LAKES REGION BROADBAND PLAN
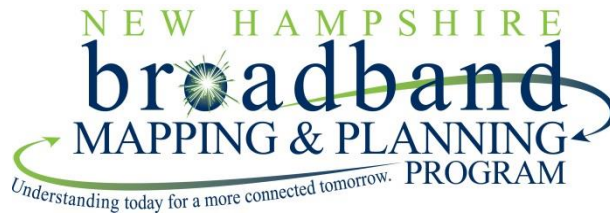

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A. EXECUTIVE SUMMARY

Introduction

The Lakes Region Broad Plan is a local and regional planning initiative based on a statewide plan and approach from the New Hampshire Broadband Mapping and Planning Program (NHBMPP). NHBMPP is a comprehensive, multi-year initiative that began in 2010 with the goal of understanding where broadband is currently available in New Hampshire, how it can be made more widely available in the future, and how to encourage increased levels of broadband adoption and usage.

A "snapshot"

As technology is constantly changing and evolving, the Lakes Region Broadband Plan represents a "snapshot" in time and is likely relevant for no more than three years. The major emphasis of this Plan is the recognition of the critical role that broadband and high speed Internet play in the long-term economic well-being and prosperity of the region.

The Regional Vision

The Lakes Region is an area that has the capacity for high quality fixed and mobile broadband Internet service and is pro-active in ensuring that all sectors are well served --- business, education, healthcare, local government/community support and the general public. The public and private sectors need to work together to ensure that broadband Internet service is improving to meet the needs of the region.

Major Issue

At present, lack of broadband exists in some rural pockets of the Lakes Region. In addition some areas still lack access to competitive options for affordable quality broadband options. While many communities may have infrastructure, rural segments lack adequate last mile connections. In the Lakes Region, a 'digital divide' exists between some of the urban and rural communities.

Regional Demographics

Four significant trends will affect broadband in the future:

- The region growing older population;
- Projected slow population growth for the next 25 years;
- Loss of employment; and
- Retiring manufacturing employees who will need to be replaced by highly skilled persons.

Commercial quality broadband, which provides new opportunities for modern businesses and telecommuters, can be a driving force for new growth and disposable income and can attract new business and residents.

Demand for Broadband

Broadband service is analogous to the early days of electricity, which became a necessary commodity. The majority of people and businesses recognize the important function that broadband service plays in the local and regional economy. As technology changes and improves, professionals in government, business, public safety, health care and education need to maintain current competence in the field. Education, business and healthcare demonstrate strong demand.

The rural nature of the region encourages broadband use for shopping and communications with friends and relatives. For many, large box-store chains are a 30 to 60 minute drive, and specialty stores are even farther. There is also demand for broadband by those who rent vacation homes, as renters demand sufficient bandwidth for each member of the family and their guests to watch movies on rainy days. Professionals with second homes in the region demand higher speed broadband, so that they can work away from the office, and those that can telecommute full time are moving to the area. The distance to specialized medical care, in Concord and Lebanon, creates an increasing demand for tele-medicine, especially for the elderly and those with children. Finally, with the change-over to digital over-the-air television, there are few to no stations available, except through cable offerings. With cable expense and limited availability in some areas, the Internet is a primary method of getting video and music entertainment.

Sector Analysis

Economic Development - In today's environment, high quality and high speed broadband and Internet service is critical for normal business applications and functions and also for economic development in the Lakes Region. Businesses located along the NH Routes 3 and 25 have access to fiber optics and generally have strong broadband and Internet connection. Businesses for the most part are satisfied with consumer grade Internet services, but an increasing number are building corporate headquarters, remote offices and Internet based companies, which demands additional commercial grade high-speed, symmetrical capacity. Some Lakes Region communities want to attract ecological friendly businesses, outside the manufacturing space, and the availability of commercial broadband is a key factor in attracting the kind of new business desired. Since the majority of businesses are small and do not have a data intensive needs, they are happy with consumer grade broadband.

Education - Kindergarten through 12th grade students need access to high-speed Internet connections both inside and outside the classroom. Some educational professionals have concerns when assigning projects that require Internet access at home because students may not have residential broadband access. Even students with access to the Internet at home can experience challenges connecting to graphic-intensive websites or downloading large files due to limited bandwidth. Inadequate broadband availability poses additional challenges for learners seeking more flexible options like online and distance learning courses and programs.

Public Safety - In the digital age, there are a suite of broadband-enabled devices and technologies that can be used to enhance channels of communication among public safety and emergency management officials; however, in order for these tools to be effective, ubiquitous and reliable high performing broadband is often necessary. Universal broadband access would enable emergency

medical technicians to share information digitally and in real time to hospitals and emergency facilities from the ambulance or point of response. First Net, a nationwide telecommunications initiative, will provide fire, police and EMS with new capabilities to do live streaming of events in real time and to simulcast events.

Health - Advances in telecommunications technology have significantly enhanced the ability of the medical sector to expand access to health care. A myriad of technology solutions are available for health specialists to communicate with and deliver services to patients, clients, and colleagues via nontraditional channels such as videoconferencing, remote patient monitoring[1], and 'cloud-based' digital medical imaging. These innovations are driven by the need of the medical sector to decrease costs through operational efficiencies while expanding access to and improving quality of care. Telehealth, the delivery of health-related services over telecommunications technologies, is dependent on adequate broadband availability throughout the state

Local Government - While some matters are best handled through face-to-face contact, technology will augment New Hampshire's tradition of accessibility to the public process. Citizens have come to desire and expect a certain level of online interactivity with government and community support organizations. Most towns in New Hampshire currently host websites providing immediate, remote access to public notices, events calendars, applications, forms, ordinances and regulations

Residents - According to the UNH survey, most residents are satisfied with their Internet service. Many of those with second homes and vacation home renters are using the cellular Internet services rather than subscribing to a wired service that would get limited use. While this works in many areas, most cellular services get costly as bandwidth is consumed, limiting the practicality of this method.

Findings and Recommendations:

***Overall LRPC Goal:* Improve the availability and capacity of Broadband in order to bolster and enhance the region's economic development potential and overall quality of life.**

Findings

- Most of the Lakes Region is well served with broadband, but gaps exist.
- For residential uses, cable is the most common provider, with DSL handling more rural areas and those wishing lower cost solutions.
- Fixed wireless may address some of the gaps, but it is difficult to attract new providers due to regulatory and business issues.

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[1] Remote patient monitoring, also called homecare telehealth, is a type of ambulatory healthcare that allows a patient to use a mobile medical device to perform a routine test and send the test data to a healthcare professional in real-time.

- The US Census block method of calculating wired broadband availability makes it appear that 95% of the region is served, but does not identify the true extent of the unserved.
- The lack of broadband and high speed Internet service affects the marketability and real estate value of property.

Recommendations

- Establish a broad goal of 100% availability and work with member municipalities and UNH Granit to maintain an inventory of areas that lack service or are underserved.
- Create GIS layer maps that show where business grade broadband services are available.
- LRPC to maintain contact list for each community for coordination of information and projects
- Create links to provider contacts on the LRPC website.
- Leverage federal and state funding to provide local and regional services.
- Recommend that local governments include the availability of broadband as a component on property assessment records.

LRPC Implementation Strategies and Action Steps

- Encourage broadband as an economic development tool.
- Expand the access of affordable broadband service.
- Educate businesses and citizens on the use of broadband.
- Encourage the establishment of local Broadband Committees and Stakeholder Groups
- Establish LRPC as a clearinghouse for resource information.
- Encourage more Planning Boards to include a Broadband Chapter in local Master Plans
- Encourage dedicated funding sources for expansion of broadband service.
- Continue the mapping and data collection efforts.
- As a critical infrastructure component, ensure existing and new broadband infrastructure is both resilient and redundant.

B. INTRODUCTION TO THE NH BROADBAND AND MAPPING PROGRAM (2009-2014)

The New Hampshire Broadband Mapping and Planning Program (NHBMPP) is a comprehensive, multi-year initiative that began in 2010 with the goal of understanding where broadband is currently available in New Hampshire, how it can be made more widely available in the future, and how to encourage increased levels of broadband adoption and usage. Funded through the National Telecommunications and Information Administration (NTIA), the NHBMPP is part of a national effort to expand broadband access and adoption.

NHBMPP is managed by the GRANIT (Geographically Referenced Analysis and Information Transfer) System within the Earth Systems Research Center at the University of New Hampshire (UNH), and is a collaboration of multiple partners. These include the NH Office of Energy and Planning (OEP), NH Department of Resources and Economic Development (DRED), UNH Cooperative Extension (UNHCE), and the State's nine Regional Planning Commissions (RPCs).

Program Components & Objectives

The NHBMPP is comprised of several components, including a broadband availability inventory and mapping effort and a suite of planning and technical assistance initiatives. Following are brief descriptions of these components as well as an overview of the broadband planning initiative.

Mapping - In 2010, UNH, the Regional Planning Commissions, and other partners began an inventory and mapping effort aimed at mapping the current availability of broadband throughout the state through several projects and activities, which include:

- Collecting data semi-annually from the public and commercial entities that provide broadband services in New Hampshire on the location, type and speed of broadband technology available in the state;
- Surveying and mapping the broadband availability at Community Anchor Institutions (CAIs) such as schools, libraries, hospitals, emergency management facilities, and municipal buildings in New Hampshire;
- Developing the first public master address file of households located in rural census blocks for the state through the NH Rural Addressing Project;
- Further refining the information collected on broadband availability through the broadband mapping component with municipal stakeholders and representatives through the Municipal Broadband Service Map Verification Project; and
- Sharing information and data on broadband availability in the state with the NTIA and the Federal Communications Commission (FCC) on a semi-annual basis for inclusion in the National Broadband Map.

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This map shows Broadband availability by Community Anchor Institutions Type

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Rural Addressing Point Data

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length	Description
				Geometry	Point			
				Contains M values	No			
				Contains Z values	No			
OBJECTID	Object ID							
SHAPE	Geometry	Yes						
UNIQ	String	Yes					20	UNIQ
NUMBER_	String	No					6	Address Number
SUB_NUM	String	Yes					3	Address Sub Number
PRE_DIR	String	No	SW	dmDIRECTIONAL_TYPE			2	Prefix Direction
STR_NAME	String	No					50	Street Name
STR_TYPE	String	No		dmSTREET_TYPE			4	Street Type
SUF_DIR	String	Yes		dmDIRECTIONAL_TYPE			2	Suffix Direction
UNIT_TYPE	String	Yes		dmUNIT_TYPE			4	Unit Type
UNIT_NUM	String	Yes					4	Unit Number
CITY	String	No	"TIGARD"	dmCITY			17	City
JURIS	String	Yes		dmJURISDICTION			17	Jurisdiction
ST	String	No	"OR"				50	State
ZIP5	String	Yes		dmZIPCODES			5	Zipcode
ZIP4	String	Yes					4	Zipcode +4
FULL_ADDRESS	String	Yes					100	Full Street Address
SITUS	Short integer	Yes	0	dmTRUEFALSE	0			SITUS
PRIMARY_	Short integer	Yes	0	dmTRUEFALSE	0			Primary Site Address?
DATE_CREATED	Date	Yes			0	0	8	Date Create
CREATED_BY	String	Yes					50	Created By
DATE_MODIFIED	Date	Yes			0	0	8	Date Last Modified
MOD_BY	String	Yes					50	Modified By
X_COORD	Double	Yes			0	0		X Coordinate
Y_COORD	Double	Yes			0	0		Y Coordinate
PARCEL_ID	String	Yes					50	Parcel ID
STATUS	String	No	A	dmSTATUS_TYPE			1	Address Status Type
ACCOUNT	String	Yes					16	County Tax Account Number

Simple feature class fc_address

Public Outreach & Data Verification

Technical Assistance and Training - UNHCE has taken the lead on developing and administering technical assistance and training opportunities to help businesses, organizations and individuals better understand the importance of and applications for broadband. The activities undertaken by UNHCE through the NHBMPP include:

- Assessing the technical needs of stakeholder groups including educational institutions, small businesses, local governments and nonprofits through the creation and administration of sector-based surveys;
- Developing tools and learning modules on topics related to broadband utilization and adoption such as ways for municipalities to promote or market themselves via the Internet; and
- Delivering technical assistance and training to stakeholder groups.

Capacity Building - A third component of the NHBMPP, capacity building is focused on the development of tools and resources necessary to implement broadband projects within communities and regions across the state. This component offers continued support for the Director of Broadband Technology, a position established within the NH Department of Resource and Economic Development to coordinate and provide leadership on statewide telecommunications policy initiatives such as:

- Encouraging collaboration to establish best practices in policy management, financial resources, and advocacy for business and residential broadband;
- Tracking and reviewing legislation related to broadband and telecommunications;
- Serving as a resource for State policy makers to develop policies geared towards increasing access to and expansion of broadband infrastructure; and
- Working with the NH Telecommunications Advisory Board, to analyze and assess the State's broadband infrastructure and promote access to affordable and reliable advanced telecommunications services.

Planning - In 2011, NHBMPP partners engaged in a four-year effort aimed at incorporating the information and momentum gained during the mapping activities to better understand current broadband availability in New Hampshire and plan for increased broadband adoption and utilization through outreach, community engagement, and surveying activities.

As part of an effort to gain a better understanding of broadband at the regional level, each RPC developed a Broadband Stakeholder Group (BSG), comprised of individuals representing a wide range of sectors, which met quarterly. The BSGs have played a vital role in assisting Regional Planning Commissions in assessing the need for improved broadband capability, availability, and affordability. The BSGs helped the RPCs develop a list of broadband needs and barriers to broadband adoption and utilization as well as determining goals, objectives, and strategies to overcome barriers in each region.

A major undertaking of the broadband planning component was a sector-based analysis. This activity involved developing and facilitating focus group meetings, structured interviews, and other methods to identify broadband needs and challenges specific to various sectors, including healthcare, education, local government, economic development, and public safety. Each planning commission conducted focus groups or interviews with representatives from these sectors to better understand the importance of broadband accessibility to each sector.

Census Geography

Block:
- Smallest unit of geography for data collection
- Bounded by visible features

Tract:
- Subdivision of county
- Optimum size of 4,000 people, but can range from 1,500 – 8,000
- Initially, goal is for homogeneity w/r to population characteristics

Source: www.census.gov/www.cengeoga.pdf

Attachment A: Hierarchical Relationship of Census Geographic Entities

NATION
REGIONS
DIVISIONS
States
AIANHHs
ZCTAs™
Congressional Districts
School Districts
Voting Districts
County Subdivisions
Subbarrios
Counties
Places
TAZs
Census Tracts
Block Groups
ANRCs
SLDs
UGAs
Urban Areas
Blocks

AIANHH: American Indian Area/Alaska Native Area/ Hawaiian Home Land
ANRC: Alaska Native Regional Corporation
SLD: State Legislative District (upper & lower chambers)
TAZ: Traffic Analysis Zone
UGA: Oregon Urban Growth Area
ZCTA™: ZIP Code® Tabulation Area

Additionally, each RPC held public forums throughout the course of the project. These forums were an opportunity to share information regarding ongoing broadband efforts in the region, progress of the NHBMPP, and to receive feedback from community members regarding broadband availability.

Information gathered from the activities described above led to the development of nine regional broadband plans in New Hampshire. LRPC reviewed and analyzed data collected through the mapping efforts, outreach activities, sector-based analysis, as well as public forums to develop comprehensive documents that highlight the current landscape of broadband availability in the state and identify ways to increase broadband adoption and utilization. The regional broadband plans serve as guidance documents for communities, policy makers, businesses, institutions, and residents to better understand the availability and need for and utility of broadband now and into the future. All nine plans are to be compiled into a statewide broadband planning document by the NH Office of Energy Planning.

C. UNDERSTANDING BROADBAND

Broadband Explained

Broadband, also called 'high-speed Internet,' is the umbrella term referring to Internet access that is always on and is faster than dial-up Internet access. The National Telecommunications and Information Administration (NTIA) defines broadband as, "advanced communications systems capable of providing high-speed transmission of services such as data, voice, video, complex graphics, and other data-rich information over the Internet and other networks."[2] As our technology capabilities are continually changing, it is important to define what broadband is so that stakeholders can determine where broadband is currently available, and how it can be made more widely available to more people.

Broadband is defined in terms of how fast the user's computer can download and upload information from the Internet. Download speed is the rate that a computer receives data from the Internet while upload speed is the rate a computer can send data. The speed at which information can be transmitted depends on bandwidth. Bandwidth is the transmission capacity of an electronic pathway. That capacity can be described in terms of how much data, measured in bits, can be transmitted per second, and is reported in kilobits (Kbps), megabits (Mbps), and gigabits (Gbps). NTIA defines broadband as providing a minimum speed of 768 Kbps download and 200 Kbps upload. Most broadband technologies have different downloading and uploading speeds, with upload speed typically being more limited. As technology and applications continually change, there are many different types of broadband services as well as resulting speeds and functions while using the Internet.

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[2] "Broadband: As defined by the NH Broadband Mapping and Planning Program," *New Hampshire Broadband Mapping and Planning Program*, February 15, 2012, http://iwantbroadbandnh.com/planning-and-assistance. (accessed July 17, 2013).

Although NTIA defines broadband at a 768 Kbps minimum download threshold, download speeds up to 3 Mbps have limited functionality. At up to 3 Mbps Internet users are able to use web-based email, send and receive small to medium-sized documents, and browse the web. However, operating multiple functions may cause potential slowness, making it difficult to conduct necessary business and education operations. Today, in order to use many Internet applications successfully, a minimum download speed of 3 Mbps is required. From 3 Mbps to 6 Mbps download speed, and 1.5 Mbps to 3 Mbps upload speed, users can send and receive photos and word documents through email, conduct multiple functions simultaneously, and access small window videoconferencing, such as Skype. At 6 Mbps to 10 Mbps download and 3 Mbps to 6 Mbps upload, users can send and receive large documents and files, such as small videos, and can access their company's network while traveling or working from home with a speed of operation that is similar to being in the office. Also, higher quality videoconferencing can be conducted allowing businesses to communicate with clients, partners, and employees. At 10 Mbps to 25 Mbps download and 6 to 10 Mbps upload, telemedicine and telehealth applications are possible and remote education, professional development, and workshops can occur in high definition (HD) quality. At 25+ Mbps download and 10+ Mbps upload, real time HD medical imaging and consultation can occur.[3] As Internet technology and applications continuously emerge and evolve it takes much more than the minimum broadband threshold to operate successful businesses, and provide relevant education and quality medical care.

The New Hampshire Broadband Mapping and Planning Program (NHBMPP) developed a matrix to assist stakeholders in understanding the many levels of broadband available in the state of New Hampshire today, and the typical functions a user might be able to perform within a range of download and upload speed tiers. Using these tiers, the NHBMPP has established broadband availability categories ("un-served," "underserved," and "served") to describe access to broadband service. The table below is a condensed version of the NHBMPP matrix.
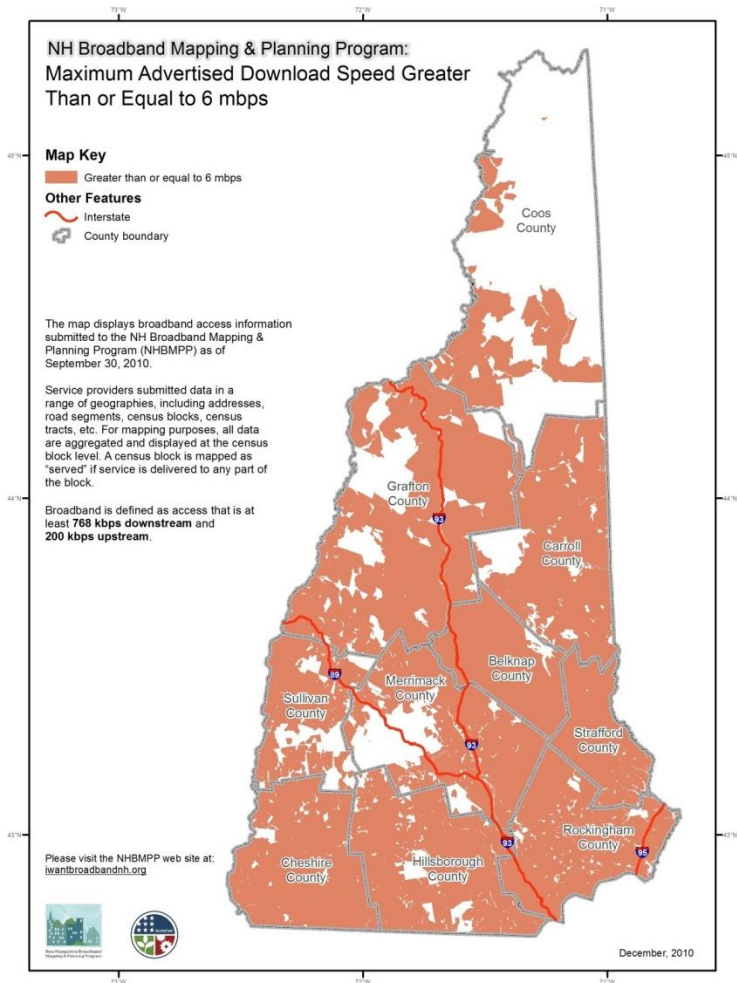
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[3] "Broadband: As defined by the NH Broadband Mapping and Planning Program," *New Hampshire Broadband Mapping and Planning Program*, February 15, 2012, http://iwantbroadbandnh.com/planning-and-assistance. (accessed July 17, 2013).

Tiers of Service	Download Speed	Upload Speed	Typical Functions / Use *(functions additive to level above)*
un-served	< 768 Kbps	< 200 Kbps	• Email (client/server-based)
underserved	768 Kbps to < 1.5 Mbps	200 Kbps to < 768 Kbps	• Web-based email • Limited web browsing • Send/receive small documents not concerned with speed of download/upload • Single user Internet device
	1.5 Mbps to < 3 Mbps	768 Kbps to <1.5 Mbps	• Medium social media use • Send/Receive medium-size documents/files • Limited streaming content, buffering a concern • 1-3 simultaneous Internet devices possible
Served	3 Mbps to <6 Mbps	1.5 Mbps to <3 Mbps	• Send/Receive medium to large-size documents or files • Streaming content, downloading High Definition (HD) content, speed a concern • Low quality, small window videoconferencing
	6 Mbps to <10 Mbps	3 Mbps to 6 Mbps	• Send/Receive large documents or files (small videos) • Streaming HD • Virtual Private Network (VPN) access for remote work at speed critical to job function • Multi-player online gaming
	10 Mbps to <25 Mbps	6 Mbps to <10 Mbps	• HD quality, large frame videoconferencing • Remote synchronous education, professional development facilitated simultaneously at multiple locations • Tele-health applications possible
	25+ Mbps	10+ Mbps	• Send/Receive medium to large databases • Real-time HD medical imaging and consultation, remote patient monitoring

Source: New Hampshire Broadband Mapping and Planning Program http://www.iwantbroadbandnh.org

How It Works

Broadband can be thought of as consisting of three hierarchical components, or layers, much like the nation's highway system of interstate roads, state roads and local roads. Broadband infrastructure consists of the Internet "backbone" which is hosted by large commercial, government, academic, and other high-capacity network centers. The "middle mile" refers to the segment linking a network operator's core network to the local network plant. In order to transport the Internet to homes and businesses, known as the "last mile," it can be most cost-effective to increase the reach of the "middle mile" through Community Anchor Institutions. Community anchor institutions are typically municipal libraries and Town offices, hospitals and schools, emergency services and public safety operations, and large businesses that have the means and capacity to access broadband-based services. The majority of home and small business users rely on the last mile hosts, Internet service providers (ISPs), to obtain broadband services.[4]

Source: http://www.whitehouse.gov/sites/default/files/20091217-recovery-act-investments-broadband.pdf

There are many different broadband delivery technologies. These technologies can be separated into two major categories of wired and wireless broadband. Wired technologies include Digital Subscriber Lines (DSL), Cable Modem, Fiber Optics, Leased Lines (T1), and Broadband over Powerline (BPL). Wireless technologies include mobile wireless (3G, 4G, LTE, WiMax), Wi-Fi, satellite, and Wireless Internet Service Providers (WISP).[5] Wired broadband technologies bring a wire connection to the home or business. Often, a Wi-Fi router is used by the subscriber to share the Internet connection wirelessly among different devices within the home, such as a laptop computer or tablet.

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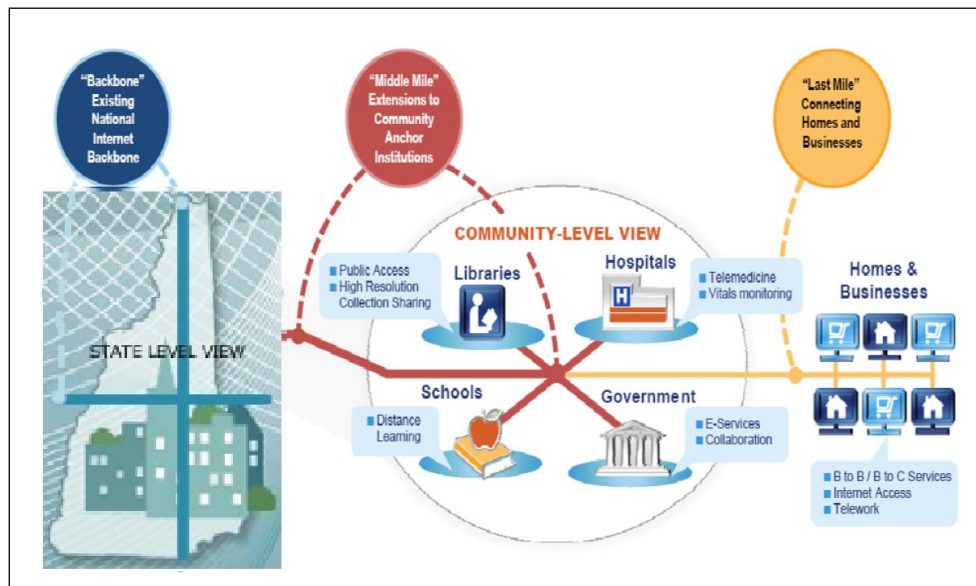
[4] State of New Hampshire, Department of Resources and Economic Development and The Telecommunications Advisory Board, State of New Hampshire Broadband Action Plan: Appendix A, 2008, http://www.nheconomy.com/uploads/Broadband-Action-Plan-Appendices.pdf . (accessed July 17, 2013).

[5] "Wireless Internet 101," *Institute for Local Self-Reliance*, http://www.ilsr.org/content-types/fact-sheets-resource-archive/?contenttype=fact-sheets-resource-archive&initiative=broadband. (accessed June 2013).

Digital Subscriber Lines (DSL) is the existing landline-wired technology commonly used by residential and small businesses. DSL uses copper phone lines to deliver direct, one-on-one connections to the Internet, allowing users to not have to share bandwidth with neighbors. Users must be located within 18,000 feet (3.4 miles) of a phone company's central office, which means service is often unavailable in rural areas.[6] The most common DSL connections are asymmetric, with networks offering more bandwidth and faster speeds for download compared to upload, since residential users predominately are downloading more information from the Internet than uploading. Symmetric types of DSL provide equal bandwidth for uploading and downloading speeds, which is sometimes marketed as "Business DSL" as companies often have greater needs for uploading, or transmitting data. The dominant provider using DSL in the Lakes Region is Fairpoint.

Cable Modem based Internet service uses the cable television network to deliver broadband. This type of service is typically faster than a common, asymmetric DSL connection. Cable networks are a shared connection, so speeds can slow during peak usage times due to congestion when people in the same neighborhood are online. The primary provider of cable modem based service within the region is Comcast.

Source: L. Frenzel – Electronic Design
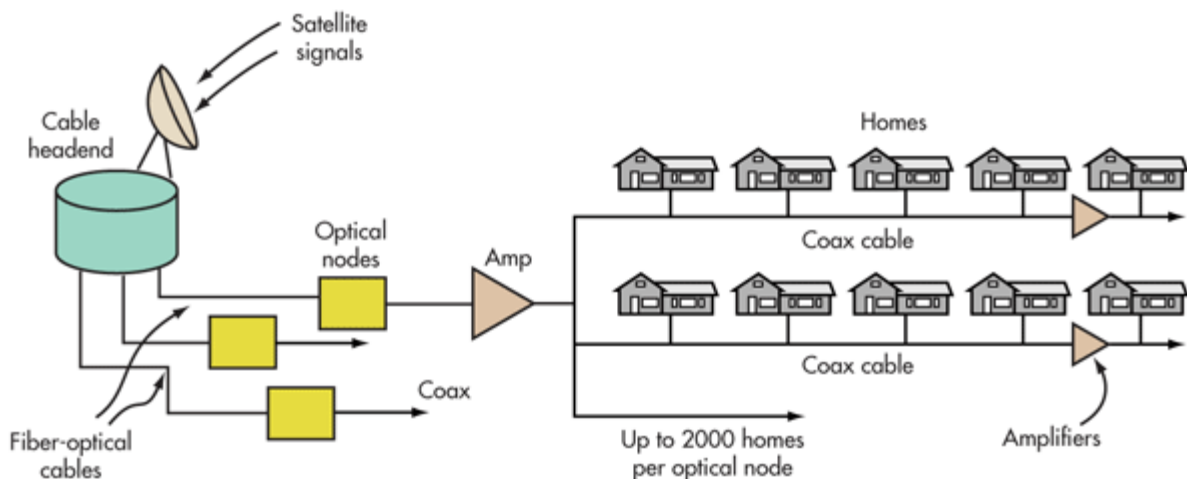
Fiber optic systems use lasers across very thin strands of glass creating reliable, resilient technology that has an extremely high capacity for speeds and data transmission. There is a high cost associated with laying out the fiber network but once in place the system can be easily upgraded and maintained, with lower operating costs than DSL, cable, or wireless networks.[7] Building out the fiber network is currently the most effective means to provide the highest capacity broadband Internet.

Cellular broadband also known as Wireless broadband is available through many technologies, including mobile wireless (3G, 4G, LTE), Wi-Fi, satellite, and Wireless InternetService Providers

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[6] Shuffstall, Bill, Monica Babine, and Andy Lewis, "Connecting Communities," *The National e-Commerce Extension Initiative*, http://www.connectingcommunities.info/. (accessed July 2013).

[7] "*Broadband 101,*" *Institute for Self-Reliance,* http://www.ilsr.org/content-types/fact-sheets-resource-archive/?contenttype=fact-sheets-resource-archive&initiative=broadband. (accessed on July 17, 2013).

(WISP). Unlike wired technologies, which bring wires directly to a location, wireless technologies use radio frequencies through transmitters and receivers to deliver broadband. Wireless broadband can be categorized as wireless networks or satellite. Cell phones, and other mobile devices, use mobile wireless licensed technologies such as 3G, 4G, LTE, WiMax, and other networks.

Wireless Internet Service Providers (WISP) are designed to cover large areas using point-to-multipoint networks to broadcast wireless data up to 20 miles. A signal is broadcast from a base station and is received by a fixed wireless antenna mounted on a customer's premises. A combination of a Wi-Fi Hotspot and a WISP can enable a Neighborhood Internet Service Provider (NISP) or a Wi-Fi Hotzone. A Wi-Fi Hotzone can cover an area such as a neighborhood, shopping mall, or campground.[8] WISP networks can provide "last mile" solutions and broadband availability to rural areas where it is often cost-prohibitive to build wired networks.

Satellite Internet users send and receive information via small dishes installed on the premises to a satellite in space which retransmits the signal to a network operation center that is connected to the Internet. Satellite-based Internet connection can be interrupted by objects and weather, and broadband upload speeds are typically slower than wired or other wireless networks.[9] While wireless broadband can offer mobility and access for rural locations, wireless connections are unlikely to overtake the wired network which is likely to maintain higher speeds and lower costs, especially when compared to a ubiquitous fiber network. Wireless and wired broadband networks can be thought to complement each other to create available broadband Internet connections.[10]

Wi-Fi or 'hotspots' are designed to broadcast the Internet for several hundred feet. They are used by public and private networks, including businesses for their employees or retailers for their customers, who connect to the Internet using built-in Wi-Fi cards in their mobile devices (e.g. laptops, tablets, or cell phones, et cetera). While this is not a primary means for distribution of Internet service in most cases, it is a type of networking that could be expanded in some cases by Internet service providers.

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[8] Shuffstall, Bill, Monica Babine, and Andy Lewis, "Connecting Communities," *The National e-Commerce Extension Initiative*, http://www.connectingcommunities.info/. (accessed July 2013).

[9] Shuffstall, Bill, Monica Babine, and Andy Lewis, "Connecting Communities," *The National e-Commerce Extension Initiative*, http://www.connectingcommunities.info/. (accessed July 2013).

[10] "Wireless Internet 101," *Institute for Local Self-Reliance*, http://www.ilsr.org/content-types/fact-sheets-resource-archive/?contenttype=fact-sheets-resource-archive&initiative=broadband. (accessed June 2013).

Why Broadband Is Important

Broadband is in 2014 what electricity was to New Hampshire in the 1930's - a necessity. As a predominantly rural state, the availability of high-speed Internet is one of the most significant factors that will impact the ability of communities to achieve economic growth and maintain quality of life. In a relatively short period of time, fast and reliable broadband has become essential for economic and community development and is critical infrastructure for public safety, education, health care, business and government operations.[11]

Communities today face many challenges: a competitive global marketplace; an aging population; the need for a better-educated and better-prepared workforce; and, access to health care. These issues are magnified in rural areas by far distances between households and services, scarce resources and changing demographics. The financial resources traditionally available to overcome these challenges are often unavailable to rural communities and regions. New solutions are required. Broadband can help community leaders find innovative solutions to these challenges.

There is no doubt that we live in an information society, and broadband connects us to opportunities and services. Whether this is training for a new skill, a new language, or completing an online course - broadband facilitates the access of information in many different forms.[12] The receipt and delivery of information over the Internet at high speeds is considered an essential tool for accomplishing tasks that contribute positively to economic activity and social welfare. In 2010, it was estimated that there were almost 200 million Americans with access to broadband at home, up from 8 million in 2000.[13] A November 2013 report from the University of New Hampshire's Broadband Center of Excellence, entitled "Broadband 2020: Achieving Ubiquity" states that an estimated 96% of residents in the United States had access to broadband networks that provide downstream data rates of 6 megabits per second or faster in 2012. While this is an impressive increase, there are still many Americans with insufficient access to broadband services. In New Hampshire, access varies from good coverage and availability in denser areas of the state to areas of un-served and under-served communities in the northern, western and eastern parts of the state. This variability can lead to disparities in economic opportunity, education, community vitality, public health and safety, and quality of life.

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[11] "Building Community Capacity through Broadband (BCCB) Initiative," *University of Wisconsin Extension*, November 2010, http://www.uwex.edu/broadband/documents/BCCBUWEXFAQ_rev_11_18_10withmap.pdf. (accessed June 2013).

[12] David Salway, "Why is Increasing Broadband Adoption so Important to Society?," *About.com Guide*, http://broadband.about.com/od/barrierstoadoption/a/Why-Is-Increasing-Broadband-Adoption-So-Important-To-Society.htm. (accessed July 2013).

[13] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013).
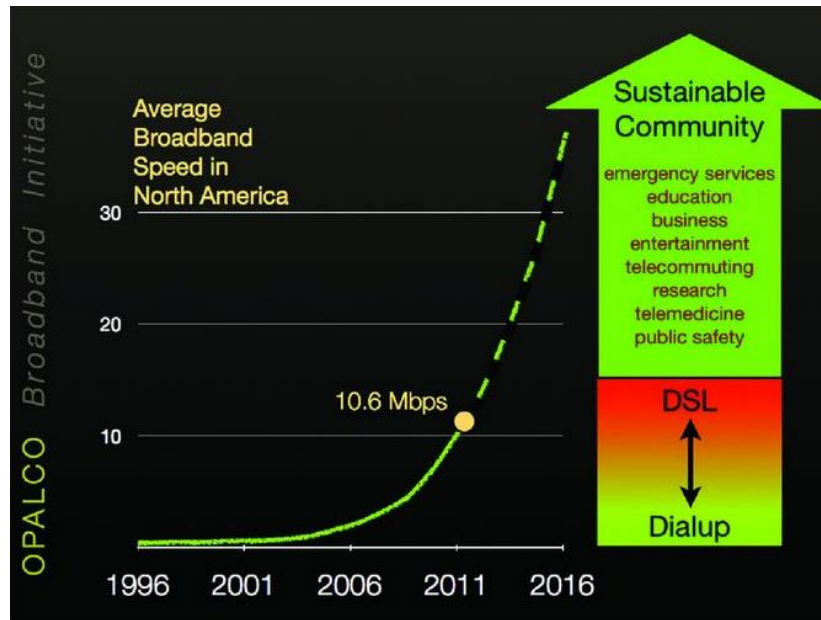
Broadband Importance by Sector

Education - Broadband is an important tool to enhance access to and improve the quality of education at all levels in New Hampshire and beyond. Broadband-enabled teaching and learning has the potential to extend learning beyond the limits of the classroom, provide more customized learning opportunities, and increase the efficiency of school systems. [14] The availability of a wide range of Internet based resources such as distance learning programs, online learning modules, and digital textbooks allows students to engage in multimedia lessons, take virtual trips, and communicate with classrooms in other parts of the world. These tools offer educators a platform to share curricula and provide adult learners easy access to professional development or educational opportunities online.

However, as teaching and broadband technology become increasingly intertwined, students lacking access to adequate broadband both in school and at home will be unable to keep up with educational trends and potentially, be less prepared than their peers in more 'connected' areas. The State Educational Technology Directors Association recommends that K-12 schools have access to broadband speeds of 100 megabits per second for every 1,000 students and staff by the year 2014

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[14] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013); United National Educational, Scientific, and Cultural Organization, Technology, *Broadband and Education: Advancing the education for all agenda*, Jan. 2013, http://unesdoc.unesco.org/images/0021/002196/219687e.pdf. (accessed July 17, 2013).

and 1 gigabyte per second by 2017.[15] Although most schools provide some level of Internet access, too often the speeds of these connections fall short of what is considered appropriate or necessary.[16] This need for improved broadband connections in schools will only increase over time; especially, as educators transition to web-based content and resources and more states require online assessments and testing.

Not only does the availability of reliable broadband technology offer advances in education, it is imperative to the economic welfare and long-term success of our state and nation.[17] Participation and competition in the global economy is increasingly dependent on 21st Century skills, including the ability to effectively use technology and navigate the digital world.[18] Providing access to learning opportunities that address these skills can help empower students to actively engage in an increasingly technology-driven and digital culture.

Health - With increasing and changing health needs, ranging from rising health care costs, to managing chronic illnesses, to meeting the needs of an aging population, and a shortage of specialists in rural locations, broadband Internet plays an important role in how these issues are addressed. Many emerging technologies and approaches to health care are dependent on broadband connections to improve health care outcomes while also controlling costs and extending the reach of health care providers.[19] Individual patients, providers, and the overall public health of a community benefit from more efficient, innovative, and informed health care systems as new technologies are adopted.

Telehealth, the broader term incorporating telemedicine, is the transfer of electronic medical data (images, sounds, live video and patient records) from one location to another. It includes the use of electronic information and telecommunications technologies to support long distance clinical care, patient and professional health related education, public health, and health administration.[20] New Hampshire, with rural geography, scarcity of local specialty medical

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[15] C. Fox, J. Walters, G. Fletcher and D. Levin, "The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs," *State Education Directors Technology Association*, 2012, http://www.setda.org/web/guest/broadbandimperative. (accessed July 17, 2013).

[16] C. Fox, J. Walters, G. Fletcher and D. Levin, "The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs," *State Education Directors Technology Association*, 2012, http://www.setda.org/web/guest/broadbandimperative. (accessed July 17, 2013).

[17] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013).

[18] Charles M. Davidson and Michael J. Santorelli, *The Impact of Broadband on Education*, A Report to the U.S. Chamber of Commerce, Dec. 2010, http://www.uschamber.com/sites/default/files/about/US_Chamber_Paper_on_Broadband_and_Education.pdf. (accessed July 2013).

[19] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013).

[20] Louis Kazal Jr. and Anne Conner, "Planning and Implementing a Statewide Telehealth Program in New Hampshire*"*, 2005, http://www.endowmentforhealth.org/uploads/documents/resource-center/Planning%20and%20Implementing%20a%20Statewide%20Telehealth%20Program%20in%20NH.pdf

services, and high percentage of elderly residents, can benefit from telehealth systems.[21] Broadband Internet is necessary to continue supporting current and emerging telehealth applications for patients, providers, hospitals, and health care businesses.

Electronic medical records systems enable providers to collaborate in patient care by accessing treatment information from different locations. Patients can have better access to their medical records and information in an effort to better engage patients and families in managing their health. Video conferencing allows physicians to conduct video consultation and monitor treatment of patients remotely. It also increases the reach of specialized physicians and research.[22] Broadband Internet connection plays an essential role in the ability to incorporate the latest health technologies that benefit patients, health providers, and health industry businesses.

Community Support/Government - From providing a displaced community member with food and shelter to organizing community initiatives, local governments and community support organizations in New Hampshire deliver a wide variety of valuable services to their constituents. Demands for services are constantly increasing, yet organizational budgets rarely follow that same trend. Broadband connectivity provides the capacity to more efficiently and cost-effectively deliver services while opening up possibilities for new services and facilitating more robust public participation.

Citizens expect a certain level of online interactivity with government and community support organizations. Most local governments in New Hampshire host websites providing immediate, remote access to public notices, event calendars, applications, forms, ordinances and regulations. While constituents benefit from easy access to the information they need, governments and community support organizations save time, money and resources when routine requests are handled online.

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[21] Louis Kazal Jr. and Anne Conner, "Planning and Implementing a Statewide Telehealth Program in New Hampshire*",* 2005, http://www.endowmentforhealth.org/uploads/documents/resource-center/Planning%20and%20Implementing%20a%20Statewide%20Telehealth%20Program%20in%20NH.pdf

[22] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013).
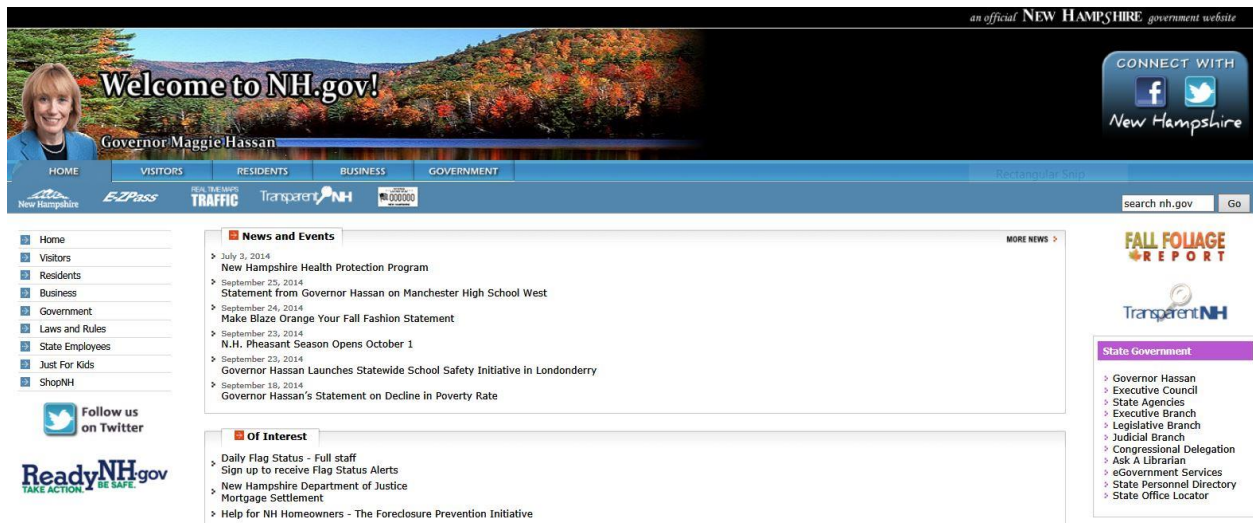
Equal in value to the administrative efficiencies associated with broadband technology are the accessibility opportunities broadband creates. Online meetings, surveys, blogs and other modules offer new ways for a larger percentage of the population to watch and participate in community decision-making processes. Similarly, technologies utilized by community support organizations now enable them to administer one-on-one services without travelling.

While new applications allowing for improved public sector interaction and transparency will continually surface, their reliance on perpetually maintained broadband infrastructure will remain a constant.

Public Safety - New Hampshire is a predominantly rural state, where firefighters, law enforcement and emergency medical personnel cover wide geographic areas. These public safety officials are often required to quickly make potentially life-saving decisions in the field, despite the challenges of rugged terrain and natural and man-made disasters. Public safety personnel need the ability to quickly communicate with each other, access online resources (via a PC or mobile device), connect to networks, and quickly transfer important video and data files during emergencies. Through a combination of wired and wireless technologies, broadband enhances public safety by enabling first responders to make informed decisions and allowing them to communicate effectively with one another.

Economic Development/Business - The total economic impact of broadband in New Hampshire was estimated at $634 million in 2010 and in 2011, 11,000 net new jobs were created as a result of expanded broadband.[23] Strong broadband connectively strengthens the economic development process and allows businesses to function well in the digital age. The use of broadband for economic development improves the ability to retain and recruit businesses, increases business profitability, attracts highly skilled workers, improves the efficiency of municipal services, enhances access to healthcare, and contributes to stronger educational attainment. All are key ingredients to a successful economic development strategy.

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[23] R. Crandall and H. Singer. "The Economic Impact of Broadband Investment." *National Cable and Telecommunications Association*, 2010.

Jobs depending on broadband and information and communications technology will grow by 25% between 2008 and 2018 or at a rate of 2.5% faster than the average for other occupations and industries.[24] Broadband technology has changed the way business is conducted in the 21st Century and will continue to change business applications in the future. In 2011, 73% of New Hampshire households and businesses had access to broadband and, nationally in 2012, 66% of adults have broadband at home, which is up from 3% in 2000.[25] Investment in broadband shows benefits for small businesses and local economies. A Connect Iowa study of the state's small businesses found that Iowa small businesses generate $1.9 billion in online sales and that small businesses with a broadband connection have revenues that are $200,000 higher annually than those which do not.[26] This trend will continue in the future.

Broadband and broadband-dependent applications allow small businesses to increase efficiency, improve market access, reduce costs and increase the speed of both transactions and interactions. By using Web-based technology tools, 68% of businesses surveyed boosted the speed of their access to knowledge, 54% saw reduced communications costs and 52% saw increased marketing effectiveness.[27] The use of broadband by small businesses has proven to be an efficient and cost effective tool. Business statistics have shown that small businesses have consistently been the backbone for job and wealth creation in the US economy.

D. REGIONAL BROADBAND OVERVIEW

Introduction

Lakes Region Planning Commission

Established in 1969 in accordance with NH RSA 36:45 – 50, the Lakes Region Planning Commission (LRPC) is one of nine regional planning commissions in the State of New Hampshire. LRPC is a voluntary association of local governments that provide a variety of services to enhance the overall economic and environment conditions of the region. The overall mission of LRPC is to provide assistance to local municipalities with the purpose of

improving the quality of the environment, increasing economic opportunities and to encouraging cultural development through leadership, education, technical assistance, information, advocacy and coordination. State legislation requires the Commission to prepare a Regional Development Plan

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[24] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013).

[25] The Pew Internet and American Life Project , Sept. 2012, available at http://www.pewinternet.org/ .

[26] Anna Read and Damon Poter, "Building High-Speed Communities," *APA Planning Magazine*, March 2013.

[27] Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, http://www.broadband.gov/plan/11-education/#_edn16. (accessed July 17, 2013).

and this Broadband Plan is a component of the Regional Plan. A board of 36 Commissioners, nominated by the planning boards of their respective communities, govern the LRPC. The 12-member Executive Board, elected by the Board of Commissioners, provides leadership, policy direction, guidance and oversees the financial affairs of the organization.

The Lakes Region of New Hampshire consists of the following thirty municipalities: Alexandria, Alton, Andover, Ashland, Barnstead, Belmont, Bridgewater, Bristol, Center Harbor, Danbury, Effingham, Franklin, Freedom, Gilford, Gilmanton, Hebron, Hill, Holderness, Laconia, Meredith, Moultonborough, New Hampton, Northfield, Ossipee, Sanbornton, Sandwich, Tamworth, Tilton, Tuftonboro, and Wolfeboro.

Lakes Region of New Hampshire
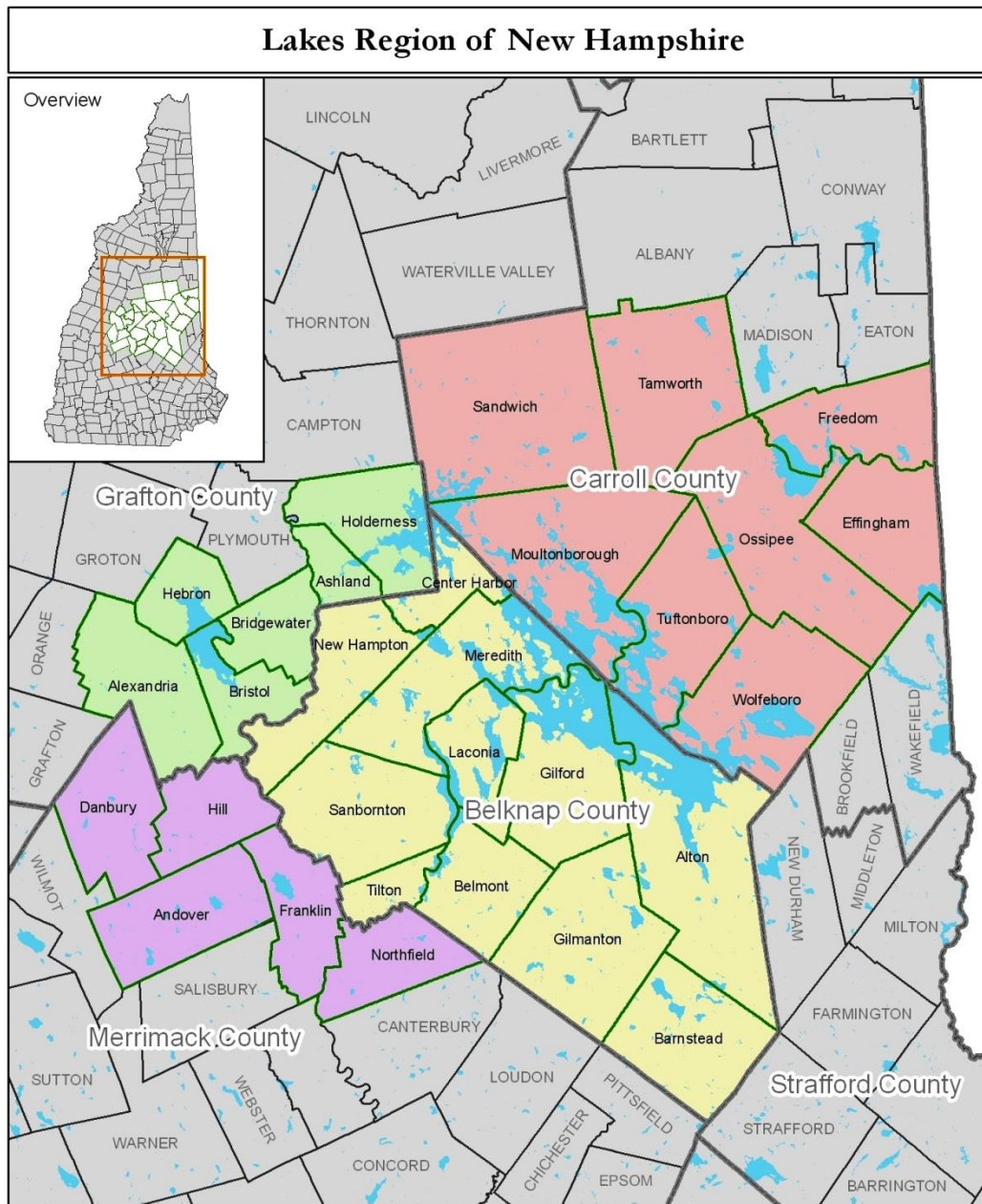
Regional Broadband Vision

In today's interconnected, global economy, broadband is a critical infrastructure for all. To enable municipalities, businesses, and residents to benefit from the economic, educational, and recreational opportunities provided by broadband access, the Lakes Region Planning Commission envisions a region in which broadband is considered a critical piece of the regional infrastructure and that the maintenance and enhancement of broadband will ensure the region thrives in an economically sustainable manner. The challenge of ensuring that the State of New Hampshire's citizens and organizations have adequate levels of broadband to compete in the 21st century economy will require leaders of state and local governments and the private sector to continue to work together to evaluate best practices, encourage of public-private partnerships where appropriate, and understand both the supply (deployment challenges) and demand (usage of broadband to spur further deployment) dynamics in the State and the LRPC region.

Several communities in the Lakes Region are actively engaged in local economic development efforts to ensure that adequate broadband is available to support these local initiatives. As the region's economy continues to shift into the global knowledge-based economy, decision makers need to consider broadband as critical infrastructure, similar to highways, water/sewer and energy.

Economic development leaders and municipal officials in the region view broadband as an essential service that is needed to:

- Create and retain high-skill and higher-wage jobs
- Increase business profitability
- Provide access to educational opportunities
- Improve the efficiency of municipal services
- Enable faster emergency response
- Improve access to health care

On April 26, 2013, the Lakes Region Broadband Stakeholders Group conducted a visioning session designed to identify goals and action steps that could lead to a regional vision statement. The BSG members provided the following:

- "Broadband for all" is an aspirational goal.
- A variety of competitive options available to consumers.
- Understanding and acceptance of all alternatives for delivery of broadband.
- Creation of a regional advisory group that remains after conclusion of the NHBMPP. The group would serve as a clearing house for individuals, towns and others interested in learning how to improve broadband.

- At present, the existing broadband speed is sufficient to meet the expanding business, social and infrastructural needs of the region. This may not always be true.
- Attempt to maximize the use of existing fiber network.
- Promote collaboration with service providers.
- Understand the future needs of the various sectors
- Assist and support local telecommunications committees and the planning processes.
- Increased awareness of available resources and technical assistance

- Increased understanding of link between broadband and economic stability and economic development
- Sustainable funding for regional broadband planning
- After everyone is served, strive for goal of improved broadband service.
- Develop a technical bulletin for municipal officials who wish to improve broadband in their communities.

The regional vision --- The Lakes Region is an area that has the capacity for high quality broadband Internet service and is pro-active in ensuring that all sectors are well served --- business, education, healthcare, local government/community support and the general public. The public and private sectors need to work together to ensure that broadband Internet service is improving to meet the needs of the region.

History of Broadband Planning Efforts in the Lakes Region

Broadband planning is an essential component of maintaining the Lakes Region's competitiveness as a place to work, live and play. Broadband plays a key role in community and regional strategies designed to attract new industry, businesses and a competitive workforce. Historically, commercial and industrial land use in the region initially clustered near ocean and river ports and then to railroads and highways. In the rapidly growing digital economy, access to technological infrastructure such as broadband becomes as important for economic growth as the physical location of a business or industry.

In today's world, business growth is increasingly built on the fusion of the physical and the digital. Broadband has become an essential component to economic development, as well as to telemedicine, education, and all forms of communication from email to teleconferencing and social media. The development of a national broadband access system is similar to the creation of the interstate highway system in the mid-twentieth century and to the establishment of a reliable, standardized electrical distribution system in the early 20th century.

One of the earliest efforts toward planning for infrastructure and utilities in the Lakes Region was published in 1990, when the Lakes Region Planning Commission (LRPC) prepared the _Regional Public Utilities & Infrastructure Plan for the Lakes Region of New Hampshire_. It was developed as a guide, offering encouragement and direction to municipalities with the foresight to approach community facility development from a regional viewpoint. The guide identified advantages to the establishment of inter-municipal solutions for infrastructure needs which extend beyond the boundaries of a single municipality. The guide discusses evaluating the availability of existing and future power lines as an important factor for community development. The goal, at that time, focused on the identification of communities and areas whose electric service needs were not being met or who could benefit from the upgrading of existing systems. (LRPC, 1990).

In early 2009, the New Economy Sub-committee of the Lakes Region Comprehensive Economic Development Strategy (CEDS) Committee sought to define where digitization, the Internet, and other future-oriented technology will take our economy so that we can better take advantage of the opportunities provided by these modes of communication. The Sub-committee set a goal of developing a plan to expand and improve the technology infrastructure as it relates to increases in bandwidth, reliability, redundancy, predictability and access within the Lakes Region, in such a way that businesses and residents may be able to attain adequate and efficient data transmission speeds to conduct business and other activities over the Internet. The _Lakes Region Broadband Expansion Study – Phase 1_ (SHS Consulting, 2009) concentrated on reviewing several documents that studied the challenges and opportunities related to improving broadband access, including the _Northern New Hampshire Technology and Telecommunications Master Plan_ (SHS Consulting, 2007) and the _State of New Hampshire Broadband Action Plan_.
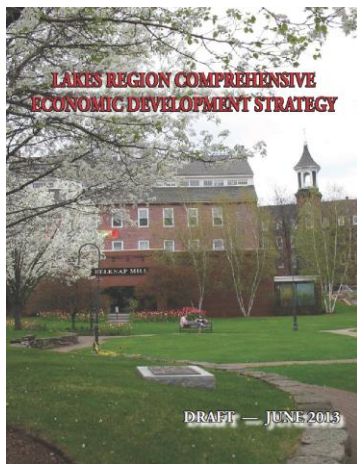
The intent of the study was to identify an approach that would serve as a platform for the development of a detailed regional broadband expansion action plan. In 2013, the CEDS Committee prepared an update including objectives to increase bandwidth for the business community, to identify deficiencies and suggest improvements to the existing regional Internet services, and to work to improve reliability and redundancy with in the region's broadband networks. To accomplish these objectives, the committee will encourage the expansion of broadband in the region consistent with the recommendations put forth in the Lakes Region Broadband Plan.

The Lakes Region has benefited from several State-led broadband planning initiatives. Since 2000, with the Department of Resources and Economic Development and the Division of Economic Development providing leadership and shaping policy for in-state telecommunications and broadband, the State of New Hampshire has worked aggressively through its Telecommunications Advisory Board and key partners to increase deployment of broadband services throughout the state. The resulting State of NH Broadband Action Plan was published on June 30, 2008 by Berry, Dunn, McNeil, and Parker.

In 2009, the NH Legislature created the position of Director of Broadband Technology and in late 2009 NH DRED hired a director with the responsibility of coordinating the planning and development of a comprehensive broadband plan for the state.

The State's broadband mission it to

- Expand the availability of affordable broadband Internet access for all people, businesses and community organizations.
- Promote the use of broadband to improve the quality and availability of health care, education and government services.
- Work collaboratively with partners to develop an ongoing census of the broadband network infrastructure and related services to unserved and underserved areas of our state.
- Foster statewide collaborative efforts in which ideas, experiences and resources can be shared in order to develop new ways of harnessing the Internet for the public good.

According to the NH Division of Economic Development and the National Telecommunications Information Administration (NTIA) national assessment, adoption of broadband has increased significantly in the past two years. In 2010, NH had a 73% broadband penetration rate (2nd in the Nation). In March 2013, NH increased broadband penetration rate to 88%. In September 2013, NH increased broadband penetration rate to 96%. Estimates on investments in infrastructure since 2008 equal $562 million, with 11,000 net new jobs created as a result of expanded broadband since 2010.

In addition, the LRPC has been working closely with UNH, NH Office of Energy and Planning, and all the other regional planning agencies in the state to complete the NH Broadband Mapping and Planning Program (NHBMPP, described at the beginning of this report), and to assess the needs and deficiencies of broadband in the region.

Today, deficient middle and last mile infrastructure is commonly seen in some rural pockets of the Lakes Region that still lack access to affordable quality broadband options. While many communities may have middle mile infrastructure, large segments lack last mile connections. In some cases, it may not be feasible for service providers to expand broadband to individual homes in low density areas. In the Lakes Region, a 'digital divide' exists between some of the urban and rural communities.

Lakes Region Broadband Stakeholder Group

The Lakes Region Broadband Stakeholder Group (BSG) is comprised of individuals representing a wide spectrum of sectors in the region who contribute their time and skills to help the NH Broadband Mapping and Planning Program (www.iwantbroadbandnh.org) to determine and prioritize the need for broadband services in underserved areas by identifying barriers and proposing solutions for the expansion of high speed Internet access.

The BSG meet on October 10, 2014 to review and provide comments on the Draft Lakes Region Broadband Plan. The Lakes Region BSG was an active group in 2012 and 2013, holding quarterly meetings to discuss the unique broadband issues within our region. The BSG sponsored an informational forum in Danbury in late July 2013 with the major Internet service providers. The intent of the forum was to encourage the Town and providers to work together to expand service in the Town.

The LRPC promoted a Broadband Assessment and Pilot Program to member municipalities. The three Towns selected for the pilot projects were: Bethlehem, Greenfield and Moultonborough. A Lakes Region BSG participant from the Town of Moultonborough Broadband Committee is looking for assistance in setting priorities and using their technology fund to provide resources for broadband improvements and enhancements.

LRPC Open House: Michelle Roberts, GIS Analyst and John Morgenstern, Gilford LRPC Commissioner discuss the broadband mapping program. *(Photo by LRPC)*

Regional Overview

Geography and Physical Landscape - Thirty municipalities comprise the Lakes Region. The area has natural beauty with abundant mountains, lakes, and pastoral settings provide residents and visitors with scenic views and many recreational opportunities. The region is composed of a system of inter-connected waterways. Of the total 818,000 acres composing the Lakes Region, 15 percent of the region is covered by surface waters and wetlands. These waterways, natural resources, and corresponding quality of life have been noted as the most important benefit to regional businesses. Situated between the White Mountains to the north and the more densely populated Merrimack Valley to the south, the Lakes Region serves as an easily accessible destination with an ideal mix of pristine natural resources and modern amenities. Lake Winnipesaukee, New Hampshire's largest lake has a total surface area of 44,600 acres. Maximum and mean depths are 180 and 43 feet, respectively. The lake is natural, but is raised by damming to an elevation of 504 feet. Eighty-three

relatively small tributaries draining a watershed of 215,133 acres provide the main water source for the lake. There are 240 miles of shoreline (this includes the shoreline length of islands over five acres in area) and about 250 islands (the total number of islands is frequently debated, depending on definition of "island").

Population Characteristics - In 2010, the US Census reported a total of 112,735 residents in the region and the projections estimate an increase of 277 persons by 2015 for a total of 113,012. This projection is in sharp contrast to the history of last 40 years when the population increased by 86% from 60,461 in 1970 to 112,735 in 2010. The "baby boom" generation, the in migration from southern New England states, the tax climate in the state and the overall attractive lifestyle in the Lakes Region fueled this high level of growth.

For the next 25 years (2015 to 2040), the population in the Lakes Region will be slow in contrast to the past. The projections call for an increase to 123,940 persons in 2040 for a total increase of 10,968 or 9.7 percent over the 25-year period. That represents an annual average increase of about 0.4% per year. These population projections have implications for many aspects of life in the Lakes Region such as housing, the local tax base, available labor force, school enrollments and others.

Economic Conditions - The 2013 unemployment rate for the Lakes Region was 5.1 percent. In June 2014, the rate was 4.0 percent not seasonally adjusted. During the 2000 to 2010 period, the population growth was less than the state's and the percent of persons over 65 years was higher. Approximately 17.5 percent of the Lakes Region population is over 65 years and 13.0 percent of New Hampshire's is over 65 years. Generally, the unemployment rate in the Lakes Region follows New Hampshire, about 5.0 percent. The following trends are significant:

- There was a significant loss of private sector jobs during 2006 to 2011;
- A 9.2 percent loss of manufacturing jobs for the Lakes Region during the period; the large job loss numbers resulted from the retirement of low-skilled jobs in manufacturing; now a high level of skills is required and all manufacturers are presently constrained in their growth by the lack of a high skill manufacturing workforce; a 5.7 percent loss of manufacturing jobs in the U.S.;
- Management forecasts it will be difficult to replace retiring workers;
- Lakes Region Community College provides high skill manufacturing training and training on "soft skills";
- A perception that the Lakes Region is dependent on tourism and second homes; however, the region still has a strong manufacturing base;
- The professional technical sector, including accounting, consulting, computer service, et cetera is growing.

From anecdotal information, the 2014 summer tourism season is positive. Major employers include the local schools districts, LRGHealthcare, Freudenberg, Huggins Hospital, Vutek, Webster Value, NH Ball Bearings and other smaller manufacturers. In region, there is Lakes Region Community College with Plymouth State College and UNH Durham nearby.

Significant Economic and Demographic Trends - *Aging of the population:* When comparing the Lakes Region median age to the state as a whole, the four Lakes Region counties are above the state's 2010 median age of 41.1 years. Several knowledgeable commentators refer to this trend as the "silver tsunami" whereby the aging of the state's population and the increase in those over 65 years will have significant impacts on local governments in the areas of health care, transportation, social services, and housing. Leaders throughout the state and region are beginning to consider the impact of the "silver tsunami" on individual communities and the region's future economic prospects. Planning for the aging population boom is a theme that Lakes Region communities need to consider.
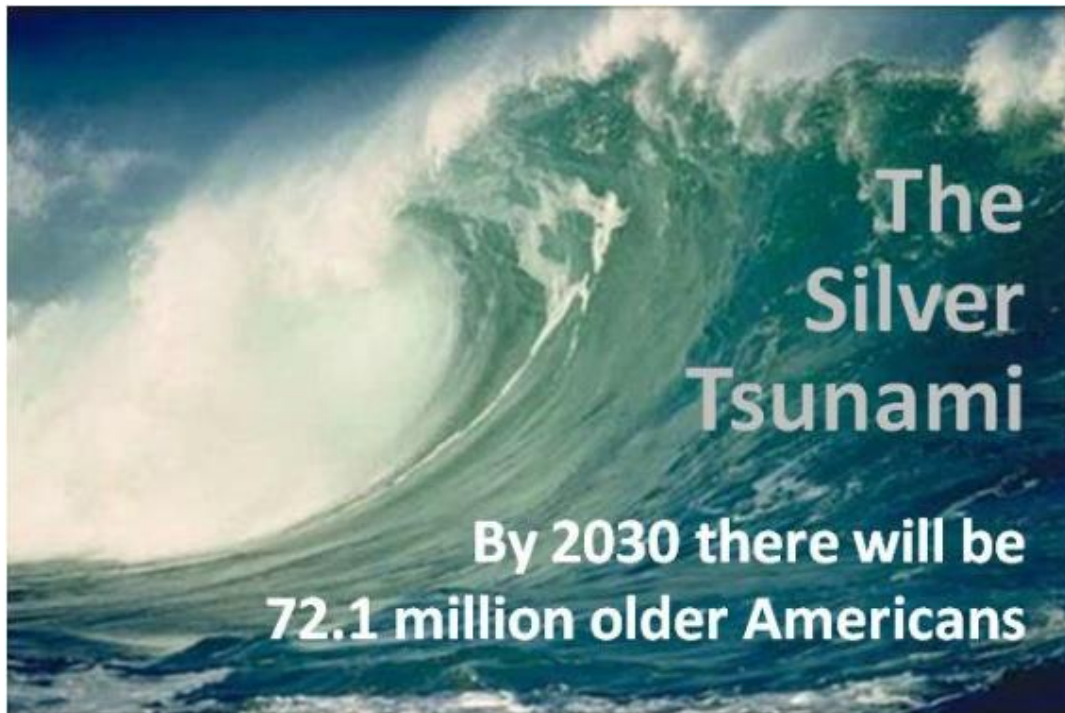
New Hampshire's aging population represents the most striking and broadly impacting demographic trend that the Lakes Region and State will experience over the next quarter century. When discussing broadband as it relates to the nation's elderly population, the Associate Administrator of the NTIA's Office of Telecommunications and Information Applications stated: "Broadband can improve quality of life for older Americans in many ways. Online videoconferencing technology can allow seniors to see grandchildren who live on the other side of the country. Medical websites can provide easy access to everything from health and wellness tips to information about illness and disease. Telemedicine and remote monitoring can enable elderly patients too frail to travel to consult with doctors at distant hospitals. Social media tools can combat isolation and even serve as a lifeline to the outside world.

"What's more, at a time when many Americans are working into their retirement years, Internet job listings and online employment applications – as well as Web-based training programs and classes - can help seniors retool for today's economy.

"But not enough older Americans are sharing in the benefits of broadband. NTIA, in collaboration with the Census Bureau, conducts some of the most extensive survey work on broadband adoption trends in the U.S. Our most recent published survey, in October of 2010, found that only 45 percent of U.S. households headed by someone 65 or older had broadband. That compares with 72 percent of households headed by someone ages 45 to 64, and 77 percent of households headed by someone ages 16 to 44."

In presenting strategies for increasing broadband use among the elderly, NTIA said that it will be important that seniors not only gain a sense of comfort through patient trainers and trusted intermediaries, but that they acquire an understanding of all opportunities the Internet provides to simplify and enhance their daily lives. Providing the elderly with the tools and education to fully utilize the Internet will remain an important priority for the future.

http://www.cfha.net/blogpost/689173/156161/Geriatric-training-Allowing-our-patients-to-be-our-educators

Median Age by Rank in 2010		
Rank	Oldest towns	2010
1	Hebron	55.1
2	Sandwich	53.2
3	Freedom	53.1
4	Wolfeboro	52.1
5	Tuftonboro	50.8
6	Moultonborough	50.5
7	Center Harbor	49.9
8	Bridgewater	492
9	Meredith	49.7
10	Gilford	47.9

Rank	"Younger" towns	2010
1	Northfield	39.2
2	Barnstead	39.9
3	Franklin	40.2
4	Andover	41.4
5	Belmont	42.1
6	Laconia	43.0
7	Gilmanton	43.1
8	Ashland	43.1
9	Bristol	43.5
10	Hill	43.6

*Other items of note: A*s an area dominated by the recreation and tourism economy, many of the employees in the tourism and service industries tend to have low to moderate incomes. These individuals tend to subscribe to lower speed services to save cost. Low income and elderly persons living in the more rural areas (northeastern and northwestern sections) are the ones most adversely affected by the lack of affordable and reliable broadband service.

Many owners of second homes and renters of vacation homes are using the cellular Internet services rather than subscribing to a wired service that would get limited use. While this works in many areas, most cellular services get costly as bandwidth is consumed, limiting the practicality of this method.

The majority of businesses are small, and do not have a data intensive business model, so are happy with consumer grade broadband. Larger businesses and those needing commercial grade services tend to locate where these services are available.

Small town governments are increasingly budget constrained and are finding it economically beneficial to add e-government services. This strategy works best when there is universal broadband coverage within that town.

The decrease of population comes with a decrease in the student population and reduced local education budgets. In order to maintain a high standard of education, remote learning is a key part of many school district strategies. This requires commercial grade broadband to the school properties, so that many students can simultaneously learn through streaming media. In addition, most colleges offer Internet based online courses, which are of interest to persons in rural and remote areas.

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Regional Broadband Availability

Results of Broadband Mapping

The nine regional planning commissions along with its partners on the NH Broadband Mapping Program began mapping Community Anchor Institutions (CAIs) in 2010. This initiative is part of a national effort, led by the National Telecommunications Information Administration (NTIA), to create and maintain a searchable, public database of information on broadband availability in the United States. It is also the first comprehensive effort to understand where broadband is currently available in New Hampshire. Broadband is defined in terms of how fast data can be downloaded and uploaded from the Internet. That capacity can be described in terms of how much data, measured in bits (8 bits to 1 Byte), can be transmitted per second, and is reported in kilobits (Kbps), megabits (Mbps), and gigabits (Gbps). NTIA defines broadband as providing a minimum speed of 768 Kbps download and 200 Kbps upload. The NHBMPP has chosen to consider areas with available broadband download speeds less than 768 Kbps as 'un-served' and areas with download speeds of less than 3 Mbps as 'underserved.'

The maps and information included in this section represent data received on broadband availability through UNH's direct work with over 40 of the state's 63 identified broadband service providers and through an inventory of 4,067 Community Anchor Institutions (CAIs) across the state. This data has been updated every six months since 2010 to ensure the information remains accurate and current. The Lakes Region has broadband providers and 496 (12%) of CAIs in the state. The information presented in the maps included in this section of the report is based on data collected as of March 2014. Upon its completion in 2014, this Broadband Plan will reflect the most current information available at the time.

Information on the maps included in this section is displayed according to NTIA guidelines. Speeds shown are the maximum advertised speeds for the geographic features depicted, and must exceed the NTIA minimum definition for broadband speed (currently 768 kbps download and 200 Kbps upload) to be included. Actual speeds may vary due to the granularity and currency of the data, technological limitations, limitations and latency between the survey respondent and the speed test server

Broadband Availability: This map displays the status of available service for each census block within the Lakes Region. Of particular concern are the yellow and purple areas, these highlight census blocks with residences that have limited or no access to broadband. This map overstates the availability of broadband since the data is aggregated at the block level. If one single home has access to a broadband technology, the entire block will be reflected as having access.

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This map shows Technology Delivering Maximum Advertised Download Speed

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Speed Test Results

Broadband Availability by Maximum Advertised Download Speed: This map reports where speed tests have been taken and which ISP the user taking the test was using. The locational data used to place the points is from a self-reported "address" that users enter when taking the speed test and is subject to error. If a user takes the speed test at work and reports their home address the location may be incorrect. The vast majority of speed survey respondents were using Comcast or Fairpoint as their provider. The speeds reported can be greatly affected by many variables at the time of the test, such as traffic inside the users network, the node on their WAN (wide area network) and even things like viruses that may be congesting the Download and Upload of the computer.

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This map shows the maximum download speeds available as advertised by service providers.

This map shows the maximum download speeds as advertised by service providers of available technology.

This map shows the number of broadband providers currently offering service.

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Broadband Providers - The following are the common providers found in the Lakes Region: AT&T Mobility, Cyberpine Cooperative, FairPoint Communications, G 4 Communications, Lakes Region Wireless, Metrocast, OTT Communications, Sprint, T Mobile, Time Warner Cable (TWC), U.S. Cellular, NH Optical Systems, 186 Communications and Verizon Wireless. To find providers in a particular community, go to http://iwantbroadbandnh.org/ and click on Town Profiles and search the municipality. For example, if interested in Meredith, go to http://iwantbroadbandnh.org/townprofile/meredith

Broadband Costs - Depending on the entity (private residence, government, school district, high tech business), the monthly cost of high speed interest can range from $50 to $1,500 and even higher. Depending on the entity, quality of service needed, bandwidth capacity needed and guarantee of uptime, residential service is generally less than $50 a month. The cost of business service is directly related to bandwidth capacity needs, service level agreements and value added services.

Regional Demand for Broadband

Overview - As mentioned several times in this Plan, broadband service is analogous to the early days of electricity, which became a necessary commodity. The majority of people and businesses recognize the important function that broadband service plays in the local and regional economy. As technology changes and improves, professionals in government, business, public safety, health care and education need to maintain current competence in the field. Education, business and healthcare demonstrate strong demand.

The rural nature of the region encourages broadband use for shopping and communications with friends and relatives. For many, large box-store chains are a 30 to 60 minute drive, and specialty stores are even farther. There is also demand for broadband by those who rent vacation homes, as renters demand sufficient bandwidth for each member of the family to watch movies on rainy days. Professionals with second homes in the region demand higher speed broadband, so that they can work away from the office, and those that can telecommute full time are moving to the area. The distance to specialized medical care, in Concord and Lebanon, creates an increasing demand for tele-medicine, especially for the elderly and those with children. Finally, with the change-over to digital over-the-air television, there is few to no stations available, except through cable offerings. With cable expense and limited availability in some areas, the Internet is a primary method of getting video and music entertainment.

Businesses for the most part are satisfied with consumer grade Internet services, but an increasing number are building corporate headquarters, remote offices and Internet based companies, which demands commercial grade high-speed, symmetrical capacity. Some Lakes Region communities want to attract ecological friendly businesses, outside the manufacturing space, and the availability of commercial broadband is a key factor in attracting the kind of new business desired.

Survey results - In 2012 the UNH Survey Center conducted a survey of broadband technology uses and needs of small businesses in New Hampshire. Some of the key results include the following:

- 70% of respondents use the Internet for advertising

- 64% said their Internet speed is sufficient
- 50% accessed the Internet via cable

The Survey Center also surveyed local governments and educational institutions in New Hampshire. Key survey findings for these groups include the following:

- 55% of local government respondents said they would like to learn more about e-governance, or conducting municipal business via the Internet
- 51% of local government respondents would like training on making websites interactive
- 74% of educational institutions respondents stated that their biggest Internet challenge was keeping up with technology
- 59% of educational institutions responding would like to learn how to effectively use technology for teaching

A survey of residential broadband access and use in New Hampshire was conducted by the UNH Survey Center in 2012. The findings indicated the following:

- 86% of respondents had access to the Internet at home
- of those 86%, seventy three percent had broadband
- Respondents indicated that the biggest barrier to broadband use was keeping up with the technology
- 31% percent of respondents who did not have Internet access at home said they did not because it was too expensive
- 94% of residents stated that their Internet connection is adequate for their uses

Results of the 2013 Survey of Lakes and Central Regions

During May-July 2013, the UNH Survey Center conducted surveys for several regions, including the nine regional planning commissions, as part of the Granite State Future project and the NHBMPP. Several regions, including the Lakes and Central (joint survey), requested a region-specific survey. Key findings from the survey of joint Central and Lakes region residents included:

- 93% of residents surveyed have Internet access at home
- 63% of residents have a cable Internet connection
- 29% of residents pay $50-99 per month for Internet service
- 76% of residents pay for a bundled Internet service, which includes, phone, cable and Internet services
- 91% of residents state that their Internet access is adequate for their uses
- 88% of residents would not be willing to pay for more faster Internet speeds
- Responses from residents of the two region survey were largely similar to those of statewide residents.

Broadband Access by Geography
Granite State Poll
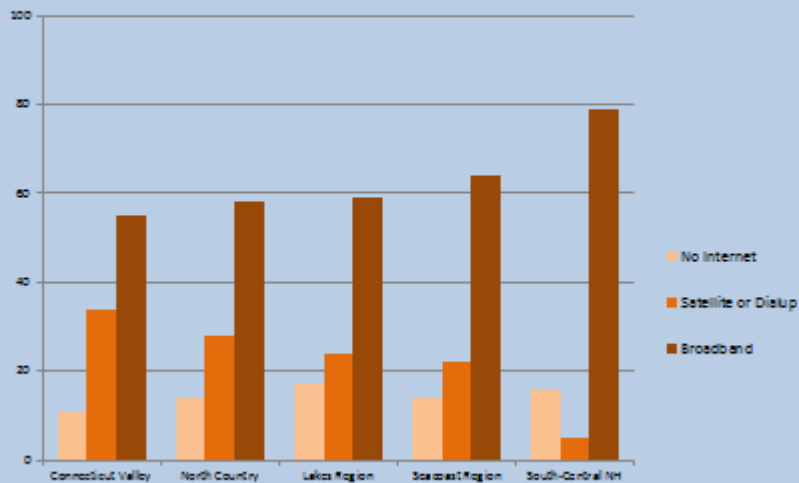
Poll conducted by UNH Survey Center, April 9-11, 2012.

Small Business/Education/Municipal: Key results across sectors

- 40% of educational institutions, 26% of small businesses and 19% of municipalities said that they did not have sufficient connectivity to meet their needs.

- The educational sector is more familiar with its upload and download speed than the municipal and small business sector.

- 85% of the municipal sector (79% business and 74% education) indicate that there is not or they are unsure of other Internet connection options with greater speeds.

- Educational institutions source of Internet connection is largely fiber optic and cable while municipalities and small business are served by cable and DSL.

- All three sectors indicated that their greatest technology related challenge to be keeping up with technology. The education and municipal sectors are also challenged by the lack of resources for the best technology.

- The small business sector is challenged by rapidly changing technology, lack of technology options and lack of information technology knowledge followed by lack of resources.

- All sectors are looking for training opportunities relative to their sector. The small business sector was able to identify a number of very specific training needs.

Sector Based Analysis

In preparing the information on the following sectors, LRPC contacted individuals in the sectors for data and reviewed the information with the BSG.

Education Sector - The educational experience of today's elementary and high school students is significantly influenced by broadband-enabled resources and devices; schools in the Lakes Region recognize the need to keep current with the demands for improved broadband connections

Today's K through 12 students need access to high-speed Internet connections both inside and outside the classroom. Some educational professionals have concerns when assigning projects that require Internet access at home because students may not have residential broadband access. Even students with access to the Internet at home can experience challenges connecting to graphic-intensive websites or downloading large files due to limited bandwidth. Inadequate broadband availability poses additional challenges for learners seeking more flexible options like online and distance learning courses and programs. Other concerns include:

- Access of high speed Internet both inside and outside the classroom.
- Need for improved and increased broadband connections at the facility or institution.
- Broadband needed for innovative teaching.
- Need to raise funds to maintain acceptable broadband standards

 Many schools are using the "blizzard bag" approach for snow days which include homework that requires high-speed Internet connections. Recently, School Administrative Unit (SAU) # 45 (Moultonborough) received Dedicated Internet Access (DIA) fiber service through TWC and upgraded its service to 150 Mbps upload and download, which will be sufficient for the present time being. SAU # 45 implemented an online learning management system named Schoology. When it becomes fully operational, the system will allow students to access course information at any location. Many SAUs are headed in that direction.

In higher education, the UNH system serves as Internet Service Provider for the NH Community College of NH, including the Lakes Region Community College (LRCC). The NH Community

College System (CCSNH) is part of the Broadband Telecommunications Opportunity Program (BTOP) grant effort along with other universities in the UNH System. Each College including the Chancellor's Office is now under contract with UNH for all Wide Area Network (WAN) services. UNH WAN service is the BTOP Fiber Assets created under Network NH. UNH has 12 fibers throughout the state and CCSNH is one of their clients, which was a requirement in the grant award. As part of the CCSNH, LRCC receives a very favorable rate. At present, their needs are met.

Several colleges have and are introducing massive open online course (MOOC) program. The courses are free to all and are expected to attract a large global audience of lifelong learners.

Economic Development Sector - As noted previously, in today's environment high quality and high speed broadband and Internet service is critical for normal business applications and functions and also for economic development in the Lakes Region. Businesses located along the NH Routes 3 and 25 have access to fiber optics and generally have strong Broadband and Internet connection. In Laconia, Fairpoint recently installed an upgraded Data Center (DC) with built-in redundancy and businesses within three miles of Fairpoint's Data Center have connection of 45 Mbps upload and download. In 2014, Cru-Con Cruise Outlet completed construction of its 30,000 square foot facility directly off of NH Route 25 in Moultonborough. This business is highly dependent on high speed, high quality and reliable Internet service. The company has redundant service with TWC and TW fiber optics, Fairpoint and Verizon. At present, Cru-Con Cruise Outlet has three 30 Mbps servers for upload and one with 50 Mbps. An important factor in their location was the availability and redundancy of high speed Internet services.

A `large statewide bank with headquarters in downtown Laconia "pushed away" from wireless broadband and DSL and now uses Fairpoint for Internet and has a Virtual Private Network (VPN) and uses digital Ethernet. With digital Ethernet, the bank can expand the bandwidth as needed.

Businesses with high quality and reliable service can be advocates or "ambassadors" to prospective businesses considering the region. Residents working from home need access to reliable residential broadband service that is capable of performing tasks such as large data transfers, videoconferencing, and remote computing. Nationally, many businesses are adopting the practice of telecommuting, which involves employees working remotely from home using a computer. In rural Danbury (population of 1,164), a young professional lives and telecommutes for a large international investment bank on Wall Street. Since high speed service is not available at his home, he rents a small office in the village center near the US Route 4 and NH Route 104 intersection. This small investment saves his company about $150,000 a year but not requiring office space in downtown Manhattan.
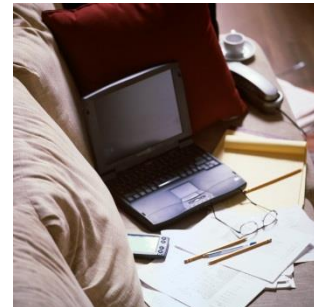
In conclusion, long term regional economic growth and vitality is dependent on the capacity of businesses and institutions to keep pace with rapidly evolving technology.

Public Safety Sector - In today's digital age, there are a suite of broadband-enabled devices and technologies that can be used to enhance channels of communication among public safety and emergency management officials; however, in order for these tools to be effective, ubiquitous and reliable high performing broadband is often necessary. For example, the Lakes Region Fire Mutual Aid Association dispatches fire and ambulance service in 42 communities the Lakes Region.

Lakes Region Mutual Fire Aid Association mentioned as a key topic the use of Mobile Data Terminals to enable each apparatus to be GPS tracked.

This includes fire trucks, ambulances, law enforcement patrol cars, Emergency Management Services (EMS) vehicles and others. The ability to enable a dispatcher to coordinate each vehicles

A Mobile Data Terminal or MDT is a computer placed in a fire apparatus or police cruiser used track said vehicle and to communicate with a central dispatch office and to display maps and other information so that it can be used in the field. MDT's can also be found in some public transit vehicles, taxis, commercial trucking fleets, etc.

arrival based on what is needed and when, in order to maintain the highest level of efficiency. In police patrol situations knowing the cruiser's locations can save valuable seconds by being able to choose the closest car to the scene in order to reduce response time. This same technology could be used to provide firefighters with the layout of the home or building prior to arriving at the scene. Another potentially life-saving use for MDT's using broadband capability is in ambulances where EMTs could use it to send defibrillator readouts directly to the hospital while in transit rather than having to rely in unreliable cellular service as they have to now.

New Hampshire and the Lakes Region present many unique situations to emergency responders. Broadband technology could greatly increase efficiency in the Lakes Region by aiding in mutual aid efforts. Although it may not be a critical situation, communication between marine patrol and land based law enforcement can be vital, especially at peak times during the summer such as Laconia Bike Week, the Fourth of July weekend and fall foliage.

There is also the need for increased service in the underserved mountainous areas where cell service is nonexistent. Every year there are several search and rescue missions throughout the mountains of New Hampshire; in those situations, communication is critical. Wireless broadband systems (SafeNet) can keep search and rescue officials in contact with fellow searchers, and the search pilots in the skies above.

Universal broadband access would enable emergency medical technicians to share information digitally and in real time to hospitals and emergency facilities from the ambulance or point of response.

First Net, a nationwide telecommunications initiative, will provide fire, police and EMS with new capabilities to do live streaming of events in real time and to simulcast events.

Health Sector - In recent years, health care facilities have experienced an increased reliance on broadband-supported devices and applications to perform and streamline administrative functions such as billing, record keeping, and data management. The most important use of the Internet identified by those interviewed is managing Electronic Health Records (EHR)[28]. EHR software, which is web-based, is an important aspect of health and human service agency operations. It enables providers to securely store and manage health records and to share information across different health care settings.
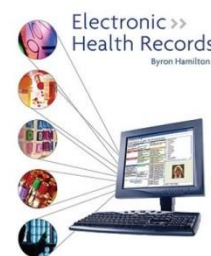
Since January 2014, digital record-keeping is required of public and private healthcare providers as part of federal mandates enacted by the Affordable Care Act. Currently, any health care provider funded through the state is required to maintain EHR. Unreliable broadband connections and lack of bandwidth impact the ability of offices to connect to EHR software systems. There is a need to keep up to date with technology and to support upgrades to this software. The privacy of health records is a very important concern.

Advances in telecommunications technology have significantly enhanced the ability of the medical sector to expand access to health care. A myriad of technology solutions are available for health specialists to communicate with and deliver services to patients, clients, and colleagues via nontraditional channels such as videoconferencing, remote patient monitoring[29], and 'cloud-based' digital medical imaging. These innovations are driven by the need of the medical sector to decrease costs through operational efficiencies while expanding access to and improving quality of care. Telehealth, the delivery of health-related services over telecommunications technologies, is dependent on adequate broadband availability throughout the state. However, widespread and adequate broadband availability is needed for telehealth, which is the delivery of health-related services over telecommunications technologies, to be successful in the Region.

Electronic health information exchange (HIE) allows doctors, nurses, pharmacists, other health care providers and patients to appropriately access and securely share a patient's vital medical information electronically—improving the speed, quality, safety and cost of patient care.

Despite the widespread availability of secure electronic data transfer, most Americans' medical information is stored on paper—in filing cabinets at various medical offices, or in boxes and folders in patients' homes. When that medical information is shared between providers, it happens by mail, fax or—most likely—by patients themselves, who frequently carry their records from appointment to appointment. While electronic health information exchange cannot replace provider-patient communication, it can greatly improve the completeness of patient's records, (which can have a big effect on care), as past history, current medications and other information is jointly reviewed during visits.

Appropriate, timely sharing of vital patient information can better inform decision making at the point of care and allow providers to

- Avoid readmissions

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[28] Electronic Health Records is a digital record of health related information about a patient that can be shared across different health care settings via information networks or exchanges.
[29] Remote patient monitoring, also called homecare telehealth, is a type of ambulatory healthcare that allows a patient to use a mobile medical device to perform a routine test and send the test data to a healthcare professional in real-time.

- Avoid medication errors

- Improve diagnoses

- Decrease duplicate testing

Local Government/Community Support Sector - Certain matters are best handled through face-to-face contact and technology should augment New Hampshire's tradition of accessibility to the public process. But citizens have come to desire, and sometimes expect, a certain level of online interactivity with government and community support organizations. Most towns in New Hampshire currently host websites providing immediate, remote access to public notices, events calendars, applications, forms, ordinances and regulations. While constituents benefit from easy access to the information they need, governments and community support organizations save time, money and resources when routine requests are handled online.

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Weekend Internet Slow-down

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Location: Moultonborough, New Hampshire

Background: Moultonborough has a tourist based economy that swells the population during the summer and especially on weekends. The 2010 census shows that 60.5% of Moultonborough's homes are seasonal. The average residential home occupancy is 2.4 persons per unit while occupancy in vacation homes, including guests, is about 5.0 persons per unit. Nearly every member of the household has his or her own Internet capable devices (PC, laptop, tablet, smartphone, etc.), plus there are shared devices such as smart TV's, game consoles, webcams and so forth. In addition, Internet applications are using streaming more video, increasing capacity requirements for speed and capacity. These trends are expected to increase. In 2013, Moultonborough's permanent population was 4,320 persons and seasonal population was about 20,495 persons.

Challenge: Internet providers are not delivering Internet capacity for a seasonal population, combined with increasing demand for modern applications is a challenge. When there is an influx of tourists and vacation homeowners, many experience slow Internet performance. The Internet is not a regulated utility, like are electricity, telephone service and in some areas, water and sewer services. Local governments have little or any voice in the nature of Internet service offerings, such as locations served, speed, cost or reliability. The Town of Moultonborough and its active citizens realize that having Internet services for everyone is important for economic health and modern student education. The challenge for Moultonborough was to identify the locations in town that were unserved or had slow Internet speeds. With the available data, the next step is to work with the Internet providers to expand the service.

Solution: Several years ago, local residents informed Moultonborough officials they could not get access to fast or affordable Internet services. Some residential neighborhoods were pooling funds to pay the Internet providers to extend their service down their streets, but in less built up areas, the cost remained prohibitive. To accumulate funds to fix the problem, the Board of Selectmen created a technology fund and started collecting a 2% cable TV franchise fee. This amounts to $1-2 per month on the bill of cable TV subscribers. One purpose of this fee is to assist unserved neighborhoods. Other uses will be recommended by a Town Internet working group and approved by the Board of Selectmen.

The Town of Moultonborough conducted an Internet speed test during the summer of 2014 to measure the capacity of Internet users across different areas of the Town. The test was run in partnership with the New Hampshire Broadband Mapping and Planning Program, managed by the University of New Hampshire. Through an advertising campaign that used posters, newsletters, social media and newspaper articles, 400 properties, about 10% of the Town, measured their Internet speed. An inventory of all the Internet providers in town was also produced, which will be used to help residents and businesses better understand their choices.

Outcome: While the analysis of the speed test data is not complete, a few items are clear. More than 75% of those taking the test were on cable based Internet, rather than the telephone company's DSL service. Cable is more popular, because the average reported speed is more than two times faster. The Town identified several areas where Internet service is not available to residents. During the three month campaign, numerous residents reported slowdowns and other reliability problems with their Internet provider. This information is documented and gives the Town valuable information for when it is having discussions with the providers.

Lessons Learned:
1. The need to collect information. Before any problem can be solved, the magnitude of the problem must be understood along with possible solutions and the cost.
2. Difficulty in collecting accurate information needed for decision making about Internet improvements as the providers consider information about their customers confidential. The only way to locate unserved and underserved residents and businesses is to conduct surveys. Survey tools, such as the speed test used, result in measuring only a small sample of the population and not all the test data is reliable.
3. Reports from residents regarding Internet service or its speed is not necessarily the fault of the Internet provider. Some residents need information regarding what is available in their neighborhood and how to choose the best service for their needs. Some need assistance in solving performance problems, caused by their own equipment, such as misconfigured Wi-Fi routers.
4. The proper level of local government involvement is not clear. The providers are not regulated and are profit motivated. Some sparsely populated areas of Town do not meet the investment hurdles of the cable and telephone companies.

Moultonborough Public Safety Building

DANBURY CASE STUDY

With a small group of enthusiastic locals, the Town, with assistance from the LRPC, organized a successful informational session in late July 2013 on broadband opportunities and improvement solutions in Danbury and nearby Towns. Representatives from Fairpoint, Metrocast, Comcast and other providers attended the session and explored ways to upgrade and extend service. Broadband service is good (at 100 Mbps) in the Village area where cable is available, but less so in the outlying rural areas. Members of the group are working with Metrocast and Comcast about potential expansion but at present no decisions have been made. At present, the Ragged Mountain Resort, a well-known ski area and potential area for second homes, has fiber service. An interesting note … a young professional rents office space in Danbury Village and telecommutes with a major international bank based in New York City.

Danbury Country Store

E. CHALLENGES AND OPPORTUNITIES FOR REGIONAL BROADBAND IMPLEMENTATION

The following is a list of political/regulatory, economic, social, and technological barriers related to commercial and residential broadband in the region.

Political/Regulatory Barriers

Regulatory Concerns - Cable/Internet providers do not fall under the purview of the NH Public Utilities Commission. Broadband providers prefer not to be regulated as a utility by the Public Utilities Commission. While cable TV access franchises are subject to negotiated agreements with individual municipalities, the broadband/Internet component of the service is not part of formal franchise service negotiations.

Deployment Difficulties – Many consider deployment to certain rural remote areas to be cost-prohibitive. Securing pole attachment rights is costly and sometimes abetted by competitive conflicts.

Cable Franchise Agreements - An impediment to increased competition (and thus service and choices) may be related to Cable Franchise Agreements (CFA). Alternative broadband providers are often in direct competition with cable providers under agreement with municipalities. Some municipalities are gaining experience when it comes to negotiating Cable Franchise Agreements, and are becoming proactive in improving local service. A CFA is with a telephone company such as Fairpoint.

Economic Barriers

Inadequate Access for Commercial Applications - While the LRPC region generally has good coverage, especially in commercial zones, complaints have been received. The level of service required by technologically demanding business in the foreseeable future could potentially outstrip the planned build-out of broadband services.

Economic Constraints – The capital investment required to provide broadband service in areas with low population densities may not be economically feasible for the private sector because the return on investment is too low. In these cases, public funding will likely be needed. Additionally, some providers appear to be focusing on expansion of metered wireless broadband services rather than wired broadband, indicating it may be the more lucrative investment. Alternative economic models (e.g. municipal or neighborhood association financing) to provide last mile connections exist but some existing providers discourage this approach.

Social Barriers

Complacency – As noted in the 2013 UNH survey, respondents indicated the region is adequately served and prepared for the future. Throughout the planning process, the LRPC has noted a lack of concern about broadband access among the general resident population. The perception is that, by and large, broadband access and speed are adequate. However, some communities, such as Danbury and Tamworth, have been proactive in working to enhance service.

Age – Some of those within the aging population have not adopted the changes that the Internet has brought to society over the past 20 years. As government, healthcase and businesses shift to the use of Internet applications, those without sufficient Internet access or knowledge will be left behind.

Technological Barriers

Infrastructure Information - In order to understand future network expansion, the large commercial broadband users need to understand the existing broadband infrastructure, and its ability to meet future needs. There is a desire to have better information relating to the location of broadband backbone infrastructure as well as existing and potential bottlenecks. This information is available from public providers but is considered proprietary by the private providers and unavailable to planning agencies or users. If there were regulation of the industry, or if service level agreements became part of commercial delivery business models, the information might be available and service might be provided.

The following are potential opportunities in the region:

- *Public/Private Partnerships* – Prepare a guidance document to help communities and neighborhoods understand the potential to partner with service providers to extend lines into underserved areas of the community. A revolving loan grant program may support such an initiative.

- *Service Expansion Grants:* Explore grant opportunities to extend service/capabilities in underserved neighborhood/communities.

- *Regional collaboration:* Bundle a larger numbers of users to leverage increased investment and responsiveness from existing service providers to enhance their offerings.

- *Publish Accurate Service Maps:* Precise service maps may show providers the potential savings by displaying accurate service regions (less wasted advertising to areas with no infrastructure), provide customers with information on the extent (or lack of) service. Internet capacity is increasingly a feature that impacts property values and choice.

- *Community Master Plans:* Develop a broadband-specific chapter for local and regional master plans to help with understanding of zoning for broadband infrastructure and awareness of broadband as critical infrastructure for economic development and quality of life. This will help to maintain consistency and to share innovative ideas.

- *Legal reform:* Identify regulatory issues, such as pole attachment, fixed wireless antenna placement and shared radio frequency rights, then work to resolve those issues within communities where possible.

- *Local Technical Assistance:* Develop a regional informational package for municipalities to help local decisions makers better understand how to foster broadband improvements through franchise agreement and other means.

- *Broadband Technological Opportunities Program (BTOP):* Ensure there is availability to expand or ensure there is adequate coverage of business quality broadband infrastructure, including regional access to fiber capacity implemented through the NH BTOP and others.

F. FINDINGS & RECOMMENDATIONS

Overall LRPC Goal: **Improve the availability and capacity of Broadband in order to bolster and enhance the region's economic development potential and overall quality of life**

Findings:

- Most of the Lakes Region is well served with broadband, but gaps exist.
- For residential uses, cable is the most common provider, with DSL handling more rural areas and those wishing lower cost solutions.
- Fixed wireless may address some of the gaps, but it is difficult to attract new providers due to regulatory and business issues.
- The US Census block method of calculating wired broadband availability makes it appear that 95% of the region is served, but does not identify the true extent of the unserved.
- The lack of broadband and high speed Internet service affects the marketability and real estate value of property.

Recommendations:

- Establish a broad goal of 100% availability and work with member municipalities and UNH Granit to maintain an inventory of areas that lack service or are underserved.
- Create GIS layer maps which show where business grade broadband services are available.
- LRPC to maintain contact list for each community for coordination of information and projects
- Create links to provider contacts on the LRPC website.
- Leverage federal and state funding to provide local and regional services.
- Recommend that local governments include the availability of broadband as a component on property assessment records

G. IMPLEMENTATION STRATEGIES AND ACTION STEPS

The following strategies and actions are the result of research and discussion by the nine regional planning commissions and the Lakes Region Broadband Stakeholders Groups, Director of Broadband Technology at NH Department of Resources and Economic Development and the NH Office of Energy and Planning.

Encourage Broadband as an Economic Development Tool

- Recognize the critical role that broadband and high speed Internet plays in the economic well-being of the Lakes Region and its importance as a regional economic development tool.
- Encourage the business community to adopt broadband and high speed Internet service as their major form of communication in order to increase productivity, access new markets and foster entrepreneurial development.
- Encourage local governments to adopt e-government applications to reduce costs and improve productivity and citizen interactions.

- Encourage the business community to promote their successes attained through broadband and share that information with their peers.
- Promote the availability of fiber for new and expanding businesses and cite successful local examples such as CruCon Cruise Outlet in Moultonborough.
- Encourage telecommuting as appropriate, while striving to support sufficient broadband services throughout the community for this purpose.

Expand the Access of Affordable Broadband Service

- Develop program to offer affordable Internet and access to underrepresented populations, veterans, home-based business owners and households living in remote rural areas of the Lakes Region.
- Expand the use of and access to existing programs offered by service providers to increase access to computers, and broadband for youth and underrepresented populations.
  - For example, the Comcast Internet Essentials program offers reduced service rates and purchase prices of computers for families qualifying for free or reduced lunch.
- Expand existing and develop new free or low cost, public Wi-Fi networks.
  - Facilitate conversations with industry experts, local communities and sector stakeholders around the development and subsidy of public Wi-Fi networks.
- Work with schools systems to encourage expanded access to affordable broadband technology/high speed Internet, including the use of federal grant programs.

Educate Businesses and Citizens on the Use of Broadband

- Recognize the important role UNH Cooperative Extension UNHCE) plays in assisting businesses and citizens in understanding the importance of broadband. Use UNHCE for technical assistance when the opportunity arises.
- Expand and develop opportunities for education around broadband use. The Lakes Region Community College could offer workshops or training.

- Work with the NH Municipal Association to promote or sponsor education / training/ other opportunities around broadband capacity building for municipalities.

- Help market the Lakes Region area to businesses, tourists and prospective new residents as broadband rich, with maps showing the communities and areas within communities that have high-capacity service available.

Encourage the Establishment of Local Broadband Committees & Stakeholder Groups

- Promote the development of municipal telecommunications or broadband committees so local officials can be knowledgeable of the changing broadband environment.
- Explore possible funding opportunities for sustaining staff support to regional broadband stakeholder groups past December 2014.

Establish LRPC as a Clearinghouse for Resource Information

- Develop a clearinghouse of information (web-based) and reference materials for business owners, legislators and others to stay informed of regional and local efforts around planning for broadband.

Encourage More Planning Boards to Include a Broadband Chapter in Master Plans

- Encourage towns to create and adopt broadband components to municipal master plans such as broadband chapters. For example, the Town of Sanbornton has completed a Telecommunications Chapter as part of the Town's Master Plan.
- Develop model broadband chapter to master plan for use by communities.
- Maintain an online library of existing broadband chapters of local Master Plans.

Encourage Dedicated Funding Sources for Expansion of Broadband

- Promote establishment of dedicated funds for broadband at the municipal level. For example, the Town of Moultonborough established Community Technology Fund six years ago, which has grown to in excess $100,000. With funds from the cable franchise fee, the Technology Fund can invest in broadband infrastructure improvements.

Continue Mapping & Data Collection Efforts

- Support continuation and improvements of the NH Broadband Mapping program efforts to collect, analyze and map broadband information from providers and Community Anchor Institutions across the state.
- Encourage all providers to make information available on the location of cable, DSL, fixed and mobile wireless and fiber infrastructure.
- Explore innovative methods for acquiring information on the location of broadband. There is a connection between broadband availability and local property values.

As Critical Infrastructure Ensure the Resiliency of Broadband Infrastructure

- Ensure that existing and new broadband infrastructure is resilient and redundant.
- Encourage inclusion of broadband in hazard mitigation or recovery planning as part of a local emergency response plan.
- Consider legislative measures to help pay for universal access such as the Universal Service Fund of 1996 for telephone service.

Lakes Region Broadband Plan Implementation Matrix

Priority Rating	Phase*	Strategy	Level of Action*	Economic	Education	Government	Health	Public Safety	Residential	Potential Partners	Notes*
							Relevant Sectors*				
High	Short	Encourage broadband as an economic development tool	● Local ○ Region ○ State ○ Nation	○	○	○	○	○	○	UNH Cooperative Extension; NH Municipal Association NH DRED	
	Short	Expand the access of affordable broadband service	● Local ○ Region	○	○	○	○	○	○	LRPC; Municipalities; NH DRED	
	Med / Ongoing	Educate businesses and citizens on the use of broadband	● Local ○ Region ○ State ○ Nation	○	○	○	○	○	○	LRPC; Municipalities	
	Med-Long	Encourage the establishment of local of Broadband Committee and Stakeholder Groups that remain in existence after NHBMPP has concluded in December 2014	● Local ○ Region ○ State ○ Nation	○	○	○	○	○		LRPC; Municipalities; NH DRED	
	Long	Encourage LRPC as a clearinghouse for resource information	● Local ○ Region ○ State		○					LRPC	
	Long	Encourage more Planning Boards to include Broadband Chapter in the Master Plan	● Local ○ Region ○ State ○ Nation	○	○	○	○	○	○	LRPC; Municipalities	
	Long	Encourage dedicated funding sources for the expansion of broadband service	● Local ○ Region	○	○	○	○	○	○	LRPC; LR BSG	
	Long	Continue the mapping and data collection efforts	● Local ○ Region ○ State	○	○	○	○	○	○	LRPC; LR BGSG; Municipalities	

* Matrix Key

Phase
Short = < 1 yrs.
Med = 2-4 yrs.
Long = >4 yrs.
Ongoing

Level of Action
● Primary level of action
○ Secondary level of action

Relevant Sectors
● Primary Sector Affected
○ Secondary Sector(s) Affected

Notes:
This field can contain information on potential funding sources, fiscal impact (cost neutral, minimal investment, significant investment), and other relevant factors.

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H. APPENDIX

For additional information related to Glossary of Terms, Broadband Technology Primer, the UNHCE Broadband Training Module and local mapping results, go to
http://iwantbroadbandnh.org/

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