

Colorado Broadband Data & Development Program

October 1, 2013 Data Delivery Report

For more information about the Colorado Broadband Data and Development Program (CBDDP), please see the websites below:

Colorado Broadband Data Development Program - www.colorado.gov/oit/broadband

National Broadband Map - www.broadbandmap.gov

Colorado Broadband Mapping Application - <http://maps.co.gov/ColoradoBroadband>

Purpose of this Report

The following report provides details about the data set delivered to the NTIA on October 1, 2013 to support the National Broadband Map and to meet the requirements of the State Broadband Data and Development Program grant to the Governor's Office of Information Technology (OIT). The report describes the various processes used to verify the data set and the results of those processes. It also describes, in general terms, how the CBDDP collects and validates information about broadband availability in the State of Colorado.

Status of Data Collection

The Colorado Broadband Data & Development Program data collection effort began with a third party contractor through a data collection contract signed on March 22, 2010. After the October 2011 data submission, the CBDDP data processing was brought in-house to the Governor's Office of Information Technology. For the October 2013 delivery, a search of current providers in the state of Colorado was conducted by reviewing the FCC 499 registry. During our research, 30 providers were identified and initial outreach was conducted to determine broadband capabilities. Only 10 providers met NTIA broadband standard. Once contact was established, a call for data requesting broadband coverage was distributed. Of the providers the CBDDP contacted, 5 submitted broadband coverage for the October 2013 Data delivery; whereas 5 providers either did not want to submit data or were non-responsive. In addition, 11 of the 13 previous non-responsive providers continued to elude participating in the current delivery cycle, despite continuous outreach.

Since the April 2013 delivery, OIT contacted the known service providers to contribute data to Round 8. From the total list of providers, 98 participated in previous deliveries. Of the 105 currently participating providers, 39 provided coverage updates, 7 were new to the current cycle; and 59 providers were counted as "no data change" from the last data submission. With regards to the 16 providers not currently participating, 2 refuse to send data and 14 were non-responsive. The majority of the 14 non-responsive providers carried over from the previous delivery cycle. The 3 providers who did not meet broadband requirements for the current delivery cycle, also failed to meet broadband requirements for Round 7. We did manage to get data from two of the previously non-responsive providers from the April 2013 delivery cycle. They are accounted for in the 47 providers who submitted data. Effort to identify all broadband providers in Colorado is ongoing.

The following table categorizes all possible broadband service providers in Colorado known to the CBDDP, and indicates the status of their participation in the program:

Service Providers	October 1, 2013
Potential Identified Providers	156
Data Sets Delivered to NTIA	105
Non-Responsive Providers	14
Not a Broadband Provider	3
Will Not Provide Data	2
Out of Business	33

The following table describes service providers included in the current data delivery:

Service Provider Updates	October 1, 2013
New in Data Set	7
Updated Data	39
Responded "No Data Change"	59
Data Sets Delivered to NTIA	105

As mentioned in the previous delivery cycle, a new GIS team member was hired to specifically focus on the accuracy of the Community Anchor Institution database; with regards to activity, location, and broadband speed. The CBDDP is very pleased with the progress that has been made in promoting speed tests among reporting CAI's. We have encouraged our providers to reach out to Community Anchor Institutions within their broadband coverage area and we have personally reached out to known CAI's to update provider information and speed tests. As of date, we have acquired new speed tests for more than 1% of our current dataset. We eliminated duplicate CAI records, expired CAI's, and those which could not be located or identified. Although our original CAI database decreased, we were able to add new CAI's for the current delivery cycle. The total CAI count is: 5,524, which is a 1% increase from the previous delivery and reflects a more accurate database. Although, the CBDDP has not significantly expanded the number of CAIs submitting speed test information between April 2013 and the current delivery, we expect to make a more concerted effort to collect, update, and improve the data an additional 5% by December 30, 2013. The following table shows the number of community anchor institutions that have been identified in the state:

Community Anchor Institutions	October 01, 2013		
	Identified	Collected	Includes Speed Test
Cat. 1 - School K -12	2111	2111	922
Cat. 2 - Library	252	252	17
Cat. 3 - Medical/Healthcare	711	711	83
Cat. 4 - Public Safety	1780	1780	95
Cat. 5 - University/College	55	55	20
Cat. 6 - Other Government	604	604	89
Cat. 7 - Other non-Government	11	11	6
TOTALS	5524	5224	1232

The CBDDP chooses to report multiple CAIs at the same address as distinct entities (i.e. a county sheriff's office and a 911 call center at the same address are reported as two distinct entities).

Validation and Verification Processes for the April 2013 Data Set

Techniques:

1. Automated Validation
2. Analysis of Change
3. Visual Review
4. Website Validation
5. Third Party Data Validation
6. Feedback Loop
7. CAI Speed Test Analysis
8. Drive Testing Mobile Coverage Areas
9. Mobile Pulse
10. FCC Speed Test Validation
11. Crowd Sourcing

1. Automated Validation

The CBDDP has been developing and improving automated validation scripts since its first data delivery in April 2011. The CBDDP runs both the script it has developed as well as the script provided by the NTIA on final dataset post processing in every delivery cycle. The data delivery includes documentation demonstrating the data has passed the NTIA validation script as required.

In addition to testing all of the issues covered by the NTIA script, the CBDDP's automated script:

- Verifies that the Geodatabase has metadata, is in the correct projection, and the feature classes are properly named
- Verifies all columns are properly named and defined
- Verifies all table value domains are adhered to
- Captures the required information to accurately complete the Records Count and Provider Table tabs for the SBDD Data Package
- Cross references and creates statistical tables of technology type and valid speed combinations for both Service Provider and CAI data
- Compares FCC assigned Frequency Reference Numbers (FRNs) to provider names to ensure consistency across the data set
- Ensures consistency in provider names
- Identifies possible duplicates among CAIs
- Tests all feature classes to ensure they are within the State's boundaries
- Creates a statistical table for all features classes, including: records details, service provider information, and attribution frequencies
- Ensures the data model, business rules, and schema are in compliance

2. Analysis of Changes

There are three major types of data changes between the April 2013 delivery and the October 2013 delivery: The addition of new providers; the transfer of broadband services between providers and receiving new data from existing providers. The coverage was updated to reflect the increase or decrease in service, with regards to the aforementioned data changes. As a result of efforts to decrease the amount of exaggerated coverage, there has

been a decrease in the amount of coverage for some types of features. The following table shows the percentage change in the number of features from April 2013 to October 2013:

	Census Blocks		Road Segments		Wireless Service		Middle Mile		Address Pts	
	Number of Providers	% Number of Features Changed	Number of Providers	% Number of Features Changed	Number of Providers	% Number of Features Changed	Number of Providers	% Number of Features Changed	Number of Providers	% Number of Features Changed
New Providers	1	100%	1	100%	6	100%	3	100%	0	100%
Received new data	21	-8%	20	-11%	22	18%	21	-8%	2	151%
Re-processed existing data	0	0%	0	0%	0	0%	0	0%	0	0%
No Changes	31	0%	27	0%	38	0%	42	0%	2	0%

3. Visual Review

The CBDDP routinely reviews the coverage areas of new service providers and those with updates or changes to coverage in preparation for each delivery. In an effort to prevent wireless providers from exaggerated coverage, all wireless tower locations provided in current coverage model were inspected using aerial imagery, in order to identify towers on the surface. Where towers could not be identified, the provider was contacted to ascertain accuracy of tower location information. Otherwise, we also verified tower points falling atop other surface features, for instance, water silos, grain elevators, dwelling structures, or tall buildings. Additionally, tower specification information was requested from all wireless providers, if information was currently unknown. Numerous wireless providers submit PDF's of polygon coverage or claimed coverage extended uniformly a certain radius from tower. In order to prevent further exaggeration of wireless coverage; beam radius, azimuth, tower height, and frequency were requested for each tower in wireless coverage model. A more accurate coverage model was created for all the providers in compliance with our requests.

4. Website Validation

Our team also extended validation efforts to provider website analysis. For all providers having a website where address information could be input to determine available speeds, a sample set of addresses were used to extract website claims and then verified against the current provider coverage model. The following providers were evaluated: Comcast, CenturyTel, Megapath Corporation, Strasburg Telephone Company, and Time Warner Cable. The address dataset used in analysis consisted of 30 addresses with a rural and urban mix (20/10), per provider, per county. Counties evaluated include: Adams, Boulder, Broomfield, Clear Creek, Denver, El Paso, Elbert, Gunnison, Jefferson, Kit Carson, Larimer, Logan, Ouray, Teller, and Weld County. Providers were contacted when coverage model was inconsistent with information reported on their website.

5. Third Party Data Validation

OIT compares service provider coverage areas to the following third party data sets: American Roamer, ComSearch, Pitney Bowes, MediaPrints, and SpectrumView. When compared, 23 providers overlapped multiple third party data sets, so in these cases all of the relevant third party data sets were used to validate a single service provider/technology type combination. The CBDDP records comments about coverage area, geometry, and

attribution provided for the technology type, and assigns a categorical assessment of the match between the CBDDP data and each third party dataset. This assessment is necessarily subjective as the third party data sets are sometimes very crude in their spatial resolution, making it difficult to make precise comparisons.

6. Feedback Loop

As a routine part of the work flow, the CBDDP gave all service providers the opportunity to review the final geospatial representation of their data in the form of map books. In addition, the OIT team created validation assessments based on the tests described below and communicated results to providers for verification of speed accuracy within the provider coverage area.

7. CAI Speed Test Analysis

Community Anchor Institutions are a critical component to identifying broadband coverage accurately. Furthermore, these establishments, and their respective communities benefit greatly from efficient broadband service. The CBDDP acquired CAI data in two ways. The primary method involved using CAI data created by Critigen in 2009, under contract with the Office of Information Technology (OIT). In conjunction with local departments, data was acquired in the form of point layers and address lists. Additionally, the CBDDP later developed a web application which allows local members to input new CAI points as well as edit the accuracy of current points. This tool can be located at - <http://maps.co.gov/CommunityAnchors/Account/LogOn?ReturnUrl=%2fCommunityAnchors>. Although this second data collection method holds great potential, only a very small amount of all CAI point were acquired in this way thus far.

Spatial accuracy is a principal goal in regard to Community Anchor Institutions (CAI(s)). As such, spatial editing is a necessary method in this process. Existing CAI features are checked for spatial accuracy using cross referencing with several resources. These include Google Earth, Google Maps, NAIP imagery, and internet research. Spatial inconsistencies are rectified using spatial editing tools. Additionally, attribute data is also verified and corrected if necessary, in conjunction with spatial editing. Examples of discrepancies include incorrect addresses, missing attributes, and CAI locations which are not longer operational. This will be an ongoing process moving forward; the dataset will continue to be edited and modified to reflect Community Anchor Institutions accurately.

In addition spatial accuracy, identifying providers of CAIs as well as their current broadband speeds is a key priority. It is important to identify if CAIs are receiving the broadband speeds as advertised, or if the actual service provided is slower. Outreach efforts have been conducted in order to contact individual CAIs and identify several characteristics regarding their location. Specifically, Technology of Transmission, Name of Provider, address confirmation, and Speed Testing. Speech outlines were created in order to help maintain structure and professionalism when contacting CAI locations. Only a small portion of CAIs contacted provided complete data, if any at all. Conclusively, the sample of CAIs with complete broadband attribution is small.

Several issues exist when comparing speed test data to service provider advertized maximum speeds. Many speed tests do not collect the name of the service provider being tested. Therefore, in areas where more than one service provider offers varying maximum service speeds, it is not possible to know who is providing the service to the CAI. Additionally, even if a speed test result is tied to specific provider, it remains unknown which speed package the CAI chose to subscribe to. Consequently, some bias remains when attempting to compare maximum speeds to observed speeds. Speed test results from CAIs are added to the CAI feature class. Theses speed results are joined to CAI features using a common identifier field. In addition, attribute fields are modified in order to meet NTIA standard. Finally, the download and upload speeds must be represented in speed tiers rather than exact speeds. Consequently test results are converted into their associated speed tiers. Completed CAI feature class is then loaded into NTIA

deliverable. Moving forward, this dataset will continue to be updated, and improved upon in regards to both accuracy and completion.

The following table compares the speed tier for the CAI speed test to the maximum advertized speed tier by any service provider for that particular census block or blocks within 150 feet of the test. A similar test also compared the CAI tests to the minimum advertised speed by any providers that reported service in that area, and the table with these results is below as well.

CAI Speed Test Compared to Maximum Download speed by Census Block																	
	Speed Test Slower								Same Tier	Speed Test Faster							Total Tests
Number of Speed Tiers Slower or Faster	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	
School K - 12	22	35	40	94	66	303	116	103	93	52	18	4	7	0	0	0	953
Library	0	0	2	2	1	0	7	2	3	1	0	0	0	0	0	0	18
Healthcare	2	7	5	10	18	15	22	8	6	3	1	2	0	0	0	0	99
Public Safety	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	4
University, college	0	0	2	1	0	2	3	2	6	2	1	3	0	0	0	0	22
Other Government	2	2	4	13	10	21	21	13	5	3	0	0	1	0	0	0	95
Other Non-Government	1	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	6
Totals	27	44	53	121	96	341	172	128	113	61	21	9	8	3	0	0	1197
Totals	982								113	102							1197

CAI Speed Test Compared to Minimum Download speed by Census Block																		
	Speed Test Slower									Same Tier	Speed Test Faster							Total Tests
Number of Speed Tiers Slower or Faster	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	
School K - 12	0	1	3	2	9	21	46	79	113	150	148	269	102	24	15	3	1	986
Library	0	0	0	0	0	2	0	4	5	7	1	1	2	0	0	0	0	22
Healthcare	0	0	1	0	2	12	11	13	15	13	10	8	3	3	3	0	0	94
Public Safety	0	0	0	0	1	4	8	15	16	15	11	10	18	3	2	4	0	107
University, college	0	0	0	0	0	0	1	0	1	3	0	1	2	3	6	5	0	22
Other Government	0	0	0	0	2	4	12	13	16	13	13	9	9	6	1	0	0	98
Other Non-Government	0	0	0	0	1	0	1	2	2	0	0	0	0	0	0	0	0	6
Totals	0	1	4	2	15	43	79	126	168	201	183	298	136	39	27	12	1	1335
Totals	438									201	696							

8. Drive Testing Mobile Coverage Areas

The CBDDP tested the mobile wireless coverage areas reported by mobile service providers. The CBDDP completed drive testing for over 5,000 miles of roads two years ago. These tests are still informative when compared to the current data from broadband service providers. The testing followed a test scheme starting with primary test points along major highways, followed by secondary points from one half to one mile away from the primary point to confirm the result of the primary test point. Tests continued until either four secondary points (beyond the primary points) were collected or until at least two of the secondary tests failed (with test speeds of less than 768 Kbps). The primary points were generally 10 to 15 miles apart, and the derived points were clustered around the primary points within 2 to 3 miles. All tests used commercially available wireless air cards, identical laptops, and the same FCC speed test site. The tests checked only the major national mobile providers and were all performed between March and May of 2011.

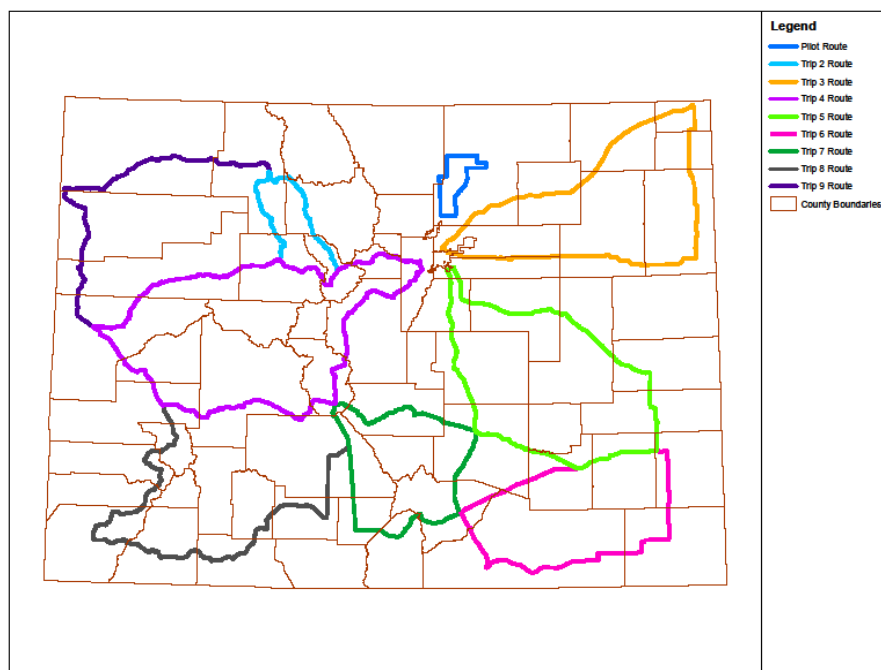


Figure 1: The following graphic is a general depiction of the routes used for the drive testing.

The following table presents the results of these drive tests when compared to “Maximum Advertised Download” speed submitted to the broadband coverage model from each provider. The number of test results shown for each provider reflects only the test points that fell within the coverage area submitted to the CBDDP by that service provider.

MOBILE WIRELESS COVERAGE TESTING										
All Points Tested Including Primary and Derived										
Combined Result for Three Providers Tested										
	Tiers Slower					Same Tier	Tiers Faster			Total Tests
<i>Number of Speed Tiers Slower or Faster</i>	< -5	-4	-3	-2	-1	0	1	2	3	
	392	402	257	237	85	35	9	0	0	1417
Totals	1373					35	9			1417

ATT										
	Tiers Slower					Same Tier	Tiers Faster			Total
Number of Speed Tiers Slower or Faster	< -5	-4	-3	-2	-1	0	1	2	3	
	110	71	79	135	32	13	4	0	0	444
Totals	427					13	4			444
Sprint										
	Tiers Slower					Same Tier	Tiers Faster			Total
Number of Speed Tiers Slower or Faster	< -5	-4	-3	-2	-1	0	1	2	3	
	150	189	79	55	30	10	0	0	0	513
Totals	503					10	0			513
Verizon										
	Tiers Slower					Same Tier	Tiers Faster			Total
Number of Speed Tiers Slower or Faster	< -5 Kbps	-4	-3	-2	-1	0	1	2	3	
	132	142	99	47	23	12	5	0	0	460
Totals	443					12	5			460

9. Mobile Pulse

The CBDDP collected speed test data from a private vendor of a mobile speed testing service, Mobile Pulse. The 3rd party vendor collects speed tests from an application and device installed on local agency vehicles. The speed tests submitted by Mobile Pulse significantly increased the mobile data set currently used for validation. Due to the continuous enhancement of technology, acquiring current speed test data is essential to demonstrate accurate validation of Provider coverage. The Mobile Pulse dataset was used to validate the following mobile providers: AT&T, Sprint, T-Mobile, and Verizon.

MOBILE PULSE WIRELESS COVERAGE TESTING										
ATT										
	Tiers Slower					Same Tier	Tiers Faster			Total Tests
<i>Number of Speed Tiers Slower or Faster</i>	< -5	-4	-3	-2	-1	0	1	2	3	
	17577	10710	10837	4098	1911	556	32			45721
Totals	45133					556	32			45721
Sprint										
	Tiers Slower					Same Tier	Tiers Faster			Total
<i>Number of Speed Tiers Slower or Faster</i>	< -5	-4	-3	-2	-1	0	1	2	3	
	19790	3733	851	245	314	80	7	2	1	25023
Totals	24933					80	10			25023
T-Mobile										
	Tiers Slower					Same Tier	Tiers Faster			Total
<i>Number of Speed Tiers Slower or Faster</i>	< -5	-4	-3	-2	-1	0	1	2	3	
	1789	124	342	672	524	171	2			3624
Totals	3451					171	2			3624

Verizon										
	Tiers Slower					Same Tier	Tiers Faster			Total
Number of Speed Tiers Slower or Faster	< -5	-4	-3	-2	-1	0	1	2	3	
	44907	23663	11021	5354	4194	532	21	2		89694
Totals	84945					532	23			89694

9. FCC Speed Test Validation

The FCC speed test information contains two separate data sets: mobile speed tests and terrestrial/fixed wireless speed tests. Both data sets cover a date range from January 2011 to February 2013. The Consumer Broadband Test (CBT) data includes speed tests from homes, businesses, community centers, and other landline or fixed wireless locations. The FCC mobile data includes speed tests collected using the mobile app on a mobile device (i.e. iPhone or Android).

For validation of the FCC CBT speed tests, validation layers were created using census and roads coverage from the final SBDD_TRANSFER.gdb. A layer was created with the maximum available download speed, and a second layer consisted of the minimum available download speed. The census blocks were merged with overlapping buffered roads with same speed tier. The FCC CBT speed test points were then buffered by 150 feet and these buffers were compared to the merged census block and road layers described above.

The first two tables below compare the speed tier of the FCC CBT speed tests to the maximum and minimum advertised speed tiers reported by any non-mobile service provider at each location. The results of the table vary from the April 2013 data submission because a wider date range was used for the current delivery, than was used in the previous delivery. The October 2013 FCC CBT validation results are shown below:

FCC CBT Data Speed Tests Compared to Maximum Download Speed																			
	Speed Test Slower								Same Tier	Speed Test Faster									Total Tests
Number of Speed Tiers Slower or Faster	<-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	
Maximum	367	724	629	1396	1283	2907	1226	571	330	201	60	8	10	0	0	0	0	0	9712
Totals	9103								330	279									9712
FCC CBT Data Speed Tests Compared to Minimum Download Speed																			
	Speed Test Slower								Same Tier	Speed Test Faster									Total Tests
Number of Speed Tiers Slower or Faster	<-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	
Minimum	2	18	47	127	233	518	932	1044	1309	1289	2482	1370	332	71	8	2	0	0	9784
Totals	2921								1309	5554									9784

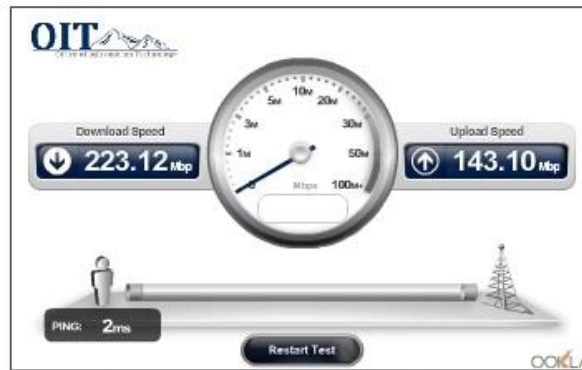
The FCC Mobile Data includes speed tests collected using the Mobile App on a mobile device (i.e. iPhone or Android). The FCC mobile speed tests compare mobile service providers maximum available download speed with the FCC speed tests from mobile providers. The speed test points were buffered 150 feet and a one-to-many join was conducted against all intersecting wireless coverage polygons. The composite table is a comparison of the maximum

available download speed across all mobile providers. Tables following the composite are a breakdown by individual providers coverage: AT&T, Leap (Cricket), Nucla-Naturita, Sprint, T-Mobile, Verizon, and Vieraero.

FCC Mobile Speed Tests compared to Mobile Services Providers															
		Speed Test Slower					Same Tier	Speed Test Faster							Total Tests
Number of Speed Tiers Slower or Faster	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7+	
Composite															
	5207	7989	7105	9363	10724	6201	9309	219	43	12	26	0	0	0	55298
Totals	46589						9309	30							55928
AT&T Inc.															
	4307	6732	6763	9524	10929	6613	9447	817	800	24	0	1	2	0	55959
Totals	44868						9447	1644							55959
Leap Wireless International, Inc.															
	0	0	0	0	4580	7157	6169	8249	9388	5366	8681	130	1	2	49712
Totals	11737						6169	31815							49712
Nucla-Naturita Telephone Company															
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Totals	2						0	0							2
Sprint Nextel Corporation															
	0	0	3051	4468	6441	9716	10043	7094	8966	2474	4266	67	2	1	56588
Totals	23676						10043	22869							56588
T-Mobile USA, Inc.															
	4882	7594	6659	8759	10108	6004	9170	514	80	72	2	0	0	0	53844
Totals	44006						9170	668							53844
Verizon Wireless															
	5141	7848	6826	8883	10381	6384	9676	480	223	68	61	0	0	0	55971
Totals	45463						9676	832							55971
Viaero Wireless															
	65	110	103	43	45	8	4	0	0	0	0	0	0	0	378
Totals	374						4	0							378

10. Crowd Sourcing

Colorado broadband speed tests are collected in four ways: a public speed test application, a provider-only speed test application, a CAI speed test, and the Colorado Broadband Mapping Application. The public speed test is located in the CBDDP mapping application (<http://maps.co.gov/ColoradoBroadband>) and an image of the speed test is shown below. A direct link speed test application also exists that can be placed on any website, which will help increase availability of the speed test and collect more results than the CBDDP mapping application alone.



Please Enter Your Test Information Below: 🚨

Street:

City:

State: Zip:

Provider:

Technology:

Monthly Cost:

Speed:

Submit Your Results

Using the application, the general population can conduct speed tests from their home or office. The speed test is provided by an Ookla application, and results are given for download and upload speeds in Mbps. In addition to test results being collected, the user's location, provider name, technology type, and monthly cost are also requested with the test results. The purpose is to collect reports of service from citizens and Community Anchor Institutions in order to compare against provider data. The speed tests are processed quarterly and included in validation for individual providers.

The provider-only speed test application allows providers to submit speed tests during service calls or installations, at which time they are able to test the bandwidth unrestricted by the particular service level subscribed to by the customer. The CBDDP is continuing efforts to collect speed tests using the aforementioned methods, which are used to compare against provider data.

Provider validation efforts continue to improve. For the October 2013 data delivery, the CBDDP used speed tests from the FCC, CAI's, drive tests, Mobile Pulse, public speed test application, and the provider speed test application. Validation against mobile provider coverage uses drive tests, Mobile Pulse, and FCC Mobile speed tests points, while validation for wireline and fixed wireless provider coverage uses FCC, CAI's, public, and provider speed tests.

Summary of Process

The CBDDP follows the data collection process outlined on the National Broadband Map website: <http://www.broadbandmap.gov/about/technical-overview>. A more detailed description of the data processing methods is provided in the Process Guide, which is included with the data submission (CO_Process_Guide_2013_10_01.pdf).

During the first two years of the program, the CBDDP contracted a third party business (Critigen) to perform data processing. Starting with the April 1, 2011 delivery, the CBDDP hired staff and brought this process in-house.

The CBDDP will continue with in-house staff through the remainder of the program to October 31, 2014. In-sourcing has improved data quality and increased the number of providers reporting in comparison to previous deliveries. The CBDDP has implemented the following process, which may vary from other state programs:

Data Collection

1. The data gathering process begins by identifying and contacting potential broadband providers. Participation in the program is voluntary, but many providers choose to support our effort.
2. The CBDDP reaches out to providers who have not previously submitted data, in order to create a more comprehensive state dataset.
3. The CBDDP also contacts each currently participating provider to allow them to report data changes or confirm the existing data is still accurate.
4. The CBDDP works closely with providers to help find the best and most accurate method to submit data. We encourage a uniform data submission across all providers, but accept data in various formats dependent on the provider's software limitations.

Data Processing

1. Reference layers include the U.S. Census Bureau 2010 TIGER/Line Shapefile with Census Blocks and Roads.
2. Landline data is divided into three separate categories: census blocks less than two square miles, census blocks greater than two square miles, and service address points
 - For census blocks less than two square miles, the entire census block is presumed to have coverage if a service provider reports broadband service within that census block.
 - For census blocks greater than two square miles, the CBDDP reports service along road segments.
 - Service addresses represent providers who provide service to specific business locations or CAIs, but do not advertise or provide service to residences.
3. When receiving new or updated Provider coverage, data is often submitted as address or point specific information, in which case a 150 foot buffer is drawn around each point and the resulting coverage is used to select the appropriate census blocks and road segments. The CBDDP also implements a network analysis to transform DSLAM (digital subscriber line access multiplexer) locations into a service network area, which is then used to spatially select Census Blocks and Road Segments. The data submitted by the provider is used to collect census blocks and road segments from the reference layers (U.S. Census Bureau 2010 TIGER/Line Shapefile).
4. Wireless data submitted as a service coverage area is added directly to the provider coverage.
5. Wireless data submitted as tower locations is processed using signal propagation software to create a coverage plot.
6. Middle mile locations are reported by the providers using either addresses or coordinates. Central office locations and wireless towers are included in the BB_ConnectionPoint_MiddleMile.
7. Representing typical speeds continues to be an issue, as less than two thirds of the providers report typical speed information.
8. Based on clarifications from the NTIA, the CBDDP did not provide any features in the BB_Service_Overview feature class as more granular speed information was provided in the BB_Service_CensusBlock, BB_Service_RoadSegment and BB_Service_Address feature classes.
9. The CBDDP is not currently collecting pricing information.
10. Various validation methods are implemented to check the data accuracy, as described in "Validation and Verification" section of this document.

Data Submission

1. Before submitting data to the NTIA, the CBDDP compiles the data from each provider into a single dataset using the data model specified by the NTIA.
2. The NTIA then integrates the CBDDP's dataset into the National Broadband Map dataset.

Colorado

Data Summary

File Summary

File Type		Number of Records
Total Records in all Files		582107
Census Block < 2 sq. miles		418931
Street Segments		152448
Wireless Shape File		111
Service Address		3131
BB Service Overview		0
Community Anchor Institutions		5524
Middle Mile		1962
Metadata Provided for Geospatial Data		Yes

Provider Information

File Type		Number of Records
Number of ISPs Provided		105

Colorado

Census Blocks < 2 sq. miles

Data Type	Code	Data Element	Count	%	Data Type	Code	Data Element	Count	%
Records Details		Total Records	418931		Typical Download Speed	3	>= 768 kbps. < 1.5 mbps.	2477	0.6%
		Census Blocks < 2 sq. miles with Broadband	140955			4	>= 1.5 mbps. < 3 mbps.	27308	6.5%
		Census Blocks < 2 sq. miles in State (with & without broadband)	192101			Wired	>= 3 mbps. < 6 mbps.	107848	25.7%
		Census Blocks > 2 sq. miles in the State (with & without broadband)	8961			6	>= 6 mbps. < 10 mbps.	65945	15.7%
		Total Census Blocks in the State (with & without broadband)	201062			7	>= 10 mbps. < 25 mbps.	80469	19.2%
						8	>= 25 mbps. < 50 mbps.	34492	8.2%
Services Provider Details		Providers	53			9	> 50 mbps, < 100 mbps.	45	0.0%
		Number of Distinct "Doing Business As"	51			10	> 100 mbps, < 1 gbps.	38	0.0%
		Number of Distinct FRN	54			11	> 1 gbps.	0	0.0%
Technology	10	Asymmetric xDSL	173584	41.4%		ZZ "null"		100309	23.9%
	20	Symmetric xDSL	61139	14.6%	Max. Advertised Upload Speed	2	>200 kbps, < 768 kbps.	34118	8.1%
	30	Other Copper Wireless	86894	20.7%		3	>= 768 kbps. < 1.5 mbps.	63452	15.1%
	40	Cable Modem-DOCSIS 3.0	59661	14.2%		4	> 1.5 mbps, < 3 mbps.	64162	15.3%
	41	Cable Modem-Other	20306	4.8%		5	> 3 mbps, < 6 mbps.	106480	25.4%
	50	Optical Carrier/Fiber	17347	4.1%		6	> 6 mbps, < 10 mbps.	41724	10.0%
	60	Satellite	0	0.0%		7	> 10 mbps, < 25 mbps.	95892	22.9%
	70	Terrestrial Fixed Wireless-Unlicensed	0	0.0%		8	> 25 mbps, < 50 mbps.	6734	1.6%
	71	Terrestrial Fixed Wireless-Licensed	0	0.0%		9	> 50 mbps, < 100 mbps.	6021	1.4%
	80	Terrestrial Mobile Wireless	0	0.0%		10	> 100 mbps, < 1 gbps.	304	0.1%
	90	Electrical Power Line	0	0.0%		11	> 1 gbps.	44	0.0%
	0	Other	0	0.0%	Typical Upload Speed	2	>200 kbps, < 768 kbps.	32489	7.8%
Max. Advertised Download Speed	3	> 768 kbps, < 1.5 mbps.	7841	1.9%		3	> 768 kbps, < 1.5 mbps.	55503	13.2%
	4	> 1.5 mbps, < 3 mbps.	27278	6.5%		4	> 1.5 mbps, < 3 mbps.	62351	14.9%
	5	> 3 mbps, < 6 mbps.	88773	21.2%		5	> 3 mbps, < 6 mbps.	98383	23.5%
	6	> 6 mbps, < 10 mbps.	94381	22.5%		6	> 6 mbps, < 10 mbps.	40276	9.6%
	7	> 10 mbps, < 25 mbps.	91889	21.9%		7	> 10 mbps, < 25 mbps.	26635	6.4%
	8	> 25 mbps, < 50 mbps.	38373	9.2%		8	> 25 mbps, < 50 mbps.	2947	0.7%
	9	> 50 mbps, < 100 mbps.	8492	2.0%		9	> 50 mbps, < 100 mbps.	38	0.0%
	10	> 100 mbps, < 1 gbps.	61860	14.8%		10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	44	0.0%		11	> 1 gbps.	0	0.0%
Provider Type	1	Provider	418931	100.0%		ZZ "null"		100309	23.9%
	2	Reseller	0	0.0%	End User Name	1	Residential	404311	96.5%
End User Name	1	Residential	404311	96.5%		2	Governmental	13757	3.3%
	2	Governmental	13757	3.3%		3	Small Business	111	0.1%
	3	Small Business	111	0.1%		4	Med or Lrg Enterprise	752	0.4%
	4	Med or Lrg Enterprise	752	0.4%					

Colorado									
Street Segment									
Data Type		Code	Data Element	Count	%				
Record Details			Total Records	152448					
Services Provider Details			Providers	48					
			Number of Distinct "Doing Business As"	47					
			Number of Distinct FRN	49					
Technology	10	Asymmetric xDSL		81248	53.3%				
	20	Symmetric xDSL		15612	10.2%				
	30	Other Copper Wireless		20631	13.5%				
	40	Cable Modem-DOCSIS 3.0		13642	8.9%				
	41	Cable Modem-Other		4347	2.9%				
	50	Optical Carrier/Fiber		16968	11.1%				
	60	Satellite		0	0.0%				
	70	Terrestrial Fixed Wireless-Unlicensed		0	0.0%				
	71	Terrestrial Fixed Wireless-Licensed		0	0.0%				
	80	Terrestrial Mobile Wireless		0	0.0%				
	90	Electrical Power Line		0	0.0%				
	0	Other		0	0.0%				
Max. Advertised Download Speed	3	> 768 kbps, < 1.5 mbps.		14154	9.3%				
	4	> 1.5 mbps, < 3 mbps.		25239	16.6%				
	5	> 3 mbps, < 6 mbps.		11485	7.5%				
	6	> 6 mbps, < 10 mbps.		32025	21.0%				
	7	> 10 mbps, < 25 mbps.		43716	28.7%				
	8	> 25 mbps, < 50 mbps.		8362	5.5%				
	9	> 50 mbps, < 100 mbps.		3864	2.5%				
	10	> 100 mbps, < 1 gbps.		13603	8.9%				
	11	> 1 gbps.		0	0.0%				
Provider Type		1	Provider	152448	100.0%				
		2	Reseller	0	0.0%				
End User Name	1	Residential		130392	85.5%				
	2	Governmental		22016	14.4%				
	4	Med or Lrg Enterprise		40	0.0%				

Data Type		Code	Data Element	Count	%
Typical Download Speed	3	> 768 kbps, < 1.5 mbps.	3931	2.6%	
	4	> 1.5 mbps, < 3 mbps.	22072	14.5%	
	5	> 3 mbps, < 6 mbps.	12076	7.9%	
	6	> 6 mbps, < 10 mbps.	21568	14.1%	
	7	> 10 mbps, < 25 mbps.	30554	20.0%	
	8	> 25 mbps, < 50 mbps.	1810	1.2%	
	9	> 50 mbps, < 100 mbps.	0	0.0%	
	10	> 100 mbps, < 1 gbps.	0	0.0%	
	11	> 1 gbps.	0	0.0%	
		ZZ "null"	60437	39.6%	
Max. Advertised Upload Speed	2	>200 kbps, < 768 kbps.	24419	16.0%	
	3	> 768 kbps, < 1.5 mbps.	32092	21.1%	
	4	> 1.5 mbps, < 3 mbps.	32188	21.1%	
	5	> 3 mbps, < 6 mbps.	14138	9.3%	
	6	> 6 mbps, < 10 mbps.	23516	15.4%	
	7	> 10 mbps, < 25 mbps.	19997	13.1%	
	8	> 25 mbps, < 50 mbps.	5988	3.9%	
	9	> 50 mbps, < 100 mbps.	109	0.1%	
	10	> 100 mbps, < 1 gbps.	1	0.0%	
	11	> 1 gbps.	0	0.0%	
	Typical Upload Speed	2	>200 kbps, < 768 kbps.	20600	13.5%
3		> 768 kbps, < 1.5 mbps.	20474	13.4%	
4		> 1.5 mbps, < 3 mbps.	25914	17.0%	
5		> 3 mbps, < 6 mbps.	8554	5.6%	
6		> 6 mbps, < 10 mbps.	15200	10.0%	
7		> 10 mbps, < 25 mbps.	1269	0.8%	
8		> 25 mbps, < 50 mbps.	0	0.0%	
9		> 50 mbps, < 100 mbps.	0	0.0%	
10		> 100 mbps, < 1 gbps.	0	0.0%	
11		> 1 gbps.	0	0.0%	
		ZZ "null"	60437	39.6%	

Colorado

Wireless

Data Type	Code	Data Element	Count	%	Data Type	Code	Data Element	Count	%
Record Details		Total Records	111		Typical Download Speed	2	>200 kbps, < 768 kbps.	2	1.8%
Services Provider Details		Providers	66			3	> 768 kbps, < 1.5 mbps.	15	13.5%
		Business As"	64			4	> 1.5 mbps, < 3 mbps.	7	6.3%
		Number of Distinct FRN	64			5	> 3 mbps, < 6 mbps.	15	13.5%
Technology	10	Asymmetric xDSL	0	0.0%		6	> 6 mbps, < 10 mbps.	14	12.6%
	20	Symmetric xDSL	0	0.0%		7	> 10 mbps, < 25 mbps.	13	11.7%
	30	Other Copper Wireless	0	0.0%		8	> 25 mbps, < 50 mbps.	0	0.0%
	40	Cable Modem-DOCSIS 3.0	0	0.0%		9	> 50 mbps, < 100 mbps.	0	0.0%
	41	Cable Modem-Other	0	0.0%		10	> 100 mbps, < 1 gbps.	0	0.0%
	50	Optical Carrier/Fiber	0	0.0%			ZZ "null"	45	40.5%
	60	Satellite	6	5.4%	Max. Advertised Upload Speed	2	>200 kbps, < 768 kbps.	15	13.5%
	70	Unlicensed	55	49.5%		3	> 768 kbps, < 1.5 mbps.	27	24.3%
	71	Terrestrial Fixed Wireless-Licensed	22	19.8%		4	> 1.5 mbps, < 3 mbps.	23	20.7%
	80	Terrestrial Mobile Wireless	28	25.2%		5	> 3 mbps, < 6 mbps.	20	18.0%
	90	Electrical Power Line	0	0.0%		6	> 6 mbps, < 10 mbps.	16	14.4%
	0	Other	0	0.0%		7	> 10 mbps, < 25 mbps.	9	8.1%
Max. Advertised Download Speed	3	> 768 kbps, < 1.5 mbps.	12	10.8%		8	> 25 mbps, < 50 mbps.	0	0.0%
	4	> 1.5 mbps, < 3 mbps.	13	11.7%		9	> 50 mbps, < 100 mbps.	0	0.0%
	5	> 3 mbps, < 6 mbps.	22	19.8%		10	> 100 mbps, < 1 gbps.	1	0.9%
	6	> 6 mbps, < 10 mbps.	26	23.4%		11	> 1 gbps.	0	0.0%
	7	> 10 mbps, < 25 mbps.	36	32.4%	Typical Upload Speed	2	>200 kbps, < 768 kbps.	16	14.4%
	8	> 25 mbps, < 50 mbps.	1	0.9%		3	> 768 kbps, < 1.5 mbps.	22	19.8%
	9	> 50 mbps, < 100 mbps.	0	0.0%		4	> 1.5 mbps, < 3 mbps.	8	7.2%
	10	> 100 mbps, < 1 gbps.	1	0.9%		5	> 3 mbps, < 6 mbps.	12	10.8%
	11	> 1 gbps.	0	0.0%		6	> 6 mbps, < 10 mbps.	6	5.4%
Spectrum	1	800 MHz Spectrum Used	5	4.5%		7	> 10 mbps, < 25 mbps.	2	1.8%
	2	700 MHz Spectrum Used	7	6.3%		8	> 25 mbps, < 50 mbps.	0	0.0%
	3	1900 MHz Spectrum Used	12	10.8%		9	> 50 mbps, < 100 mbps.	0	0.0%
	4	1700 MHz Spectrum Used	8	7.2%		10	> 100 mbps, < 1 gbps.	0	0.0%
	5	2500 MHz Spectrum Used	7	6.3%			ZZ "null"	45	40.5%
	6	Unlicensed Spectrum Used	58	52.3%	End User Name	1	Residential	95	85.6%
	7	Specialist Mobile Radio Servi	4	3.6%		2	Governmental	0	0.0%
	8	Wireless Communication Ser	4	3.6%		5	Other	16	14.4%
	9	Satellite	6	5.4%					

Colorado

Service Addresses

Data Type	Code	Data Element	Count	%	Data Type	Code	Data Element	Count	%
Record Details		Total Records	3131		Typical Download Speed	3	> 768 kbps, < 1.5 mbps.	0	0.0%
Services Provider Details		Number of Distinct Providers	4			4	> 1.5 mbps, < 3 mbps.	0	0.0%
		Number of Distinct "Doing Business As"	4			5	> 3 mbps, < 6 mbps.	0	0.0%
		Number of Distinct FRN	4			6	> 6 mbps, < 10 mbps.	0	0.0%
						7	> 10 mbps, < 25 mbps.	0	0.0%
Technology	10	Asymmetric xDSL	0	0.0%		8	> 25 mbps, < 50 mbps.	0	0.0%
	20	Symmetric xDSL	0	0.0%		9	> 50 mbps, < 100 mbps.	0	0.0%
	30	Other Copper Wireless	0	0.0%		10	> 100 mbps, < 1 gbps.	516	16.5%
	40	Cable Modem-DOCSIS 3.0	0	0.0%		11	> 1 gbps.	2292	73.2%
	41	Cable Modem-Other	0	0.0%			ZZ "null"	323	10.3%
	50	Optical Carrier/Fiber	3131	100.0%	Max. Advertised Upload Speed	2	>200 kbps, < 768 kbps.	0	0.0%
	60	Satellite	0	0.0%		3	> 768 kbps, < 1.5 mbps.	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	0	0.0%		4	> 1.5 mbps, < 3 mbps.	0	0.0%
	71	Terrestrial Fixed Wireless-Licensed	0	0.0%		5	> 3 mbps, < 6 mbps.	0	0.0%
	80	Terrestrial Mobile Wireless	0	0.0%		6	> 6 mbps, < 10 mbps.	0	0.0%
	90	Electrical Power Line	0	0.0%		7	> 10 mbps, < 25 mbps.	0	0.0%
	0	Other	0	0.0%		8	> 25 mbps, < 50 mbps.	0	0.0%
Max. Advertised Download Speed	3	> 768 kbps, < 1.5 mbps.	0	0.0%		9	> 50 mbps, < 100 mbps.	0	0.0%
	4	> 1.5 mbps, < 3 mbps.	0	0.0%		10	> 100 mbps, < 1 gbps.	35	1.1%
	5	> 3 mbps, < 6 mbps.	0	0.0%		11	> 1 gbps.	3096	98.9%
	6	> 6 mbps, < 10 mbps.	0	0.0%	Typical Upload Speed	2	>200 kbps, < 768 kbps.	0	0.0%
	7	> 10 mbps, < 25 mbps.	0	0.0%		3	> 768 kbps, < 1.5 mbps.	0	0.0%
	8	> 25 mbps, < 50 mbps.	0	0.0%		4	> 1.5 mbps, < 3 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%		5	> 3 mbps, < 6 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%		6	> 6 mbps, < 10 mbps.	0	0.0%
	11	> 1 gbps.	3131	100.0%		7	> 10 mbps, < 25 mbps.	0	0.0%
Provider Type	1	Provider	2292	73.2%		8	> 25 mbps, < 50 mbps.	0	0.0%
	2	Reseller	839	26.8%		9	> 50 mbps, < 100 mbps.	0	0.0%
End User Name	1	Residential	43	1.4%		10	> 100 mbps, < 1 gbps.	516	16.5%
	2	Governmental	3088	98.6%		11	> 1 gbps.	2292	73.2%
							ZZ "null"	323	10.3%

Colorado

Community Anchor Institution

Data Type		Code	Data Element	Count	%
Record Details			Total Records	5524	
Anchor Category	1	School-K through 12	2111	38.2%	
	2	Library	252	4.6%	
	3	Medical/healthcare	711	12.9%	
	4	Public safety	1780	32.2%	
	5	post-secondary	55	1.0%	
	6	Other community support- /gov't	604	10.9%	
	7	Other community support- non-/gov't	11	0.2%	
	Technology	10	Asymmetric xDSL	1212	21.9%
20		Symmetric xDSL	21	0.4%	
30		Other Copper Wireless	1914	34.6%	
40		Cable Modem-DOCSIS 3.0	7	0.1%	
41		Cable Modem-Other	146	2.6%	
50		Optical Carrier/Fiber	1804	32.7%	
60		Satellite	14	0.3%	
70		Terrestrial Fixed Wireless- Unlicensed	25	0.5%	
71		Terrestrial Fixed Wireless- Licensed	89	1.6%	
80		Terrestrial Mobile Wireless	0	0.0%	
90		Electrical Power Line	0	0.0%	
0		Other	0	0.0%	
		-9999 "null"	292	5.3%	
Max. Advertised Download Speed	1	< 200 kbps.		0.0%	
	2	>200 kbps, < 768 kbps.	2	0.0%	
	3	> 768 kbps, < 1.5 mbps.	112	2.0%	
	4	> 1.5 mbps, < 3 mbps.	153	2.8%	
	5	> 3 mbps, < 6 mbps.	237	4.3%	
	6	> 6 mbps, < 10 mbps.	175	3.2%	
	7	> 10 mbps, < 25 mbps.	388	7.0%	
	8	> 25 mbps, < 50 mbps.	73	1.3%	
	9	> 50 mbps, < 100 mbps.	22	0.4%	
	10	> 100 mbps, < 1 gbps.	2	0.0%	
	11	> 1 gbps.	20	0.4%	
		ZZ "null"	4292	77.7%	

Data Type	Code	Data Element	Count	%	
Max. Advertised Upload Speed	1	< 200 kbps.	0	0.0%	
	2	>200 kbps, < 768 kbps.	126	2.3%	
	3	> 768 kbps, < 1.5 mbps.	124	2.2%	
	4	> 1.5 mbps, < 3 mbps.	153	2.8%	
	5	> 3 mbps, < 6 mbps.	289	5.2%	
	6	> 6 mbps, < 10 mbps.	298	5.4%	
	7	> 10 mbps, < 25 mbps.	193	3.5%	
	8	> 25 mbps, < 50 mbps.	17	0.3%	
	9	> 50 mbps, < 100 mbps.	11	0.2%	
	10	> 100 mbps, < 1 gbps.	19	0.3%	
	11	> 1 gbps.	2	0.0%	
		ZZ "null"	4292	77.7%	
Y/N Broadband Service	Y	Yes-Subscribers to Service	5231	94.7%	
	N	No-Does Not Subscribers to Service	286	5.2%	
	U	Unknown	7	0.1%	
Lat/Long Accuracy	1	Lat/Long falls within the State	5524		
	2	Total Lat/Long	5524	100%	
Anchor Names	Total Count Anchors Names		5524		
	Distinct Count of Anchor Names		5371		
Community Anchor Institution Category Count with Broadband Information			Count	BB Info	
	1	School-K through 12	2111	2084	
	2	Library	252	251	
	3	Medical/healthcare	711	694	
	4	Public safety	1780	1593	
	5	University, college, other post-secondary	55	55	
	6	Other community support-/gov't	604	546	
	7	Other community support-non-/gov't	11	8	
		Totals	5524	5231	
	Public WIFI	1	Y	16	
		2	N	5508	

Colorado

Middle Mile

Data Type	Code	Data Element	Count	%	Data Type	Code	Data Element	Count	%
Record Details		Total Records	1962		Facility Type	1	Fiber	992	50.6%
						2	Copper	4	0.2%
Services Provider Details		Number of Distinct Providers	66			3	Hybrid Fiber Coax (HFC)	2	0.1%
		Number of Distinct "Doing Business As"	63			4	Wireless	964	49.1%
		Number of Distinct FRN	62				N/A "null"	0	0.0%
Ownership	0	Owned	1158	59.0%	Lat / Long		# of Lat/Long in State	1962	100%
	1	Leased	804	41.0%			Total Lat/Long	1962	
Facility Capacity	1	Multiple T1's and less than 40 mbps.	829	42.3%	Elevation		Number of Data Points	699	
	2	Greater than 40 mbps. and less than 150 mbps.	171	8.7%			Lowest Elevation	0	
	3	Greater than 150 mbps. and less than 600 mbps.	135	6.9%			Highest Elevation	350	
	4	Greater than 600 mbps. and less than 2.4 gbps.	51	2.6%					
	5	Greater than 2.4 gbps. and less than 10 gbps.	0	0.0%					
	6	Greater than 10 gbps	776	39.6%					

Colorado

Services Providers				Census	Roads	Wireless	Mid Mile
#	Broadband Services Providers Submitted						
	FRN	Company Name	Doing Business As				
1	0022810253	Aerux Broadband	Aerux Broadband			1	
2	0004311627	Agate Mutual Telephone Cooperative Association	Prairie Networks, LLC	28	214		10
3	0019535699	Airbits, LLC	Airbits, LLC			1	25
4	0003777927	Antilles Wireless, LLC	USA Communications	232		1	
5	0004496774	AT&T Inc.	AT&T Corp, Inc.			5	1
6	0014860522	Baja Broadband Holding Company	Baja Broadband Operating Company, LLC	3201	280		
7	0003728292	Beulahland Communications, Inc.,	Beulahland			1	1
8	0010612067	Big Sandy Telecom, Inc.	Big Sandy Telecom, Inc.	351	2039		18
9	0003754652	Bijou Telephone Co-op Association,	Bijou Telephone	1005	1082	2	4
10	0003766201	Blanca Telephone Company	Blanca Telephone	2205	2409		
11	0017108747	Brainstorm Internet	Brainstorm Internet	562	54	3	45
12	0014778781	BySky, Inc.	BySky, Inc.			1	
13	0019746445	CAP Cable	USA Communications	628	5	1	
14	0018589259	Cardinal Broadband, LLC	Cardinal Broadband, LLC	35			
15	0018626853	CenturyTel, Inc.	CenturyLink	93556	51989		
16	0007001977	Charter Communications, Inc.	Bresnan Communications	16248	3274		
17	0006980866	Chase 3000, Inc.	Chase 3000, Inc.			1	2
18	0001621127	City of Glenwood Springs	City of Glenwood Springs, Community Broadband	115	1	1	
19	0017775628	Clear Wireless, LLC	Clear Wireless, LLC			1	
20	0001614015	Colorado Mobile Inet, LLC	Colorado Mobile Inet, LLC			1	22
21	9999	Colorado Wireless Exchange Cooperative	Colorado Wireless Exchange Cooperative			1	3
22	0002147098	Columbine Telecom Company	FairPoint Communications	516	1646	1	20
23	0004441663	Comcast Cable Communications, LLC	Comcast	59552	13642		
24	0018122879	Commnet Wireless	Commnet Wireless			4	
25	0001617281	Delta County Tele-comm, Inc.	TDS Telecom	833	848		1
26	0020233508	DirectLink, LLC	DirectLink, LLC			2	77
27	0017195017	Diverse Datum, Inc.	Diverse Datum, Inc.			1	28
28	0001629781	Dubois Telephone Exchange, Inc.,	DTE	55	113	1	4
29	0013339973	Eagle Communications, Inc.	Eagle Cable TV And	237	29		1
30	0004317731	Eastern Slope Rural Telephone Association, Inc.	Eastern Slope Rural Telephone Association,	1975	6254		12
31	0020146056	Elevated Access LLC	Elevated Access LLC	23	1	3	5
32	0461178919	Elite Broadband	Elite Broadband			1	
33	0003767852	Eschelon Telecom of Colorado, Inc.	Integra Telecom	81750	20735		
34	0017509779	Estes Valley Networks, Inc.	Estes Valley Networks,			1	3
35	0019436757	Falcon Broadband, Inc.	Falcon Broadband, Inc.	276	12		
36	0005059092	Farmers Telephone Company	Farmers Telecommunications	682	111	2	1

Colorado

Services Providers				Census	Roads	Wireless	Mid Mile
#	Broadband Services Providers Submitted						
	FRN	Company Name	Doing Business As				
37	0004338489	Farmers Telephone Company	Farmers Telephone Company	180	921		12
38	0007719719	FastTrack Communications, Inc.	FastTrack Communications, Inc.	12380	22005		
39	0015575285	Front Range Internet, Inc.	Front Range Internet, Inc.	5794	97		1
40	0014830616	GoGo Inc	GoGo Air				8
41	0016084683	Grand County Internet Services, Inc.	Grand County Internet Services, Inc.			1	34
42	0000824224	Grand Valley Telecommunications, Inc.	Grand Valley Telecommunications, Inc.	1171	10	1	7
43	0004381380	Great Plains Communications, Inc.	Great Plains Communications, Inc.	5	2		
44	0001616200	Haxtun Telephone	Haxtun	1023	1327		
45	0019794643	HiSpeed 4 U, Inc	HiSpeed 4 U, Inc			1	24
46	0018483073	Hughes Network Systems, LLC	HughesNet			2	
47	0007651219	iLOKA Inc	Microtech-tel	2458	43		
48	0015866460	Internet Colorado	Internet Colorado	364	54	1	12
49	0018706002	Inventive Wireless of Nebraska, LLC	Vistabeam			1	
50	0014175673	JAB Broadband	Skybeam, Inc.			1	399
51	0003766623	Jade Communications, LLC	Jade Communications, LLC			1	7
52	0002748044	James Cable LLC	CommuniComm Services	692	3		1
53	0003728284	J.e.d. Enterprises, Inc.	J.e.d. Enterprises, Inc.	203	1355		16
54	0001611334	KenTec Communications	KenTec Communications	737	1791	1	35
55	9999	Kremmling Technology Services	Kremmling Technology Services, LLC			1	3
56	0002963528	Leap Wireless International, Inc.	Cricket Communications, Inc.,			2	
57	0003723822	Level 3 Communications, LLC	Level 3 Communications,				272
58	0005030200	Live Wire Networks, Inc.	Live Wire Networks, Inc.	293		3	
59	0018769547	Magnolia Road Internet Coop	MRIC			2	20
60	0003753787	MegaPath Corporation	MegaPath Corporation	119224	4710		3
61	0021388996	Mountain Broadband, LLC	Mountain Broadband			1	18
62	0016631087	Mountain Computer Wizards	Mountain Computer Wizard			1	5
63	0001610815	Mountain Village Cable TV	Mountain Village Cable TV	61			
64	9999	Nedernet, Inc.	Nedernet, Inc.			1	15
65	0004312187	Nucla-Naturita Telephone Company	Nucla-Naturita Telephone Company	297	332	2	
66	0004311809	Nunn Telephone Company	Nunn Communication, LLC	398	1358		1
67	0022042568	OurayNet	OurayNet			1	13
68	0016286825	PCI Broadband	PCI Broadband			1	7
69	0014699953	Peetz Communications, LLC	Peetz Cooperative Telephone Company	94	179	1	2
70	0004314316	Phillips County Telephone Company	PCTelecom	649	1043	2	3

Colorado

Services Providers				Census	Roads	Wireless	Mid Mile
#	Broadband Services Providers Submitted						
	FRN	Company Name	Doing Business As				
71	0001615889	Plains Cooperative Telephone Association, Inc.,	Plains Cooperative Telephone Association,	1113	3374	1	52
72	0011953643	Premier Systems Unlimited Inc.	Plains.Net			1	27
73	0016084675	Rebeltec Communications, LLC	Rebeltec	91		2	26
74	0005059092	Rico Telephone Company	Rico Telephone Company	78	93		3
75	0014705602	Roggen Telephone Cooperative Company	Roggen Telephone Enterprises, Inc.			1	2
76	0001615665	Rye Telephone Company, Inc.	ghValley.net	894	2641	1	2
77	0004310769	S&T Telephone Coop Association. Inc	S&T Telephone Coop Assoc Inc	22	29		
78	0005061775	San Isabel Telecom, Inc.	San Isabel Telecom, Inc.	1360	634	1	5
79	0016136327	SECOM	SECOM			2	28
80	0018756155	Skycasters, LLC	Skycasters			1	
81	0016134751	SkyWerx Industries, LLC	SkyWerx Industries, LLC			1	
82	0017163304	Slopeside Internet, LLC	Slopeside Internet, LLC			3	
83	0005070933	South Park Telephone Company, LLC	ghValley.net			2	1
84	0003778941	Spring Creek Cable	Spring Creek Cable	225	47		1
85	0003774593	Sprint Nextel Corporation	Sprint			2	1
86	0005087457	StarBand Communications Inc.	StarBand Communications Inc.			1	
87	0015021066	Stelera Wireless, LLC	Stelera Wireless, LLC			1	28
88	0001616390	Strasburg Telephone Company	TDS Telecom	111	175		1
89	0003723236	Sunflower Telephone Company	FairPoint Communications	289	531		12
90	0006945950	T-Mobile USA, Inc.	T-Mobile			8	7
91	0013430244	Time Warner Cable	Time Warner Cable	925	859		
92	0004351086	tw telecom inc.	tw telecom inc.	1342	5		2
93	0005200067	Uintah Basin Electronic Telecommuni	Strata Networks	810	277		
94	0003290673	Verizon Wireless	Verizon Wireless			4	
95	0015360456	Viaero Wireless	Viaero Wireless			1	
96	0007843766	ViaSat	ViaSat Communications			2	
97	0020647715	Vision Wireless Communications	Vision Wireless Communications			3	19
98	0018191155	Wifi West	Wifi West			1	7
99	0001616192	Wiggins Telephone Association	Wiggins Telephone Associa	720	3769		1
100	0006275945	XO Communications, LLC	XO Communications Services, Inc. (Affiliated Entity)	863	46		
101	0015331689	Zayo Enterprise Networks, LLC	Zayo Enterprise Networks, LLC				496
102	0018186395	Zero Error Networks, LLC	Zero Error Networks, LLC			1	19
103	0012579652	Zirkel Wireless, LLC	Zirkel Wireless, LLC			4	20
104	0019898303	Cogent Communications, Inc.	Cogent Communications, Inc	43 Service Address			
105	0003723822	Level 3 Communications, LLC	Level 3 Communications, LLC	2292 Service Address			
106	0014817357	Unite Private Networks, LLC	Unite Private Networks	516 Service Address			

Colorado								
Services Providers					Census	Roads	Wireless	Mid Mile
#	Broadband Services Providers Submitted							
	FRN	Company Name	Doing Business As					
107	0015331689	Zayo Enterprise Networks, LLC	Zayo Enterprise Networks, LLC	280 Service Address				

Colorado

Distinct Speed Tiers Provided

Technology Codes		Allowable	
		Down	Up
10	Asymmetric xDSL	3 to 10	2 to 9
20	Symmetric xDSL	3 to 9	2 to 9
30	Other Copper Wireless	3 to 11	2 to 11
40	Cable Modem-DOCSIS 3.0	3 to 10	2 to 7
41	Cable Modem-Other	3 to 7	2 to 7
50	Optical Carrier/Fiber to End User	3 to 11	2 to 11
60	Satellite	3 to 5	2 to 4
70	Terrestrial Fixed Wireless-Unlicensed	3 to 7	2 to 7
71	Terrestrial Fixed Wireless-Licensed	3 to 7	2 to 7
80	Terrestrial Mobile Wireless	3 to 7	2 to 7
90	Electric Power Lines	3 to 5	2 to 5
0	All Other	3 to 11	2 to 11

Speed Tier Codes	
1	< 200 kbps.
2	>200 kbps, < 768 kbps.
3	> 768 kbps, < 1.5 mbps.
4	> 1.5 mbps, < 3 mbps.
5	> 3 mbps, < 6 mbps.
6	> 6 mbps, < 10 mbps.
7	> 10 mbps, < 25 mbps.
8	> 25 mbps, < 50 mbps.
9	> 50 mbps, < 100 mbps.
10	> 100 mbps, < 1 gbps.
11	> 1 gbps.

Colorado

Distinct Speed Tiers Provided

Maximum Advertised Speed				Typical Speed			
Technology	Download	Upload	Freq.	Technology	Download	Upload	Freq.
10	3	2	218	10	3	2	1345
10	3	3	4487	10	3	3	4487
10	4	2	17566	10	4	2	17462
10	4	3	18496	10	4	3	17616
10	5	2	6488	10	5	2	30934
10	5	3	10656	10	5	3	13018
10	6	2	27569	10	6	2	2483
10	6	3	9908	10	6	3	9782
10	6	4	1181	10	7	3	29058
10	6	5	396	10	7	4	76072
10	6	6	8229	10	8	5	11509
10	7	3	36322	10	8	7	22958
10	7	4	73494	10	ZZ	ZZ	23508
10	7	7	1097	20	3	3	576
10	8	4	13	20	4	4	12092
10	8	5	11509	20	5	5	1101
10	8	7	22958	20	6	6	55426
10	8	8	372	20	7	7	3778
10	9	7	2295	20	8	8	1799
10	9	8	878	20	ZZ	ZZ	1979
20	3	2	41	30	4	4	2210
20	3	3	316	30	5	5	74778
20	4	4	6809	30	6	4	22
20	5	5	7001	30	7	5	2
20	6	3	35	30	7	7	338
20	6	5	184	30	7	8	1099
20	6	6	53466	30	ZZ	ZZ	29076
20	7	3	54	40	ZZ	ZZ	73303
20	7	7	6119	41	5	2	93
20	8	8	2726	41	6	4	272
30	3	2	5078	41	6	5	19522
30	3	3	11850	41	7	2	772
30	4	4	4961	41	7	4	266
30	5	4	5	41	ZZ	ZZ	3728
30	5	5	75841	50	6	3	6
30	6	4	22	50	7	3	1434
30	6	5	1499	50	7	4	2731
30	6	6	1326	50	7	5	25

Colorado

Distinct Speed Tiers Provided

Maximum Advertised Speed				Typical Speed			
Technology	Download	Upload	Freq.	Technology	Download	Upload	Freq.
30	7	5	2	50	7	6	50
30	7	7	2343	50	7	7	798
30	7	8	1099	50	8	7	32
30	8	8	3481	50	8	8	4
30	9	9	14	50	9	8	45
30	10	10	4	50	10	9	38
40	6	3	741	50	10	10	516
40	10	7	72562	50	11	11	2292
41	4	2	695	50	ZZ	ZZ	29475
41	4	3	4	60	3	2	2
41	4	4	11	60	4	2	1
41	5	2	93	60	ZZ	ZZ	3
41	5	3	5	70	3	2	2
41	5	4	2	70	3	3	2
41	6	4	1	70	4	3	4
41	6	5	19583	70	4	4	1
41	7	2	772	70	5	2	3
41	7	3	1074	70	5	3	3
41	7	4	2322	70	5	4	2
41	7	7	91	70	5	5	1
50	3	3	5	70	6	4	3
50	4	4	3975	70	6	5	3
50	5	2	15	70	6	6	2
50	5	3	40	70	70	4	1
50	5	5	112	70	7	5	2
50	6	2	2	70	7	6	3
50	6	3	45	70	7	7	2
50	6	6	2219	70	ZZ	ZZ	21
50	7	3	1506	71	3	3	4
50	7	4	3554	71	4	2	1
50	7	5	4491	71	5	2	1
50	7	7	1265	71	5	3	2
50	8	7	2433	71	6	3	1
50	8	8	3243	71	6	4	1
50	9	7	1619	71	6	5	1
50	9	8	923	71	7	5	2
50	9	9	5927	71	7	6	1
50	10	7	2407	71	ZZ	ZZ	8

Colorado

Distinct Speed Tiers Provided

Maximum Advertised Speed				Typical Speed			
Technology	Download	Upload	Freq.	Technology	Download	Upload	Freq.
50	10	9	189	80	2	2	2
50	10	10	301	80	3	2	4
50	11	11	44	80	3	3	1
60	4	2	1	80	5	3	3
60	5	3	3	80	6	3	2
60	7	4	1	80	6	5	1
60	7	5	1	80	7	5	2
70	3	2	1	80	ZZ	ZZ	13
70	3	3	2				
70	4	3	4				
70	4	4	1				
70	5	2	2				
70	5	3	4				
70	5	4	3				
70	5	5	1				
70	6	2	1				
70	6	3	2				
70	6	4	5				
70	6	5	3				
70	6	6	4				
70	7	3	1				
70	7	4	2				
70	7	5	5				
70	7	6	6				
70	7	7	6				
70	8	7	1				
70	10	10	1				
71	3	3	3				
71	4	2	1				
71	5	2	1				
71	5	3	3				
71	5	5	1				
71	6	3	1				
71	6	4	1				
71	6	5	3				
71	6	6	3				
71	7	5	2				
71	7	6	1				

Colorado

Distinct Speed Tiers Provided

Maximum Advertised Speed			
Technology	Download	Upload	Freq.
71	7	7	2
80	3	2	6
80	4	2	2
80	4	3	2
80	4	4	2
80	5	3	1
80	5	4	3
80	6	4	3
80	7	3	1
80	7	4	2
80	7	5	4
80	7	6	2