

OFFICIAL APRIL 2012 UPDATE SUBMISSION TO  
THE NATIONAL TELECOMMUNICATIONS AND INFORMATION  
ADMINISTRATION UNDER THE  
STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM  
FOR THE STATE OF ILLINOIS

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April 2012

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## COVER LETTER

April 2012

Ms. Anne W. Neville  
SBDD Grant Program Director  
National Telecommunications and Information Administration  
U.S. Department of Commerce  
1401 Constitution Avenue, NW Room 4716  
Washington, DC 20230

Dear Ms. Neville:

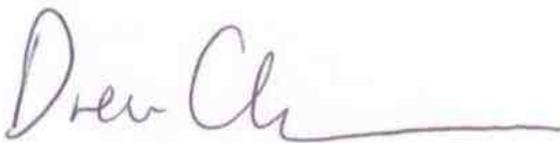
Please accept this submission from the Partnership for a Connected Illinois (PCI), the Designated Entity for Illinois.

These artifacts should be found to be compliant with the April 1, 2012, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications.

This cycle, PCI continued its full responsibility for the data-collection activities from broadband providers in the State. Assuming this role is vital to achieve the State's goals with regard to improving broadband access and adoption – and which are in turn central objectives of the Partnership for a Connected Illinois. All facets of this data-collection transition, and the activities that flowed from it, are included in the narrative that follows.

If you have any questions about this Data Narrative, please do not hesitate to contact me, at 217-816-4151.

Respectfully submitted,



Drew Clark  
Executive Director  
Partnership for a Connected Illinois, Inc.

## **INTRODUCTION**

The data submission cycle ending on April 1, 2012 marks the second round that PCI has held the full responsibility of data collection and publishing for the entirety of the six months. In this round, PCI used creative new strategies in its outreach to the carriers. PCI continued to establish Non-Disclosure Agreements (NDAs) with broadband providers for confidential information. The data that accompanies this narrative contains edited data for 56 out of the 128 carriers included in the submission. This round gave PCI the opportunity to refine its data verification process through the use of GeoPDF maps and third party data sources. PCI also improved its Community Anchor Institution database through a comprehensive survey strategy.

In this round, the Partnership for a Connected Illinois (PCI) took major steps in its three-fold mission to collect and publish broadband data, to ensure broadband access throughout the State, and to maximize broadband's impact. Assuming this data collection role is vital to achieve the State's goals with regard to improving broadband access and adoption. PCI appreciates the assistance provided by NTIA as PCI improved its collection, processing, and verification of broadband data for submission according to NTIA standards.

PCI has continued to refine the Broadband Illinois web site. This consumer-friendly interface allows for residents of the State to intuitively access the information collected by PCI – and provides the ability to “crowdsource” the collection of price information, actual speed data, and to let consumers verify the data provided by broadband providers. Since the last submission cycle that ended on October 1, 2011, PCI has included a range of maps not previously available. The Broadband Illinois website contains county-level GeoPDFs for each of Illinois's 102 counties, as well as pages for each broadband provider in the State of Illinois. These maps can be downloaded and edited using the TerraGo Technologies toolbar, which will be explained in great depth in various parts of this narrative.

This narrative will summarize the carrier outreach, the data production methods, carrier data verification, and the community anchor institution data. It will conclude with an examination of the Broadband Illinois website and the ways in which PCI is publishing carrier data in a user-friendly manner that allows for feedback from the consumer.

## **CARRIER OUTREACH**

From January 9- through January 11, 2011, all providers currently in the PCI census block and wireless layers were sent GeoPDFs that displayed their coverage area in the State of Illinois. The GeoPDFs were fully editable by the provider using the TerraGo technologies' toolbar. As part of this e-mail, PCI requested that updated data be submitted to PCI for its Cycle 5 submission to the NTIA and for the update to the Illinois Broadband map. For those providers who had not previously established a Non-Disclosure Agreement with PCI, a copy of PCI's draft version accompanied these maps.

This entire outreach process was tracked on Salesforce, PCI's contact management tool. As maps were created, distributed, and verified, fields were populated in Salesforce to denote that a map that

met the approval of the provider had been created. For those providers who did not respond to their initial map request, multiple follow-up e-mail and phone call attempts were made. PCI also tracked whether there would be an update to the data for this submission, what version number of the data PCI would be submitting, and the dates in which an NDA had been established.

This section will explain the way in which PCI conducted its outreach to the carriers and the different ways in which it received data. It will outline some of the major updates that were received in this round as well as describe both quantitatively and qualitatively the extent to which data was updated in this round.

## **NDA**

PCI continues to offer and abide by the terms of our NDA. If providers did not establish an NDA in a previous round, they were given the opportunity to do so in this round. In other instances, NDA's were individually negotiated to address specific provider concerns.

When an NDA was established with a provider, the date that the NDA was established was recorded in Salesforce. A field in Salesforce was also populated as to whether or not the provider would be submitting new data for this Cycle 5 submission. If a provider responded with no change to the data, PCI removed priority from that provider and refocused attention on those providers who reported that there was a change to their data as of December 31, 2011. PCI wanted to establish the NDAs by focusing on those providers with new data to submit.

To date, PCI has established 92 NDA's with the 128 providers in the database that accompanies this submission. Many of the carriers who have chosen not to establish an NDA with PCI, never had one with the previous mapping contractor, and continue to work with PCI to refine the data. The data package demonstrates that PCI is providing updated data for several providers with whom an NDA has not been established.

## **UPDATES TO DATA**

Of these 128 providers submitted as part of the data package in this round, edited data has been submitted for 56 of them. This data comes in the form of new infrastructure, speed changes, and corrections from PCI's previously submitted data. In this round, the Partnership for a Connected Illinois added ten new carriers: New Wave Net Corp, Open Air Wireless, Illinois Rural Electric Cooperative, Illinois Century Network, Kaizenet, Sonic Spectrum, Essec Telecom, Park TV & Electronics, 4SIWI, Hughes Networks, and WildBlue Communications. A merger between Leap Wireless and Denali Spectrum resulted in data for only Leap Wireless in this round. Also, Comcast sold all of its equipment to Telecommunications Management in Southern Illinois.

Broadband service providers submitted coverage in terms of the areas that they served, either in edited GeoPDFs, direct geospatial formats, CAD files, excel databases, Google Earth files, or as paper maps. The submitted polygons were overlaid on the census block polygons and those blocks touching were selected and used. The proper speed tier categories were assigned as necessary.

Throughout February and early March, the PCI data team formatted data as it was received. A cutoff date of February 17, 2012 was established for the acquisition of new data to include in this submission. However, PCI continued to accept well data after that date, and all providers who submitted updated coverage in this round is included in this submission.

The table below summarizes the status of data among providers.

No update to coverage area/ verified previous data/previous data submitted	62
Previous provider provided an update to coverage area that was included in this cycle.	45
New provider for this round	11
<b>Total number of providers included in this submission</b>	<b>128</b>

Total number of providers included in this submission	128
Identified Illinois providers that have never participated in mapping project	46
<b>Total number of providers identified in the State of Illinois</b>	<b>174</b>

## CHANGES AND CORRECTIONS

On August 19, 2011, PCI along with the other SBDD's designated entities submitted a changes and corrections document to the NTIA for the data that was submitted in Round 3. PCI felt this was a very useful document, and would like to incorporate it into this narrative to demonstrate the extent to which PCI updated its data in this round. While the last section quantitatively expressed how data was changed, this section qualitatively explains each of the updates that were made. Some of the more extensive changes and corrections will be described in later sections.

Provider	Change	Correction	Description
4SIWI		X	New Wireless and FTTH Provider
Adams Networks Incorporated	X		Added FTTH to Several Rural Towns
Alhambra-Grantfork Telephone Company	X		Increased Speed in Rural Towns
AT&T	X		Added new dataset for middle mile, mobile, and census block.
		X	Corrected mobile, middle mile, and census block data, that was incorrectly reported in last round
Cass Communications Management, Inc.	X		Increased T1 Speed
		X	Added cable towns not previously included.
Cellular Properties, Inc.	X		Updated new fixed wireless data and coverage area
		X	Added mobile wireless coverage
CenturyLink		X	Corrected Coverage to comply with speed tier check in script
Cequel Communications	X		Increased Coverage and Speed
		X	Addressed duplicate error

Charter Communications	X		Increase Coverage and Speed
Clearwire Corporation	X		Increase Coverage and Speed
Comcast	X		Comcast sold infrastructure in Southern Illinois. Updated Census Blocks and Roads
		X	Corrected previous census block issues
Computer Dynamics	X		Increase Speed and Coverage
Corn Belt Wireless	X		Increased Coverage and Speed
Covad Communications	X		Updated Street, Census Block and MiddleMile
		X	Correced issue When Joining Data
Delta Communications		X	Added DSL by 20 wire center central offices, as well as updating wireless
ESSEC TELCOM, INC.		X	New Provider in wireless layer
Fairpoint	X		Corrected Speed Tiers Change: Regocoded Address to get Census Blocks, increase coverage
		X	Added Service Address.
Frontier Communications		x	Trimmed existing data using wirecenter boundaries
Full Choice	X		Increase Speed and Coverage for DSL and Wireless
Heartland Cable	X		Added 2 Towers
Hughes Network Systems		X	New satellite provider in wireless layer
Illinois Century Network		X	New provider in middle mile layer
Illinois Rural Electric Cooperative		X	New provider in wireless layer
Intelligent Computing Solutions	X		No Change to Coverage, Increase MaxAdDown Speed
Jo-Carroll	X		Added 34 Towers
Joink	X		Updated Wireless data and coverage area
		X	Added DSL as a reseller
Kaizennet		X	New provider in wireless layer
KWISP Wireless Internet Services	X		Updated Coverage and Speed
Leap Wireless International, Inc.	X		Updated TT80 Coverage, merger with Leap and Denali
McDonough Telephone Cooperative	X		Added FTTH
McNabb Telephone Company	X		Increase Speed and Coverage
		X	Coverage increase
Mediacom		X	Trimmed data, and mapped based on service addresses, also added service address
Mount Vernon.Net, Inc.	X		Updated Coverage and Speed
New Wave Net Corp.		X	New provider in wireless layer

New Windsor Telephone Company	X		Added FTTH
		X	Addressed issue of duplicate census blocks with varying speeds.
One-Eleven Internet Service, Inc.	X		Increased Coverage and Speed
Oneida Telephone Exchange, Inc.	X		Added FTTH in rural community
Open Air Wireless		X	New provider in wireless layer
Park TV & Electronics		X	New provider in wireless and census block layer
RCN Regulatory	X		New Database Geocoded added
		X	Added Service Address
Shawnee Telephone Co	X		Added FTTH connection as a result of BTOP project
Sidera LLC	X		Added 3 Middle-Mile Points
Sonic Spectrum, Inc		X	New provider in wireless layer
Sprint Nextel	X		Mobile Wireless Update
		X	Corrected to have 3G in 4G coverage, per NTIA requests
T-Mobile	X		Mobile Wireless Update
Telecommunications Management, LLC	X		Added Cities in Southern Illinois, bought from Comcast, added D3 to towns
Time Warner Cable	x		Updated data and coverage area
Tw Telecom of Illinois, LLC	X		Middle Mile Update
US Cellular		X	Mobile Wireless Update
US Signal Company, LLC	X		Middle Mile Update
Verizon Communications, Inc.	X		Mobile Wireless Update
Wabash Telephone Cooperative, INC		X	Added DSL
WildBlue Communications		X	New satellite provider in wireless layer
Wireless Data Net, LLC	X		Increased Coverage and Speed
Wisper ISP, Inc.	X		Increase in Speed and Coverage
Woodhull Telephone Company		x	Increased Speed

### SBDD DATA TRANSFER MODEL METHODOLOGY

The submission of the broadband dataset for April 1, 2012 is contained within the SBDD Data Transfer Model. PCI has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the State, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Illinois.

**Inventory of Deliverables, Partnership for a Connected Illinois: April 1, 2012:**

<u>NOFA Requirement</u>	<u>Data Transfer Model</u>	<u>Data Description</u>
Appendix A: 1(a)	BB_Service_Address	List of addresses at which broadband service is available to end users in the provider's service area.
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

The provider data collected by PCI on behalf of the State of Illinois have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments. Wireless availability is contained as polygons of coverage areas. Middle-mile connections and community anchor institutions are contained as point data. The subscriber weighted nominal speed (if available) is contained within the overview feature class. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible. (Methodology Paper, April 2011)

For this round, we are including the state boundary. In this report, the NTIA highlights issues with gaps near the borders of the state. PCI is using the specified boundary included in the report. The boundary comes from the 2010 Tiger/Line Shapefiles. Downloaded from the Census, the boundary comes in the GCS\_North\_American 1983 Coordinate System, and is loaded as is into the submission geodatabase as is by way of the simple data loader.

**DATA PRODUCTION METHODS**

As mentioned, data was received in a number of formats that required processing in order prepare the data for submission in accordance with NTIA requirements. This section will discuss the various

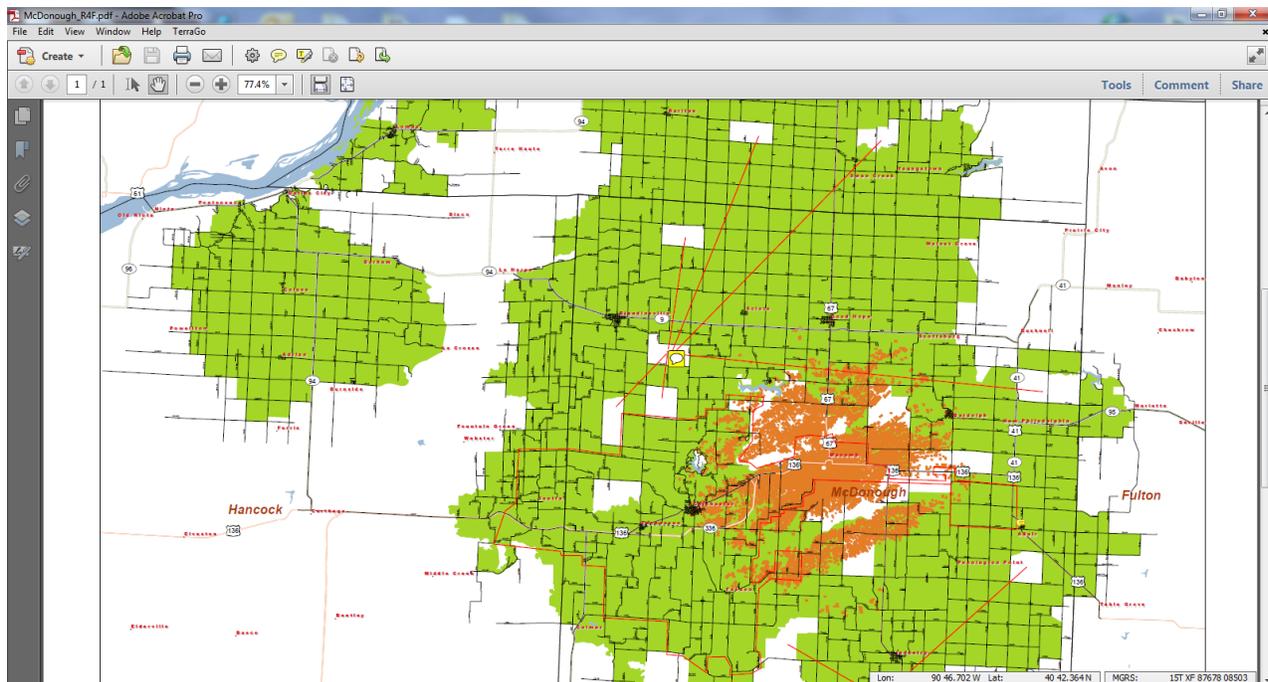
means in which PCI took as raw data were received from the provider, as well as how PCI assisted the provider in making the update process as easy as possible. It will examine each layer and the steps PCI took in updating the data that NTIA is in receipt of.

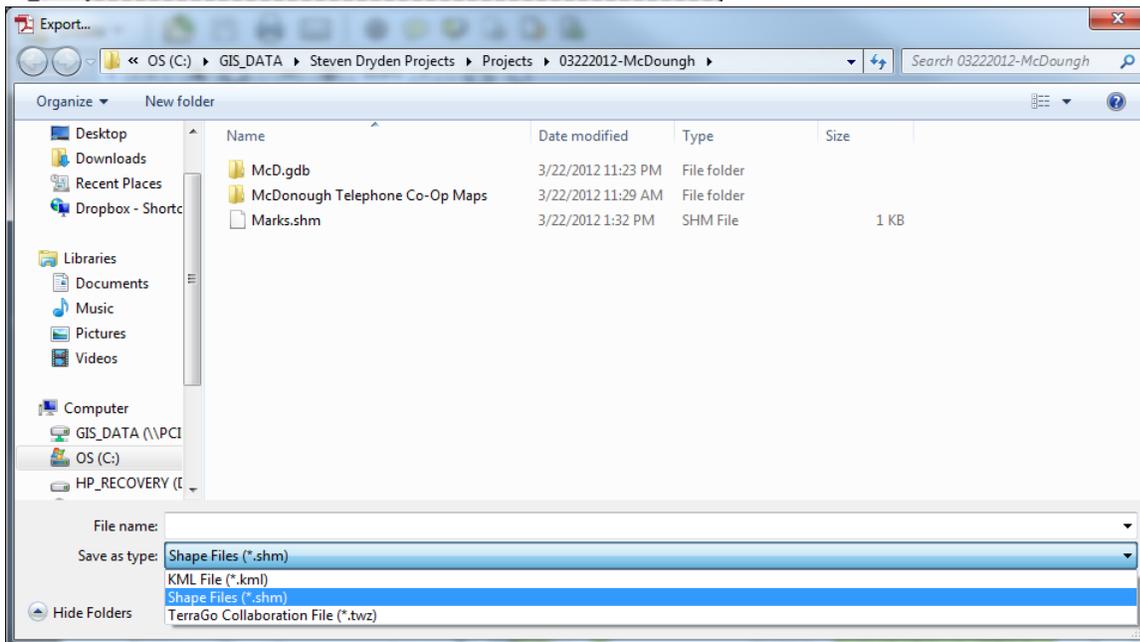
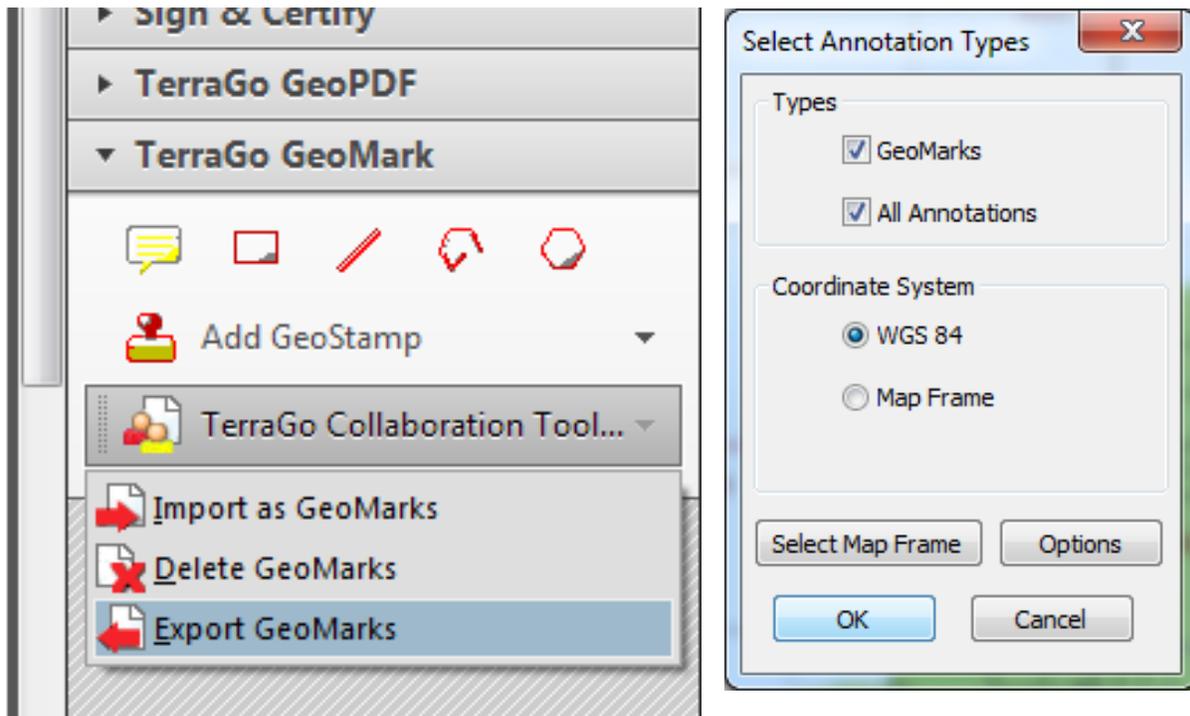
## GEOPDF AND TERRAGO TECHNOLOGIES TOOLBAR (DSL & FTTH)

In the initial outreach made to the providers from January 9 through January 11, they received a map of their existing coverage area. We do this through the use of TerraGo GeoPDF's. This allows the provider to mark up the map with corrections and allows PCI to bring those corrections into ArcGIS. Instructions on how to install and use TerraGo GeoPDF were made available here: <http://broadbandillinois.org/maps/Carrier-Maps/About-GeoPDF-Maps.html>.

This toolbar created several opportunities for the provider to really zoom in and edit their coverage area according to how they were actually represented. When it comes to verifying carrier level data, PCI felt the GeoPDF and the virtual meetings where PCI and the provider started carving up the data were extremely useful. The images on the next several pages demonstrate how DSL and FTTH providers were able to use the toolbar to carve up coverage areas to update their data.

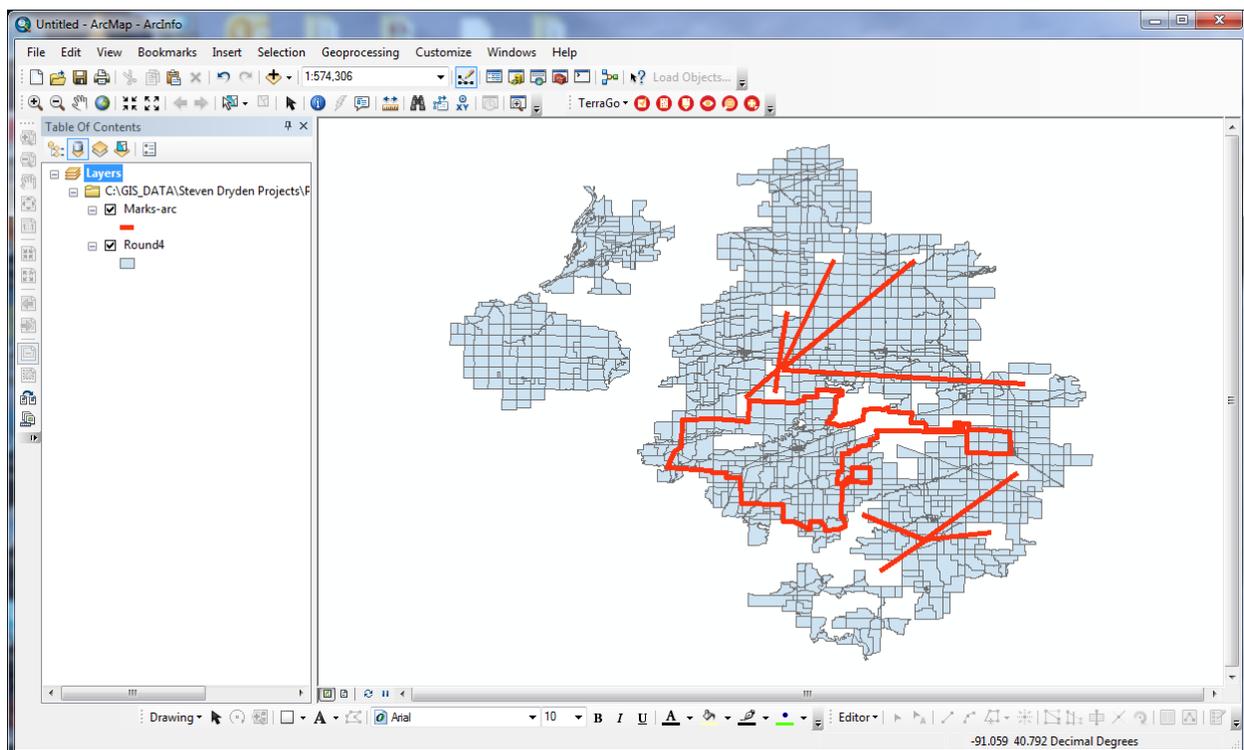
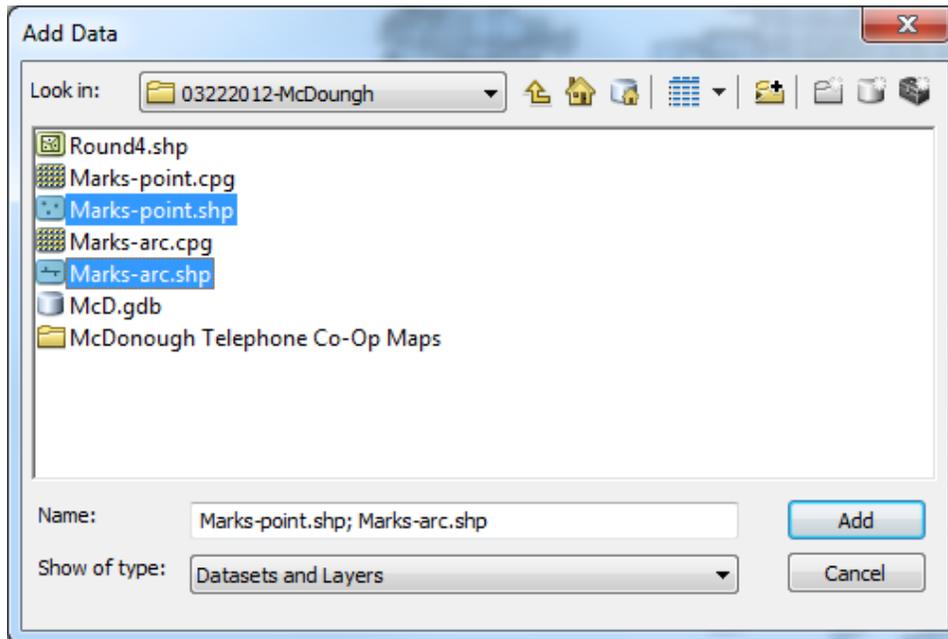
The provider, upon opening the map was instructed to use the  icon to turn layers on and off, and follow the instructions to mark up the map. The image below is a marked up GeoPDF of McDonough Telephone Cooperative in which they indicate where they have had FTTH deployment since their previous submission.



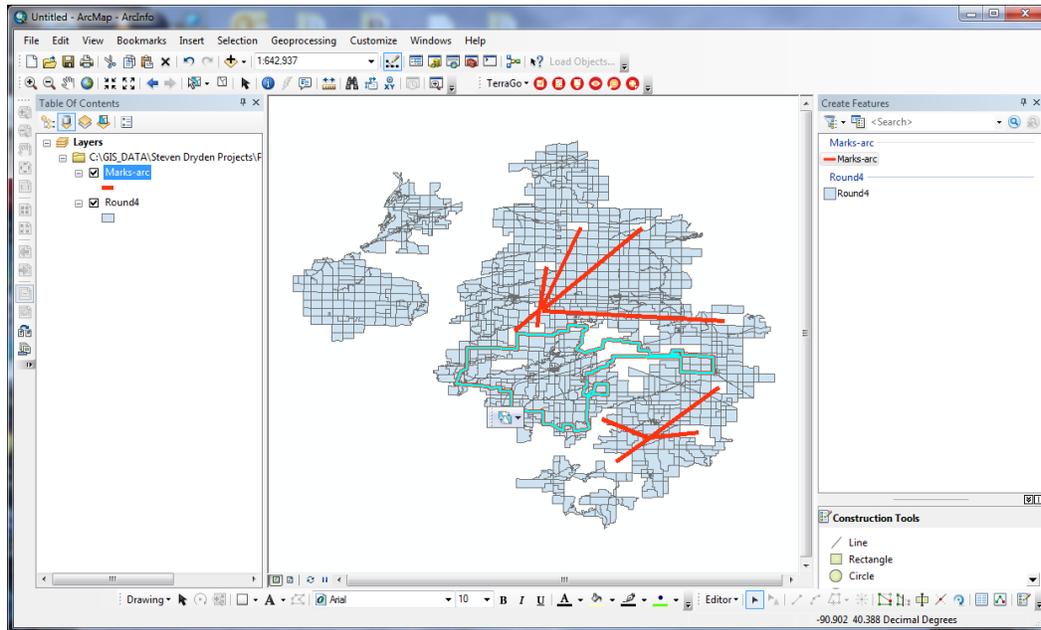


With this tool, providers can draw lines, comments, polygons, and points as indicated in the image to the top-left. From here we can export comments and geomarks as an ESRI Shapefile as demonstrated by the images above.

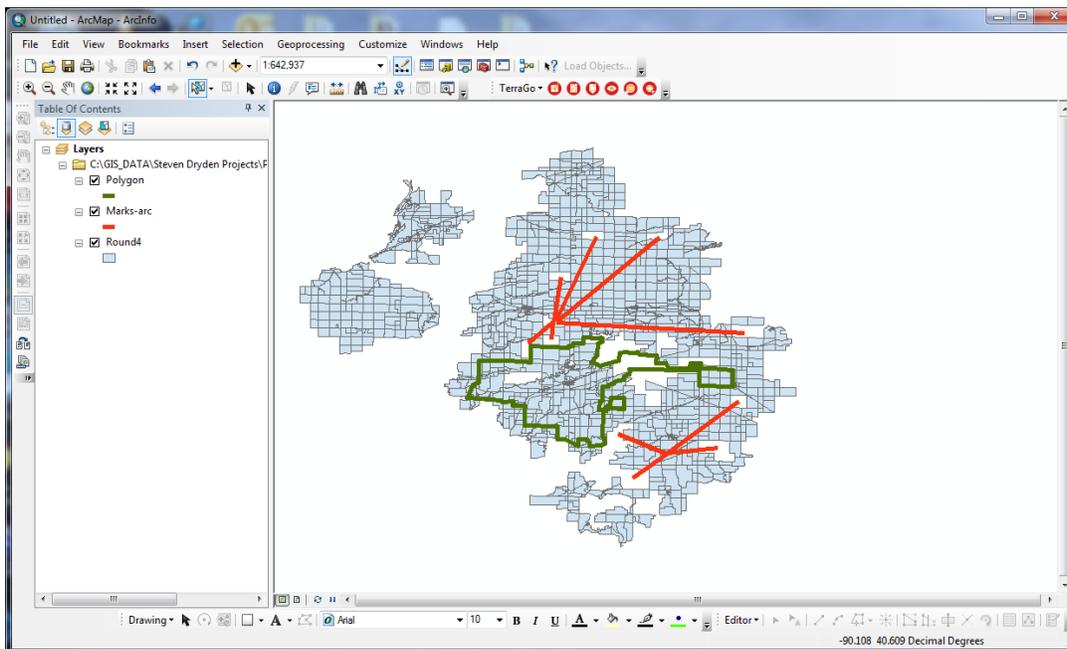
After exporting the geomarks from the GeoPDF, we can now import them into ArcGIS. This provider has drawn lines to show where they have added FTTH and where they want us to fill in holes in their other census block coverage. The geomarks are indicated by the red lines on the bottom image.



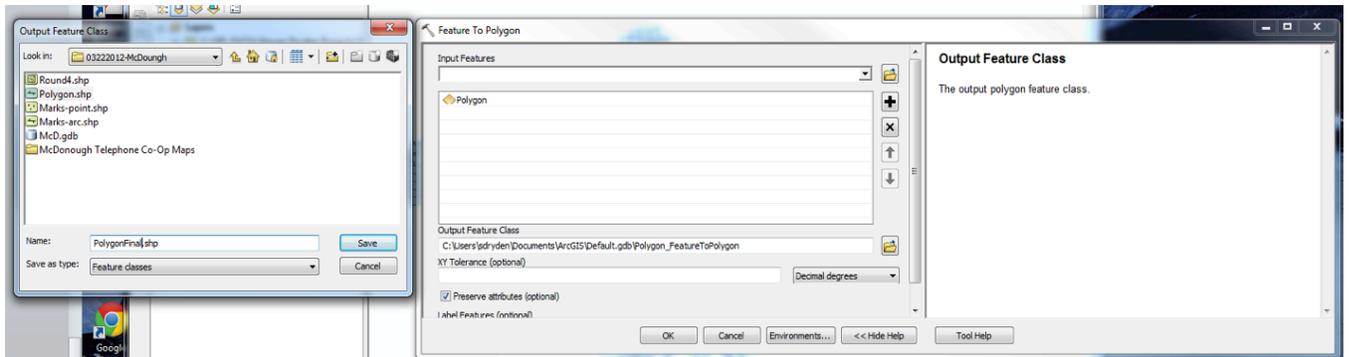
From here, we add Census Blocks as needed. For lines that represent an area, we can convert to a polygon so we can easily select Census Blocks. First we needed to the lines that need to be converted into a polygon (highlighted in Blue), we will export the selected.



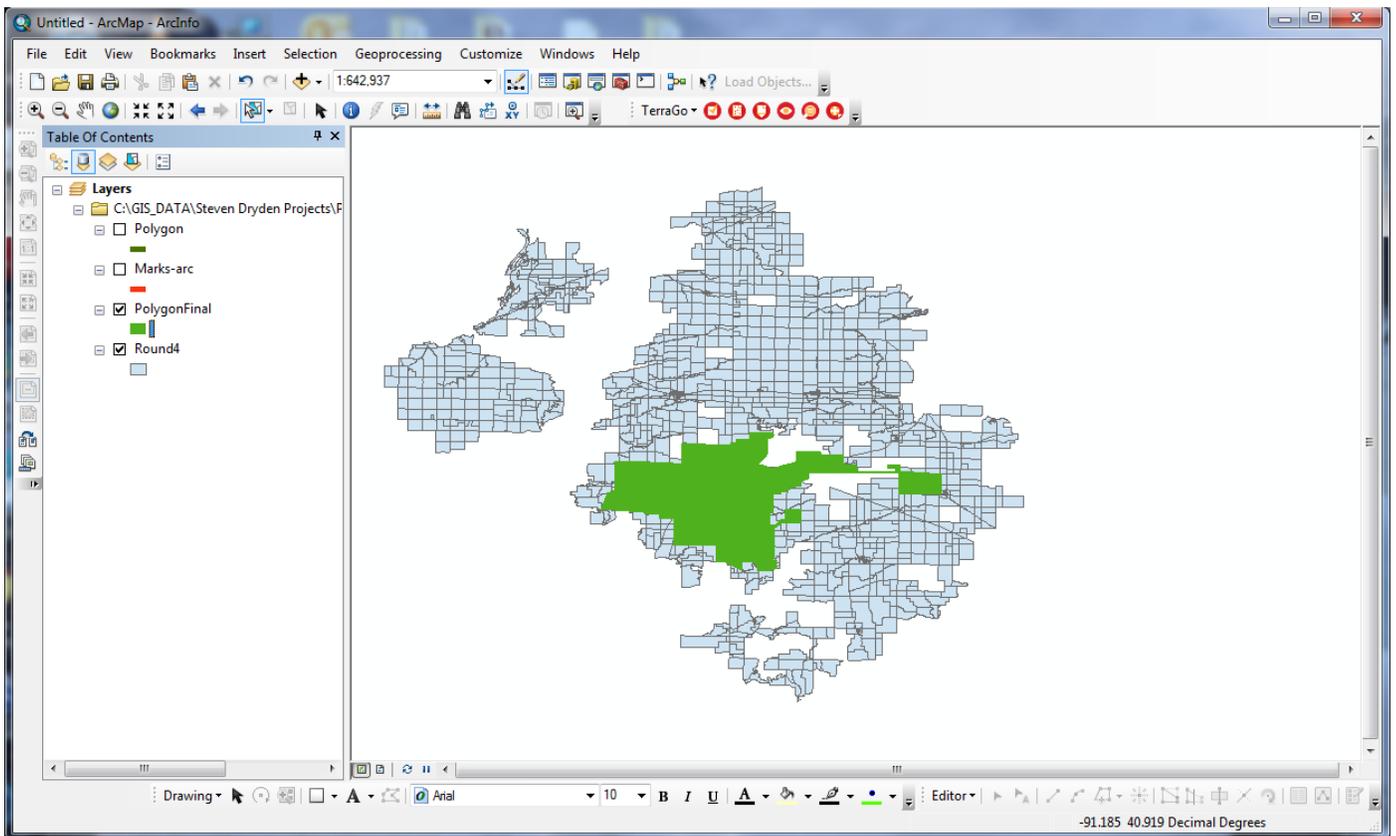
Here you can see we now have separated the polygon line we need. Now we can convert this to a true polygon.



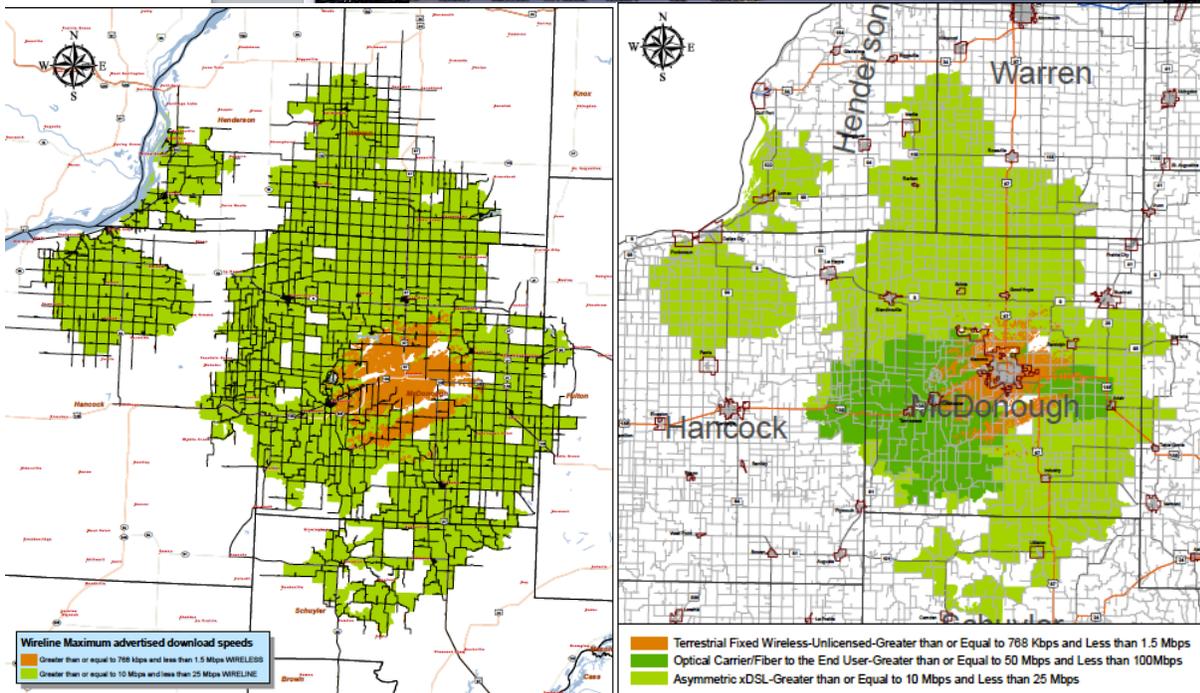
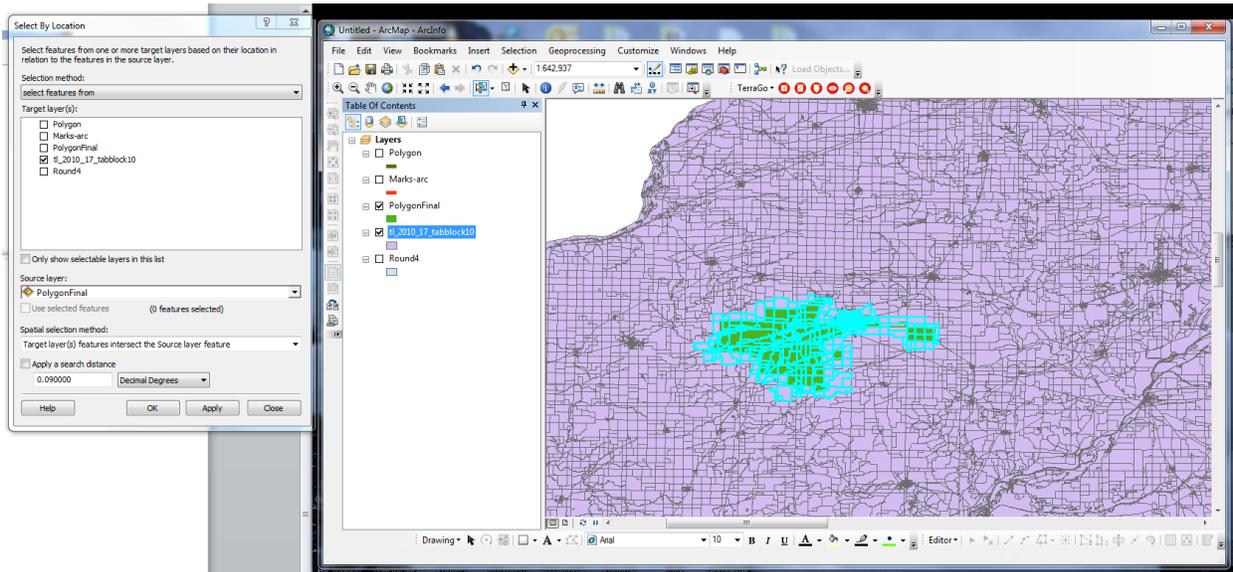
To convert a line to a Polygon, we used the Feature To Polygon tool in ArcGIS



This is the end result is a polygon that will be used to select Census Blocks that are inside or touch the boundary.

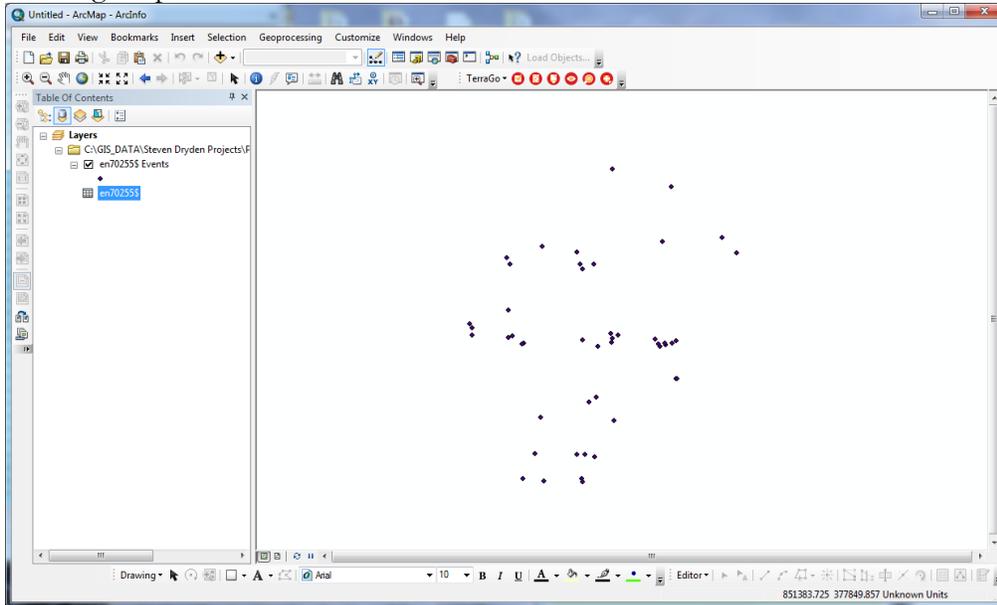


To obtain the Census Blocks needed, we will use select by location. As you can see, the Census Blocks are now selected. All that is needed now is to export the specified census blocks out, and provide the data with attributes as indicated by the provider. The maps below show the initial data and the data after the updates are made through the GeoPDF software.

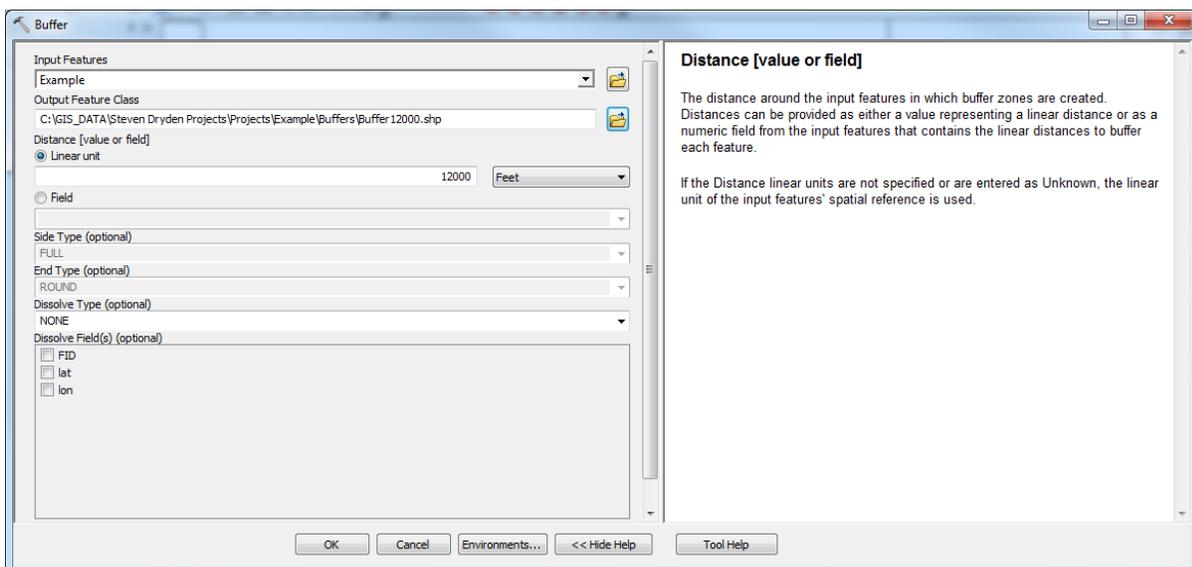


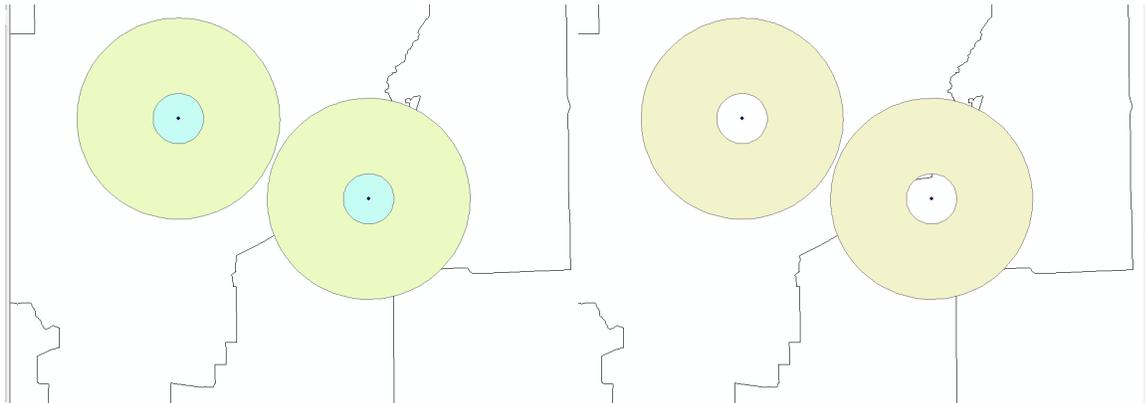
## WIRE CENTER BOUNDARY CLIPPING

Some DSL providers provided an excel table that displayed latitude and longitude for central office and remote terminal locations. This creates a special challenge for us because DSL service extends 12,000 feet from the center, but is not allowed to cross the wire center boundaries. Also, we must factor in that at 3000 feet from the wire center, speed decreases from speed tier 5 to speed tier 4. First, we load the excel table into ESRI ArcGIS. In ArcGIS, we can use latitude and longitude information to display data on a map using the Display XY Data. We will use this here to get a working shapefile.



Now with a working shapefile, we will now need to buffer around each point for speed and coverage. We will be using 2 buffers of 3000ft and 12000ft.



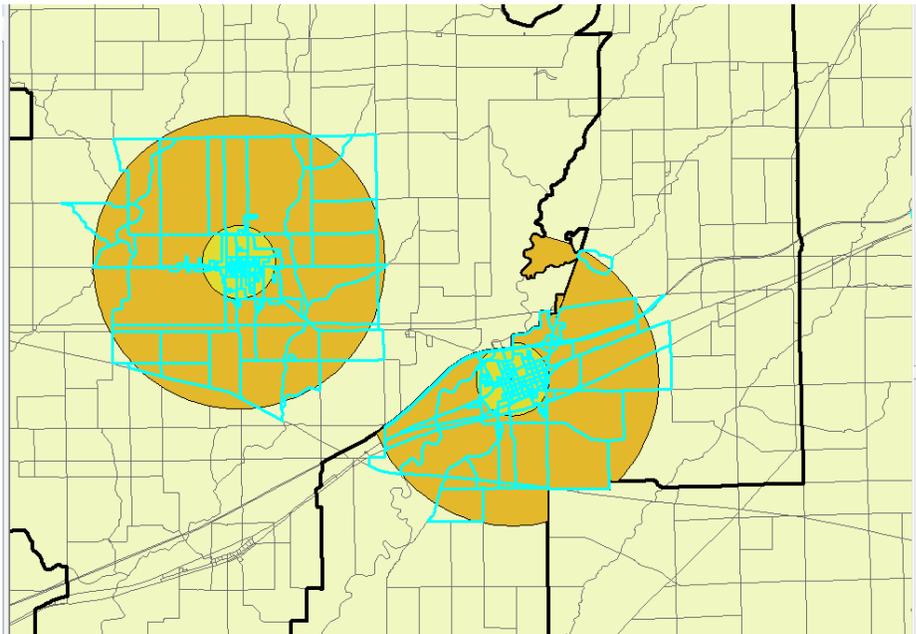
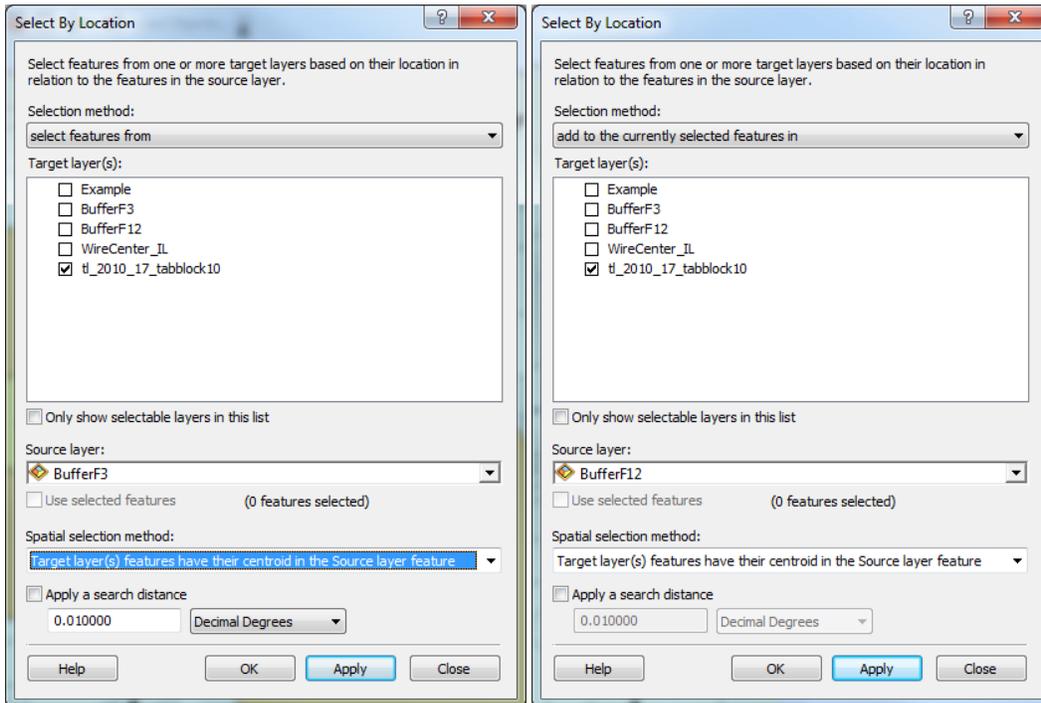


The resulting buffers are found in the above image to the left. We will now need to clip the innermost 3000 feet from the 12,000 foot buffer. In the image on the right, we have turned off the 3000ft Buffer to show that there is nothing under them now. Coverage for wire centers can not cross wire center boundaries, so we now need to trim the buffers so they remain inside the boundary it is located. We will use the intersect tool to break apart the coverages based on the wire center boundaries.

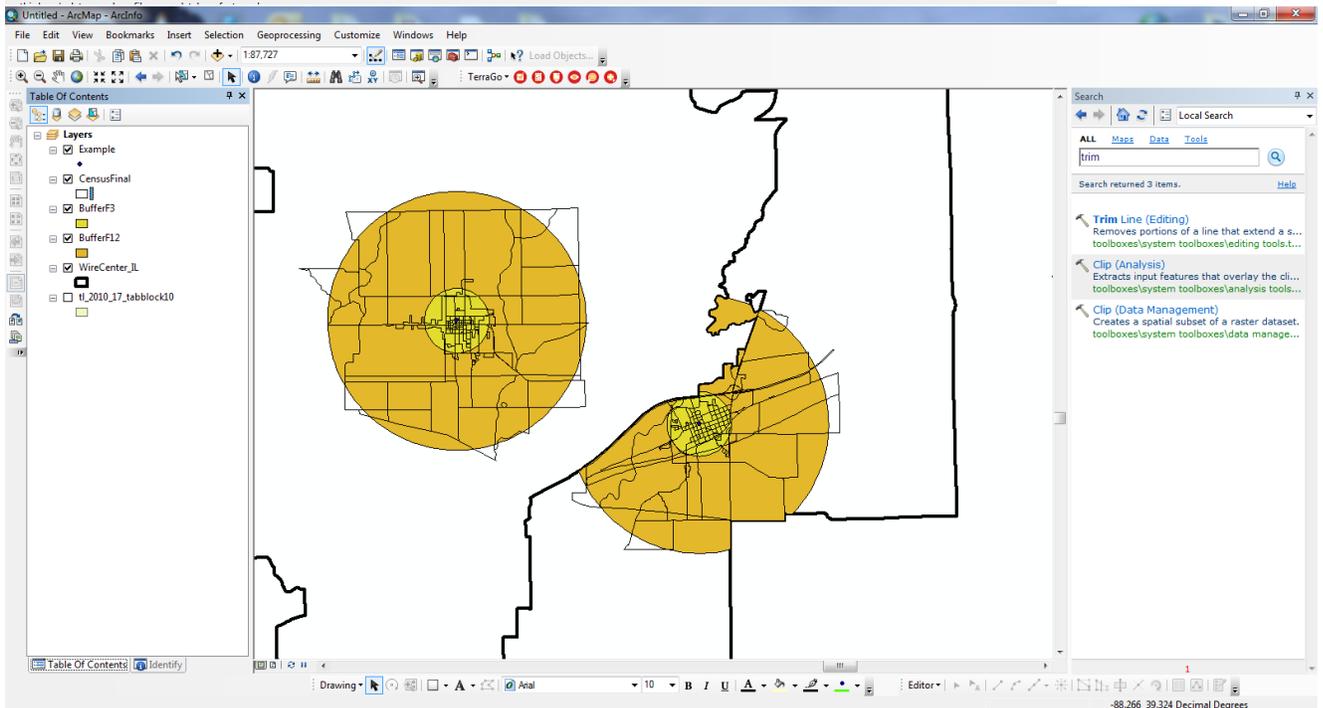
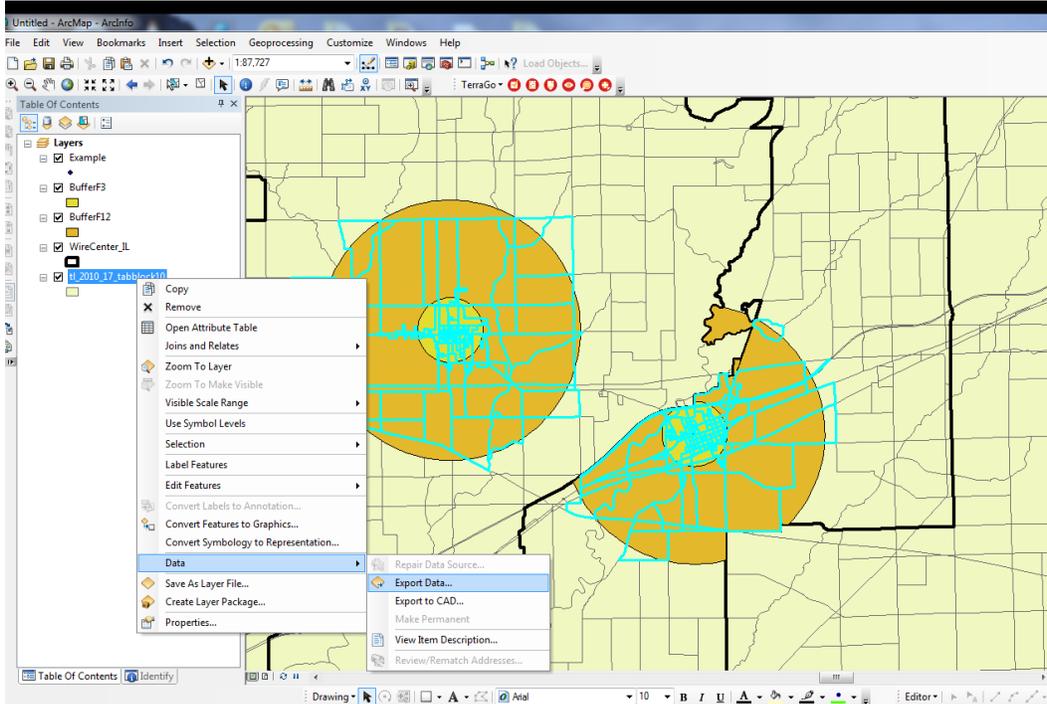


As you can now see, the polygon is now broken apart by the wire center lines. From here, we will start an editing session and delete those areas that fall outside the wire centers boundary. Select the area outside the boundary and press “delete” to remove those census blocks.

We will do this for all wire centers, and then save our edits. After we are through with this, we will then use these buffers to select census blocks by location. In this case we will specify that a census blocks centroid be within either the 3000ft buffer or the 12000ft buffer in order to count.



At this point we are ready to export the selected Census blocks, and assign speeds based on which buffer the census blocks fall within.

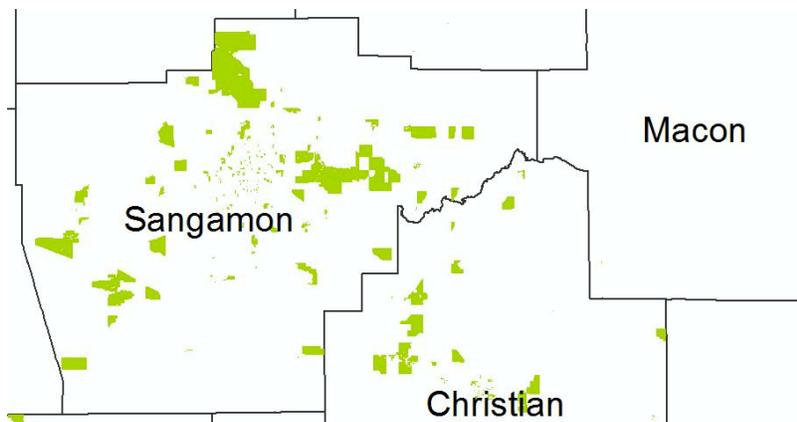


After we provide the census blocks with attribute information, we will send a GeoPDF to the carrier for approval, and then load it into the master geodatabase.

## ILLINOIS TELECOMMUNICATIONS ASSOCIATION (ITA)

As part of its efforts to reach out to providers throughout the State, the Partnership for a Connected Illinois interacts with broadband players of all types. Most providers are willing to submit information to the broadband mapping efforts, during this cycle, or Round 5 of the data collection effort the Partnership for a Connected Illinois received a letter raising concerns about our activities from the Illinois Telecommunications Association (ITA). All nationally recognized carriers, whether through traditional telecommunications, wireless or cable, did provide data during this cycle. However, for the small handful of carriers who did not provide data, or did not provide data in time for this cycle, PCI examined the web site of the individual carrier to see if the advertised services were similar to data that had previously been assembled by PCI. In Round 4 of the data collection effort, PCI went to great lengths to reel in coverage using the GeoPDF tool. Therefore, the only changes found were a small handful of FTTH communities and speed upgrades. Several of these carriers chose to provide data very late in the process as late as Monday March 26; PCI made every effort to include them.

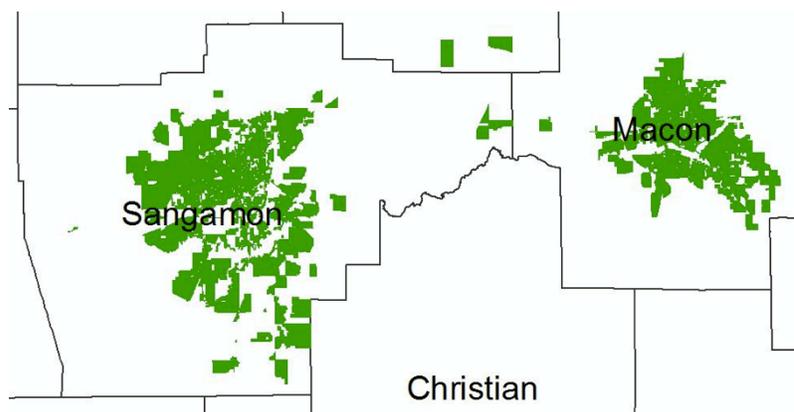
## CABLE COVERAGE



Some cable carriers submitted their service area coverage data in the form of a spreadsheet citing customer addresses. These addresses were converted to a point layer via a geocoding process. These points were then superimposed on top of a 2010 census block layer, and all of the census blocks that had one or more address-derived points associated with them were

selected. The selected blocks were then converted into a polygon layer which was attributed with appropriate broadband provider information such as provider name, technology of transmission, maximum advertised downstream speed and so on. A portion of the Mediacom map above indicates an example of this in the above map.

Other cable carriers including Comcast submitted a series of spreadsheet records were matched with the corresponding Illinois 2010 census blocks polygon layer. The matching polygons were then superimposed on the Census CBSA layer which was joined with the provided maximum advertised (MAXAD) speeds spreadsheet. This way each individual census



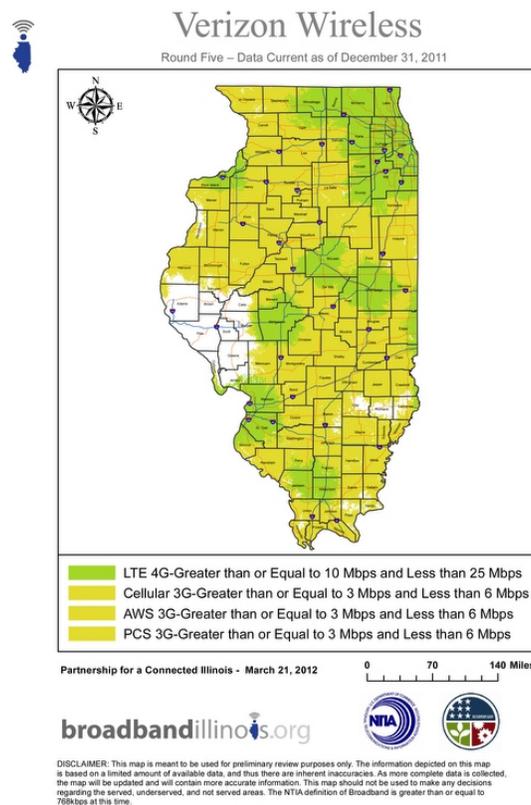
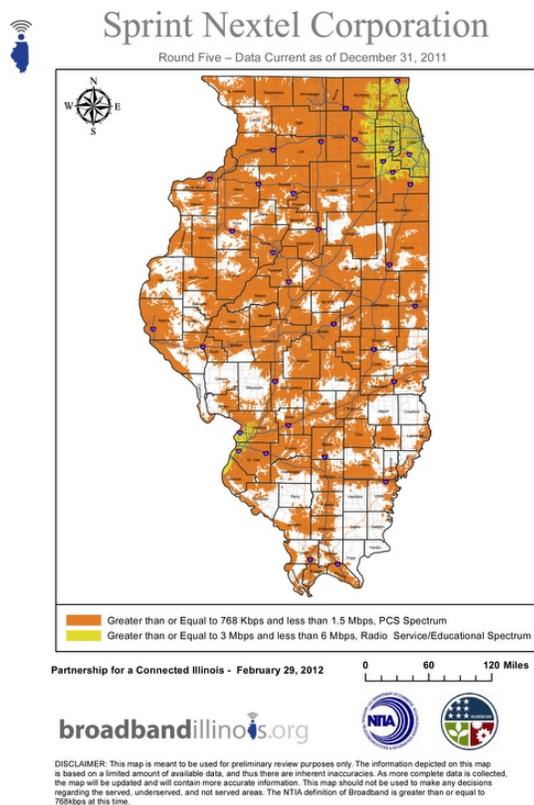
block was attributed with the corresponding MAXADDOWN and MAXADUP value.

Street segment spreadsheet data records were geocoded based on mid-point value of the reported street segment address range. A point layer thus derived was next overlaid with the 2010 census street layer. Census street layer segments that were associated with the geocoded points were then examined, one-at-a-time, to make sure that they matched the reported street, city and census block information. Some of the reported records had to be discarded as they could not be located via the above process.

A GeoPDF map depicting both, census block and road segment data, was reviewed by Comcast and a number of census block records were deleted as a result of Comcast feedback. From the originally submitted 117,386 census block records, 115,153 were retained for the final submission. All of the successfully matched street segment records were retained and included in the final submission.

## MOBILE WIRELESS COVERAGE

PCI has collected mobile wireless coverage from most providers in the State. These shapefiles were imported into the database and assigned attribute. Every mobile wireless provider submitted updated data in this round. An example of this data is below.



## WIRELESS METHODOLOGY



via an Excel spreadsheet with 16,383 records referencing state, county, census tract and block (FIPS) codes. These codes were concatenated into a single (FULLFIPSID) code which was then used to join Excel data with the U.S. Census Bureau block data for the 2000 census. This process resulted in a successful match of all 16,383 records. Census blocks thus identified were dissolved into a single polygon which was next attributed and included in the submission cycle. An example of this is depicted below.

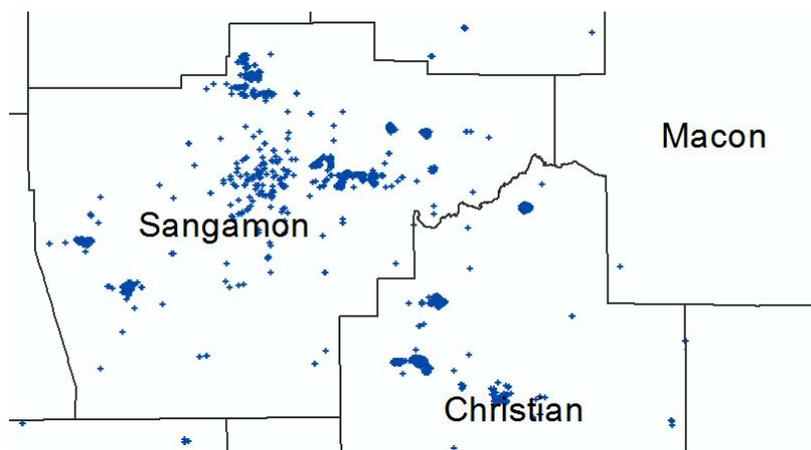
### MIDDLE MILE

Middle-Mile (MM) data is acquired via either a direct carrier submission in the form of a spreadsheet or a text document citing specific MM hub coordinate pair values, or by obtaining the general MM hub location from the carrier's web site.

In the case where specific coordinate pair values are available, a point layer is generated using ArcGIS software. This process entails bringing tabular XY coordinate pair values into ArcGIS, and creating an "event theme". The "event theme" is then exported into a stand-alone point layer which is then attributed with the necessary information.

General, web-derived locations are converted to a point layer by citing towns where the MM hub presence is identified by the carrier. Town point locations are next attributed with relevant data.

### ADDRESS LAYER DATA



Three carriers provided Service Address information – Mediacom Illinois LLC, FairPoint Communications and RCN Telecom Services of Illinois, Inc. Supplied address data was geocoded. Great care was taken to successfully rematch addresses that were not matched during the initial geocoding run. The resulting point layer was used to derive the missing LATITUDE and

LONGITUDE coordinate pair values which were then added to the Service Address layer attribute table. An example of this is above.

### METADATA

Metadata, which literally means data about data, represent PCI's attempt to document procedures, coding, and overall methodology used in managing broadband supply data. Both short and long terms goals of developing PCI's metadata are to improve communication on Geographic Information Systems (GIS) data management issues for both internal and external partners. PCI's

metadata is organized and structured around Federal Geographic Data Committee (FGDC) standards associated with key information impacting the following issues:

- What GIS data layers are managed by an organization?
- How is data coded or classified in assisting outside partners or organization use the GIS data developed?
- When was the data developed and how often is it updated?
- Who developed the data layers and who should be contacted if anyone has questions?

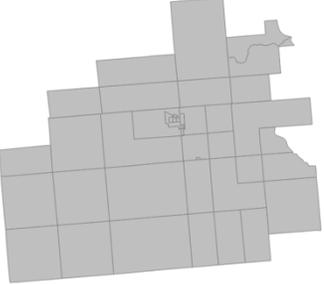
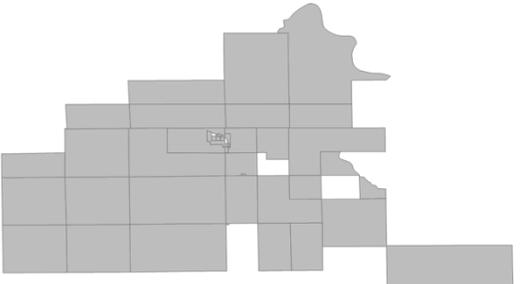
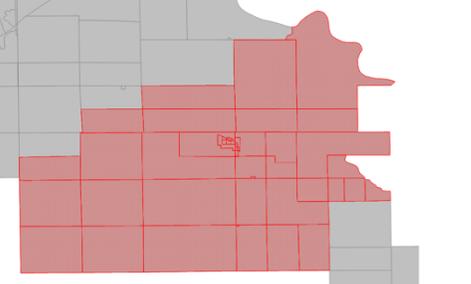
The net result of developing PCI's metadata connects to the idea of communication and standards. When applied correctly over time PCI's metadata will assist in educating other users on essential questions needed when applying GIS data. In addition, it will assist PCI internally as metadata will help the organization identify and document critical developing issues shaping data development. Any new employee or organization will be pointed to metadata files when asking questions relating to methodology, attribute codes, dates of data edits or updates, and follow-up contact information within PCI's data team.

#### ROUND 4: CENSUS BLOCK CONVERSION

In round 4, PCI made the conversion from 2000 to 2010 census blocks at the instruction of the NTIA. Using existing 2000 coverage, PCI created coverage polygons based upon provider, transtech, and maximum advertised download speeds. Using a spatial overlay, PCI selected census blocks in the 2010 layer with a centroid point in the carrier polygons. These new census blocks then inherited the same attributes as they were previously recognized in the 2000 census block layer.

PCI initially attempted to use the conversion table that was provided by the Census Bureau to make the conversion from 2000 to 2010 census blocks. PCI noticed holes in the data when this process was used. The images that follow demonstrate the difference in the conversion from 2000 census blocks to 2010 using the spatial overlay as opposed to the conversion table.

Using the conversion table process, we had a total of only 605,038 census blocks covered. The all-inclusive spatial overlay filled these holes and contained a more accurate 652,602 census blocks.

2000	Conversion using Conversion Table	Conversion using all-inclusive spatial overlay
		

## DATA VERIFICATION

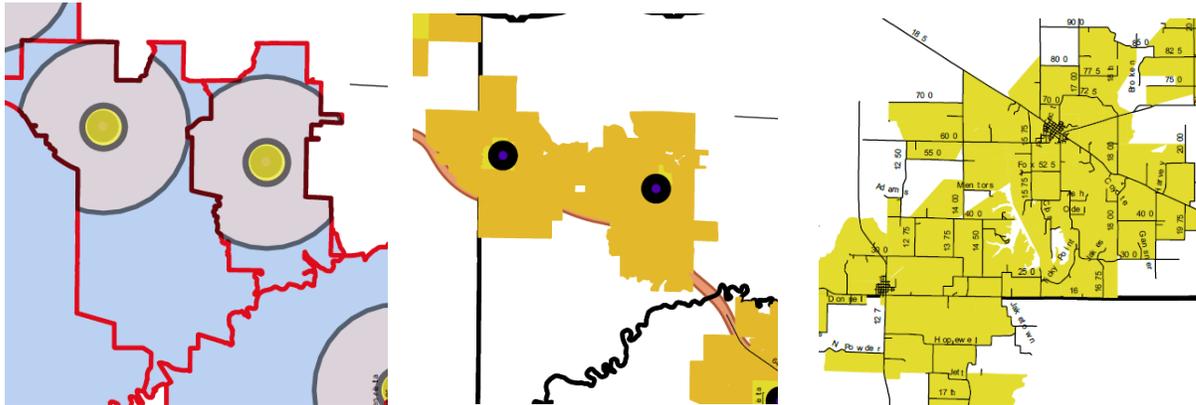
Verification has become an evolving and ongoing process at PCI. The development of the Broadband Illinois website, along with the use of the GeoPDF process has created a feedback loop between provider and consumer and PCI that allows PCI to verify the carrier level data that it submits semi-annually to the NTIA. PCI continues to develop eTeams throughout the state that are able to take county and provider level maps and visualize the data and begin indicating areas where the data may not be accurate. PCI has also published a Supply Side Inventory in which PCI developed a system to rank Illinois's counties by broadband connectivity and looked at two major sets of third-party data to verify the data it had collected. Various means are as well being used to aggregate demand in parts of the State, which indicate there is a need for better broadband and better data.

### PROVIDER

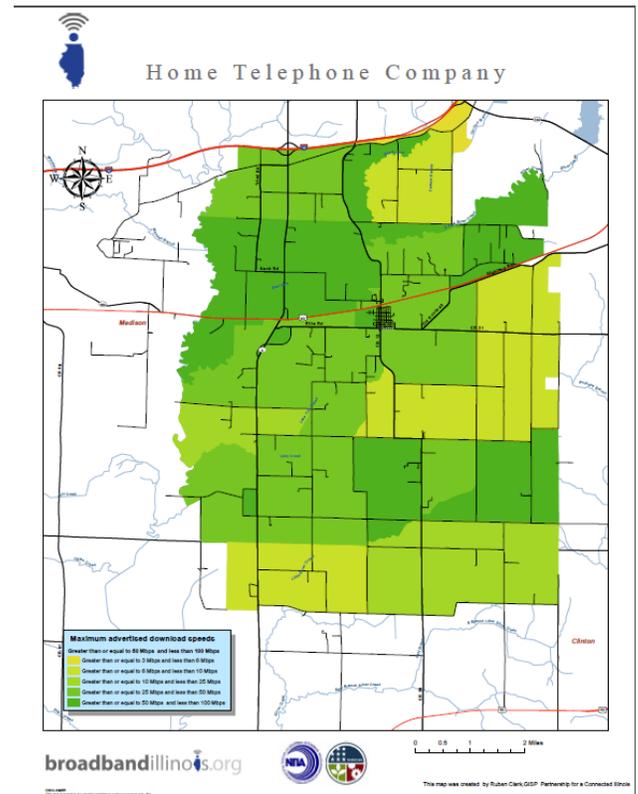
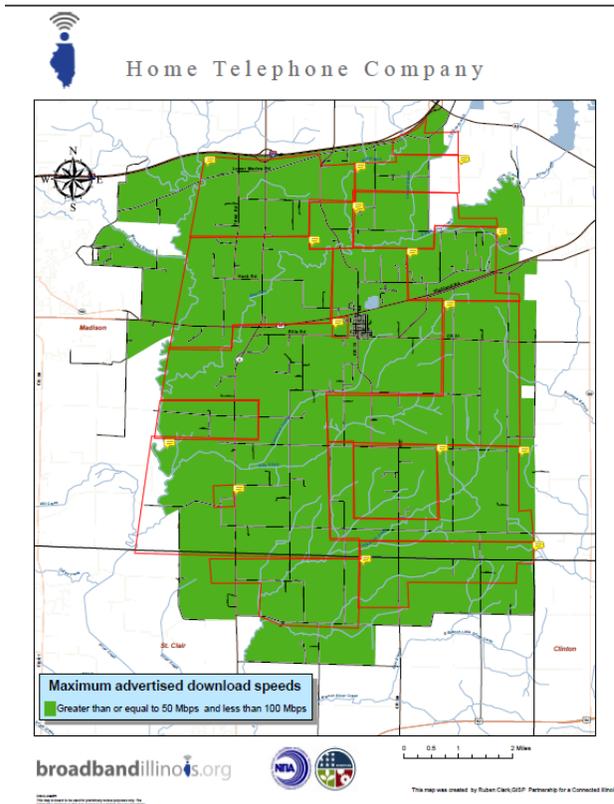
In this Round, PCI worked very closely with the provider sending back versions of the GeoPDF until the data was represented according to the provider. PCI considers this process to be the first of five forms of verification PCI has and will continue to carry out to ensure the data that is submitted to the National Broadband Map is as accurately as possible.

In the last round, PCI purchased a set of wire center boundaries, which PCI used to map out DSL coverage for a couple of providers. Knowing that a DSL provider's Central Office or Remote Terminal that fell in a certain wire boundary could not extend service outside that boundary allowed PCI to map out these locations and create buffers around these locations based upon the speed. PCI recognized that locations 7500 feet from a DSL C.O. or R.T. would not receive the same speeds as locations only 1000 feet from that location. These buffers allowed PCI to make these changes. Due to confidentiality of these locations, maps that contain these locations with these buffers and boundaries are protected under the NDAs that have been established.

However, the images below provide an example of how PCI would use a C.O. or R.T. location to map out the coverage that a provider is able to provide in that wire center boundary. The image on the left shows two wire center boundaries that contain a C.O. The buffers are indicating that the areas closest to the C.O. receive speeds that are in Tier 5 while areas outside that initial ring receive download speeds in Tier 4. The second image shows how the data beneath these buffers looks when the wire boundaries and buffers are removed. The third image shows how the previous mapping contractor would have submitted this data in a previous round. As you can see, the same flat speed is dispersed across the entire region surrounding C.O. and R.T. locations. This is undoubtedly a form of verification.



PCI has worked through this process for one of the two largest DSL providers in Illinois as well as a handful of small telephone companies throughout the State. In some instances, small telephone companies admittedly provided this data without sharing the locations and the GeoPDFs made this possible. The images of Home Telephone Company on the next page demonstrate how they used the TerraGo toolbar to reel back the previous data that was incorrectly submitted as DSL data with speeds across the region in Tier 9.



## USER

PCI views the user as the second form of verification and has developed a tool to allow feedback on the data that is on the Illinois Broadband Map and in the semi-annual submission to the NTIA. When a consumer clicks on Broadband Illinois's search map they see the carriers that service that census block. The widget below allows the consumer to give PCI feedback on the providers that service that location. PCI has launched this of data collection. The data that PCI receives from this tool will be used to start plotting points on a map that can be given to the provider to show areas the consumer is claiming does not have coverage.

### 3 carriers serve this area

Sort by **Fastest** Slowest Carrier Technology

CARRIER	MAX ↓	TYP ↓	MAX ↑	TYP ↑
<b>Cass Telephone Company</b> Asymmetric xDSL	3-6 Mbps	3-6 Mbps	1.5-3 Mbps	0.2-0.7 Mbps
Accurate?	20 Yes 10 No			

Is this service available to you at the reported speeds?

Why do we ask?

Share your thoughts...

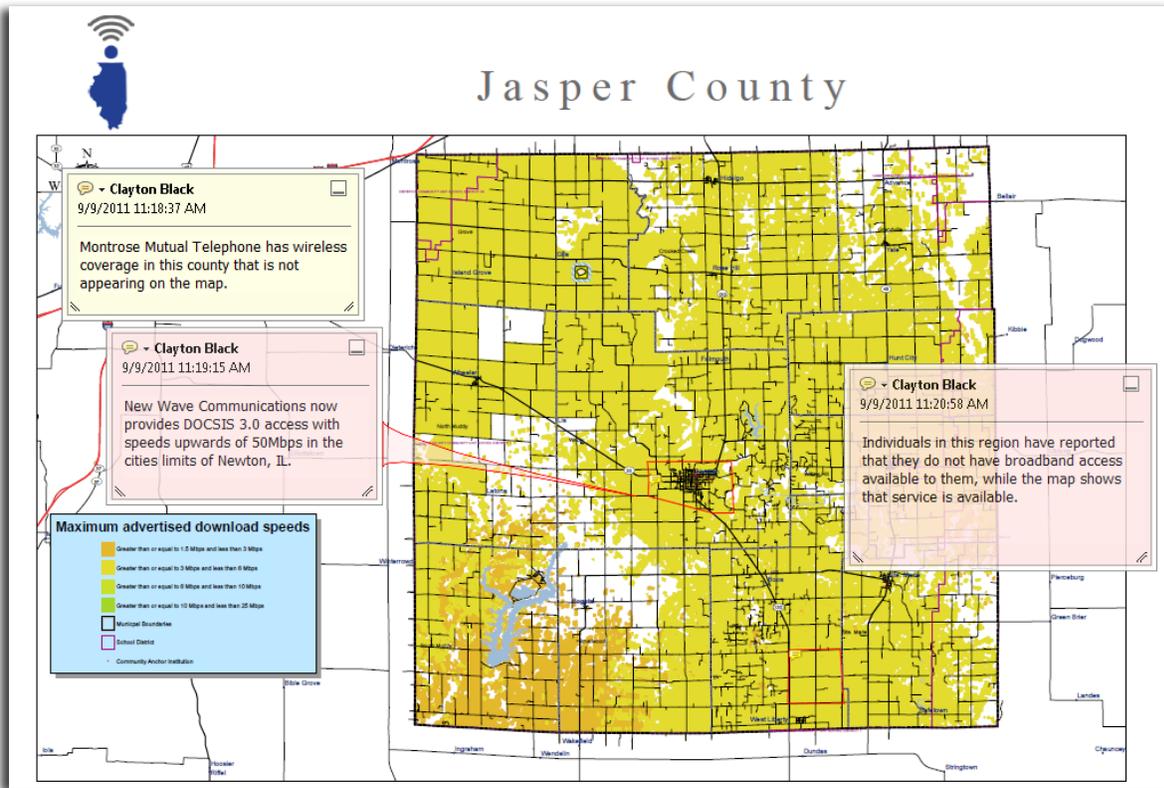
Save Cancel

<b>Verizon Wireless</b> Terrestrial Mobile Wireless	3-6 Mbps	0.2-0.7 Mbps	1.5-3 Mbps	0.7-1.5 Mbps
Accurate?	2 Yes 0 No			
<b>Sprint</b> Terrestrial Mobile Wireless	0.7-1.5 Mbps	0.7-1.5 Mbps	0.2-0.7 Mbps	0.2-0.7 Mbps
Accurate?	Be the first			

## TRUSTED USER

The third form of verification comes from the Trusted User. PCI has created GeoPDFs of all 102 of Illinois's counties that are available on the Broadband Illinois website. It has also deployed eTeams throughout the state that are capable of editing these maps and returning them to PCI as a form of verification. The map below shows an example of all the changes that PCI made to Jasper County in this round thanks to user feedback from eTeam members on the ground. As you can see,

New Wave Communications launched DOCSIS 3.0 technology to the city of Newton in this round. PCI had also not been including wireless data for Montrose Mutual Telephone Company. PCI recognized this error and included this data in this round. The county maps are currently available on the website, and the provider level GeoPDFs will soon be published and available for editing as well.



### THIRD PARTY DATA SOURCES

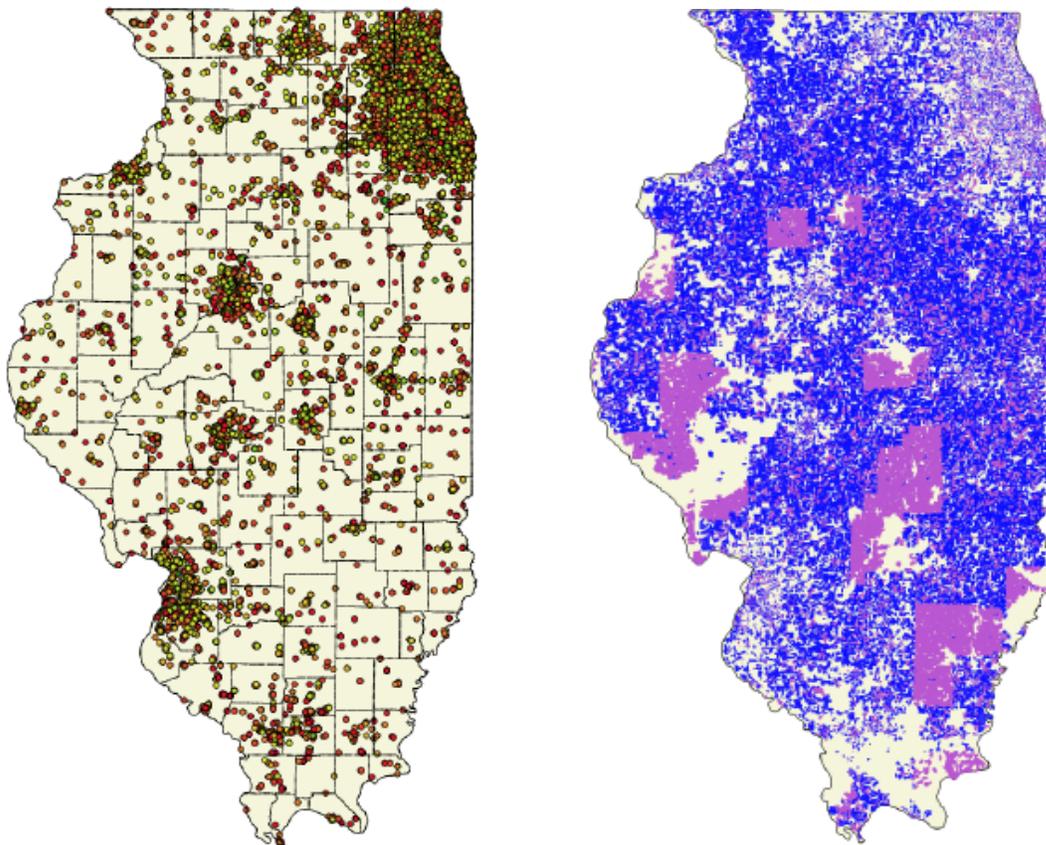
On August 15, 2011, PCI published a Supply Baseline Study, “Broadband Access in Illinois: A Baseline Snapshot”, that summarized the state of broadband supply in Illinois. The report, a product of the data analysis by the PCI data team aims to quantify what is known about broadband data in Illinois and publish it along with an analysis of Third-Party data sources.

The first method of third-party verification used in this examination was user speed test data through the broadband.gov website. Through this website, the NTIA and the FCC solicited street address information with each speed test. They provided PCI with speed test data gathered over a 12 month period. This has been mapped and some limited studies have been conducted. These speed tests were accompanied by mini surveys which allowed for some analysis. The users were asked to input their street address and the type of internet connection they were using.

The second set of third-party data used for verification used in this study was gathered by the Gadberry Company. The Gadberry data is a combination of various user/crowd sourced data sets. They indicate if there is broadband activity at the street address level and they then incorporate that

information at the census block level. We have compared blocks showing coverage as stated by the carriers against the user reported information. There are some areas of the state where there are low or no user reported information.

The maps below show these third party data sources projected on a map of Illinois. The map on the left shows the location and results of the FCC speed tests, while the image on the right shows census blocks where the Gadberry dataset did not provide enough results for a significant analysis. On the Gadberry map, census blocks in blue indicate where there is a low sample rate, and census blocks in pink show where no samples were obtained. For more information on these third party data analyses, the Supply Side Baseline has been included in the appendix of this paper.



## DEMAND RESEARCH

PCI is undergoing efforts to develop a survey process to survey demand across the state of Illinois. This demand research is the fifth form of data verification that PCI is using to verify the data. This survey process once developed will identify current broadband adoption trends, applications, and barriers for community anchor institutions, businesses, and residents. It will be referenced around critical geographic units for analysis.

Connect SI, a regional broadband initiative in Southern Illinois, developed a tool called “I Want My Broadband” that surveyed consumers who felt they were underserved or unserved in terms of broadband service. Working with eTeams, PCI has followed the Connect SI model to launch this tool in other regions around the State. The images below demonstrate just how powerful this tool can be. The image on the left shows the current broadband supply data sits in a given part of the state. As you can see, the reported speeds fall in download tiers 3 & 4. The image on the right shows the same part of the state and displays locations where consumers have reported that they need better service. While PCI continues to think of the best way to launch a similar effort state wide, this demand aggregation is an exceptional form of verification.



[« Back to maps](#)

### Broadband Request Map

In an effort to help carriers and consumers throughout Illinois, we have created an outlet for consumers needing access to better broadband to reach the carriers in their area. The map on the right shows where consumers have requested this access.

If you are a consumer with no access to broadband or you are interested in finding better internet access, please complete the form [here](#).

If you are a carrier that is not currently subscribed to our consumer request notification tool and would like to begin receiving consumer requests in your counties of service, please contact us at [eteams@broadbandillinois.org](mailto:eteams@broadbandillinois.org).

[Request broadband](#)

## ILLINOIS COMMUNITY ANCHOR INSTITUTIONS

PCI has established an ongoing procedure for gathering data on the physical location and broadband connectivity of Community Anchor Institutions (CAIs) in accordance with the data requirements of the SBDD NOFA Technical Appendix. In this Round, PCI has partnered with the Strategic Networking Group (SNG) and the Illinois Institute of Rural Affairs (IIRA) to carry out a comprehensive survey outreach process to all anchor institutions and select businesses and households in the State of Illinois. The survey outreach began in mid-February and will continue through at least the end of April. While the research initiative was separate from the PCI mapping project, PCI has utilized the data to further enhance the CAI data that is being submitted in this round.

As with all previous submittals, PCI has identified existing, centralized sources for CAI connectivity data. PCI geocoded each submitted data point by using ESRI software and Google batch geocoding programs. In this round, PCI further refined the geocoding process as all institutions that geocoded to the city center were individually mapped to the rooftop using Google Earth software.

This section will describe the process used to build the foundation of the Illinois CAI database in much the same way it has been described in previous rounds, but it will focus on how the dataset has been improved for this submission.

## STRATEGIC NETWORKING GROUP SURVEY PROCESS

In this round, the Illinois Institute of Rural Affairs in conjunction with the Partnership for a Connected Illinois' communication team reached out to fifty major Illinois Stakeholder Groups to market and promote the comprehensive survey on broadband demand and access. While the survey asked all of the required questions for the NTIA mapping project, it also asked a range of questions on Internet use at the anchor institution.

As a result of this outreach process, PCI is now submitting a dataset with updated information for anchor institutions who had previously responded to PCI requests for data, as well as a larger range of anchor institutions in categories 6 & 7.

The table below summarizes the set of data that PCI will be submitting in this round. As one can tell, over the last three rounds of data submission, the total number of anchor institutions with connectivity data has continued to increase. The total number of anchor institutions stands at 12,948

Cat	April 2012			Oct 2011			April 2011		
	Total	Connected Points	% with connectivity data	Total	Connected Points	% with connectivity data	Total	Connected Points	% with connectivity data
1	5,331	3,278	61.49%	5,314	3236	60.90%	5,604	1,417	25.29%
2	1,338	710	53.06%	1,422	721	50.70%	1,444	713	49.38%
3	1,373	210	15.29%	1,327	138	10.40%	15,267	138	0.90%
4	2,314	497	21.48%	2,319	449	19.36%	2,339	433	18.12%
5	294	146	49.66%	271	115	42.44%	266	111	29.47%
6	1,527	1,526	99.93%	1,446	1445	99.93%	1,449	1,449	100.00%
7	321	135	42.06%	235	37	15.74%	230	27	11.74%
Totals	12,498	6,502	52.02%	12,334	6,141	49.79%	26,599	4,288	16.12%

While PCI made some of the greatest data improvements in Round 4 to the K-12 and library datasets, in this round, some of the most substantial increases have occurred within the healthcare, public safety, higher education, and other non-governmental categories.

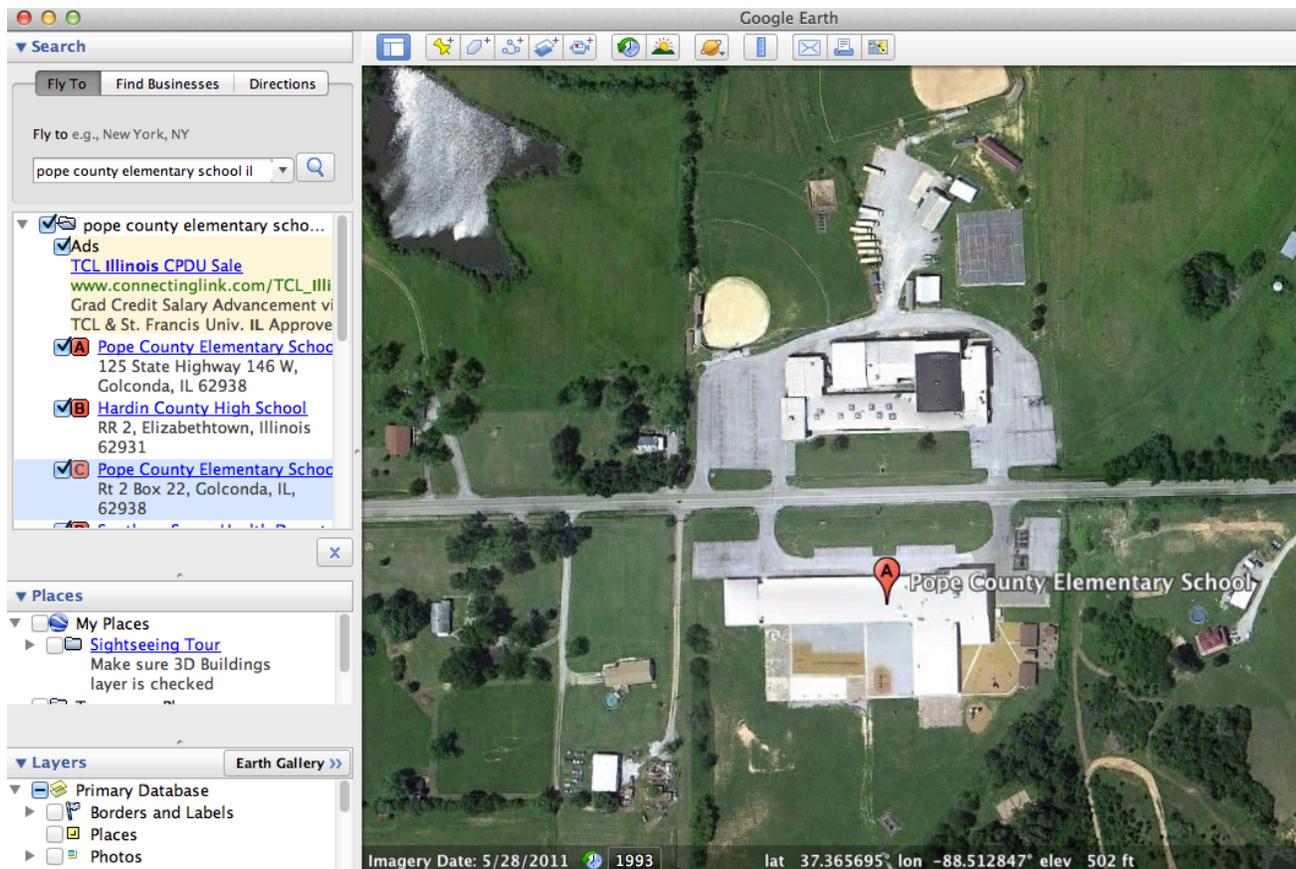
In the past, the non-governmental anchor institution category included only workforce development centers and other computer training centers. The anchor institutions that are now in category 7 include economic development centers, park districts, farm bureaus, and other community hubs. The SNG and IIRA survey process will continue through at least the end of April 2012 so overall reports on the data and their findings for non-NTIA mapping purposes will be made available in May 2012. Likewise, the data that is included as part of this submittal will continue to improve.

## ROUND 5 CORRECTIONS TO CAI DATABASE

In this round, PCI regeocoded every community anchor institution in the geodatabase, after recognizing latitudes and longitudes were wrong in previous rounds. Likewise, multiple anchor institutions that had identical names (i.e. Lincoln Elementary School) had an issue where the address

of the anchor institution in one city was associated with an anchor institution by the same name in a separate city. This caused geocoding problems in previous rounds, thus creating the need for an extensive regeocoding process.

After addresses were corrected, anchor institutions were recoded using ESRI software and batch geocoding processes. A total of 787 anchor institutions geocoded to the center of the city due to rural route addresses, PO Box addresses, slight misspellings, and/or incomplete addresses. All 787 of the anchor institutions were individually mapped using Google Earth software. The image on the next page shows a county elementary school with a rural route address. In previous rounds, the anchor institution geocoded to a location within the county but 15 miles away from the actual anchor institution. In this round, the latitude and longitude that was indicated in Google Earth was captured.



## PREVIOUS ROUNDS

Outreach in Round 1 focused on collecting the point and address data while subsequent submissions in Rounds 2 & 3 focused heavily on survey development, web site database research and teleconferences. Together with the Illinois Department of Commerce and Economic Opportunity (DCEO), PCI engaged in a process of working with CAIs on an organized basis. Other state agencies and organizations have included the Illinois Commerce Commission, Illinois Board of Education, and the Illinois State Police.

PCI created a survey using Survey Monkey and both carrier and price information were requested, and the speed test became a required item for completion of the survey. The speed test(s) that was administered was the one on the Federal Communications Commission web site.

PCI worked with a number of organizations in gathering data for these submissions. We are encouraged that the relationships with these organizations has continued to develop and facilitate other facets of our organization. These organizations are listed below:

K-12	Illinois Association of Regional School Superintendents, Illinois State Board of Education
Libraries	Illinois Library Association
Healthcare	Illinois Critical Access Hospital Network, Illinois Rural HealthNet, Illinois Healthcare Association
Public Safety	Existing Database
Colleges & Universities	Illinois Community Colleges Board
Other Government	Existing Database
Other Non-Government	Illinois Workforce Development

In Round 4, as opposed to previous rounds where PCI submitted secondary CAI's that did not fit perfectly into NTIA parameters, PCI decided to submit only those CAI's that clearly fell into the seven categories laid forth by the NTIA. This led to a significant decrease in the total number of CAI's submitted, but a significant increase in the quality of the data that is being submitted. PCI continued to follow some of the same outreach methods developed in previous rounds, but in this round made the greatest gains in terms of data quality in the areas of K-12 schools and libraries.

As an example, of the 26,869 locations submitted in October 2011, there were 14,000 Category 3 Healthcare locations which were geocoded, yet had no connectivity data. Many of these were for actual practitioners as opposed to clinics, or what might be considered institutions. PCI elected to remove this larger number for the October filing. PCI also removed duplicates where they existed in the other categories. For instance, the previous mapping contractor included a record for each individual college and university in both the K-12 and Higher Education categories. PCI felt it made sense to include only one record of this category in only the Category 5 Higher Education category. In Round 4, PCI enhanced the quality of the data in the K-12 category through the use of an eRate database that showed what schools had applied for the eRate and what providers were servicing their location. This allowed PCI to populate the BBService and TransTech fields for those CAI's.

## BROADBAND ILLINOIS WEBSITE

On February 17, 2011, the Partnership for a Connected Illinois launched its new web site, featuring an easy graphical interface for accessing PCI data about broadband providers with a single mouse click or touch on a smart phone. In this first, initial version, the web site offered a broadband location finder with detailed service provider information and assessments of internet speeds, as well as locations of community broadband providers. This map remains on the website along with other maps in the "Maps" section of the website. The aforementioned county GeoPDFs have also been

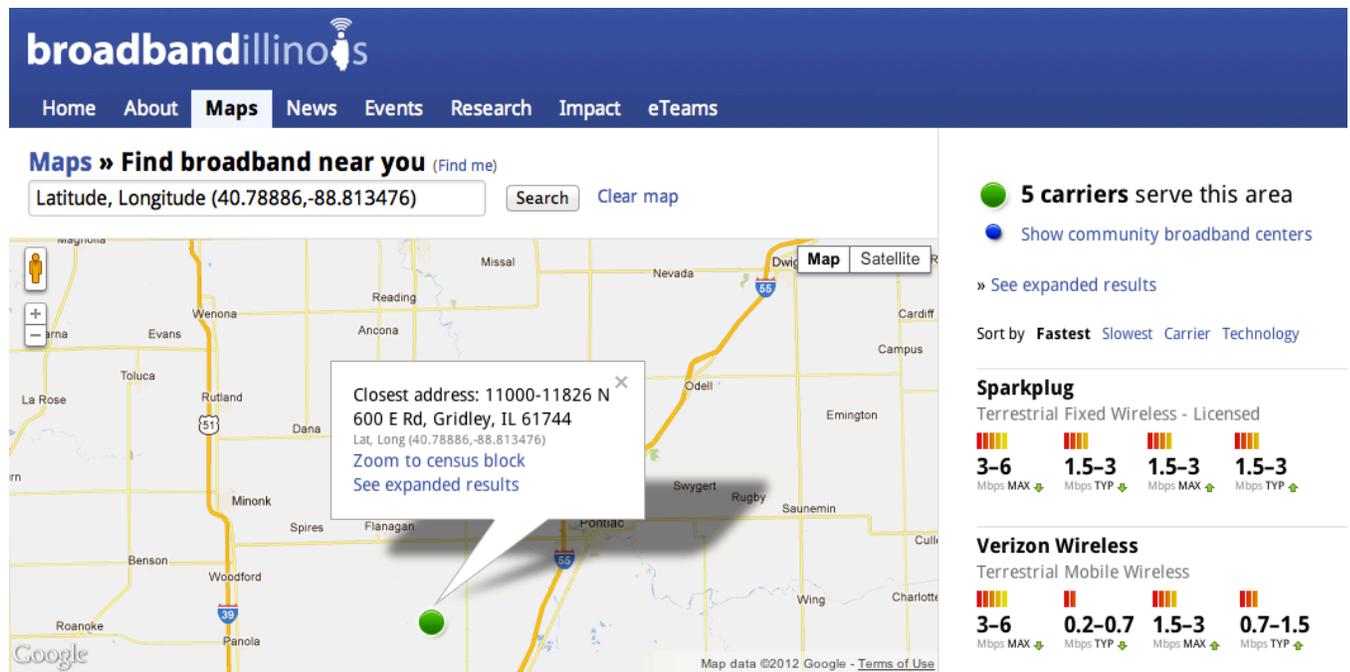
made available, along with individual map pages for each carrier in the State with the data current as of this submission, allowing for near instantaneous presentation of updated data.

### METHODOLOGY FOR THE BROADBANDILLINOIS.ORG WEB SITE

Clicking on the home page map opens a side panel with broadband providers. Expanded results also show the libraries, schools, and public buildings in the area with broadband. As the State-designated entity under the NTIA’s State Broadband Data and Development, PCI provides, on <http://broadbandillinois.org>, the same data that it submits to the NTIA for inclusion in the national broadband map.

The web site is built around open and transparent data-sharing tools. As with the national broadband map, PCI aims to encourage user feedback as a means of helping to improve and promote broadband in Illinois. For example, the site's "eTeam" section encourages citizens to get involved with Broadband Illinois eTeams. These community leadership groups are working to help connect rural residents and others throughout Illinois. The site’s "Impact" section is beginning to assemble materials that pertain to broadband adoption. There are also sections for “News” and “Events” where the latest relevant broadband related news and events can be accessed.

The image below shows the primary search map that the user is able to use to search for broadband providers at their location. The other image displays locations that have been searched since PCI launched the map in February 2011. The third and final image shows one of the many provider pages that became available on the PCI website in March 2012.

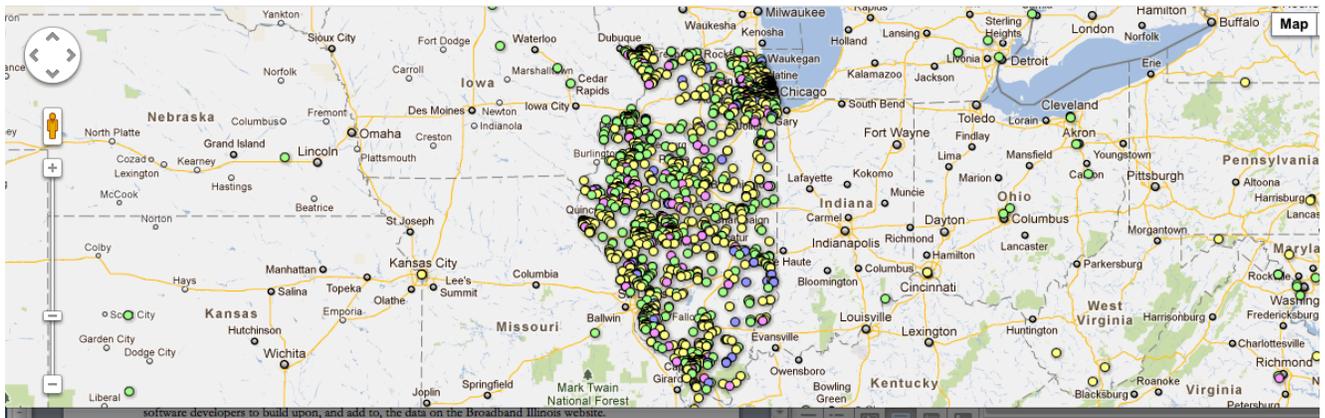


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**Maps » See where people are searching**

Address, zip code, or latitude and longitude 5 miles # clicks/point Search Reset map

Address search Map point click Link from external site Community Broadband Center click

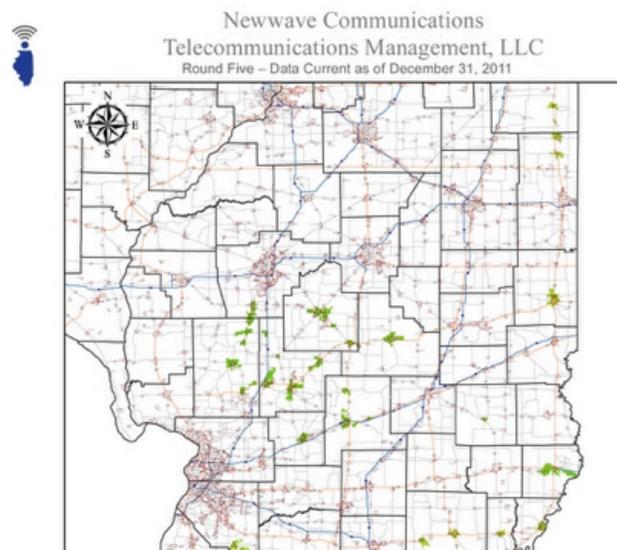


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**Carrier Maps** Request broadband Get involved

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- County Data Maps
- Carrier Maps**
- » About GeoPDF Maps
- Broadband Request Map
- National Broadband Map
- Raw Data

**Telecommunications Management, LLC**



## **THE APPLICATION PROGRAMMING INTERFACE FOR BROADBAND ILLINOIS DATA**

PCI's web site is built around an open source Application Program Interface. This free tool allows software developers to build upon, and add to, the data on the Broadband Illinois website. Documentation for the PCI's API is available at <http://developer.broadbandillinois.org>.

## **CONCLUSION**

The data submission cycle ending on April 1, 2012, has been the second round that the Partnership for a Connected Illinois has conducted every facet of the data collection process. PCI has become much more comfortable in this round, with a new and improved mapping team. Likewise, PCI is confident many of the issues that were found in previous PCI submittals have been resolved thanks in large part to the experience of previous rounds. Now that PCI has assumed full discretion over this process, it has brought the data "closer to home" for Illinois. PCI has taken major steps in its three-fold mission to collect and publish broadband data, to ensure broadband access throughout the State, and to maximize broadband's impact, and the data has helped drive each of these steps.