



New Mexico State Broadband Initiative

Mapping Methodology: April 1, 2013

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New Mexico State Broadband Initiative

Mapping Methodology: April 1, 2013

Introduction

The State of New Mexico (hereafter, NM or State), through its agents Earth Data Analysis Center (EDAC [Mapping Team]) at The University of New Mexico and NM Department of Information Technology (DoIT), submitted the April 1, 2013 New Mexico Broadband (NMBB) Program data package, in compliance with the National Telecommunications and Information Administration (NTIA) State Broadband Initiative Program (SBI).

Data Submittal Description

The NMBB April 1, 2013 data submission includes:

- NMBB_DeliverableMemo_2013_04_01.pdf: This document describes NMBB data submittal components, state-restricted data fields, and contact information.
- NM_SBDD_2013_04_01.gdb: The NMBB geodatabase was created to NTIA standards and includes FGDC-compliant metadata for the database layers.
- NM_DataPackage_2012_31_12.xlsx: The FCC-prepared data-package spreadsheet consists of three worksheets for overview and checklist, record count, and provider table.
- NM_2013_04_01.txt: The data receipt file generated from running the Check Submission Tool, lists pass/fail for received data-submission layer and field entries.
- NM_ReadMe_2013_04_01.txt: This readme gives a brief description on the error or warning messages generated by the Check Submission Tool.
- NM_Methodology_2013_04_01.pdf: The Methodology document is included in the submitted package.
- NM_Changes_and_Corrections_2013_04_01.pdf: The document corresponds to a readme document, especially for Internet Service Provider (ISP) information.
- NMBB_Provider_Data_Request_Template.xls: The data-request spreadsheet contains an overview and upload instructions in addition to eight worksheets for different types of service, subscriber speed, and community anchor institutions.

All files were zipped together and submitted as NM_SBDD_20130401.zip.

SBDD Geodatabase Layer	Number of Records: April 1, 2013
BB_Service_Address	0*
BB_Service_Road_Segment	9,797
BB_Service_CensusBlock	153,656
BB_Service_CAIstitutions	3,185
BB_Service_Wireless	43
BB_Service_Overview	159
BB_ConnectionPoint_LastMile	0*
BB_ConnectionPoint_MiddleMile	487

* Due to restrictions in the Non-disclosure Agreement (NDA) with New Mexico Internet Service Providers (ISPs), New Mexico cannot populate the Service Address and Last-Mile feature classes in the NMBB Geodatabase.

Provider Participation

The NMBB Program, in January 2013, requested broadband data for the April 2013 (Round 7) submittal from sixty-four (63) companies, which represented seventy (70) NM Internet Service Providers (ISPs).

A total of forty-three different ISPs, representing thirty-seven companies, responded to this data request. Of those, thirty-two ISPs (representing thirty-five companies) provided data and the others indicated no changes to their previously-submitted data. And one ISP is still identified as not a broadband provider because the provided speeds did not meet broadband requirements. Six (6) ISPs' contact information has changed and we were not able to obtain their correct contact information.

Additionally, MegaPath Corporation acquired Covad Communications Company.

Internet Service Providers	Number: April 1, 2013
Contacted	70
Responded: Provided Data	35
Responded: No Changes to Data	7
Responded: Will not Participate	0
Responded: Not NM Broadband Provider	1
Did Not Respond: Previously Submitted Data	6
Did Not Respond: Never Submitted Data	21

See *Appendix A: Table of New Mexico Internet Service Providers* for those ISPs included in the data request and the participating ISPs.

Data Verification Techniques

Consistency Checks

- EDAC reviewed data provided by NM ISPs for completeness (and/or consistency), per NTIA Data Transfer Model requirements. The NMBB Program contacted ISPs by e-mail to request any missing information.
This review included comparing newly provided data with the provider's previous data sets. Discrepancies or inconsistencies were noted and addressed through e-mail correspondence with the provider. *Appendix B: ISP-Data Verification and Validation* presents examples of these e-mails. See sections 1. *Data Collection*, 1.5 *Data Evaluation* and 2. *Data Validation*, 2.1 *Data Assessment*, 2.6 *Final Data Validation*.
- For those ISPs who provided block- or segment-level coverage, the Mapping Team checked for coverage containment within known service boundaries.
See section 3. *Data Processing*, 3.3 *GIS Data Verification*.
- For ISPs providing wireless coverage, the Team checked for coverage containment to New Mexico. (3.3 *GIS Data Verification*)

- If an ISP provided Census Block shapefiles, the Team checked the area of the block to confirm that it fell into the categories for area less than 2 sq. mi. or greater than 2 sq. mi.
(3.3 GIS Data Verification)
- The Mapping Team performed speed checks on data received from the ISPs to make sure they met broadband requirements.
(3.3 GIS Data Verification)
- Topology is validated after loading the data into the geodatabase to identify any inconsistencies in data.
See section 3. *Data Processing*, 3.6 *Validate Geodatabase*.
- Checked Speed values using the NTIA Readme.txt and Data_Model_Changenotes.txt files, provided with the data model in December 2012.

Geocoding

- The Mapping Team geocoded address data using different reference street data sets to determine which road reference data set provided the best match. Sometimes a combination of reference data sets was used to obtain better address match rates.
See section 3. *Data Processing*, 3.1, 3.2 *GIS Data*.
- Unmatched records were sent to the ISP as part of the validation process, with a request for better address information.
See section 3. *Data Processing*, 3.3, 3.4 *GIS Data Verification, Updates, and Edits*.

NM ISP Feedback Loop

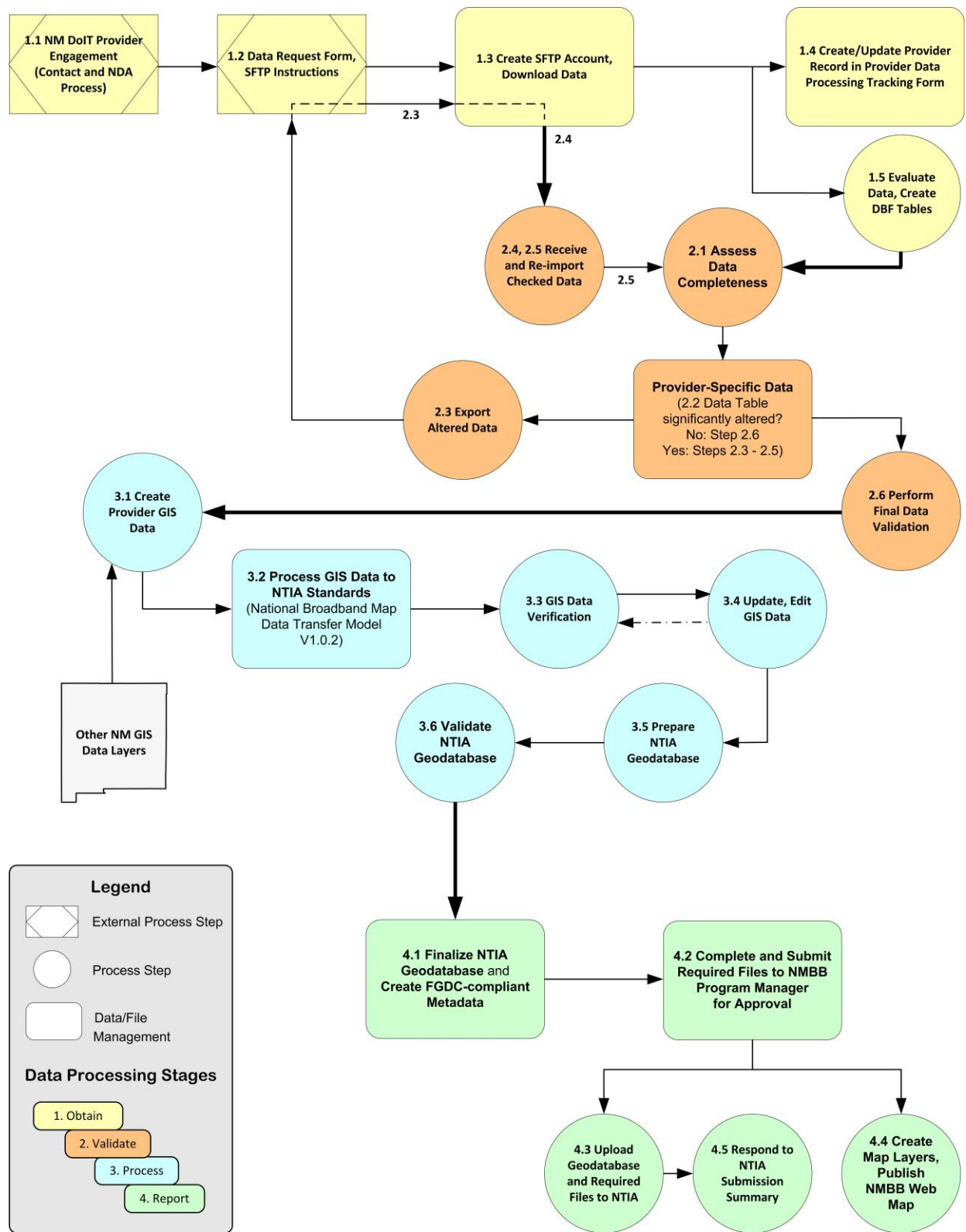
- After processing ISP data, the Mapping Team sent Feedback maps for approval. Any issues for how the service area was represented on the map, such as addition or removal of service, were addressed and corrected, as appropriate. Revised maps then were sent to the provider for review and approval. Feedback maps also included propagation-model results for Wireless broadband.
See section 3. *Data Processing*, 3.3, 3.4 *GIS Data Verification, Updates, and Edits*.
See *Appendix C: Feedback and Propagation Model Map*.

Workflow Processing Scheme

New Mexico acknowledges the importance of understanding data reliability and integrity as the Provider data are processed for NTIA submittal. The NMBB Data Workflow and Processing Scheme includes four broad stages:

1. Obtain – Acquire raw Provider data.
2. Validate – Check for internal data consistency and for consistency with external data sources.
3. Process – Develop Geographic Information System (GIS) data and update NTIA Geodatabase.
4. Report – Submit the final Geodatabase to NTIA.

These stages and their relationships are depicted in the diagram below, and are discussed in the sections that follow. The April 1, 2013 Data Workflow and Processing Scheme did not change from the April 2011 scheme and so retained the V3.0 designation.



New Mexico Broadband Data Workflow and Processing Scheme V3.0 10.01.2012. EDAC

Figure 1 New Mexico Broadband Workflow and Processing Scheme

1. Data Collection

1.1 Provider Engagement

The NM Department of Information Technology established contact with each New Mexico Broadband Provider and negotiated a signed NDA with the State and with EDAC, as required.

1.2 Data Request

EDAC sent an e-mail requesting broadband data to sixty-four NM companies (seventy ISPs) in January 2013 and a reminder e-mail in February to those who had not responded. In addition to an NMBB Program overview and formal request for data, the message included a Web link for the NM Broadband Data Request Form (MS Excel Worksheet); this form included instructions for completing the eight data worksheets and for securely uploading Provider data to the EDAC Secure FTP site.

Data Request Schedule

NMBB Round 7 Data Collection Announcement	01/22/2013
NMBB ISP Data Collection Due	02/28/2013
NMBB Feedback Maps to ISPs for Approval	03/11/2013
NMBB ISP Feedback Due	03/22/2013
NTIA Round 7 Data Due	04/01/2013

1.3 Data Receipt

EDAC created a Secure File Transfer Protocol (SFTP) site for broadband data upload, and created an account on the site for each NM Provider. Each Provider is assigned a unique username and password; this account information is stored in the NMBB SFTP Account Management form.

Provider data arrive in numerous formats, including NMBB or Provider spreadsheets, shapefiles, CAD files, and text files. These data are downloaded from the SFTP site to the EDAC network.

1.4 Provider and Data Tracking

EDAC creates or updates the specific Provider record in a Provider Data Processing Tracking Form. Throughout the data process, each Tracking Form step is recorded with analyst initials and date of task completion. Steps include:

- Record Provider name information and the assigned 2-digit Primary Key (PKey).
- Record the Holding Company Name, DBA Name, FRN (if available), and whether Community Anchor Institutions data are provided.
- Record type of files submitted; date of data submission and the initials of the receiving GIS analyst; and how data were submitted (e.g., FTP or physical medium).

1.5 Data Evaluation

EDAC evaluates the uploaded Provider data for consistency with the NTIA data model and previously submitted data and creates database-format tables.

2. Data Validation

2.1 Data Assessment

EDAC assesses the submitted data for completeness according to the National Broadband Map Data Transfer Model:

- Identify fields (names, types);
- Fill in missing data, if possible; and
- Check field codes, and standardize the values where appropriate.

2.3 Data Export

If the data are incomplete, based upon the above assessment steps, EDAC performs the *If required* steps, below; otherwise, EDAC proceeds with data validation. Changes and assumptions are documented.

If required:

- 2.2 Was the Data Table significantly altered? If yes, go to step 2.3. If no, go to step 2.6.
- 2.3 Return data in standardized format to the Provider for completion.
- 2.4 Receive modified data back from Provider.
- 2.5 Re-import data.

2.6 Data Validation

EDAC performs the final data validation for each Provider's data set: all missing data filled in; all field codes checked and standardized where appropriate. EDAC checks the ISP's provider name and FRN number using FCC's Commission Registration System (CORES) database.

<https://fjallfoss.fcc.gov/coresWeb/publicHome.do>

3. Data Processing

3.1, 3.2 GIS Data

EDAC creates and verifies Provider-specific GIS data, using ArcGIS 10.1 software and third-party data sets.

- New Mexico Road Centerline (NM RCL) data files [Geocoding; Primary Roads Data Set]
- NM Telephone Exchange Boundaries 911 [Census Blocks Processing]
- U.S. Census TIGER/Line shapefiles [Geocoding]
- NAVTEQ Road data files [Geocoding]
- ESRI Cable Boundaries data file [Census Blocks Processing]
- Ancillary consistency checks include comparison with other data sources that are available through the New Mexico geospatial clearinghouse – Resource Geographic Information System (RGIS; <http://rgis.unm.edu>)
- Propagation model results

EDAC processes the GIS data according to the National Broadband Map Data Transfer Model.

Middle Mile Points

- ISPs provide the geographic coordinates for Middle Mile points. Those points are exported as shapefiles and a spatial join is performed against Census 2010 Blocks to obtain FULLFIPSID.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Census Blocks

- ISP data were requested for the Census 2010 Blocks, rather than the Census 2000 Blocks.
- If an ISP provides the Census Block IDs, then those tables are spatially joined with the Census 2010 Data and the blocks are extracted. Then, the Census Blocks (Area < 2 sq. mi.) are extracted.
- If the ISP provides address-specific data, those addresses are geocoded against the New Mexico Road Centerline (NM RCL) address locator. Unmatched addresses are processed against third-party data sets, such as the NAVTEQ Road data purchased by the State as a part of the NMBB project, and ESRI Road data. All of those matched records are appended together to obtain a single address data set. The address points are aggregated spatially to the Census Blocks, and the Census Blocks (Area < 2 sq. mi.) are extracted.
- If an ISP provides shapefiles of Census Blocks, EDAC verifies those to make sure they are less than 2 sq. mi. in area.
- If an ISP provides telephone exchange boundaries instead of addresses, then those boundaries are verified with the NM Telephone Exchange Boundaries 911 data set, and Census Blocks (Area < 2 sq. mi.) that lie within those boundaries are extracted. If an ISP provides the CO/RT locations, then a buffer of 1800 ft. is drawn, and the Census Blocks (Area < 2 sq. mi.) that intersect with the buffer area are extracted.
- If an ISP provides service areas instead of addresses for Cable, then the service areas are verified with the ESRI Cable Boundaries data file. Census Blocks (Area < 2 sq. mi.) that lie within the boundaries are extracted.
- Resulting Census blocks were checked for the attribute ALAND10 (2010 Census Land Area); blocks with Area = 0 were deleted from the data set.
- If an ISP does not provide data for this data-submittal round, data processed for the previous rounds are used for the current submittal.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Road Segments

- If an ISP provides address-specific data, EDAC geocodes those points (using a process similar to that explained above in *Census Blocks*). The address points are aggregated spatially to Census Blocks, and the blocks with area greater than 2 sq. mi. (Area > 2 sq. mi.) are extracted. NM RCL roads within those Census Blocks are exported, and the geocoded address points are spatially joined with adjacent road segments within a distance of 25 ft. (or 30 ft. for rural areas). The road segments with joined address points are selected and exported.
- If an ISP provides road segment data with address ranges, any one of the address range values (TO/FROM) for the road is taken and the data are geocoded. Or, if no address ranges are provided, the address file is joined with the NM RCL roads, based on Street Name, City, and Postal Code and the matched records are extracted. This involves manual data processing.

- If an ISP provides Tiger/Line roads data, those roads are extracted from the U.S. Census Tiger/Line shapefile by joining them based on the TLID (Tiger/Line ID). NM RCL road data that match the Tiger/Line roads are exported. If there are no matched roads in RCL data then Tiger/Line roads are submitted to NTIA.
- If an ISP provides Telephone Exchange Boundaries or CO/RT locations or Cable service area boundaries, road segments for these data sets are not processed due to uncertainty about the NMBB procedures for these cases. EDAC checks for ISP-provided address-specific data and, if those data are present, processes the data using the first-listed *Road Segments* step. Otherwise, those roads are not further processed.
- To improve upon the above-mentioned uncertainty, EDAC tested a different road-segments processing step by selecting two ISPs with coverage for Census blocks greater than 2 sq. mi. in area and adjoining smaller blocks. For those ISPs, EDAC processed road segments data by clipping the roads to the large blocks and manually choosing the road segments that were closer to the smaller blocks (less than 2 sq. mi. in area) with broadband coverage from the same ISP. EDAC has provided feedback maps to the ISPs and is currently assessing the processed results for improved accuracy.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Community Anchor Institutions

- EDAC created an Anchor Geodatabase that has data for all the Community Anchor Institutions, such as Schools, Libraries, Health Care, Higher Education, Public Safety Facilities, Government Agencies, and Non-governmental Institutions throughout the State of New Mexico. These data were obtained from different sources, including the Public School Facilities Authority (PSFA), New Mexico State Library, Homeland Security Information Program (HSIP), and NM Resource Geographic Information System Program (RGIS).
- EDAC developed a Community Anchor Site Assessment (CASA) crowd-sourcing application to collect information about Institutions and their Broadband Internet Access in the State of New Mexico. These results are added to the Anchor Database after locations are validated against satellite and aerial imagery.
- There are no changes to the UNM Bureau of Business and Economic Research (BBER) digital-literacy-survey data for non-governmental-organization (NGO) community support.
- Broadband data provided by the ISPs are also included in the geodatabase. EDAC uses the third-party USAC (Universal Service Administrative Company) data set for broadband information for Schools and the NM State Library data set for broadband information for Libraries.
- The Anchor Geodatabase is further processed to meet the NTIA requirements. NCES IDs for schools, IPEDS IDs for higher education, and IMLS IDs for libraries are obtained from the respective Web sites and are joined with records in the geodatabase.
- Data sets are additionally processed by adding required fields based on the NTIA Data Model.

Wireless

- If an ISP has multiple spectra, the provided polygon is duplicated for each spectrum and then appended together to obtain a single shapefile with stacked geometry.

- If an ISP provides only tower locations (address or coordinates) instead of shapefiles showing their wireless coverage, EDAC generates wireless coverage using SiteSync propagation modeling software. For this, we request additional information from the ISP, such as: Location (address or coordinates), Antenna pattern (omni-directional, 180, 120, 90, etc.), Transmit frequency (MHz), Transmit Antenna Gain (dBi), and Antenna elevation.
- If an ISP provides tower location (address or coordinates), transmit radius and no other above mentioned variables, those locations are mapped and a buffer is drawn with the transmit radius.
- Wireless-coverage polygons with area less than 0.125 sq. mi., whether ISP-provided or modeled, are eliminated from the coverage, per NTIA specifications.
- If an ISP indicates providing Satellite services state-wide, a state boundary file is added to the database, processed per NTIA requirements.
- If an ISP provides KMZ (or KML) files, those files are converted to shapefiles and are further processed to remove the polygons with area less than 0.125 sq. mi.
- All of these wireless polygons were clipped to the New Mexico State Boundary to ensure that they fall within the state.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Overview

- This set of notes applies to wire-line data, only.
- If an ISP provides the Subscriber Weighted Nominal (SWNOM) Speed of respective technology types for the counties it serves, those values are joined with the County boundary file from the U.S. Census Tiger/Line shapefiles.
- If an ISP provides the technology of transmission, number of subscribers, and the maximum advertised speed for the Counties it serves, the SWNOM Speed is calculated and the values are joined with the County boundaries shapefile.
- These county files from each ISP are appended together to obtain a statewide stacked geometry. Data are further processed by adding required fields based on the NTIA Data Model.

3.3, 3.4 GIS Data Verification, Updates, and Edits

Processed data are developed as Provider-specific spreadsheet and GeoPDF products. As the first step in New Mexico's Provider feedback loop, EDAC places each Provider's products on the SFTP site and requests that Providers verify accuracy and identify needed edits and corrections. Eleven (11) ISPs responded to the verification request in the April 1, 2013 data submission cycle.

GIS and modeled data are updated and edited, based on Provider feedback, and modified data products (spreadsheet and GeoPDF) are delivered to the Provider through the SFTP site for final verification and to complete the feedback loop.

3.5 NTIA Geodatabase Preparation

EDAC produces a final "clean" GIS data set from the processed and Provider-specific, versioned feature data sets, and then prepares the NTIA Geodatabase from these finalized GIS data. Crowd-sourced data were not used for preparation or validation.

3.6 NTIA Geodatabase Validation

EDAC validates the geodatabase by performing the validation checks provided below and by running the geodatabase through the SBDD_CheckSubmission tool. EDAC then assigns Quality Assurance/Quality Control (QA/QC) values.

- Repair Geometry
- Validate Topology
- Check Provider identification fields by Frequency tool and Summarize tool
- Check for Provider Name, Census Block, and Transmission Technology. Each ISP (Provider Name) should have only one Census Block per Transmission Technology.
- Check for Null values in Transmission Technology codes, PROVIDER_TYPE, FULLFIPSID, STATEFIPS, COUNTYFIPS, TRACT, BLOCKID, GEOUNITTYPE, STATECOUNTYFIPS fields
- Check for Null values in OWNERSHIP, BHCAPACITY, BHTYPE, TRANSTECH, ANCHORNAME, ADDRESS (BLDGNBR, STREETNAME), CITY, ZIP5, STATE, Latitude, Longitude fields
- Check Maximum advertised and typical down/upload speed fields for null values and for valid domain values: MAXADDDOWN/TYPDOWN < MAXADUP/TYPUP; MAXADDDOWN < '0' OR MAXADDDOWN > '11'
- BHCAPACITY <0 and >9, BHTYPE <0 and >4, CAICAT <1 and >7
- Check for SPECTRUM values <1 and >10
- Speed Tiers:
 - DSL download speed tier: if 7 or higher, contact ISP to verify
 - Cable Modem – DOCSIS 3.0 should not be 7 or lower
 - Cable Modem – Other should not be 9 or higher
 - Fixed Wireless download speed tier should not be 8 or higher

4. NMBB Report and Submittal

4.1 Finalized NTIA Geodatabase and Metadata

EDAC finalizes the Geodatabase per NTIA standards (National Broadband Map Data Transfer Model) and creates the associated metadata.

4.2 NMBB Program Manager

The NMBB Program Manager receives the finalized Geodatabase through the SFTP site and approves the files for submittal to NTIA.

EDAC completes and delivers all files to the NMBB Program Manager, as required by the Program. Files include correspondence logs with NM Providers, documentation for Web mapping activities, and the Provider-specific Data Processing Tracking Form.

4.3 NTIA Submittal

The Geodatabase and required files (data transmittal memorandum, Provider data request template [not a required file], data package spreadsheet, check-submission receipt, methodology, and changes and corrections) are uploaded, using the FCC/NTIA SFTP site.

4.4 NMBB Map Layers

Following the NTIA submittal, EDAC creates GIS map layers from the Geodatabase and publishes them to the New Mexico Broadband Program Mapping site, www.nmbbmapping.org/mapping/.

4.5 Response: NTIA Submission Summary

NM DoIT and EDAC developed a document template to respond to the NTIA Submission Summary, both to address NTIA-identified issues or gaps and to request clarification and additional information. New Mexico responds within one week of receiving NTIA's Submission Summary.

NMBB System Security

System Security

The NM Broadband Server is a fully patched Windows Server 2008. The server is protected by Symantec Endpoint Protection and a double firewall.

The first layer of firewall protection is a Cisco hardware firewall that protects the Server from any intrusion from outside the EDAC network. This firewall only allows connections on Ports 80 and 22.

- Port 80 allows Web browsing.
- Port 22 allows Secure FTP. SFTP service is fully encrypted with SHA1 stored passwords.

The Windows software firewall is configured to allow access on Ports 80, 22, 443, and 3389.

- Port 443 gives EDAC developers the ability to configure ArcGIS Server from within the EDAC network.
- Port 3389 gives EDAC system administrators the ability to configure the base Windows server from within the EDAC network.

Server Connections

Connect to the Server from the outside:

- HTTP: No authentication (simple Web browsing).
- SFTP: Authentication required and fully encrypted.

Connect to the Server from within the EDAC network:

- HTTPS: Authentication required and fully encrypted.
- RDP: Authentication required and fully encrypted.
- SMB: Port 445, Windows file-share port.

Virtual Machine and Networked Drive Back-ups

The NMBB Virtual Machine (VM) is a dedicated server.

Back-up: Development Networked Drive (not published)

- Daily: A differential back-up to a tape server is performed; the tape server is connected to a secure tape library.
- Friday/Weekend: A full back-up of the networked drive is performed to the secure tape server.

Back-up: Virtual Machine (published)

- Daily: The entire VM is backed up by VDR (VMware Data Recovery [application]) to a secure, self-contained data store.
- Weekly: The entire VM is backed up to a TrueCrypt volume in remote storage.

Physical Security

NM Broadband Server physical security is accomplished through:

- Controlled-environment floor space in a locked, code-protected room for system servers, and
- An uninterrupted power supply (UPS).

Lessons Learned

EDAC devised an approach to further engage wireless-service ISPs that had submitted incomplete data. This approach involved generating feedback maps based on approximated propagation-model parameters and sending those maps to ISPs. The approach was successful in prompting them to respond with accurate values. EDAC then generated modified feedback maps. Beginning with an approximate coverage and refining that coverage based on the resulting ISP feedback has improved NMBB data collection and broadband-coverage displays.

NMBB Web Map

The New Mexico Broadband Map (www.nmbbmapping.org/mapping/) is developed as part of the NMBB Program for the State of New Mexico. This Web map displays all of the processed ISP broadband data that are submitted to NTIA for the National Broadband Map, and the processed statewide satellite-service data.

Figure 2 (below) is a screen-capture image of the New Mexico Broadband Map V 4.0 with Data Update: 1 October 2012 [map data are updated following each NTIA data submittal]. Map layers for DSL (green), Cable (dark red), Fiber (magenta), and Copper Wire (cyan) broadband coverage are displayed with Tribal Land Boundaries and the Streets base map. Fiber, Fixed Wireless, Mobile Wireless, and Satellite layers are not displayed. Tools include: layer selection; base map selection; dynamic legend; slider-bar and custom zoom; drag-and-drop and directional pan; full, previous, and next extent; identify; find address; scale bar; and print map. Additionally, the mapping site provides a feedback tool, help (online user guide), program information, and New Mexico's disclaimer.

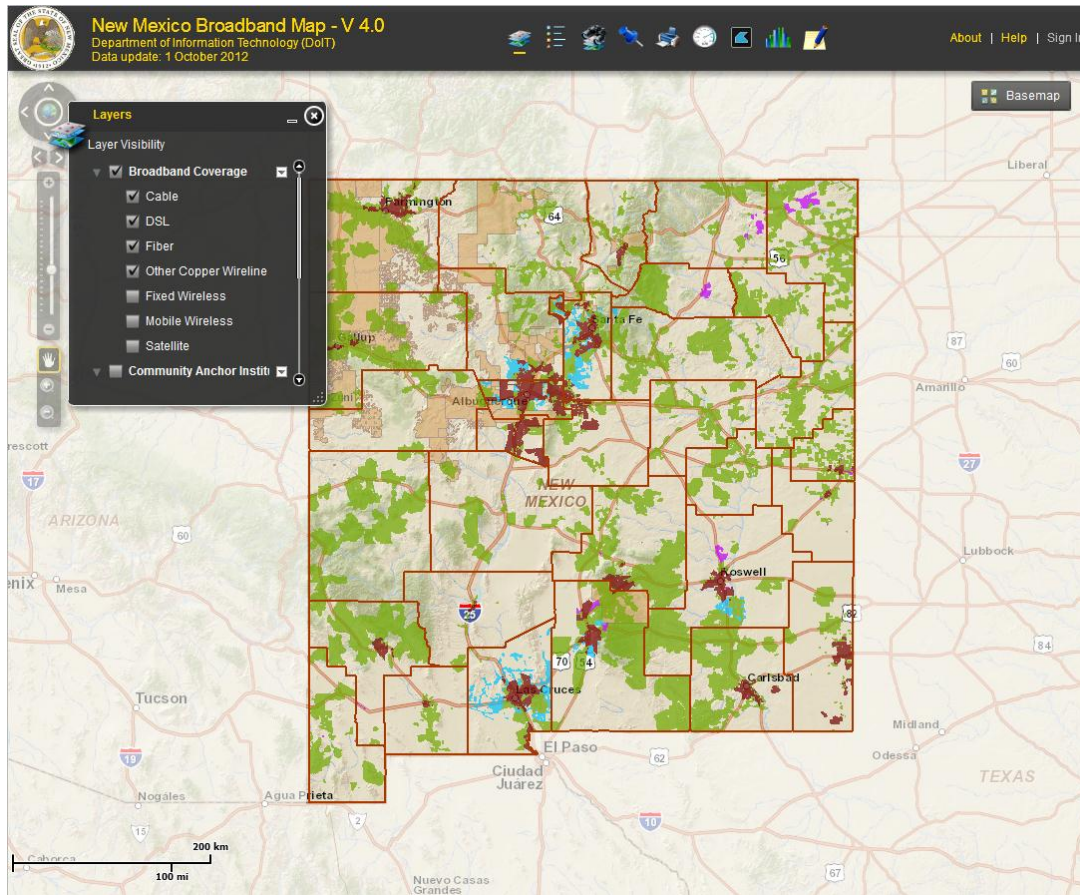


Figure 2 New Mexico Broadband Map V 4.0, www.nmbbmapping.org/mapping/; accessed 28 March 2013

Appendix A: Table of New Mexico Internet Service Providers

Internet Service Providers listed in black text were participating providers in NTIA Data Round 7.

Providers listed in blue text did not respond to NTIA Data Round 7 data requests.

Identified New Mexico Internet Service Providers: NTIA Data Submittal, April 1, 2013	
Agave Broadband LLC	Time Warner Cable
AT&T Corp, Inc.	Transworld Network, Corp
AT&T Mobility LLC	Tularosa Communications, Inc.
Baca Valley Telephone Company, Inc.	TW Telecom of New Mexico, LLC
Baja Broadband	Valley Telecom Group (Copper Valley Telephone, Inc.)
Cable One	Valley Telecom Group (Valley Telephone Cooperative, Inc.)
CenturyLink	Verizon Wireless
CityLink Fiber Holdings, Inc.	ViaSat, Inc.
CNSP Internet	VSAT Systems, LLC (Skycasters)
Comcast	Windstream Communications SouthWest
Cricket Communications, Inc.	WNM Communications
Cyber Mesa Telecom	Yucca Telecom (Roosevelt County Rural Telephone Cooperative, Inc.)
Dell Telephone Cooperative, Inc.	Yucca Telecom (Yucca Telecommunication Systems, Inc.)
ENMR Telephone Cooperative	Zayo Group
Frontier Navajo Communications (Navajo Communications Company, Inc.)	Action INTELEX
Higher-Speed Internet, LLC	AmigoNet
Hughes Network Systems	Azulstar, Inc.
Kit Carson Electric	BlackRock Networks, LLC
La Canada Wireless Association	Brainstorm Internet
La Jicarita Rural Telephone Cooperative	Cnet Internet
Leaco Rural Telephone Cooperative	Desertgate Internet
Level 3 Communications, LLC	Huntleigh Telecommunications Group, Inc.
MATI Networks (Mescalero Apache Telecom, Inc.)	La Tierra Communications, Inc.
MegaPath Corporation	Lobo Internet Services, LTD.
Penasco Valley Telecommunications	MetTel
Plateau Telecommunications, Inc.	Oso Grande Communications
PTCI (Panhandle Telephone Cooperative, Inc.)	RioLink, LTD
PVT Networks	SCS Connect
Sacred Wind Communications, Inc.	SentivaNet
Sierra Communications (a subsidiary of Baca Valley Telephone)	Southwest Cyberport
Southwestern Wireless	Spinn.Net
Sprint	TaosNet, LLC
Suddenlink Communications	Tewa Communications
StarBand Communications, Inc. (Spacenet, Inc.)	Trilogy
T-Mobile	Fast Track Communications (Not interested in participation from Round 1)

Appendix B: Table of Abbreviations and Acronyms

BB	broadband
BBER	[UNM] Bureau of Business and Economic Research
CAD	Computer-aided Design
CORES	[FCC] Commission Registration System
CO/RT	Central Office/Rural Terminal
DBA	Doing Business As
dBi	decibel isotropic
DoIT	[NM] Department of Information Technology
DSL	Digital Subscriber Line
EDAC	[UNM] Earth Data Analysis Center
FCC	Federal Communications Commission
FGDC	Federal Geographic Data Committee
FRN	FCC Registration Number
ft.	foot
FTP	File Transfer Protocol
GDB, gdb	Geodatabase; Geodatabase file extension
GIS	Geographic Information Systems
HSIP	Homeland Security Information Program
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
ID	[unique] identifier
IMLS	Institute of Museum and Library Services
IPEDS	Integrated Postsecondary Education Data System
ISP	Internet Service Provider
MHz	megahertz
NCES	National Center for Education Statistics
NDA	Non-Disclosure Agreement
NGO	Non-governmental Organization
NM	New Mexico, State of New Mexico
NMBB	New Mexico Broadband [Program]
NM DoIT	New Mexico Department of Information Technology
NTIA	National Telecommunications and Information Administration
PDF, pdf	[Adobe] Portable Document Format and file extension
PSFA	[NM] Public School Facilities Authority
QA/QC	Quality Assurance/Quality Control
RCL	[NM] Road Centerlines
RDP	Remote Desktop Protocol
RGIS	[NM] Resource Geographic Information System
SBI	State Broadband Initiative

SFTP	Secure File Transfer Protocol
SHA1, sha1	Secure Hash Algorithm 1
SMB	Server Message Block
sq. mi.	square mile(s)
SWNOM	Subscriber Weighted Nominal [Speed]
TIGER	[U.S. Census] Topologically Integrated Geographic Encoding and Referencing (system)
TXT, txt	Text file extension
UNM EDAC	The University of New Mexico Earth Data Analysis Center
UPS	uninterrupted power supply
USAC	Universal Service Administrative Company
VDR	VMware Data Recovery (application)
VM	Virtual Machine
Web	World Wide Web
XLS, xls	Microsoft Excel file extension
ZIP, zip	Zipped file extension