Broadband Mapping
in Coos County, New Hampshire

Grantee:
Earth Systems Research Center
University of New Hampshire
8 College Road
Durham, NH 03824

NBRC Project Number NBRC-14-G-NH-00005
October 1, 2014 – June 30, 2016

Report Submitted:
July 30, 2016

Report Submitted by:
Fay Rubin
Project Director
Earth Systems Research Center
Durham, NH 03824
(603) 862-4240

Name of Project:	NBRC Project Number:
Broadband Mapping in Coos County, New Hampshire	NBRC-14-G-NH-00005
Grantee Name:	Grant Period:
Earth Systems Research Center, University of New Hampshire	October 1, 2014 – June 30, 2016
Project Director:	NBRC Grant Amount:
Fay Rubin	$102,442

Background:

Broadband "high speed internet access" has clearly become an integral part of the New Hampshire's economy. It is critical for creating and maintaining jobs and for supporting public safety, education, healthcare, tourism, business, and our overall quality of life. The state must continually promote expanded broadband access and adoption in order to remain competitive with our neighboring states, with Canada, and globally. To do so effectively, a thorough understanding of the ever changing broadband landscape is required.

The New Hampshire Broadband Mapping & Planning Program (NHBMPP) began in 2010 as a comprehensive program that seeks to understand where broadband is currently available in NH, how it can be made more widely available in the future, and how to encourage increased levels of broadband adoption and usage. Housed at the University of New Hampshire and initially funded by the National Telecommunications and Information Administration through the American Recovery and Reinvestment Act, the NHBMPP comprises two main components: a broadband availability inventory and mapping effort, and a suite of planning and technical assistance initiatives. "Broadband Mapping in Coos County, New Hampshire" was an effort to extend the broadband availability mapping and related outreach activities of the NHBMPP, focusing on areas of northern New Hampshire where gaps in broadband availability persist.

Activities:

The Coos County project integrated data collection, data analysis, and data visualization/map generation, in order to: 1) provide an enhanced and ongoing picture of the broadband landscape in Coos County by identifying areas that are unserved/underserved; 2) work with communities, regional agencies, and providers to ensure that they are aware of the broadband gaps identified; and 3) utilize geospatial modeling tools to deliver a generalized cost estimate for additional broadband deployment in Coos County.

An important decision point faced by the NHBMPP project team early in the project was how to define broadband. In 2015, the Federal Communications Commission (FCC) released an updated broadband standard, defining broadband as a minimum download speed of 25 Mbps and a minimum upload speed of 3 Mbps (see Federal Communications Commission, "2015 Broadband Progress Report", https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report).   The NHBMPP project team adopted this definition of broadband to guide its data collection and processing efforts.

The primary project activities completed were:

1) **Data Collection** relied on several input mechanisms. While the initial intent was to solicit broadband availability data directly from providers, it was quickly apparent providers were

either unable or unwilling to commit the resources required to provide data directly to us and we would instead need to rely on data published by the FCC. Consequently, the NHBMPP derived broadband coverage information by accessing successive versions of the FCC Form 477 data (see https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477), the latest of which incorporated provider data from June 30, 2015. The data identified census blocks served by each Coos County provider, and for each block identified the broadband technology(ies) offered and the corresponding advertised speed tiers.

A component of the data collection activity involved maintaining a list of all active broadband providers in Coos County. This was also accomplished by reviewing the FCC Form 477 data to extract the provider names. Additional information on broadband providers active in Coos County was collected from local sources, although coverage footprints associated with the additional service providers was not available.

In addition to the national availability data, the NHBMPP collected local address-level data via the online broadband speed test tool hosted on the project website (http://iwantbroadbandnh.org or http://nhspeed.org). At the project outset, the speed test tool was restricted to receiving input only from wireline-based devices. During the project period, the tool was migrated to a non-flash based environment that allowed for collecting information from both wireline and wireless-based mobile devices (tablets and phones). This migration was important to support expanded speed test access and utilization.

Several marketing efforts were undertaken to promote the use of the speed test in Coos County. A promotional postcard was developed (see Figure 1), and packets containing postcards and an associated marketing flyer were mailed to all libraries in Coos County for direct distribution to library patrons. In addition, the postcards were distributed to organizations active in broadband issues in Coos County, as well as distributed at project meetings and workshops.

Figure 1. NHBMPP Promotional Speed Test Postcard
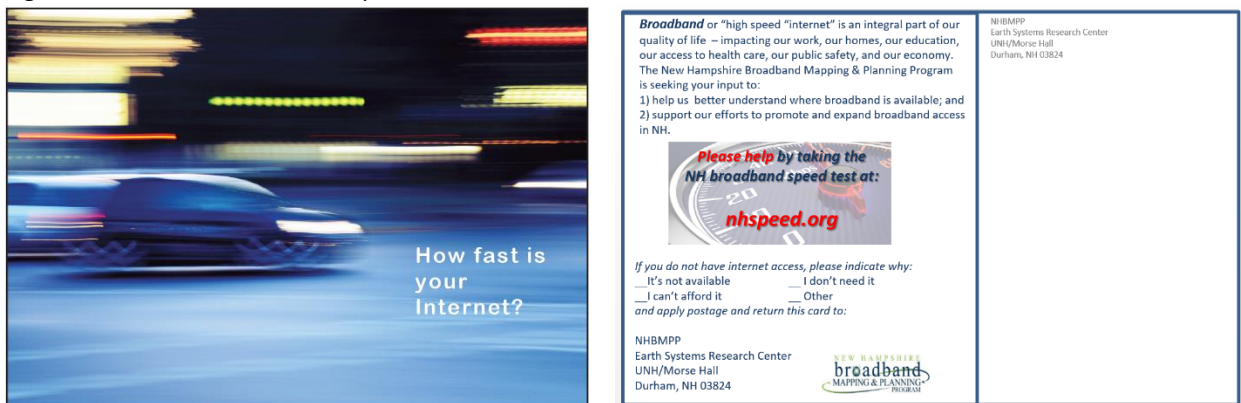
2) **Data Analysis** involved processing the broadband availability and speed test data to generate summary maps and tables of the results, and sharing the mapping results through coordination with partners in Coos County, through a series of local workshops, and through the production of a project summary document. The results of the analyses were also used to guide the

development of a geospatial modeling tool to derive generalized cost estimates for additional broadband deployment in Coos County. Each of these elements is described further below.

Broadband Availability Mapping: The data collected from the FCC, the speed test tool, and other sources was processed to generate tabular data summarizing the population of New Hampshire, and Coos County specifically, that is considered served, underserved, and unserved. Table 1 presents the results across all technologies, including fixed wireline, fixed wireless, cellular, and satellite deployments. As shown, 25,820 persons in Coos County, representing just over 78% of the 2010 population of 33,055, have broadband service available. Note that this figure is significantly lower than the state figure, with almost 94% of the statewide population having access to broadband. An additional 5,587 persons, or almost 17% of the population, are considered underserved because they have access to the internet at speeds that are not considered broadband. Finally, 1,648 persons, or 5% of the population, have no access.

Table 1. Broadband and Other Internet Availability in New Hampshire by County – All Technologies

County	Total Population (2010)	Served (25+ Mbps down x 3+ Mbps up)		Underserved - Other Internet Access (6-25 Mbps down x 1.5-3 Mbps up)		Unserved (< 6 Mbps down x <1.5 Mbps up)	
		Population	%	Population	%	Population	%
Belknap	60,088	57,917	96.4%	2,149	3.6%	22	0.0%
Carroll	47,818	46,157	96.5%	1,638	3.4%	23	0.0%
Cheshire	77,117	58,363	75.7%	18,148	23.5%	606	0.8%
Coos	33,055	25,820	78.1%	5,587	16.9%	1,648	5.0%
Grafton	89,118	80,724	90.6%	8,203	9.2%	191	0.2%
Hillsborough	400,721	381,214	95.1%	19,470	4.9%	37	0.0%
Merrimack	146,445	135,196	92.3%	11,153	7.6%	96	0.1%
Rockingham	295,223	292,870	99.2%	2,353	0.8%	0	0.0%
Strafford	123,143	120,217	97.6%	2,926	2.4%	0	0.0%
Sullivan	43,742	35,483	81.1%	8,199	18.7%	60	0.1%
State of New Hampshire	**1,316,470**	**1,233,961**	**93.7%**	**79,826**	**6.1%**	**2,683**	**0.2%**

Table 2 presents the corresponding data with cellular and satellite based technologies excluded. These technologies are omitted in recognition of the potential limitations associated with latency, reliability, and data caps. As shown, availability in Coos County decreases to 23,491 persons or approximately 71% of the population with access to broadband. Again, Coos County residents are at a considerable disadvantage relative to the rest of the state with respect to broadband access. An additional 4,431 persons in Coos County, or 13% of the population, have other internet access.   Perhaps of most significance, over 5,000 persons, or 15.5% of the population, are without access based on wireline and fixed wireless technologies.
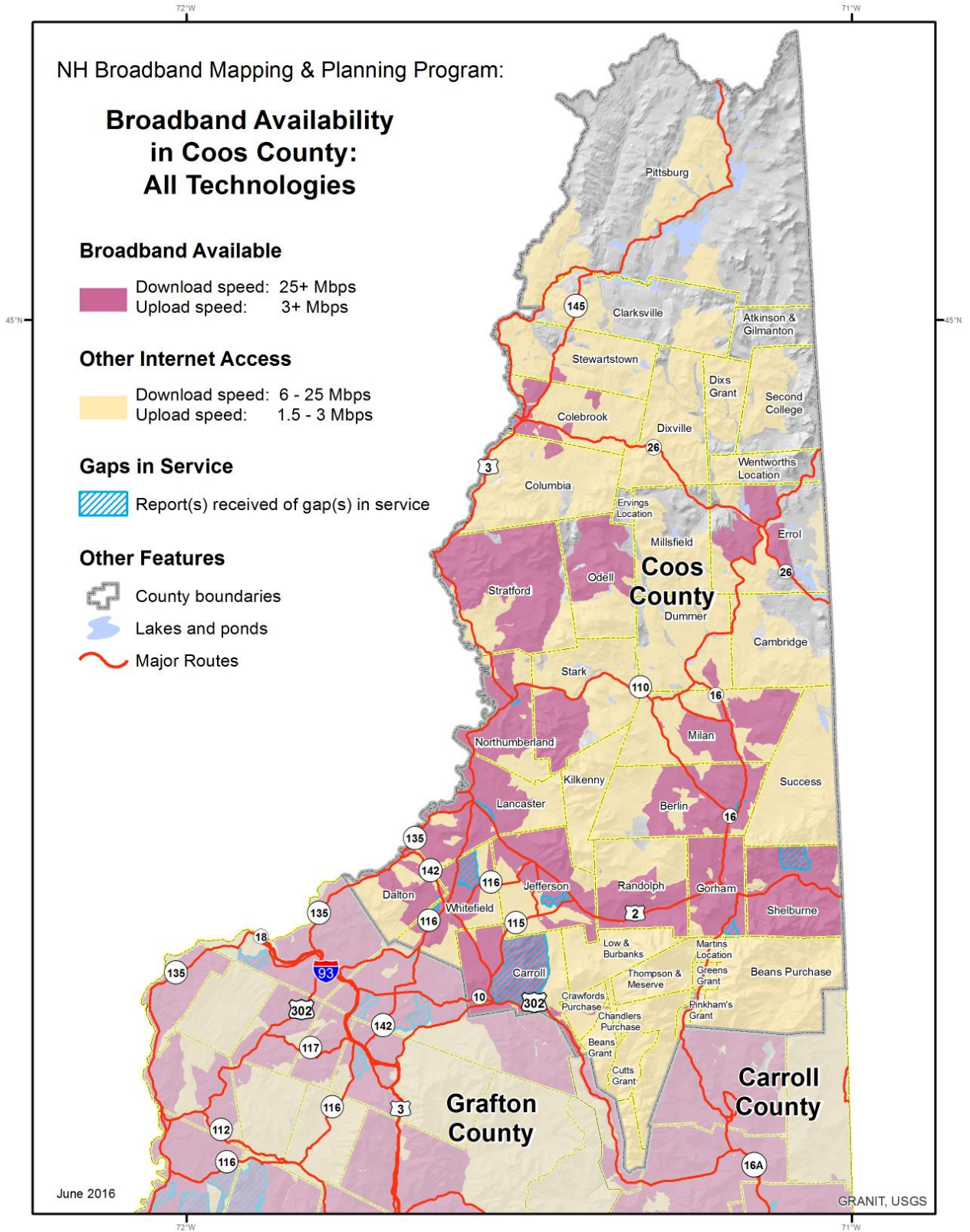
Table 2. Broadband and Other Internet Availability in New Hampshire by County – Excluding Cellular and Satellite Technologies

County	Total Population (2010)	Served (25+ Mbps down x 3+ Mbps up)		Underserved - Other Internet Access (6-25 Mbps down x 1.5-3 Mbps up)		Unserved (< 6 Mbps down x <1.5 Mbps up)	
		Population	%	Population	%	Population	%
Belknap	60,088	57,877	96.3%	46	0.1%	2,165	3.6%
Carroll	47,818	45,674	95.5%	521	1.1%	1,623	3.4%
Cheshire	77,117	55,050	71.4%	5,199	6.7%	16,868	21.9%
Coos	33,055	23,491	71.1%	4,431	13.4%	5,133	15.5%
Grafton	89,118	80,705	90.6%	2,730	3.1%	5,683	6.4%
Hillsborough	400,721	380,362	94.9%	1,191	0.3%	19,168	4.8%
Merrimack	146,445	135,030	92.2%	305	0.2%	11,110	7.6%
Rockingham	295,223	292,849	99.2%	40	0.0%	2,334	0.8%
Strafford	123,143	120,176	97.6%	73	0.1%	2,894	2.4%
Sullivan	43,742	35,320	80.7%	229	0.5%	8,193	18.7%
State of New Hampshire	**1,316,470**	**1,226,534**	**93.2%**	**14,765**	**1.1%**	**75,171**	**5.7%**

It is important to note that the availability figures in Tables 1 and 2 report on the number of persons who have access to broadband without regard to cost. Clearly not all people who have broadband available to them subscribe to services, with cost, lack of understanding of the benefits, and/or lack of interest contributing to the decision to not subscribe.

Figures 2 and 3 below presents the geographic distribution of the availability data for all technologies and with cellular and satellite technologies excluded, respectively. As shown, residents of southern Coos County have the best access to broadband, while those in the northern tier of the County have few if any options to access the Internet.

Figure 2. Broadband Availability in Coos County - All Technologies

Figure 3. Broadband Availability in Coos County – Excluding Cellular and Satellite Technologies

NH Broadband Mapping & Planning Program:

**Broadband Availability
in Coos County:
Wireline and
Fixed Wireless Technologies**

Broadband Available

Download speed: 25+ Mbps
Upload speed: 3+ Mbps

Other Internet Access

Download speed: 6 - 25 Mbps
Upload speed: 1.5 - 3 Mbps

Gaps in Service

Report(s) received of gap(s) in service

Other Features

County boundaries
Lakes and ponds
Major Routes

June 2016

GRANIT, USGS

The broadband availability tables (Tables 1 and 2) and figures (Figures 2 and 3) are based on the list of broadband providers presented in Table 3 below. This provider list was generated from the June 2015 FCC Form 477 data, and does not include a number of providers who are known to offer service in Coos County but who did not submit data to the FCC.

Table 3. Coos County Internet Service Providers[1]

Technology	Provider	Class of Service
Cable	Time Warner Cable Inc.	Business/Residential
Cellular	AT&T Mobility LLC	Residential
	United States Cellular Corporation	Residential
	USAT Corp.	Residential
	Verizon Wireless	Business
Fiber	Bretton Woods Communications	Business
	PAETEC Communications Inc.	Business
Fixed Wireless	King Street Wireless, L.P.	Business/Residential
	Wireless LINC/NCIC	Business/Residential
Satellite	dishNET Satellite Broadband, L.L.C.	Residential
	GCI Communications, Corp.	Business
	HNS License Sub, LLC	Business/Residential
	Skycasters, LLC	Business/Residential
Copper-Wireline (T1)	BayRing Communications	Business
	EarthLink Business, LLC	Business
	MCI (Verizon Business)	Business
xDSL	FairPoint Communications	Business/Residential
xDSL, Fiber	FirstLight	Business

[1]Other providers offer service in Coos County (including TCC Networks/Skywire, Fibercast, etc.) and some providers listed may offer additional types of services (including FairPoint), but information on the footprints they serve was not part of the FCC data set at the time of this report.

Speed Test Data:

Table 4 below summarizes the speed test data collected via the tool hosted on the NHBMPP web site and accessible at http://nhspeed.org. Data was collected from 114 testers in 19 municipalities in Coos County. The results were aggregated to indicate the average download and upload speeds and the range of test results from each location.

The test results are important data elements that contribute to mapping and monitoring broadband access in the state. They also provide a means to verify that the actual, delivered speeds are within an acceptable range of the services advertised by broadband providers.

Table 4: Coos County Speed Test Data

Town	# of Speed Tests	Average Download Speed (Mbps)		Average Upload Speed (Mbps)	
		Average	Range	Average	Range
Berlin	24	3.285	.150-10.441	1.027	.098-3.929
Carroll	3	1.513	.124-2.329	6.232	.121-18.354
Colebrook	10	3.637	.681-8.222	3.506	.131-11.945
Dalton	5	1.897	1.276-3.127	0.897	.047-1.666
Dummer	3	3.639	2.508-4.657	1.047	.737-1.507
Errol	1	5.885	5.885-5.885	0.965	.965-.965
Gorham	7	2.944	.587-10.164	3.980	.369-12.370
Jefferson	11	3.907	.807-6.542	1.689	.117-5.344
Lancaster	12	5.679	.673-16.269	2.111	.261-11.235
Milan	4	3.225	1.367-5.549	1.371	.486-3.381
Northumberland	3	3.821	1.936-5.230	1.566	1.069-1.933
Pittsburg	8	2.195	.661-4.083	0.702	.118-1.680
Randolph	1	7.081	7.081-7.081	0.665	.665-.665
Shelburne	4	3.221	.842-8.139	0.716	.101-1.054
Stark	2	1.912	1.124-2.700	2.938	1.482-4.394
Stewartstown	1	0.176	.176-.176	0.065	.065-.065
Stratford	1	5.490	5.490-5.490	0.968	.968-.968
Wentworths Location	1	0.048	.048-.048	0.113	.113-.113
Whitefield	13	3.095	.105-8.110	0.756	.045-2.936
Coos County	**114**	**3.416**	.048-16.269	1.710	.045-18.354

Partner Coordination: Partner coordination was achieved through a series of videoconferencing meetings throughout the project. Generally, the purpose of the meetings was to update all partners on the progress of the various broadband-related activities ongoing in Coos County, to demonstrate to external partners the tools and resources developed by the NHBMPP, and to plan for the workshops and meetings held in Coos County and described below.

Workshops: Results of the data collection and analysis were shared with Coos County stakeholders through a series of three sector-targeted workshops (see Attachments 1-3 for workshop agendas). The first workshop was held in November of 2015 at Colebrook Academy, Colebrook, NH, and focused on the education and health care sectors. The program included an overview of broadband technology, a review of the broadband availability data as of the workshop date, and two sections looking at the use of video-conferencing equipment to support educational programming and health care in northern New Hampshire. The workshop included

a live demonstration of using two-way high definition video technology in a teaching environment. Attendance at the workshop included town officials, emergency service providers, Chamber of Commerce staff, UNH Cooperative Extension outreach staff, and staff from the regional planning commission.

The second workshop was convened in March of 2016 at the Town & Country Inn and Resort, Gorham, NH. This session, co-sponsored by the Women's Rural Entrepreneurial Network (WREN), focused on small business activity. The program again included a technology overview and summary of broadband availability, which was followed by a "digital audit" of the Berlin/Gorham region and a review of social media options for promoting small business activities. The successful workshop was attended by 26 participants, representing small businesses, communities, regional planning agencies, planning boards, downtown associations, and others. Press coverage was provided by NHPR as well as local/national newspapers (see Attachment 4).

The third workshop, held in June of 2016 at the Mountain View Grand Resort, Whitefield, NH, was similar in content for the first two components. The focus of the remainder of the workshop, however, was on broadband use for municipalities and public safety. Presenters discussed the Hanover Special Assessment District(s), the North Country Cell and Internet Service Project, and the NH FirstNet initiative. Participants included local officials (including planning board members, police department members, and others), staff from regional dispatch and transport centers, staff from regional planning agencies, representation from Senator Shaheen's office, and several representatives of FairPoint.

 "Broadband in 2015: Coos County": The NHBMPP project team also shared the mapping results through the production of a separate report that describes "current conditions" with respect to broadband in Coos County (provided under separate cover). It presents an informative and easy-to-read summary of the status of broadband availability, and also discusses several of the current broadband programs and initiatives in the County. The report is being distributed via the NHBMPP web site as well as the UNH Broadband Center of Excellence web site (http://bcoe.unh.edu). Along with selected materials from the above workshops, it has also been integrated into the NH Telecommunications Advisory Board (TAB) 2016 annual report.

Geospatial Modeling to Estimate Cost of Broadband Deployment: The results of the data analysis were used in developing a generalized geospatial model that estimates the cost of additional fiber-based broadband deployment to unserved/underserved areas of Coos County (see Attachment 5).   Fiber was considered for broadband expansion because it represents one technology that appears to have unlimited capacity to deliver high transmission speeds. The intent of the analysis was not to complete a make-ready estimate, but rather, to provide to communities a level of magnitude of costs associated with building out fiber to unserved areas.

Two communities – Northumberland and Berlin - were selected for the fiber expansion modeling activities. These two towns were chosen primarily due to the presence of Network NH Now (NNHN) fiber optic lines (see http://unh.edu/networknhnow). Additionally, each community has a relatively dense downtown area, with the balance of the town's population widely dispersed throughout the remaining areas of the town.

The modeling activity utilized the processed FCC broadband availability data, the fiber line footprint provided by NNHN, road centerline data, and parcel data. Using geospatial tools to analyze these data, the model identified properties beyond the existing NNHN fiber line footprint. It then applied estimated average costs of $50,000 per road mile to extend fiber to these properties in conjunction with an average per property tie-in cost of $11,250. The generalized estimates produced for each town are provided in Table 5 below.

Table 5: Generalized Model Results for Fiber Buildout

Town	Total Number of Properties	Number of Properties Beyond NNHN Fiber Extent	Total Estimated Fiber Expansion Cost
Berlin	5,968	5,156	$65.5m
Northumberland	1,531	1,218	$16.2m

Based on these relatively high costs of expansion based on FTTH, communities may be well-served to explore hybrid solutions that combine fiber along the roadways with wireless service to the individual home.

3) **Data Visualization** was primarily achieved through maintaining and updating the NHBMPP project web site (http://iwantbroadbandnh.org, see Figure 4), including designing a new graphic interface to make the site more intuitive and engaging. The site provides access to updated speed test data and statistics, static maps, and project reports. In addition, the site includes an interactive mapping tool that allows users to query the current broadband availability data, view the speed test data, and generate custom displays (see Figure 5). The website also hosts general information about NHBMPP activities past and present.

Figure 4. Home page for NHBMPP web site

Figure 5. Interactive Mapping Tool hosted on NHBMPP web site
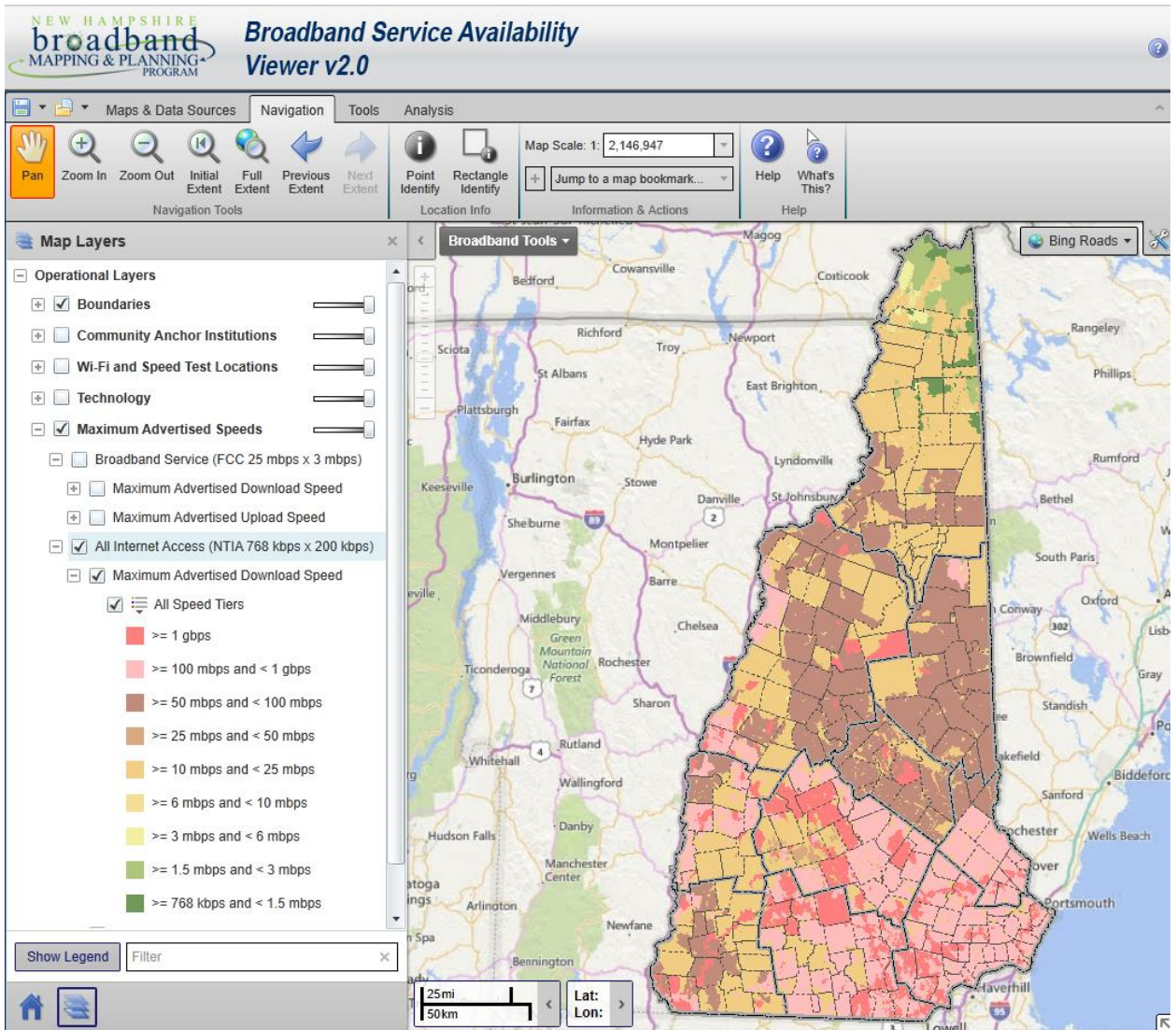
Project Outcomes:
 Raising awareness, promoting change, building partnerships and coordinating public/private efforts take time and make it challenging to document short term project outcomes. However, one clear outcome is Coos County needs to expand broadband access to underserved and unserved areas in order to remain viable and competitive on many fronts. The project outputs, including maps, tables, modeling analyses, reports, and workshops, collectively served to provide to partners, stakeholders and the general public current information on areas in the County with and without access to broadband. They also identified providers offering broadband service to Coos County, as well as information on the technologies and advertised/delivered speeds associated with those technologies. The community engagement and partner collaboration components helped to achieve coordination in existing

broadband initiatives, and to determine what additional efforts may be necessary to encourage expanded broadband deployment.

In the longer term, the resources developed help to provide decision-makers with the data and tools needed to expand broadband infrastructure in Coos County, which in turn will extend their use of broadband in furtherance of their programmatic goals. Expanded access to broadband will improve the economy, enhance business, support public safety and advances in health care, improve educational opportunities, and enhance the overall quality of life.

Problems Encountered:
At the outset of the effort, the project team identified a number of potential project partners who we hoped would participate with us in meetings and workshops with stakeholders as well as in preparing project documents and reports. These potential partners were largely organizations engaged in broadband-related activities in Coos County, and included entities involved in deployment initiatives, direct broadband providers, and others interested in broadband expansion in northern NH. In some instances, we were not able to fully engage these partners in our discussions around broadband expansion.

One of the problems the NHBMPP encountered in mapping broadband availability in New Hampshire is the quality of the data available. Because of limited resources, the Program relied on data published by the FCC to estimate and map broadband availability in the state. While this information was augmented with locally-collected data, for example data collected via the project speed test tool, the fundamental properties of the FCC data present important limitations. The most significant problem is that of data generalization to the Census block level. Because a single address in a Census block served by broadband results in the entire block being considered served, this level of data aggregation likely yields broadband coverage data that is overstated. A second issue with the FCC data is the lack of provider participation. In Coos County, for example, the NHBMPP was aware of broadband providers who did not submit their data to the FCC and therefore were not represented in the NHBMPP mapping results. As a result, there is likely some under-representation of broadband availability in the project maps and tables. These issues arose at the start of the NHBMPP in 2010, and continue to impact the accuracy and credibility of the data we report.

The data issues could be addressed by allocating significantly more resources to the mapping project, thereby accommodating direct collection of data from the providers to the NHBMPP and avoiding reliance on the data published by the FCC. A more modest approach to address the data quality issues would be to devote more project resources to promoting the project speed test tool and thereby maximizing access to locally collected data.

Program Continuation and Sustainability:
The NHBMPP is currently and will continue to seek opportunities to maintain its broadband mapping activities. However, at the conclusion of this project, efforts to process FCC data on broadband availability and to maintain the local speed test tool(s) will end if no new resources are identified. If that does occur, the speed test data will be archived in the GRANIT Clearinghouse. GRANIT has been hosted at UNH since the mid 1980's, is recognized as the state's GIS Clearinghouse, and receives annual financial support from a number of NH state agencies.

Conclusions and Recommendations:

Broadband, or high-speed Internet access, is critical infrastructure to ensure that the state's residents and businesses are connected locally, nationally, and globally. Currently, broadband in Coos County is available to approximately 78% of the residents, and there remain significant areas with limited or no broadband access. While progress is being made to improve access, Internet Service Providers, businesses, decision makers, and concerned citizens need to work together to expand access to ensure the tools are available for creating and maintaining jobs and for supporting public safety, education, healthcare, tourism, business, and the overall quality of life.

In addition, the cost of broadband service makes it unaffordable to a number of New Hampshire businesses and residents. Much of the state has coverage from only one or two wire-line broadband providers, and this lack of competition can lead to higher prices, while not increasing available speeds. New Hampshire needs to encourage competition among providers to bring the lowest possible cost to consumers.

Not all residents of Coos County who have access to affordable broadband services take advantage of the opportunities. Many small businesses and residents are unaware of the wide range of applications, information, communication and services available on-line. New Hampshire needs to continue to coordinate, promote, and sponsor trainings for residents, businesses, and organizations on the benefits of broadband usage. Increased skills and knowledge of broadband applications encourages broadband use and will lead to a well-educated, prosperous, healthy, and a safe New Hampshire.

Finally, New Hampshire needs to monitor, inventory, and evaluate its broadband availability, affordability, adoption, and competitive position on an ongoing and regular basis. Continuing to collect statewide broadband availability and adoption data is necessary in order to measure the effectiveness of broadband efforts and to provide a clear picture of New Hampshire's broadband competitive position in comparison to other states, to Canada, and globally.

List of Attachments:

1. Workshop 1 Agenda – November, 2015
2. Workshop 2 Agenda – March, 2016
3. Workshop 3 Agenda – June, 2016
4. Press Coverage - Workshop 2, March 2016
5. Summary of FTTH Modeling Results

NetworkNH

NEW HAMPSHIRE
broadband
MAPPING & PLANNING
PROGRAM

ConnectNH

NH
University of
New Hampshire

Broadband and Teaching at a Distance – November 19, 2015
Colebrook Academy, Colebrook, NH
3:30pm – 5:00pm

Agenda

I. **Welcome/Introductions**
   A. Welcome
   B. Self-Introductions
   C. Review Agenda

II. **Broadband in Coos County**
   A. Coos County Broadband Project
      i. What is Broadband?
      ii. Where is Broadband?
      iii. Why is it Important?
   B. Current Broadband Initiatives
      i. Overview
      ii. NH School Connectivity Initiative)
      iii. Teaching & Telehealth at a Distance
         1. What do you need?
         2. What are the benefits?
   C. ConnectNH
      i. Brief History
      ii. Network/Services Today
      iii. Distance Learning & Telehealth in Coos County

III. **K-12 Education at a Distance**
   A. Colebrook to Pittsburg, NH and/or Canaan, Vt.;
      Teaching Spanish/French
      i. Demonstration
      ii. Best Practices
      iii. Questions & Answers

IV. **Nurse Training at a Distance**
   A. Colebrook to Berlin, NH; White Mountain Community College
      Training Nurses
      i. Demonstration
      ii. Best Practices
      iii. Questions & Answers
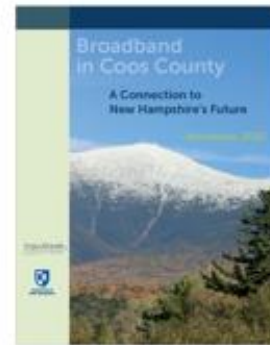
(Note: Continuing Education credits for teachers available)
Light Refreshments and Networking Following Event

Sponsored in part by: Northern Border Regional Commission (NBRC)

Attachment #2: Workshop 2 Agenda, March, 2016

Broadband and Economic Development – March 31, 2016
Berlin/Gorham, NH
5:00pm – 6:30pm

Agenda

I. **Welcome/Introductions**
   A. Welcome
   B. Introductions
   C. Review agenda

II. **Broadband in Coos County**
   A. Current Technologies
      i. Fiber
      ii. Wireless
   B. Current Broadband Initiatives
      i. Overview
      ii. NetworkNH, ConnectNH, FirstNet, NHSCI
   C. Coos County Broadband Project
      i. What is broadband?
      ii. Where is broadband available?
      iii. Why is it Important?

III. **Broadband and Economic Development**
   A. Overview and Videos
   B. Case Studies

IV. **Digital First Impressions of Berlin/Gorham Region**
   A. Digital presence audit of region
   B. Recommended tools and resources to implement

V. **Broadband and Your Business**
   A. Why is it important to have a digital presence
      i. Facts about how the WWW improves business
      ii. Best Practices, Enlightenment for Businesses
   B. Tools and resources: B2B, Social Media, Cloud Services, Google, etc.

Light Refreshments and Networking Following Event
Sponsored in part by: Northern Border Regional Commission (NBRC)

Broadband for Municipalities and Public Safety - June 23, 2016
Mountain View Grand Resort, Whitefield, NH
3:30pm – 5:00pm

Agenda

Presenters
Brian Shepperd, Director of Broadband Services, UNH
Fay Rubin, GRANIT Project Director, UNH
Julia Griffin, Town Manager, Hanover, NH
Bob DeAngelis, President, Coos Economic Development Corporation
John Stevens, SWIC, NH Dept. of Safety

I. **Welcome/Introductions**
     A. Welcome
     B. Introductions
     C. Review agenda

II. **Broadband in Coos County**
     A. Current Technologies
          i. Overview
          ii. Wired, Wireless, and Fiber speeds
     B. Current Broadband Initiatives
          i. Overview
          ii. NHSCI (NH School Connectivity Initiative)
     C. Coos County Broadband Project
          i. What is broadband?
          ii. Where is broadband available?
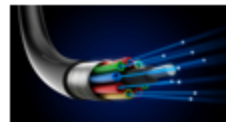
III. **Broadband and Municipalities**
     A. Why is broadband important for economic development, delivering services, communication, etc.?
     B. Overview: Hanover's special assessment districts to finance telecommunications infrastructure.

IV. **North Country Cell and Internet Service Project**
     A. How can we better serve rural areas of the state?
     B. Overview: A public-private initiative to bring high-speed cell phone and broadband Internet service to rural areas of Coos County including Pittsburg, Milan, Groveton, and Errol.

V. **Broadband and Public Safety**
     A. Why is broadband important for public safety?
     B. Overview: NH/FirstNet - a project to design, build, manage and sustain a state-of-the-art, carrier-neutral communication network for public safety.

VI. **Questions and Discussion**

Light Refreshments and Networking Following Event

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The Berlin Daily Sun

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Almost a third of Coos residents have no access to broadband

By Barbara Tetreault
THE BERLIN DAILY SUN

SHELBURNE — Almost a third of the population in Coos County does not have access to broadband or high speed internet access. With broadband a critical tool for supporting businesses, education,

and healthcare, the lack of access hampers economic development in the North Country.

The N.H. Broadband Mapping and Planning Program at UNH is currently working on broadband availability mapping in Coos County under a grant from the Northern Border Regional Commission.

The purpose is to identify areas that are unserved or underserved and to draw attention to gaps. The program will also develop a generalized cost estimate to expand broadband availability in the county.

Eric Grenier, staff civil engineer at HEB Engineers, explained the expansion planned for Capone Iron Northwoods to the Berlin planning board Tuesday night. The board approved the site plan and Stephen Capone said he plans to start the project as soon as all permits are in place. (BARBARA TETREAULT PHOTO)

Planning board approves site plan for Capone Iron

By Barbara Tetreault
THE BERLIN DAILY SUN

BERLIN — The planning board Tuesday night gave site plan approval to a proposed expansion at Capone Iron Northwoods.

The city's newest industrial company is finishing up an earlier renovation and now plans to add a 16,000 square foot addition to the building it purchased last year at the city's

industrial park.

With company president Stephen Capone in attendance, HEB Engineer Staff Civil Engineer Eric Grenier outlined the site plan for the new addition. Grenier said Capone Iron is a steel fabrication shop that started operations last year and currently has 10 employees.

North Country Healthcare up and running

By Barbara Tetreault
THE BERLIN DAILY SUN

The long-planned affiliation of the four North Country hospitals — Androscoggin Valley Hospital, Berlin; Littleton Regional Healthcare; Upper Connecticut Valley Hospital, Colebrook; and Weeks Medical Center, Lancaster became official with the completion of closing documents.

The closing launches a new system called North Country Healthcare. Its purpose is to coordinate the activities of the four hospitals in the areas of planning, administration, purchasing, human resources, marketing, finance and contracting. Its goal will be to maintain access to high quality, affordable health care throughout the North Country.

The new arrangement maintains the four independently governed North Country hospitals as critical access hospitals providing care in their local communities. The four hospitals retain their names, their individual Boards of Trustees, and control of their assets and charitable endowments.

Warren West, head of Littleton Regional Healthcare, and Russ Keene, formerly head of Androscoggin Valley Hospital have been selected by the new board to lead the new system, West as CEO and Keene as President and CFO.

Michael Peterson, FACHE has been selected as the new president of AVH. Recruitment is underway for new site leaders at LRH, Weeks Medical Center and Upper Connecticut Valley Hospital.

Mark Kelley, former chair of Androscoggin Valley Hospital's board, will also chair the North Country Healthcare board. Donald Crane, treasurer of the Weeks Medical Center board will serve as its vice chair.

HEALTH from page one

Steve Treuboff, former chair of Littleton Regional Healthcare's board, will serve as North Country Healthcare's treasurer. Greg Placy, chair of Upper Connecticut Valley Hospital's board will serve as its secretary.

The newly formed board of directors held its orientation last month and will hold its first official meeting on May 5.

"I'm excited that we've reached this point," said Kelley. "Now we can roll up our sleeves and get to work to build a health system that makes life better in the communities our hospitals serve."

More information about the North Country Hospitals affiliation may be found at www.northcountryhealth.org.

BROADBAND from page one

A workshop on broadband and economic development was held at the Town and Country Inn and Resort Thursday night. Broadband is defined as minimum download speeds of 25 megabits per second (Mbps) and minimum upload speeds of 3 Mbps.

A preliminary report by the program shows statewide, seven percent of the population lacks access to broadband. But in Coos County, 30.8 percent of the population does not have access to broadband. Furthermore, access to high speed Internet is mostly limited to the southern tier of the county, leaving a large part of the county without broadband.

The data from participating providers show Time Warner Cable, Bretton Woods Communications, and ViaSat Communications are the main providers of broadband in Coos.

High speed internet access is a significant advantage for economic development said Dr. Charlie French, program team leader and community and economic development for UNH Cooperative Ext. He said jobs related to broadband and information technology are expected to grow by 25 percent between 2008-2018. If the state significantly increased broadband availability, the state could see more than 11,000 new jobs and $634 million in economic impact annually.

The report states that broadband helps New Hampshire businesses improve efficiency, expand markets, reduce costs, and increase revenues. French described how broadband is also used by other sectors including public safety, healthcare, and education.

Fay Rubin, GRANIT project director at UNH, said there are a lot of options for internet connectivity through the county but definite gaps for the higher capacity broadband service.

Carol Miller, director of broadband technology for the state, said providers do not bring broadband to rural areas like those in Coos County because there is no money to be made there. Furthermore, the state has no funds to build broadband to unserved areas. As a result, she said her division looks for public-private partnerships such as North County Cell Service Initiative launched last year to bring first time cell voice service and high capacity broadband to northern Coos County. The initiative is behind schedule but Brian Shepperd, director of broadband services at UNH, assured the group the initiative is moving forward. He said one to four sites are in progress with the potential for up to 10 sites.

Miller said the legislature has rejected bills to remove restrictions on allowing municipalities to bond to finance broadband infrastructure.

UNH Cooperative Extension Field Specialist Geoffrey Sewake said a digital presence audit of the Berlin-Gorham region shows internet use is highest among 18-49 years olds and lowest with those 65 and older. Social media is highest among the 18-29 age group and declines to about 35 percent for those 65 and older. He said businesses should have an active digital presence but advised focusing on one or two platforms. He reviewed the various social media platforms such as Trip Advisor, Yelp, Pinterest, and Facebook.

Laura Jamison of WREN showed the group how to use various social media platforms to create a market for goods and services and to see who their customers are.

The workshop was hosted by the NH Broadband Mapping & Planning Program, NetworkNH, UNH Cooperative Extension, and WREN.

Missing In Action: Broadband In Coos County

By CHRIS JENSEN · APR 4, 2016
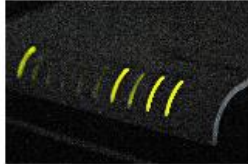
Chris Jensen for NHPR

About seven percent of New Hampshire's residents don't have access to broadband. But in Coos County that jumps to about 31 percent. That's the worst - by a narrow margin - in the state, according to a new study by the University of New Hampshire.

And much of Coos – which has about 33,000 residents – has no broadband access because the technology is typically offered in the southernmost and most populated part of the county.

"There was a clear pattern of having all of the served parts of Coos in the southern tier of the county and the entire central and northern part of Coos County not meeting the FCC definition of broadband service," said Fay Rubin, a UNH researcher who worked on the study.

That definition is a minimum download speed of 25 megabits per second. The minimum upload speed is three megabits per second.

The central and northern part of Coos may have access to the internet, Rubin said, but it isn't fast enough for many uses, including some businesses.

The problem, she says, is that internet providers don't see a profit in the most rural areas because there are so few people and businesses.

That puts residents - including students - and businesses at a disadvantage, the UNH researchers concluded.

For businesses broadband "helps improve efficiency, expand markets, reduce costs and increase revenues," the report says.

And, it is "an important tool for education."

But, the state has not set aside any money to encourage broadband in areas that commercial firms shun, says Carol Miller, an official the the Department of Resources and Economic Development.

Coos was not alone in this problem. The second worst county was Cheshire, where about 30 percent of the residents do not have access to broadband.

The best was Rockingham, where less than one percent didn't have access to broadband.

The preliminary study was based on FCC information collected from internet providers at the end of 2014. The final version of the UNH report is expected at the end of June.

The project was done by UNH's New Hampshire Broadband Mapping & Planning Program. It was partially financed by the Northern Border Regional Commission.

(http://nhpr.org/post/missing-action-broadband-coos-county)

HOME \ NEWS

Study: Coos County has worst broadband access in state

Print View Comments

By - Associated Press - Monday, April 4, 2016

LANCASTER, N.H. (AP) - A college study says that about 31 percent of residents in a northern New Hampshire county don't have access to broadband service- the worst coverage in the state.

New Hampshire Public Radio (http://bit.ly/1S3iDuD) reports that the University of New Hampshire study says much of Coos County has no broadband access because technology is typically offered in the southern and most populated part of the county.

Researcher Fay Rubin says the central and northern parts may have access to the internet, but it's not fast enough for many uses, including some businesses.

Rubin says the problem is that internet providers don't see a profit in rural areas because there are few people and businesses.

Officials say the state hasn't set aside money to encourage broadband in areas ignored by commercial firms.

(http://www.washingtontimes.com/news/2016/apr/4/study-coos-county-has-worst-broadband-access-in-st/)

Fiber Build-out Cost Modeling

As part of a larger effort to map broadband availability in Coos County, New Hampshire, and to provide a suite of related technical resources to local communities, the New Hampshire Broadband Mapping & Planning Program (NHBMPP) developed a basic geospatial model to estimate the cost of building out fiber in underserved and unserved areas of northern New Hampshire. The model was not intended to produce make-ready estimates, but rather, to provide communities with a general cost estimate that could be utilized in evaluating options for broadband expansion into their unserved and underserved areas.

Why consider fiber for broadband expansion?

Fiber optic broadband offers a technology that appears to have effectively unlimited capacity to deliver high transmission speeds with very little interference over long distances. Fiber optic deployments are today reaching speeds of up to 1 gpbs and greater. In addition, Fiber to the Home (FTTH) or Fiber to the Premise (FTTP) enables providers to make available "symmetrical circuits" that deliver the same upload and download speeds. As applications like high-definition videoconferencing and those that back up large databases to the Cloud have become more prevalent, the need for symmetrical circuits has increased.

FTTH or FTTP solutions can be expensive, with costs depending on many factors. To mitigate these high costs, hybrid networks are being built, i.e. combining fiber, wired and wireless technologies. However, hybrid networks typically provide broadband access to end users at slower speeds.

To focus on the best technology available today, the NHBMPP opted to evaluate FTTH or FTTP in its modeling efforts. We utilized a suite of geospatial data and tools to develop a model that estimates the cost of fiber expansion that would bring fiber directly into homes, businesses, organizations, hospitals, government offices, etc.

The geospatial modeling approach

The NHBMPP geospatial modeling included the following steps:

- Map Network NH Now fiber network;
- Buffer the fiber network by 200';
- Identify streets and properties that are within the buffered areas (e.g. potentially served areas), and streets and properties outside of these areas (e.g. unserved areas);
- Summarize street mileage and number of properties in the unserved areas; and
- Using industry standard cost estimates, generate an approximate cost per community to extend service into unserved areas.

The average cost per mile and connection estimates used in the analysis were developed by Network NH Now (see http://unh.edu/networknhnow) - NH's Broadband Technology Opportunities Program which

built 865 miles of fiber optic network extending into all 10 counties in New Hampshire. The figures included:

- Average cost per mile to lay fiber along the roadway: $50,000
- Average cost per property to connect to fiber: $11,250

Data sets utilized in the analysis were as follows:
- FCC Form 477 data, June 2015 version (see https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477)
- Network NH Now fiber line footprint
- NH Road Centerlines, NH Department of Transportation, 2015
- NH Parcel Mosaic, NH Department of Revenue Administration, 2015

Two Coos County communities – Northumberland and Berlin - were selected for the fiber expansion modeling activities. These two towns were chosen primarily due to the presence of Network NH Now fiber. Additionally, each community has a relatively dense downtown area, with the balance of the town's population widely dispersed throughout the remaining areas of the town.
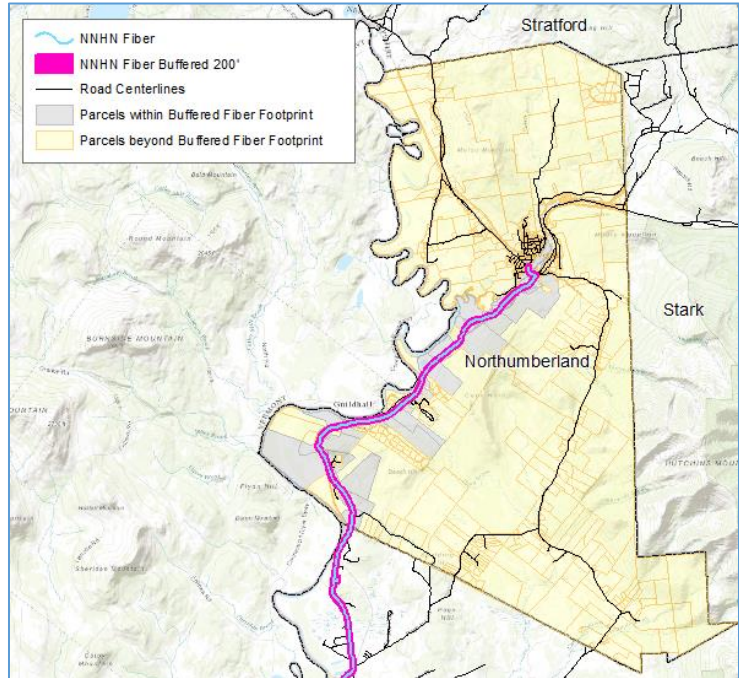
The results

a. ***Town of Northumberland***

Results for the Northumberland analysis are presented in the table below:

Total number of properties	1,531
Number of properties outside of NNHN 200' buffer	1,218
Linear miles of roadway outside of NNHN 200' buffer	50
Cost of fiber deployment	$16.2 m

The figure to the right illustrates the geospatial data layers used in the analysis. Note the NNHN buffered footprint used to identify intersecting parcels (mapped in gray) and non-intersecting parcels (mapped in yellow).

The analysis is based on connecting each of the yellow parcels to NNHN fiber.

b. *Town of Berlin*

Results for the Berlin analysis are presented in the table below:

Total number of properties	5,968
Number of properties outside of NNHN 200' buffer	5,156
Linear miles of roadway outside of NNHN 200' buffer	150
Cost of fiber deployment	$65.5 m

As above, the figure to the right displays the mapping data used in the analysis.
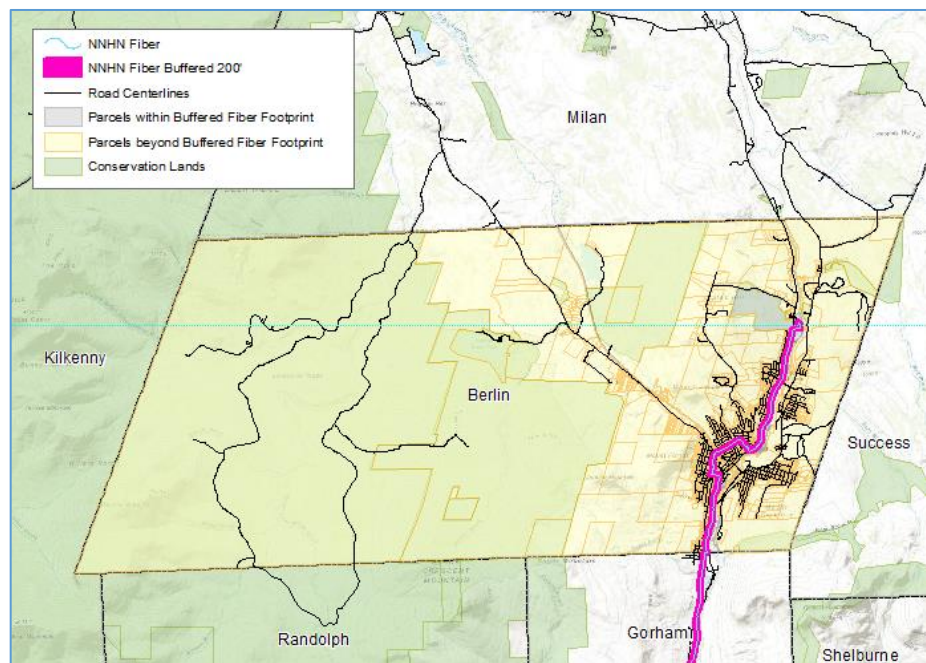
Next steps

Given the high cost of fiber deployment, it is recommended that any community considering broadband expansion conduct a feasibility study. The study should:

- Develop sustainable strategy(s) to promote comprehensive broadband access and utilization;
- Identify potential public/private partnerships in the community;
- Develop a reasonable assessment of the opportunities for the community, covering 1) the most viable and sustainable business, financial and operational models including one-time and recurring third-party funding sources (ERate, grants, etc.), and 2) the deployment plan that will enable the community to take advantage of these opportunities in conjunction with broadband-friendly public policy development;
- Conduct a residential and business survey in order to gauge:
  - Willingness and desire to change internet service providers
  - Interest in and demand for higher bandwidth service and the costs associated with that service

Additional resources

The NHBMPP Broadband Solutions and Funding Toolkit available at http://iwantbroadbandnh.org/toolkit is a collection of resources to support local broadband planning in New Hampshire. Sections cover organizing a committee of local stakeholders, informing your stakeholders about broadband technologies, assessing the state of broadband in your community, creating a community plan for broadband, implementing an action plan, and understanding funding options. Armed with this information, a community can enhance broadband access to meet future economic, education, and communication needs.

Funding for broadband initiatives may require multiple sources to reach the level of investment needed by your community. Successful funding strategies could consist of combining resources from residents, businesses, municipalities, counties, and state resources. Other funding sources could include foundation funds, development corporations, and bank financing. Your strategy should be guided by how much capital you need to raise, and then finding resources to fund portions or all of the project. Broadband Communities Magazine has developed "Broadband Communities' interactive FTTH Financial Analyzers" designed to help evaluate the financial viability of FTTH projects. Whether you are considering an FTTH network deployment or have a project under way, these tools aid in evaluating the financial implications of your project.