OFFICIAL APRIL 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE COMMONWEALTH OF PUERTO RICO

CONNECT PUERTO RICO®

April 1, 2011

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PUERTO RICO COVER LETTER

April 1, 2011

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:

It is with highest regard that the collective stakeholders of Connect Puerto Rico offer congratulations to the U.S. Department of Commerce's National Telecommunications & Information Administration (NTIA) on the recent release of the National Broadband Map. This extraordinary milestone demonstrates the intense and joint effort of the NTIA, FCC, state governments, industry, and non-profits like Connected Nation and will serve as a key tool for the American public and policymakers resulting in smarter investments and targeted state and local broadband policies and programs. We are proud of the role that Connect Puerto Rico has played in creating such a powerful tool that will surely benefit not just Puerto Ricans, but consumers and businesses nationwide.

Therefore, as the Designated Entity, the Puerto Rico Office of the Chief Information Officer (OCIO), in partnership with Connected Nation, is pleased to present this submittal of the Commonwealth of Puerto Rico's State Broadband Data and Development (SBDD) Grant Program, known as Connect Puerto Rico.

These artifacts should be found to be compliant with the April 1, 2011, 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 pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Puerto Rico: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
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
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Data Dictionary, and Provider Summary Table
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the October 2010 SBDD data submission for the Connect Puerto Rico program. Specifically, these new requirements are:

SBDD Data Transfer Model
The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model as released on the Grantee Workspace on January 14, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes the updated DataPackage spreadsheet with enhanced provider listings as well as satisfactory outputs from the SBDD_Check toolbox to ensure fewer unexpected values with the submitted broadband datasets prior to federal processing for the National Broadband Map update.

It is therefore with great pleasure that the Connect Puerto Rico program submits this April 2011 semi-annual data update under the State Broadband Data and Development Grant Program. We will continue to implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate territory-level broadband mapping data, developing territory-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking territory-wide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBDD includes the participation of approximately 68.42% of the Puerto Rico provider community, or 13 of 19 total providers. Of the 13 participating providers,

6 supplied an update to their network or coverage area(s), while 6 have reported no change. The remaining provider previously supplied data but was non-responsive in the April 2011 update effort; therefore its previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 6 providers that are not represented in the attached datasets, one has remained unresponsive to the numerous attempts at contact by Connect Puerto Rico. The remaining 5 providers are currently in some form of progress toward data submission but were not able to either submit or verify coverage areas at the time of this submission. While the broadband provider OneLink has continued to be non-responsive to requests for data and information on its network, an estimated service area is submitted in this dataset based on publicly available information and field validation efforts. Additional information on the methodology used to create and revise the OneLink service area is available in the Field Validation narrative.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Puerto Rico principals that all commercially reasonable efforts were made to account for 100% of the known Puerto Rico broadband provider community, pursuant to this semi-annual data update submission.

Connect Puerto Rico has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Puerto Rico conducts field validation efforts. To date, 11 (57.89%) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Narrative.

At the program's inception, Connect Puerto Rico launched a website to create awareness about the initiative. Connectpr.org continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Puerto Rico website encountered 1,846 unique visits during this reporting period, which includes 1,086 visits to the English website and 760 visits to the Spanish website (3,659 total to date for the life of the grant awarded on December 20, 2009, which includes 2,695 to the English website and 964 to the Spanish website). Additionally, this pronounced Web activity netted 16 broadband inquiries over this same reporting period (24 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer initiated actions are facilitated through the Connect Puerto Rico website and the Connect Puerto Rico Interactive Mapping Tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Puerto Rico mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

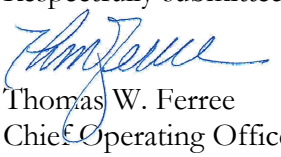
Connect Puerto Rico has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix.

In conjunction with the Commonwealth of Puerto Rico, outreach was conducted during this data update reporting period by Connect Puerto Rico to continue identification of existing, centralized sources for CAI connectivity data. Working with the Puerto Rico Office of the Chief Information Officer (OCIO), Connect Puerto was able to secure data from the territory from a variety of CAIs and process this data for inclusion in the upcoming submission. Outreach was coordinated to distribute both an English and Spanish language CAI survey to institutions throughout the territory through multiple methods including a customized online survey available on the Connect Puerto Rico website. Connect Puerto Rico continues to work in close coordination with territory-wide associations such as the Consejo General de Educación, Consejo de Educación de Puerto Rico, and Departamento de Salud - OIAT to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process.

While we continue to document institutions and the related addresses, the connectivity data collected in most categories remains incomplete at this time. Connect Puerto Rico will be implementing a number of new processes to increase participation including launching a CAI newsletter to connect communities across the territory, increasing industry-specific planning to target new community contacts, and revising the CAI portion of our website to increase visibility and content. Additionally, Connect Puerto Rico will continue working closely with the OCIO to reach CAI associated with their respective sectors. From our work in Connect Puerto Rico, as well as other states, we recognize the great value of this data to future collaboration efforts within the territory and its value to the recently released National Broadband Map. We plan to continue to bring best practices to the Connect Puerto Rico efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Puerto Rico program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great Commonwealth of Puerto Rico, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,



Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

cc: Juan Eugenio Rodriguez de Hostos, CIO
Government of Puerto Rico

DATA ACQUISITION: PUERTO RICO COMMUNITY ANCHOR INSTITUTIONS

In this third reporting period of the SBDD, Connect Puerto Rico, working in close coordination with the Puerto Rico Office of the Chief Information Officer (OCIO), has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBDD NOFA Technical Appendix. During this reporting period Connect Puerto Rico has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Puerto Rico has continued to identify and process CAI data obtained through an ongoing territory-wide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Puerto Rico through ESRI ArcGIS software. One of the challenges that we face in Puerto Rico is the use of a non-standard addressing system. Discussions are ongoing with the OCIO and internal staff to address this issue and report data to NTIA that has not been processed and reported in this submission.

Connect Puerto Rico continues to utilize a customized online survey hosted through SurveyMonkey in both English and Spanish, with a landing page on the Connect Puerto Rico website that was developed during the first reporting period. This survey, in combination with a customized data gathering spreadsheet, was distributed to a targeted list of CAI throughout the territory. Connect Puerto Rico will continue to use these data gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link in both English and Spanish using the following password:

English Survey
http://en.connectpr.org/mapping/Community_Anchor_Institution_Data_Collection.php

Spanish Survey
http://es.connectpr.org/mapa/recopilacion_de_datos__de_instituciones_comunitarias_ancla.php

Password: CAI_PR_2158

Connect Puerto Rico, OCIO, and OCIO consultants CSA Group, have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. Centralized CAI broadband connectivity data was received during this reporting period from the OCIO and has been included in this submission. We will continue to identify data sources that may have this type of data and include it in upcoming submissions as the data is made available.

In tandem with these efforts to identify existing data, Connect Puerto Rico continues to identify key CAI contacts among all CAI categories in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Coordination with organizations such as Consejo General de Educación, Consejo de Educación de Puerto Rico, and Departamento de Salud – OIAT are very important to the success of this data collection effort, and we will continue to work closely with these and other agencies to gather connectivity data within Puerto Rico.

Connect Puerto Rico has an ongoing mission to educate CAI throughout the territory on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. To assist with our data collection efforts, Connect Puerto Rico is developing an English and Spanish language CAI newsletter to be distributed quarterly beginning in April 2011. The newsletter will highlight a CAI in Puerto Rico, encourage institutions to share their data, and highlight the National Broadband Map.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Puerto Rico will continue its ongoing work with OCIO, the CSA group, and key organization contacts in an effort to raise awareness of this project among CAI and overcome the challenges of geocoding, identifying, and securing CAI data within Puerto Rico.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12 Schools	1,998	1,998	1,689	1,504	1	1
Libraries	154	154	153	3	2	2
Healthcare	621	620	139	0	0	0
Public Safety	308	307	277	24	14	14
Higher Ed Institutions	553	553	88	21	16	16
Other Government	6	6	1	0	0	0
Other Non-Government	1,508	1,448	980	8	5	5
Total	**5,148**	**5,086**	**3,327**	**1,560**	**38**	**38**

SBDD Data Submission Methodology

The submission of the broadband dataset for April 1, 2011, is contained within the SBDD Data Transfer Model and additional components as released on the Grantee Workspace on January 14, 2011. Connected Nation 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 or territory, 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. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

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 Commonwealth of Puerto Rico.

Inventory of Deliverables, Connect Puerto Rico: April 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
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.
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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 Connected Nation on behalf of the Commonwealth of Puerto Rico 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, and middle-mile connections and community anchor institutions are contained as point data. 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.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but it is not included in this submission dataset. Additional information is necessary to be able to show where service satisfactorily exists in the commonwealth rather than submitting the entire boundary of the island as the serviceable area. Analysis information distributed and discussed with the satellite providers, as well as any additional guidance from the Program Office on the desired analysis for satellite-serviceable areas, will be implemented for the October 2011 data submission.

PUERTO RICO FIELD VALIDATION NARRATIVE

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the territory using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the territory using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date Connected Nation's staff conducted on-site validation tests in Puerto Rico on the following providers: Aeronet Wireless, AT&T, Critical Hub Networks, Data@ccess, Liberty Cablevision of Puerto Rico, Neptuno Media, San Juan Cable LLC d.b.a. OneLink, Puerto Rico Telephone Company, Sprint, T-Mobile, and Worldnet.

During this reporting period, Connected Nation conducted 81 additional on-site validation tests with Aeronet Wireless, AT&T, Critical Hub Networks, Neptuno Media, San Juan Cable LLC d.b.a. OneLink, Puerto Rico Telephone Company, and Sprint.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 11 companies (out of a universe of 19 viable providers) totaling 57.89% on the island of Puerto Rico.

DATA SUBMISSION OF NON-PARTICIPATING PROVIDER

As part of its ongoing broadband mapping efforts, Connected Nation has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBDD mapping initiative.

The following narrative will discuss the recent data collection activities related to San Juan Cable, LLC (d.b.a. OneLink), a cable television and cable modem provider in the San Juan, Puerto Rico area, explaining how and where CN obtained publicly available data and the "on-the-ground" validation techniques that support the underlying data.

Background

CN staff members attended meetings in Puerto Rico from September 21-25, 2009, for a series of one-on-one provider meetings, which had been scheduled by Maria Pou, Special Assistant to the OCIO, to discuss the SBDD grant program. OneLink was scheduled to attend a meeting on September 24 at 10:00 a.m.; however, no one from their organization arrived (nor did they notify Maria of their intent to cancel). Outreach efforts conducted from September 2009 through September 2010 failed to motivate San Juan Cable, LLC into either responding or participating in the mapping initiative.

The Issue

San Juan Cable, LLC, by its lack of actions, indicated its unwillingness to participate in the island-wide mapping initiative. This surfaced as a problem during the first two stages of mapping and the lack of data for this provider will continue to threaten to skew future research and planning activities under the direction of the OCIO.

Identification of Provider's Legal Name, d.b.a., and FRN

CN began building a file based on anecdotal information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN received information from the Junta Reglamentadora de Telecomunicaciones de Puerto Rico ("JRT") indicating that territory once operated by Adelphia was the same territory now operated by OneLink. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system did not yield results. It was later discovered that the entity of record with the JRT was, in fact, San Juan Cable, LLC. A new search on the FCC CORES site yielded an FRN of 0013778857 and additional contact data. This was later confirmed when NTIA provided CN with a submission summary comparison against FCC Form 477 filers (see graphic below).

State Broadband Data and Development (SBDD) Program
Submission Summary
Date: 6/25/2010

Puerto Rico

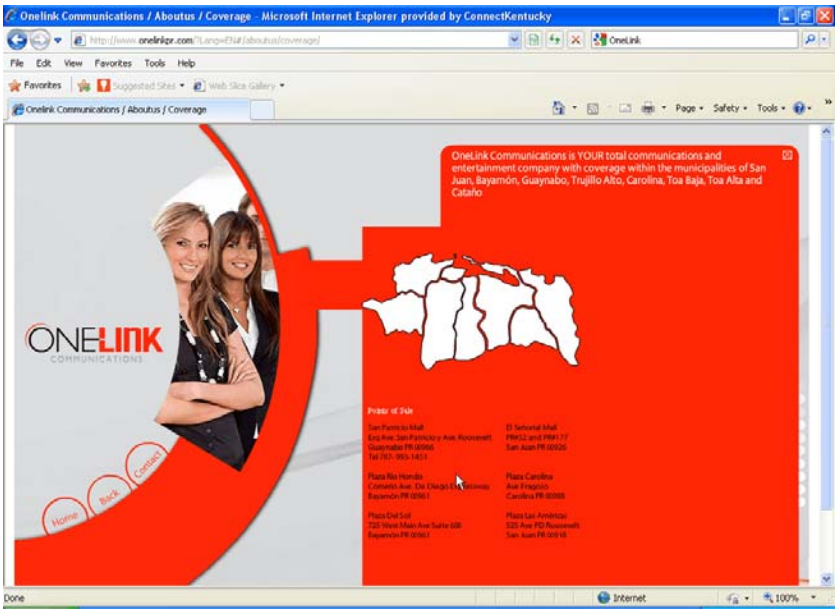
Service Providers Submitted *

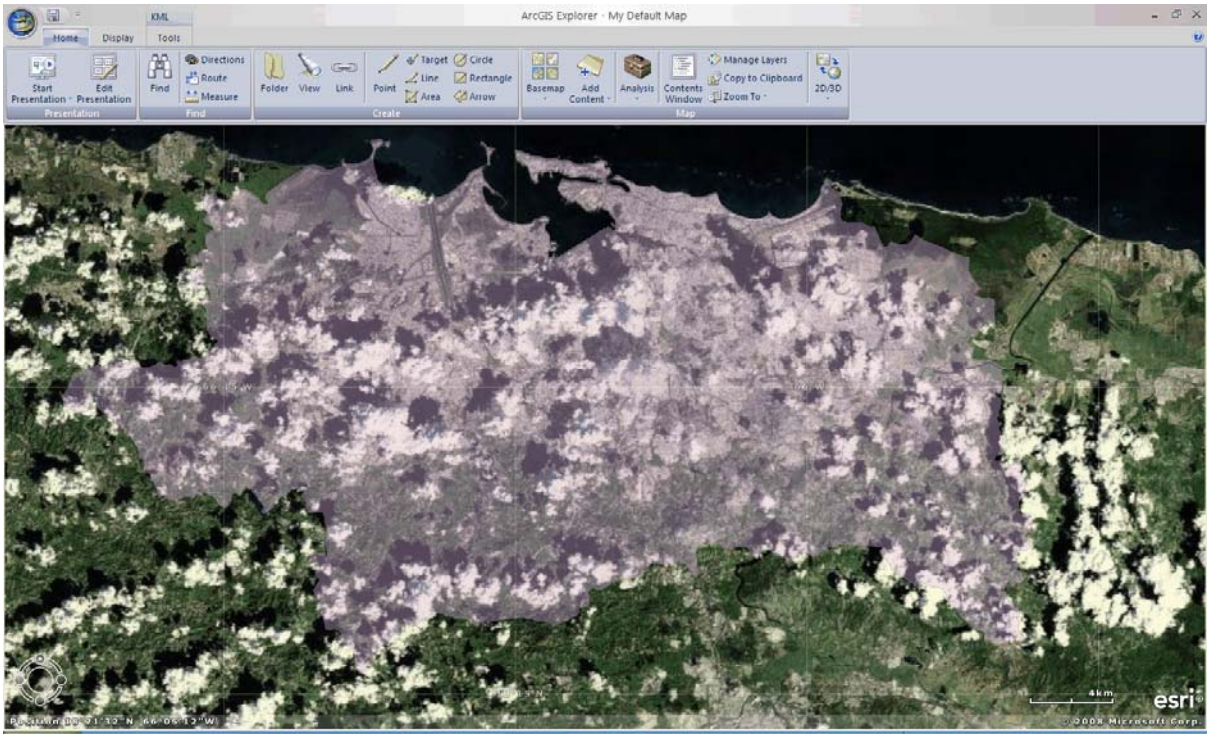
* Based on data from Census Block <2 Sq. Miles, Address-Level, Street Segment, Residential Overview Files, Wireless Shape Files

State Broadband Data Submission			#	FCC Form 477 (June 2009)		
FRN	Company Name	Doing Business As		FRN	Company Name	Doing Business As
4979233	AT&T Mobility LLC	AT&T Mobility LLC	1	0003766532	AT&T Inc.	New Cingular Wireless Services, Inc.
001731470	America Movil	Puerto Rico Telephone Company, Inc.	2	0004496774	AT&T Inc.	AT&T Corp.
0017434911	Hughes Network Systems, LLC	Hughes Network Systems, LLC	3	0001731470	Am¿rica M¿vil	Puerto Rico Telephone Company, Inc.
0010593408	Liberty Global, Inc.	Liberty Cablevision of Puerto Rico Ltd.	4	0012216933	Am¿rica M¿vil	Telecomunicaciones de Puerto Rico, Inc.
0003774593	Sprint Nextel Corporation	Sprint	5	0009631136	Centennial Communications Corpo	Centennial Communications Corp.
			6	0018463073	Hughes Communications, Inc.	HNS License Sub, LLC
			7	0010593408	Liberty Global, Inc.	Liberty Cablevision of Puerto Rico Ltd.
			8	0012841458	Neptuno Media, Inc.	Neptuno Media
			9	0003605953	Qwest Communications Internation	Qwest Communications Company, LLC
			10	0013778857	San Juan Cable Holding, LLC	San Juan Cable LLC
			11	0003774593	Sprint Nextel Corporation	Sprint Nextel Corporation
			12	0005067457	StarBand Communications Inc.	StarBand Communications Inc.
			13	0018547828	Telefonica Data Corp SA	Telefonica USA, Inc.
			14	0018547885	Telefonica International Holding, BV	Telefonica Larga Distancia de Puerto Rico, In
			15	0018591826	Worldnet Telecommunications, Inc.	WORLDNET TELECOMMUNICATIONS

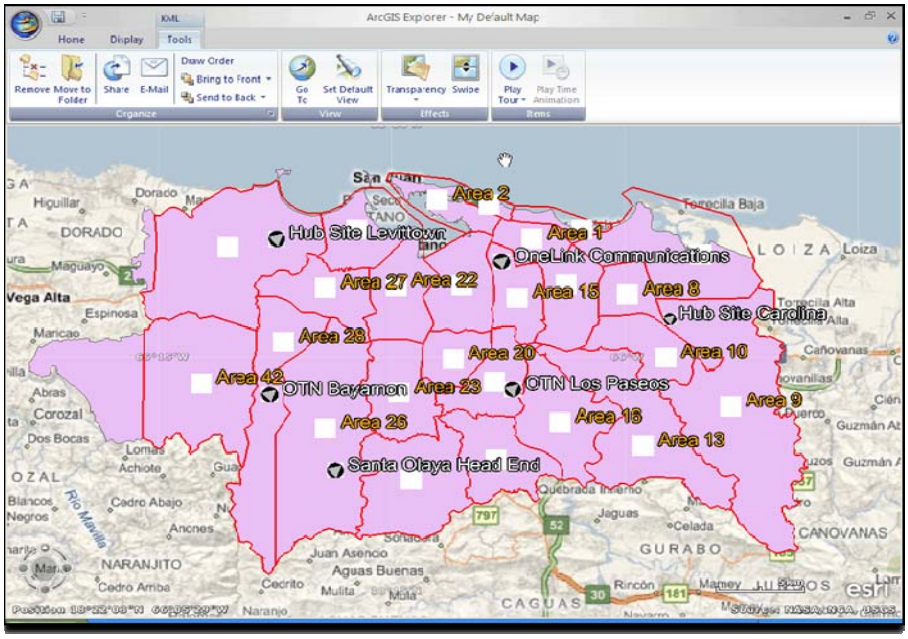
Identification of Provider's Coverage Area

Connected Nation extracted the municipio boundaries from OneLink's publicly available website (see first illustration below) and used the company's published boundaries to create a GIS shapefile (see second illustration below) of the greatest advertised extent of OneLink's service area.





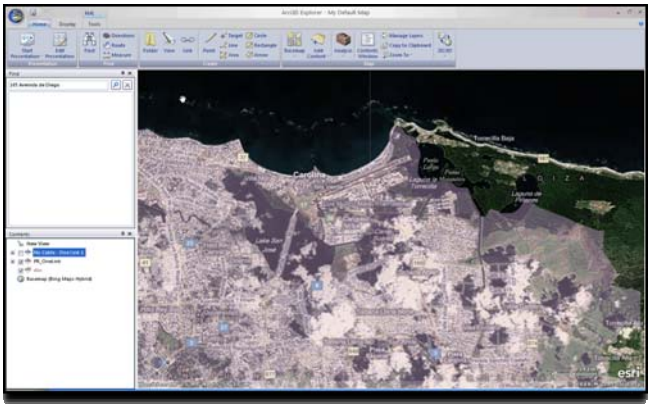
These polygons were then compared against <u>the only</u> shred of data supplied by OneLink during the course of attempted communication (see comparative illustration below). The purple-shaded area was the CN coverage polygon extracted from OneLink's website, and the red outlines illustrate the franchisee boundaries submitted by OneLink.



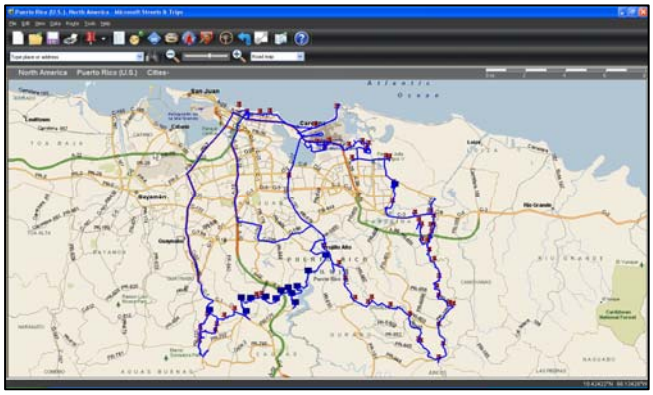
Using this combined coverage polygon as the basis for further investigation, Connected Nation set out on an exploratory "drive test" to determine where cable plant existed and estimate where cable modem likely existed in the greater San Juan area. During the period of February 7-11, 2011, Connected Nation deployed five staff members (all highly trained, former telecommunications operators) to conduct a thorough analysis of OneLink's "alleged" coverage area.

Testing Techniques

Specific quadrants were assigned to each of the validation teams on a daily basis. The goal was to drive through each of the areas and determine the existence (or lack thereof) of CATV plant – whether fiber or coaxial.



Test points were pre-selected and entered into Microsoft Streets & Trips, which also created a GPS-enabled "trace route" of each day's drive testing activities.

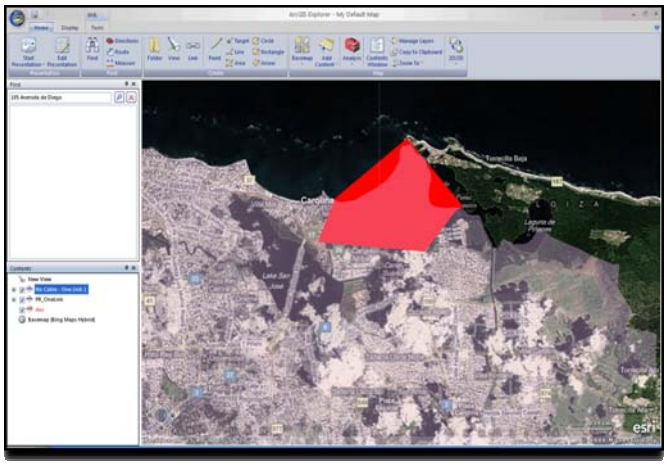


As cable plant was identified, markers were placed within Streets & Trips pinpointing the areas where service was likely to exist.

Connected Nation staff members then proceeded to stop at points along the way and conducted random interviews with residents within the area querying the actual availability of cable modem service.

Based on the lack of visible or traceable cable plant, polygons were created in ArcGIS Explorer to specify the population areas where the Connected Nation staff believed coverage gaps existed.

The illustration on the right represents one such "gap area" identified during the drive test.



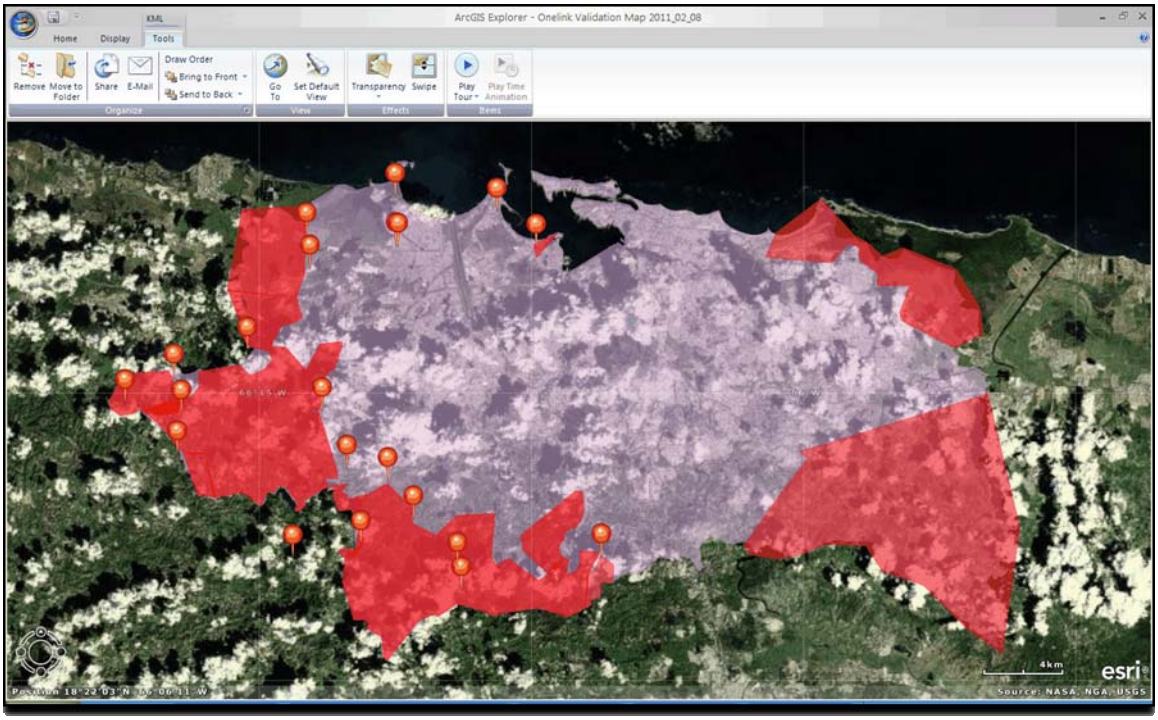
Visual identification of physical CATV plant was relatively easy and straightforward. The Connected Nation team members, many of whom were former CATV operators, found very little difficulty in identifying aerial (above ground) CATV plant or in locating plant that traveled below the earth's surface (underground plant) based simply on looking for specific cable routes.

The image to the left below demonstrates that the Connected Nation team could, in fact, locate aerial plant while the image to the right below demonstrates where CATV plant moved from an aerial design to an underground design. In the picture to the right, the CATV plant moves from a pole to an area where underground vaults or above-ground pedestals could be easily traced and identified.

At the conclusion of this week-long exercise, Connected Nation had driven through several hundred miles of the OneLink franchise area, located above ground and underground plant, visited with and surveyed numerous local residents, obtained collateral material from OneLink's local offices (to determine maximum advertised connection speeds), and created a polygon that illustrates the identified and likely coverage area of OneLink.

Results and Submission for April 2011

As a result of the collection of publicly available information and the on-the-ground validation efforts, Connected Nation is submitting on behalf of the Commonwealth of Puerto Rico, the cable modem broadband service area of OneLink. Without provider participation and support of the SBDD mapping initiative, CN has proceeded with developing a relevant and feasible methodology for collecting and validating the service area of a currently non-participating broadband provider. The image below shows the exact results of the validation efforts in terms of the revisions made to the advertised cable broadband availability in the San Juan area. Polygons in red demonstrate areas where the CN staff reasonably believes "gaps" exist in the franchise area. The remaining purple-shaded areas are included, along with full attributes, in the Puerto Rico broadband data submission for the April 1, 2011, deliverable to NTIA for the SBDD grant program.



Sample OneLink Cable Modem Collateral Material

ACCURACY AND VERIFICATION: METHODOLOGY - PROVIDER VALIDATION

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated to an island-wide level, static maps of island-wide and municipality-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 8.18% of Puerto Rico households do not have terrestrial fixed broadband service available, and approximately 0.89%[1] of Puerto Rico households have neither mobile nor fixed broadband service available.[2]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBDD NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBDD data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block

Within rural areas of the commonwealth, results derived from provider-validated data indicate that approximately 12.68% of rural Puerto Rico households do not have terrestrial fixed broadband service available, and approximately 1.49%[3] of rural Puerto Rico households have neither mobile nor fixed broadband service available.[4]

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)

whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state or territory.

[3] See footnote 1.

[4] See footnote 2.

19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries. These inquiries represent any type of communication received from the public regarding broadband service. Once broadband inquiries are received across the island, this information is overlaid with the broadband availability information which was collected through the SBDD program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Broadband inquiries are able to provide three types of information: 1) Residents who do not have broadband but want it. 2) Residents who have broadband but want a different provider. 3) Residents who do not have broadband, but the broadband inventory maps indicate that they do.

Through the collection of broadband inquiries, a visual demand for broadband is presented. This visualization allows Connected Nation the ability to validate broadband availability maps for accuracy. If residents within a region state that they are without broadband, but the broadband inventory maps show otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground. On the other hand, if there is a region in the territory in which broadband is not available, the broadband inquiries allow providers close to that region to see where they can successfully expand their broadband networks, leading to a high return on investment. In short, the

higher number of inquiries leads to a higher level of certainty in regard to the broadband availability maps. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which are scheduled as soon as possible. Additional information on field validation can be found in the Field Validation Narrative.

The broadband inquiry process has been implemented in each of the Connected Nation programs with successful results. Altogether Connected Nation has received over 16,000 broadband inquiries since 2007, allowing the programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these jurisdictions has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Puerto Rico project has received a total of 16 inquiries (24 grant inception to date). As more inquiries are submitted to Connect Puerto Rico, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumers to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Puerto Rico project launched BroadbandStat on September 17, 2010, and has received a total of 369 visits to date, of which 224 occurred this reporting period.

SPEED TEST METHODOLOGY

The 165 speed tests that are represented in the Connect Puerto Rico Speed Test Report during this reporting period (396 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Puerto Rico speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for municipality-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Puerto Rico project, speed test information is collected throughout the commonwealth. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Puerto Rico with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the Commonwealth of Puerto Rico.

CONNECT PUERTO RICO

Broadband Provider Log

Complete	12
Non-Responsive/Refused	0
In Progress	13
Count of Datasets by Viable Status	**25**
Total Unique Providers Represented	**19**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	
Aeronet Wireless Broadband Corp.	Backhaul	Backhaul Provider Only Processing Complete		
Critical Hub Networks	Backhaul	Backhaul Provider Only Processing Complete	9/30/2010	
Neptuno Networks, Inc.	Backhaul	Backhaul Provider Only Processing Complete	4/29/2010	
Claro	ILEC/CLEC	Partial Data Approved	4/23/2010	
Critical Hub Networks	Fixed Wireless	Provider Approval Solicited	9/30/2010	
Puerto Rico Cable Acquisition Company, Inc.	Cable	Provider Approval Solicited	9/27/2010	
Aeronet Wireless Broadband Corp.	Fixed Wireless	Provider Gathering Data		
Claro	Mobile Wireless	Provider Gathering Data	4/23/2010	
Data@ccess Communications	Backhaul	No Update to Provide	9/29/2009	
MCI Communications Services, Inc.	Backhaul	No Update to Provide	12/14/2011	
PREPA Networks Corp	Backhaul	No Update to Provide	4/21/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Sprint Nextel Corporation	Mobile Wireless	No Update to Provide	1/14/2010	
Worldnet Telecommunications inc.	Backhaul	No Update to Provide	4/19/2010	
Liberty Global, Inc.	Cable	No Update Provided - Use Last Submission Data	10/19/2009	
Ayustar Corp	Fixed Wireless	Solicited Initial Data	7/12/2010	
INTECO	Fixed Wireless	Solicited Initial Data		
INTECO	Backhaul	Solicited Initial Data		
Orizon Wireless Corp	Fixed Wireless	Solicited Initial Data	1/28/2011	
Telefonica International Holding, BV	Backhaul	Solicited Initial Data		
Hughes Network Systems, LLC	Satellite	Other	2/5/2010	[MAR-09-11 Jess Cary] Satellite data will not be submitted due to additional information being necessary to show where service is available, rather than submitting the entire island boundary as serviceable area.
Onelink Communications	Cable	Other		[FEB-11-11 Chip Spann] Independent of provider participation (or in this case, the lack thereof) the engineering and technical services team has completed the drive testing, validation, data collection of the OneLink system. Data was obtained from the provider's website, collateral material veryfying Max Advertised Speed was obtained at the local office, routes were charted, pictures taken and revisions to coverage polygon created. [MAR-8-2011 Jess Cary] Data will be submitted for April 2011.
T-Mobile USA, Inc.	Backhaul	Other	1/8/2010	[MAR-09-2011 Jess Cary] As of December 31, 2010, T-Mobile offers no backhaul service in Puerto Rico.