Windham 2015

Investing in Broadband

For Windham's Economic Growth

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Town of Windham, NH

January 2015 ~~DRAFT December 2014~~

An Economic Development Plan Prepared by the Windham Broadband Advisory Group & the Southern New Hampshire Planning Commission

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Acronyms

ACS	American Community Survey
BPL	Broadband over Power Line
BSG	Broadband Stakeholders Group
BTOP	Broadband Technology Opportunities Program
CAI	Community Anchor Institutions
CEDS	Comprehensive Economic Development Strategy
CFA	Cable Franchise Agreement
DSL	Digital Subscriber Line
ED	Economic Development
FCC	Federal Communications Commission
Gbps	Gigabit per second
GIS	Geographic Information System
GRANIT	Geographically Referenced Analysis and Information Transfer System
GSF	Granite State Future
HD	High Definition (Video)
ISP	Internet Service Provider
IT	Information Technology
Kbps	Kilobit per second
Mbps	Megabit per second
NHBMPP	New Hampshire Broadband Mapping and Planning Project
NH DRED	New Hampshire Department of Resources and Economic Development

NH ELMB	New Hampshire Economic and Labor Market Information Bureau
NH ES	New Hampshire Economic Security
NH OEP	New Hampshire Office of Energy and Planning
NISP	Neighborhood Internet Service Provider
NNHN	Network New Hampshire Now
NSLP	National School Lunch Program
NTIA	National Telecommunications and Information Administration
PC	Personal Computer
PEG	Public, Educational and Government Access (Television Channels)
ROW	Right of Way
RPC	Regional Planning Commission
SAU	School Administrative Unit
SNHPC	Southern New Hampshire Planning Commission
TIF	Tax Increment Financing
UNH	University of New Hampshire
UNH CE	University of New Hampshire Cooperative Extension
USDA	United States Department of Agriculture
VPN	Virtual Private Network
Wi-Fi	Wireless Fidelity
WISP	Wireless Internet Service Provider

Executive Summary

The Southern New Hampshire Planning Commission (SNHPC) is utilizing available funding, which was obtained through the NH Broadband Mapping and Planning Program (NHBMPP), through the end of December 2014 to assist the Town of Windham in developing a broadband plan for the town.

The NHBMPP is managed by the University of New Hampshire and is funded by the American Recovery and Reinvestment Act, through the National Telecommunications and Information Administration (NTIA). The NHBMPP has two main components: Broadband Availability, Inventory and Mapping; and Broadband Planning and Technical Assistance. The goal of the NHBMPP is to understand where broadband is currently available in New Hampshire, how it can be made more widely available in the future, and how increased levels of broadband adoption and usage can be encouraged throughout the state. The program advocates expanding broadband infrastructure to support economic development, energy efficiency, healthcare, and improved educational opportunities.

A Broadband Advisory Group was organized and came together to work with the SNHPC to facilitate and guide the development of this plan. Most of the information about the town's broadband services and infrastructure is provided from the NHBMPP, the Town of Windham's 2005 Master Plan, and local broadband surveys~~. The Town Administrator, the Town's Information Director, Police and Fire Chief,~~ and other Town Officials ~~have also provided valuable information, which is included in this plan~~.

The primary focus of the plan is to provide the Town of Windham with guidelines and recommendations for enhancing local broadband infrastructure development and investment within the community. This includes raising awareness of the importance of broadband as an economic development necessity and identifying areas where enhanced broadband infrastructure, access and connectivity can be improved.

The specific goals of the plan are to: (1) provide a brief overview of broadband technology, (2) identify strengths and weaknesses that exist in the Town of Windham's broadband coverage, (3) identify barriers to access for coverage expansion, and (4) make recommendations for what improvements can be made to increase high speed broadband access throughout the community.

~~High speed broadband is one of the most important infrastructure investments of the 21st century, and it is important in, (1) creating new business opportunities and jobs, (2) attracting a younger, skilled workforce, and (3) providing advanced connectivity is a necessity.~~

Introduction

According to Carol Miller, Director of Broadband Technology at the Department of Resources and Economic Development, New Hampshire has some of the best broadband networks in the U.S., but there are still gaps in rural areas of the state and high-speed broadband services are not equally available across the state and within the state's municipalities. Roughly 9% of the state's population lives in areas with reported gaps according to the New Hampshire Broadband Planning and Mapping Program.[1]

In the latest report on the use of Computers and the Internet issued by the US Census in November 2014, NH is ranked 2nd in the nation at 93.2% of households owning a computer and 1st in New England. New Hampshire is also ranked 1st in the nation at 85.7% of households that use high-speed Internet (as defined as 40Mb down by 1Mb up).

According to Akamai's most current June 2014 report, New Hampshire placed 3rd in the nation for increased high speed broadband over 15Mbps to 26% of households, 53% of NH households over 10Mbps; and 84% of NH households with speed of over 4Mbps.[2]

Over the last 5 years, NH has benefited from over $600 million of federal and private investment for communications infrastructure improvements with new fiber, telecom and cable broadband expansion, and mobile cellular deployment and upgrades.

Similar to the above statewide statistics, broadband availability and coverage within the Town of Windham, NH is fairly comprehensive and equally available across the town. What Windham struggles with is speed and resiliency as noted by many of the survey returns and findings.

In September 2014, the Town organized an ad-hoc Broadband Advisory Group to help facilitate and guide the development of this plan. Between October 2014 and January 2015, a total of four~~three~~ meetings were held and the following topics were discussed:

1. Who are the current broadband service providers in Windham?
2. Are current broadband services in Windham adequate and reliable?
3. What are the major broadband issues and needs facing Windham?
4. Can current broadband services and speeds be improved and enhanced?

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[1] http://nheconomy.com/business-services/broadband-telecommunications/default.aspx (accessed March 6, 2014). It is important to note that these penetration rates are determined at a census block level and then averaged at a statewide level so the exact penetration rate varies considerably by geography (at the census block level) throughout the state. According to the Director of Broadband Technologies with the NH Division of Economic Development, these penetration rates do not mean that every household in the state has broadband.

[2] Akamai is a leading cloud-based platform that also develops quarterly "State of the Internet" reports based on the data it gathers from servers across the globe; see http://www.akamai.com/stateoftheinternet/ (accessed September 16, 2013). Akamai's ratings reflect data measured at the edge of all the networks and these averages can fluctuate quarterly when a new report is issued. The rates are also indicative of the competition among states to utilize new network infrastructure and enhanced speed offerings.

5. How does the business community view their broadband needs in Windham?
6. How does broadband services in Windham compare to other towns in the region/state?
7. Is there a need for more cell towers in Windham in the future?
8. Is there adequate broadband, wireless communication and Wifi for town and public buildings?
9. Are there any streets, subdivisions, neighborhoods currently underserved?
10. What are the major elements of the town's cable franchise agreement?
11. Is the franchise agreement up to date and adequate?
12. How do the town's telecommunications regulations stack up to current state statutes?
13. What can Windham do to accommodate and bring about enhanced broadband services in the future?

Many of the answers to these questions are provided by the maps and information contained in this plan. Where information is lacking, it is recommended that the Town of Windham staff and relevant boards and committees dedicate the necessary time and energy to better understand the issue and develop effective strategies and actions.

~~Background~~

~~Reliable high speed broadband access is an increasingly important asset for communities. The benefits of having reliable and high speed broadband internet services is critical for economic development, small business growth, emergency services, and can result in increased property values and improved quality of life. The proliferation and expansion of broadband access today is often paralleled with the great public infrastructure projects of the Twentieth Century – namely the expansion of the electricity network and the creation of the interstate highway system. Today, high speed broadband access creates economic development opportunities, increases the potential of business and industry, provides greater educational opportunities to both adults and children, improves the ability and efficiency of emergency responders and government officials to effectively do their jobs and improve the lives of all citizens.~~

~~However, high speed broadband access is often hindered by factors such as low population densities and geographical barriers like topography and infrastructure costs. It often does not make financial sense for internet service providers to extend the necessary "last mile" broadband infrastructure to homes and businesses in remote locations without a profit. As a result, rural residents and businesses must often deal with spotty or non-existent broadband coverage. Approximately 19 million Americans—6 percent of the population—still lack access to fixed broadband service at threshold speeds. In rural areas, nearly one fourth of the population — 14.5 million people—lack access to this service. In tribal areas, nearly one-third of the population lacks access. Even in areas where broadband is available, approximately 100 million Americans still do not subscribe.~~[3]

~~One of the most important tools in broadband planning is the National Broadband Map. This map was created by the National Telecommunications and Information Administration, the Federal Communications Commission (FCC) and all states of the United Stations. It is an online tool that provides semi-annual information on the availability, technology, speed, and location of broadband Internet access at the census block level. In looking at the National Broadband Map for Rockingham County, the county has a total population of 295,074 and of that, a total population of 15,944 is without broadband access. With a population density (population per square mile) of 425 and a per capita income of $35,889, the percentage of housing units in Rockingham County with access to broadband with fiber is 0% and cable is 78%. (National Broadband Map Data, Eight Broadband Progress Report, Federal Communications Commission, June 2011.)~~

[3] ~~"Eighth Broadband Progress Report, Federal Communications Commission, August 2012.~~

~~Federal Telecommunications Act of 1996~~

~~The Federal Telecommunications Act of 1996, enacted by the Federal Communications Commission (FCC) is the comprehensive federal law that governs the telecommunications industry to this day. Section 704 of the Act specifically outlines the land use and zoning roles local governments can play regarding telecommunications and wireless infrastructure. It grants local governments zoning authority for the most part, stating "Nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities." There are several exceptions and/or limitations to this statement outlined in Section 704, which include:~~

- ~~Land use development standards may not unreasonably discriminate among wireless service providers and may not prohibit the deployment of personal wireless services.~~
- ~~Local governments must act upon applications for new wireless infrastructure within a reasonable period of time after the request is filed according to the nature and scope of the request.~~
- ~~Land use policies may be adopted to promote the location of telecommunications facilities in certain designated areas. The Act also encourages the use of third party professional review of site applications.~~
- ~~Local governments cannot deny an application for a new wireless facility or the expansion of an existing facility on the basis of the environmental effects of radio frequency emissions, provided such facilities comply with the FCC's emissions regulations.~~

~~Section 704 also states:~~

> ~~"Any person adversely affected by any final action or failure to act by a State or local government or any instrumentality thereof that is inconsistent with this subparagraph may, within 30 days after such action or failure to act, commence an action in any court of competent jurisdiction."~~

~~Additionally, Section 707 of the Act requires states to keep up to date with the latest advanced technology available and to help foster its expansion. This applies especially to broadband service, which was not widely available in 1996 when the Act was initially released. The Section states:~~

> ~~The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.~~[4]

[4] ~~All the information contained in this section is provided from the Federal Communications Commission's 1996Telecommunications Act, http://www.fcc.gov/Reports/tcom1996.pdf~~

Understanding Broadband

~~1. What is Broadband?~~

~~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."[5] 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.~~

Background

Reliable high speed broadband access is an increasingly important asset for communities. The benefits of having reliable and high speed broadband internet services is critical for economic development, small business growth, emergency services, and can result in increased property values and improved quality of life. The proliferation and expansion of broadband access today is often paralleled with the great public infrastructure projects of the Twentieth Century – namely the expansion of the electricity network and the creation of the interstate highway system. Today, high speed broadband access creates economic development opportunities, increases the potential of business and industry, provides greater educational opportunities to both adults and children, improves the ability and efficiency of emergency responders and government officials to effectively do their jobs and improve the lives of all citizens.

However, high speed broadband access is often hindered by factors, such as low population densities, and geographical barriers, like topography and infrastructure costs. It often does not make financial sense for internet service providers to extend the necessary "last mile" broadband infrastructure to homes and businesses in remote locations where there will likely be no profit. As a result, rural residents and businesses must often deal with spotty or non-existent broadband coverage. Approximately 19 million Americans—6 percent of the population—still lack access to fixed broadband service at threshold speeds. In rural areas, nearly one-fourth of the population —14.5 million people—lack access to this service. Even in areas where broadband is available, approximately 100 million Americans still do not subscribe.[6] See Figure 3 for a diagram of Broadband Infrastructure.

One of the most important tools in broadband planning is the National Broadband Map. This map was created by the National Telecommunications and Information Administration, the Federal Communications Commission (FCC) and all States of the United Stations. It is an online tool that provides semi-annual information on the availability, technology, speed, and location of broadband Internet access at the census block level. In looking at the National Broadband Map for Rockingham County, the county has a total population of 295,074 and of that, a total population of 15,944 is without broadband access. With a population density (population per square mile) of 425 and a per capita income of $35,889, the percentage of housing units in Rockingham County

~~[5] "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).~~

[6] "Eighth Broadband Progress Report, Federal Communications Commission, August 2012.

with access to broadband with fiber is 0% and cable is 78%. (National Broadband Map Data, Eight Broadband Progress Report, Federal Communications Commission, June 2011.)

Broadband Speed

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.

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.[7] 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 developed a matrix to assist stakeholders in understanding the many levels of broadband available in the state of New Hampshire today, as well as 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 three broadband availability categories ("un-served," "underserved," and "served") to describe access to broadband service. Figure 1 ~~The table below~~ is a condensed version of the NHBMPP matrix.

Broadband Network

[7] "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).

Establishing a broadband connection requires investment in a physical network that facilitates the transfer of information. Broadband infrastructure consists of an 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, 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.[8] Figure 2 shows these network connections.

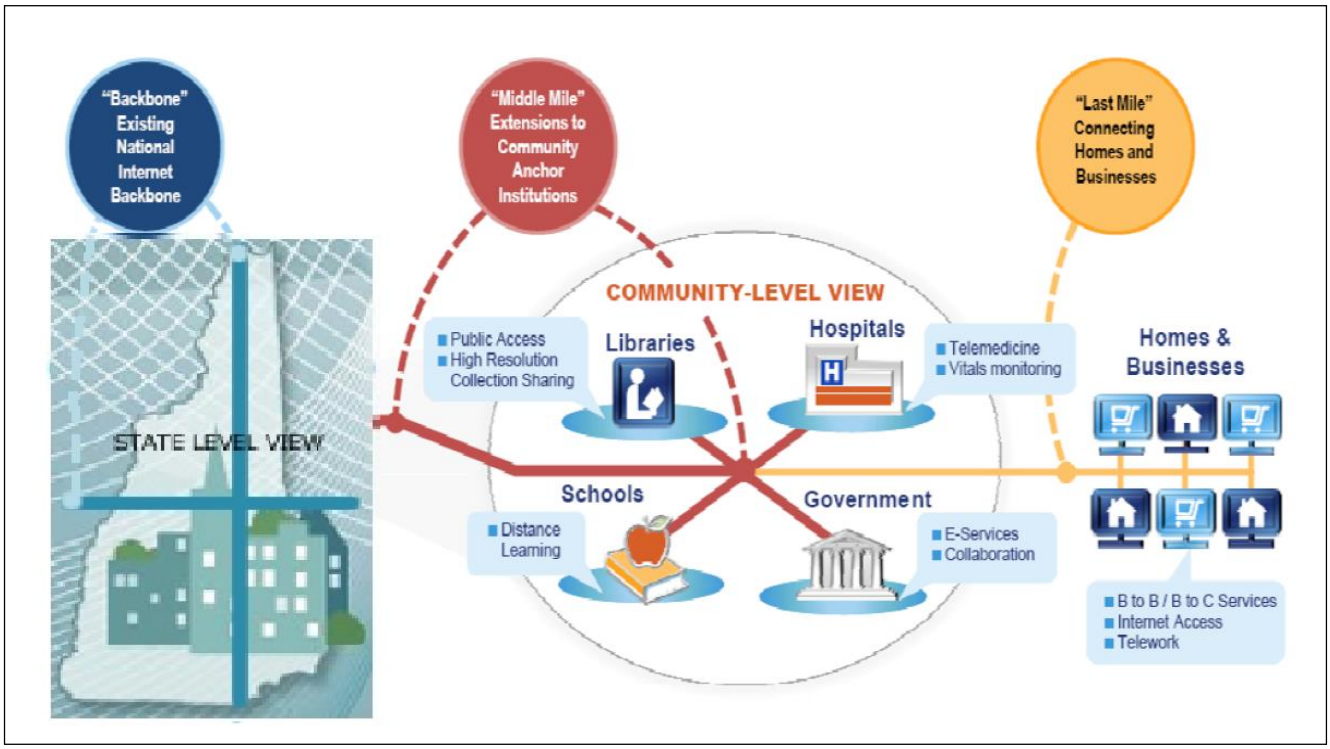
[8] State of New Hampshire, Department of Resources and Economic Development and The Telecommunications Advisory Board, State of New Hampshire Broadband Action Plan: Appendix A, 2008, http://www.nheconomy.com/uploads/Broadband-Action-Plan-Appendices.pdf . (accessed July 17, 2013).

Figure 1: Tiers of Broadband Service

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

Figure 2: Broadband Network Connections



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

Broadband Technology

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).[9] 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.

Digital Subscriber Lines (DSL) and Cable Modem are wired technologies 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.[10] 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

[9] "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).

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

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.

Cable Modem, which is typically faster than a common asymmetric DSL connection, uses the cable network to deliver broadband to users. 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. 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.[11] Building out the fiber network is currently the most effective means to provide the highest capacity broadband internet.

Wireless broadband is available through many technologies, including mobile wireless (3G, 4G, LTE), Wi-Fi, satellite, and Wireless Internet Service Providers (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. 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, cell phones, etc.).

Wireless Internet Service Providers 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 a set geographic area such as a neighborhood, shopping mall, or campground.[12] 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 upload speeds are typically slower than wired or other wireless networks.[13]

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,

[11] "*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).

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

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

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.[14]

Federal Telecommunications Act of 1996

The Federal Telecommunications Act of 1996, enacted by the Federal Communications Commission (FCC), is the comprehensive federal law that governs the telecommunications industry. Section 704 of the Act specifically outlines the land use and zoning roles local governments can play regarding telecommunications and wireless infrastructure. It grants local governments zoning authority for the most part, stating "Nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities." There are several exceptions and/or limitations to this statement outlined in Section 704, which include:

- Land use development standards may not unreasonably discriminate among wireless service providers and may not prohibit the deployment of personal wireless services.
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- Local governments cannot deny an application for a new wireless facility or the expansion of an existing facility on the basis of the environmental effects of radio frequency emissions, provided such facilities comply with the FCC's emissions regulations.

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Additionally, Section 707 of the Act requires states to keep up to date with the latest advanced technology available and to help foster its expansion. This applies especially to broadband service, which was not widely available in 1996 when the Act was initially released. The Section states:

> The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local

[14] "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).

telecommunications market, or other regulating methods that remove barriers to infrastructure investment.[15]

~~Broadband Technology~~

~~The term broadband denotes "a type of high-speed data transmission in which the bandwidth is shared by more than one simultaneous signal."[16] This technology is in comparison to the old "narrowband" technology which used telephone lines for a dial-up connection of about 56 kbps. Today's broadband is hundreds of times faster than narrowband and measured in megabits per second rather than kilobytes per second. As of 2011, the National Telecommunications and Information Administration (NTIA) has set the minimum speed for service to be considered true broadband at download speeds of 768 kbps and upload speeds of 200 kbps.~~

~~Broadband is delivered to residential and business through either telephone or cable lines. A Digital Subscriber Line (DSL) transmits high capacity digital signals over telephone lines at high frequency bands while cable-based broadband utilizes higher capacity television lines to deliver internet service. Both DSL and cable internet services provide a broader, higher capacity spectrum of service than traditional dial-up.~~

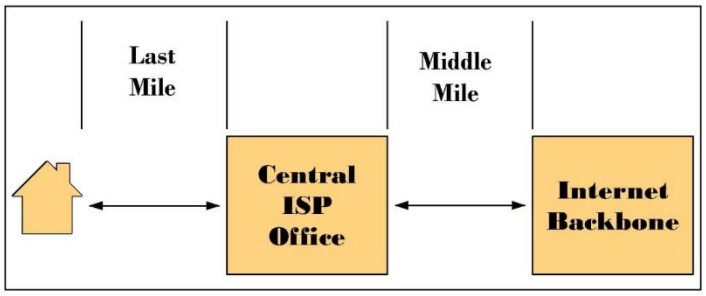
~~Commercial users and large institutions often choose higher capacity T-1 copper wire and fiber optic lines. T-1 provides the customer with a dedicated line to the internet that bypasses the local Internet Service Provider's (ISP) network. Fiber optic lines deliver information using pulses of light through optical fiber and are able to deliver higher bandwidths of information over longer distances than DSL or cable. While T-1 and fiber optic technologies offer high speeds and capacities, both are considerably more expensive to operate than DSL or cable and are typically unavailable in more remote locations.~~

~~More remote communities oftentimes lack middle mile infrastructure, meaning that broadband lines are not present in the town and access is not available anywhere (See figure 3). It is also common that many communities have middle mile infrastructure, but large segments are not serviced by last mile. In many places it may not make financial sense for service providers to extend broadband lines to individual homes in moderately to sparsely populated areas, resulting in large areas with no wired service. These two problems are common in many rural New Hampshire communities and must be addressed.~~

Figure 3: Diagram of Broadband Infrastructure

[15] All the information contained in this section is provided from the Federal Communications Commission's 1996Telecommunications Act, http://www.fcc.gov/Reports/tcom1996.pdf

~~[16] New Hampshire Broadband Mapping and Planning Program, http://iwantbroadbandnh.com/where-is-broadband. February, 2012.~~



Source: SNHPC 2012

New Hampshire Broadband Mapping and Planning Program (move to appendix)

The State of New Hampshire is currently working on the New Hampshire Broadband Mapping and Planning Program (NHBMPP), a coordinated, multi-agency initiative funded by the American Recovery and Reinvestment Act through the National Telecommunications and Information Administration (NTIA). It is part of a national effort to expand high-speed internet access and adoption through improved data collection and broadband planning. The University of New Hampshire's GRANIT program was granted $1.7 million to manage the program which will inventory and map current and planned broadband coverage available to the state's businesses, educators, and citizens. The project is comprised of two components: a five-year broadband availability inventory and mapping effort, and a four-year planning initiative.

The inventory, now in its fifth year, uses service-area landline and wireless data collected from the 60-plus public and commercial entities that currently provide broadband services in the state.[17] This data shows service availability, type, and technology and will help to identify areas of the state that are unserved or underserved by the current broadband infrastructure. Concurrently rural addresses are being collected through the program to develop a database containing a mapped point feature and associated street addresses for every residential address in the rural Census blocks in the State of New Hampshire. Rural Census blocks are defined as having an area of at least 2 square miles. 2010 Census figures for the entire state of New Hampshire identify a total of 39,991 households within those rural blocks. Lastly, data is also being collected on broadband availability at individual community anchor institutions such as schools, libraries, medical/healthcare locations, public safety offices, and state, county, and municipal buildings.

The planning component of the NHBMPP will incorporate the information collected and the momentum generated by the mapping activities into regional broadband plans throughout New Hampshire. The development of these regional plans will be coordinated by the state's nine regional planning commissions. The plans will involve establishing regional broadband stakeholder groups to identify barriers to broadband deployment, promote collaboration with service providers, and facilitate information sharing regarding the use of and demand for broadband services. Additional support for the program will be provided by a variety of state agencies, including the Division of Economic Development, the Office of Energy and Planning, and the Public Utilities Commission.[18]

[17] For a full list refer to: New Hampshire Broadband Mapping and Planning Program, http://iwantbroadbandnh.com/where-is-broadband. February, 2012.
[18] NH Business Resource Center, http://blog.nheconomy.com/?tag=new-hampshire-broadband-mapping-program

To learn more about this program see: http://www.iwantbroadbandnh.org/.

~~Other Programs~~

Network NH Now (NNHN) ***(move to appendix)***

NNHN is a sister program of the NHBMPP designed to provide broadband connectivity that is symmetrical and capable of delivering current and next generation services that are comparable to the rest of the country. The end result will enable many social service, non-profit and commercial organizations to receive reliable service without having to pay for expensive copper-based connections. This will assist New Hampshire's competitiveness to attract potential businesses and investment.

As the construction contractor for Network NH Now (NNHN), Waveguide technicians are installing more than 750 miles of optical fiber along roadways throughout the state. When complete, this network will provide a high-capacity communications backbone that will allow local providers to bring high-quality voice, video and data services to all 10 counties in the state.

As a public-private partnership, the NNHN project is made possible thanks to federal economic stimulus funds, as well as private contributions. Much like the Eisenhower Interstate Highway System of the 1950s did for the nation's transportation infrastructure; Network New Hampshire Now (www.networknhnow.org) will bring a comprehensive and forward-thinking broadband highway to communities all across New Hampshire, fostering economic growth, job creation, improved communication, and affordable high-speed internet access. Figure 4 shows the current NNHN three statewide projects: Middle-Mile Fiber; FastRoads; NH DOT connections; and Microwave improvements.

To learn more about this program see: http://www.networknhnow.org/

NH FastRoads ***(move to appendix)***

The NH FastRoads program intends to build an open access middle mile and last mile network that aggregates demand for an entire region in New Hampshire, including community anchor institutions, large and small businesses, government offices and agencies, and residents. The routes built provide middle mile and last mile projects that will provide fiber connections to businesses and residents in the project area, where many residents are still limited to dial up Internet access.

To learn more about this program see: http://www.newhampshirefastroads.net/

Figure 4: Network New Hampshire Now Concept Map

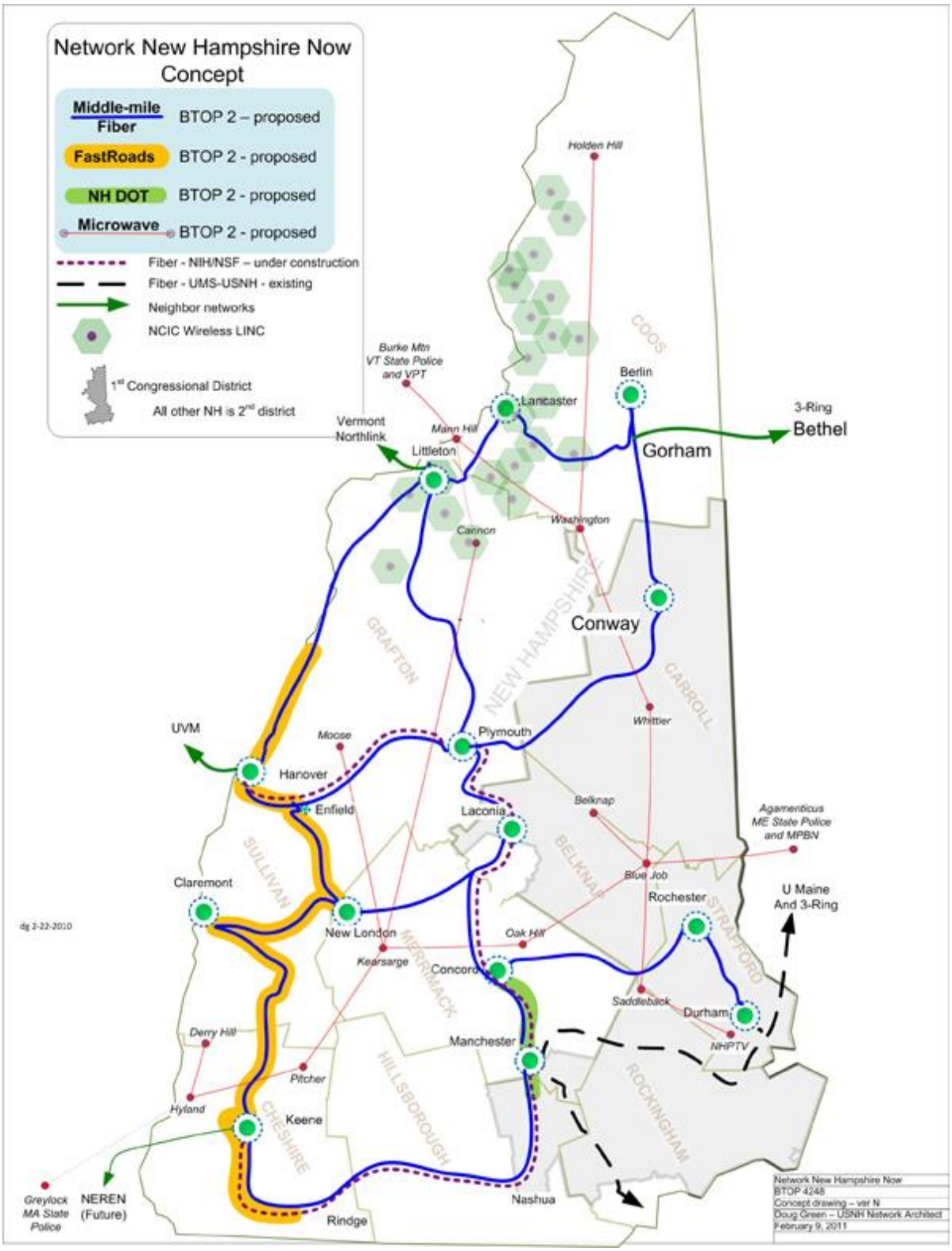


Figure 5: Regional BTOP Internet "Backbone" Planned Investments

Source: Broadband Technology Opportunities Program[19]

Why is Broadband Important?

As a predominantly rural state, the availability of high-speed internet is one of the most significant factors impacting the ability of communities to achieve economic growth and maintain a certain quality of life. In a relatively short period of time, fast and reliable broadband has become essential for economic and community development and it is critical infrastructure for public safety, education, health care, business and government operations.[20]

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, as the distance between households and services makes it difficult to access certain resources and opportunities. Reliable and cost-effective 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.[21]

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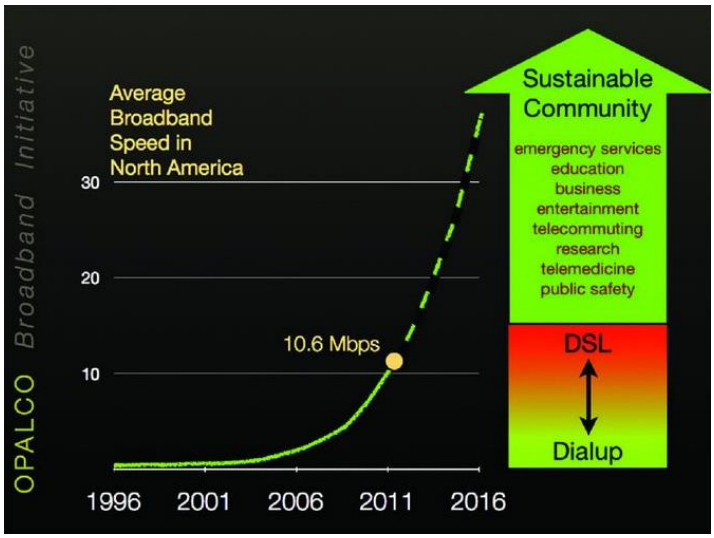
[19] (http://www2.ntia.doc.gov/BTOPmap/) accessed August 13, 2013.

[20] "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).

[21] 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).

Figure 6: Projected Broadband Speed in North America



Source: http://www.opalco.com/broadband/do-we-really-need-faster-internet-service-2013-05-01/

In 2010, it was estimated that there were almost 200 million Americans with access to broadband at home, up from 8 million in 2000.[22] 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.

For Education

Broadband is an important tool that enhances access to and improves the quality of education at all levels, in New Hampshire and across the country. 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.[23] 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

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

[23] 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).

megabits per second for every 1,000 students and staff by the year 2014 and 1 gigabyte per second by 2017.[24] 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.[25] 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.[26] Participation and competition in the global economy is increasingly dependent on twenty-first century skills, including the ability to effectively use technology and navigate the digital world.[27] Providing access to learning opportunities that address these skills can help empower students to actively engage in an increasingly technology-driven and digital culture.

~~Currently, 96.3 percent of the Windham's residents have earned a high school diploma and 52.8 percent have a bachelor's degree or higher. These percentages are above the 2009 national average of 85.3 percent and 27.9 percent respectively (See Table 1).[28] A highly educated workforce increases the potential for higher-paying, specialized industries to develop and/or relocate to the area. As the largest region (Southern NH Planning Commission Region) for higher education in New Hampshire (in terms of number of institutions and student population), access to high speed broadband and greater internet connectivity is a high priority.~~

~~Table 1: Educational Attainment~~

~~Municipality~~	~~Percent High School Graduate or Higher~~	~~Percent Bachelor's Degree or Higher~~
~~Auburn~~	~~94.0~~	~~33.6~~
~~Bedford~~	~~96.1~~	~~58.1~~
~~Candia~~	~~96.9~~	~~29.0~~
~~Chester~~	~~94.8~~	~~38.9~~
~~Deerfield~~	~~93.4~~	~~34.2~~
~~Derry~~	~~93.5~~	~~28.5~~
~~Goffstown~~	~~90.2~~	~~28.7~~

[24] 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).

[25] 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).

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

[27] 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).

~~[28] ibid.~~

~~Hooksett~~	~~93.4~~	~~33.9~~
~~Londonderry~~	~~95.9~~	~~40.6~~
~~Manchester~~	~~86.1~~	~~25.8~~
~~New Boston~~	~~97.0~~	~~41.7~~
~~Raymond~~	~~88.2~~	~~22.0~~
~~Weare~~	~~94.6~~	~~26.0~~
~~**Windham**~~	~~**96.3**~~	~~**52.8**~~
~~Regional Average~~	~~93.6~~	~~35.3~~

~~Source: 2007-2011 American Community Survey 5-Year Estimates~~

According to Adam Steel, Business Manager with the Windham School District, Windham Schools currently have in place a scalable 300mb/s connection to the Internet and fiber connections between all locations. All the schools also provide access, after school, throughout each building for WiFi use. Over the next three years, the School District is looking to increase the bandwidth between the school building locations to 10GB Fiber and expand the school's network footprint allowing for the extension of services beyond just the core buildings. This includes utilizing current infrastructure, as well as building out several other key areas. This would allow students to have greater access to technology and resources beyond the standard school day. The goal is to foster the notion of a truly Digital Learning Commons and allow easier access to resources both Flipped and Virtual Classrooms.

For Health Care

With increasing and changing health needs, ranging from rising health care costs, managing chronic illnesses, 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.[29] 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.[30] New Hampshire, with a rural geography, scarcity of local specialty medical services, and a high percentage of elderly residents, can benefit from telehealth systems.[31] Broadband internet is necessary to continue

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

[30] 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

[31] 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

supporting current and emerging telehealth applications for patients, providers, hospitals, and health care businesses.

Electronic medical records systems enable providers to collaborate on 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 them and their 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.[32] 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.

For 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.

Undoubtedly, certain matters will always be best handled through face-to-face contact but technology can augment New Hampshire's tradition of accessibility to the public process. Citizens have come to ask for, and sometimes expect, a certain level of online interactivity with government and community support organizations. Most towns in New Hampshire currently host websites, which provide 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.

Equal in value to the administrative and E-governance 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 great distances.

Add information here from Town ID Director about what the Town of Windham is doing and hopes to do in the future….

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

For Public Safety (Margaret feels much of this does not apply to broadband and should be deleted)

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. Broadband access, through a combination of wired and wireless technologies, can enhance public safety by enabling first responders to make informed decisions and allowing them to communicate with one another effectively, usually resulting in reduced loss of life and property.

Chief Lewis, with the Windham Police Department, provided the following statement for use in this plan: "Also with limited budgets and minimal public sector growth most agencies do not have the ability to add additional staff. Hence technology, primarily in the area of broadband communications, is critical. Speed and thoroughness of information allows authorities to quickly obtain and evaluate information and act sooner, which in many cases can help avert a more significant incident requiring additional manpower and resources." In addition, Chief Lewis has identified the following areas of concern with cellular signals, as well as radio, within the Town of Windham:

- Shelley Road (cell)
- Wilson Road (cell)
- North Lowell Road
- Castle Hill Road
- Field Road
- Rowe Road
- Deer Leap
- Ryan Farm Road at the end
- Heritage Hill Road
- Londonderry Road
- Country Club Road
- Glance Road
- Parts of Searles~~s~~ Road
- Marblehead Road
- Mammoth Road (Rt. 128)/Pelham town line

Why not make a map highlighting areas of concern instead of a list???

For Economic & Business Development

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.[33] ~~Broadband and economic development are connected in that as we progress into the future, both are needed for each to be successful.~~ 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. There are a~~A~~ll are key ingredients to a successful economic development strategy.

Jobs depending on broadband and information and communications technology will grow by 25 percent between 2008 and 2018 or at a rate of 2.5 percent faster than the average for other occupations and industries.[34] To say that broadband technology has not changed the way we do business is to deny the tremendous impact that computers have had on our lives worldwide. In 2011, 73 percent of New Hampshire households and businesses had access to broadband and, nationally in 2012, 66 percent of adults have broadband at home, which is up from 3 percent in 2000.[35]

Investment in broadband is showing benefits for small businesses and local economies, as well. 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.[36]

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, naturally 68 percent of businesses surveyed boosted the speed of their access to knowledge, 54 percent saw reduced communications costs and 52 percent saw increased marketing effectiveness.[37] 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. The use of broadband has truly served to enrich that position into the 21st century.

~~Table 2 breaks down employment in the SNHPC Region by industry sector. Of the three major industry sectors (Goods-Producing Industries, Services-Producing Industries, and Government), Services-Producing Industries has by far the largest number of employees and represents the main economic engine in the region. Sub-sector industries such as "retail trade" and "health care and social assistance"~~

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

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

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

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

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

~~have the next largest proportion of employees. Many of these sub-sector industries depend heavily on broadband services, including:~~

- ~~Information~~
- ~~Finance and Insurance~~
- ~~Real Estate and Rental and Leasing~~
- ~~Professional and Technical Services~~
- ~~Management of Companies/Enterprises~~
- ~~Administration and Waste Services~~
- ~~Educational Services~~
- ~~Hospital Care and Social Assistance~~

~~The same industry trends at the state level also apply to the Town of Windham. Table 2 provides information on annual average employment and average weekly wages in these industry types in the region. Similarly, similar industries in Windham will parallel this data.~~

Cumulatively, the sub-sector industries that rely on excellent broadband service account for 39 percent of all annual average employment in the region. Most importantly, the average weekly wage for these particular sub-sector industries is $1,091.97 and accounts for some of the highest paying weekly wages.

~~Table 2: NH Employment and Wages by Sector~~

~~Industry~~	~~Regional Annual Average Employment~~	~~Proportion of Sector Employment~~	~~Regional Average Weekly Wage~~
~~*Goods-Producing Industries*~~	~~*17,333*~~	~~*14.52%*~~	~~*$1,097.86*~~
~~Agriculture/Forestry/Fishing~~	~~156~~	~~0.13%~~	~~$464.89~~
~~Mining~~	~~159~~	~~0.13%~~	~~$1,105.01~~
~~Construction~~	~~5,161~~	~~4.32%~~	~~$1,023.79~~
~~Manufacturing~~	~~11,858~~	~~9.93%~~	~~$1,138.30~~
~~*Service-Providing Industries*~~	~~*88,243*~~	~~*73.90%*~~	~~*$877.29*~~
~~Utilities~~	~~431~~	~~0.36%~~	~~$1,728.94~~
~~Wholesale Trade~~	~~5,626~~	~~4.71%~~	~~$1,232.90~~

~~Retail Trade~~	~~15,541~~	~~13.02%~~	~~$598.57~~
~~Transportation and Warehousing~~	~~4,057~~	~~3.40%~~	~~$820.05~~
~~Information~~	~~3,409~~	~~2.85%~~	~~$1,454.89~~
~~Finance and Insurance~~	~~5,188~~	~~4.34%~~	~~$1,471.58~~
~~Real Estate and Rental and Leasing~~	~~2,002~~	~~1.68%~~	~~$795.53~~
~~Professional and Technical Service~~	~~6,738~~	~~5.64%~~	~~$1,432.63~~
~~Management of Companies/Enterprises~~	~~2,424~~	~~2.03%~~	~~$1,224.87~~
~~Administrative and Waste Services~~	~~7,211~~	~~6.04%~~	~~$636.94~~
~~Educational Services~~	~~3,660~~	~~3.07%~~	~~$752.17~~
~~Health Care and Social Assistance~~	~~17,122~~	~~14.34%~~	~~$967.13~~
~~Arts, Entertainment, and Recreation~~	~~1,424~~	~~1.19%~~	~~$387.72~~
~~Accommodation and Food Services~~	~~8,893~~	~~7.45%~~	~~$317.19~~
~~Other Services Except Public Admin~~	~~4,514~~	~~3.78%~~	~~$667.75~~
~~*Total Government*~~	~~*13,829*~~	~~*11.58%*~~	~~*$956.32*~~
~~**Total Regional Jobs**~~	~~**119,405**~~	~~-~~	~~-~~

~~Source: NH Employment Security, Economic and Labor Market Information Bureau, 2011 Annual Averages~~

The NH Economic and Labor Market Bureau anticipates that by expanding broadband access and capacity, additional businesses within the major industry sectors of Good-Producing Industries and Service-Producing Industries ~~these targeted industries~~ will likely grow or relocate to the SNHPC Region, thereby generating higher wage jobs. Generally, most all industry sectors today depend on broadband access for information and business purposes. Increased economic benefits could also be realized through free Wi-Fi access throughout the region. This region wide goal to expand broadband access and capacity would also benefit the Town of Windham.

~~*Work At Home*~~

High-speed internet has also sparked a revolution in telecommuting and home-based businesses by allowing employees to access files and servers off-site to work and allowing new businesses to start-off slowly with minimal overhead. By increasing the popularity and rate of telecommuting, businesses and workplaces can help to decrease traffic congestion and greenhouse gas emissions and improve quality of life. The rise in home-based businesses help foster the entrepreneurial spirit and keep the economy moving forward. Coordinated efforts such as this plan to increase broadband capacity and access can help in achieving these goals. ~~Table 3 displays the percent of SNHPC region's municipal workforce that~~

~~works at home. Both the towns of Goffstown and Deerfield have rates above 11 percent; nearly double the region's overall average of 6 percent.[38]~~

The Census Bureau term "work at home" does not distinguish between those who have a home-based business and those telecommuting; however, these numbers are the most accurate portrayal of workers telecommuting. A large percentage of Windham residents also work at home (8.2 percent), as reported by the 2007-2011 ACS 5-year estimate ~~which is among the fourth highest percent in the region~~.

~~Table 3: Work at Home (SNHPC Region)~~

~~Municipality~~	~~Percent Worked at Home~~	~~Percent Margin of Error~~
~~Auburn~~	~~4.4~~	~~+/ 2.3~~
~~Bedford~~	~~6.2~~	~~+/-1.5~~
~~Candia~~	~~3.5~~	~~+/-2.0~~
~~Chester~~	~~7.0~~	~~+/-2.8~~
~~Deerfield~~	~~11.0~~	~~+/-7.5~~
~~Derry~~	~~3.6~~	~~+/-0.8~~
~~Goffstown~~	~~11.1~~	~~+/ 3.5~~
~~Hooksett~~	~~5.0~~	~~+/-1.9~~
~~Londonderry~~	~~6.3~~	~~+/-1.5~~
~~Manchester~~	~~2.8~~	~~+/-0.4~~
~~New Boston~~	~~**8.3**~~	~~+/-3.5~~
~~Raymond~~	~~1.8~~	~~+/-1.1~~
~~Weare~~	~~4.9~~	~~+/-2.3~~
~~**Windham**~~	~~**8.2**~~	~~**+/-2.3**~~
~~**Regional Average**~~	~~**6.0**~~	~~**+/-2.4**~~

~~Source: 2007-2011 ACS 5-Year Estimates~~

~~*Impacts of I-93*~~

~~With the widening of I-93 and natural population growth and in-migration, the SNHPC Region is expected to experience an increase of over 35,000 new residents between 2010 and 2030. This will present numerous challenges to the region as, well as many communities which are located within the I-93 corridor, including the Town of Windham. With these challenges will be opportunities for economic growth and workforce development. One of these opportunities will be improved regional and local mobility; an improved I-93 will make it easier for the region's and Windham's residents to commute out of state for work. New business growth in the region and Windham will also be more compatible with the resident workforce growth. Continued attraction of high-skilled companies to the region and the Town of Windham is also highly important and anticipated.~~

~~[38] 2007-2011 American Community Survey 5-Year Estimates~~

Summary

This business attraction model must also include broadband improvements as an essential component of the town's economic development vision. In addition, it must view broadband in a larger lens particularly in retaining a younger, well educated population and workforce. In short, the key to expanding and improving broadband access and connectivity in Windham must come from the businesses, neighborhoods and residents which demand greater access and higher speeds. The Town of Windham has many characteristics that encourage economic development, as well as positive indicators of economic growth for the future. The success of Windham's economic future is dependent on stable, state of the art and equitable broadband access and service. Windham's many desirable attributes, its skilled workforce, and improvements in broadband infrastructure, access, connectivity and resiliency will help to sustain this performance in the future.

Challenges and Opportunities for Broadband Implementation

There are many political/regulatory, economic, social, and technological barriers related to broadband development, investment and implementation~~. Nationally at the state level and in Windham some of these barriers and issues are noted as follows~~. These barriers are at all levels – national, state, and in Windham, which are notes as follows.

Political/Regulatory Barriers

Regulatory Concerns - Cable/Internet providers do not fall under the purview of the NH Public Utilities Commission and ~~. B~~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). A CFA is with a telephone company, such as Fairpoint, and Alternative broadband providers are often in direct competition with cable providers under agreement with municipalities. Some municipalities are gaining more insight ~~experience~~ when it comes to negotiating Cable Franchise Agreements, and are becoming proactive in improving local service. MARGARET WOULD RECOMMEND DELETING THIS

Economic Barriers

Inadequate Access for Commercial Applications - 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 – Many residents and businesses feel that ~~As noted in the 2013 UNH survey (See pages 35 & 36), respondents indicated~~ the region is adequately served and prepared for the future. There has been ~~Throughout the planning process, the SNHPC 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.

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~~healthcare and businesses shift to the use of Internet applications, those without sufficient Internet access or knowledge will be left behind.

See Appendix _____ for the results of the Granite State Future Survey.

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.

Regional/Local Community Opportunities

The following list identifies a number of potential opportunities for improving broadband investment and implementation within communities:

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 the availability to expand or that there is adequate coverage of business-quality broadband infrastructure, including regional access to fiber capacity implemented through the NH BTOP and others.

The Demand for Broadband in Windham

Windham's Economic Development Self-Assessment

In August 2014, Northeastern University, Dukakis Center for Urban and Regional Policy facilitated the implementation of an Economic Development Self-Assessment Tool for the Town of Windham. Information technology and broadband and was included in the assessment. The following results were identified:

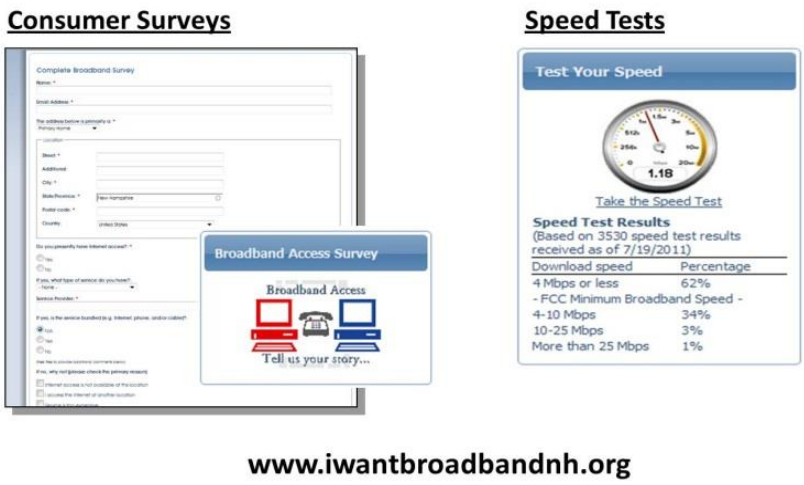
- Windham's infrastructure-water supply, electric power, cellular, and fiber-optic/cable/DSL- were noted as providing unreliable service and as such, were identified as the most serious weakness in Windham.
- Specifically regarding telecommunications, landlines have capacity for current needs only and cellular service is unreliable. Broadband service (.e., fiber optic, cable, and DSL) also have unreliable service. Windham may also want to initiate conversations with telecommunications and broadband providers on opportunities for enhancing infrastructure and service.
- In terms of data/telecommunications – cellular, fiber optic, cable, DSL-the assessment determined that existing services in Windham are unreliable.

Specifically with regard to broadband, the report recommended that the Town of Windham initiate discussions with broadband providers to upgrade and expand their infrastructure and services in Windham. Also to engage regional, state, and federal resources that support bringing broadband services to rural areas.

UNH Speed Test Survey Results

In order to supplement public outreach efforts verifying local broadband service, as well as advertised speeds by Internet Service Providers (ISPs), the University of New Hampshire developed a speed test and a short survey for residents across the state to share. When participants selected the speed test application at www.iwantbroadbandnh.org, both download and upload speeds were measured at the reported location of the user. Table 4 displays the total number of speed test and survey participants by municipality in the SNHPC Region, as of September 2013. The most speed tests completed were in the City of Manchester and the towns of Derry, Goffstown and Bedford.

Figure 7: Speed Test Instruments



Source: www.iwantbroadbandnh.org

As of September 2013 only 7 speed tests have been submitted by residents and businesses in the Town of Windham to this site. Based upon this information, the Broadband Advisory Committee recommended that a survey be conducted among Windham's businesses to assess not only speeds, but reliability of service and other needs.

~~Table 4: Completed Speed Tests and Surveys~~

~~Municipality~~	~~Speed Tests~~	~~Surveys~~
~~Auburn~~	~~1~~	~~0~~
~~Bedford~~	~~21~~	~~0~~
~~Candia~~	~~7~~	~~0~~
~~Chester~~	~~15~~	~~0~~
~~Deerfield~~	~~16~~	~~2~~
~~Derry~~	~~71~~	~~1~~
~~Goffstown~~	~~28~~	~~2~~
~~Hooksett~~	~~5~~	~~0~~

~~Londonderry~~	~~14~~	~~2~~
~~Manchester~~	~~70~~	~~1~~
~~New Boston~~	~~6~~	~~1~~
~~Raymond~~	~~11~~	~~1~~
~~Weare~~	~~11~~	~~1~~
~~**Windham**~~	~~**7**~~	~~**1**~~
~~**Regional Total**~~	~~**283**~~	~~**12**~~

~~Source: New Hampshire Broadband Mapping and Planning Program, September 2013~~

How Reliable and Fast is Windham's Broadband (Email Survey)

As part of this plan, the Windham Community Development Director and the Southern New Hampshire Planning Commission (SNHPC) conducted a short broadband survey to assess what various improvements to broadband could be made to expand business and promote economic development within the Town of Windham. The survey was distributed by email by the Windham Community Development Department on November 3, 2014 and December 1, 2014 among 520 businesses and non-profits throughout the community. A ~~With a December 16, 2014 deadline; a~~ total of 16 responses ~~have been~~were received ~~to date~~. The questionnaire consisted of four questions regarding broadband services, speeds and backup connections to help assess the needs of the local business community. See Appendix ____ for the full survey results. ~~See following news article about this survey in the Union Leader.~~

Survey Results

The survey results obtained from the first question – "do you have adequate broadband service" - is clear that the majority of business respondents felt they have adequate high speed broadband access/service, however many of the respondents noted that they would like to have faster speeds and bandwidth to perform more functions. Among many of these respondents, obtaining faster speeds and bandwidth is also a cost and affordability issue.

With regard to the second question – "do you need faster speeds" – there was no clear majority and the responses were almost equally split between 6 that would like faster speeds and 7 responses that they do not. Several responses indicating that they would like faster speeds noted that they are paying to have fiber installed to their place of business to increase speeds and bandwidth.

In terms of the third question – "do you have or need a "back up" internet connection during power outages" – again there was no clear majority as 6 businesses indicated that they would like a backup generator or internet connection – especially if data is stored on-line, while 7 businesses indicated that they already have it or do not need it based on current work activities.

Responses received to the fourth question – "what were your results with regard to the speed test" – ~~averaged~~ are as follows:~~.~~ Generally these test results are varied due to differences in services; connections; availability of fiber or not; and activity at the time of the test. However, the results clearly fall within the range of broadband service, which is considered to be "served", as per the broadband tier definitions provided in Figure 1.

Download – from 5 to upwards 95 Mps with lowest at 4.69 Mps

Upload – from 5 to upwards 61 Mps with lowest at .04-.08 Mps

With regard to the final ~~last~~ question – "other comments" – some of the comments provided noted that it would be effective to have more "fiber" at a lower cost to promote business growth; the town needs another alternative to Comcast; and any improvements must include network engineering and customer service.

~~***(See Survey in Appendix)***~~

Granite State Futures Telephone Survey Results (MOVE TO APPENDIX)

During May-July 2013, the University of New Hampshire Survey Center conducted a statewide and regional telephone survey for each of New Hampshire's nine Regional Planning Commissions, as part of the *Granite State Future* and *New Hampshire Broadband Mapping and Planning* initiatives. The results from this survey were used to inform the broadband plans developed in each of NH's nine planning regions.

A total of 2,935 New Hampshire adults were contacted by telephone by UNH staffers between May 9 and July 21, 2013 in conducting the survey. The overall response rate was 33 percent and the margin of sampling error for the survey was +/- 2.2 percent.[39]

Survey Results

Many of the survey responses obtained within the SNHPC Region closely mirror statewide responses; however, a select few are noted for their difference. Of prime importance, 93 percent of the region's residents report having access to the internet at home (See Table 5). Overall, the UNH Survey Center found statewide those who are 70 or older, those unemployed and looking for work, those with a high school education or less, and households earning less than $20,000 are less likely to have internet access at home. Results for the City of Manchester may differ from the region as a whole, considering the city's socio-economic characteristics, such as median household income and unemployment rates discussed earlier.

Table 5: Internet Access at Home

Do you have access to the internet at home?

Respondents	Yes	No	Don't know	Number responding
Statewide	91%	9%	0%	2925
SNHPC Region	**93%**	**7%**	**0%**	**591**

Source: Granite State Future 2013 Statewide Survey

Table 8 ~~(see Appendix)~~ reveals there are several reasons why 7 percent of the region's residents do not have internet access at home, many of which are related to social preferences. 29 percent of respondents claimed they don't need the internet and 10 percent said they don't know how to use it. These answers

[39] "NH Regional Planning Commissions: A Granite State Future, 2013 Statewide Survey." The Survey Center, UNH. September 2013.

may be related to differences between generations. Of those who don't have internet access at home, 13 percent do not have a computer that can adequately handle internet connections, while 17 percent reported internet service is too expensive. Identifying and implementing strategies addressing the affordability of broadband will help decrease the number of people unable to access internet at home.

The majority of residents within the SNHPC Region utilize cable-based broadband internet (79 percent) while DSL generates the second most common type of internet connection (See Table 9~~ in Appendix~~). Compared to statewide types of internet connections, residents in the Southern New Hampshire Region use cable internet more. 4 percent of respondents in the region report using fixed wireless, while only 3 percent have a fiber-based connection at home.

Table 10 ~~(see Appendix)~~ explores why residents use their current internet providers. The two most common responses are that it was the only provider and "other" (31 percent). About 24 percent stated that they were happy with their current service provider.

Of those respondents who knew what their monthly internet bill was, the most common price range indicated is $50-$99 (29 percent), followed by monthly internet bills exceeding $100 (28 percent) (See Table 11~~, Appendix~~). A $20-$49 monthly internet bill is also fairly common, with 21 percent of respondents paying this amount. These prices are not clear if they include bundled services, which account for 79 percent of residents paying for internet services (See Table 12~~, Appendix~~). The Survey Center found that statewide, households earning less than $20,000 are less likely to pay for bundled internet service (see Tables 12-17~~ in Appendix~~).

Additionally, The Survey Center found those who are 70 or older, retired people, those with a high school education or less and households with an income of less than $20,000 are less likely to shop online. Millennials are found to be more likely to watch videos online, while conversely, those who are 60 or older are less likely to watch online videos.

With 93 percent of the region's residents having access to broadband at home, 94 percent report being pleased with their internet connection at home for their uses (See Table 18~~, Appendix~~). This response rate signifies that the popularly-utilized cable internet connection serves the region's population well.

A strong majority of residents (87 percent) are uninterested in paying more per month for a faster internet connection (See Table 19~~, Appendix~~). With such an overwhelming majority of respondents stating their connection is adequate, paying more for a faster connection will not yield significant benefits.

Of particular importance to local elected officials, residents were asked if they would support their municipality funding the expansion of broadband access to existing and potential development. 56 percent of respondents oppose a municipality using any funds for broadband (See Table 20~~, Appendix~~). Of the 40 percent who favored the use of municipal funds for broadband, 22 percent stated they would accept higher taxes for the service, while 18 percent would prefer a different funding mechanism used other than taxes.

~~***(See Tables 8 through 20 in the Appendix)***~~

Broadband Availability in Windham

~~According to Carol Miller, Director of Broadband Technology at the Department of Resources and Economic Development, New Hampshire has some of the best broadband networks in the U.S., but there are still gaps in rural areas of the state and high-speed broadband services are not equally available across the state and within the state's municipalities. Roughly 9% of the state's population lives in areas with reported gaps according to the New Hampshire Broadband Planning and Mapping Program.[40]~~

~~In the latest report on the use of Computers and the Internet issued by the US Census in November 2014, NH is ranked 2nd in the nation at 93.2% of households owning a computer and 1st in New England. New Hampshire is also ranked 1st in the nation at 85.7% of households that use high-speed Internet (as defined as 40Mb down by 1Mb up).~~

~~According to Akamai's most current June 2014 report, New Hampshire placed 3rd in the nation for increased high speed broadband over 15Mbps to 26% of households, 53% of NH households over 10Mbps; and 84% of NH households with speed of over 4Mbps.[41]~~

~~Over the last 5 years, NH has benefited from over $600 million of federal and private investment for communications infrastructure improvements with new fiber, telecom and cable broadband expansion, and mobile cellular deployment and upgrades.~~

~~Similar to the above statewide statistics, broadband availability and coverage within the Town of Windham, NH is fairly comprehensive and equally available across the town, except for the identified issues in this sections and the numerous cellular dead zones as reported by the Police Chief. Overall, however, Windham's broadband availability and coverage is relatively good compared to many other towns. What Windham struggles with is speed and resiliency as noted by many of the survey returns and findings. The following provides a quick update on Windham's broadband planning, coverage, availability and regulations.~~

1. Broadband History – Windham 2005 Master Plan

The Town of Windham's existing 2005 Master Plan provides an overview of the development of broadband and various communication systems within the town. Under the Utilities Chapter in the plan, it is pointed out that local telephone service in Windham was originally provided by Verizon and long distance service is provided by various carriers who compete to provide this service to residents. Today, FairPoint Communications now provides this long distance service. ~~The plan furthers notes that Windham does not have a unique telephone exchange, but shares exchange prefixes with adjacent towns. However,~~

~~[40] http://nheconomy.com/business-services/broadband-telecommunications/default.aspx (accessed March 6, 2014). It is important to note that these penetration rates are determined at a census block level and then averaged at a statewide level so the exact penetration rate varies considerably by geography (at the census block level) throughout the state. According to the Director of Broadband Technologies with the NH Division of Economic Development, these penetration rates do not mean that every household in the state has broadband.~~

~~[41] Akamai is a leading cloud-based platform that also develops quarterly "State of the Internet" reports based on the data it gathers from servers across the globe; see http://www.akamai.com/stateoftheinternet/ (accessed September 16, 2013). Akamai's ratings reflect data measured at the edge of all the networks and these averages can fluctuate quarterly when a new report is issued. The rates are also indicative of the competition among states to utilize new network infrastructure and enhanced speed offerings.~~

~~all calls within the town are billed as local, without a long distance charge. We do not know if this is still the fact or not.~~

The master plan also goes on to explain that as a result of greatly expanded Internet use and the proliferation of business conducted from homes, there is an increasing demand for new lines and bandwidth within the town. To meet this increasing demand, the master plan notes that Verizon has been making substantial investments in fiber optic cables and hubs. Both analog and digital services are provided. Integrated Services Digital Network (ISDN) service is available, as is Asymmetrical Digital Subscriber Line (ADSL). Both of these services allow for digital data access.

The plan also points out that older neighborhoods and businesses are primarily served by above ground utilities and that new commercial or residential subdivisions are served by underground utilities. The master plan also states that Internet access is becoming increasingly important to Windham residents. In the 2000 Master Plan Survey, over 60% of the households surveyed have Internet access. Telecommuting is a reality for a number of residents, as are home-based businesses. These trends are expected to continue. The master plan also notes that Verizon has upgraded all links and hub points to optical fiber. Telephone usage (particularly wireless) is increasing significantly today as many households now have multiple lines for voice, fax, and Internet access.

"Telecommuting is a reality for a number of residents, as are home-based businesses. These trends are expected to continue."
(2005 Windham Master Plan, p.88)

Under the Utilities Chapter in the town's master plan it notes that the topography of Windham, with many hills and valleys, has made wireless communication difficult. However, police and fire communications use a "voter system" to provide 95% coverage with portable two-way radios. The primary transmitter/receiver is located on a private tower on Jenny's Hill, with secondary antennas at Golden Brook School and on an industrial building just over the town line in Pelham. All Windham town departments, except the transfer station, are connected to the Internet system through a T-1 telephone line connection at the Town Library.

In addition, the town has installed a Private Branch~~each~~ Exchange (PBX) system for the Police Department, Town Hall, Fire Department, Armstrong Building, and Community~~Planning~~/Development Department. The system is connected underground by fiber optic cable to provide for expanded communications requirements. This single system allows for efficiency in communication and cost by using shared outgoing lines. It is also not subject to interference from electrical storms. The master plan also points out that there was a remaining copper line connection that was scheduled to be replaced by the end of 2004.

The combination of these private and public communication systems, including from Internet services to public access television, provides the core of a strong communication system in Windham. The master plan also notes that although there are some upgrades that would enhance the internal town department communication, the town has in place staff and infrastructure to provide quality communication services. The master plan also recommends that the town continue to upgrade the overall communication system

as newer technologies come into the market place. ~~For example, the plan indicates that the local cable station WCTV intends to upgrade to a digital system from its current analog system over the next few years.~~

The master plan also notes that the Information Technology (IT) Department has begun a limited wireless technology system in the Town Hall and plans to continue to expand this technology to other town buildings within its annual budget requirements as computer and communication equipment is upgraded. This technology will allow high speed communication without the requirement for hardware retrofitting of town buildings and facilities, which may be problematic in some instances.

2. Wireless Communications Towers

The Town of Windham currently has three cell towers (see following map).

One tower is located on Jenny's Hill east of Interstate 93, off Governor Dinsmore Road, and is owned by Motorola. This tower has cellular, paging, TV relay link and business repeater antennas. Sprint, AT&T, Cell One, and the Town of Windham all lease space on the tower located on Jenny's Hill.

Another tower is located in the area between Route 111 and Hardwood Road and consists of a monopole designed as a pine tree (see photo).

Tower Disguised as a Tree
Town of Windham

Source: NH OEP

The third tower is located at the intersection of Rt 111 and Rt 128 ~~on Searles Road~~ and is known locally as the Waterhouse Cell Tower. ~~According to the Community Development Director, this tower is still active and there have been permits applied for over the years for work in/on the tower.~~

With the widespread adoption of cell phones, research in recent years has identified a growing trend among households cancelling their landline phone service to rely solely on their mobile phone.[42] In June 2010, the National Center for Health Statistics reported more than one-in-four (26.6 percent) households did not have a landline phone and only had a wireless phone. According to an article in USA Today, researchers identified both renters and low-income households are more likely to be wireless- only homes. Charles Govin, of Forrester Research, states that young people growing up with cell phones see no need investing in a landline.[43] An established mobile phone number remains with the owner over the years, saving someone from changing their contact information any time they were to move to a new location. Carrying a cell phone on-hand provides the added benefit of flexibility and increased availability.

[42] Snider, Mike. "More people ditching home phone for mobile," USA Today, April 21, 2011. (http://usatoday30.usatoday.com/tech/news/2011-04-20-cellphone-study.htm) Accessed March 4, 2014.
[43] ibid.

The increasing reliance on cell phones as the primary means of communication have caused wireless communication towers to be considered vital infrastructure for residents of any community.

> "~~*'The phrase 'home telephone number' is going the way of rotary dial phones and party lines,' says Stephen Blumberg at the Center for Disease Control and Prevention's National Center for Health Statistics. The trend toward wireless-only homes shows no sign of slowing down, it said."*~~
>
> ~~*("More people ditching home phone for mobile", USA Today, April 21, 2001)*~~

3. Telecommunications Regulations

Wireless communications are served by cell towers, which are located in almost every municipality of the state. Concentration of cell towers is generally higher along major interstates and state highways, although the past few years have witnessed increasing service even in rural areas. The construction of new towers is a highly regulated issue for planning and zoning boards who mitigate between the increasing need for wireless services and the aesthetic preservation of the town.

~~The towns of Chester, Derry and Weare within the SNHPC Region all have for example Telecommunications Overlay Districts in place while many other towns in the region encourage or mandate companies to use and co-locate on existing tower facilities rather than constructing new ones.~~ All cell towers are subject to setback, design, and zoning regulations. It is a generally accepted practice that municipalities adopt strict regulations that force competing companies to cooperate on the use of existing telecommunications infrastructure and transmission structures in order to minimize impact to the town and increase the efficiency of communications systems.

Currently, communications towers or Personal Wire Service Facility (PWSF) as provided for under NH RSA 12-K-2 are restricted in Section 701.3 of the Windham Zoning Regulations to specific commercial and industrial properties within the town. ~~See Section 701.3 below:~~

> ~~**701.3** PWSF Towers, as defined in RSA 12-K:2(XXIV), PWSF Mounts, as defined in RSA 12-K:2(XX), and Broadcast Antenna Structures, as defined in Section 200 are permitted in the Business Commercial A, Limited Industrial, and Professional, Business, and Technology Zoning Districts subject to the following:~~

~~**701.3.1** PWSF towers, PWSF mounts and Broadcast Antenna Structures shall not exceed in height the distance to the nearest lot line or 150 feet, whichever is the lesser.~~

~~**701.3.2** Intentionally omitted.~~

~~**701.3.3** Guy wires shall not extend into the required building setback areas.~~

~~**701.3.4** PWSF towers, PWSF mounts and Broadcast Antenna Structures attached, bracketed or mounted on buildings shall not extend more than twenty five (25) feet above the established roof line.~~

~~**701.3.5** Only one (1) PWSF towers, PWSF mounts and Broadcast Antenna Structures shall be erected on a lot. PWSF towers, PWSF mounts and Broadcast Antenna Structures shall be located at least four thousand (4,000) feet apart, measured in a straight line from the base of each PWSF tower, PWSF mounts or Broadcast Antenna Structures.~~

~~**701.3.6** PWSF towers, PWSF mounts and Broadcast Antenna Structures shall be designed and placed to allow co-location of facilities and uses on each structure.~~

~~**701.3.7** Intentionally Omitted~~

~~**701.3.8** A site alternative analysis, including existing PWSF towers, PWSF mounts and Broadcast Antenna Structures, shall be conducted.~~

~~**701.3.9** A bond shall be submitted to and held by the Town of Windham for the removal of the Broadcast Antenna structure when the structure is no longer operational.~~

In comparing the Town of Windham's PWSF regulations in the Zoning Ordinance and Site Plan Regulations to the telecommunication planning statutes provided for under RSA 12-K:1, there are several areas where improvements can be made as identified below.

1. The town's zoning regulations should recognize that the visual effects of tall antenna mounts or towers may go well beyond the physical borders between municipalities. Thus, Windham's regulations could be amended to require that all affected parties have the opportunity to be heard as part of the review process.
2. Windham's zoning regulations could also encourage carriers wishing to build PWSFs in the town to consider commercially available alternative PWSFs to tall cellular towers, which may, include the use of the following:
   - Lower antenna mounts which do not protrude as far above the surrounding tree canopies;
   - Disguised PWSFs such as flagpoles, artificial tree poles, light poles, and traffic lights, which blend in with their surroundings;
   - Camouflaged PWSFs mounted on existing structures and buildings;
   - Custom designed PWSFs to minimize the visual impact of a PWSF on its surroundings;
   - Other available technology.

3. In addition, a requirement for a PWSF map could be added to Windham's zoning regulations. A PWSF map is necessary to allow for orderly and efficient deployment of wireless communication services and to ensure that the public has adequate information with which to consider appropriate siting and options to mitigate the visual effects of PWSFs.
4. The guidelines and suggestions in the NH Office of Energy and Planning model ordinance for PWSFs, as well as other communities ordinances, should also be reviewed and considered by the Windham Planning Board ~~and Community Development Office~~.

~~There are also many towns in New Hampshire which have effective zoning regulations (see copy of the Town of Sharon, NH example telecommunications and broadband ordinance in the Appendix). These ordinances should also be evaluated by the town.~~ While the need for another cell tower in Windham may not be a high priority or needed in the future, the town should be prepared as wireless and broadband technology is changing rapidly. A simple amendment to Windham's PWSF zoning ordinance to include broadband is also presented in the Recommendations ~~last~~ section of this plan ~~(see page 74)~~.

~~In addition to these zoning regulations, the Planning Board enforces site plan regulations to protect public health and safety, promote the general welfare of the community, and to conserve the environment by encouraging construction which is designed and developed in a manner which assures that adequate provisions are made for (1) traffic safety and access, (2) emergency access, (3) site aesthetics, (4) management of stormwater, erosion and sedimentation, (5) reduction of adverse impacts on adjacent properties, and (5) harmonious placement into the fabric of the community.~~

~~The Planning Board's regulations are divided into major and minor site plan approvals. PWSFs are not exempt from these regulations.~~

5. While new cell towers require significant site engineering and access considerations, thus triggering site plan approval; co-locating onto existing towers generally should not require site plan approval unless there are significant changes to the site, access and security, and site aesthetics. The Planning Board could consider adding co-locating to existing PWSF facilities as a Conditional Use under the town's PWSF zoning ordinance and as an "exempted use" or use requiring minor site plan review under the Board's site plan regulations. In this fashion, the public health and welfare of the town can be protected at the same time the town is promoting the co-location of these facilities and uses on existing structures; thus, enhancing wireless communications within the town.
6. In addition, as wireless technology improves and changes, the Windham Planning Board mays also want to explore developing or adding additional provisions in the town's zoning ordinance to address and promote the development of Fixed Wireless Transmitter Antenna Array within the community. This technology could help improve cellular coverage within the community particularly within the dead zones and hot spots identified by the Windham Police Chief. ~~The copy of the Town of Sharon's Broadband Ordinance included within the Appendix of this plan is a good example for the Community Development Office and Planning Board to consider in this regard.~~

Insert Map 1: Telecommunications Facilities in Windham

4. Cable Franchise Agreement (Margaret thinks this should all be deleted)

~~According to the Town's 2005 Master Plan in 1998, Windham signed a 10-year non-exclusive cable franchise agreement with Harron Communications (now owned by Adelphia Communications). This agreement was recently renewed in 2008. Harron has provided cable service to Windham since 1984, and serves the majority of Windham households. A similar 10-year contract was also signed with MediaOne (now owned by AT&T). AT&T currently serves Windham residents and businesses along and adjacent to Route 28 between Salem and Derry. Both business and residential high-speed cable internet service is available.~~

Windham Community Television (WCTV) is the public access channel for the Town of Windham. Founded in 1987 in a small trailer, the station has been located since 1998 next to the Town Hall in the Armstrong building that includes a 500 square foot studio. The station also has a satellite studio in the town's Community ~~planning and d~~Development Department building. This studio is used for all government access programming since all town boards meet in this building. The studio is well-equipped with two digital studio cameras and an new production switcher in the control room. The station also has mini-field cameras and other audio-video equipment, all of which are available to the community of Windham. WCTV also has mobile robotic cameras in Town Hall, which are used for large meetings that may need to meet in this space. WCTV has one full-time employee and numerous volunteers who share video production activities.

According to the 2005 master plan, WCTV operates three channels. Channel 20 is the government access channel and provides programming of all community board meetings. Channel 21 is the public access channel, which produces major town events. Channel 22 is the educational channel and is located at Windham High School.

~~According to the 2005 master plan, WCTV operates three channels. Channel 20 is the government access channel and provides programming of all community board meetings including the Board of Selectmen, Planning Board, Zoning Board of Appeals, and Conservation Commission. Channel 21 is the public access channel, which produces major town events such as Little League Opening Day and the annual Memorial Day Parade and Ceremonies.~~

~~WCTV 21 also has volunteer-produced public affair shows such as "Focus on the Issues" which deals with topics that directly affect the Windham community. WCTV 21 also produces informational and entertainment shows that cover a wide range of topics including cooking, gardening, books, healthy life styles, music performance, and dog training. Channel 22 is the educational channel. However, WCTV is responsible for programming only Channel 20 and 21. Channel 22's programming originates from Salem High School. WCTV provide free training to any citizen of Windham and to any non-profit organizations located in Windham. Training includes introduction to studio production, field shooting, studio lighting, field lighting, non-linear editing, and studio shows direction.~~

According to the Town's 2005 Master Plan in 1998, Windham signed a 10-year non-exclusive cable franchise agreement with Harron Communications (now owned by Adelphia Communications). This agreement was recently renewed in 2008. Harron has provided cable service to Windham since 1984, and serves the majority of Windham households. A similar 10-year contract was also signed with MediaOne (now owned by AT&T). AT&T currently serves Windham residents and businesses along and

adjacent to Route 28 between Salem and Derry. Both business and residential high-speed cable internet service is available.

According to available information, the Town of Windham's cable franchise agreement with Comcast was recently renewed in 2013 and will not be up for renewal again until 2023. At that time, the Town of Windham should closely examine the agreement and the amount of franchise fees it has obtained over during this ten year period. In addition, if the agreement does not already contain a provision for use of a certain percentage of the franchise fee to go to a technology fund to make physical improvements for broadband expansion in Windham, this should be seriously considered. ~~The Town of Moultonborough directs 2 percent of their cable franchise fee directed to such a technology fund and the town has roughly $180,000 available to make improvements within the community.~~

~~Table 6: Current Status of Cable Franchise Agreements in the SNHPC Region~~

~~Municipality~~	~~Cable Franchisee~~	~~Start Date~~	~~End Date~~
~~Auburn~~	~~Comcast~~	~~2007~~	~~2017~~
~~Bedford~~	~~Comcast~~	~~2003~~	~~2018~~
~~Candia~~	~~Comcast~~	~~2008~~	~~2018~~
~~Chester~~	~~Comcast~~	~~2003~~	~~2013~~
~~Deerfield~~	~~MetroCast~~	~~2000~~	~~2013~~
~~Derry~~	~~Comcast~~	~~2009~~	~~2019~~
~~Goffstown~~	~~Comcast~~	~~2001~~	~~2011~~
~~Hooksett~~	~~Comcast~~	~~2004~~	~~2012~~
~~Londonderry~~	~~Comcast~~	~~2009~~	~~2019~~
~~Manchester~~	~~Comcast~~	~~2000~~	~~2015~~
~~New Boston~~	~~Comcast~~	~~2003~~	~~2013~~
~~Raymond~~	~~Comcast~~	~~2012~~	~~2022~~
~~Weare~~	~~Comcast~~	~~2008~~	~~2015~~
~~**Windham**~~	~~**Comcast**~~	~~**2006**~~	~~**2013**~~

~~Source: www.iwantbroadbandnh.org/cable-franchise-agreements~~

~~Currently about 93 percent of all municipal Cable Franchise Agreements in the SNHPC Region are with Comcast, with the exception of Deerfield as the sole community in a contract with MetroCast (See Table 6). Following the Town of Deerfield's example, the Town of Windham F~~for the next cable renewal, the Town of Windham could work cooperatively together with other towns in the region to enter into an informal or formal inter-municipal agreement to obtain legal services or other additional services at reduced costs. In addition, by working together, municipalities would be able to obtain greater access to and assistance and knowledge in the CFA contract and negotiation process.

The following map showing streets in Windham with cable service provided by Comcast was requested by the town under its franchise agreement. This map should be verified that it is up to date and current and if so, overlaid on top a comprehensive street map of Windham to identify streets, areas and/or neighborhoods which may not be served. ~~This could easily be done by the Windham Community Development Office.~~

Windham, NH Plant Area

5. Current Broadband Providers

There are, in general, a large number of broadband providers currently operating within the SNHPC Region. This is an indicator that there is healthy competition, which contributes to lower prices and potentially more coverage and higher speeds as providers try to attract customers with better services. As shown on Table 7, many communities in the Southern New Hampshire Region have been found to have between eight to twelve broadband providers available for customers to choose from.

Communities along the fringes of the region, ~~such as Weare, New Boston, Deerfield, Raymond, Chester and Candia~~ generally have the least (two to seven) broadband providers. Many of the communities located immediately along and/or within the I-93 corridor are found to have the highest number of broadband providers. The I-93 corridor is also where the majority of the region's population can be found.

~~The current list of available Internet Service Providers (ISPs) operating within the SNHPC Region as of September 2013 is provided below. This list often changes so it must be kept up to date locally by each municipality as ISPs change. It should be noted that each identified ISP offers internet services through a variety of different modes, such as with Satellite or Wireless. In summary, there are a total of 18 Internet Service Providers currently operating throughout the SNHPC Region.~~

~~The City of Manchester and the Town of Hooksett currently have the largest number of ISPs at 14 each. The towns of Bedford, Goffstown and Windham are the next largest currently having 13 ISPs each. The towns with the fewest number of ISPs are the towns of Deerfield and Raymond with only 9 respectively.~~

The 13 ISPs currently (September 2013) operating within the Town of Windham include:

- AT&T Mobility, LLC
- Clear
- Clearwire
- Comcast
- FairPoint Communications, Inc.
- G4 Communications
- Granite State Telephone
- MegaPath Corporation
- Spectra Access
- Sprint
- T-Mobile
- US Cellular
- Verizon Wireless

Table 7: Internet Service Providers

Internet Service Providers[44]	Municipalities														Total Municipalities ISP serves in Region
	Auburn	Bedford	Candia	Chester	Deerfield	Derry	Goffstown	Hooksett	Londonderry	Manchester	New Boston	Raymond	Weare	**Windham**	
AT&T Mobility, LLC	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**14**
Clear														**X**	**1**
Clearwire														**X**	**1**
Comcast	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**14**
Dunbarton Telephone Company, Inc.		X					X	X		X	X		X		**6**
FairPoint Communications, Inc.	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**14**
G4 Communications	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**14**
Granite State Telephone	X	X	X	X		X	X	X	X	X	X	X	X	**X**	**13**
Level 3 Communications, LLC										X					**1**
MegaPath Corporation	X	X	X	X		X	X	X	X	X	X			**X**	**11**
MetroCast			X		X			X				X			**4**
OTT Communications		X					X	X		X					**4**
Spectra Access	X	X		X		X	X	X	X	X	X		X	**X**	**11**
Sprint	X	X	X	X	X	X	X	X	X	X		X	X	**X**	**13**
T-Mobile	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**14**
TDS Telecom											X		X		**2**
U.S. Cellular	X	X	X	X	X	X	X	X	X	X	X		X	**X**	**13**
Verizon Wireless	X	X	X	X	X	X	X	X	X	X	X	X	X	**X**	**14**
Total Providers	**11**	**13**	**11**	**11**	**9**	**11**	**13**	**14**	**11**	**14**	**12**	**9**	**12**	**13**	

Source: New Hampshire Broadband Mapping and Planning Program

[44] Providers listed are those that submitted data indicating they offer broadband services via the technologies displayed in the profiled community.

6. Broadband Maps for Windham

Results of Broadband Mapping

This section of the plan provides a summary of the results of the broadband mapping and data collection prepared for the SNHPC Region under the New Hampshire Broadband Mapping and Planning Program (NHBMPP). These maps provide information about existing broadband availability, technology, download speeds, and service levels for the Town of Windham. The maps are based upon the availability of the data submitted to the NHBMPP by existing service providers as of September 2014. For the purposes of this plan, a total of ten broadband maps have been prepared for the Town of Windham. These maps are described below and include the following (full descriptions of each map will be provided in this plan upon completion of the maps by SNHPC):

- Broadband Availability for Uses that Require High Speed
- Broadband Availability for Uses that Require Moderate Speed
- Broadband Availability at Community Anchor Institutions
- Level of Service for Broadband Intensive Applications and Uses
- Broadband Availability By Maximum Advertised Download Speed
- Satellite Broadband Service
- Broadband Availability With Maximum Advertised Download Speed
- Broadband Availability
- Wireline Versus Terrestrial Wireless Service Availability
- Degree of Competition for Broadband Availability ***(this map is pending upon receipt of data)***

Final Descriptions of all the NHBMPP maps will be provided in final DRAFT as these maps were only recently updated for this plan.

Broadband Availability for Uses that Require High Speed shows that high speed is defined as advertised download speed greater than 10 Mbps and advertised upload speed greater than 6 Mbps. Uses that require a high speed broadband connection include: sending/receiving large files and small to medium sized databases; HD quality, codec based, large frame videoconferencing; multiple (bridged) sites/users; remote synchronous education, professional development, workshops, etc., facilitated simultaneously at multiple classrooms and/or other locations; telehealth/telemedicine applications; high speed end to end network and business to business applications; telemetry-based applications (rely critically on the ability of broadband to continuously monitor and multiplex data, i.e. remote patient monitoring, sensing systems, etc.); and "Internet2" connectivity and applications.

As shown by this map, the majority of the Town of Windham is able to use applications that require moderate speed broadband which is also the same providing the ability to use applications that require high speed broadband. This map shows that the Town of Windham's broadband availability for uses requiring high speeds is an advantage, both technologically and economically, compared other towns in the region. Residents' living in areas where broadband is capable of handling high speeds have access to download speeds greater than 10 Mbps and upload speeds greater than 6 Mbps. At these speeds, users are able to view high-definition videos, send and receive large file sizes, handle large databases and telemedicine applications. Many of the areas depicted with "no available service" are generally unpopulated areas. ~~This map serves to emphasize the need for and/or lack of adequate broadband in the Town of Windham.~~

Broadband Availability for Uses that Require Moderate Speed explains that moderate speed is defined as advertised download speed 3 to 6 Mbps and advertised upload speed of 1.5 to 3 Mbps. Uses that require a minimum of moderate speed broadband include: medium to high social media use; sending and receiving medium to large-scale documents or files (photos, word processing); streaming standard-definition (SD) content; buffering not a concern; downloading high-definition (HD) content (movies, video) speed a concern); 3-5 connected internet devices possible; VPN access is needed, speed of operation is important but not critical to job function; multiple functions performing simultaneously required (e.g. web browsing, streaming video/music, downloading content), but not concerned with potential slowness of downloads; low quality, small window frame videoconferencing (Skype); and cloud-based computing and data storage.

Broadband Availability at Community Anchor Institutions identifies those community anchor institutions (e.g. K-12 schools; libraries; medical/health care; public safety; university/college; and other governmental and non-governmental community institutions) where broadband is currently available or not available or not known to be available in Windham. Broadband availability at these institutions is absolutely necessary, for educating students using the latest technology and at medical and public safety facilities in accessing high-speed broadband for important public safety reasons and emergencies. ~~There are numerous schools, libraries, medical, public safety and other community institutions throughout the SNHPC Region where it is not known if broadband is available or not. Most K-12 schools in the SNHPC Region are noted as having broadband available, although there are a few facilities in the towns of Raymond, Deerfield, Chester and Londonderry that do not or are not known to have broadband available. Of major concern is the fact that many medical/health care facilities report either not having or not known to have broadband access. The majority of these facilities are clustered in Manchester, with several other medical/health care facilities without broadband or unknown to have broadband service found in Bedford, Hooksett, Londonderry, Derry, Windham and Raymond. Public Safety facilities noted as unknown or not having broadband available are documented to exist in the towns of Weare, Deerfield and Bedford.~~

The data collected on community anchor institutions for this map was obtained by contacting each institution to establish their baseline broadband availability profile. This inventory is updated by the GRANIT System at University of New Hampshire and all the regional planning commissions in the state every six months utilizing the NHBMPP Community Anchor Institution web portal. All municipalities, public safety officials and health organizations, and facilities within the SNHPC Region are encouraged to inspect and to go to the NHBMPP Community Anchor Institution web portal (http://iwantbroadbandnh.org/get-involved) to identify/verify the Community Anchor Institutions designated as not having or unknown to be connected to broadband. Through the broadband mapping and data collection prepared for the SNHPC Region, it will be an important goal and action step of this plan to ensure the Town of Windham and any isolated unserved areas as well as all the CAIs within the town be adequately identified and provided with the necessary infrastructure to obtain access and connectivity to reliable and high-speed broadband within the immediate future.

There are currently a total of 26 Community Anchor Institutions Identified in the Town of Windham as reported on the www.iwantbroadbandnh.org.

Windham – Fire Department	**3 Fellows Road, Windham**
Windham – Police Department	**4 Fellows Road, Windham**
Nesmith Library	**8 Fellows Road, Windham**
Warde Health Center	**21 Searles Road, Windham**
Windham Center School	**2 Lowell Road, Windham**

~~Windham Preschool~~	~~21 Haverhill Road, Windham~~
Windham Center School Library	2 Lowell Road, Windham
Windham – Town Hall	3N Lowell Road, Windham
Windham – Highway Department	2 Ledge Road~~3N Lowell Road~~, Windham
Pine Hill Estate Ltd	35N Lowell Road, Windham
Windham Terrace	3 Church Road, Windham
Golden Book Elementary School	112B Lowell Road, Windham
Windham Middle School	112A Lowell Road, Windham
Golden Brook Elementary School Library	112B Lowell Road, Windham
Windham Middle School Library	112A Lowell Road, Windham
Elliot Family Medicine at Windham	58 Range Road, Windham
~~J&K Home Care*~~	~~8 Bear Hill Road, Windham~~
Elliot Peak Internal Medicine at Windham	127 Rockingham Road, Windham
Windham High School	64 London Bridge Road, Windham
Windham High School Library	64 London Bridge Road, Windham
Grace House of Windham	23 Mammoth Road, Windham
~~Warde Health Center Supplemental Pre Care Facility~~	~~21 Searles Road, Windham~~
ConvenientMD Urgent Care	125 Indian Rock Road, Windham
~~ConvenientMD Urgent Care Lab Windham~~	~~125 Indian Rock Road, Windham~~
SAU 28 – SAU #28 Office	19 Haverhill Road, Windham
Labcorp – Windham PC	49 Range Road, Windham
Windham Seniors, Inc.	2N Lowell Road, Windham

*J&K Home Care is a licensed health care facility, but it moved from Windham to 85 Stiles Road Salem in 2013.

Level of Service for Broadband Intensive Applications and Uses Map clearly identifies that the Town of Windham is considered to be served for broadband intensive applications and uses. There are also several isolated areas located within Windham which are currently identified as served with reported gaps in service. There are no identified unserved or underserved areas with reported gaps within the town.

Broadband Availability By Maximum Advertised Download Speed Map displays the range of download speeds reported by the broadband service providers within Windham. As currently reported, cable is the technology of choice in providing the highest maximum advertised internet services and download speeds within the Town of Windham. ~~The majority of the SNHPC Region has access to download speeds within the range of 100 Mbps and 1 Gbps.~~ This map also provides a more detailed portrayal of the technologies that are included in each census block. These include DSL, Cable, Optical Carrier/Fiber to the end user. The map is based upon the broadband information submitted by the service providers to the NHBMPP as of September 30, 2014. For mapping purposes, this data was aggregated and displayed at the census block level. A census block is mapped as "served" if service is delivered to any part of the block. Further data collection is needed to refine the service area to a smaller scale.

Satellite Broadband Service Map clearly identifies that complete satellite broadband service available in Windham.

Broadband Availability With Maximum Advertised Download Speed Map displays the availability of broadband based on internet service providers' advertised speeds. Again, this map identifies that the Town of Windham is considered to be served by broadband. To be considered "served," users must have the ability to download at a speed of 3+ Mbps and upload to the internet at a speed of 1.5+ Mbps.

Broadband Availability Map (Description to be added)

Wireless Versus Terrestrial Wireless Service Availability Map confirms that Windham has both wireless and terrestrial wireless broadband service available.

Degree of Competition For Broadband Availability Map identifies the number of broadband providers offering internet services to residents and end users within the Town of Windham. According to latest NHBMMP, the Town of Windham currently has 13 providers.

Overall Map Summary

The Map showing "Level of Service for Broadband Intensive Applications" and "Uses and Broadband Technology with Maximum Advertised Download Speeds" are best maps displaying the maximum advertised download speed by available broadband technology, such as DSL, cable, fixed wireless, mobile wireless, fiber and other technologies available in Windham. The data portrayed by these maps also closely matche the results contained in the Granite State Futures Broadband Telephone Survey. As shown by this data, the vast majority of the Town of Windham is covered by cable and this specific broadband technology currently offers customers fast (but not the fastest) download and upload speeds available.

These maps also identify several areas which are unserved with broadband – particularly along Routes 111 and 28, which are concerning. Coverage throughout Windham is also provided by terrestrial mobile wireless and terrestrial fixed wireless services.

Optical fiber, the broadband technology capable of the fastest speeds, is currently limited to paying customers in Windham (primarily commercial) through a few Internet Service Provider (ISP), such as FairPoint and Verizon who are willing to make the significant investment and commitment necessary in installing fiber to the home or business. Ultimately, everyone within the Town of Windham could benefit from improved broadband connectivity and improved Internet service if there was more competition among other ISPs in offering fiber to their customers. This should be identified as an important and future long term goal of this plan.

The Town of Windham also has universal broadband service availability through satellite, wireline and terrestrial wireless services. However, despite the availability of these modes of broadband, very few residents/businesses in the Town of Windham responded to the town's recent broadband survey and the Granite State Futures survey that they are actually utilizing these broadband services.

A significant area of focus for broadband investment should be within the town's Professional, Business and Technology District, Limited Industrial District, the Village Center District, the Business Commercial A and B Districts, and the Gateway Commercial District~~, and the Route 28, Access Management Overlay District~~. Business growth and development and broadband investment is critical within these areas of Windham. In addition, with a large percentage of residents in Windham which work from home and run home based businesses, it is important that Comcast provided the highest and most affordable Internet services possible to the town's residents under the cable franchise agreement.

~~The future growth and development of the town's Professional, Business and Technology District is directly linked to the overall future economic growth of Windham. As such, it is extremely important that adequate broadband infrastructure be provided to this area.~~

Broadband Issues, Goals and Recommendations

During development of the SNHPC Regional Broadband Plan and the meetings held by the Town of Windham Broadband Advisory Group~~Committee~~, a number of broadband issues and needs, goals and recommendations for the Town of Windham were identified and discussed. ~~**These issues, goals and recommendations are presented below in draft form and should be reviewed and clearly defined by the Windham Broadband Advisory Committee before completing this plan.**~~

(The info below needs to be better broken out into issues, goals and recommendations, which I can do after the group reviews and finalizes.)

Broadband Issues and Needs:

- Expanding broadband service that meets the needs of current and future businesses in non-residential areas of the town.
- The Town of Windham and local broadband customers need a broadband backbone which would provide a few more hours of internet access (fiber & phone) in the event or loss of power.
- Comcast has generators in place to keep the Internet up and running during power outages, however it is not known what backup systems other service providers have to ensure resiliency.
- Electrical outages and power issues are common in Windham. Backup power supplies, generators and even two Internet providers are a common way of life for many businesses in town.
- Some of Windham businesses have installed fiber to increase broadband speeds and service. The Town of Windham School District has installed fiber between all of its school buildings, however, there is no similar connectivity between municipal buildings and facilities.
- There was a study conducted in _____ to determine the feasibility of extending fiber from the High School to the Library, but it was determined to be too expensive. This s~~S~~hould ~~this~~ be reevaluated. ~~in the future?~~
- Research possible locations for the implementation municipal public wifi, such as all Town-owned buildings and recreation facilities ~~The meeting room in the Community Development Building and the Library currently have Wifi available for the public and during meetings. Are there other public facilities in Windham which should be considered for Wifi, such as Griffin Park?~~
- Conduct ~~Should~~ a study ~~be conducted~~ comparing Windham's broadband services and infrastructure to Nashua, Salem, Londonderry and Derry for economic development and marketing purposes.~~?~~

- More information is needed from Comcast, FairPoint and other ISPs to determine existing infrastructure needs, future fiber plans, and what broadband services can be easily improved within the community.

Goals and Recommendations:

- Broadband is part of the community's infrastructure, much like roads and stormwater facilities. Research the ability ~~Municipalities should be able~~ to invest in this infrastructure as necessary through use of bonds, impact fees (broadband-specific or public safety), TIF Districts and ED grants, and franchise and right-of-way fees ~~for example~~.

- ~~Windham should not try to change the free market or force service providers to go into certain areas; however, as communities invest in infrastructure the providers will come because they will see a market.~~

- Ensure all interested users, whether residential or commercial, have access to broadband services that meet their needs.

- Ensure all public safety-related services and departments are served by *dependable* broadband.

- Consider new requirements for installing underground conduit in ~~new~~ public roads and streets for new non-residential development in the community.

- Encourage use of public right of way for broadband infrastructure to generate fees and taxes to fund broadband improvements in the community.

- The ~~It is recommended that~~ Town of Windham's overall Broadband Goal is to improve the availability and capacity of Broadband within the community, in order to bolster and enhance economic development and quality of life.

- Create links to provider contacts on the Town web site

- Include the availability of broadband as a component on the Towns property assessment records

~~In summary, cable is the most common internet provider in Windham. Cable coverage throughout the community is good and provided along every street within the community. There are very few if any gaps in cable service availability. Broadband speeds can be improved with fiber and new technologies. Fixed wireless may address some of the gaps, but it is difficult to attract new providers due to regulatory and business issues. The lack of broadband and high speed Internet service affects the marketability and real estate value of property within the community, thus it is important to have the best service made available to all residents and businesses.~~

~~It is recommended that the Town of Windham establish a broad goal of 100% availability and work with the SNHPC and UNH GRANIT to maintain an inventory of areas where services can be improved. This includes continuing to create GIS layer maps which show where business grade broadband services are available, create links to provider contacts on the Town website, leverage federal and state funding to improve local and regional services, and consider including the availability of broadband as a component on the town's property assessment records~~

~~Some implementation strategies and action steps that could be taken are:~~

Encourage Broadband as an Economic Development Tool

- ~~Make reliable broadband a requirement in the town's master plan and zoning regulations.~~
- ~~Establish an overall strategy for broadband in the community.~~
- Shorten the town's existing cable franchise agreement terms from 10 years to 5 years or less to reflect changing technologies and service realities.
- Require an annual report be provided to the town as part of the franchise agreement which would enable the Broadband Advisory Committee to accurately keep up to date with broadband services and infrastructure needs within the community.

Improve the town's telecommunications zoning regulations and the planning board's site plan regulations to reflect state statutes and encourage co-location.

- Consider adopting new right of way policies and procedures for the installation of conduit in the town's subdivision and site plan regulations.
- Shadow duct regulations requires broadband utilities to be constructed and/or repaired and buried only during scheduled street reconstruction or resurfacing. The objective is to maximize the availability of new conduit networks for the provision of commercial telecommunications services within the Town and to minimize multiple street openings and resulting disruption to the public way
- Require conduit be installed as part of and in anticipation of new business development to facilitate broadband infrastructure expansion within the community.

Expand Access of Affordable Broadband Service to all Windham Residents and Businesses

- Require ISPs to develop programs to offer affordable Internet services to all residents and businesses in Windham as part of the town's cable franchise agreements.

Educate Businesses and Citizens on the Use of Broadband

- ~~Recognize the 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 to the business community.

~~**Continue the Broadband Advisory Committee as a formal committee of the town**~~

- ~~Establish a formally recognized Broadband Stakeholder Group (BSG) Committee in Windham to keep track of the changing broadband environment and work with existing ISPs to promote and expand broadband infrastructure and services.~~

Encourage the Planning Board to include this plan as a Broadband Chapter in Master Plan

- Encourage Town of Windham to create and adopt broadband components in the town's 2015 Master Plan ~~and zoning regulations~~.

Encourage Dedicated Funding Sources for Expansion of Broadband

- Promote establishment of dedicated funds for broadband at the municipal level through the franchise fees collected. ~~For example, the Town of Moultonborough established a Community Technology Fund six years ago requiring that 2% of the town's franchise fees go into this fund. This fund has now grown in excess $100,000 which can be used to invest in broadband infrastructure improvements within the Town~~.

~~**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 the Community Anchor Institutions identified within the Town of Windham.~~
- ~~Include broadband as part of the town's property assessment records for every parcel of land within the community.~~

As Critical Infrastructure Ensure the Resiliency of Broadband Services

- Ensure that existing and new broadband infrastructure is resilient and redundant so that there are adequate opportunities for connection when power supply is down due to storms.
- Encourage the inclusion of broadband in hazard mitigation and recovery planning as part of the Town's local emergency management and response plans.

Identified Broadband Issues and Needs

The Town of Windham has in place cable broadband services covering the majority of the community. There is also terrestrial fixed and mobile wireless services provided throughout the town. There are no major issues with respect to having access to sufficient broadband download or upload speeds in Windham, however, many businesses and home based businesses in Windham would like faster broadband services and to be assured that these services are available at reasonable rates. While this is not a major disadvantage within the community and the community's future economic growth and development, it could become an issue, if high speed access and necessary infrastructure is not made available within the community in the future.

To ensure these services, the Town of Windham should do all it can to promote and facilitate state/private broadband programs and initiatives to expand these technologies within the community~~. As discussed earlier in this plan, programs such as the NH FastRoads program can assist in building connections between the middle mile and last mile network that aggregates demand, including community anchor institutions, large and small businesses, government offices, and residents. The routes provide fiber connections to businesses and residents, where many residents in Windham are limited to cable, wireless or no connection at all.~~

In addition, the Town of Windham can and should look at expanding WiFi services to key public buildings and facilities in the community, including the town's key parks. ~~In addition, the town's Planning Board~~

~~could consider incentives in the town's zoning regulations to encourage small businesses to include and promote free WiFi as part of their business strategy.~~

Future Growth/Technologies/Considerations

The technology and techniques for providing fast, reliable internet service are constantly changing. It is important to remain aware of these emerging technologies and the potential infrastructure, zoning, and planning challenges they might create.

Terrestrial fixed wireless internet sources, such as WiFi, are transmitted through radio waves and require no cable connections or hookups and less physical infrastructure than DSL or cable. Terrestrial mobile wireless internet (which can be accessed by mobile electronic devices like smart phones) has and will continue to become increasingly popular within the town. Like fixed wireless internet, mobile requires little in the way of physical infrastructure. However, it is limited by the provider's service range, typically slower connection speeds, small screen sizes, and limited operability compared to a PC or laptop.

Satellite internet, as its name suggests provides service through satellites orbiting the Earth. Like wireless, this method of delivery requires little terrestrial infrastructure but at its current stage of development has many limitations. Satellite internet has the potential to become a more viable internet delivery option in the future as the technology associated with it improves. Currently, it is used mainly by those who do not have access to DSL or cable lines.

Fiber optic cables, which deliver information using pulses of light through optical fiber, are becoming an increasingly popular method of high speed internet delivery. Able to deliver higher bandwidths of information over longer distances than DSL or cable, fiber optics should become more and more common in the future. However, there will be significant last mile delivery problems associated with fiber optics, even more so than currently exist with DSL or cable, as entirely new lines will have to be laid to the homes and businesses of end users.

Broadband over Power Line (BPL) is another emerging technology. It delivers broadband over the existing electric power distribution network, so there is little need in the way of added infrastructure or extending lines and has speeds similar to those currently found in DSL and cable modems. Today BPL is only available in a very limited number of areas but it has the potential to bring high-speed internet access to anyone connected to the electrical grid.

~~**Shadow Duct Regulations**~~

~~At the last Windham Broadband Advisory Committee meeting, the City of Boston's Shadow Duct Regulations, or Grant of Location Policy, be considered as a guide for how the Town of Windham can improve utility installations, including broadband. This particular policy (see copy of policy in the Appendix) requires broadband utilities to be constructed and/or repaired and buried only during scheduled street reconstruction or resurfacing. According to the language of the policy, the objective is "...to maximize the availability of new conduit networks for the provision of commercial telecommunications services within the City and to minimize multiple street openings and resulting disruption to the public way".~~[45]

[45] ~~"Policy Relating to Grants of Location for New Conduit Network for the Provision of Commercial Telecommunications Services". August 4, 1994.~~

~~Implementation and coordination is conducted by the Public Improvement Commission (PIC), an independent body located in the Boston Public Works Department. By instituting this policy, the city intends to accomplish four functions: "...minimize disruption to the City's public ways, allow the planned development of telecommunications facilities within the City to benefit Boston's economy, provide future Network applicants reasonable and timely access to City streets and facilitate the timely construction of all such Networks."[46] Upon speaking with the PIC Lawyer, Mr. Chong Liu, SNHPC staff learned that the City of Boston views this policy as being very successful, so much so that cities across the country have contacted them to learn more.~~

~~**NH DRED Broadband Program**~~

~~Lastly to help empower communities to improve broadband infrastructure and services, the NH Department of Resources and Economic Development (NH DRED) Broadband Coordinator has produced "Taking Control of Your Broadband Destiny," a ten-step process that is provided on the NH DRED website. This ten-step process is designed to enable citizens and local officials to initiate better broadband service both at the community and neighborhood level.~~

Suggested Amendment to Windham's Zoning Ordinance for Broadband Infrastructure

A Municipal Fixed Wireless Broadband Facility Ordinance should be considered by the Town of Windham to provide a mechanism to more readily allow fixed wireless broadband facilities (which include towers, relay sites and antenna array) to be placed within the community. This could either be performed through an expanded permitting mechanism within the town's existing PWSF zoning ordinance or as a separate broadband ordinance ~~(Refer to the Town of Sharon, NH -- Example Broadband Ordinance in the Appendix).~~

In addition to the permitting process, minor revisions to Windham's Zoning Ordinance, Section 200 Definitions can also be easily addressed to better position the Town of Windham in preparing and planning for enhanced broadband development within the community.

Insert the following bold italic text to read as follows:

200 Definitions

Personal Wire Service Facility (PWSF): A PWSF includes the set of equipment and network components, exclusive of the underlying tower or mount, including, but not limited to, antennas, accessory equipment, transmitters, receiver, base stations, power supplies, cabling, and associated equipment necessary to provide personal wireless services per NH RSA 12-K:2(XXII), ***including high speed (broadband) internet or any other communications through the sending and/or receiving of electromagnetic waves of any frequency and bandwidth.***

~~[46] Ibid.~~

Appendix

Glossary of Terms

Asymmetrical – For the purposes of broadband technologies, it means that the download speed and upload speed are not the same. The download speed is higher than the upload speed. A common configuration would be 1.544 mbps download speed and 256 kbps upload speed.

Bandwidth – The transmission capacity of an electronic pathway such as a communications line, computer bus or computer channel. In a digital line, it is measured in bits per second or bytes per second (see Mbps). In an analog channel or in a digital channel that is wrapped in a carrier frequency, bandwidth is the difference between the highest and lowest frequencies and is measured in Hertz (KHz, MHz, GHz).

Broadband – (1) High-speed transmission. The term commonly refers to Internet access via cable and DSL, which is as much as 400 times faster than analog dial-up. The term has always referred to a higher-speed connection, but the speed threshold varies with the times. Widely employed in companies, the 1.5 Mbps T1 line was often considered the starting point for broadband speeds, while the FCC defines broadband as a minimum upload speed of 200 Kbps.

The T1 line is no longer the coveted connection for Web surfing. Home users with cable modems experience download speeds up to four times that of T1 and more (see cable modem). For example, in 2007, Comcast offered home users a premium service of 1 Mbps upload and 16 Mbps download. Fiber-based offerings from telephone companies are even greater.

After the turn of the century, South Korea leapfrogged the U.S. in Internet access, offering DSL up to 50 Mbps and calling their 1.5 Mbps service "light." See broadband router, wireless broadband, T1, cable modem and DSL.

(2) Transmitting data by modulating a carrier wave in order to differentiate it from other signals in the air or in a single line. For example, frequency division multiplexing (FDM) is used to carry hundreds of channels of analog and digital TV in a single coaxial cable. In this context, broadband is used in contrast with "baseband," which is data that has not been modulated or multiplexed. In most cases, the term "broadband" is used for high-speed transmission as in definition #1 above.

Cable modem – A modem used to connect a computer to a cable TV service that provides Internet access. Cable modems can dramatically increase the bandwidth between the user's computer and the Internet service provider. Download speeds have reached 6 Mbps and beyond, but the connection is asynchronous. In order to prevent users with lower-cost cable access from hosting high-traffic Web servers, the upload speed is considerably slower, from 10 to 20 times slower. Cable operators also routinely change IP addresses assigned to users to prevent Web hosting.

Channel – The physical connecting medium in a network, which could be twisted wire pairs, coaxial cable or optical fiber between clients, servers and other devices.

Disaster Recovery Plan – A plan for duplicating computer operations after a catastrophe occurs, such as a fire or earthquake. It includes routine off-site backup as well as a procedure for activating vital information systems in a new location.

DSL (Digital Subscriber Line) – A technology that dramatically increases the digital capacity of ordinary telephone lines (the local loops) into the home or office. DSL speeds are based on the distance between the customer and Telco central office. There are two main categories. Asymmetric DSL (ADSL) is for Internet access, where fast downstream is required, but slow upstream is acceptable. Symmetric DSL (SDSL, HDSL, etc.) is designed for connections that require high speed in both directions.

FCC (Federal Communications Commission) – An independent United States government agency, directly responsible to Congress. The FCC was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable. The FCC's jurisdiction covers the 50 states, the District of Columbia, and U.S. possessions. (http://www.fcc.gov/aboutus.html)

FCC Rural Healthcare Pilot Project – The pilot program is an enhanced funding initiative intended to help public and non-profit health care providers construct state- and region-wide broadband networks to provide telehealth and telemedicine services throughout the nation. The program will fund up to 85% of the costs of constructing those networks, as well as the costs of advanced telecommunications and information services that will ride over these networks. If selected, up to 85% of the cost of connecting to Internet2, a dedicated nationwide backbone, may also be funded by the pilot program. Connection to Internet2 is not required, but may be requested by the applicants. (http://www.fcc.gov/cgb/rural/rhcp.html)

Fiber-optic – Refers to systems that use optical fibers. Fiber-optic communications networks have transformed the world. Barely starting in the late 1960s but gaining serious momentum in the 1980s, the phone companies began to replace their copper long distance trunks with fiber cable. Eventually, all transmission systems and networks are expected to become fiber based, even to the home. In time, the electronic circuits in computers may be partially or fully replaced with circuits of light, in which case fiber pathways would be used throughout the system.

Fixed Wireless – Refers to point-to-point transmission through the air between stationary devices. Fixed wireless is typically used for "last mile" connectivity to buildings.

FTP (File Transfer Protocol) – A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a Web site on a local machine, they are typically uploaded to the Web server using FTP.

FTP includes functions to log onto the network, list directories and copy files. It can also convert between the ASCII and EBCDIC character codes. FTP operations can be performed by typing commands

at a command prompt or via an FTP utility running under a graphical interface such as Windows. FTP transfers can also be initiated from within a Web browser by entering the URL preceded with ftp://.

Internet2 – The second generation of the Internet, developed by a consortium of more than 200 universities, private companies and the U.S. government. It was not developed for commercial use or to replace the Internet, but is the reincarnation of it, intended primarily for research. Whereas the Internet was first designed to exchange text, Internet2 is designed for full-motion video and 3D animations. Originally named UCAID (University Corporation for Advanced Internet Development), Internet2 spawned the high-speed Abilene backbone.

Kbps – One thousand bits per second. Kbps is used as a rating of relatively slow transmission speed compared to the common Mbps or Gbps ratings.

Last Mile – The connection between the customer and the telephone company, cable company or ISP. The last mile has traditionally used copper-based telephone wire or coaxial cable, but wireless technologies offer alternative options in some locations. Also called "first mile."

Mbps – Mbps means megabits per second and is used for transmission speeds in a network or in internal circuits.

Mobile Wireless – Refers to transmission through the air from a base station to a moving device such as a cell phone.

Cellular vs. Wi-Fi – Cellular carriers offer optional, digital data services for Web browsing, e-mail and other text and data applications. The data service is separate from the carrier's voice plans, often costing considerably more than a basic voice subscription. The cell phones must support the data service, which is also available for laptops and other portable devices with the installation of the appropriate modem.

Wi-Fi networks are available to the public in many cities and municipal areas. Individual venues such as airports and coffee shops also provide service. Typically fee based by the hour or day, some municipalities provide free service.

Location is the key issue in real estate and also the primary concern with wireless systems. For travelers who need ubiquitous connectivity, there are many gaps (white spaces) in Wi-Fi coverage. Although cellular data rates (EDGE, EV-DO, HSPA, etc.) are typically slower than Wi-Fi, cellular carriers offer the most inclusive coverage when traveling, very often equivalent to using a cell phone for voice.

Network – A system that transmits any combination of voice, video and/or data between users. The network includes the network operating system in the client and server machines, the cables connecting them and all supporting hardware in between, such as bridges, routers and switches. In wireless systems, antennas and towers are also part of the network.

Redundancy – Having a secondary peripheral, computer system or network device that takes over when the primary unit fails.

Remote access – The ability to log on to a computer or network within an organization from an external location. Remote access is typically accomplished by directly dialing up analog or ISDN modems or via a connection to the Internet.

Router – A network device that forwards packets from one network to another. Based on internal routing tables, routers read each incoming packet and decide how to forward it. The destination address in the packets determines which interface on the router outgoing packets are directed to. In large-scale enterprise routers, the current traffic load, congestion, line costs and other factors determine which outgoing line to forward to.

Satellite Broadband – Just as satellites orbiting the earth provide necessary links for telephone and television service, they can also provide links for broadband. Satellite broadband is another form of wireless broadband, also useful for serving remote or sparsely populated areas.

Downstream and upstream speeds for satellite broadband depend on several factors, including the provider and service package purchased, the consumer's line of sight to the orbiting satellite, and the weather. Typically a consumer can expect to receive (download) at a speed of about 500 Kbps and send (upload) at a speed of about 80 Kbps. These speeds may be slower than DSL and cable modem, but download speed is about 10 times faster than download speed with dial-up Internet access. Service can be disrupted in extreme weather conditions. (http://www.fcc.gov/cgb/broadband.html)

Server – A computer system in a network that is shared by multiple users. Servers come in all sizes from x86-based PCs to IBM mainframes. A server may have a keyboard, monitor and mouse directly attached, or one keyboard, monitor and mouse may connect to any number of servers via a switch. In large companies, servers often reside in racks in the datacenter, and all access is via their network connections.

SLA (Service Level Agreement) – A contract between the provider and the user who specifies the level of service that is expected during its term. SLAs are used by vendors and customers as well as internally by IT shops and their end users. They can specify bandwidth availability, response times for routine and ad hoc queries, response time for problem resolution (network down, machine failure, etc.) as well as attitudes and consideration of the technical staff.

Symmetrical – For the purposes of broadband technologies, it means that the download speed and upload speed are the same.

T1 – A 1.544 Mbps point-to-point dedicated, digital circuit provided by the telephone companies. The monthly cost is typically based on distance. T1 lines are widely used for private networks as well as interconnections between an organization's PBX or LAN and the Telco. The first T1 line was tariffed by AT&T in January 1983. However, starting in the early 1960s, T1 was deployed in intercity trunks by AT&T to improve signal quality and make more efficient use of the network.

TCP/IP (Transmission Control Protocol/Internet Protocol) – A communications protocol developed under contract from the U.S. Department of Defense to internetwork dissimilar systems. Invented by

Vinton Cerf and Bob Kahn, this de facto UNIX standard is the protocol of the Internet and the global standard for communications.

Telecommuting – Working at home and communicating with the office by phone, fax and computer. In the U.S., at the beginning of the 21st century, more than 30 million Americans were telecommuting at least one day a week. Also called "teleworking."

Telehealth – Telehealth and telemedicine are sometimes used interchangeably, however, telehealth is generally considered to be a broader and provider neutral term that encompasses various applications where technology and medicine are being utilized to provider better patient care.

Telemedicine – Using a videoconferencing link to a large medical center in order that rural health care facilities can perform diagnosis and treatment. A specialist can monitor the patient remotely taking cues from the general practitioner or nurse who is actually examining the patient. Also referred to as “long distance" medicine.

USAC (Universal Service Administrative Company) – An independent, not-for-profit corporation designated as the administrator of the federal Universal Service Fund by the Federal Communications Commission (FCC). USAC administers Universal Service Fund (USF) programs for high cost companies serving rural areas, low-income consumers, rural health care providers, and schools and libraries. The Universal Service Fund helps provide communities across the country with affordable telecommunications services. (http://www.usac.org/about/usac/)

USF (Universal Service Fund) – The goals of the Universal Service, as mandated by the Telecommunications Act of 1996, are:

♦ To promote the availability of quality services at just, reasonable, and affordable rates

♦ To increase access to advanced telecommunications services throughout the Nation

♦ To advance the ability of such services to all consumers, including those in low income, rural, insular, and high cost areas at rates that are reasonably comparable to those charged in urban areas

The Universal Service Fund (USF) was created by the Federal Communications Commission in 1997 to meet these goals. In addition, the 1996 Act states that all providers of telecommunications services should contribute to federal universal service in some equitable and nondiscriminatory manner; there should be specific, predictable, and sufficient Federal and State mechanisms to preserve and advance universal service; all schools, classrooms, health care providers, and libraries should, generally, have access to advanced telecommunications services; and finally, that the Federal-State Joint Board and the FCC should determine those other principles that, consistent with the 1996 Act, are necessary to protect the public interest. (http://www.usac.org/about/universal-service/purpose-of-fund/)

Video Conferencing – A real time video session between two or more users or between two or more locations. Although the first videoconferencing was done with traditional analog TV and satellites, in-house room systems became popular in the early 1980s after Compression Labs pioneered digitized

video systems that were highly compressed. While videoconferencing may comprise any number of end points communicating, the term "video chat" typically means between two end points only.

VoIP (Voice Over IP) – A telephone service that uses the Internet as a global telephone network. Many companies, including Vonage, 8x8 and AT&T (CallVantage), typically offer calling within the country for a fixed fee and a low per-minute charge for international. Broadband Internet access (cable or DSL) is required, and regular house phones plug into an analog telephone adapter (ATA) provided by the company or purchased from a third party.

VPN (Virtual Private Network) – A private network that is configured within a public network (a carrier's network or the Internet) in order to take advantage of the economies of scale and management facilities of large networks. VPNs are widely used by enterprises to create wide area networks (WANs) that span large geographic areas, to provide site-to-site connections to branch offices and to allow mobile users to dial up their company LANs.

WAN (Wide Area Network) – A long-distance communications network that covers a wide geographic area, such as a state or country. The telephone companies and cellular carriers deploy WANs to service large regional areas or the entire nation. Large enterprises have their own private WANs to link remote offices, or they use the Internet for connectivity. Of course, the Internet is the world's largest WAN.

Wi-Fi (Wireless-FIdelity) – Network devices comply with the IEEE 802.11 wireless Ethernet standards. In the early 2000s, Wi-Fi/802.11 became widely used (initially 802.11b, then 802.11g), and within a short time, all laptops and other handheld devices came with Wi-Fi built in. Earlier laptops can be Wi-Fi enabled by plugging in a Wi-Fi adapter via the USB port or PC Card.

WiMAX (World Interoperability for Microwave Access, Inc.) – An organization founded in 2001 that promotes the IEEE 802.16 wireless broadband standard and provides certification for devices for compliant devices. WiMAX is designed to extend local Wi-Fi networks across greater distances such as a campus, as well as to provide last mile connectivity to an ISP or other carrier many miles away. In addition, Mobile WiMAX offers a voice and higher-speed data alternative to the cellular networks. (www.wimaxforum.org)

~~Town of Sharon, NH: Example Telecommunications and Broadband Zoning Ordinance~~

~~A. Purpose~~

~~This article has been enacted in order to establish guidelines for regulating the installation of facilities for enhanced broadband services and fulfill the following goals:~~

1. ~~Preserve the authority of the Town of Sharon to regulate and provide reasonable opportunity for the siting, construction and maintenance of broadband services without cost to the town, or adjacent property owners, either directly or indirectly.~~

2. ~~Reduce the adverse impacts such facilities may create on, including, but not limited to: migratory bird flight corridors, impacts on aesthetics, environmentally sensitive areas, historically significant locations, health and safety by injurious accidents to person and property, and diminution of property values.~~

3. ~~Preserve Sharon's unique viewsheds, visual beauty, rural character, sensitive natural environment and scenic values, in particular those associated with Temple Mountain.~~

~~Regulations relating to Telecommunications Facilities (commonly known as cell towers and cell phone antennas) are covered in Article XXI: Telecommunications Facilities.~~

~~.~~

~~B. Definitions~~

~~Average Tree Canopy Height:~~ ~~Means the average height found by inventorying the height above ground level of all trees forming the canopy within a radius of one hundred and fifty feet (150'). Canopy height is determined utilizing the Forest Ecosystem Rapid Assessment Scorecard (FERAS)~~

~~Compound~~~~: Means the tower site and includes any and all accessory structures and exposed equipment, including security fencing.~~

~~Existing Structure~~~~: Means a residential or commercial building, barn, silo, water tower, public utility transmission power pole, tower or other similar structure where fixed wireless broadband technology is to be deployed.~~

~~Fixed Wireless Transmitter Tower Structure~~~~: Means a structure that supports one or more antenna(s) that receives and transmits fixed wireless signals to provide subscribers with high-speed (broadband) internet access capabilities.~~

~~Fixed Wireless Transmitter Antenna Array~~~~: Means any series of antenna or array of antennas that receives and transmits fixed wireless signals to provide subscribers with high speed (broadband) internet access capabilities.~~

~~Over-the-Air Reception Devices (OTARD):~~ ~~Federal Communications Commission adopted the OTARD rule in 1996 (47 C.F.R. Section 1.4000). OTARD rules as amended in 2000 prohibit restrictions on property that~~

~~impair the use of certain antennas. The rule applies to customer-end antennas serving customers on the premises that transmit and/or receive fixed wireless signals. Fixed wireless signals are defined to be any commercial non-broadcast communications signals transmitted via wireless technology to and/or from a fixed customer location.~~

~~**C. Permitted Uses**~~

~~**Amateur Radio:** The installation or use of a tower and/or an antenna less than seventy feet (70') in height which is operated and used exclusively by a federally licensed amateur radio station operator is not subject to the provisions of these Regulations~~

~~**Essential Services & Public Utilities:** Fixed Wireless Broadband Facilities shall not be considered infrastructure, essential services, or public facilities, as used elsewhere in the Town's ordinances and regulations. Siting for fixed wireless broadband facilities is a use of land, and is addressed by this regulation.~~

~~**D. Construction Performance Requirements:**~~

~~**Federal Requirements:** All Facilities must meet or exceed current standards and regulations of the Federal Aviation Administration (FAA), Federal Communications Commission (FCC), and any other agency of the federal government with the authority to regulate such Facilities. If such federal standards and regulations are changed, the owners of Facilities governed by this Article shall achieve compliance within six (6) months of the effective date of the changes, unless a more stringent compliance schedule is mandated by the controlling federal agency. Failure to bring facilities into compliance with any changes in federal requirements shall constitute grounds for the removal of the tower or antenna at the owner's expense, in accordance with Section H herein below through execution of the posted security.~~

~~**Building Codes/Safety Standards:** To ensure the structural integrity of towers and antennas, all facilities shall be inspected to determine structural safety every year by a licensed engineer approved by the Town, with the cost to be paid by the owner. The engineer will submit a report to the Town. If the report concludes that a tower fails to comply with all applicable codes and standards and constitutes a danger to persons or property, the owner will receive notice to bring such tower and/or antenna into compliance with such codes and standards within thirty (30) days of receipt of such notice. If the owner fails to comply within thirty (30) days, such action shall constitute an abandonment and grounds for the removal of the tower or antenna, in accordance with Section H herein below, at the owner's expense through execution of the posted security~~

~~**1. Fixed Wireless Transmitter Tower Structures:** These requirements shall supersede any and all other applicable standards found elsewhere in Town Ordinances or Regulations that are less strict.~~

> ~~**a. Height:** Facilities shall be erected and maintained at the lowest feasible height. In no case shall the height of any Facility exceed thirty-five (35) feet above the Average Tree Canopy Height, or one hundred (100) feet above ground, whichever is greater.~~
>
> ~~**b. Setbacks and Separation:** In addition to compliance with the minimum zoning district setback requirements for all structures, towers shall be set back a distance equal to 125% of the height of~~

~~the tower from all property lines. For locations adjacent to wetland, there shall be a setback of at least one hundred (100) feet from the boundaries of the wetlands conservation district.~~

~~**c. Security Fencing:** Towers shall be enclosed by security fencing not less than six (6) feet in height and be equipped with appropriate anti-climbing devices. Any accessory structure shall be situated fully within twenty feet (20') of the tower and within the fenced area.~~

~~**d. Landscaping:** A buffer shall be provided and maintained that effectively screens the view of the compound from adjacent residential property. The standard buffer shall consist of existing indigenous vegetation within the setback required in paragraph 2 above. Existing vegetation and natural landforms on the site shall be preserved to the extent possible. In some cases, such as towers sited on large wooded lots, natural growth around the property may be deemed a sufficient buffer.~~

~~**e. Camouflaging:**~~
~~i. At a tower site, the design of the buildings and related structures shall, to the maximum extent possible, use materials, colors, textures, screening, and landscaping that will blend the tower facilities with the natural setting and built environment.~~
~~ii. If an antenna is installed on a structure other than a tower, the antenna and supporting electrical and mechanical equipment must be of a neutral color that is identical to, or closely compatible with, the color of the supporting structure so as to make the antenna and related equipment visually unobtrusive.~~

~~**f. Balloon Test**: For the siting of any tower or similar structure, the applicant shall provide notice of a date on which a balloon (or balloons) will be floated at the proposed site, and provide photographs from locations specified by the Planning Board ("Board"). All towns within twenty (20) miles of the proposed location will be notified of the test, by certified mail, to be paid by the applicant. A notice will also be posted in a newspaper of general circulation within such municipalities. Such notice shall be published not less than seven (7) days nor more than twenty-one (21) days prior to the public hearing date. The test will be continued for a minimum of three (3) hours and if cancelled or delayed by inclement weather, such as limited visibility or wind velocities above ten (10) miles per hour, the test will be re-scheduled and re-noticed, as detailed above~~

~~**g. Fall Zone:** In order to insure public safety, no structures (other than those within the compound) shall be within an area of setback, as detailed in paragraph 2 above.~~

~~**Fixed Wireless Transmitter Antenna Array** may be located on an existing structure in any zoning district, but may not exceed five (5) feet above the existing structure. Before attaching any fixed wireless transmitter antenna array technology to any public utility transmission towers or poles a written request must be submitted to the Board of Selectmen and obtain the Selectmen's written approval. The applicant shall provide any and all information or documents requested. The written approval shall be subject to such conditions as the Selectmen may require. Before attaching fixed wireless transmitter antenna array to any existing residential or commercial building, governmental building, barn silo or other similar structure an application for a Conditional Use Permit shall be submitted to the board as set forth in Section E hereunder.~~

~~If an antenna is installed on the exterior of a structure other than a tower, the antenna and supporting electrical and mechanical equipment must be of a neutral color that is identical to, or closely compatible with, the color of the supporting structure so as to make the antenna and related equipment visually unobtrusive.~~

~~**E. Conditional Use Permits**~~

~~**General:** Fixed Wireless Transmitter Tower or Antenna Array are permitted upon obtaining from the Board a Conditional Use Permit (excluding those attaching to public utility transmission towers and approved by the Board of Selectmen). All such uses must comply with other applicable ordinances and regulations of the Town of Sharon, except for those specifically noted herein. The applicant shall use the form of Application for Fixed Wireless Transmitter Tower and Antenna Facilities as provided by the town. Request for waivers from the application (Section F) must be made in writing, noting the name of the project, and the date of application which request shall become a part of the application. Conditional Use Permit approval may be granted by the Board pursuant to RSA 674:21 after a public hearing. All applications for Tower Structure shall contain a scaled plan in accordance with the Site Plan Review Regulations and further information including a scaled elevation view, topography, radio frequency coverage, tower height requirements, setbacks, drives, parking, fencing, landscaping, adjacent uses (up to two hundred feet [200'] away), and any other information deemed necessary by the Board to assess compliance with this regulation. The board may decline to grant a Conditional Use Permit if the applicant does not provide sufficient additional broadband capabilities for the residents of the Town of Sharon.~~

~~**Issuance of Conditional Use Permits:** In granting the Conditional Use Permit, the Board may impose conditions to the extent the Board concludes such conditions are necessary to minimize any adverse effect of the proposed tower or antennas on adjoining properties, and preserve the intent of this article.~~

~~**Procedure on Application:** The Board shall act upon the application in accordance with the procedural requirements of the Site Plan Review Regulations and RSA 676:4. Each applicant shall pay an application fee as specified on the form of Application for Fixed Wireless Transmitter Tower and Antenna Facilities. If the Board determines that additional technical review is required, such review shall be conducted at the applicant's expense. The board will attempt to limit such expenses, but refusal by the applicant to pay for such technical assistance as the board determines to be necessary~~
~~hall be grounds for denial of the permit.~~

~~The Board will consider the following factors before making a decision regarding a request for Waiver or the granting of a Conditional Use Permit:~~

~~1. The activity is a productive and reasonable use of the land and is in compliance with the purpose of this regulation.~~

~~2. Design, construction and maintenance methods are established to minimize detrimental impacts.~~

~~3. Factors that will be considered in granting decisions:~~

~~a. Height of the proposed supporting tower structure.~~
~~b. Mechanical safety of the structure.~~
~~c. Compliance with Radiofrequency Electromagnetic Fields (RF) exposure guidelines.~~

~~d. Proximity of tower structure to residential development.~~
~~e. Nature of uses on adjacent and nearby properties.~~
~~f. Surrounding topography.~~
~~g. Surrounding tree coverage and foliage.~~
~~h. Design of the tower with particular reference to design characteristics that have the effect of reducing or eliminating visual obtrusiveness.~~
~~i. Proposed ingress and egress to the site.~~
~~j. Visual impacts on viewsheds, ridgelines, and other impacts by means of tower structure location, tree and foliage clearing and placement of incidental structures.~~
~~k. Availability of alternative tower structures and alternative siting locations.~~

~~If the applications is for the construction of a free standing Fixed Wireless Transmitter Tower Structure, the requirements detailed under Article XX: Telecommunications Facilities, Section F Plan Requirements will apply.~~

~~**Decisions:** All decisions shall be rendered in writing. A denial of the Conditional Use Permit or any waivers requested by the applicant must be based upon evidence contained in the written record. Conditions demanded by the Board will be detailed in the letter of approval and the minutes of the board.~~

~~**F. Waivers**~~
~~1. Any requirement of this article may be waived or modified when, in the opinion of the Board, strict conformity would pose an unnecessary hardship to the applicant and such waiver would not be contrary to the spirit and intent of the article or that specific circumstances relative to the project indicate that the waiver will properly carry out the spirit and intent of the article.~~

~~2. The basis for any waiver granted by the Board shall be recorded in the minutes of the Board, and recorded in the decision of the board.~~

~~**Conditions:** In approving waivers, the Board may impose such conditions as it deems appropriate to substantially secure the objectives of the standards or requirements of this article.~~

~~**Procedures:** A petition for any such waiver shall be submitted in writing by the applicant for Board review. The petition shall state fully the grounds for the waiver and all of the facts relied upon by the applicant.~~

~~**G. Bonding and Liability Insurance**~~
~~The applicant shall provide a surety bond or other appropriate security to the Town in an amount sufficient to cover the costs of removal and disposal of the facility components. The Board shall set the form and amount of the security. The Board shall also require the applicant to submit proof of appropriate liability insurance with respect to the proposed facilities prior to construction. The term of the bond shall be determined by the Board. The Selectmen shall administer the bond requirements. In addition, if the Board requires an engineering assessment in order to set the amount of the bond, the cost shall be borne by the applicant.~~

~~**H. Removal of Abandoned Antennas and Towers**~~
~~Any antenna or tower that is not operated for a continuous period of 12 months shall be considered abandoned and hazardous to the public health and safety, unless the owner of said tower provides proof~~

~~of quarterly inspections with results satisfactory to the Board. The owner shall remove the abandoned structure within ninety (90) days of receipt of a declaration of abandonment from the Town. A declaration of abandonment shall be issued only following a duly noticed public hearing in accord with Town regulations. Abutters and the last known owner/operator of the tower shall also receive notice. If the abandoned tower is not removed within ninety (90) days, the Town may execute the security and have the tower removed. If there are two or more users of a single tower, this provision shall not become effective until all users cease using the tower.~~

~~I. Administration and Enforcement~~

~~It shall be the duty of the Board of Selectmen, and they are hereby given the power and authority, to enforce the provisions of this article. The Selectmen may appoint an agent to enforce this article.~~

~~Upon any well-founded information that this article is being violated, the Selectmen shall take immediate steps to enforce the provisions of the article by seeking an injunction in the Superior Court or by any other legal action.~~

~~J. Appeals~~

~~Pursuant to RSA 676:5, any decision made under this article cannot be appealed to the Board of Adjustment, but to the superior court as provided by RSA 677:15.~~

~~Adopted~~ ~~(date)~~

~~City of Boston, MA Grant of Location Policy~~

~~IN PUBLIC IMPROVEMENT COMMISSION~~
~~OF~~
~~THE CITY OF BOSTON~~

~~POLICY RELATING TO GRANTS OF LOCATION FOR NEW CONDUIT NETWORK FOR THE PROVISION OF COMMERCIAL TELECOMMUNICATIONS SERVICES.~~

~~1. The policy objective of the City of Boston, acting through its Public Improvement Commission " PIC ", " the City ", or " the Commission ", is, consistent with public interest, to maximize the availability of new conduit networks (" Networks ") for the provision of commercial telecommunications services within the City and to minimize multiple street openings and resulting disruption to the public ways. This policy shall apply to each Network constructed within the Telecommunication Impact Area, as defined in the attached statement, and as adopted by vote of the PIC on March 1, 1990, and shall apply to~~

~~Networks constructed outside said Telecommunication Area if there is more than one Network to be constructed. Repair of conduit in such disrepair that substantial replacement is required shall be considered " new " conduit subject to this policy. The phrase commercial telecommunications services is intended to be broadly defined and be all inclusive of any and all public or private telecommunications services provided in any manner by a Network operator.~~

~~2. Specifically, the PIC adopts the following policy objectives to be met in the construction, installation and maintenance of new conduit for the use of one or more Networks. The actions to be taken by the Network operators and the City will [i] minimize disruption to the City's public ways, [ii] allow the planned development of telecommunications facilities within the City to benefit Boston's economy, [iii] provide future Network applicants reasonable and timely access to City streets and [iv] facilitate the timely construction of all such Networks.~~

~~3. Therefore, pursuant to the authority vested in the PIC, the following policy is hereby adopted.~~

~~I. **Minimize Disruption to the City's Public Ways**~~

~~4. The Public Improvement Commission has the duty to regulate and oversee the use of the City's public ways, subterranean spaces and air-rights. The Commission finds that the management of the public ways has been made more complex because of the recent increase in building construction in the core of the City, the attendant activity in and under City streets, and a corresponding increase in vehicular traffic. Further, the Commission finds that the depression of the Central Artery and construction of the Third Harbor Tunnel will create significant future complexities in all aspects of the management of Boston streets.~~

~~5. To minimize the number of street cuts and to allow all Network applicants reasonable access to City streets, in principle only one new grant of location for new conduit for commercial telecommunications services will ordinarily be issued by the Commission for each downtown street or part thereof located within the Telecommunications Impact Area but such a grant may be made to two or even more applicants simultaneously.~~

~~6. Generally, the first responsible applicant for grants of location will become the " Lead Company " with the overall operational responsibility for the installation and maintenance~~

~~of new conduit at the requested locations. The P.I.C. will expect to communicate with only one such Lead Company concerning all aspects of a conduit construction project and future maintenance of the public ways no matter how many other firms are also licensed to occupy the designated locations. The PIC reserves the right to designate a Lead Company, if necessary, in furtherance of this policy.~~

~~7. Within five days following a preliminary review of its initial application by the staff of the PIC or at such other time as the PIC may allow, the Lead Company must notify all companies whose names are on file with the PIC. and must give the same notice by publication. Such notice shall disclose where the Lead Company intends to construct conduit and contain a clear map of the proposed route or locations including all proposed lateral or connecting conduit to specific locations. The Lead Company shall invite all other firms to join with it in placing their own conduit and laterals in all opened streets on a cost-shared basis. Interested companies have~~ **~~10 business days from the receipt of the notice to respond to the Lead Company~~** ~~informing it of their intention to enter into a joint construction project. share costs, and jointly occupy some or all of the designated locations. Prior to and during construction, all service connections applied for from the Department of Public Works by a Lead Company or a Participant in a Network project after an original plan and map have been submitted as required herein shall notify all other participants in the Network project of such application and shall afford an opportunity for each to place conduit in such service connection if requested; in every case City conduit shall be installed in such service connections unless waived by the PIC.~~

~~8. Thereupon, all interested companies [Participants] shall work with the Lead Company to submit a coordinated plan to the PIC.~~ **~~Each company shall file amended or simultaneous applications for the desired grants of location within forty [40] days of the receipt of the initial notice from the Lead Company, or such other time as the PIC may allow.~~** ~~Each application will include specifications indicating the number and size of the conduits to be constructed as well as a plan for the maintenance of and access to the proposed conduit system. Ordinarily, grants of location will not be issued to the Lead Company or any other Participant in the project unless the PIC is satisfied that all interested firms have had an opportunity to place their conduit in all the requested locations and each shall have executed a "Participant's Agreement" as defined in~~

~~paragraph 10 of this policy with the Lead Company and the Lead Company shall have executed a "Lead Company Agreement", as defined in paragraph 15 of this policy. Among engineering specifications that may ordinarily be required, manholes or handholes shall be installed at major intersections, or other designated locations, at such appropriate intervals as the PIC may deem necessary. Laterals and service connections shall not ordinarily exceed 250 feet in length and shall be located to minimize traffic disruptions and future street openings. The use of pedestals or any surface mounted structures shall require both PIC and Department of Public Works approval.~~

~~9. **Once the PIC has granted locations, the Lead Company must begin construction within 90 days, unless in conflict with the Commission policies prohibiting winter holiday season construction; otherwise, its grants of location shall expire and become void.** Ordinarily, when any Network conduit trench is being constructed, the City will inspect the trench area with a representative of the Lead Company prior to the completion of the construction. The City retains the right, upon inspection or upon determination that a condition hazardous to public health and safety exists as a result of Network construction, to order such additional work or modifications as may be required to correct any such defects or condition. Any increased fee, deposit or additional cost incurred shall be deemed a shared cost for which Lead Company and Participants shall be liable.~~

~~All Participants in a Network at their sole cost and expense shall abide by all City of Boston and Department of Public Works rules, regulations and practices, including specifically requirements relating to street resurfacing and reconstruction; all costs of compliance shall be deemed shared costs among Network Participants.~~

~~During the backfilling of any trench area the City may, at its option, provide inspectors, the cost of which shall be paid for by all Network participants as a shared cost.~~

~~All Network participants shall abide by the City's special regulations pertaining to the list of streets which were reconstructed or resurfaced during the preceding 5 years, and shall be liable for all costs of cold planing and all costs of curb-to-curb resurfacing required for said streets. All such costs shall be deemed shared costs among all Network participants.~~

~~10. In the event there is in fact more than one applicant for the same locations, all such applicants shall enter into a contract, the " Participant's Agreement ". to construct, manage,~~

~~and maintain the proposed conduit system on a cost shared basis. Each Participant's Agreement shall be substantially in the form and content as attached hereto, entitled Model Participant's Agreement.~~

~~11. Consistent with the public interest, the review of all license applications shall include a review by the PIC of any Lead Company Agreement or Participant's Agreement contract provisions, including but not limited to : sharing, disclosure, and certification of costs; escrow agreement; rights and responsibilities of other licensee companies; construction scheduling; coordination of access to the proposed conduit; maintenance of conduits; ownership; maintenance and access to manholes; liability issues; and administrative matters.~~

~~**12. To assure that conduit capacity will be available in the future without the need to make repeated street openings, the City will normally contract with a licensee [or joint licensees] to install a spare or additional conduit [the City Conduit] alongside any new conduit within the Telecommunications Impact Area or, in the event that there is more than one licensee in a Network to be constructed outside the Telecommunications Impact Area, in such Network, unless waived by the PIC according to paragraph 18 hereof. The City Conduit will parallel all such newly constructed conduit whether characterized as " trunk " or " lateral ". City conduit shall extend to the property line of any location to which the Lead Company or any Participant is connected. The City Conduit shall be deemed to be a shared cost among all Licensees in a Network and shall be constructed by the Licensee or joint Licensees in such Network but thereafter the City Conduit itself will be owned and maintained by the City of Boston, which will hold it for future use.~~**

~~13. Network applicants applying to the PIC for new locations after streets have already been cut and new conduit installed, including the City Conduit, shall normally be expected to locate their cables in the City Conduit, or, upon appropriate application, in other existing conduit.~~ ~~**The City Conduit, as installed, consists of four [4] separate 1-1/4 plastic pipe sections or their equivalent, [each a " City Conduit Section "] fused into a single bank.**~~ ~~In order to assure non-discriminatory and efficient use of the City Conduit, and in order to promote efficiency of use, persons wishing to lease the City Conduit shall in any application for a grant of location demonstrate the need in fact for that number of City~~

~~Conduit Sections for which grants of location and rental agreements are sought, and no rental agreement shall be executed until and unless the P.I.C. finds that the number of City Conduit Sections to be leased are in fact needed by such applicant and will be forthwith used by and useful to such applicant.~~

~~In furtherance of this policy, subject to availability, the City will make available each City Conduit Section to any and all subsequent licensees for fair and reasonable compensation on a non-discriminatory basis, as generally set forth in the Model Lead Company Agreement in Section 4.4 and Schedule D thereof and as specifically set forth in the Model Rental Agreement defined in this paragraph. The Lump sum payment to be made pursuant to said Section 4.4 said Schedule D, and the Model Rental Agreement shall be made separately for each City Conduit Section to be leased. At the time the PIC grants any location for the use of any City Conduit Section, it shall determine an additional annual rental payment to be made based on a review of then current market data relating to the rental of comparable conduit in Boston. During the calendar year 1999 and every fifth year thereafter, the PIC shall make a finding of the applicable market rental rate for all leases of City Conduit Sections and such rental rate shall apply to each such lease for the next five calendar years. At the time the grant of location is made and the rental agreement is executed, pro-rated rent shall be payable for the remainder of the calendar year. Thereafter, all annual rent shall be paid in advance on or before the fifteenth day of January of each year.~~

~~Each lease of a City Conduit Section shall be in accordance with the terms and conditions of a standard rental agreement with the City [the "Model Rental Agreement"] which shall be substantially in the form and content as attached hereto. Any person who leases a City Conduit Section shall be required to become a Participant in a Network and both the Lead Company and the lessee of City Conduit shall be required to execute a Model Assignment, Assumption and Consent substantially in the form attached hereto. The Model Rental Agreement shall also provide that the lessee will assume its share of the City's existing obligations to the Lead Company for each City Conduit Section leased.~~

~~Any and all lateral or service connections constructed with respect to any leased City Conduit Sections, and any and all manholes or handholes constructed, shall be at the sole cost and expense of the lessee and shall only be installed after design approval by the staff of the PIC.~~

~~After a Network is constructed, the construction of new lateral conduit for the purpose of making service connections to particular addresses shall be governed by the provisions of a Lateral Lead Company Agreement between the City and a Licensee, all as appearing substantially in the Model Lateral Lead Company Agreement attached hereto. Licensees, other than a Lead Company that has already constructed new conduit networks may, upon execution of a Lateral Lead Company Agreement. perform construction of laterals according to the provisions of said agreement. Any Licensee constructing laterals shall locate new City Conduit, that is, four [4] 1-1/4 inch pipes, in such locations at the sole cost and expense of the Licensee, or in the event that other Participants locate conduit at such time, as a shared cost, as the case maybe.~~

~~The PIC expressly recognizes the competitive necessity of establishing prompt service connections in each Network within the Telecommunication Impact Area, and requires that each licensee constructing laterals, manholes, handholes or service connections facilitate such connections for all licensees in an expeditious manner. Any entity licensed to be in a Conduit System, including any lessee of a City Conduit Section, shall have the right to petition the Chairman of the PIC for enforcement of this policy in the event that any licensee fails to fulfill any of its obligations with respect to the construction of service connections or Laterals in an expeditious manner.~~

~~14. All conduit whether existing or newly constructed may only be occupied, operated, and maintained pursuant to a grant of location granted by the PIC , or the City's predecessor licensing authorities.~~

~~15. In order to implement this policy, a contract between the City and each Lead Company shall be required. The City and the Lead Company shall execute a contract, the " Lead Company Agreement ", substantially in the form and content attached hereto, entitled, Model Lead Company Agreement. Through the Lead Company Agreement and the Participant's Agreement, licensees will agree to take all needed steps to abide by the P.I.C.'s policies and procedures, install the City Conduit, minimize street cuts, and take appropriate steps to minimize traffic disruption and damage to the integrity of city streets. Each Lead Company Agreement and each Participant's Agreement must be executed prior to any vote of PIC granting any location for that Network.~~

~~II. **Encouraging the Orderly Creation of Telecommunications Conduit That Will Materially Benefit Boston In The Future.**~~

~~16. Over time, the City seeks the construction of a conduit Network that will serve the needs of the future telecommunications users, including public safety and other critical public services. Initially, such conduits will be located chiefly in the Downtown Financial District and Back Bay, but will also reach out to other neighborhood locations within the Telecommunications Impact Area. An extensive conduit system will eventually serve the maximum number of commercial and public buildings as well as such other locations as a licensee may apply for. The number and size of conduits to be installed as part of the new conduit system, as well as lateral branching, shall be approved by the PIC and incorporated into any license issued for a grant of location.~~

~~III **All Network Applicants Shall Have Access to City Streets On a Non-Discriminatory Economic Basis.**~~

~~17. Future Network operators who are not joint licensees during the construction of new conduit may apply at any time for licenses to occupy the City Conduit. Consistent with paragraph 13 herein, the City will lease its conduit space to such subsequent Network licensees " Future Participants " on a non discriminatory basis according to the terms and conditions set forth in the Model Rental Agreement with the City, and in accordance with the Model Lead Company Agreement and Model Assignment, assumption and Consent and specific executed Lead Company Agreements relating to the specific locations which such Future Participants wish to utilize. The Commission recognizes that in certain cases not all future licensees will be able to utilize the City Conduit. If the City Conduit is unavailable or inappropriate, subsequent license applicants may be permitted to install their own new conduit.~~

~~**18, The City retains the right to waive the City Conduit requirement; however, if it intends to waive the City Conduit requirement it shall give public notice of its intention to do so and the PIC shall vote to make such waiver and state the reasons for so doing . The City reserves the right to use its conduit for any purpose whatsoever, but its use will be compatible with other telecommunications uses in the same locations.**~~

~~19. The PIC shall issue such rules and regulations as may be necessary to interpret and implement this policy.~~

~~**IV Facilitate Construction of Networks**~~

~~20. The City will encourage the design and installation of new conduit for licensed Networks as quickly as possible. To this end, the procedure to apply for a revocable license for the grants of locations required before construction or occupation of a conduit system is summarized as follows:~~

~~1.) Applicants shall disclose to the PIC all data requested in the City's Request for Information.[See e.g. Request dated May 6, 1988.]~~

~~2. Applicants will be given a timely and public opportunity to testify before the PIC on the merits of any license or joint license application.~~

~~3. Grants of location shall be made subject to conditions to assure compliance with the PIC policies, and procedures, as herein adopted or later amended.~~

~~4. Applicants issued grants of location shall simultaneously enter into a contract with the City concerning the manner in which new conduit shall be constructed and occupied.~~

~~5. Licensees shall be required to comply strictly with all ordinances, PIC procedures and regulations, contractual provisions and license conditions as well as administrative procedures concerning street opening permits, construction scheduling, and traffic~~

~~management.~~

~~**Adopted by vote of the Public Improvement Commission on August 4, 1988.**~~

~~**Amended by vote of the Public Improvement Commission on March 1, 1990.**~~

~~**Amended by vote of the Public Improvement Commission on April 28, 1994**~~

Windham Broadband Survey

Survey Respondents

Matt Mock
Medicus Health Care Solutions, LLC
Marry Ann Pfeiffer
108 Degrees, LLC
John Connors
The Troupe
Deborah Vandeberghe
Private Island Cakes
Trent Sanders
36Creative
Thomas Case
Resident
Garage Storage Cabinets of Northern New England
Spencer Hehje
Kevin Verratti
Windham School District

Alexandra Van De Water
The Dubay Group, Inc.
Daniel Koravos
DK Engineering Associates, Inc.
Scott Baetz
AdminInternet
David Sullivan
Windham Town Administrator
Michelle McManus
Benchmark-Office Systems
Meghan Lemke
Quarry Brook Outdoor Learning Center
Gerry Lewis
Windham Police Department

Al Getler
Ellie Wheels Media Inc.

Survey Responses

Question #1: Do you have adequate high speed broadband service?

	YES	NO
Medicus Health Care Solutions, LLC		No, the speed does not allow us to take advantage of heavy cloud usage or remote office connectivity.
108 Degrees, LLC	I would prefer if it were faster, however I already pay Comcast several limbs per month so I can't really afford a higher cost service.	
The Troupe	Yes	
Private Island Cakes	The broadband speed I have is adequate for this business but faster connection speeds would certainly be welcome.	
36Creative	Average, we could always use more.	
Garage Storage Cabinets	Yes	
Windham School District	At this time yes, our solution is scalable to meet our needs should we require faster speed.	
Ellie on Wheels Media Inc.	Adequate is the best way to describe it.	
The Dubay Group, Inc.	We currently do have adequate high speed broadband service for our needs.	
Windham Police Department	Yes, but efficiency and effectiveness of the customer system impacts our service.	
DK Engineering Associates, Inc.	Yes	
AdminInternet	Yes, we most certainly do. We subscribe to Comcast, we have the option of increasing our overall bandwidth for	

	additional funds. The standard rate, and supplemental rates are both appropriate for our needs and essentially the industry standard, so we have more than adequate speed.	
Quarry Brook	Yes	

Question #2: Do you need faster speeds?

	YES	NO
Medicus Health Care Solutions, LLC	We are currently having our provider Windstream install fiber to accomplish as we do need faster download and upload speeds.	
108 Degrees, LLC	Gawd yes.	
The Troupe		No
Private Island Cakes	I don't need faster speed but it would definitely help make me more efficient.	
36Creative	Yes	
Garage Storage Cabinets		No
Windham School District		Not at this time.
Ellie on Wheels Media Inc.	Yes for website design and uploads.	
The Dubay Group, Inc.		We currently do not need faster speeds for our business type. We mostly send emails so it is not critical to have the fastest broadband. If we became a huge company that relied on VOIP phones, frequent video conference calls between multiple offices, or if all our data was stored 100% in the

		cloud we would need faster speeds.
Windham Police Department	Yes.	
DK Engineering Associates, Inc.		No.
AdminInternet		Want versus need would be the key phrase here. We need no additional speed, would we enjoy it, sure. Speed is NOT a hold back for us.
Quarry Brook		As of now the speed works well For us.

<u>Question #3</u>: Do you have or need a "back up" internet connection during power outages?

	YES	**NO**
Medicus Health Care Solutions, LLC	Yes, we must have redundant connectivity at all times.	
108 Degrees, LLC	We have a generator so we don't usually lose internet during power outages... however when the internet goes down, we are without phone or internet service, so it is pretty devastating.	
The Troupe		No
Private Island Cakes	I would definitely benefit from a backup internet connection when the power goes out. As it stands, I usually end up at the library as soon as they are up but that's not ideal working conditions. Having an internet connection is vital for me to be able to work when it's down, I don't get paid.	

36Creative	Would be amazing.	
Garage Storage Cabinets		No
Windham School District		We have several backups to our connection, one via coax and being wireless hotspots.
Ellie on Wheels Media Inc.	That would be wonderful.	
The Dubay Group, Inc.		Currently we do not need a "back up" internet connection because most of our data is local on our machines. If we made the switch to a cloud based data storage system we would need a "back up" internet connection. Data storage is rapidly moving online to non-local "cloud" storage systems and not being able to have access to it would shut down the business until the internet came back online.
Windham Police Department	Need back-up/redundancy (off site).	
DK Engineering Associates, Inc.		No
AdminInternet		We do not run that type of business our servers are located in several locations throughout the U.S, so we are not too concerned if we lose service here due to power issues.
Quarry Brook		It would be good to have but not necessary.

Question #4: What were the results of the speed test?

	Download	Upload
Medicus Health Care Solutions, LLC	5 mb	5 mb
108 Degrees, LLC	15.31 mbps	12 mbps
The Troupe	38 mbps	12 mbps
Private Island Cakes	5 mbps	5 mbps
36Creative	21536 kbps	8878 kbps
Thomas Case	94.92 mps	12.14 mps
Garage Storage Cabinets	20 Mps	13.8 Mps
Windham School District	13 mbs	61 mbs
Ellie on Wheels Media Inc.	15.40 Mbps	8.08 Mbps
The Dubay Group, Inc.	31.22 Mbps	11.17 Mbps
Windham Police Department	5.38 Mbps	10.84 Mbps
DK Engineering Associates, Inc.	6479 kbps	3954 kbps
AdminInternet	35 Mps	8.91 Mps
Windham Town Administrator	5.50 Mps	11.08 Mps
Benchmark-Office Systems	4.69 Mbps	.04-.08 Mbps
Quarry Brook	10.60 Mbps	8.24 Mbps

Question #5: Other comments-

	Comments
Medicus Health Care Solutions, LLC	Having more fiber in the area would allow more providers at a lower cost for business class circuits.
The Troupe	Regarding providers, I found that FairPoint is just trying to compete whereas Comcast has been more aggressive to get the business and has provided more bandwidth options.
36Creative	We have very unique needs as the internet is basically the backbone of our company.
Garage Storage Cabinets	Provider: FairPoint Fios!
Windham School District	All buildings in the SAU are connected via fiber to the SAU and receive internet service from the central office.
Ellie on Wheels Media Inc.	Not that I have had issues with them, but it would be nice to have a Comcast alternative.

Windham Police Department	Any improvement(s) to broadband service need to include quality network engineering of the customers system; otherwise, such improvement(s) serve no purpose.
AdminInternet	Internet speed is not a business barrier for our business at this time

Table 8: Reasons for not having Internet

Which of the following is the most important reason why you don't have internet access at home?

Respondents	It is not available where I live	I have access at another place such as my job	It is too expensive	I don't know how to use it	I don't need it	I don't have an adequate computer	Some other reason	Don't know	Number responding
Statewide	5%	9%	20%	8%	26%	9%	21%	2%	262
SNHPC Region	**0%**	**5%**	**17%**	**10%**	**29%**	**13%**	**27%**	**0%**	**43**

Source: Granite State Future 2013 Statewide Survey

Table 9 Types of Internet Connections

What type of connection do you have to the internet at home?

Respondents	Dial-up	DSL	Cable	Fixed wireless	Cellular	Satellite	Fiber	Other	Don't know	Number responding
Statewide	1%	16%	68%	5%	2%	2%	2%	1%	3%	2646
SNHPC Region	**1%**	**9%**	**79%**	**4%**	**1%**	**0%**	**3%**	**2%**	**1%**	**547**

Source: Granite State Future 2013 Statewide Survey

Table 10: Why Dial-up/Satellite?

If you are on dial-up or satellite, why?

Respondents	Only available option	Too costly to change	Too much effort to change	Learning curve is too steep	I don't know what other options are available	Other	Don't know	Number responding
Statewide	26%	9%	2%	2%	2%	10%	49%	158
SNHPC Region	**0%**	**11%**	**0%**	**0%**	**0%**	**17%**	**72%**	**9**

Source: Granite State Future 2013 Statewide Survey

Table 11: Current Provider Choice

Why are you using your current provider?

Respondents	I'm happy with my current provider	Only option available	Too costly to change	Too much effort to change	Learning curve is too steep	I don't know what other options are available	Other	Don't know	Number responding
Statewide	22%	39%	5%	3%	0%	2%	23%	6%	2631
SNHPC Region	**24%**	**31%**	**3%**	**4%**	**0%**	**1%**	**31%**	**6%**	**545**

Source: Granite State Future 2013 Statewide Survey

Table 12: Monthly Internet Bill Prices

What is your monthly internet bill?

Respondents	Less than $20	$20-49	$50-99	$100 or more	Don't know	Number responding
Statewide	3%	25%	29%	24%	19%	2590
SNHPC Region	**1%**	**21%**	**31%**	**28%**	**19%**	**537**

Source: Granite State Future 2013 Statewide Survey

Table 13: Bundled Services

Do you pay for a bundled service (internet, TV, phone)?

Respondents	Yes	No	Don't know	Number responding
Statewide	76%	22%	2%	2624
SNHPC Region	**79%**	**20%**	**2%**	**545**

Source: Granite State Future 2013 Statewide Survey

Table 14: Email

Do you use the internet to check your email at home?
If Yes: Is the speed of your internet connection too slow, or is the speed of your internet connection adequate for this?

Respondents	Do not check email at home	Do, but connection is slow	Do, and connection speed is adequate	Don't know	Number responding
Statewide	4%	5%	90%	1%	2622
SNHPC Region	**4%**	**3%**	**93%**	**0%**	**542**

Source: Granite State Future 2013 Statewide Survey

Table 15: Shopping Online

Do you use the internet to shop online at home?
If Yes: Is the speed of your internet connection too slow, or is the speed of your internet connection adequate for this?

Respondents	Do not shop online at home	Do, but connection speed is slow	Do, and connection speed is adequate	Don't know	Number responding
Statewide	19%	5%	75%	0%	2622
SNHPC Region	**18%**	**5%**	**77%**	**0%**	**541**

Source: Granite State Future 2013 Statewide Survey

Table 16: Online Videos

Do you use the internet to watch online video, such as YouTube or Netflix at home?
If Yes: Is the speed of your internet connection too slow, or is the speed of your internet connection adequate for this?

Respondents	Do not watch online video at home	Do, but connection speed is slow	Do, and connection speed is adequate	Don't know	Number responding
Statewide	37%	10%	53%	1%	2622
SNHPC Region	**32%**	**8%**	**60%**	**0%**	**542**

Source: Granite State Future 2013 Statewide Survey

Table 17: VPN

Do you use the internet to connect to other computers using VPN (Virtual Private Network) at home?

Respondents	Do not connect to other computers at home	Do, but connection speed is slow	Do, and connection speed is adequate	Don't know	Number responding
Statewide	66%	4%	27%	2%	2612
SNHPC Region	**60%**	**7%**	**32%**	**1%**	**542**

Source: Granite State Future 2013 Statewide Survey

Table 18: Adequate Internet Connection?

Overall, do you consider your internet connection at home to be adequate for your uses?

Respondents	Yes	No	Don't know	Number responding
Statewide	92%	7%	1%	2630
SNHPC Region	**94%**	**5%**	**1%**	**544**

Source: Granite State Future 2013 Statewide Survey

Table 19: Paying for Faster Internet Speeds

How much more (if any) would you be willing to pay for faster internet speeds?

Respondents	Nothing	25% more per month	50% more per month	Don't know	Number responding
Statewide	85%	11%	2%	3%	2622
SNHPC Region	**87%**	**9%**	**1%**	**3%**	**543**

Source: Granite State Future 2013 Statewide Survey

Table 20: Using Municipal funds for Broadband Access

Do you favor or oppose using municipal funds to provide broadband access to existing and potential development?
If Favor: Would you be willing to pay higher fees or taxes to pay for it?

Respondents	Favor higher taxes	Favor no taxes	Oppose	Don't know	Number responding
Statewide	26%	16%	51%	6%	2910
SNHPC Region	**22%**	**18%**	**56%**	**4%**	**589**

Source: Granite State Future 2013 Statewide Survey

~~The following pages provide a Resource Guide and Grant Calendar Spreadsheet for Communities Interested in Making Broadband Investments~~

~~This Guide was prepared by the Director of Broadband Technologies, NH DRED (03/2014)~~

~~Organization~~	~~Grant/Loans~~	~~Timeframe/deadline~~	~~Available Funding~~	~~Rules~~	~~Frequency~~	~~Who is Eligible~~	~~Web Address for Information~~
~~Community Connects Grants USDA~~	~~(RUS) Library Development Grant~~	~~Applications for the 2013 Fiscal Year are currently being accepted. All applications must be submitted to RUS by May 3, 2013.~~	~~50,000 to 1.5 million~~	~~Each project requires matching contributions (15%) must serve a rural area where broadband service does not exist, and must offer basic service to all premises within proposed service area. And Applicants must provide broadband for two years to libraries and other community facilities free of charge.~~	~~Annually~~	~~Eligible for funding:: Incorporated Organizations Indian Tribes or Tribal Organizations, State or local units of government, or Cooperative, private corporations or limited liability companies, organized on a for-profit or not-for-profit basis Eligible areas include: A single community with a population less than 20,000 which does not have Broadband~~	~~http://www.rurdev.usda.gov/utp_commconnect.html~~
~~Community Development Finance Authority~~	~~The Community Development Block Grant program offers funding:~~	~~Economic Development Funding-On-Going~~	~~4,000,000~~	~~Must Apply Online at the website for any grants~~	~~On-going yearly~~	~~Grantee: Municipal sponsors of the project. Sub-recipient: An Economic Development Entity Business: the entity which will create the jobs.~~	~~www.nhcdfa.org~~
~~EDA~~	~~Funding~~	~~Dec.15 Cycle 1 March 10 Cycle 2 June.10 Cycle 3 September.15 Funding for Cycle 1 of FY 2013~~	~~Generally, the amount of the grant May not exceed 50% total cost of project, but an additional amount shall not exceed 30% based on the relative needs of the region in which the project will be located.~~		~~Yearly~~		~~http://www.eda.gov/InvestmentsGrants/Investments.xml~~
~~Ethyl Grant Program~~	~~Grant~~	~~Ongoing Basis~~	~~Grants allocated at 500-2,500 with a Potential of 5000 for a community and a 10,000 estimated funding a year~~	~~Nationwide must be OPASTCO member telephone companies~~	~~Every six months applications can be submitted~~	~~OPASTCO member telephone companies that are involved with projects aimed at bettering schools and communities.~~	~~http://www.fred.org/ethyl~~
~~Farm Bill Broadband Program (USDA)~~	~~Loans~~		~~Low Cost Loans~~	~~See Folder For All Rules And Regulations For This Loan Process.~~	~~Limited Time~~	~~Finance the construction, improvement, and acquisition of all facilities required to provide service at the broadband lending speed in eligible rural areas, including facilities required for providing other services over the same facilities; Finance the cost of leasing facilities. Finance the acquisition of facilities, portions of an existing system; Refinance an outstanding obligation on another telecommunications loan, Finance pre-loan expenses,~~	~~http://www.rurdev.usda.gov/utp_farmbill.html~~
~~Foundation For Rural Education and Development~~	~~Technology Grants For Rural Schools~~	~~September 16,2011~~	~~1,000 - 5,000~~	~~Telephone companies can only submit four applications for schools. Must be OPASTCO member.~~	~~Once a year~~	~~Schools K-12 Public~~	~~http://www.fred.org/~~
~~Lowes ToolBox For Education~~	~~Grant Program~~	~~Spring and Fall yearly~~	~~5000~~	~~Basic One Time Project Needs~~	~~Twice yearly~~	~~Grassroots community and school projects in communities where Lowes does business~~	~~http://www.toolboxforeducation.com~~

~~Mascoma Savings Bank~~	~~Grants~~	~~Deadline is April 1 and October 1 each year.~~	~~Up to 7500 and rarely larger amounts~~	~~Nonprofit organizations which will help fund activities that strengthen these communities organizations as they pursue their mission and to help initiate projects that improve life within the Banks MSB Foundation Map~~	~~They will not allow the same organization a grant every year~~	~~Not For Profit Organizations 501©(3)~~	~~http://www.mascomabank.com/foundation~~
~~NH Business Finance Authority~~	~~Loans (LDO)~~	~~All the time~~	~~$0- 1,000,000~~	~~Secondary Market For Loans Program~~	~~Constant~~	~~Any Local Development Organization including Municipalities~~	~~www.nhbfa.com/ldo_main.html~~
~~NH Charitable Foundation~~	~~Express Grants~~	~~Express March 1/2013 and then Sept 1/2013~~	~~5000 and under~~		~~Every day of the year~~		~~http://www.nhcf.org/page.aspx?pid=606~~
~~NH Charitable Foundation~~	~~Community Impact Grants~~	~~Community Impact proposals April 1,2013 and Sept 30,2013~~	~~Over 5000 to 20,000 regions and 25,000 statewide~~				~~http://www.nhcf.org/page.aspx?pid=606~~
~~NH Charitable Foundation~~	~~Express Grants~~	~~April 29,2013~~	~~5000 and under~~	~~Manchester Region Only~~	~~Annually~~		~~http://www.nhcf.org/page.aspx?pid=606~~
~~NH Charitable Foundation~~	~~Community Impact Grants~~	~~June 1,2013~~	~~Over 5000 to 20,000 regions and 25,000 statewide~~	~~Manchester Region Only~~	~~Annually~~		~~http://www.nhcf.org/page.aspx?pid=606~~
~~Northern Border Regional Commission Grant~~	~~Grant~~	~~End Of August this year 2013~~	~~30 million to be disbursed from 2008-2012~~	~~Transportation and basic infrastructure, job skills training and entrepreneurial development, comprehensive strategy development, advanced technologies and telecommunications, and sustainable energy solutions~~		~~States covered for this NY-VT-NH-ME~~	~~www.nado.org~~
~~PSNH~~	~~Community Development Grants~~	~~Funding is based on a yearly guideline~~	~~150,000~~	~~The project is a product of a municipal, government and/or non-profit organization.~~ ~~The project is an investment in economic development.~~ ~~The project will enhance economic activity.~~ ~~The impact will be in PSNH service territory.~~ ~~The project will create or retain jobs. The project will ultimately result in increased or retained electric sales~~	~~Yearly~~	~~Municipal, Government or Non-profit projects and organizations that have a direct positive impact on the economic development of NH communities~~	~~http://www.psnh.com/Environment/Grant-Programs.aspx~~
~~State Farm Insurance®~~	~~Safety Grants~~	~~January 2 thru October 31 yearly~~			~~One proposal per organization per year~~	~~Auto and Roadway Safety~~ ~~Home Safety and Fire Prevention~~ ~~Disaster Preparedness~~ ~~Disaster Recovery~~ ~~Personal Financial Safety/Security~~ ~~Nonprofit, Tax-exempt 501(c)(3) Charitable Organization Safety Application~~ ~~Educational Institution or Government Entities Safety Application~~	~~http://www.statefarm.com/aboutus/community/grants/grants.asp~~

~~State Farm Insurance®~~	~~Community Development Grants~~	~~January 2 thru October 31 yearly~~			~~One proposal per organization per year~~	~~Affordable Housing 1st Time Homeowners Community Revitalization Economic Development Nonprofit, Tax-exempt 501(c)(3) Charitable Organization Community Development Application Educational Institution or Government Entities Community Development Application~~	~~http://www.statefarm.com/aboutus/community/grants/grants.asp~~
~~State Farm Insurance®~~	~~Educational Grants~~	~~January 2 thru October 31 yearly~~			~~One proposal per organization per year~~	~~We fund three types of grants for K-12 public schools: Teacher Development, Service-Learning and Systemic Improvement. Teacher Development application for nonprofit, tax-exempt 501(c)(3) charitable organization Teacher Development application for educational institution or government entity Service-Learning application for nonprofit, tax-exempt 501(c)(3) charitable organization Service-Learning application for educational institution or government entity Systemic Improvement application for nonprofit, tax-exempt 501(c)(3) charitable organization Systemic Improvement application for educational institution or government entity~~	~~http://www.statefarm.com/aboutus/community/grants/grants.asp~~
~~State Farm Insurance®~~	~~Other Small Grants~~	~~January 2 thru October 31 yearly~~		~~Arts and Culture Business Groups & Associations Civic Environment Health and Wellness Other Education Other Safety~~	~~One proposal per organization per year~~	~~Nonprofit, Tax-exempt 501(c)(3) Charitable Organization Application Educational Institution or Government Entities Application~~	~~http://www.statefarm.com/aboutus/community/grants/grants.asp~~
~~Telecom Infrastructure Loans~~	~~Loans~~	~~Applications are accepted year round.~~	~~Cost-of-Money loans Guaranteed loans, Hardship loans~~	~~Loan funds may be used to finance telecommunications services in rural areas for: New construction; Improvements; Expansions; Acquisitions (some restrictions apply–cost of acquisition must be incidental to cost of improvements in loan); Refinancing (some restrictions apply–amount refinanced cannot exceed 40 percent of loan amount).~~	~~Yearly~~	~~Rural utilities; municipalities; commercial corporations; limited liability companies; public utility districts; Indian tribes; and cooperative, nonprofit, limited-dividend, or mutual associations.~~	~~http://www.rurdev.usda.gov/utp_infrastructure.html~~
~~Tillotson Fund~~	~~Neil and Louise Funding~~	~~By 5pm April 1,2013 or October 1, 2013~~	~~Up to 20,000 or 20,000 to 100,000~~	~~For Economic Development Basic Needs Community Safety. Strengthen regional infrastructure and small business owners and increase public use of regions rich natural culture and recreations resources~~	~~Annually~~	~~Programs from Colebrook, Pittsburg, Clarksville, Stewartstown, Dixville and other towns in Coo's County~~	~~http://www.nhcf.org/page.aspx?pid=606~~

~~USDA~~	~~(RBEG) PROGRAM~~	~~To apply for funding for the RBEG program, please contact your Rural Development State Office.~~	~~No maximum level of grant funding. Smaller projects are given higher priority. Generally grants range $10,000 - $500,000.~~	~~At least 51 percent of the outstanding interest in any project must have membership or be owned by U.S. citizens or resident aliens.~~	~~Each year, Congress provides program funding as called for in the Federal Budget. Fiscal Year funding levels will be made available as soon as possible after the beginning of each Fiscal Year.~~	~~Rural public entities (towns, communities, State agencies, and authorities), Indian tribes and rural private non-profit corporations are eligible to apply for funding.~~	~~http://www.rurdev.usda.gov/rbs/busp/rbeg.htm~~
~~USDA~~	~~Predevelopment Planning Grants~~	~~Anytime~~	~~State Directors are authorized to make PPG up to $15,000 or 75 percent of the project costs, whichever is less.~~	~~Funding for the balance of the eligible project costs not funded by the PPG must be from applicant resources or funds from other sources. PPG funds advanced will be considered when calculating the amount of loan and grant funding needed, and will be subtracted from the total grant eligibility, if the Agency provides additional funds for a portion of the project. PPG funds cannot be used to pay for work already completed. If the Agency does not provided additional funds for any portion of the project, the grant will not require repayment.~~	~~There is no set time frame for these specific grants.~~	~~The applicant must meet eligibility requirements of Part 1780.7 of RUS Instruction 1780. The median household income of the proposed area to be served by the project must be either below the poverty line or below 80 percent of the statewide non-metropolitan median household income. Applicant must provide financial information to document that they do not have the resources to pay predevelopment expenses on their own. .~~	~~http://www.rurdev.usda.gov/UWP-predevelopment.htm~~
~~USDA~~	~~Rural Business Opportunity Grants (RBOG)~~	~~Anytime~~	~~The amount of funding for the program can vary from year to year. March 29, 2010 reads Total Funding $2.48 million.~~	~~The types of projects that may be funded might include identification/ analysis of business opportunities that will utilize local material and human resources; provision of leadership development training to existing or prospective rural entrepreneurs and managers; business support centers; centers for training, technology and export trade; and, economic development planning~~	~~Yearly~~	~~Rural public bodies, rural nonprofit corporations, rural Indian tribes, and cooperatives with primarily rural members that conduct activities for the mutual benefit of the membership are eligible provided they have sufficient financial strength and expertise to carry out the activity to be funded~~	~~http://www.rurdev.usda.gov/BCP-RBOG.html~~

~~USDA~~	~~DLT Program Grants~~	~~Anytime~~	~~Awards can range from $50,000 to $500,000.~~	~~Acquisition of eligible capital assets:~~ ~~Interactive video equipment~~ ~~Audio and video equipment~~ ~~Terminal equipment~~ ~~Data terminal equipment~~ ~~Inside wiring~~ ~~Computer hardware and software~~ ~~Computer network components~~ ~~Other facilities that further DLT services~~ ~~Acquisition of instructional programming that is a capital asset~~ ~~Acquisition of technical assistance and instruction for using eligible equipment~~ ~~Additional Purposes Eligible for 100% Loans~~ ~~Project operating costs for the first two years~~ ~~Distance learning broadcasting~~	~~Applications are accepted annually, after the National Office publishes a Notice of Funds Availability (NOFA) in the Federal Register when funding has been approved by Congress and signed into law by the President.~~ ~~Grants will be awarded on a competitive basis.~~ ~~There is no requirement for matching funds in this program~~	~~Entities providing education and medical care via telecommunications including corporations or partnerships, Indian tribes or tribal organizations, state or local units of government, consortia, and private for-profit or not-for-profit corporations. Individuals are not eligible.~~	~~http://www.rurdev.usda.gov/UTP_DLT.html~~
~~USDA~~	~~Public Television Digital Transition Grants~~	~~Annually~~	~~The amount available for grants for FY 2010 is $4.5 million. The maximum amount for grants under this program is $750,000 per public television station per year.~~	~~Grant funds may be used to acquire, lease, and/or install facilities and software necessary to the digital transition, including:~~ ~~Digital transmitters, translators, and repeaters, including all facilities required to initiate DTV broadcasting.~~ ~~Power upgrades of existing DTV equipment, including replacement of low-power digital transmitters with digital transmitters capable of delivering the final authorized power level.~~ ~~Studio-to-transmitter links~~ ~~Equipment to allow local control over digital content and programming, including: Master control equipment~~ ~~Digital program production equipment, including cameras, editing, mixing and storage equipment~~ ~~Multicasting and datacasting equipment~~ ~~Cost of the lease of facilities, if any, for up to three years~~ ~~Associated engineering and environmental studies necessary to Implementation~~	~~Annually~~	~~Public television stations which serve rural areas. A public television station is a non-commercial educational television broadcast station that is qualified for Community Service Grants by the Corporation of Public Broadcasting under section 396(k) of the Communications Act of 1934. Individuals are not eligible for this program. Grants are not renewable.~~	~~http://www.rurdev.usda.gov/UTP_DTV.html~~

~~USDA~~	~~Rural Community Development Initiative Grants (RCDI)~~			~~Rural Community Development Initiative grants may be used for but are not limited to (a) training sub-grantees to conduct a program on home-ownership education; (b) training sub- grantees to conduct a program for minority business entrepreneurs; (c) providing technical assistance to sub-grantees on how to effectively prepare a strategic plan; (d) provide technical assistance to sub-grantees on how to access alternative funding sources; (e) building organizational capacity through board training; (f) developing training tools, such as videos, workbooks, and reference guides to be used by the sub-grantee; (g) providing technical assistance and training on how to develop successful child care facilities; and (h) providing training on effective fundraising techniques.~~		~~To develop the capacity and ability of private, nonprofit community-based housing and community development organizations, and low income rural communities to improve housing, community facilities, community and economic development projects in rural areas.~~	~~http://www.rurdev.usda.gov/HAD-RCDI_Grants.html~~
~~USDA~~	~~Community Facility Grants~~		~~The amount of grant assistance for project costs depends upon the median household income and the population in the community where the project is located and the availability of grant funds. In most instances, projects which receive grant assistance have a high priority and are highly leveraged with other loan and grant awards. Grant assistance may be available for up to 75% of project costs. Grant funding limitations are based on population and income, economic feasibility, and availability of funds.~~	~~Projects will be selected based on a priority point system. Projects that will receive priority are those that: Serve small communities - with the highest priority going to projects located in a community with a population of 5,000 or less. Serve low-income communities with the highest priority going to projects serving communities with median household incomes below the higher of the poverty line or 60% of the State non-metropolitan median household income. Provide healthcare, public safety, or public and community services~~		~~Grant funds may be used to assist in the development of essential community facilities. Grant funds can be used to construct, enlarge, or improve community facilities for health care, public safety, and community and public services. This can include the purchase of equipment required for a facility's operation. A grant may be made in combination with other CF financial assistance such as a direct or guaranteed loan, applicant contributions, or loans and grants from other sources.~~	~~http://www.rurdev.usda.gov/HAD-CF_Grants.html~~

~~Verizon Foundation Funding~~	~~Funding~~	~~January 1st through the last business day of September~~	~~Grant requests of $10,000 or more are required to include a project budget breakdown,~~	~~Increase their literacy and educational achievement.~~ ~~Avoid being an abuser or a victim of domestic violence.~~ ~~Achieve and sustain their health and safety.~~	~~They accept proposals January 1 thru Sept 30 each year.~~	~~170(B)(1)(a)(ii) - School*~~ ~~170(B)(1)(a)(iii) - Hospital or medical research organization~~ ~~170(B)(1)(a)(iv) - Organization which operates for benefit of college or university and is owned or operated by a governmental unit.~~ ~~170(B)(1)(a)(v) - Governmental unit~~ ~~170(B)(1)(a)(vi) - Organization which receives a substantial part of its support from a governmental unit or the general public~~ ~~509(A)(2) - Organization that normally receives no more than one-third of its support from gross investment income and unrelated business income and at the same time more than one-third of its support from contributions, fees, and gross receipts related to exempt purposes.~~ ~~509(A)(3) - Organizations operated solely for the benefit of and in conjunction with organizations described in the previous seven items.~~ ~~eligible tax-exempt organizations in certain 501(c)(3) subsections~~	~~http://foundation.verizon.com/grant/guidelines.shtml~~