



BROADMAPSM
Beyond The Boundaries

Nebraska Broadband Mapping Project: Product Release White Paper

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OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's April 1st, 2014 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

Provider Participation Statistics Summary

Summary	Count
Total Valid Broadband Providers	106
Non-Responsive Providers	20
Non-Cooperative Providers	1
Number of Providers - Initial Response Only	4
Number of Providers – Represented in Data Submission	93
Number of Providers - Supplied Updates for this Submission	41
Number of Providers - Confirmed No Updates	38
Number of Providers – Promised Data	3

- Still no data response for 4Stateservices, Chase 3000 Inc, KDSI Internet Services, Kentec Communications, Lightedge Solutions Inc, McCookNet, Rcom LLC, Swiftel Communications, Swiftlink Communications, & Telecom West
- Cannot acquire enough data for BroadBand Wireless Internet,
- Telephone Systems of Nebraska Inc did not send their first data as promised
- Wire Free Nebraska Inc will probably never send data
- Non-Cooperative Providers
 - Wire Free Nebraska, Inc./Community Internet Systems, Inc.
- New Providers Since Last Data Submission
 - Viaero Wireless
- Non-Responsive Providers
 1. 4StateServices



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2. Cable One, Inc.
3. Charter Communications Inc.
4. Chase 3000, Inc.
5. Geneva Broadband, LLC
6. Jagwireless
7. KDSI Internet Services
8. Kentec Communications, Inc
9. Lightedge Solutions, Inc.
10. McCookNet
11. Nebraska Technology & Telecommunications, Inc.
12. Orbitcom, Inc. (Oneeighty)
13. Rcom, L.L.C.
14. Skywave Wireless, Inc.
15. STE Wireless, Inc.
16. Swiftel Communications
17. Swiftlink Communications
18. Telecom West
19. Vistabeam
20. WirelessInet, LLC

- Providers gave initial response
 1. BroadBand Wireless Internet/Haug
 2. Great Plains Broadband, Inc.
 3. Northeast Nebraska Telephone
 4. Wire Free Nebraska, Inc./Community Internet Systems, Inc.
- Providers who promised data
 1. Future Technologies
 2. Sandhills Wireless, LLC
 3. Telephone Systems of Nebraska, Inc.
- Providers – Supplied Updates
 1. Action Communications
 2. Affordable Internet Solutions
 3. AT&T Mobility
 4. ATC Communications (Arapahoe)
 5. ATCJet.Net LLC (Arapahoe)
 6. Blaze Wireless
 7. CenturyLink
 8. Connecting Point
 9. Cozad Telephone Company
 10. Cricket Communications, Inc.
 11. Dalton Telecommunications, Inc.
 12. Diode Communications
 13. Fibercomm L.C.
 14. Frontier Communications Of Nebraska (Citizens)
 15. Glenwood Telecommunications, Inc.
 16. Glenwood Telephone
 17. Golden West Telecommunications Cooperative, Inc.
 18. Great Plains Communications, Inc.



19. Hamilton Telephone Company
20. Hamilton.Net, Inc. (NEDELCO)
21. Hartelco
22. Hershey Cooperative Telephone Company
23. Level 3 Communications, LLC
24. Mobius Communications Company (Hemingford)
25. Mobius Communications Company (Mobius)
26. Nebraska Central Telephone Co. (NCTC)
27. Nebraska Link
28. Northeast Nebraska Telephone Company
29. PC Telcom
30. Peetz Communications, LLC
31. Pierce Telephone Co Inc.
32. Rural Telephone Service Company, Inc.
33. Southeast Nebraska Communications
34. SpeedConnect
35. Sprint Nextel Corporation
36. Time Warner Cable
37. Unite Private Networks, LLC
38. Verizon Wireless
39. Viaero Wireless
40. Wauneta Telephone Company
41. Windstream Nebraska, Inc.

- Existing Providers – Confirmed No Updates
 1. Allo Communications
 2. Applied Communications Technology, Inc. (Arapahoe)
 3. Blue Valley Telecommunications, Inc.
 4. BWTelcom (Benkelman)
 5. Cambridge Telephone Company
 6. Clarks Telecom
 7. Consolidated Telco, Inc.
 8. Consolidated Telecom, Inc.
 9. Consolidated Telephone Company
 10. Cox Communications
 11. Curtis Telephone Company, Inc.
 12. Fort Randall Cable Systems, Inc (Hanson)
 13. Hartman Telephone Exchanges, Inc.
 14. HughesNet
 15. Huntel Cablevision
 16. Huntel Communications
 17. Huntel, Inc.
 18. Internet Nebraska Corporation
 19. K & M Telephone Company, Inc.
 20. Long Lines Siouxland, LLC
 21. Mainstay Communications
 22. Nyecom Teleservices
 23. Omni-Tech Inc.
 24. Pinpoint Communications Inc.
 25. Skycasters



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26. Stanton Telecom, Inc.
27. StarBand Communications
28. Superior Inet
29. Telebeep Wireless
30. Three River Communications, LLC
31. Three River Digital Cable, L.L.C.
32. Three River Telco
33. U.S. Cellular Corporation
34. USA Communications (Cable Nebraska)
35. USA Communications (USA Communications)
36. ViaSat, Inc.
37. Westel Systems (Hooper)
38. Zito Media

COMMUNITY ANCHOR INSTITUTION (CAI) DETAILS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	CAIID Counts	Broadband Subscriber (Yes)	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	1496	1342	1120	1118	1119	1116
Category 2 - Library	125	99	92	124	124	124
Category 3 - Medical/Healthcare	162	0	155	155	155	155
Category 4 - Public Safety	130	1	130	130	130	130
Category 5 - Universities/Colleges	162	3	136	131	136	136
Category 6 - Other: Government	349	0	348	348	348	348
Category 7 - Other: Non-Government	134	0	134	134	134	134
Total	2,558	1,445	2,115	2,140	2,146	2,143



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HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, 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 currently known providers and research.
- The inventory and everyday interaction with providers is tracked using the Provider Catalog (PCat). Below are some examples of the web application, which has a shared access between our team and mapping partner (BroadMap).

The screenshot displays the 'Company Information' form in the Provider Catalog (PCat) web application. The form is divided into two main sections: 'Company Information' and 'Contacts'. The 'Company Information' section includes fields for Provider Name, Company Address, Company PO Box, Company House Number, Company Street Name, Company City Name, Company Suite, Company Postal Boundary, Company State, Company Website, Source ID, Child Source, Parent URL, Parent Source ID, User Name, Password, Form 477 Interest, and Provider Portal Trained. The 'Contacts' section includes a table with columns for Type, Name, Preferred, Phone 1, Phone 2, Email, and Position. The 'FRN Info' section includes fields for Provider Name, DBA, and FRN Number. A dropdown menu for 'TT Types' is open, showing options: None, Asymmetric xDSL, Symmetric xDSL, Other Copper Wireline, Cable Modem-DOCSIS 3.0, Cable Modem-Other, Optical Carrier/Fiber to the End User, and Satellite.

Type	Name	Preferred	Phone 1	Phone 2	Email	Position
P	Sourcing					

Provider Name	DBA	FRN Number



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Confidence		New	
TT Type	Confidence	Last Modified	Comment
Status Tracking			
Non Facilities Based Provider	<input type="checkbox"/>		
Business Only Provider	<input type="checkbox"/>		
Reseller	<input type="checkbox"/>		
NDA Review - Internal	<input type="checkbox"/>		Non Responsive Provider <input type="checkbox"/>
NDA Review - External	<input type="checkbox"/>		Non Cooperative Provider <input type="checkbox"/>
			Source Closed <input type="checkbox"/>
Service Provider Details			
BroadMapper	--None--	BroadMap Status	Unassigned
Initial State Outreach Date		Initial Contact Vehicle	
Provider Origin		Member Association	
		Initial State Outreach	<input type="checkbox"/>
		NDA Status	--None--
		NDA Not Required	<input type="checkbox"/>
		NDA Requested	<input type="checkbox"/>
		NDA Exchanged	<input type="checkbox"/>
Provider Packet Exchanged	<input type="checkbox"/>	NDA Exchange Date	
Provider Packet Info Sent		NDA Signed	<input type="checkbox"/>
Provider Meeting Status	--None--	NDA Signed Date	
Technical Meeting Requested	<input type="checkbox"/>		
Technical Meeting Scheduled	<input type="checkbox"/>		
Number of Subscribers			
		Date Loaded	
		Source Closed Date	

BDIA Delivery 0412		Edit	
Status	--None--	Provider Data Reviewed	<input type="checkbox"/>
Outreach Date		Provider Data Reviewed Date	
Initial Response		FootPrint	
Meeting Date		MiddleMile	
No Update Date		Subscriber	
Waiting For Data Date		Provider Login	<input type="checkbox"/>
Data Received Date		Provider Login Date	
Data Accepted Date			
Source Ingested		Source Ingested Date	
Additional Data			
Notes			
Next Steps			
Inactive	<input type="checkbox"/>	Owner	briordan
Created By		Last Modified By	
briordan 2011-06-13 12:06:35		krousseau 2012-03-16 13:41:58	

- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in the project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (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.).



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COMMUNITY ANCHOR INSTITUTION (CAI)

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

- Collect and maintain inventory of CAIs through currently known CAIs, data mining, and research.
- 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.
- In the upcoming months, one of the statewide semi-monthly webinars produced by the Planning team is scheduled and will focus on CAI engagement, education on the program, and use of the CAI Portal. The broadband planning and mapping teams are working together to present material on the overall broadband program, benefits, and importance on CAI involvement.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allows for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports 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.
- Process coverage area to build the required NTIA data model layers.

With the deployment of the Provider Portal, the data collection and later validation process was streamlined allowing both activities to occur within a secure web application. The majority of the providers used this methodology as it supplies them with more visibility into how their data is being represented and gives them knowledge and ownership of their coverage representation. Below are some bullet points and supporting screen shots on how the portal is used.



- Each provider is assigned credentials with a strong password to ensure security measures are taken into consideration

A screenshot of a web login form titled "Login". It contains two input fields: "Username" and "Password". Below the "Password" field is a "Login" button.

- Collection and confirmation our contact, as well as the company's DBA Name and FRN accuracy

A screenshot of a web form titled "Contact and Provider Information". It includes a heading "Please enter contact information and change provider information if incorrect:". The form contains several input fields with red asterisks indicating required fields: "Contact name" (filled with "Kristin Rousseau"), "Contact E-mail" (filled with "kris.rousseau@broadmap.com"), "Contact Phone" (filled with "603-448-4475"), "Doing Business As (DBA) Name" (filled with "acmetech" and an "Add DBA" button), and "FCC Registration Number (FRN)" (filled with "22222222" and a "Submit" button). Below the form, there is a section "Please note the following:" with two bullet points: "Contact info will only be stored when a record is saved" and "Provider info will be applied to all service areas".

- Capability to review and request changes to the coverage footprint

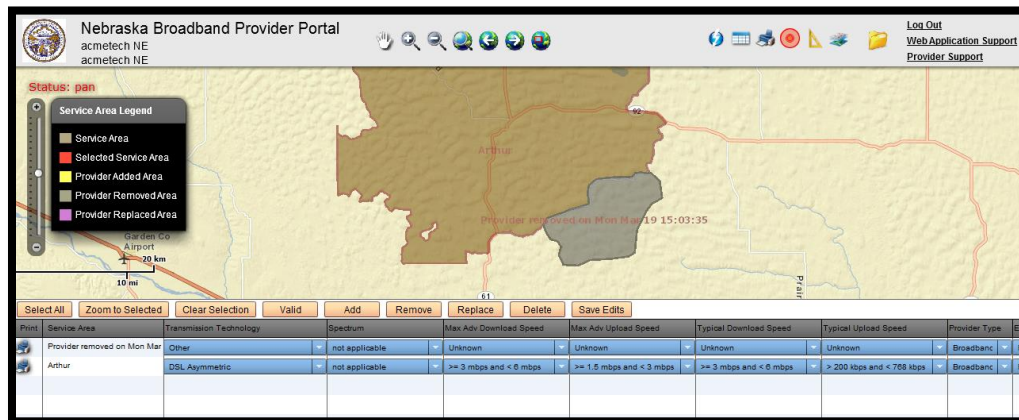
A screenshot of the "Nebraska Broadband Provider Portal" interface. The top header shows the user is logged in as "acmetech NE". The main area features a map of Nebraska with a red-shaded "Service Area" in the central-eastern part. A "Service Area Legend" is visible on the left, showing "Service Area" (yellow), "Selected Service Area" (red), "Provider Added Area" (green), "Provider Removed Area" (blue), and "Provider Replaced Area" (purple). Below the map is a toolbar with buttons: "Select All", "Zoom to Selected", "Clear Selection", "Valid", "Add", "Remove", "Replace", "Delete", and "Save Edits". At the bottom, there is a table with columns for "Print", "Service Area", "Transmission Technology", "Spectrum", "Max Adv Download Speed", "Max Adv Upload Speed", "Typical Download Speed", and "Typical Upload Speed". The first row of data shows "Arthur" as the Service Area, "DSL Asymmetric" as the Technology, "not applicable" for Spectrum, and various speed ranges for the other columns.

Print	Service Area	Transmission Technology	Spectrum	Max Adv Download Speed	Max Adv Upload Speed	Typical Download Speed	Typical Upload Speed
	Arthur	DSL Asymmetric	not applicable	>= 3 mbps and < 6 mbps	>= 1.5 mbps and < 3 mbps	>= 3 mbps and < 6 mbps	> 200 kbps and < 768 kbps

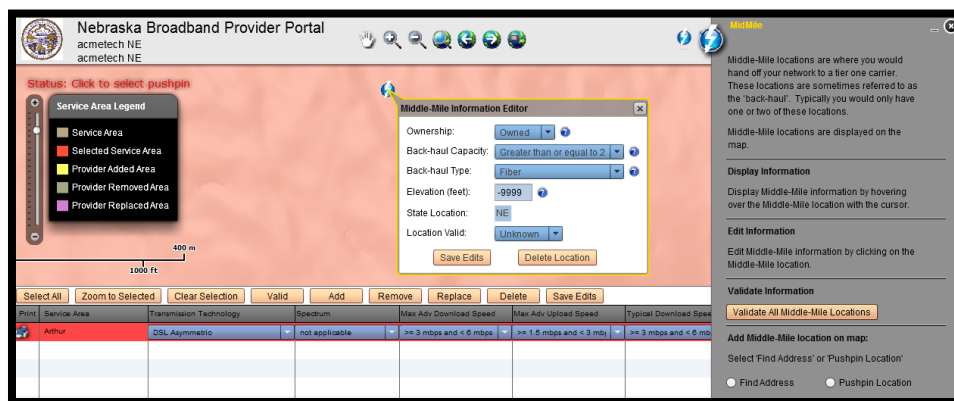
- The provider can Add/Remove portions, or all, of the footprint requesting that their footprint be increased or refined.



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- Middle Mile and Average Weight Nominal Speed (AWNS) collection and validation



AWNS

AWNS Settings for 'DSL Symmetric' in Arthur County

Change the advertised download speeds and/or change the number of subscribers and click 'Calculate AWNS'

Advertised Download kbps	# of Subscribers
Advertised Download kbps #1: 0	# of Subscribers: 0
Advertised Download kbps #2: 0	# of Subscribers: 0
Advertised Download kbps #3: 0	# of Subscribers: 0
Advertised Download kbps #4: 0	# of Subscribers: 0
Advertised Download kbps #5: 0	# of Subscribers: 0

AWNS in kbps: 0 Calculate AWNS Save AWNS Cancel

- File upload functionality to support providers that would prefer a shapefile, spreadsheet, PDF, KMZ/KML file be used to reflect changes for the data round



- Once the provider has reviewed the completed changes to their coverage, middle mile and AWNS, they can then validate them all by signing off that everything is accurate.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below in order of action.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

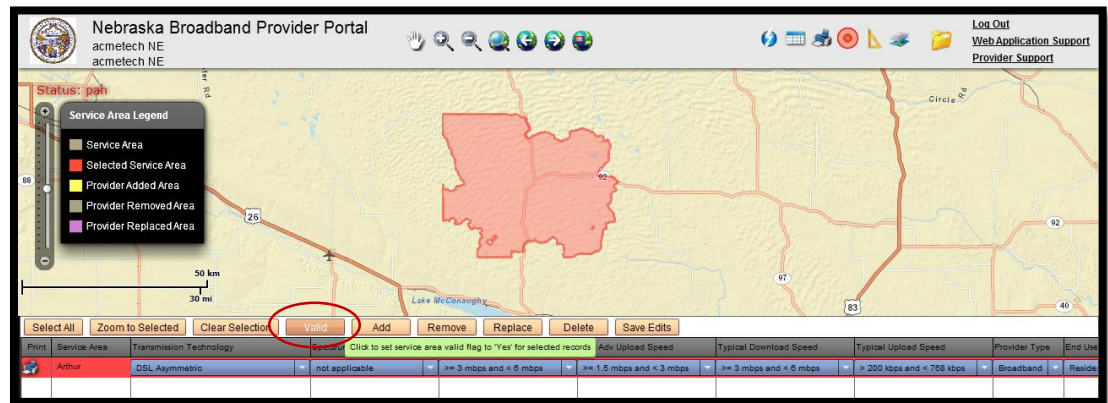
Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the [Data Integration Process](#) and are reviewed with the provider to complete validation.

With the latest released of the Provider Portal, validation on the coverage area, middle mile and average could be completed individually. Validation examples are as follows:

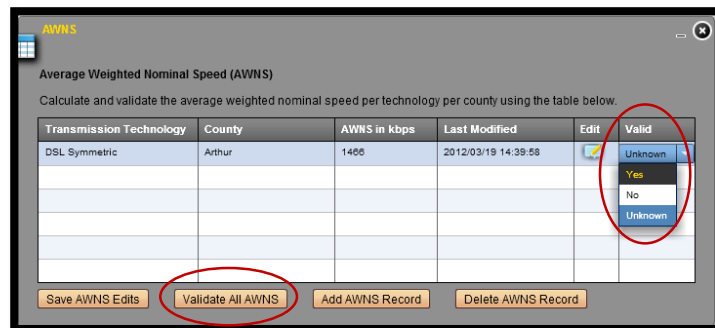
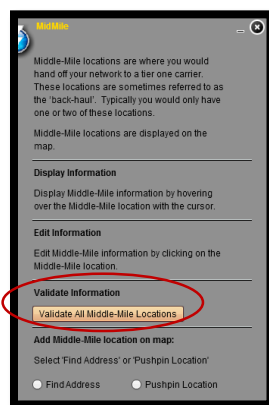
- Coverage validation can be done on one record/footprint at a time or by selecting footprints and selecting the 'Valid' button. The provider could also print off or download their coverage for their own tracking purposes.



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- Middle Mile & AWNS Validation



All validation results are tracked internally through our Validation Table, which also improves the overall **Confidence Value** as mentioned below.

PEER REVIEW

The BroadMap Team takes the time to sit down together and visually inspect the data for any abnormalities that need to be discussed.

SME VERIFICATION – PROVIDER PORTAL ADMIN

Nebraska has the new functionality available that supports administrative functionality for Subject Matter Experts (SMEs) to review the provider coverage areas and supply feedback/commentary on the accuracy and completeness. These enhancements allow them to:

- Review the coverage submitted by the carriers online
- Use subject matter expertise to evaluate the accuracy of the data against local knowledge, online advertising, personal meetings, etc.



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- Document a dialogue with its providers for verification purposes. We were able to review many of the provider submissions manually and submit questions to the providers if speeds, coverage areas, technology types, or other items appeared.
- Report verification comments and any responses from the providers to NTIA in the dataset.

Below are some screen shots illustrating the administrative capability of the Provider Portal.

- As shown below, the SME can login through the secure web application and choose the provider to be reviewed.

Login

Username

Password

Provider Portal

Contact Information and Provider Selection

Please select a Broadband provider:

Provider Name:

Doing Business As (DBA) Name:

FCC Registration Number (FRN):

- The portal supports two ways of verification at a coverage footprint level. The SME can draw areas of concern or approval on the map and supply a categorized comment that can easily be extracted at anytime.

Nebraska Broadband Provider Portal

acmetech NE
acmetech NE

Service Area Legend

- Service Area
- Selected Service Area
- Provider Added Area
- Provider Removed Area
- Provider Replaced Area
- BroadMap Added Area

Hide Select Provider Select All Zoom to Selected Clear Selection Admin Add Delete Save Edits Reload Verify Unverify Verified by BroadMap on 2012/08/02 12:19:57

Print	Service Area	Transmission Technology	Spectrum	Max Adv Download Speed	Max Adv Upload Speed	Typical Download Speed	Typical Upload Speed
<input type="button" value="Print"/>	Arthur	Optical Carrier/Fiber to the End User	not applicable	>= 50 mbps and < 100 mbps	>= 3 mbps and < 6 mbps	>= 50 mbps and < 100 mbps	>= 1.5 mbps and < 3 mbps
<input type="button" value="Print"/>	BroadMap Feedback added o...	Other	not applicable	Unknown	Unknown	Unknown	Unknown



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Reason for Adding New Service Area

Please select a reason for adding the new service area.

☐ Verified - Looks Good

☐ In Progress

☐ Not Verified

☐ Coverage in Question

☐ Other

- Additionally, the SME can leave commentary that will then be automatically e-mailed to the provider for their review and displayed as a pop-up when the first login to the Provider Portal. This includes historical tracking so you can see all commentary between the SME and provider, as well as the date/time stamp for each comment.

Commentary

Review and Submit Commentary

Comments:

Hello :-)

990 characters left

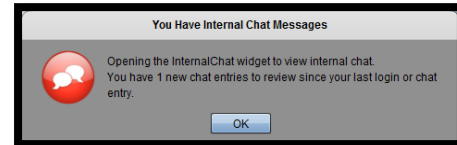
Commentary History:

2012/08/06 17:25:23 Mark Newscomb	
One more test	
2012/08/06 17:16:27 Mark Newscomb	
Testing closure of feedback loop	
2012/08/06 14:13:02 Data Analyst 0	
testing NE commentary	

- The administrative Provider Portal also allows for commentary between team members, which will only be viewable by the internal admin team members. The team members are notified automatically via e-mail when a comment is submitted, as well as when they login.



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- Similar to how the providers update and validate their coverage within the Provider Portal, the administrative version walks the SME through the verification assignments to ensure everything is reviewed and documented with a status and date/time stamp. Once everything is signed off on, the SME can select Verify to signify that the provider is signed off for the submission.



Through the testing and initial release of the portal, the providers have been very responsive to the commentary and supplying updates where needed. As we progress with this tool, the commentary and verification status will be included in future submission documentation. Some is already included within this submission's data package.

PUBLIC VERIFICATION – CROWD SOURCING

The broadband interactive map has been released to the public, which includes functionality to collect feedback on the provider's coverage areas, as well as running a speed test. The feedback and speed results continue to be collected and reviewed with the providers prior to the next data submission to identify if any map refinement is required.

The public website can be viewed at the following hyperlink:

<http://broadbandmap.nebraska.gov>

The Commission and Planning teams have also been utilizing the administrative portion of the website to review other layers for reporting or communications. Some examples of the administrative portion are displayed below:

Administrative Login:

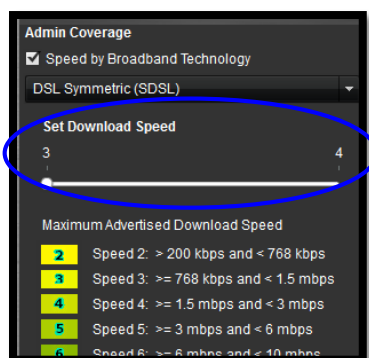
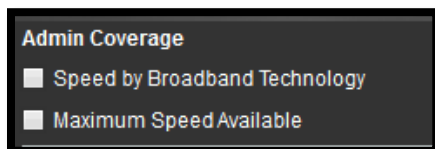


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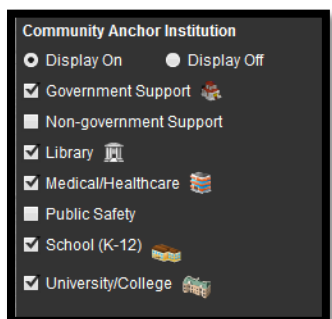


Administrative Data Layers and Functionality:

We're still adding more layers to the admin functionality, but below is an example of two that were added. As a layer is selected, additional functionality is provided. In the case below, the speeds can be changed by using the slider.



Community Anchor Institutions can also be turned on/off individually to compare against the broadband services available.



CURRENCY OF OVERALL PROCESS

This is a review of providers who sent updated coverage area data to BroadMap, or were at least cooperative, reporting no updates or changes for this round of submission.

SOURCING QC GEOMETRY AND ATTRIBUTION

This is a review that providers whose coverage areas submitted through the portal or via shapefile, met standards for the following:

- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.



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INTERNAL QC SCRIPTS

Internal QC scripts were run to check that data input into the attribution of the coverage areas matched the data in the internal Provider Catalog. This included attributes such as FRN number, source id # and Provider Name.

NTIA SUBMISSION CHECK

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 by NTIA.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a Validation spreadsheet. 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.

The confidence value is calculated from the provider meeting the Quality Control checks listed below (and outlined in detail above):

- Provider Validation
- Peer Review
- State Review / Subject Matter Expert Review
- Crowd Sourcing
- Currency of Overall Process
- Sourcing QC Geometry and Attribution
- Internal QC Scripts
- NTIA Submission Check

With the continued efforts on provider validation, 3rd party verification and the release of the public interactive map with feedback collection functionality, the confidence values will be utilized further to identify specific areas in need of attention.

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. These items are outlined above in the [Sourcing QC Geometry and Attribution](#) and [Internal QC Scripts](#) and [NTIA Submission Check](#) under [Data Validation and Verification](#)



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DETAILED PROCESS REVIEW

To review the detailed process, please review the document BMap_ProcessDetails_2014_04_01.pdf that was sent with this submission.