

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 Communications 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). Affected 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.

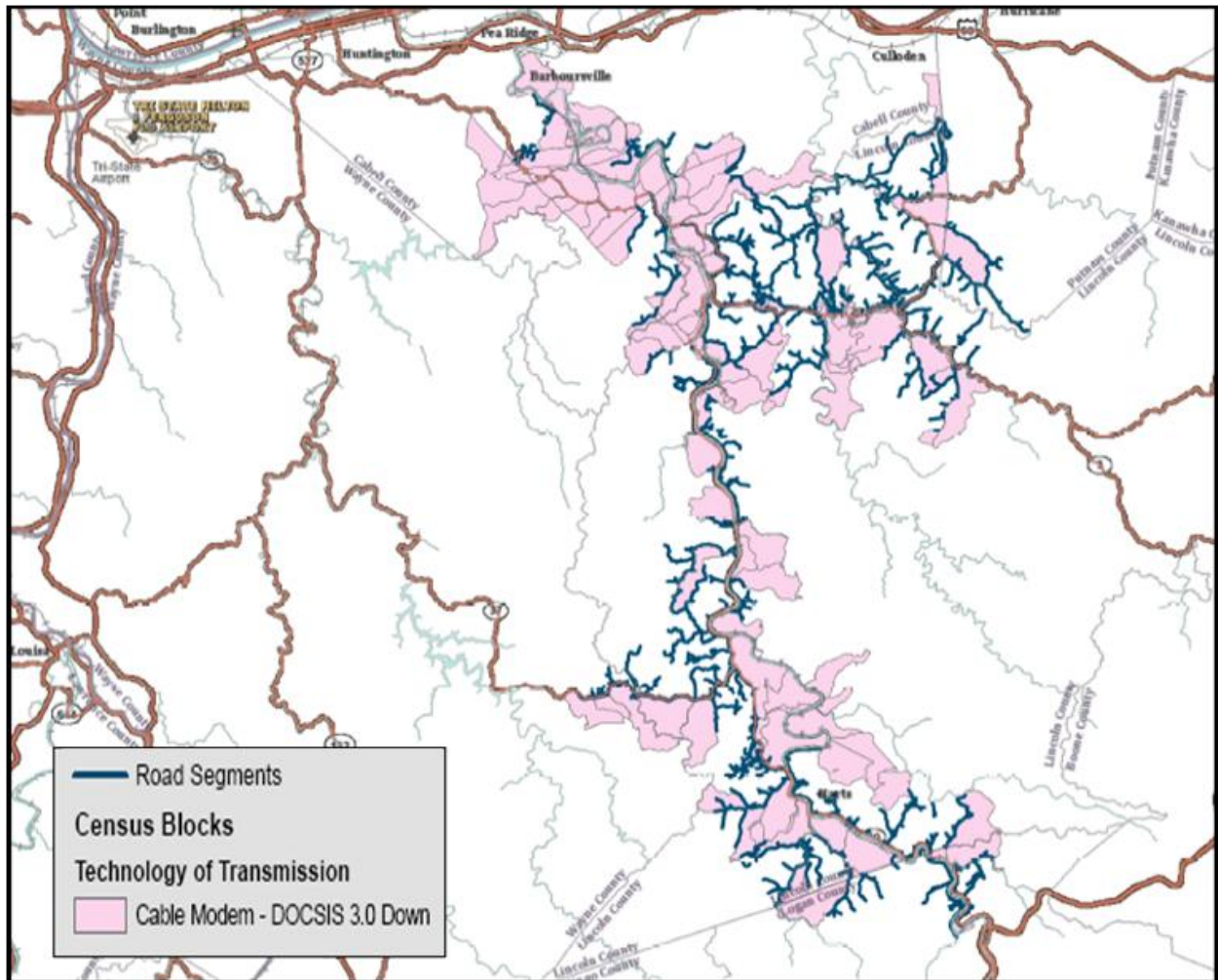


Figure 1 – Example of a portion of a provider check map

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