
Wavecrazy	Wavecrazy	Provider
WebNexus (SCR Online is parent)		Potential
West Side Telecommunications	West Side Telephone Company	Provider
Western PA Internet Access		Provider
Westfield Community Antenna Assoc.	Westfield Community Antenna Assoc.	Not a Broadband Provider or Reseller
WestPANet	WestPANet	Provider
Whitefence		Not a Broadband Provider or Reseller
Winbeam		Not a Broadband Provider or Reseller
Windstream	Windstream Pennsylvania, Inc	Provider

Filing Company DBA	Filing Company Name	Status
Wire Tele-View Corp.	Wire Tele-View Corp.	Provider
Wireless PA Internet Access	Wireless PA Internet Access	Not a Broadband Provider or Reseller
World ConnX	World ConnX	Provider
World View Resources (WVR)		Potential
Xand		Not a Broadband Provider or Reseller
XO Communications Services, Inc. (Affiliated Entity)	XO Communications, LLC	Provider
Yukon Waltz Telephone Company	Yukon Waltz Telephone Company	Provider
Zampelli Electronics	Zampelli Electronics	Not a Broadband Provider or Reseller
Zayo Bandwidth Northeast, LLC	Zayo Bandwidth Northeast, LLC	Potential
Zing!Broadband		Potential
Zito Media	Zito Media, L.P.	Provider
Zito Media Communications	EagleZipCom LLC	Provider