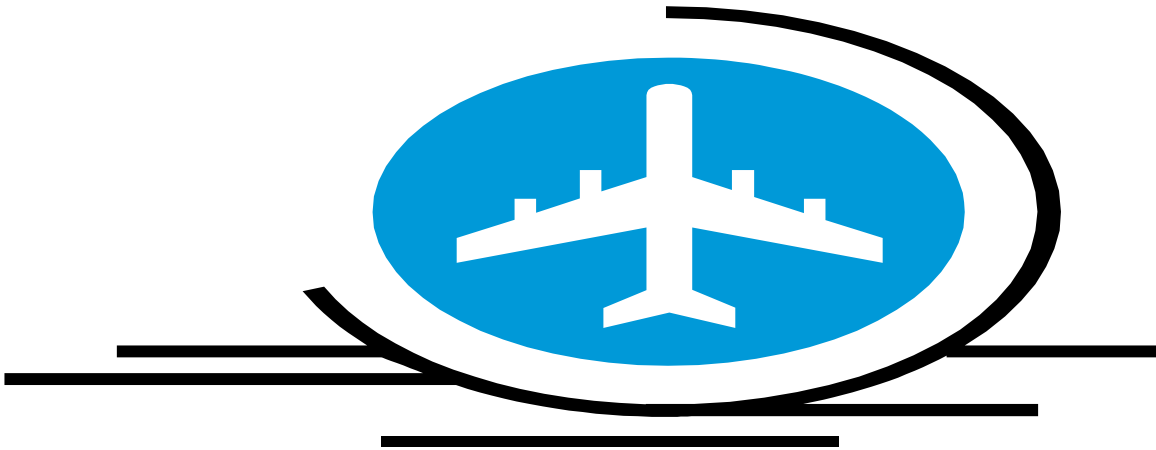


Niagara County Broadband Assessment and Fiber-Optic Network Development Plan for the Niagara Falls International Airport Focus Area



Prepared for the NFIA Stakeholders Group, Inc.

August 2015





NFIA Stakeholders Group, Inc.

This report was prepared for the NFIA Stakeholders Groups, Inc. (NFIASG), a 501(c)(6) nonprofit organization dedicated to the growth and development of Niagara Falls International Airport. The following is the mission of the NFIA Stakeholders Group: "To gather together stakeholders from business, government, hospitality and tourism, and other interested parties to explore, devise and develop processes, procedures and resources to help support the development of air services at the Niagara Falls International Airport." Deployment of fiber-optic network infrastructure at Niagara Falls International Airport has been identified as a strategy to support airport development.



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Niagara County
Department of Economic Development

Niagara Falls
Hotel-Motel Association

Niagara County
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- Town of Niagara
- Niagara Military Affairs Council
- Niagara County Community College
- Niagara County Emergency Services
- Niagara County Department of Economic Development
- Niagara County Industrial Development Agency
- Niagara County Information Technology
- Niagara County Public Works
- Niagara County Sewer District
- Niagara County Water District
- City of Niagara Falls
- Niagara Falls Central School District
- Niagara Falls Hotel/Motel Association
- Niagara Frontier Transportation Authority
- Niagara River Region Chamber
- Niagara U.S.A Chamber
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- Matrix Imaging Solutions
- Merritt Machinery
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- NiagaraHub
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- Taylor Devices
- The Dale Association
- Tomson Window Enterprises
- VWR International
- Voss Manufacturing



Table of Contents

Acknowledgements	iii
Table of Contents	iv
List of Figures.....	vi
Introduction	1
Part One - Broadband in Niagara County	3
1. Overview of Broadband Technologies	4
1.1 Dial-Up Access	4
1.2 Digital Subscriber Line (DSL)	4
1.3 Cable Modem	5
1.4 Fiber Optics.....	5
1.5 Wireless.....	6
2. The Current State of Broadband in Niagara County	7
2.1 Niagara County Infrastructure.....	7
2.2 Current Providers and Service Offerings	8
2.3 Broadband Provider Facilities.....	10
2.4 Regional Broadband Services and Capabilities.....	11
2.5 Commercial Properties and Broadband Market Analysis.....	13
3. Drivers of Broadband Demand in Niagara County	16
3.1 Residential.....	16
3.2 Business and Economic Development	18
3.3 The Niagara County Business Community	24
3.4 Education.....	26
3.5 Healthcare	28
3.6 Government, Utilities, and Emergency Services.....	30
3.7 Community Support Organizations.....	31
3.8 Smart Community Innovation	32
4. Broadband Gaps and Issues in Niagara County.....	35
4.1 Lack of Fiber Distribution Technology	35
4.2 Fiber Availability	35
Part Two - Broadband in the Niagara Falls International Airport Focus Area.....	37
5. Overview of the Airport Focus Area	38
5.1 Niagara Falls Air Reserve Station	39
5.2 Niagara Airport Commercial Park.....	41
5.3 Former U.S. Army Reserve Center site	42



5.4 Niagara Falls International Airport	43
5.5 Calspan site	43
5.6 Wheatfield Business Park	43
6. Broadband in the Airport Focus Area.....	45
6.1 Broadband Providers in the Airport Focus Area.....	45
6.2 Broadband Services and Capabilities.....	46
6.3 Airport Focus Area Sites and Broadband Market Analysis	47
6.4 Broadband Gaps and Issues at the Airport Focus Area.....	49
7. Airport Focus Area Stakeholder Interviews.....	50
7.1 107 th AW NY Air National Guard	50
7.2 Calspan.....	50
7.3 Moog-ISP	50
7.4 Niagara Frontier Transportation Authority.....	50
8. Recommendations	52
8.1 Develop a Business Plan for an Airport Fiber-Optic Network	52
8.2 Organizational Development	54
8.3 Site Development.....	56
8.4 Workforce and Business Development.....	61
Appendixes	64
A. Fiber Route Maps of Service Providers in Niagara County.....	65
B. Fiber Route Maps of Providers in the Airport Focus Area	67
C. Niagara County Broadband Penetration Map	71
D. Niagara County Business Survey	72
E. Universal Service Administrative Company (USAC) E-Rate Analysis.....	87
F. Service Provider Contact List.....	90
G. Public Policy Templates.....	91
H. Glossary of Terms.....	134



List of Figures

Figure 1-1: How Fiber-Optic Networks Connect Our Communities.....	4
Figure 1-2: Physical Bandwidth Capacity Comparisons	6
Figure 2-1: Service Provider Fiber Routes in Niagara County	11
Figure 2-2: Service Provider Fiber Routes in Niagara County.....	12
Figure 2-3: Market Analysis – Commercial Sites 1 – 7.....	13
Figure 2-4: Broadband Market Analysis – Commercial Sites 1-7.....	14
Figure 2-5: Competitive Pricing for Select U.S. Fiber Markets.....	15
Figure 3-1: Broadband Application Speed Requirements	16
Figure 3-2: Application Bandwidth Demand Growth	17
Figure 3-3: Average Time Spent with Broadband Devices.....	18
Figure 3-4: The Use of Multiple Broadband-Connected Devices.....	18
Figure 3-5: Fiber routes near the Buffalo Bolt Business Park.....	21
Figure 3-6: Fiber routes near the Cambria Technology Park.....	21
Figure 3-7: Fiber routes near the Town of Lockport Industrial Park.....	22
Figure 3-8: Fiber routes near the Niagara Airport Commercial Park.....	22
Figure 3-9: Fiber routes near the Somerset Lakeshore Site.....	23
Figure 3-10: Map of Survey Respondents in Niagara County.....	24
Figure 3-11: Comparison of Services between Small and Large Employers in Niagara County	25
Figure 3-12: Bandwidth Demands for Educational Technologies per Student	27
Figure 4-1: Cambria Technology Park Fiber Extension	36
Figure 5-1: The Niagara Falls International Airport Focus Area.....	38
Figure 6-1: Fiber-Optic Network Service Providers in the Airport Focus Area	46
Figure 6-2: Sample Portfolio of Services from Broadband Service Providers.....	47
Figure 6-3: Market Analysis Map of Airport Focus Area Sites 1-4.....	47
Figure 6-4: Broadband Market Analysis – Detail of Airport Focus Area Sites 1-4	48
Figure 7-1: Fiber Route from NFTA Bus Transit Station to Airport - Level 3 Communications.....	51
Figure 8-1: Cambria Technology Park Conceptual Fiber Buildout	57
Figure 8-2: Cambria Technology Park Conceptual Fiber Buildout Cost Estimate.....	58
Figure 8-3: Niagara Airport Commercial Park Conceptual Fiber Buildout.....	59
Figure 8-4: Niagara Airport Commercial Park Conceptual Fiber Buildout Cost Estimate.....	59
Figure A-1: Level 3 Communications Fiber Routes.....	65
Figure A-2: Fibertech Fiber Routes	65
Figure A-3: Zayo Fiber Routes.....	66
Figure A-4: Windstream (Intellifiber) Fiber Routes	66
Figure B-5: Level 3 Fiber Routes.....	67
Figure B-6: Fibertech Fiber Routes.....	68
Figure B-7: Frontier ILEC Region (est) and Fiber Corridor	69
Figure B-8: Frontier Fiber Corridor – Walmore Road	70
Figure C-9: Broadband Penetration Map for Niagara County.....	71



Introduction

“Broadband access is the great equalizer, leveling the playing field so that every willing and able person, no matter their station in life, has access to the information and tools necessary to achieve the American Dream.”

The above quote from Michael K. Powell, former chair of the FCC, emphasizes that broadband is a vital element of everyday life and is therefore essential to Niagara County’s current and future economic vitality. Fast, reliable, and affordable broadband access affects nearly every business, home, and community anchor institutions, such as hospitals, fire stations, and libraries, within the community.

Broadband provides the digital infrastructure necessary to connect communities virtually to the rest of the digital world. As more of Niagara County’s businesses, community anchor institutions, and residents utilize the Internet for critical services and enhanced lifestyle opportunities, the more reliant they become on fast, high quality, affordable broadband services. This, along with the explosion of more sophisticated online business applications, like Telemedicine or interactive video advertising, is driving the need for consistently higher bandwidth.

Broadband is high-speed connectivity to the Internet that is offered to consumers in a variety of forms, including DSL over copper, cable, and fixed and mobile wireless platforms. In Niagara County, most businesses subscribe to either DSL from Verizon or Frontier, or cable services from Time Warner Cable. Though these service providers try to evolve to provide greater service levels and reliability to Niagara County’s consumers, the demand for bandwidth is quickly outpacing the supply because of inherent limitations in these traditional broadband technologies.

To resolve the increasing demand for more bandwidth, fiber to the premise (FTTP) broadband technologies are being deployed in cities across the country to provide much greater speeds, reliability, and performance. Communities with next-generation broadband are well positioned to thrive and take full advantage of every opportunity the Internet and the digital world has to offer.

With the move of communities to next-generation FTTP technologies, the question being asked is what will incumbent providers such as Verizon, Frontier, and Time Warner Cable do to remain competitive? Verizon has publicly announced that they are suspending their FIOS, fiber-optic communications network deployment nationwide. Time Warner Cable believes that their existing cable platform technology can continue to evolve to allow greater speeds, but even with the latest technology upgrade, they cannot match the speeds nor bandwidth capabilities of next-generation FTTP platforms.

As the pace of the online revolution increases, regions equipped with high-speed, high-quality broadband networks will flourish in the digital world while others struggle to keep up. Government and civic entities across the country have realized the importance of broadband to their communities and are actively engaged with local stakeholders in the broadband development process.

To engage the stakeholders of Niagara County in the broadband development process, the NFIA Stakeholders Group commissioned this Broadband Assessment with a focus on fiber-optic network development in the Niagara Falls Airport Focus Area. The Airport Focus Area contains many important stakeholders.



A key stakeholder is the Niagara Falls Air Reserve Station, which is Niagara County's largest employer and a key economic asset that accounts for nearly 3,000 jobs. The Air National Guard unit at the Niagara Falls Air Reserve Station is positioned to grow Remotely Piloted Aircraft (RPA) missions and develop opportunities in Cybersecurity. Aspirations to partner and collaborate with regional higher education and research and development institutions, such as the University at Buffalo and the UB Center for Computational Research, would be greatly enhanced with a fiber to the premise infrastructure.

Another important driver in the Niagara Falls Airport Focus Area is the former U.S. Army Reserve Center site, which is slated to be redeveloped as a First Response and Preparedness Center. The Center will house, among other amenities, a Law Enforcement Intelligence Facility that could potentially support remote cameras and monitoring facilities through a wireless network. The facility will also be able to map and analyze crime as it happens and push that information out to local and regional law enforcement. A major requirement to support these future missions for the military and law enforcement is the necessary fiber infrastructure and services.

This report is structured in two parts. Part One is an assessment of broadband infrastructure, service providers, and service offerings in Niagara County as a whole. Part Two looks specifically at the Niagara Falls Airport Focus Area with an emphasis on access to fiber-optic network infrastructure. In addition, the report provides strategic recommendations to support further dark fiber development at and around the Niagara Falls Airport Focus Area that will provide greater access and support future investment in broadband development. The report concludes with recommendations, opportunities, and initial actions for expanding broadband access, services, and affordability for Niagara County and the Niagara Falls Airport Focus Area.

The goals of this Broadband Assessment Summary for Niagara County and the Niagara Falls International Airport Focus Area are to:

1. Identify local fiber-optic broadband service providers, including central office and company contact information for providers that have infrastructure and serve customers in Niagara County and the Niagara Falls Airport Focus Area.
2. Produce existing broadband infrastructure maps to include, but not necessarily be limited to:
 - a. Fiber-optic cabling, routing, and other infrastructure;
 - b. Service provider locations;
 - c. Planned extensions and/or expansions; and,
 - d. Major broadband users within the county
3. Provide an assessment that includes:
 - a. Broadband assessment of Niagara County;
 - b. Existing infrastructure, capacity, and excess capacity;
 - c. Future extensions and/or expansions;
 - d. Fiber availability, services, and redundancy at site;
 - e. Service providers and location of their infrastructure;
 - f. Largest data users and their locations, current demand, and future needs;
 - g. Identify areas across the county where proximity to infrastructure and capacity is optimal for potential future users; and,
 - h. Cost estimates of infrastructure development based on needs.



Part One

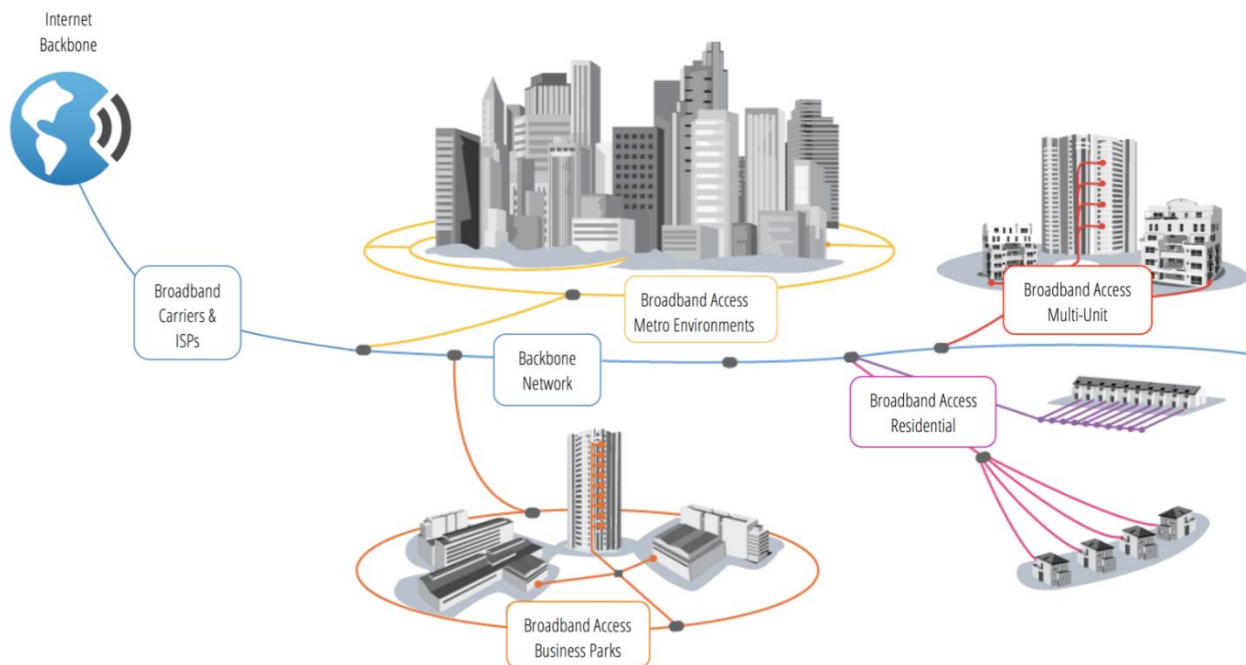
Broadband in Niagara County



1. Overview of Broadband Technologies

Broadband is deployed throughout communities as wired and wireless infrastructure that carries digital signal between end users and the content they want to access. The content comes in many forms and from many locations across the world in the networks that connect the local community to the Internet backbone. Websites, television, streaming video, videoconferencing, cloud services, and even telephone service are just a few types of content that are delivered across local broadband networks. Access to this content is made available through the type of infrastructure and kinds of connections available in the local network. Robust local infrastructure results in faster, more reliable access to content. Conversely, local infrastructure that is aging and built on older technologies results in slower, less reliable access to content.

Figure 1-1: How Fiber-Optic Networks Connect Our Communities



1.1 Dial-Up Access

Though not defined as a broadband technology due to speed and bandwidth limitations, dial-up access still exists in many areas of the world. Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network (PSTN) to establish a connection to an Internet service provider (ISP) by dialing a telephone number on a conventional telephone line.

1.2 Digital Subscriber Line (DSL)

DSL is a wireline transmission technology that transmits data faster over traditional copper telephone lines installed in homes and businesses. DSL-based broadband provides transmission speeds ranging from several thousand bits per second (Kbps) to millions of bits per second (Mbps). The availability and speed of DSL service may depend on the distance from your home or business to the closest telephone company facility.



The following are types of DSL transmission technologies:

- Asymmetrical Digital Subscriber Line (ADSL/ADSL2/ADSL2+/VDSL) - Used primarily by customers who receive a lot of data but do not send much. ADSL typically provides faster speed in the downstream direction than the upstream direction. ADSL allows faster downstream data transmission over the same line used to provide voice service, without disrupting regular telephone calls on that line.
- Symmetrical Digital Subscriber Line (SDSL) - Used typically by businesses for services such as video conferencing, which need significant bandwidth both upstream and downstream.

1.3 Cable Modem

Cable modem service enables cable operators to provide broadband using the same coaxial cables that deliver pictures and sound to televisions. Most cable modems are external devices that have two connections: one to the cable wall outlet, the other to a computer. They provide transmission speeds of 1.5 Mbps or more. Subscribers can access their cable modem service by simply turning on their computers, without dialing-up an ISP. You can still watch cable TV while using it. Transmission speeds vary depending on the type of cable modem, cable network, and traffic load.

1.4 Fiber Optics

Fiber-optic network technology converts electrical signals carrying data to light and sends the light through transparent glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of megabits per second. With fiber-optic broadband networks, speeds in the billions of bits per second range are possible.

The actual speed you experience will vary depending on a variety of factors, such as how close to your computer the service provider brings the fiber and how the service provider configures the service, including the amount of bandwidth used. The same fiber providing your broadband can also simultaneously deliver voice (VoIP) and video services, including video-on-demand.

Variations of the technology run the fiber all the way to the customer's home or business, to the curb outside, or to a location (node) somewhere between the provider's facilities and the customer.

- Fiber to the Node (FTTN) - Fiber to the Node technologies bring high-capacity fiber-optic cables to local service areas and then connect to existing DSL equipment. Rather than bringing fiber-optic cables to every home or business, the fiber is connected to the existing DSL network to increase its capacity. It allows these networks to carry more traffic; however, often times the copper-based "last mile" DSL network, connecting homes and businesses to the local nodes is still a bottleneck and results in subscribers not able to access the true speeds of fiber-optic connections.
- Fiber to the Premise (FTTP) - Fiber to the Premise is a technology for providing Internet access by running fiber-optic cable directly from an Internet Service Provider (ISP) to a customer's home or business. Fiber facilitates much faster speeds than dial-up and most coaxial cable Internet connections, and generally needs to be serviced less. Considered one of the most "future proof" types of Internet technology, since there are no foreseeable devices that could use more bandwidth than can be sent via fiber-optic cables.



To illustrate the relative difference between common Internet connection methods, Figure 1-2 compares traditional access technologies, beginning with basic dial-up service, through DSL, cable, and fiber. Whereas traditional broadband technologies have an upper limit of 300 Mbps, next-generation broadband that utilizes fiber-optic connections surpasses these limitations and can provide data throughputs of 1 Gbps and greater.¹

Figure 1-2: Physical Bandwidth Capacity Comparisons

Dial-Up - 56Kbps

- Legacy Technology
- Shared Technology

ADSL - 10Mbps

- First Generation of DSL
- Shared Technology

ADSL2 - 24Mbps

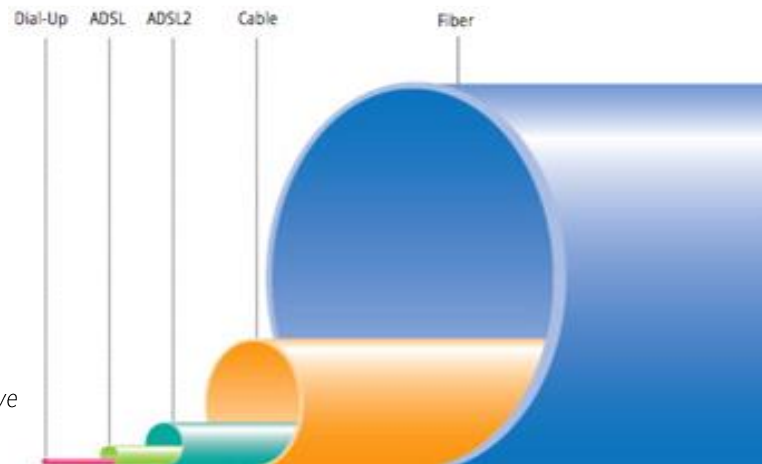
- Second Generation DSL
- Shared Technology

Cable - 150Mbps

- Data Over Cable Service Interface Specification (DOCSIS 3.0)
- Shared Technology

Next Generation Fiber - 1Gbps

- Passive Optical Network (PON), Active Ethernet
- Shared and Dedicated Technology



1.5 Wireless

Wireless broadband connects a home or business to the Internet using a radio link between the customer's location and the service provider's facility. Wireless broadband can be mobile or fixed. Wireless technologies using longer-range directional equipment provide broadband service in remote or sparsely populated areas where DSL or cable modem service would be costly to provide. Speeds are generally comparable to DSL and cable modem. An external antenna is usually required. Wireless broadband Internet access services offered over fixed networks allow consumers to access the Internet from a fixed point while stationary, and often require a direct line-of-sight between the wireless transmitter and receiver. These services have been offered using both licensed spectrum and unlicensed devices. For example, thousands of small Wireless Internet Services Providers (WISPs) provide such wireless broadband at speeds of around one Mbps using unlicensed devices, often in rural areas not served by cable or wireline broadband networks. Mobile wireless broadband services are also becoming available from mobile telephone service providers and others. These services are generally appropriate for highly mobile customers and require a special PC card with a built in antenna that plugs into a user's laptop computer. Generally, they provide relatively lower speeds, in the range of several hundred Kbps (e.g. 4GLTE).

¹ Actual speed and quality of service will depend on the specific service contracted by the end user, whether using a traditional broadband service or a next-generation broadband service.



2. The Current State of Broadband in Niagara County

2.1 Niagara County Infrastructure

As demand and utilization of Internet-based applications by subscribers have evolved, bandwidth requirements have grown along with it. Subscribers demand more and more bandwidth from their telecommunications provider to support more applications and more devices. However, the majority of Niagara County's residents and businesses still utilize copper-based broadband infrastructure to transmit information from a user to the Internet. Twisted-pair copper telephone and coaxial cable create the connectivity for DSL and cable networks that have historically provided bandwidth to a majority of residential and small business users.

In reaction to growing consumer demand for bandwidth, DSL, and cable network operators have continued to upgrade equipment and networks within capital budget limitations to make these lines faster and more reliable, however several fundamental issues exist that pose long-term challenges to meeting the growing bandwidth demand through copper infrastructure:

- Broadband signals degrade significantly as distances increase.
- Broadband signals are susceptible to electrical interference and signal degradation, particularly as they age.
- Service providers generally share bandwidth among pools of users that result in an uneven distribution of speed to users, and speed degrades to all as these facilities become congested.

The limitations of Niagara County's legacy copper-based networks can be overcome by deployment of new technologies based on fiber-optic networks. The old standard of copper in local broadband networks is slowly transitioning to fiber, but the pace of this transition is uneven and slow. Costs to deploy fiber infrastructure are high, particularly in areas where no fiber-optic infrastructure exists. Providers understand that fiber-optic broadband delivers the only long-term solution to the ever-growing bandwidth needs of homes, businesses, and community anchors. Actual speeds associated with fiber-optic connectivity are always dependent on the services provisioned by the service provider who operates the system, however speeds generally range from 10 Mbps to 100 Gbps.

Deployment of fiber-optic infrastructure varies widely by service provider. While most providers offer dedicated point-to-point fiber-optic network offerings, they can be quite expensive and are usually only marketed toward large enterprise businesses and community anchors. Alternatively, many providers are adopting Passive Optical Network (PON) distribution technologies that allow the wide spread deployment of fiber-to-the-premise services universally available within a given service territory. Providers such as CenturyLink have announced Fiber to the Home (FTTH) deployments using PON technologies where subscriber density supports the overall deployment and return on investment.

In Niagara County, Verizon was deploying their FTTH service offering, FIOS, but over the last year have suspended deployment in the region and nationwide as Verizon's corporate leadership seems to be doubling down on a wireless last mile solution.



2.2 Current Providers and Service Offerings

Magellan has studied and evaluated the state of the broadband networks in Niagara County. Through this assessment process, we have identified the existence of the necessary facilities, networks, and backhaul capacity to enable expansion of high-speed broadband in Niagara County. In general, service providers have the necessary capabilities, infrastructure, and service platforms to deploy and manage services within the region and have done so in certain areas, however these services are not universally available throughout the region.

Fiber-optic broadband services are available in some of the region's corridors and through multiple providers. In many cases, this fiber-optic infrastructure may not be available to provide services directly to retail subscribers because of its use as backhaul to interconnect communities in the area and to connect the region to long-haul networks that connect to Internet points of presence in Buffalo, Canada, and across the Northeast United States.

Where information was available, network assets have been documented and inventoried to define a baseline from which to evaluate network capabilities, network gaps, and potential for future expansion and applications. The analysis primarily focuses on fiber-optic network facilities rather than wireless since wireless spectrum is a shared capacity (including that used for 4GLTE) such that if some users are consuming the full capacity, additional users have no access to capacity.

The broadband networks in Niagara County are composed of networks built by private companies such as telephone and cable TV providers and networks built by a number of telecommunications providers including the regional incumbent local exchange carriers (ILEC), competitive local exchange carriers (CLEC), cable providers, wireless carriers, and Tier 1/Tier 2 providers. A variety of companies provide broadband infrastructure in the retail markets in Niagara County including:

- **Verizon** is an incumbent local exchange carrier (ILEC) in Niagara County that provides both retail services to consumers and wholesale services to other telecommunications providers. Verizon provides voice, Internet, and video services. Verizon maintains DSL and FIOS offerings in Niagara and have deployed fiber infrastructure selectively throughout the county.
**Maps depicting Verizon's broadband infrastructure were requested but not provided for proprietary reasons.*
- **Time Warner Cable (TWC)** is a cable provider serving the Niagara region. Time Warner maintains fiber routes throughout Niagara County; however, its primary service offerings of voice, Internet, and video are delivered to subscribers via coaxial cable. Gigabit fiber offerings are available in Niagara County through site surveys and on an individual case basis. TWC will typically allow customers to include "aid to construction" fees in the monthly recurring charge over a 36 to 60-month period to help finance the infrastructure.
**Maps depicting TWC's broadband infrastructure were requested but not provided for proprietary reasons.*
- **Frontier** is an ILEC serving portions of Niagara County, primarily within the vicinity of Sanborn. As an ILEC, Frontier provides both retail services to consumers and wholesale services to other telecommunications providers. Frontier provides voice and Internet services, and resells Dish Satellite services as its video offering in bundled service offerings. Frontier maintains fiber infrastructure within the eastern border of the Airport Focus Area along Walmore Road.
**Maps depicting Frontier's broadband infrastructure were requested but not provided for proprietary reasons.*



- **Level 3 Communications** is a global communications provider, providing communications services to enterprise, government, and carrier customers. Anchored by extensive fiber networks on three continents connected by undersea facilities, Level 3's global services platform features deep metro assets reaching more than 500 markets in over 60 countries. Level 3 maintains extensive fiber routes through the Niagara County offering a portfolio of connectivity services including, Internet, voice, transport, dark fiber, and other complementary service offerings.
**Maps depicting Level 3's broadband infrastructure are readily available on their website at maps.level3.com and have been included in this report.*
- **Fibertech Networks** operates one of the fastest growing metro fiber-optic network infrastructures in the Northeast with more than 10,000 route miles of network in 30 markets. Fibertech offers a number of telecommunications services to enterprise, government, and carrier customers. The services include Internet, transport, dark fiber and other complementary service offerings.
**Maps depicting Fibertech Network's broadband infrastructure were provided and are included in this report.*
- **Windstream** is a wholesale only telecommunications provider in the Niagara County market. Windstream purchased extensive long-haul and metro fiber routes from Intellifiber and maintains these routes today. The network includes 37,000 route miles of fiber.
**Maps depicting Windstream's broadband infrastructure are readily available on their website at www.intellifiber.com/network and are included in this report.*
- **Transwave Communications Systems, Inc.** is a communications provider of microwave, fiber-optic, data networking, telephony, tower construction, and site development services. They are a long time provider of private wireless and microwave network systems. Transwave offers dedicated Internet services, voice services, Metro Ethernet/IP Transport Services, and transport to regional data centers and co-location facilities.
**Maps depicting Transwave's broadband infrastructure were requested but not provided for proprietary reasons.*



2.3 Broadband Provider Facilities

Through discussions with providers and analysis of Niagara County, we were able to identify the following facilities that support the overall broadband infrastructure throughout the region. These facilities include Central Offices, wire centers, head-ends, and co-location facilities that provide the necessary local equipment, infrastructure, and capacity to service the immediate areas identified below. Without these facilities, current service offerings would not be possible.

Level 3

- ILEC co-location facility – 574 Portage Road, Niagara Falls, NY

Frontier

- Central Office/Wire Center – 2867 Lockport Road, Sanborn, NY

Time Warner Cable

- Headend – 2604 Seneca Ave, Niagara Falls, NY

Verizon

- Co-location facility – 574 Portage Road, Niagara Falls, NY

Verizon Central Office/Wire Centers:

- 135 76th St., Niagara Falls, NY
- 3085 Woodland Ave., Niagara Falls, NY
- 620 Onondaga St., Lewiston, NY
- 549 Second St., Youngstown, NY
- N End of Estes Pl., Ransomville, NY
- N/S Mechanic St., Wilson, NY
- 2716 Maple St., Newfane, NY
- 52 Walnut St., Lockport, NY
- W/S Gasport-Hartland, Gasport, NY
- E/S Vernon St., Middleport, NY
- 8685 Main St., Barker, NY

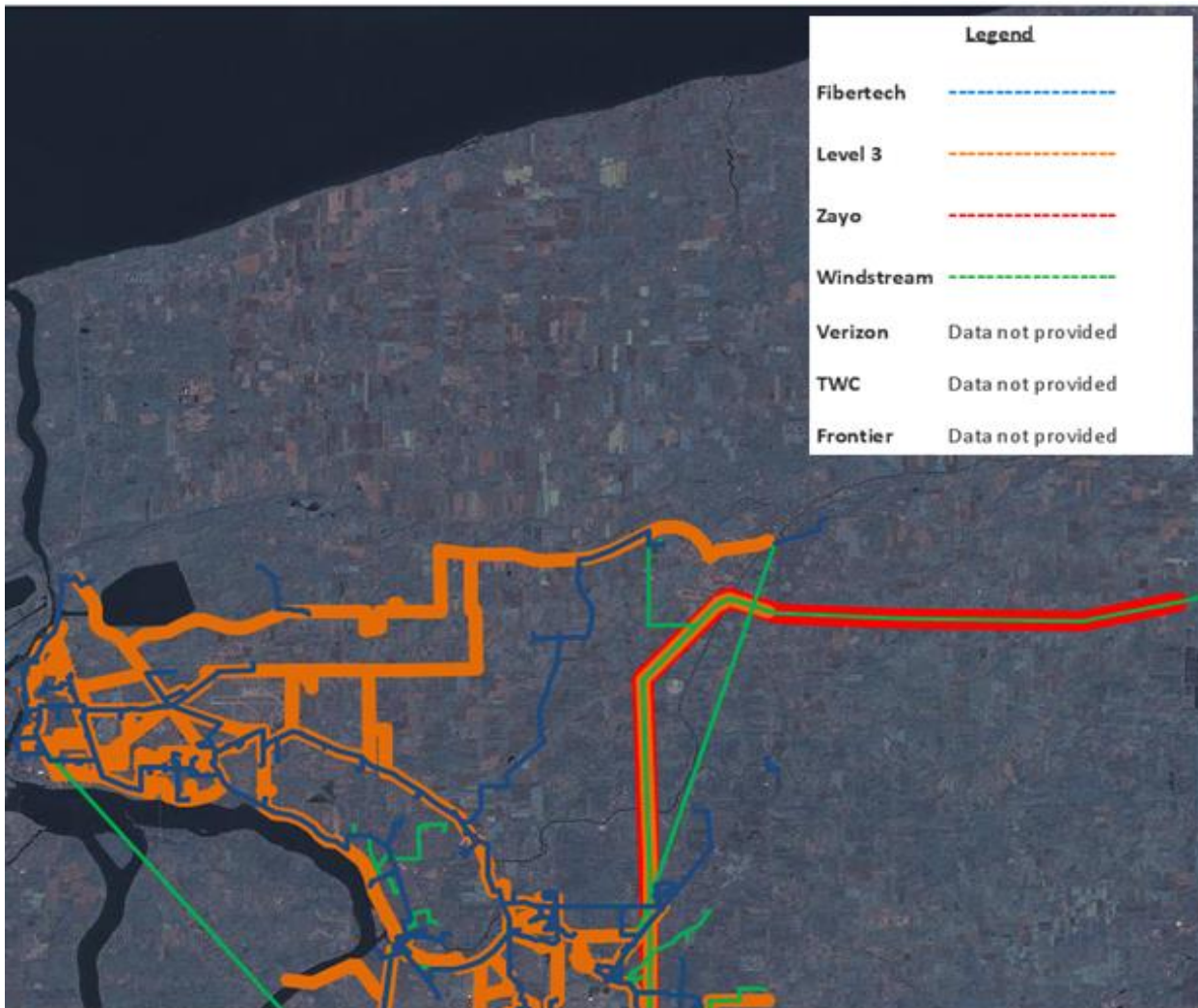


2.4 Regional Broadband Services and Capabilities

There are extensive fiber routes coming from the Buffalo market into Niagara County, with service offerings varying widely by individual service provider. Within Niagara County, there are extensive fiber routes throughout the urban cores, including the major municipalities in the county and along key transportation corridors.

As seen in Figure 2-1, outside the urbanized areas, service providers fail to exist in much of the northern portions of the county. However, the availability of multiple service providers in the region and the relative proximity of existing infrastructure certainly creates an opportunity for Niagara County to expand broadband services into many more areas of the county.

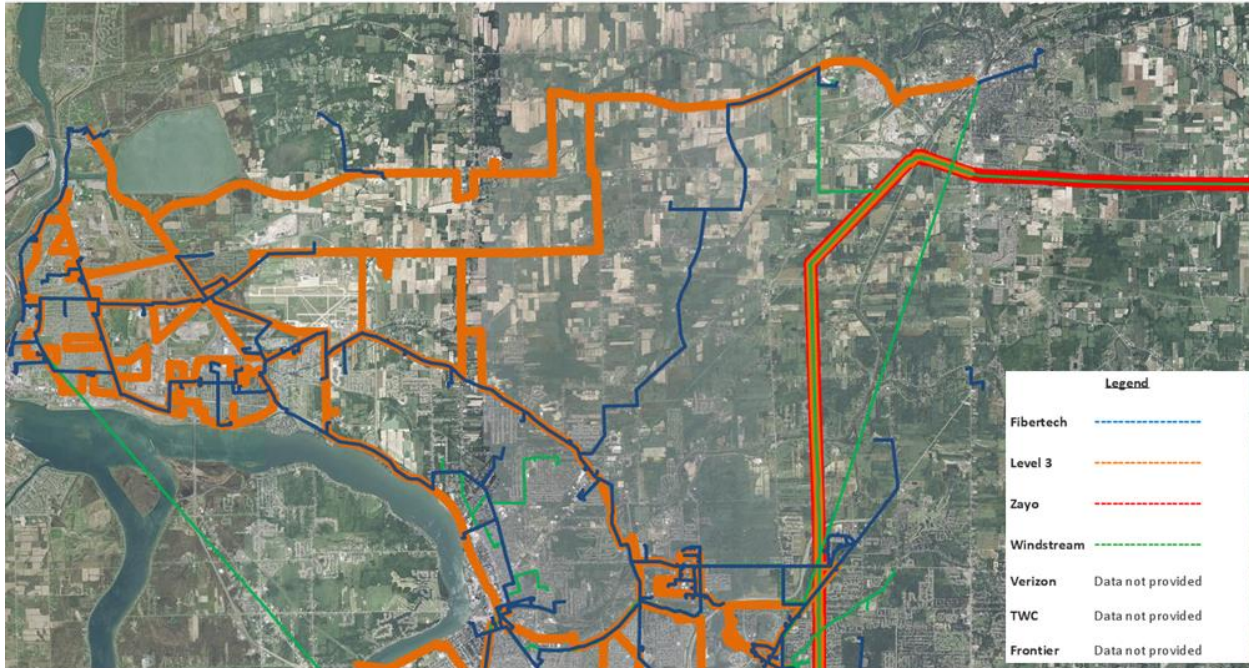
Figure 2-1: Service Provider Fiber Routes in Niagara County





In Niagara Falls, and more specifically around the Niagara Falls International Airport, there are multiple service providers maintaining fiber routes. Figure 2-2 provides a detailed look at the Niagara Falls area and the airport. Note that while this image is at a closer scale than Figure 2-1, this image contains all the known fiber routes in Niagara County.

Figure 2-2: Service Provider Fiber Routes in Niagara County



Gaining access to service provider data that shows current and future fiber routes, available capacity, and other proprietary information proved to be challenging. While several providers in Niagara County made high-level fiber maps available, the attribute data that offers specific information about fiber strand count, dark fiber availability, and other details for fiber routes in the county was not made available.

Through discussions with providers, we found full portfolios of telecommunications services including dedicated Internet access, dark fiber and Ethernet transport, Multiprotocol Label Switching, and voice offerings. In specific discussions with Level 3, they noted that the entire airport and airbase property can be serviced and the full portfolio of services are offered. This is significant as it indicates the necessary facilities are in place in around the airport to support the current needs of stakeholders located in this area, but future needs require closer examination.



2.5 Commercial Properties and Broadband Market Analysis

Through analysis of the market, Magellan identified a number of commercial sites by address, selected randomly in various sections of Niagara County. Magellan's team contacted each telecommunications provider identified as operating wireline services in the market to determine service availability and service level offerings. The results show that there is a lack of provider options for most addresses, proving that although there are several providers in the county, many businesses are still underserved.

The following seven commercial site locations were utilized:

- Commercial Site #1 - 7711 Porter Road and Recovery Road, Niagara Falls, NY 14304
- Commercial Site #2 - 80 Main Street, Lockport, NY 14094
- Commercial Site #3 - 2990 Carney Road, Sanborn, NY 14132
- Commercial Site #4 - 525 Wheatfield Street, North Tonawanda, NY 14120
- Commercial Site #5 - 3349 Niagara Falls Boulevard, Wheatfield, NY 14120
- Commercial Site #6 - 3909 Creek Road, Youngstown, NY 14174
- Commercial Site #7 - 7389 Lake Road, Barker, NY 14012

Figure 2-3: Market Analysis - Commercial Sites 1 - 7

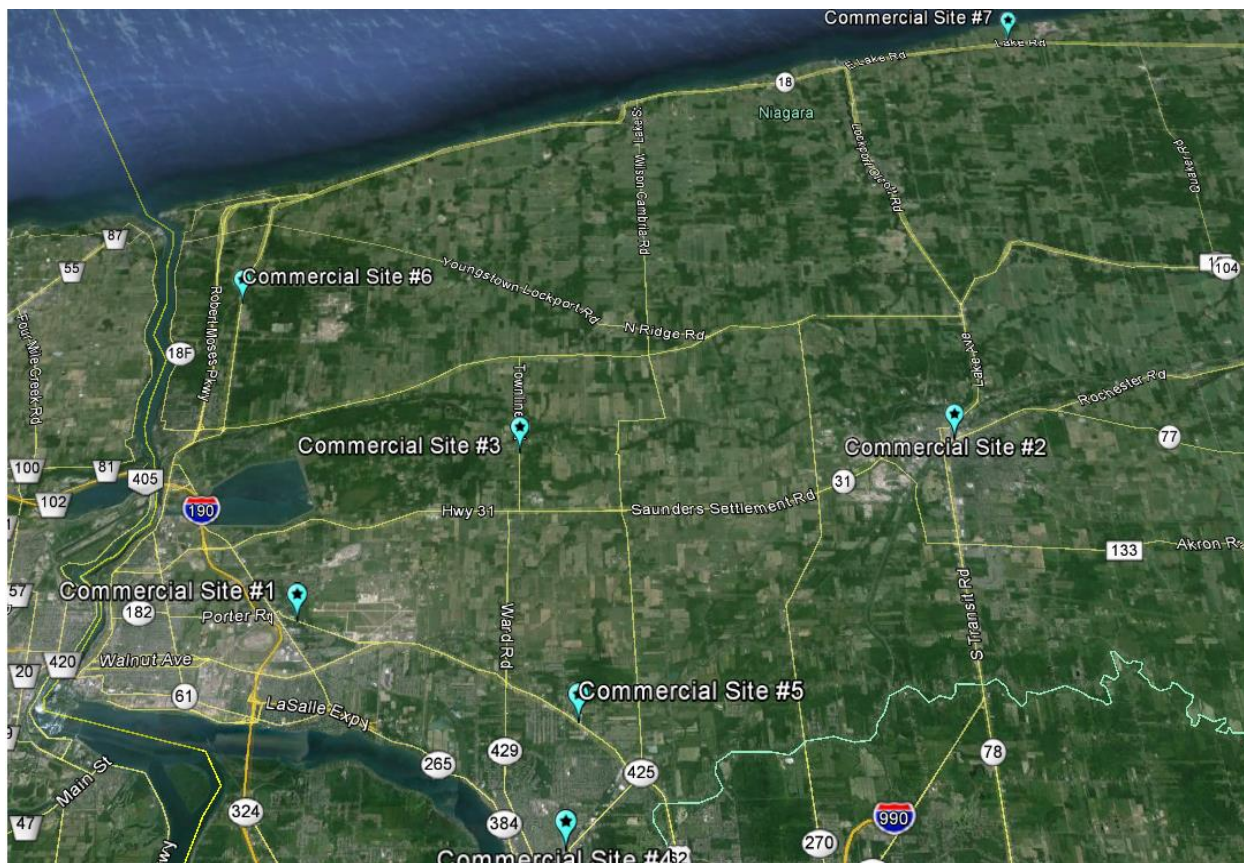




Figure 2-4: Broadband Market Analysis – Commercial Sites 1-7

Commercial Site #1 – 7711 Porter Road and Recovery Road, Niagara Falls, NY 14304		
Provider	Type of Service	Cost
Time Warner	Cable up to 50Mbps/5Mbps	\$249/month
Frontier	No Service	N/A
Verizon	No Service	N/A

Commercial Site #2 – 80 Main Street, Lockport, NY 14094		
Provider	Type of Service	Cost
Time Warner	Cable up to 50Mbps/5Mbps	\$260/month
Frontier	No Service	N/A
Verizon	DSL up to 3Mbps/1Mbps	\$79.99/month

Commercial Site #3 – 2990 Carney Road, Sanborn, NY 14132		
Provider	Type of Service	Cost
Time Warner	No Service	N/A
Frontier	Cable up to 7Mbps/1Mbps	\$49.98/month
Verizon	No Service	N/A

Commercial Site #4 – 525 Wheatfield Street, North Tonawanda, NY 14120		
Provider	Type of Service	Cost
Time Warner	20Mbps Fiber (Dedicated)	\$1,150/month
Frontier	No Service	N/A
Verizon	DSL up to 15Mbps/1Mbps	\$79.99/month

Commercial Site #5 – 3349 Niagara Falls Boulevard, Wheatfield, NY 14120		
Provider	Type of Service	Cost
Time Warner	20Mbps Fiber (Dedicated)	\$1,150/month
Frontier	No Service	N/A
Verizon	DSL up to 3Mbps/1Mbps	\$79.99/month

Commercial Site #6 – 3909 Creek Road, Youngstown, NY 14174		
Provider	Type of Service	Cost
Time Warner	Cable up to 50Mbps/5Mbps	\$249/month
Frontier	No Service	N/A
Verizon	DSL up to 1.5Mbps/384Kbps	\$79.99/month

Commercial Site #7 – 7389 Lake Road, Barker, NY 14012		
Provider	Type of Service	Cost
Time Warner	Cable up to 50Mbps/5Mbps	\$249/month
Frontier	No Service	N/A
Verizon	No Service	N/A



Considering the market information obtained from local service providers, and then comparing Niagara County with similarly sized markets in Figure 2-5 below, we see that fiber service rates in Niagara County are not competitive with what is available in other progressive municipalities in the United States. In areas where local government and organizations have collaborated and made investments in broadband infrastructure, rates for advanced broadband services have become very competitive, many times providing enough downward pressure to significantly reduce market prices throughout their region.

Figure 2-5: Competitive Pricing for Select U.S. Fiber Markets

Competitive Pricing for Select U.S. Fiber Markets		
Geographic Fiber Market	Type of Service by Download / Upload Speeds	Cost
Cedar Falls, IA	50 / 25Mbps Fiber (Best Effort)	\$53/month
Cedar Falls, IA	100 / 50Mbps Fiber (Best Effort)	\$81/month
Palm Coast, FL	10Mbps Fiber (Dedicated)	\$200/month
Hudson, OH	50 / 50Mbps Fiber (Best Effort)	\$239/month
Hudson, OH	50 / 50Mbps Fiber (Dedicated)	\$960/month

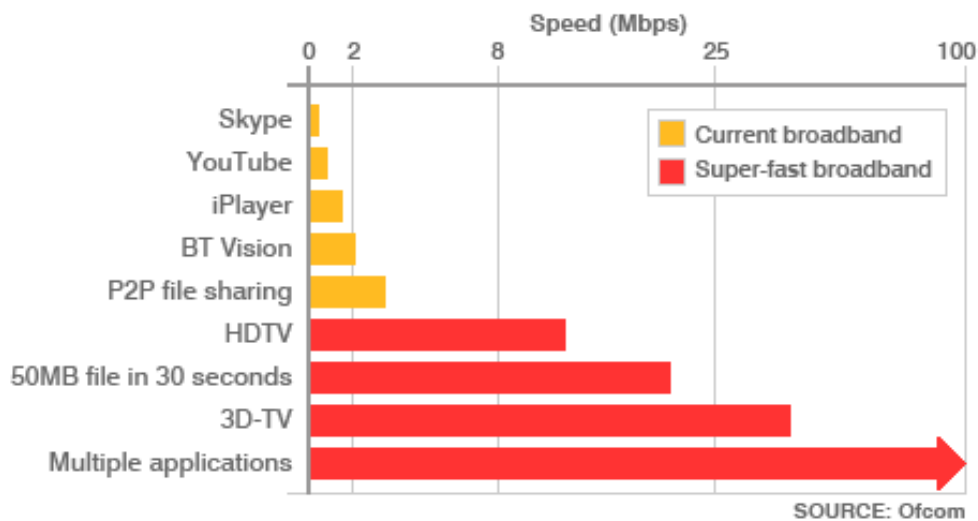


3. Drivers of Broadband Demand in Niagara County

3.1 Residential

Broadband technologies have evolved to carry more and more data because of consumer demand for more bandwidth intensive online applications as well as rapid and continuous development of new applications. Every application requires a certain amount of bandwidth on a broadband connection to function properly; as time has progressed, we have witnessed significantly more applications, and more bandwidth-intensive applications. Figure 3-1 illustrates the bandwidth requirements of common applications and the impact of multiple applications running across a broadband connection.

Figure 3-1: Broadband Application Speed Requirements



Today, broadband subscribers across every user class are utilizing more and more online applications and particularly those that consume larger amounts of bandwidth such as streaming video services. Figure 3-2 illustrates user demands for applications today and the increases in broadband that are necessary to accommodate this demand. Currently, broadband subscribers make heavy use of the core Internet functions, consisting of Internet browsing, web hosting, e-commerce, virtual private network connectivity, and voice services. However, subscribers are beginning to consume more real time video and streaming applications, which require significant bandwidth, reliability, and performance from their broadband connections. We are still early in the lifecycle of Internet video applications and these are expected to grow significantly over the next 10 years, replacing much of the text-based Internet applications common today.

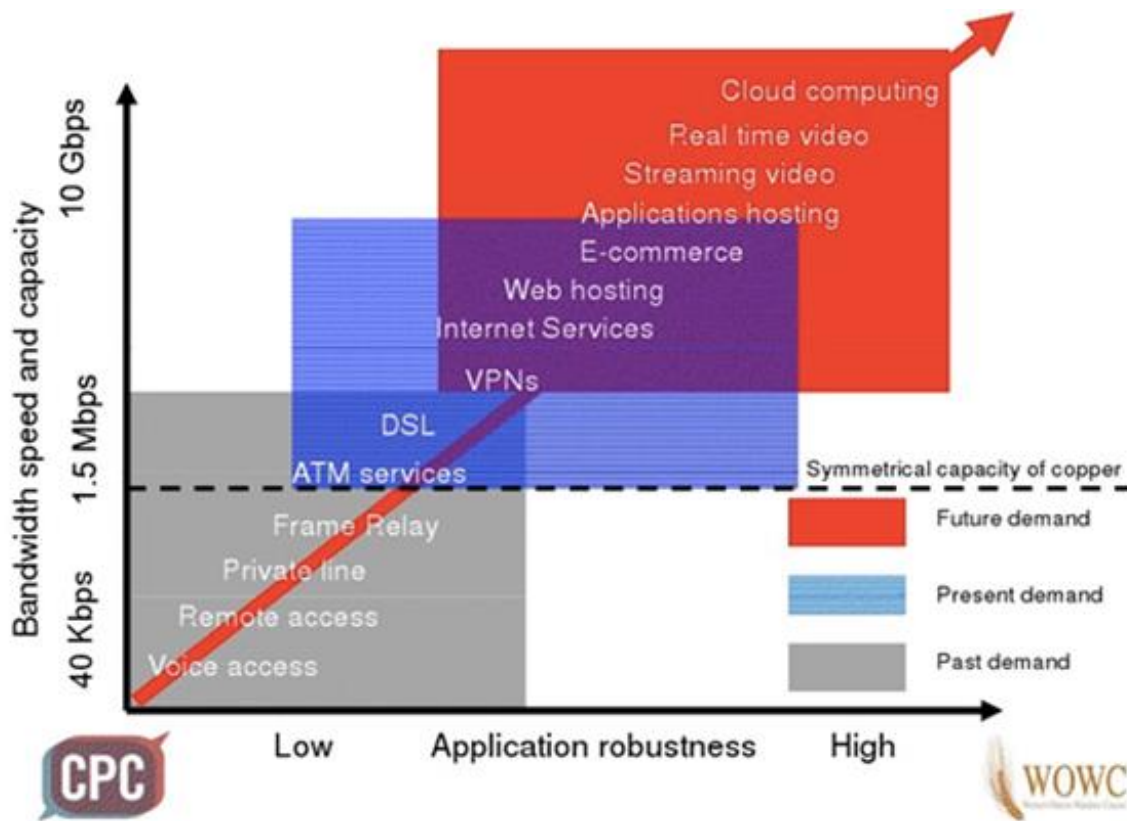
In addition, the myriad of cloud services are driving the need for more symmetrical² broadband as real time and cloud applications require additional bandwidth, both in download speed and upload speed. As more of these applications are deployed and replace traditional PC-based software, broadband connections will need to accommodate the increased bandwidth load. Many times these applications

² Symmetrical broadband connections provide equal download and upload speeds, e.g. 10 Mbps down and 10 Mbps up, instead of traditional asymmetrical broadband services that provide unequal speeds, e.g. 10 Mbps down and 2 Mbps up.



synchronize in real time, meaning that they are always consuming bandwidth at a constant rate rather than only when the user is actively engaging the application.

Figure 3-2: Application Bandwidth Demand Growth



The proliferation of devices is also driving the need for more bandwidth as more devices in the home, businesses and public places all access existing broadband connections. A report published by Google in 2012 demonstrates the amount of time the average user spends with their devices across each type of device, and how users interact with multiple devices simultaneously, as represented in Figure 3-3 and Figure 3-4. Although the study's primary goals were to "gain a deep understanding of consumer media behavior over a 24-hour period...,"³ an important implied finding is that users are spending significantly more time with their devices, devices that all require broadband connections. As these devices all vie for bandwidth on a users' broadband connections, the demand for more bandwidth to support more applications grow.

These demands also extend to many devices inside the home that are now being connected to the Internet and using our broadband connections. Many video/audio systems, thermostats, appliances, irrigation and security systems are now connected to the Internet, consuming more home broadband bandwidth.

³ "Understanding Cross-Platform Consumer Behavior" http://think.withgoogle.com/databoard/media/pdfs/the-new-multi-screen-world-study_research-studies.pdf. Accessed, January 2015.



Figure 3-3: Average Time Spent with Broadband Devices

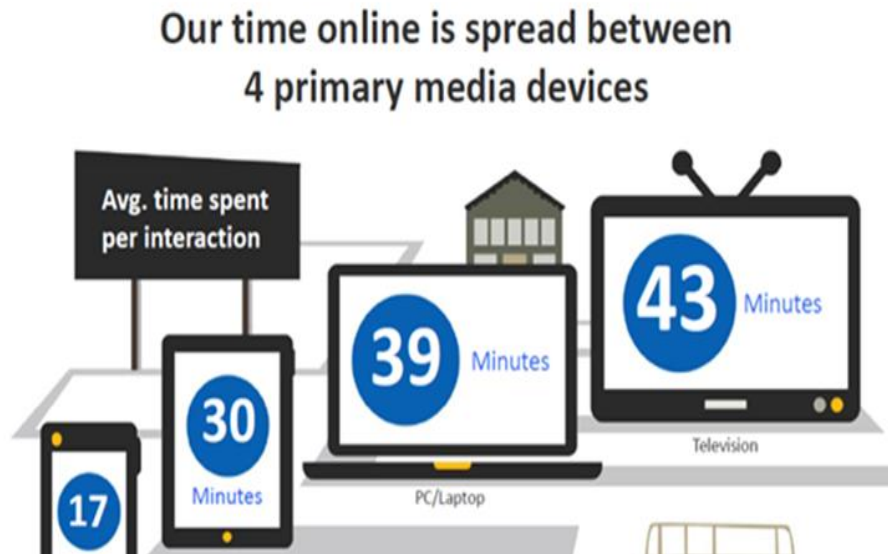
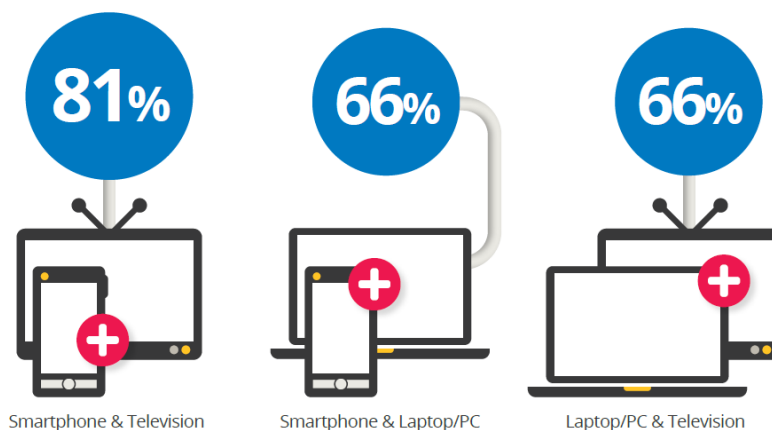


Figure 3-4: The Use of Multiple Broadband-Connected Devices

**We also multi-screen by using more than
one device simultaneously**

We use an average of three different screen combinations every day



3.2 Business and Economic Development

Accessible, affordable, and reliable broadband services is a key economic development tool to attract and retain businesses in Niagara County. In many cases, bandwidth consumption outpaces the broadband speeds local businesses are able to purchase and upgrading is often times not an option due to the prices businesses are able to afford, service availability, as well as other IT related factors.

When local broadband services cannot “keep up” with business needs, businesses lose productivity and efficiency, which affects their bottom line and makes them less competitive with regions having more affordable broadband services. Taken in aggregate, this lack of online access will eventually result in a



less competitive business market, from an economic perspective, as growth from the digital economy will go to other communities. Communities also risk retention issues as businesses that are not able to gain efficiencies with their existing broadband services will, in many cases, move operations to communities that have more availability of these services.

Evidence that the Internet has had a profound effect on the way people live and do business is all around us. We can find anecdotal proof in almost everything we do – lives have been changed indefinitely for the better by the technology that has been developed over the past several decades. Moreover, small



businesses have changed the way they conduct commerce. A new study just out by the Internet Association confirms what we have known for so long – the Internet is a major driver of part-time businesses in the U.S. The study, aptly titled, “*Internet Enabled Part-Time Small Businesses Bolster the U.S. Economy*,” explores how Americans, in an attempt to find more revenue during an economic downturn have turned to the Internet to start small businesses and earn extra income.

According to the study, the Internet contributed \$141 billion dollars to the U.S. economy in 2011, with the Internet helping to drive nearly all part-time businesses, with 90% of all those surveyed using the Internet to conduct at least some of their business, and over half saying that they couldn’t conduct business at all without the Internet. These businesses employ 6.6 million people, producing wages of \$797 million. According to the survey, most small businesses owners that rely on the Internet say that if the Internet did not exist, at least half of their income would go away.⁴

Broadband is a fundamental utility asset, like electricity or telephone service, which these businesses rely on to maintain connectedness to the electronic world. The majority of these types of businesses rely on

Over 63% of Niagara County's GDP is produced by businesses with less than 100 employees. Small and medium businesses need high-quality broadband to grow and compete.

online services to maintain their daily operations. Therefore, it is critical that Niagara County is able to promote the availability and affordability of broadband services in its recruitment efforts.

Through promotion of the community's leading-edge broadband services, prospective businesses and site selectors can be assured that they can locate in the region and have robust access to the rest of the digital world. Available and affordable high-speed broadband has also gone beyond being a differentiator to being a key part of the “minimum ante” for attracting and retaining businesses and facilities. While Niagara County has a number of locational advantages available to businesses looking to locate in the region, broadband access and capacity is questionable.

Niagara County and its economic development partners have realized the issues associated with a lack of broadband infrastructure first hand. In 2010, Yahoo opened its first data center in Niagara County in the

⁴ “*Internet Driving the Economy and Helping Small Businesses Grow*”
<http://www.theamericanconsumer.org/2013/10/internet-driving-the-economy-and-helping-small-businesses-grow/>,
October 2013



Lockport Industrial Park. Fiber access was an issue as fiber-based broadband infrastructure was not readily available in the Industrial Park. It took a coordination of local, state, and federal officials to get fiber built into the park to serve Yahoo. Since then, Yahoo has expanded its Northeast Data Center and opened a new Customer Care Center of Excellence.

Examples like this of private investment and job growth are why broadband infrastructure must be readily available in key areas of the county. Niagara County is poised to continue attracting investments in data centers and other complementary facilities given the region's access to low-cost renewable energy from hydropower as well as its supportive business climate, major fiber backhaul facilities, educated workforce, affordable cost of living, and more.

Niagara County has several priority development sites, including two State Certified Shovel-Ready Development Sites, which are listed below. As these sites were reviewed, it was learned that Verizon is the local incumbent carrier for each. While Verizon is the listed carrier of services in each case, this does not provide any guidance as to the type of infrastructure or services available, which is information that should be provided in the marketing materials developed for each site.

Readily available broadband infrastructure at these "shovel ready" sites is of the utmost importance. Niagara County's targeted industries depend on high-bandwidth connections and are major consumers of broadband services. With existing service providers identified, Niagara County's priority development sites can easily be developed and promoted as "fiber ready." The next five maps show the available fiber routes serving Niagara County's priority development sites. These sites include:

- Buffalo Bolt Business Park (*Figure 3-5*)
- Cambria Technology Park Shovel-Ready Site (*Figure 3-6*)
- Lockport Industrial Park (*Figure 3-7*)
- Niagara Airport Commercial Park Shovel-Ready Site (*Figure 3-8*)
- Somerset Lakeshore Site (*Figure 3-9*)



Figure 3-5: Fiber routes near the Buffalo Bolt Business Park



Figure 3-6: Fiber routes near the Cambria Technology Park

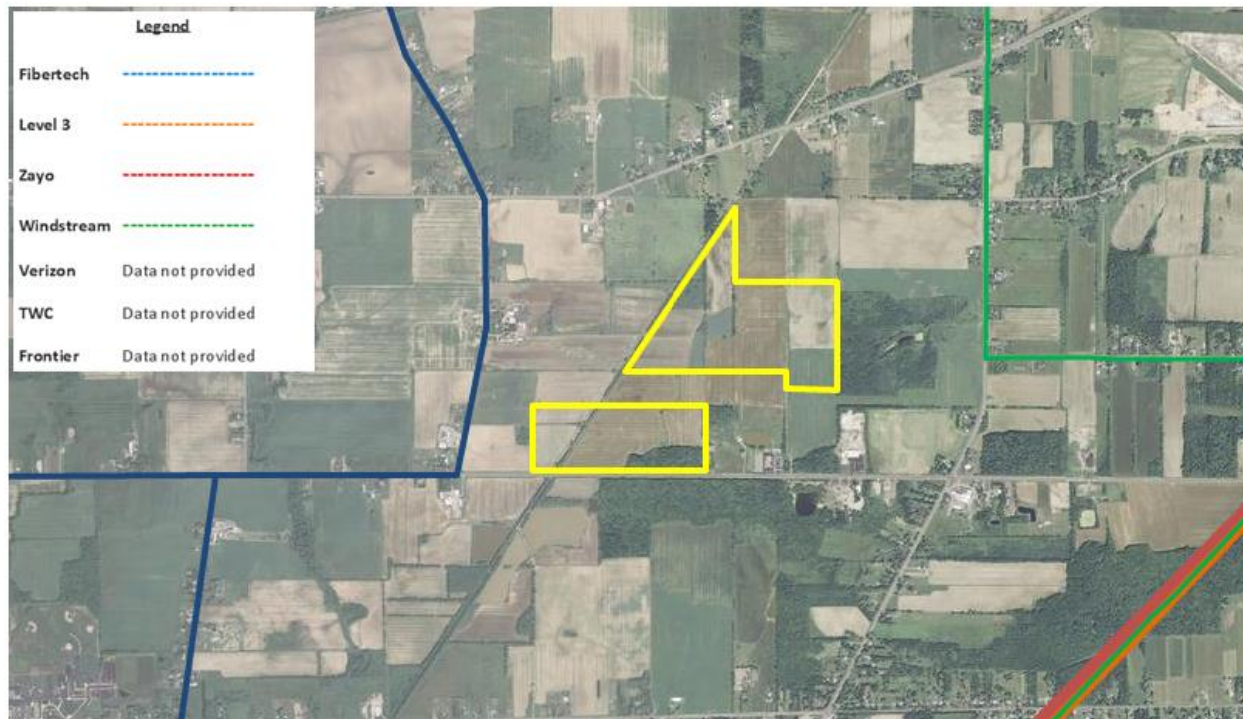




Figure 3-7: Fiber routes near the Town of Lockport Industrial Park

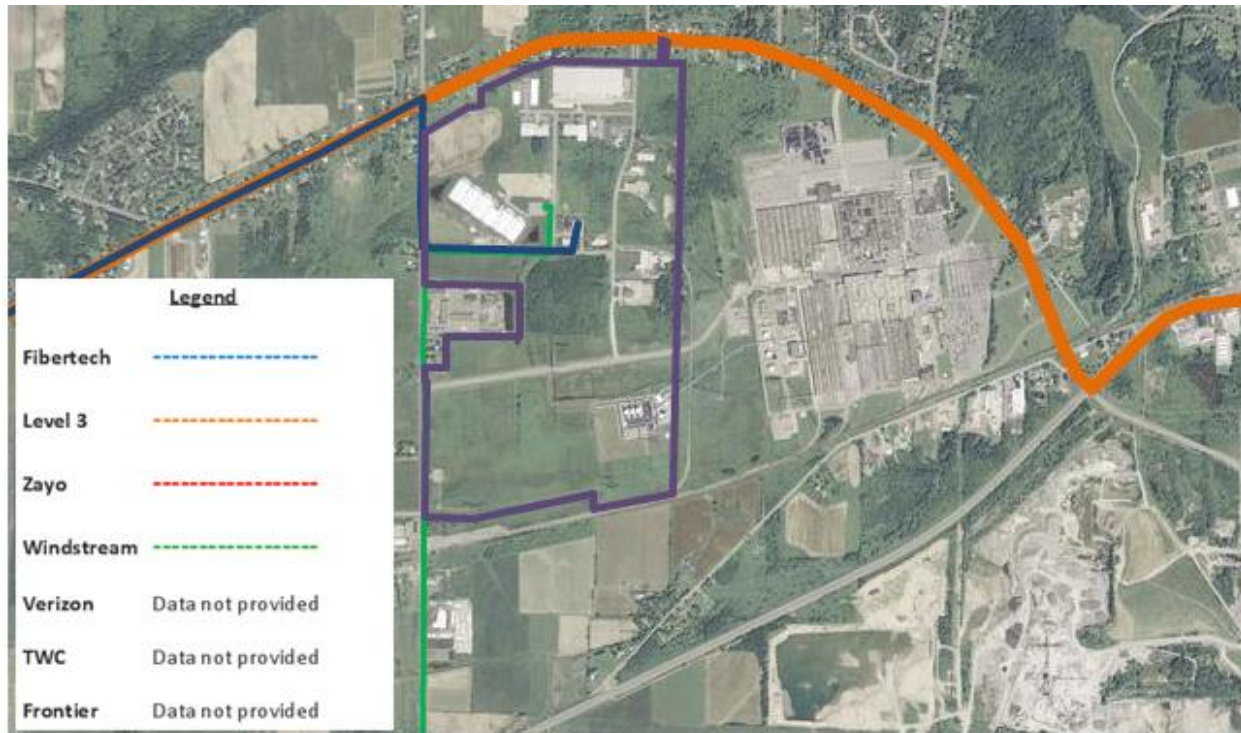


Figure 3-8: Fiber routes near the Niagara Airport Commercial Park

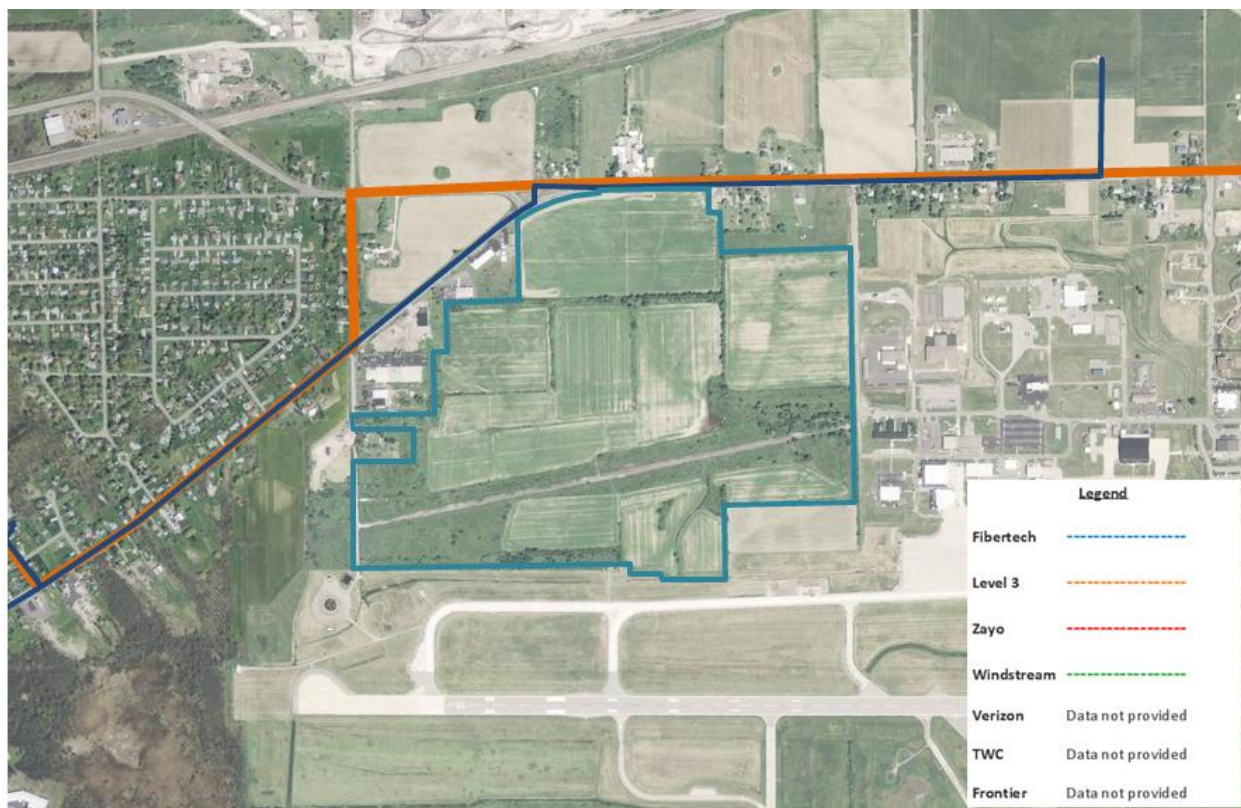




Figure 3-9: Fiber routes near the Somerset Lakeshore Site

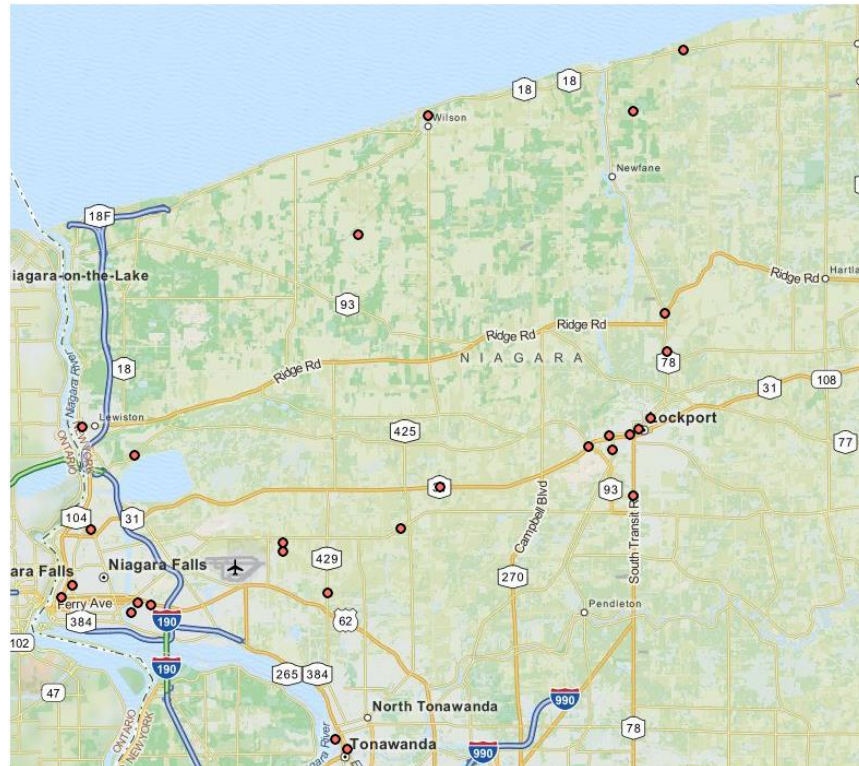




3.3 The Niagara County Business Community

As part of the research performed for this broadband assessment, a survey of Niagara County businesses was conducted to further understand the business community's broadband uses and needs. The responses were a small, but representative sample of Niagara County businesses with 43 businesses responding to the online survey. The responses were fairly dispersed throughout the county, with a concentration near Lockport and around Niagara Falls. The data provides a snapshot of how broadband is shaping the way small businesses operate in Niagara County.

Figure 3-10: Map of Survey Respondents in Niagara County



Having access to broadband and subscribing to services is one thing, but to realize benefits from broadband, meaningful utilization must occur. The top four reported reasons that Niagara County businesses say they use the Internet are for email, online research, online banking, and social media. The Niagara County numbers are similar with national trends that are topped by buying and selling online, followed by communication (email, voice), marketing (social media), and online research.

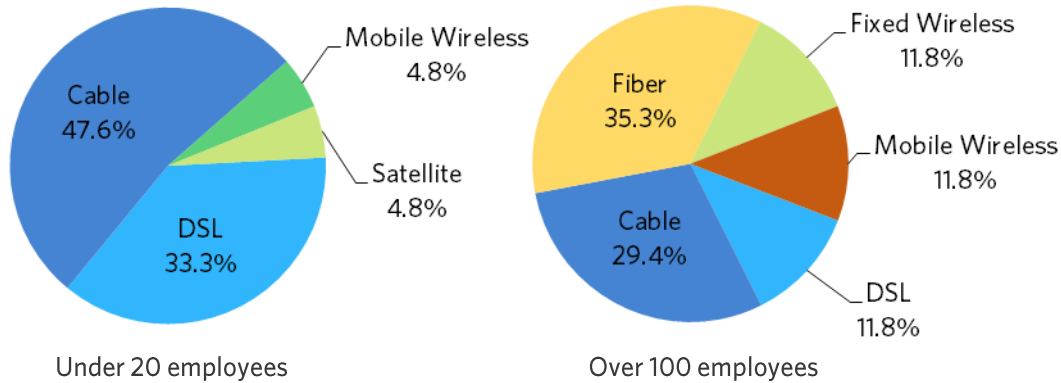
Chambers of Commerce and business development centers in Niagara County can help the business community become more aware of broadband benefits to help raise demand for broadband services, and to insure that every business is utilizing the Internet for maximum benefit. A majority of survey respondents (68%) were small businesses with 50 or fewer employees, while almost 20% were businesses with over 100 employees.

What is interesting is the comparison of broadband services subscribed to by small businesses and large businesses in Niagara County. In Figure 3-11, businesses that employ less than 20 people are represented by the chart on the left, while the chart on the right represents business with over 100 employees. Notice



that not one small business in Niagara County that responded to the survey subscribes to fiber broadband, while fiber connections are the top choice for larger businesses. Cable is the dominant choice of small business, and it remains a strong choice of larger employers.

Figure 3-11: Comparison of Services between Small and Large Employers in Niagara County



An overwhelming majority of respondents are serviced by one of three incumbent carriers, either Time Warner Cable, Verizon, or Frontier. Over half (53%) of businesses have experienced moderate, severe, or total disruption of their business from Internet problems with reliability and speed. In fact, 18% of all responding businesses reported that their current Internet services are either insufficient or not sure that current Internet service is sufficient for their business needs. Some of the comments included an assessment of what the lack of reliable connectivity means to their business or organization in terms of lost revenue or lost opportunity, like, "Low speed and capacity prevents us from offering distance learning programs to schools and other groups."

A total of 66% of businesses indicated that having choice and access to multiple broadband providers is important to their business. The responses were as follows:

- 21%: Extremely important
- 21%: Very important
- 24%: Moderately important

Casinos are a Significant Broadband Consumer

While conducting stakeholder outreach, Magellan spoke with the IT group that supports the Seneca Gaming Corporation. Seneca Gaming Corporation has been in operation since 2002, and was established by the Seneca Nation to develop, construct, lease, operate, manage, and maintain the Seneca Nation's gaming facilities. The facilities currently include three casinos: Seneca Niagara, Seneca Buffalo Creek, and Seneca Allegheny, along with a golf course. The Seneca Niagara Casino and Hickory Stick Golf Course are located within Niagara County, as well as the administrative offices that are operated out of Seneca Niagara Casino. The Seneca Gaming Corporation is currently accessing broadband services from multiple ISPs with the main provider being Windstream.

Windstream provides 50Mbps MPLS connections between the three casinos, as well as a 100Mbps circuit to the Niagara Falls location to connect all the sites. Windstream also provides a 50Mbps Internet circuit to the Niagara Falls location for administration and use by all three casinos. CenturyLink provides a backup MPLS and bandwidth for slot machine traffic. Transwave provides a 50Mbps Internet connection



for the guest network over microwave. The golf course has been the hardest location to service, yet Verizon provides a 1.5Mbps (T1) connection. The Gaming Corporation is looking for ways to upgrade this service, but so far no solutions have been sufficient or available. The consensus is that Windstream's services have been efficient and pricing has been competitive. They occasionally lose Internet service, but report no major outages of the MPLS network in the past 6 months.

3.4 Education

Educational organizations are a major user of broadband in Niagara County and their needs continue to grow. These include K-12 schools, community colleges, and other higher education organizations. Online applications used by these organizations require not only high-bandwidth broadband, but also services that meet strict quality and performance requirements to support real-time video and voice applications such as distance learning and teleconferencing. Online textbooks are in use today, and that utilization is only expanding. Texts and teaching resources incorporate multimedia – sound, graphics, video, and data. Many states have also instituted requirements for online testing or are in the process of doing so, creating an even greater need for high-quality broadband services. Additionally, educational institutions are utilizing more online content to support their curricula, from sources such as YouTube, TeacherTube, Vimeo, and Facebook.



Figure 3-12 on the following page illustrates the bandwidth requirements per student for common educational applications and the quality and performance requirements of these applications. Basic educational tools, such as web browsing and YouTube consume up to about 1Mbps per student. However, moving up to more advanced educational technologies such as streamed classroom lectures and 2-way video teleconferences use significantly more bandwidth per student, 4Mbps and 7Mbps, when combined with the basic educational tools. In addition, these advanced tools require not only more bandwidth but also strict broadband quality metrics that allow them to function properly, such as low latency and higher upload speeds.

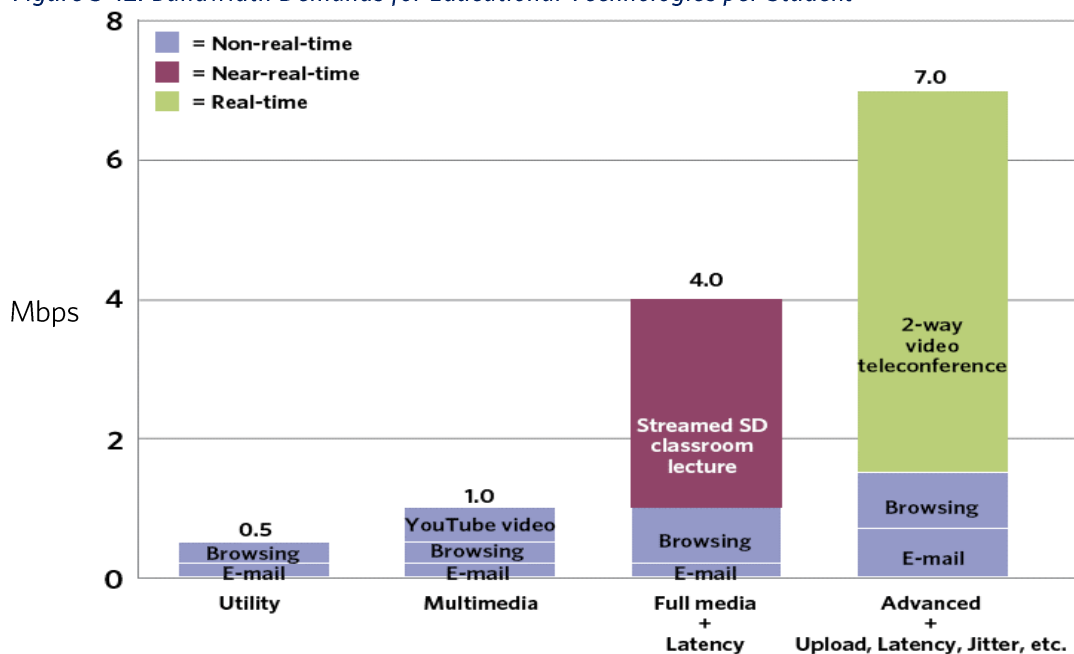
Through analysis of E-Rate data and meetings with Orleans/Niagara BOCES, the Niagara Falls City School District, and Niagara County Community College, we were able to assess existing broadband infrastructure within the local education system as well as assess how education is driving broadband demand in Niagara County.

The Niagara County K-12 educational system is comprised of 13 independent school districts, a two-county (Orleans / Niagara) Board of Cooperative Educational Services (BOCES) and a New York State Regional BOCES located in Erie County. The county's districts include a total of 45 schools and nearly 30,000 students. Each district participates in the federal E-Rate program with an average subsidy rate of 60%, which means that 60% of the county's K-12 Internet costs are paid by the federal government through the E-Rate program.



E-Rate is the commonly used name for the Schools and Libraries Program of the Universal Service Fund, which is administered by the Universal Service Administrative Company (USAC) under the direction of the Federal Communications Commission (FCC). The program provides discounts to help schools and libraries obtain affordable telecommunications and Internet access. E-Rate is one of four programs funded through a Universal Service fee charged to companies that provide interstate and/or international telecommunications services and this fee is passed on to consumers on their telecommunications bills. Since all households that consume video and/or telephone service are required to pay into the Universal Service Fund, it is important that communities maximize their participation in the E-Rate program to help recoup the investment made by their residents that pay into the fund. Further E-Rate analysis data is available in the Appendix.

Figure 3-12: Bandwidth Demands for Educational Technologies per Student



Each school district obtains its Internet services through the county-level Orleans/Niagara BOCES, which in turn receives Internet through the Erie regional BOCES. Local broadband connectivity between the schools and administrative offices is handled through each school district individually. In the Niagara Falls City School District, which is the largest school district in the County, connectivity is provided by Fibertech, a local telecommunications provider that won a contract in 2012 to build fiber to all schools within the district.

The Niagara Falls district includes 13 campuses with 11 schools and over 7,000 students. The district has initiated a 1:1 computing program for all Pre-K through 6th grade classrooms using mini laptops with middle and high schools using desktops and shared mobile carts. While state online testing has been piloted throughout the district, it has yet to be implemented permanently. The Niagara County Community College (NCCC) is part of the State University of New York (SUNY) educational system. NCCC consists of a main campus in Sanborn and several satellite campuses including a new Culinary Institute in Niagara Falls. The NCCC population includes about 7,000 students who are enrolled in over 70 degree and certification programs, eight full online degree programs, and over 100 online classes. Students using tablets and other devices on the NCCC network average approximately 2,500 connections



on any given day. In addition, 360 beds are located in campus dorms creating 24-hour demand for campus broadband.

The NCCC utilizes several different service providers to support its operation. TWC provides Internet to the dorms and provides the college with its main 400Mbps Internet connection. TWC also provides a point-to-point circuit between the main college campus and the Culinary Institute. Level 3 provides voice services to the college. During the interview, we learned that SUNY is currently undertaking an initiative to consolidate data centers across the 64 state colleges and universities. While we did not meet with the University at Buffalo (UB), we understand they offer a number of programs in the information technology field including cybersecurity and other data intensive areas. In addition, UB maintains a 2,000-server cluster Dell supercomputer.

In November 2014, NY voters passed a \$2 billion bond to fund technology for public schools in the state. The “Smart Schools” bond focuses on funding technology in the classroom, technology enabled learning, and critical infrastructure. The Smart Schools Commission reported, “one million people lack access to broadband services, while another 6.4 million New Yorkers are unable to subscribe to broadband.”⁵

The commission also highlighted that key to success is a connection to high-speed broadband for every school, with technology that is sustainable and scalable over time, as well as delivering sufficient wireless capabilities for every student.” Access to Smart School funds will be available to every school district in the state. The projected funds available for Niagara County are estimated at over \$26 million with \$8.8 million alone estimated for the Niagara Falls Central School District.

3.5 Healthcare

Broadband is crucial for Niagara County’s healthcare providers as they begin to leverage electronic medical records as many capabilities of health IT, such as telehealth and electronic exchange of health care information, require high performance broadband capability. Niagara County’s major hospitals currently maintain access to high-speed broadband services but beyond these organizations, the healthcare providers that have access to this type of service is unknown. Doctor’s offices, clinics, and imaging centers all have growing broadband needs to ensure they stay connected as their organizations transition to the digital healthcare environment. For these smaller organizations, high-speed broadband becomes a critical need to fulfill their mission and provide for long-term success.

Two large hospitals are located in Niagara County. In downtown Niagara Falls, the Niagara Falls Memorial Medical Center, a full service hospital that also maintains several satellite primary care facilities including the Summit Healthplex, Tuscarora Health Center, and the Schoellkopf Health Center, a 120-bed skilled nursing facility that specializes in short-term rehabilitation and a range of wellness programs. Based in Lewiston, Mount St. Mary’s Hospital, part of the Catholic Health System, is a 175-bed community hospital that is a New York State Department of Health Designated Stroke Center and a certified Chest Pain



⁵ NY Smart Schools Commission Report: <http://programs.governor.ny.gov/sites/default/files/SmartSchoolsReport.pdf>



Center. The hospital also maintains ten satellite facilities throughout the county, each having a specialty focus area. Connecting the various satellite healthcare facilities within Niagara County, along with connecting all the county's healthcare facilities to resources outside of the Niagara region requires lots of bandwidth.

Future needs of healthcare providers in Niagara County will continue to grow. As a guide, the FCC has released minimum recommended broadband speeds for healthcare organizations, as part of its Healthcare Connect program. These speeds identified by Healthcare Connect should be considered minimum requirements and Niagara County's healthcare organizations should have access to more bandwidth if needed.

Single Physician Practice – 4 megabits per second (Mbps)

- Supports practice management functions, email, and web browsing
- Allows simultaneous use of electronic health record (EHR) and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring

Small Physician Practice (2-4 physicians) – 10 Mbps

- Supports practice management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring
- Makes possible use of HD video consultations

Nursing home – 10 Mbps

- Supports facility management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring
- Makes possible use of HD video consultations

Rural Health Clinic (approximately 5 physicians) – 10 Mbps

- Supports clinic management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring
- Makes possible use of HD video consultations



Clinic/Large Physician Practice (5-25 physicians) - 25 Mbps

- Supports clinic management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables real-time image transfer
- Enables remote monitoring
- Makes possible use of HD video consultations

Hospital - 100 Mbps

- Supports hospital management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables real-time image transfer
- Enables continuous remote monitoring
- Makes possible use of HD video consultations

Academic/Large Medical Center - 1,000 Mbps

- Supports hospital management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables real-time image transfer
- Enables continuous remote monitoring
- Makes possible use of HD video consultations

3.6 Government, Utilities, and Emergency Services

Through meetings with various stakeholders in Niagara County, we were able to understand the operational requirements of the county departments and utility districts, including Information Technology, and Emergency Services. It appears as though the county is very dependent on traditional carrier services and wireless/microwave technologies, with very little county owned fiber in use. The Information Technology Department provides network, application and other supporting technology offerings to county departments. They are charged with managing connectivity between County facilities, ensuring that remote facilities have access to all resources and applications. Today the county uses traditional carrier offerings such as cable/DSL, fiber Ethernet and point-to-point wireless to maintain connectivity. While these solutions meet the needs of the county today, it is questionable whether these will continue to support the county well into the future.

The Niagara County Water District and Niagara County Sewer District manage several Supervisory Control and Data Acquisition (SCADA) systems, which are used to manage, monitor, and provide alarm and alert functionality over the water and wastewater utility systems. The utility districts are also heavily invested in wireless technologies. The county was the recipient of a federal grant that was used to install towers and wireless equipment to support utility district operations. It is unknown whether or not these tower sites could be utilized to support wireless broadband initiatives, but this should be investigated further.

Emergency Services departments such as Police and Fire have a requirement of high-speed access while in the field. These groups require consistent access to law enforcement and national crime data and must be able to access these systems in real time while in the field. Today fire and police use air cards that



meet today's needs. As we look into the future, it is evident that it is no longer enough for first responders to rely on a push-to-talk network for situational awareness. Police, fire, and emergency medical services play the central roles in emergency response. Mobile technology capable of sending and receiving bandwidth-intensive information can help first responders do their jobs much more effectively and safely. These emergency response organizations need broadband networks that let them share streaming real-time video, detailed maps and blueprints, high resolution photographs, and other files that today's public safety and commercial wireless networks cannot handle, especially during major events or catastrophes.

Broadband technology and infrastructure is critical to the success of our first responders because it provides them with enhanced situational awareness in emergencies. By leveraging broadband networks, public safety organizations can gain access to site information, video surveillance data, medical information or patient records, and other information that would be useful in an emergency. These networks also support and improve 9-1-1 Public Safety Answering Points (PSAPs) response time and efficiency by establishing a foundation for transmission of voice, data, or video to the responding entity.

New broadband technologies give first responders new tools to save lives. These tools include:

- Next-Generation Radio Systems
- Advanced Security Camera Systems
- Gunshot Detection Systems
- Next-Generation Wireless Data Systems
- Body-Worn Cameras
- Chemical, Biological, Radiological, Nuclear, and Explosives Sensor Systems

3.7 Community Support Organizations

In order for a community to thrive and grow, community support organizations must thrive as well; to be the reliable go-to organizations for people, communities, and the special interests and needs the organizations represent and serve. Community institutions such as local chambers of commerce, human services organizations, community centers, and churches all help connect people to services. These organizations serve important roles, stationed on the front lines in the community to collect the information necessary to fill gaps in services and to investigate opportunities to solve persistent community problems, while addressing immediate and perhaps more urgent needs.

Broadband plays a vital role in helping these types of organizations fulfill their missions. Whether it is as simple as a community church streaming their weekly service or the local chamber of commerce advertising their latest event through their web presence and email, distributing and accessing local information is central to the mission of most community organizations. Broadband equips these organizations with the critical communication tools necessary to ensure they operate efficiently, enabling often volunteer staff of budget-minded organizations to be successful in the execution of their important roles in the community.

Broadband availability inspires these organizations to be innovative in their use of technology and brings a higher level of welfare to the communities they serve. Take for example All Saints Church in rural Norfolk County, UK. The church is utilizing its spire (the tallest structure in the area) to deliver wireless Internet service to the surrounding community. Now, in a community that was lucky to see speeds up to 1 Mbps, speeds of over 8 Mbps are not uncommon. This community support organization has brought broadband service into an area that was previously underserved and is helping to bridge the digital divide that plagues many communities around the globe.



3.8 Smart Community Innovation

Broadband networks become key drivers of efficiency and innovation as more municipal applications are enabled online. As communities throughout Niagara County expand online services, broadband will become an even more critical component of the daily operations to serve communities. Applications migrated to a community network enjoy greater availability and increased bandwidths over what has traditionally been available, which creates a more effective and efficient municipal organization. High-speed, reliable broadband enables these organizations to:

- Improve operational efficiencies
- Reduce direct and indirect costs
- Provide enhancements to public safety
- Better serve the local community
- Respond more quickly to the local community
- Enable new interactions with citizens and businesses
- Ensure better preparedness in times of emergency
- Provide more information to citizens and businesses

Community-owned fiber can provide a public infrastructure that can be used for public benefits, including enhanced municipal utilities, new e-government applications, technology collaboration, and infrastructure sharing programs. In addition, a community owned network provides a platform for long-term innovation of Smart Community technologies and applications, ranging from smart homes to energy conservation and management to green building programs. While the initial goal of this infrastructure is to enhance local broadband services, it will become a long-term asset to support Smart Community programs that increase efficiency, lower cost, reduce environmental impact, and enhance quality of life.

Using a fiber network, Niagara County and its municipalities can take advantage of emerging digital technologies to enhance the wellbeing and efficiency of its community, reducing costs and resource consumption while more effectively engaging its citizens. Smart Communities are more efficient at responding to local, national, and global challenges, and are able to position themselves to be more successful than other communities that do not leverage these new technologies.

Through the implementation of a wireless sensor network, which utilizes a community fiber network infrastructure as a platform, the county and its municipalities can take advantage of the rising popularity of the “Internet of Things” - technologies that monitor components of the area’s infrastructure in real time such as traffic networks, power networks, water and sewage control systems, and street lighting. By actively monitoring these and other systems in real time, the region can proactively adjust delivery of services to meet the needs of the community while reducing costs through optimized efficiency.

Smart Grid Utilities and Advanced Metering Infrastructure

Smart Grid technology allows for two-way communication between the utility and its customers, and the networked sensors along the transmission lines is what makes the grid smart. Like the Internet, the Smart Grid consists of controls, computers, automation, and new technologies and equipment working together, but in this case, these technologies work with the electrical grid to respond digitally to our quickly changing electricity demands.

Advanced Metering Infrastructure (AMI) is an integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers. Customer systems include in-home displays, home area networks, energy management



systems, and other customer-side-of-the-meter equipment that enable smart grid functions in residential, commercial, and industrial facilities.

The Smart Grid represents an unprecedented opportunity to move the energy industry into a new era of reliability, availability, and efficiency that will contribute to our economic and environment health. Smart Grid Utilities and AMI are highly reliant on high-speed communications and can be supported through community-owned fiber infrastructure.

Smart Trash Containers

Smart Trash Containers are an emerging technology that has been successfully implemented in several communities around the world. These systems rely on embedding refuse containers with wireless sensor technology to monitor and remotely alert when the containers are at capacity and need to be emptied. By alerting only when a container is full, this saves the staff time by not having to check or empty containers that are empty or only partially full. Additionally, data can be collected with regard to the rate the containers are reaching capacity and thus allow the waste management service providers to adjust their service in real time to better meet the needs of the community.

Smart Street Lighting Systems

The businesses and residents of Niagara County can benefit from the implementation of a Smart Street Lighting system. These systems employ high efficiency Light Emitting Diode (LED) technology to replace traditional incandescent bulbs. In power savings alone, LEDs have demonstrated to be approximately 90% more energy efficient than traditional bulbs; however, simply replacing the existing bulbs with LEDs does not create an intelligent lighting system. The “Smart” components refer to the system being able to adapt in real time to the movements of pedestrians, cyclists, and automobiles. These systems will dim when no activity is detected and brighten when people or vehicles are present. Additionally, Smart Street Lighting Systems may be used to both deliver and receive data in the future creating useful “Li-Fi” networks that can provide greater and more efficient coverage than current “Wi-Fi” networks.



Smart Community Innovations through Municipal Fiber Networks

As communities invest in fiber infrastructure, they are provided the baseline infrastructure required to support a multitude of technology based initiatives that require connectivity. These initiatives can include broadband services, collaboration opportunities, public safety applications and future energy and utility management functions and features as outlined below.

Broadband Services

- Common backbone for all anchors
 - County and City
 - Schools
 - Libraries
 - Hospitals
 - Clinics
 - Public Safety
 - Community Support
- Interconnection with service providers
- WiFi in public centers

IT Collaboration

- E-Government applications
- Bulk Internet purchasing
- Application sharing
- Disaster recovery
- EOC communications

Public Safety Applications

- Video monitoring
- First responder support
- Collaboration with state and federal agencies
- FirstNET preparedness

Future Energy and Utility Management

- Smart Grid and Demand Response
- Automated Meter Reading
- Advanced Metering Infrastructure
- SCADA communications and control





4. Broadband Gaps and Issues in Niagara County

4.1 Lack of Fiber Distribution Technology

Through analysis of the available broadband infrastructure in Niagara County and through discussions with service providers, Niagara County appears to be lacking the fiber distribution technology utilized to deliver Fiber to the Premises (FTTP) services. Fiber distribution technology such as Passive Optical Networks (PON) is used to deliver a lower cost fiber connection than is available in a dedicated fiber offering service. While PON systems still utilize the concept of shared capacity, the overall amount of bandwidth that can be delivered to any group of subscribers is much greater than legacy DSL and cable networks found throughout the county.

With small to medium businesses (less than 100 employees) contributing to 63% of the county's GDP, it would make sense for the county to consider opportunities to help bring fiber distribution technologies into the market. These businesses are experiencing issues accessing the necessary services and bandwidth capabilities to support their operations. In many cases, these businesses must contract for services from multiple providers offering legacy network offerings, DSL, and cable. In discussions with the local incumbent providers, it was noted that upgrades to current platforms are planned. However, there are no plans to build out more fiber infrastructure, other than the dedicated service offerings that are far more expensive than traditional legacy services and only benefit larger enterprises and community anchors, the cost of which is almost always borne by the business or developer.

4.2 Fiber Availability

While there are vast amounts of fiber infrastructure throughout Niagara County, the direct use of the infrastructure by businesses and community anchors is limited. Fiber infrastructure is not typically installed by providers in advance of revenue opportunities, and therefore puts the county at risk when executing its economic development efforts, specifically in areas such as the priority development sites located throughout the county. Without this necessary infrastructure, the county will continue to experience issues when recruiting bandwidth intensive industries to the area.

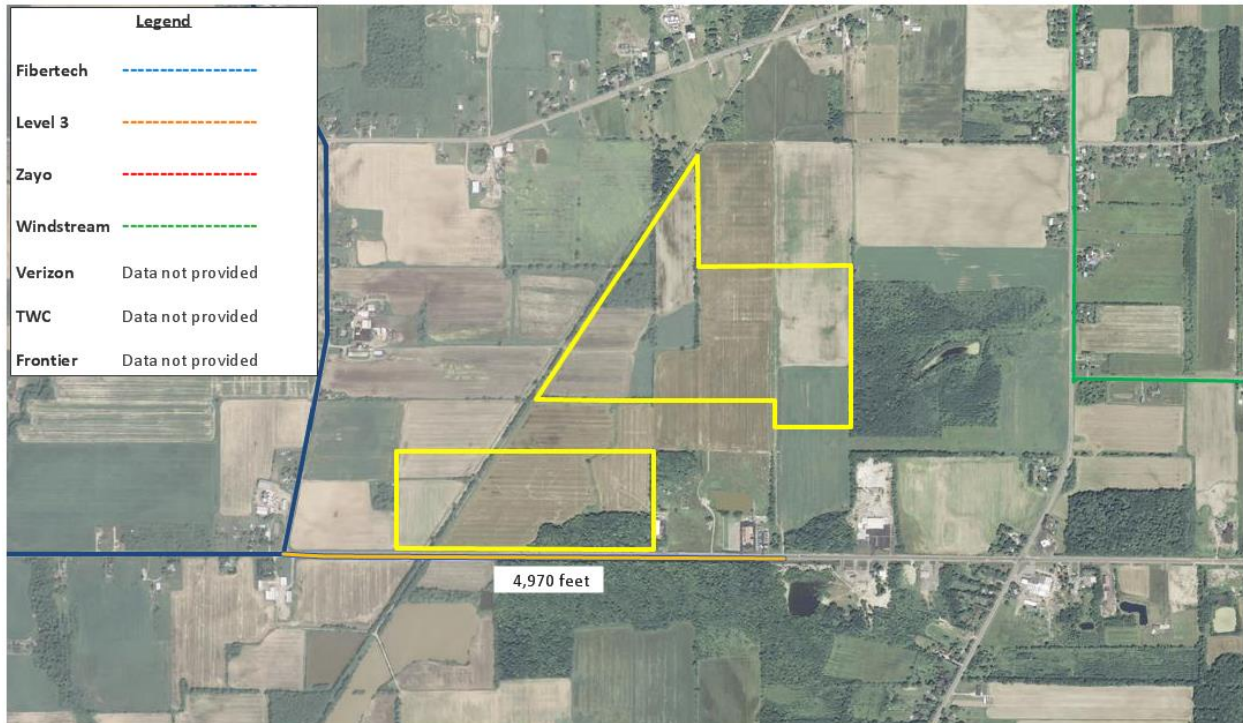
While many sites have been identified for future development, they lack the necessary facilities to attract bandwidth intensive industries such as data centers. In many cases, businesses looking to potentially locate in these areas would have to spend significant amounts of money to build out the provider's network infrastructure to receive service. Placing the county's economic future in the hands of broadband service providers can have a negative effect on the county's recruiting efforts, and can become a major obstacle to closing these deals.

The county, local municipalities, and economic development partners have the ability to require broadband infrastructure to be constructed when other underground utilities are placed. Installing fiber when the ground is open for other purposes would save future trenching and labor costs, and would prevent accidental penetrations to existing underground utilities. A "dig once" policy, as this is known in parts of the country, would allow the county to take a proactive position on providing technology infrastructure. The county should use public policy tools and direct investment when necessary to ensure key economic development areas and business parks are constructed with the appropriate broadband infrastructure allowing them to attract the ideal businesses to the county.



For example, Figure 4-1 illustrates the extension of fiber that would be required to serve the Cambria Technology Park. Fibertech maintains current fiber routes to the west of the park at the intersection of Lockport Road and Comstock Road. Currently, businesses looking to potentially locate in Cambria Technology Park would very likely be required to provide “aid to construction” to build fiber to a proposed location within the park. Such an expense could derail the business recruitment opportunity, and could be seen as a potential unnecessary expense as they evaluate competing sites. Costs for constructing underground fiber facilities can range from \$50,000 to \$100,000 per mile, while aerial construction can range from \$20,000 to \$50,000 per mile.

Figure 4-1: Cambria Technology Park Fiber Extension





Part Two

Broadband in the Niagara Falls International Airport Focus Area



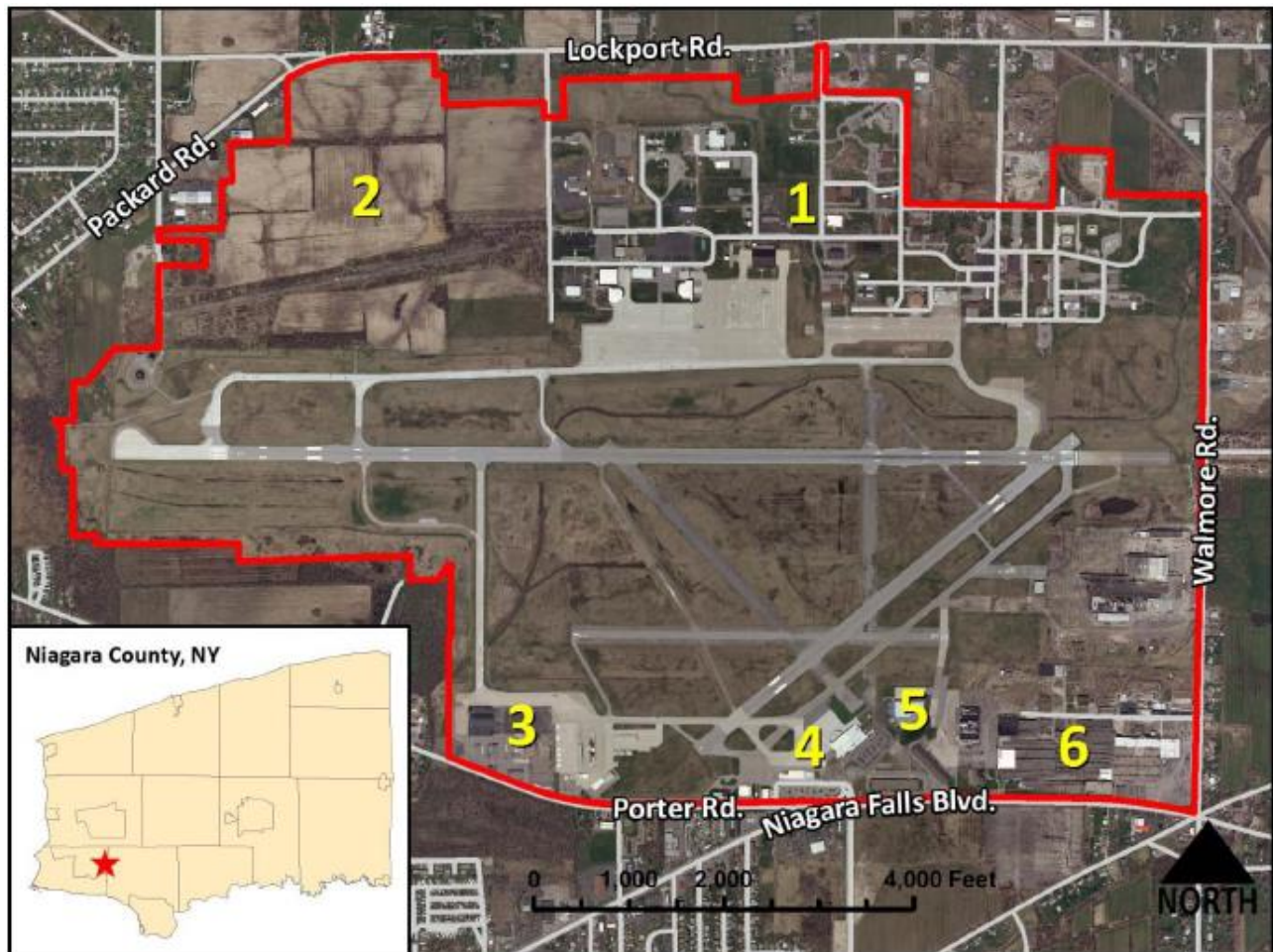
5. Overview of the Airport Focus Area

Part Two provides an analysis of the existing broadband infrastructure, service providers and services offered in the county as it relates directly to the Niagara Falls International Airport Focus Area. In addition, recommendations are provided to support further dark fiber development at and around the Niagara Falls Airport Focus Area to alleviate any gaps in service, provide greater access, and support future development.

Broadband plays an important role in supporting the operations of stakeholders located in the Niagara Falls Airport Focus Area, and will continue to do so for decades to come. The Airport Focus Area includes the following anchor institutions, businesses, and development sites:

- | | |
|--------------------------------------|--|
| 1. Niagara Falls Air Reserve Station | 4. Niagara Falls International Airport |
| 2. Niagara Airport Commercial Park | 5. Calspan Corporation |
| 3. Former U.S. Army Reserve Center | 6. Wheatfield Business Park |

Figure 5-1: The Niagara Falls International Airport Focus Area





5.1 Niagara Falls Air Reserve Station

The Niagara Falls Air Reserve Station (NFARS) is located to the north of the Niagara Falls airfield. The NFARS is Niagara County's largest employer, accounting for nearly 3,000 jobs. The 914th Airlift Wing (U.S. Air Force Reserve) hosts the installation. Other major units housed at the base include the 107th Airlift Wing (New York Air National Guard), 2nd Squadron of the 101st Cavalry (New York Army National Guard), 277th Quartermaster Company (U.S. Army Reserve), 865th Combat Support Hospital (U.S. Army Reserve), the 1982nd Forward Surgical Team (U.S. Army Reserve), and the Buffalo Military Entrance Processing Station (MEPS). As an airbase, the NFARS hosts the C-130 Hercules airlift mission (914th AW) and the Mission Control Element of the MQ-9 Reaper Remotely Piloted Aircraft (107th AW). The base has been targeted twice for closure through the U.S. Department of Defense (DoD) Base Realignment and Closure (BRAC) process.

In 2013, Niagara County, the Niagara Military Affairs Council (NIMAC), and other community stakeholders commissioned the Niagara Falls Air Reserve Station (NFARS) Future Mission Study, which was followed shortly thereafter by the Niagara Falls Air Reserve Station "Joint Base Niagara" Strategic Action Plan. These studies were conducted to ascertain the capabilities of NFARS and specifically, its strengths, weaknesses, opportunities and threats as related to the potential for future Base Realignment and Closure rounds. This assessment, like the studies before it, is intended, in part, to identify opportunities to support retention of the Niagara Falls Airbase.

The opportunity exists for new missions to be assigned to the Niagara Falls Air Reserve Station. Remotely Piloted Aircraft missions are areas within the Department of Defense where funding is increasing year over year, a trend that is expected to continue well into the future. In addition, the Department of Defense intends to spend in excess of \$23 billion on Cybersecurity over the next five years. The DoD sought more than \$4.6 billion for Cybersecurity in 2014 alone, which represented an 18% increase over 2013.

A major requirement to support these future mission areas is the necessary broadband infrastructure and support services. Therefore, it is critical that the required infrastructure be in place to support not only the Niagara Falls Air Reserve Station, but to also provide tremendous growth opportunities for the other five key stakeholders in the Airport Focus Area.

5.1.1 Remotely Piloted Aircraft

Remotely Piloted Aircraft (RPA) are a relatively new and growing application for fiber communications. Utilized as the primary communications conduit between the remotely-located ground control operator controlling the aircraft, fiber provides an ultra-fast means of transmitting very large amounts of data between long distances. Fiber connectivity enables RPA pilot and sensor operator teams to be housed within the Sensitive Compartmented Information Facility (SCIF) from where each mission is flown. Communications for flight controls need to respond in real time with no latency, so that reactionary movement of the aircraft shown by onboard cameras accurately reflects the flight controls from the remote operator, typically positioned hundreds or thousands of miles away.⁶

⁶ *The U.S. Air Force Remotely Piloted Aircraft and Unmanned Aerial Vehicle Strategic Vision*
<http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1000&context=usafresearch>, January 2005



Looking ahead, the U.S. Air Force plans to continue to grow its fleet of Remotely Piloted Aircraft (RPA) at a pace of about 70 to 100 per year through 2020, when a total of nearly 800 RPAs will be in operation. Due to the critical nature of the information sent to and from the RPA, high bandwidth and rapid transmission over long distances is imperative to success. Fiber-optic networks provide the bandwidth and transmission capabilities required with the added benefit of immunity from electromagnetic and radio frequency interference, making fiber-optic networks the ideal solution for RPA applications.

While connections to RPA fleet are conducted over GPS based technology, the RPA-controlling air base requires high-speed broadband connections capable of transporting large amounts of real-time data out of the region into a Department of Defense data center where the traffic will at some point transition to the GPS network for delivery to the RPA. Command and control should be connected and in close proximity to major Internet backbone points-of-presence, where network latency is kept to an absolute minimum, providing immediate response capabilities to real-time analytical data and Internet traffic.

Medium-altitude RPAs have bandwidth requirements of 10 to 16 megabits per second. The bandwidth needs of the RPAs are driven by multiple advanced sensors and high-definition cameras, wide area surveillance with dense data collection functions, and flight control communications through simultaneous video feeds. Higher altitude systems, such as the Global Hawk, need data rates as high as 138 megabits per second, due to additional sensors and the introduction of 3D high-definition cameras.⁷

The current NFARS RPA mission includes an Intelligence, Surveillance, and Reconnaissance (ISR) element, which is the cyber-intensive data collection component of the RPA mission, which underscores the importance of fiber-optic network connectivity at the NFARS. An opportunity exists for the DoD to engage public and private sector researchers within the Buffalo Niagara Region, including private companies and academic institutions, to create a Center of Excellence in RPA and ISR Technology, capitalizing on strengths in infrastructure, business, and human capital.

5.1.2 Cybersecurity

The NFARS Future Mission Study and Strategic Action Plan detail how cybersecurity can be used to help drive economic opportunity. As stated in the study, it is critical that the required fiber infrastructure be in place between key regional partners. The growing frequency of public-sector breaches creates a need for cybersecurity professionals to work with private enterprise to find innovative ways to protect sensitive data. Such efforts involve the partnership of government, private industry, and education working together to tackle major cybersecurity incidents.

While traditional security intelligence uses real-time data and analytics to predict, identify, and react to potential threats, cybersecurity intelligence goes beyond the normal bounds by automatically monitoring, analyzing, and prioritizing the risk landscape through sophisticated and bandwidth-intensive analytics, along with continuous monitoring to identify, track, and proactively address threats.

Economic vitality is dependent on the use of technology to accelerate productivity, yet greater use of technology increases exposure to cybersecurity risks. With cyber issues touching more aspects of our

⁷ "Remotely Piloted Aircraft Fuel Demand for Satellite Bandwidth"

<http://www.nationaldefensemagazine.org/archive/2011/July/Pages/RemotelyPilotedAircraftFuelsDemandforSatelliteBandwidth.aspx>, July 2011



lives, balancing the connection between economic growth and cybersecurity is a critical consideration for communities and organizations at all levels. The threat of data breaches, hacking attacks, identity theft, and loss of information increases in ways that hinder economic opportunities and stability.

A cyber incident can have physical impacts, such as acts against automated water and electrical systems that could shut down a city, while a physical incident can have cyber implications, such as a physical security breach that allows criminals to install keylogging capability or hackers to access local systems to gain control of data or devices across networks.

Each of these scenarios come with economic costs, and the government is paying attention. To illustrate the economic importance recognized by the federal government, agencies are increasing focus on reducing and preventing cyber risks. The Department of Defense plans to spend \$23 billion on cybersecurity over the next five years, aiming for \$5.5 billion in total cyber spending for 2016.⁸

Communities and organizations with cyber intelligence capabilities are less likely to have a security breach and are able to reduce remediation costs should a breach occur. Understanding the link between cybersecurity and the protection of physical assets can help design an approach that provides both cyber defense and economic security. To foster a climate in which cyber assets promote economic security and vitality, fiber infrastructure must be viewed as a key component in economic development.

As stated in the NFARS Future Mission Study, “within the Buffalo Niagara region are great assets that support development and deployment of advanced cyber technologies. The strengths of the region include a well-educated workforce, numerous colleges and universities granting degrees in computer science, multi-national information technology companies, and major academic research centers working with big data sets. Strong capabilities also exist at the 107th AW, including a former cybersecurity pilot program.” While the cybersecurity mission has been reassigned, the 107th retains the institutional experience, creating an opportunity for a future cyber mission, especially with the growth of RPA missions and their own cybersecurity requirements.

Again, an opportunity exists for the DoD to partner with businesses and academia to develop a Center of Excellence in Cybersecurity building off existing strengths in information technology within the region including the University at Buffalo’s Center of Excellence in Information Systems Assurance Research and Education as well as private sector companies provide network assurance in the IT field.

5.2 Niagara Airport Commercial Park

The Niagara Airport Commercial Park is a 217-acre New York State Certified Shovel-Ready Development Site located within the northwest quadrant of the Airport Focus Area. Shovel-Ready Certification means that all environmental work has been completed and the site is pre-permitted to allow for rapid development. The Niagara Airport Commercial Park is actively marketed for high tech and light manufacturing, logistics, research and development, and back office operations including data centers.

Pairing adequate land for growth with accessible and affordable fiber connectivity is an important economic development strategy. The proximity to significant institutions like the University at Buffalo,

⁸ *The Military’s Cybersecurity Budget in 4 Charts* <http://www.defenseone.com/management/2015/03/militarys-cybersecurity-budget-4-charts/107679>, March 2015



with the Calspan-UB Research Center (CUBRC) and the UB Center for Computational Research, presents a unique opportunity for collaboration around technology-based economic development. Pairing those resources with the nearby military operations and the Niagara Airport Commercial Park is perfectly suited to develop and sustain clusters in Defense, Aerospace, Technology, and many other complementary data-driven industries.

Significant amounts of bandwidth are required to sustain these “big data” operations. When considering a strategy, it is important to leverage the computing and data consumers throughout the region. With the capabilities of public and private sector research partners, who each share a need for data processing with the bandwidth capacity that fiber infrastructure and can provide, the Commercial Park can develop as a cluster for innovation and regional economic opportunity.

5.3 Former U.S. Army Reserve Center site

The former U.S. Army Reserve Center site is located on Porter Road in the Town of Niagara within the southwest quadrant of the Niagara Falls Airport Focus Area. The site is currently vacant, but will be redeveloped in the coming years into the Western New York First Response and Preparedness Center, a project that aims to improve disaster resiliency and response within the Buffalo Niagara region. The center will serve as an emergency operations hub and shared training facility for first responders, law enforcement agencies, and community organizations. The Department of Defense will de-acquisition the former Army Reserve site and convey it to the Town of Niagara Local Redevelopment Authority (LRA) for redevelopment beginning in 2016.

The center is planned as a multi-tenant facility that will house an emergency operations center, emergency supplies and equipment, rotary-wing aircraft and vehicles for first responders and law enforcement agencies, classrooms and tactical training areas, a law enforcement intelligence facility, and other uses. The center will improve disaster resiliency by strengthening coordination between first responders, enhancing law enforcement efforts, and improving emergency response capabilities. The project’s law enforcement intelligence and emergency operation components will bring significant telecommunications requirements. Servicing the site with fiber infrastructure is critical to the project.

The First Response and Preparedness Center is part of “Joint Base Niagara,” a community-supported initiative to expand use of the Niagara Falls International Airport and Niagara Falls Air Reserve Station. Potential tenants and users of the facility include:

- Mercy Flight of WNY
- Niagara County Emergency Services
- Niagara County Sheriff’s Office
- Niagara Frontier Transportation Authority Police
- New York Air National Guard
- Army National Guard units
- U.S. Border Protection, Buffalo Sector
- U.S. Coast Guard, Buffalo Sector
- American Red Cross WNY Chapter
- New York State Police
- Local police and fire departments
- Local colleges and universities with public safety and emergency preparedness programs



5.4 Niagara Falls International Airport

The Niagara Falls International Airport (NFIA) is located to the south of the airfield across from the Niagara Falls Air Reserve Station. Without question, the NFIA is an asset to the region as well as a critical economic driver. The Niagara Frontier Transportation Authority (NFTA), the state agency that oversees public transportation in the Buffalo Niagara region, owns the airport. In 2009, the NFTA opened a brand new \$31.5 million airport terminal. While the NFTA has been successful in attracting new commercial passenger service, further development of the airport is viewed as critical to its long-term sustainability. The NFTA works closely with Niagara County and the NFIA Stakeholders Group on airport development matters.

The airport has a strong and proud military legacy, playing an important role in WWII when Bell Aircraft employed over 28,000 people, and manufactured and shipped over 10,000 warplanes. The NFTA and NFARS have shared the airport for many years. In fact, operation and maintenance of the airfield is shared jointly by the two agencies, making it an economical operation. Continuing to develop strong, complementary uses of the airport will increase demand for business space in the Airport Focus Area and help sustain airport operations.

Given its location relative to the interstate highway system, the U.S.-Canada border, and major population centers, the NFIA can continue increasing its role as a regional intermodal center. As identified in the Niagara Airport Master Plan, with fiber broadband in the Airport Focus Area, data-intensive and time sensitive intermodal logistics operations of any scale would be an ideal tenant. Air cargo and freight operations would have physical intermodal access and logistics support industries would have fiber broadband access to support operations.

5.5 Calspan site

Calspan Corporation is located in the southeast quadrant of the Airport Focus Area. Calspan is an independent research, training, engineering and test services company serving aerospace, automotive, occupant protection, and race industries. Calspan operated under the name Cornell Aeronautical Laboratory from 1946 until 1972. In 1972, Cornell reorganized the lab as the for-profit Calspan Corporation and the organization became public. Calspan operates the largest wind tunnel in the U.S., located at their headquarters across from the Buffalo Niagara International Airport. In addition, Calspan also operates as the Fixed Base Operator for the Niagara Falls International Airport, providing services for general aviation, refueling, etc. The company relies on broadband service for its research and test operations as well as moving data between its headquarters and satellite locations.

5.6 Wheatfield Business Park

The Wheatfield Business Park is located in the former Bell Aerospace building, a facility with over one million square feet of leasable space. Moog-ISP, formerly AMPAC In-Space Propulsion, is a major tenant at the facility. Moog-ISP is a leading developer and supplier of liquid rocket engines, tanks, and propulsion systems for commercial, defense, and spacecraft launch vehicles.⁹ Moog is located in the former Bell

⁹ http://www.moog.com/literature/Space_Defense/SDG_Brochures/Moog_ISP_Overview_Rev_0613.pdf



Research Rocket Test Facility, containing vacuum chambers and other relevant test facilities. While Moog is headquartered in East Aurora and is engaged in a variety of industries, the satellite campus in Niagara County is designated to Space and Defense lines of business. Moog requires broadband service for research and development including moving data between its headquarters and satellite locations. Expanded broadband access at the Wheatfield Business Park would make the facility more attractive to potential commercial and industrial tenants.



6. Broadband in the Airport Focus Area

The Airport Focus Area is well served by a number of telecommunications providers, including the regional incumbent local exchange carriers (ILEC), competitive local exchange carriers (CLEC), cable providers, wireless carriers, and Tier 1/Tier 2 providers. Each provider offers different services ranging from DSL, cable and direct fiber connectivity to wireless point-to-point or microwave technology. A number of large businesses and institutions, including the Niagara Falls Air Reserve Station and Niagara Falls International Airport, anchor the Airport Focus Area. These anchors have demanded dedicated service offerings, and the providers have responded over the years. While copper-based broadband infrastructure is used extensively throughout the area, it will not meet the long-term requirements of those located in the Airport Focus Area.

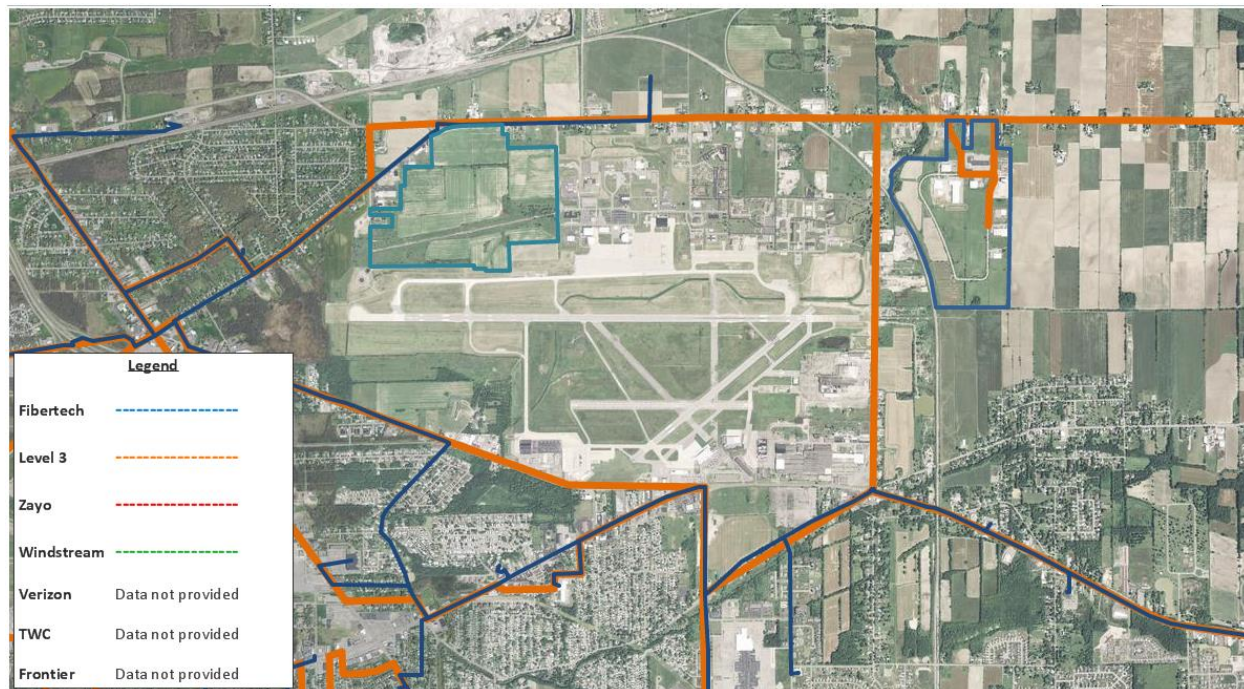
6.1 Broadband Providers in the Airport Focus Area

A variety of companies maintain fiber-optic broadband infrastructure in and around the Airport Focus Area. These providers include:

- **Verizon** - an ILEC in Niagara County providing DSL and fiber services throughout the Airport Focus Area. While Verizon has fiber in the focus area, they did not share any information about the location or extent of their infrastructure.
- **Time Warner Cable (TWC)** - a cable telecommunications provider serving the Niagara region. TWC provides coaxial cable Internet services and fiber service. They were able to confirm fiber availability to addresses within the Airport Focus Area with services of up to 50Mbps.
- **Frontier** - an ILEC located in Sanborn, NY, a hamlet in Niagara County. In addition to their DSL offering, Frontier provides dedicated fiber service and has verbally confirmed fiber availability along the eastern border of the focus area on Walmore Road.
- **Level 3 Communications** - maintains extensive fiber routes through Niagara County providing a portfolio of connectivity services including, Internet, voice, transport, dark fiber, and other complementary service offerings. Their fiber infrastructure surrounds the Airport Focus Area. Level 3 was able to confirm service availability to a number of commercial properties within the Focus Area, and confirmed availability of their full portfolio of services to the Airport Focus Area.
- **Fibertech Networks** - operates one of the fastest growing metro fiber-optic network infrastructures in the Northeast. Fibertech maintains extensive fiber routes throughout the Airport Focus Area and has confirmed availability of their full portfolio of services in the Airport Focus Area.
- **Transwave Communications Systems, Inc.** - a communications provider of microwave, data networking, telephony, tower construction, and site development services. They provide active wireless and microwave networks throughout the Airport Focus Area.



Figure 6-1: Fiber-Optic Network Service Providers in the Airport Focus Area



As seen in Figure 6-1, Fibertech and Level 3 Communications are the only providers that confirmed the location of fiber in the Airport Focus Area. Time Warner Cable and Verizon are believed to have assets in the area, but both companies were unwilling to share information about the location or extent of available infrastructure.

6.2 Broadband Services and Capabilities






Gaining access to provider data that shows current and future fiber routes, available capacity and other proprietary information can be challenging. While several providers in Niagara County made high-level fiber maps available, the attribute data for these routes is not. Instead of focusing on fiber route attributes such as fiber strand count and dark fiber availability, this report identifies the services that are available over the networks operated within the region.

There are extensive fiber routes out of the Buffalo market into Niagara County, varying widely by provider. Maps of available routes have been included in Appendix A and Appendix B. In Niagara Falls and more specifically around the Niagara Falls Airport, there are multiple providers maintaining fiber routes.

Through discussions with providers, we found full portfolio offerings of telecommunications services including dedicated Internet access, dark fiber and Ethernet transport, MPLS and voice offerings. In specific discussions with Level 3, the entire Airport Focus Area can be serviced and their full portfolio of services is available, such as those seen in Figure 6-2. This is significant as it indicates that the necessary facilities are in place within specific areas of the Focus Area to support current needs of stakeholders. **However, the ability to support future needs will require new investments in telecommunications infrastructure including fiber.**



Figure 6-2: Sample Portfolio of Services from Broadband Service Providers

 Professional Services	 Security	 Data Networks	 Voice	 Content Distribution
<ul style="list-style-type: none"> · Professional Services · Managed Network Services · Managed IT and Hosting 	<ul style="list-style-type: none"> · Secure Access Services · Email/Web Defense · Security Consulting · DDoS Mitigation · Threat Intelligence · Managed Security Services 	<ul style="list-style-type: none"> · Managed Dedicated Fiber · MPLS/IP VPN · Secure Internet Services · Converged Services · Wavelengths · Ethernet · Private Line · Virtual Private LANs 	<ul style="list-style-type: none"> · Wholesale Voice · Contact Centers · Collaboration Services · Voice Complete 	<ul style="list-style-type: none"> · Channel Origination · Content Delivery Network · VenueNet · Cloud Content Exchange · Vyvx Solutions

6.3 Airport Focus Area Sites and Broadband Market Analysis

Through analysis of the market, Magellan identified a number of commercial sites by address, selected randomly throughout the Airport Focus Area. The four sites are geo-located on the map in Figure 6-3. Magellan’s team contacted each telecommunications provider and inquired as to the availability of fiber service. The following site locations were utilized:

- Site #1 – 2221 Niagara Falls Boulevard, Niagara Falls, NY 14304
- Site #2 – 7101 Packard Road, Niagara Falls, NY 14304
- Site #3 – 8995 Lockport Road, Niagara Falls, NY 14304
- Site #4 – 2095 Niagara Falls Boulevard, Niagara Falls, NY 14304

Figure 6-3: Market Analysis Map of Airport Focus Area Sites 1-4

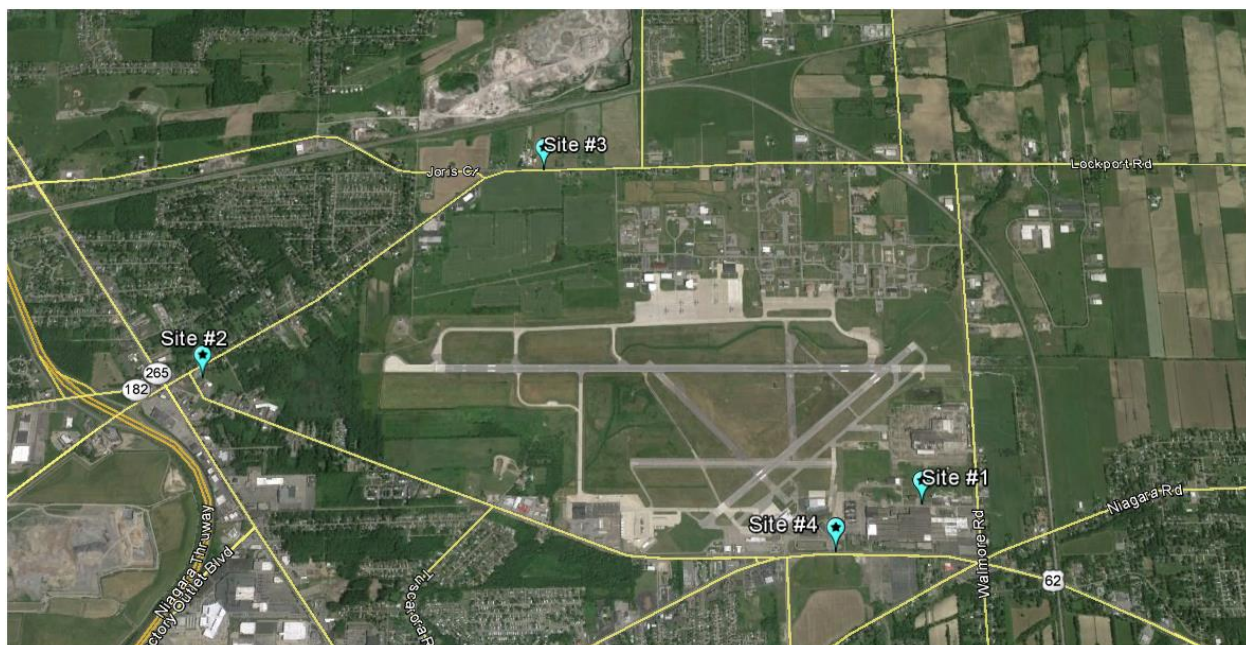




Figure 6-4: Broadband Market Analysis – Detail of Airport Focus Area Sites 1-4

Commercial Site #1 – 2221 Niagara Falls Boulevard, Niagara Falls, NY 14304		
Provider	Type of Service	Serviceable
Time Warner Cable	Fiber Service - up to 50Mbps	Yes
Frontier	No Service	No
Verizon	No Service	No
Level 3	Fiber Service - Full Portfolio of Services	Yes
Fibertech	Fiber Service - Full Portfolio of Services	Yes

Commercial Site #2 – 7101 Packard Road, Niagara Falls, NY 14304		
Provider	Type of Service	Serviceable
Time Warner Cable	Fiber Service - up to 50Mbps	Yes
Frontier	No Service	No
Verizon	No fiber in the area	No
Level 3	Fiber Service - Full Portfolio of Services	Yes
Fibertech	Fiber Service - Full Portfolio of Services	Yes

Commercial Site #3 – 8995 Lockport Road, Niagara Falls, NY 14304		
Provider	Type of Service	Serviceable
Time Warner Cable	Fiber Service - up to 50Mbps	Yes
Frontier	No Service	No
Verizon	No fiber in the area	No
Level 3	Fiber Service - Full Portfolio of Services	Yes
Fibertech	Fiber Service - Full Portfolio of Services	Yes

Commercial Site #4 - 2095 Niagara Falls Boulevard, Niagara Falls, NY 14304		
Provider	Type of Service	Serviceable
Time Warner Cable	No Service	No
Frontier	No Service	No
Verizon	No fiber in the area	No
Level 3	Fiber Service - Full Portfolio of Services	Yes
Fibertech	Fiber Service - Full Portfolio of Services	Yes

In discussions with the local incumbent broadband providers, comments indicate upgrades to current platforms and service offerings are planned. However, there are no plans to build out further fiber infrastructure, other than guaranteed, dedicated service offerings as needed. These dedicated services are far more expensive than traditional legacy services and are typically only built for larger enterprises and community anchors that depend on large amounts of dedicated and guaranteed bandwidth. These service levels are expensive and installation costs are commonly borne by the company or site developer.

Figure 6-4 confirms the availability of fiber within the Airport Focus Area through Time Warner Cable, Level 3, and Fibertech. While Verizon indicated that it could service the Focus Area with fiber, the above data suggests that Verizon does not currently have fiber infrastructure within the Focus Area.



6.4 Broadband Gaps and Issues at the Airport Focus Area

Many of the businesses located in the Airport Focus Area are enterprise level customers requiring large amounts of bandwidth. With small to medium businesses of less than 100 employees contributing to 63% of the Niagara County's GDP, it would make sense for the county to consider opportunities to help bring fiber distribution technologies into the market. As business recruitment and retention efforts increase in the Airport Focus Area, the need for more affordable high-speed services will become necessary especially for small to medium businesses locating in the Focus Area.

Through this assessment, and specifically Section 2.5 Commercial Properties and Broadband Market Analysis and Section 6.3 Airport Focus Area Sites and Broadband Market Analysis, we realize that access to fiber at the Airport Focus Area is not currently an issue. If a customer in the Airport Focus Area wants fiber broadband strongly enough, and is willing to pay the service provider to connect that customer to their fiber network, it can be done.

At issue is the lack of an inexpensive service offering from any fiber provider service the county and the Airport Focus Area. To support this finding, of the Niagara County businesses that responded to the Broadband Business Survey, 20.1% reported that fiber was the connection method for their business. Of those companies that have fiber access, 87.5% reported their monthly service costs are more than \$300, with 22% reporting monthly service charges over \$1,000. To illustrate the point that only large businesses can justify the cost of fiber connectivity, of the businesses that reported a fiber connection, 75% reported their business was larger than 90 employees.

Only dedicated offerings are available throughout the Airport Focus Area, and the price point is much higher than would be found if using a fiber distribution platform. Many communities have implemented more affordable fiber distribution technologies to support their business and residential areas. As an example, fiber distribution technologies such as Passive Optical Networks, are not available in the Airport Focus Area or within Niagara County. These systems deliver a lower cost fiber connection than that of the dedicated fiber offerings that are available throughout the county broadband market and the Airport Focus Area.



7. Airport Focus Area Stakeholder Interviews

During multiple onsite visits, the Magellan consulting team met with stakeholders in Niagara County to understand their current and future broadband needs, and where possible, identify service providers and services under contract. In the Airport Focus Area, the 107th AW NY Air National Guard, Calspan, Moog, and the Niagara Frontier Transportation Authority each participated in the meetings, providing valuable insight into the current providers, service offerings, and future needs of their organizations.

7.1 107th AW NY Air National Guard

Interviews were conducted with the 107th Airlift Wing of the New York Air National Guard, providing the opportunity to understand their overall needs as well as concerns. The Guard unit has been assigned Remotely Piloted Aircraft (RPA) missions and reports that a Sensitive Compartmented Information Facility (SCIF) is being constructed on the base. The SCIF will house the virtual cockpits used to fly RPA missions both domestically and overseas. RPA missions are “big data” missions that require substantial amounts of bandwidth and require connectivity to identified Command, Control, Communications, Computers, and Intelligence (C4I) systems. Each RPA will typically contain and provide multiple high definition video streams, numerous sensors and related data and the systems required for flight controls.

While the base appreciates the concern of the community in commissioning this study, it has relayed the message that the base itself does not need assistance at this point, but conversations are important to identify both complementary and potential conflicting activities. The base has received its mission and supporting infrastructure will be built. The Department of Defense procurement process will attract multiple fiber providers that will be capable of providing the necessary amounts of diverse fiber capacity.

7.2 Calspan

Calspan’s primary service is the data analytics that it provides to its customers garnered through research and testing of transportation products and equipment. Time Warner Cable is the current provider for both of Calspan’s facilities in Western New York; at Niagara Falls International Airport and Buffalo Niagara International Airport. Time Warner Cable provides 100Mb Internet at each location and a 100Mb circuit between the two facilities. Transwave is currently used for backup purposes. The impression from Calspan is that Time Warner is expensive, but there is a lack of available competition.

7.3 Moog-ISP

Transwave is the primary link between Moog-ISP at Niagara Falls International Airport and Moog’s corporate headquarters located in East Aurora. Time Warner Cable provides a backup connection to Moog’s headquarters. The contact at Moog-ISP who participated in the stakeholder interviews confirmed that Level 3 was the previous provider to the facility, and believes their fiber is still intact. It was also indicated that significant latency exists in the Transwave microwave connection between facilities.

7.4 Niagara Frontier Transportation Authority

The Niagara Frontier Transportation Authority (NFTA) is a multi-modal transportation agency that handles bus, rail, and airport transportation systems throughout Buffalo-Niagara region. The NFTA is a



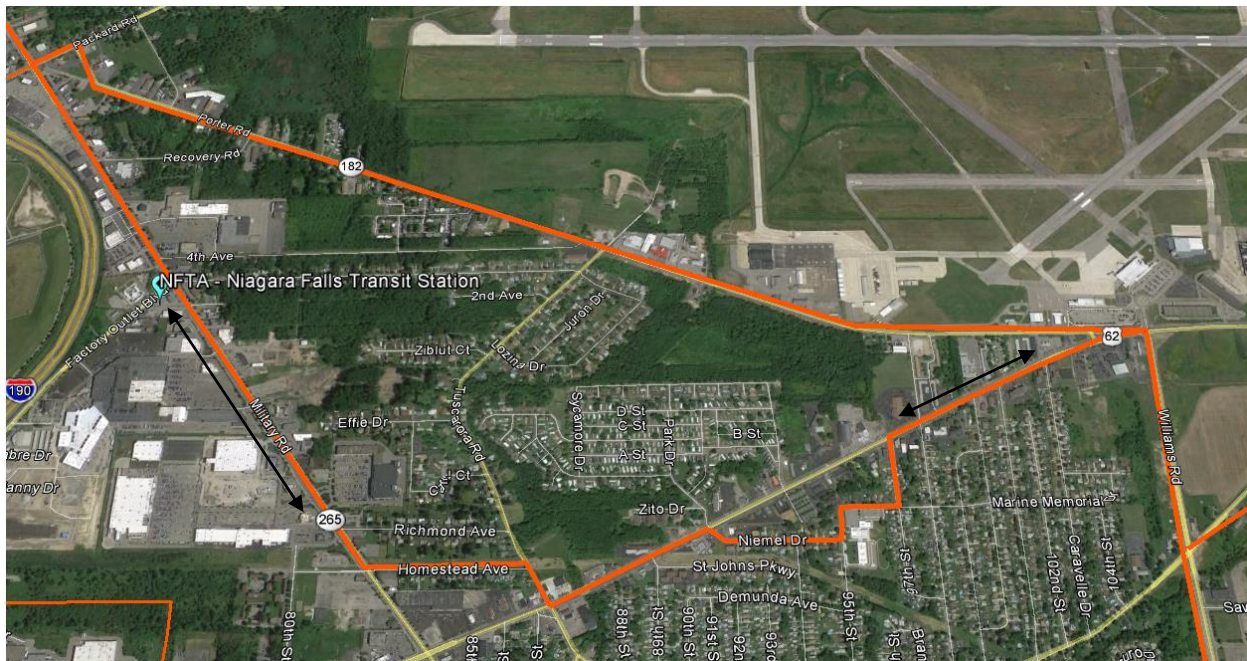
State Public Authority charged with the operations of the Buffalo Niagara International Airport and the Niagara Falls International Airport. The NFTA uses fiber optics from the State Department of Transportation in addition to the fiber it owns directly.

There are eight facilities operated by the NFTA, three of which are located in Niagara County; two bus transit stations and the airport. The NFTA uses a number of different providers throughout its network, including Level 3 Communications for Internet, and Time Warner for site-to-site connectivity. The NFTA has contracted with Finger Lakes Technology Group to manage their networks and data centers. The NFTA reports that there is a gap in their corporate network connecting the Niagara Falls Airport. There have been multiple attempts to bring fiber to the airport, but costs have been prohibitive.

While the NFTA prefers building and owning the fiber route, costs may continue to be prohibitive. They should work with the providers to determine the costs associated with dark fiber leasing or Indefeasible Rights of Use (IRU), which would provide long-term contract ownership of the required fiber route. Should this option be too costly, the NFTA should make the business case to build or attempt to jointly build the route with potential partners in a cost sharing agreement.

As is indicated in Figure 7-1 below, the NFTA Bus Transit Station is in close proximity to Level 3 Communications fiber routes. The fiber route between the NFTA Bus Transit Station and the Airport is approximately 2.55 miles (13,499 feet). As indicated by the black arrows, from the NFTA Bus Transit Station the preferred fiber route is specifically along Military Road to the south and east of the transit station, along Homestead Drive and Tuscarora Road to Niagara Falls Boulevard, then along Niemel Drive and 97th Street, back to Niagara Falls Boulevard and to the Airport.

Figure 7-1: Fiber Route from NFTA Bus Transit Station to Airport - Level 3 Communications





8. Recommendations

This broadband assessment is a study to identify local broadband assets and determine the market competitiveness of existing broadband service providers to meet the growth demands of the Airport Focus Area. With Niagara County and Airport Focus Area broadband assets known, county leaders and stakeholders can begin laying out a process of developing an action plan to increase the competitiveness of the county through the deployment of accessible and affordable fiber-optic broadband services.

The recommendations set forth in this section are based on the assessment of current fiber-optic broadband infrastructure and offerings from service providers in Niagara County, and in consideration of future communications needs of businesses in Niagara County and the Niagara Falls Airport Focus Area. Many recommendations are specific to the requirements identified through the stakeholder interview process and in consultation with county leaders.

Highest Priority Recommendation

Develop a Business Plan for an Airport Fiber-Optic Network

8.1 Develop a Business Plan for an Airport Fiber-Optic Network

8.1.1 Feasibility Study for Airport Fiber-Optic Network

A feasibility study should be developed that will identify the opportunity to construct a fiber-optic network for the southern portion of the Airport Focus Area. The sites identified for this study should include, based on current use and anticipated future need, the former U.S. Army Reserve Center, the Niagara Falls International Airport, the Calspan site, and the Wheatfield Business Park. A thorough analysis should be performed for each site, including the documentation of the future telecommunications needs of each facility, a conceptual design and engineering study to identify the necessary backbone and lateral fiber routes, and cost estimates to construct the network.

Airport Focus Area stakeholders should be engaged to develop an ownership and operational model for the network. This will include development of a financial plan identifying initial capital costs, operational costs, future expansion costs, as well as potential revenue opportunities. The financial model will drive the ownership and operational models. These models include internal operations, outsourced operations, development of potential public private partnerships, and dark fiber leasing arrangements. The feasibility study should determine the optimal structure to service the needs of all sites and potential uses for those entities locating in this area.

8.1.2 Conceptual Design and Engineering for Airport Fiber-Optic Network

Conceptual design and engineering drawings for all sites and facilities should be included within the Airport Fiber-Optic Network. This will include the identification of all network backbone and lateral fiber routes, diverse building entries, necessary hand holes, vaults and splice enclosures, as well as site-specific inside plant considerations. Discussions with service providers would determine where the Airport Fiber-Optic Network would interconnect with the regional carrier's networks so they can service those entities locating within the Airport Focus Area.



8.1.3 Develop Governance Structure and Organizational Capacity

Airport Focus Area stakeholders should be involved to determine the optimal governance structure for investment and operation of an Airport Fiber-Optic Network. These structures could include internal ownership by a local municipality, the creation of a not-for-profit entity, or consortium.

Once the optimal governance structure has identified, the organization will need to develop the necessary capacity to own, manage, and potentially operate the Airport Fiber-Optic Network. Organizational capacity includes the ability to properly document, track, and manage data that identifies all necessary fiber-optic infrastructure, develop operations and management processes that include the necessary contracts to manage the outside plant infrastructure, and the development of fiber and conduit lease and wholesale rates, IRUs and necessary contractual agreements.

8.1.4 Develop Broadband-Friendly Public Policy Pilot Program

Niagara County government entities should be engaged to introduce the concept of broadband-friendly public policies. Existing local policies throughout the county related to broadband infrastructure, such as broadband standards, joint trenching, public right-of-way policies, dig-once policies, and any ordinances and existing planning documents that include considerations for broadband and telecommunications infrastructure should be assessed and updated to accommodate broadband growth. The Town of Niagara would be an ideal community to develop specific policies for implementation through an initial Pilot Program given the recommendation to create an Airport Fiber-Optic Network within the Town, the planned development of the Niagara Airport Commercial Park, and potential for further expansion of fiber optic infrastructure. Once piloted in Niagara, best practices in broadband-friendly public policies could be implemented throughout Niagara County. More information on public policy options can be found in Section 8.3.4 and Appendix G.

8.1.5 Develop Framework to Scale Broadband Opportunities

Airport Focus Area stakeholders should develop a Broadband Investment Framework modeled from the Airport Fiber-Optic Network that can be rolled out to all jurisdictions throughout Niagara County. This framework would scale broadband investment opportunities, governance, and organizational capacity to sites and local jurisdictions throughout Niagara County. The initial governance structure of the Airport Fiber-Optic Network could be replicated, expanded, or initially designed to handle efforts to scale up the facilitation of broadband infrastructure investments countywide.

Recommendation: Niagara County should immediately begin the development of a business plan for an Airport Fiber-Optic Network.



Overarching Recommendations

Organizational Development, Site Development, and Workforce and Business Development

8.2 Organizational Development

8.2.1 Development of a Fiber-Optic Broadband Working Group

Niagara County should develop a community stakeholder-based Fiber-Optic Broadband Working Group charged with carrying out this Assessment's recommendations. The group should be made up of key stakeholders throughout the county representing those community anchors and business leaders that will be direct beneficiaries of any broadband initiatives. The Fiber-Optic Working Group should educate communities on fiber-optic broadband issues in Niagara County, coordinate with stakeholders to move toward closing fiber-optic broadband gaps, prioritize projects for funding, and work with local service providers to develop partnerships with Niagara County and its municipalities. The focus should be on deploying fiber-optic network infrastructure to support economic development, enrich the area's community anchor institutions, and enhance the overall quality of life.

Recommendation: Niagara should form the Fiber-Optic Broadband Working Group immediately to begin implementing the recommendations included in this Assessment.

8.2.2 Develop Organizational Capacity to Manage Fiber-Optic Broadband Infrastructure

Niagara County stakeholders should immediately begin to develop organizational capabilities to manage basic fiber-optic broadband infrastructure. Setting up an organizational framework to plan, implement, and manage the fiber-optic broadband initiative will enable these entities to move forward more easily with potential infrastructure investments. If stakeholders begin to make strategic investments in infrastructure, it will be important to have the organizational capabilities and structure in place to conduct sales and marketing activities, develop rate structures, manage infrastructure, and document and account for what infrastructure is available.

Recommendation: Niagara County stakeholders should immediately begin developing the appropriate organizational structure, governance model, operational model, and financial plan to formalize a fiber-optic broadband development initiative.

8.2.3 Record Keeping and Information Sharing

Niagara County and its municipalities maintain Geographic Information Systems (GIS) that contain detailed maps of the community that include right-of-way, easements, utilities, and other information. As Niagara moves forward with development of fiber-optic broadband infrastructure, the county and municipalities should ensure that any public fiber-optic broadband infrastructure in the area is documented in GIS. This will allow agencies to maintain a clear understanding and records of locations of fiber-optic broadband infrastructure, which may include conduit, vaults, pull boxes, transitions, fiber-optic cable, and other outside plant infrastructure. Record keeping is a critical aspect of developing fiber-optic infrastructure and broadband networks, and if the county and municipalities begin this process early, it will save significant costs in the long-term and ensure that the communities understand where this



infrastructure exists. This information should be made available to broadband and utility companies in the area to maintain better coordination of underground infrastructure.

Recommendation: Niagara County should implement a GIS-based mapping solution that will record and document its planned and installed broadband infrastructure.

8.2.4 Coordination with Broadband Providers

Broadband providers in Niagara County should have a seat at the table and should be included in development projects. It is important that the providers understand their role in both community and economic development efforts throughout the region, and that they understand the vision and goals of Niagara County and its municipalities. These providers provide critical services and need to understand how they factor into the regions long-term plans. The county and its municipalities should work towards memorializing joint trenching and dig-once policies with the broadband providers ultimately increasing the amount of fiber-optic broadband infrastructure investments throughout the Niagara region.

Recommendation: Niagara County should empower the Fiber-Optic Broadband Working Group to collaborate with broadband providers in the area to ensure that needs, opportunities, and development plans are orchestrated between these entities.

8.2.5 Evaluate Potential Public-Private Partnerships

A broadband public-private partnership (PPP) is a negotiated contract between a public and private entity to fulfill certain obligations to expand broadband services in a given area. PPPs have gained popularity over recent years as more municipalities employ public broadband and utility infrastructure in conjunction with private broadband providers. PPPs leverage public broadband assets, such as fiber, conduit, poles, facilities with private broadband provider assets, and expertise to increase the availability and access to broadband services.

Broadband PPPs are relatively new to local governments but their popularity is growing because they align public organizations and private providers, leveraging each other's core strengths. In most cases, PPPs alleviate municipalities from the requirements to provide retail or wholesale broadband services and allows them to employ their broadband infrastructure and policies with providers who take on these responsibilities. Public entities forgo "getting into the business" of providing retail services to make targeted investments in their broadband infrastructure, to make it available to private broadband providers with the goal of enhancing their communities. The PPP may take different forms, depending on the needs and goals of Niagara County and its partners, but generally, Niagara County would be considered an Infrastructure Provider that maintains permanent ownership interest in the broadband infrastructure that is constructed, but would likely not be an operator of the service.

As the county moves forward with fiber development plans, the consideration of a PPP, along with several important aspects of PPP formation and operation should be considered. These include items such as the number of broadband service providers that should be involved, the various incentives the county can offer potential partners, the service features and conditions the county could ask from service providers, and exploration of the various ways the PPP can be managed.



Recommendation: Niagara County should evaluate Public-Private Partnership opportunities with existing broadband providers serving Niagara County as it embarks on any strategy around fiber deployment and broadband service growth. This important evaluation will help local leaders understand the benefits of working in partnership with broadband providers.

8.3 Site Development

8.3.1 Site Development

Through local investment in fiber infrastructure, the county and site developers can make strategic investments in conduit, boxes, and fiber, ensuring that all business, industrial and technology parks, business corridors, and centers are equipped with next-generation fiber infrastructure. This infrastructure will allow the county and its municipalities to market these sites as “fiber ready,” allowing full support for big data industries looking to locate in Niagara County.

Niagara County stakeholders should develop design and engineering drawings and cost estimates for each area of interest, allowing the region to understand the total investment required to prepare these sites. Leveraging all sources of funding by planning other infrastructure at the same time, like roads and utilities, will improve site access and attractiveness to new tenants. While a public or private entity could own and manage the fiber infrastructure, it could also partner with service providers to use the infrastructure to provide data services to end user customers.

Through incorporation of Broadband Infrastructure Standards into the county and municipal land development requirements, the county could forego the capital investments by requiring private developers to include this infrastructure in their projects. In many cases, the addition of fiber infrastructure into these developments increases the marketability and overall potential for greater value in the commercial property.

Recommendation: Niagara should ensure that fiber-optic infrastructure is in place prior to prospective data-intensive tenants entering the site selection process in Niagara County business parks. Top priority here is to ensure that conduit and fiber is placed underground along with traditional site development infrastructure. The county and its municipalities should begin to review opportunities to include Broadband Infrastructure Standards into the various land development requirements.

8.3.2 Directed Investment in Fiber-Optic Broadband Infrastructure

Niagara County stakeholders could make directed investments in fiber-optic broadband infrastructure used to solve the “chicken and egg” issue currently in play throughout many of the business and industrial parks in Niagara County. In many cases, broadband providers will not speculatively build infrastructure unless there is future revenue tied to the opportunity. This limits the economic development efforts of the area as it becomes questionable whether fiber-optic broadband services are available, and at what costs, to a given area. However, public investment in conduit, hand holes, and even fiber in some circumstances could provide the necessary broadband infrastructure required to modernize these parks by offering the required telecommunications services – no questions asked.



Municipalities across the United States are investing in broadband infrastructure directly, as many recognize this infrastructure as critical to the survival of their communities and regions. Where service providers will not or cannot make the infrastructure investment, local, state, and federal government agencies have often stepped to the plate to remain relevant in this new digital economy. These multi-service networks provide the necessary broadband capacity to area businesses, community anchors, and residents while providing a platform that can bring efficiency and innovation to municipal operations.

As an example, Cambria Technology Park is situated as unplatted parcels of land. Niagara County economic development partners should ensure fiber-optic broadband infrastructure is included in the plan when the park is developed. This infrastructure should be included when power, water and other underground utilities are constructed.

Figure 8-1: Cambria Technology Park Conceptual Fiber Buildout

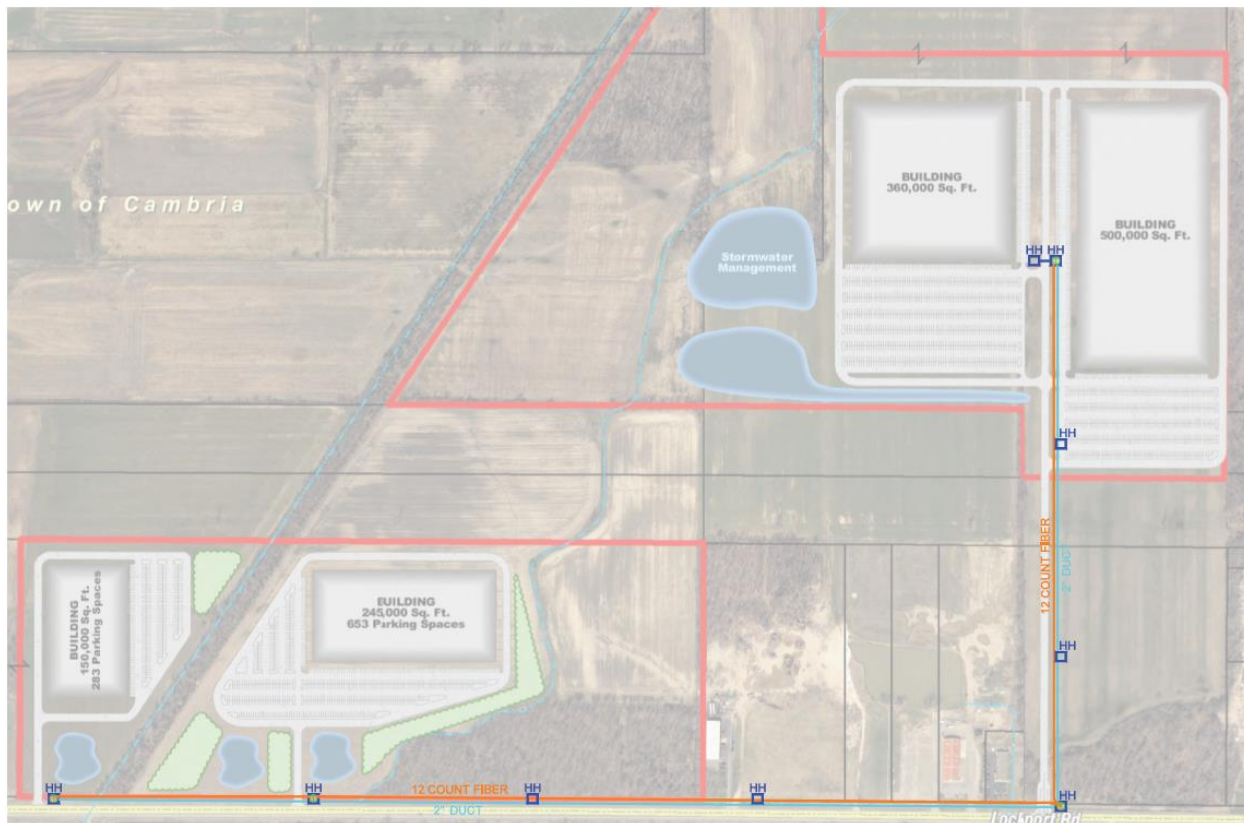




Figure 8-2: Cambria Technology Park Conceptual Fiber Buildout Cost Estimate

Cambria Tech Park - Budgetary Estimate					
Item #	Labor	Qty	Unit	Each	Amount
1	Design and permitting (does not include permit fees)	5778	Ft	\$1.00	\$5,778.00
5	Furnish and install 24x36x24 composite handholes with tier 15 "fiber optic" handholes	9	Ea	950.00	8,550.00
21	Furnish and directional bore 2" duct	580	Ft	14.00	8,120.00
22	Furnish and trench 2" duct at 36" depth (at head end)	5198	Ft	5.00	25,990.00
14	Proof duct	5778	Ft	0.25	1,444.50
18	Furnish and install 12 count fiber	6228	Ft	1.33	8,280.13
23	Furnish and install #12 tracer wire	5778	Ft	0.35	2,022.30
24	Furnish and install marker posts	7	Ea	85.00	595.00
25	Furnish and install marker posts with LCAT and ground rod	2	Ea	170.00	340.00
29	Install splice terminal	4	Ea	575.00	2,300.00
	Install splice tray and terminal port	4	Ea	175.00	700.00
32	Prep cables for splicing	4	Ea	200.00	800.00
33	Fusion splice fiber	32	Ea	30.00	960.00
34	Test fiber OTDR and powermeter	1	All	500.00	500.00
				Total Estimate	\$66,379.93

The costs to construct fiber-optic infrastructure using the conceptual design of the Cambria Technology Park are estimated at \$82,975 (\$66,380 + 25% contingency), as indicated in Figure 8-1 and Figure 8-2. During development of the park, this same infrastructure could be built for a fraction of the stated estimate by joint construction of all underground facilities.

As a technology park, it is essential that the Cambria Technology Park be equipped with the proper fiber-optic broadband infrastructure to ensure it can be appropriately marketed to site locaters and businesses. Without this infrastructure, the county and its partners risk losing the next big opportunity.

Recommendation: *Niagara County economic development partners should work together to ensure fiber-optic broadband infrastructure is incorporated into the utility design and development plan for Cambria Technology Park and any other planned developments.*

8.3.3 Niagara Airport Commercial Park

Niagara County and partnering organizations should plan to build fiber-optic broadband infrastructure throughout the Niagara Airport Commercial Park as it becomes platted, and when other underground infrastructure and roads are built. While Verizon has the responsibility of providing traditional telecommunications services, it is not required to build fiber-optic facilities throughout the Airport Commercial Park. This could be a detriment to marketing the site to data centers and other industries that require high-bandwidth connectivity. Without the county's participation, the Airport Commercial Park will continue to be equipped with legacy copper infrastructure capable of providing DSL services only.

While most providers will build into the Niagara Airport Commercial Park, they will do so only when a revenue opportunity has been identified and will look to pass the build costs onto the customer requesting services. Depending on where the site is located in the Park, the costs could be in the tens of thousands of dollars. Obviously, leaving the infrastructure growth decisions up to the service providers in market could delay or derail any potential option to recruit a business to the Park. Therefore, proactive economic development leadership and local investment can insure adequate infrastructure is in place,



which will allow service providers to focus on delivering the required services without concern of recouping the construction costs and potentially discouraging any economic development opportunities.

Figure 8-3: Niagara Airport Commercial Park Conceptual Fiber Buildout

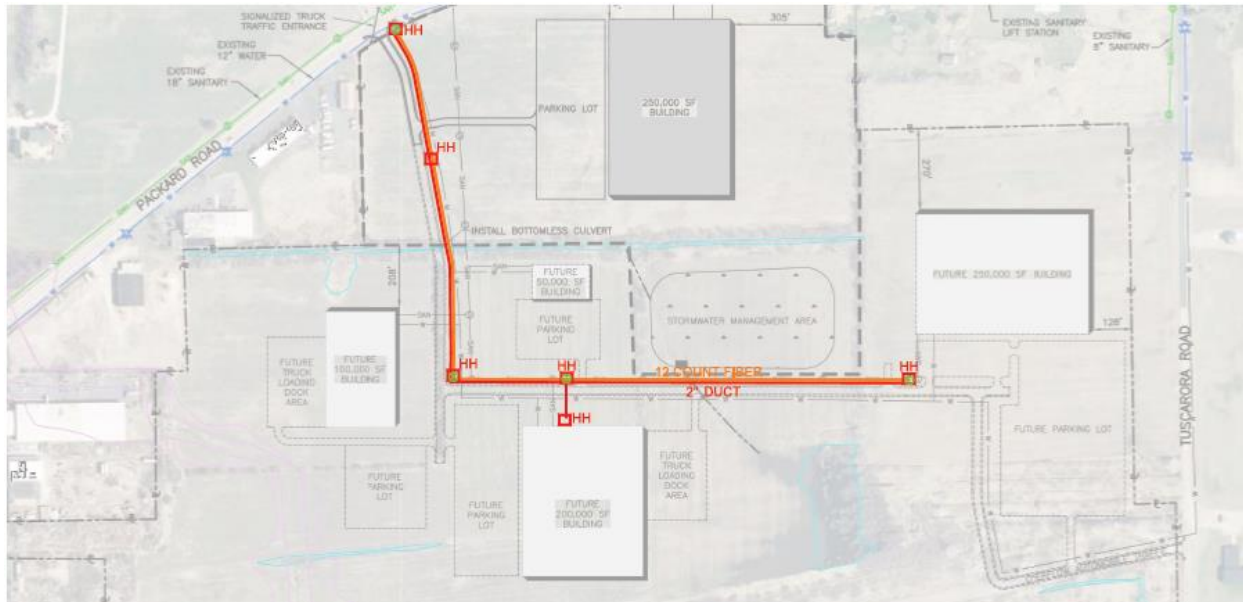


Figure 8-4: Niagara Airport Commercial Park Conceptual Fiber Buildout Cost Estimate

Niagara Airport Commercial Park - Budgetary Estimate					
Item #	Labor	Qty	Unit	Each	Amount
1	Design and permitting (does not include permit fees)	2851	Ft	\$1.00	\$2,851.00
5	Furnish and install 24x36x24 composite handholes with tier 15 "fiber optic" handholes	6	Ea	950.00	5,700.00
21	Furnish and directional bore 2" duct	286	Ft	14.00	4,004.00
22	Furnish and trench 2" duct at 36" depth (at head end)	2565	Ft	5.00	12,825.00
14	Proof duct	2851	Ft	0.25	712.75
18	Furnish and install 12 count fiber	3151	Ft	1.33	4,189.25
23	Furnish and install #12 tracer wire	2851	Ft	0.35	997.85
24	Furnish and install marker posts	4	Ea	85.00	340.00
25	Furnish and install marker posts with LCAT and ground rod	2	Ea	170.00	340.00
29	Install splice terminal	4	Ea	575.00	2,300.00
	Install splice tray and terminal port	4	Ea	175.00	700.00
32	Prep cables for splicing	4	Ea	200.00	800.00
33	Fusion splice fiber	22	Ea	30.00	660.00
34	Test fiber OTDR and powermeter	1	All	500.00	500.00
Total Estimate					\$36,919.85

Using the conceptual design for build out of the Niagara Airport Commercial Park, the cost to construct fiber-optic broadband infrastructure is estimated at \$46,150 (\$36,920 + 25% contingency), as indicated in Figure 8-3 and Figure 8-4. During development of the park, this same infrastructure could be built for a fraction of the stated estimate by joint construction of all underground facilities.

Recommendation: Niagara County should take action to insure that the Niagara Airport Commercial Park is promoted as "fiber ready" along with "shovel ready." As the build out of traditional infrastructure occurs at the park, insure that necessary underground fiber infrastructure is placed at the same time. By proactively encouraging economic expansion and relocation opportunities by providing fiber connectivity



to prospective businesses, the Park can overcome the status quo complacency of telecommunications providers to provide affordable fiber connectivity to business park tenants.

8.3.4 Implementation of Public Policy Tools

Niagara County and its municipalities should adopt broadband policies of Joint Trenching and Broadband Standards to make it easier and more cost effective to install basic fiber-optic infrastructure through their capital project programs. Since the majority of cost to build fiber-optic infrastructure is incurred through trenching and boring, this strategy can alleviate the high cost of implementing fiber-optic infrastructure throughout the region. Road widening, sidewalk, trail, and lighting projects all may be opportunities for the installation of basic conduit infrastructure at a very low cost. By installing conduit in concert with these related capital projects, the county can avoid incurring the significant costs of constructing this infrastructure by doing so when the ground is already open for other reasons.

The municipalities and the county, in alignment with their Capital Improvement Plan budgets, should determine which projects will help build usable infrastructure (there is no reason to utilize this strategy in areas that already have available conduit and fiber-optic infrastructure). Municipalities should implement broadband standards in their land development codes or engineering standards to ensure that fiber-optic infrastructure becomes a part of the design for all relevant capital projects. In doing so, these organizations can determine which projects add relevant broadband infrastructure to the community and which ones do not. This process should be coordinated with local service providers to minimize overbuilding and to ensure that service providers have an opportunity to place their infrastructure in capital projects as well.

In addition to these standards, entities should review any potential joint trenching agreements they maintain with utility and service providers in Niagara County. Joint trenching agreements are developed between entities to minimize the cost of constructing conduit in the local area by allowing one another to take advantage of trenches that have already been opened through companion projects. They allow multiple providers to install conduits in a single trench, significantly reducing the cost of underground fiber-optic network infrastructure.

If these agreements are not in place, joint trenching agreements should be developed between the county and its municipalities, as well as between local governments and utility and broadband providers in the area. Joint trenching agreements must be negotiated between parties individually and are generally exclusive between each provider and the local government.

Niagara County and its municipalities should immediately introduce public policy tools to assist in the deployment of fiber-optic broadband infrastructure, including Joint-Trenching agreements and Dig-Once policies. The Broadband Infrastructure Standards for Outside Plant Facilities (see Appendix G), should be adopted by the County and its municipalities, and implemented in the engineering standards and applicable land use and development policies to ensure broadband infrastructure is deployed whenever the opportunity presents itself.

Recommendation: Niagara County and its municipalities should each review public policies for broadband and incorporate them into each entity's comprehensive plan and zoning code, as applicable. Sample policies have been provided in the Appendix.



8.4 Workforce and Business Development

8.4.1 Planning for Economic Development

By pairing adequate land for growth with fiber connectivity, the Niagara Falls Airport Focus Area becomes a prime location for regional data centers, perfectly suited to support industry clusters in Defense, Aerospace, Technology, and complementary industries. While significant amounts of bandwidth are required to support “big data” operations – this certainly holds true for the NFAR’s RPA mission – the same fiber infrastructure lends itself as a magnet for bandwidth dependent industries such as data centers, co-location facilities, and cloud server farms for public research and private sector enterprises.

In pursuing a data center economic development strategy, an advantage that Niagara County has over other parts of the country would be the lower cost of operating – and cooling – a multi-level smart building packed full of heat-generating electronics and computers. With the long winters of Western New York, chilled by the winds blowing across the adjacent Great Lakes, a significant energy cost advantage could be realized over competing data centers operating in other warmer parts of the country. Other incentives include low-cost hydroelectric power from the New York Power Authority and various financial incentives for energy-efficient operations through the New York State Energy Research and Development Authority.

Important institutions to collaborate on technology-based economic development are the University at Buffalo with the Calspan-University at Buffalo Research Center (CUBRC) and the University at Buffalo Center for Computational Research, which houses a super-computing facility. Leveraging the computing and data processing capabilities of university research partners with the advanced communications network that a fiber-optic infrastructure can provide will create a tremendous national asset and become a driver of innovation and regional economic opportunity. By continuing to grow RPA research and deployment experience, NFARS and Niagara County could fill an important role in answering evolving national security challenges, as well.

8.4.2 Niagara Falls Air Reserve Station

With fiber-optic network infrastructure in place, Niagara County has an opportunity to develop important research and educational programs through collaboration between the Niagara Falls Air Reserve Station and the region’s public and private businesses, colleges, and universities. Partnerships between the right organizations would provide a well-trained workforce to support the base’s procurement of future missions and benefit the county with industry clusters that could spin out of the airbase’s growth.

With fiber infrastructure in place, the Airport Focus Area will be attractive to Remotely Piloted Aircraft and Cybersecurity related opportunities within the military, but it will also increase business development and economic opportunities in general. With land available to develop throughout the Airport Focus Area and proximity to population centers and transportation corridors, a fiber-optic network in Niagara County would be the key component to creating and realizing new economic opportunities.

Recommendation: Niagara County and NFARS leaders should continue to explore collaboration opportunities with regional public and private institutions to further weave the unique capacities of NFARS into the fabric of the economy. Insure that fiber networks are in places to facilitate the exchange



of information between key partners and expand the prospects of NFARS future missions possible with unlimited bandwidth.

8.4.3 Higher Education Partnerships

Current programs offered by the region's colleges and universities should be analyzed and vetted against the requirements for filling these highly technical roles to collaboratively train the next generation cyber savvy workforce. Building cyber excellence into the Niagara County workforce will result in more local talent in cybersecurity roles and will attract new firms with cyber awareness needs to Niagara County and the Niagara Falls Airport Focus Area. This will create local employment opportunities for possible advancement at NFARS and throughout the broader Department of Defense or within the private sector.

To accelerate such opportunities, the pursuit of one or more Centers of Excellence in would make it more efficient and effective for industry and government to partner with and invest in Niagara County schools, including community colleges and vocational schools, universities, career readiness programs, and business development centers. Such a partnership would help New York higher education be more responsive to private and public sector needs by validating curriculum requirements and creating meaningful educational programs. A comprehensive program would promote the broad sharing of expertise and dissemination of best practices in support of RPA and Cybersecurity missions and research as well as offer training and experience.

Recommendation: Niagara County leaders should continue to explore workforce readiness opportunities with the region's colleges and research universities. Higher education partnerships will tactically advance workforce capacity for existing industries, and will serve to strategically increase demand for growth in technical and data-intensive industries that the county would prefer to locate and expand in Niagara County.

8.4.4 First Response and Preparedness Center

As part of the redevelopment of the former U.S. Army Reserve Center site, Niagara County is planning a First Response and Preparedness Center to improve disaster resiliency and response. This center will serve as an emergency operations hub and shared training facility for first responders, law enforcement agencies, and community organizations. The center is planned as a multi-tenant facility that will house a law enforcement intelligence center, emergency supplies and equipment, classrooms, and tactical training areas. Education and training in cybersecurity and crime analysis will ensure the workforce necessary to support the law enforcement intelligence center and emergency operations center to be located at the site.

Recommendation: Niagara County workforce development leaders should inventory the various current and future workforce needs of Niagara County industries and organizations, and specifically those in the Airport Focus Area, to identify specific areas to develop programs to collaboratively train, prepare, and place the Niagara County workforce in positions in law enforcement and emergency response.





Appendixes

A. Fiber Route Maps of Service Providers in Niagara County

Figure A-1: Level 3 Communications Fiber Routes

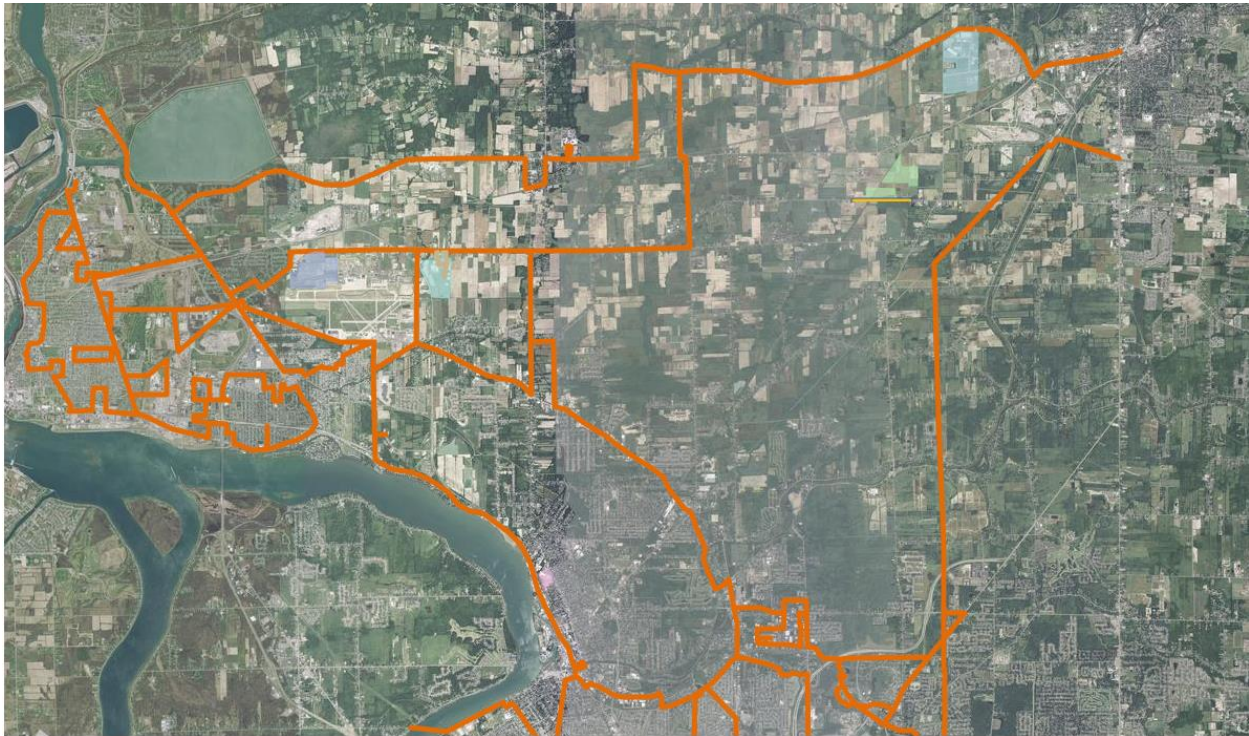


Figure A-2: Fibertech Fiber Routes

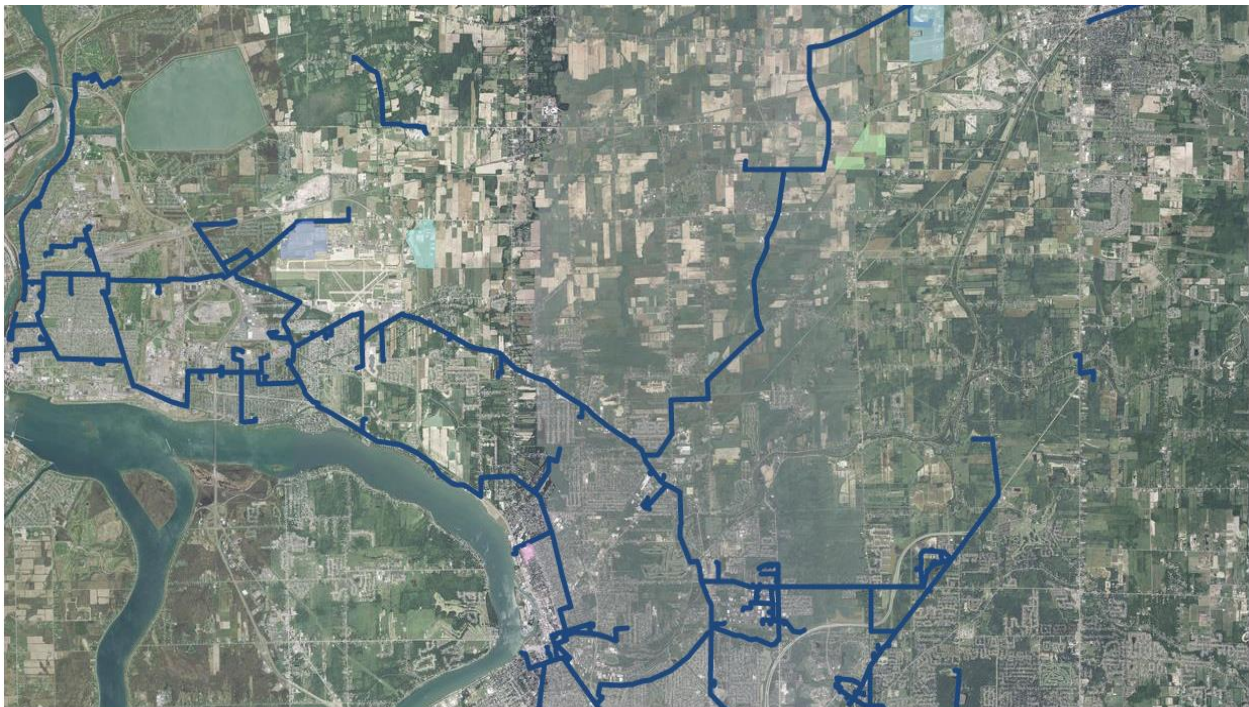


Figure A-3: Zayo Fiber Routes

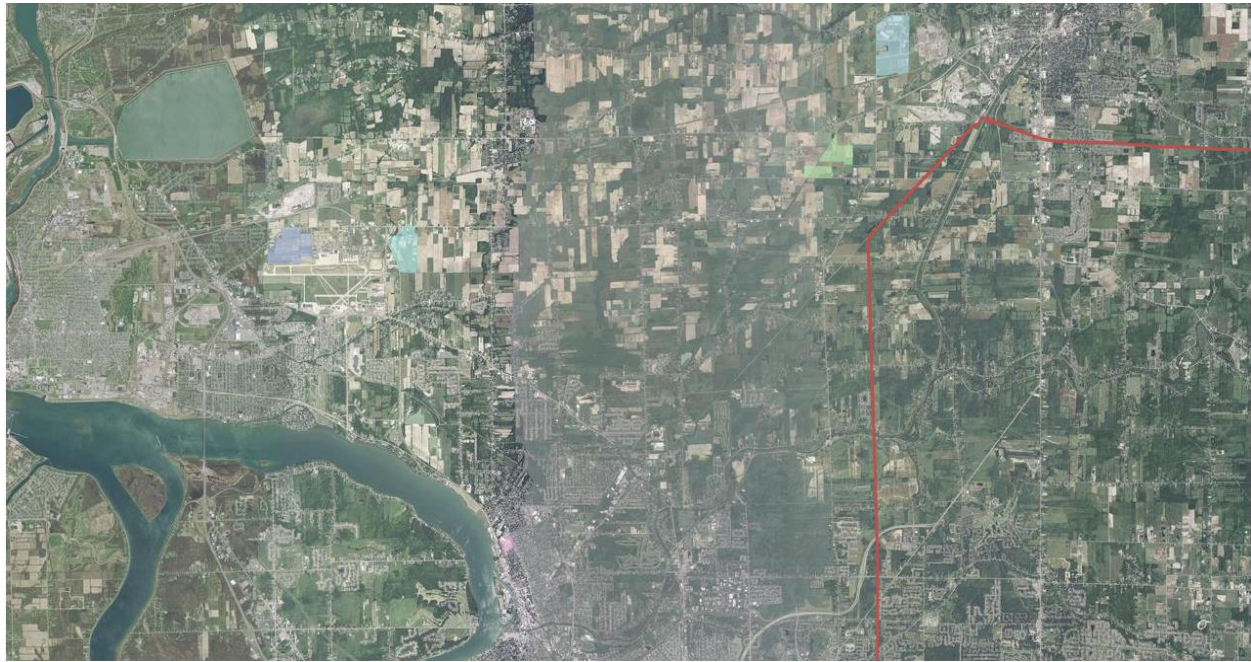
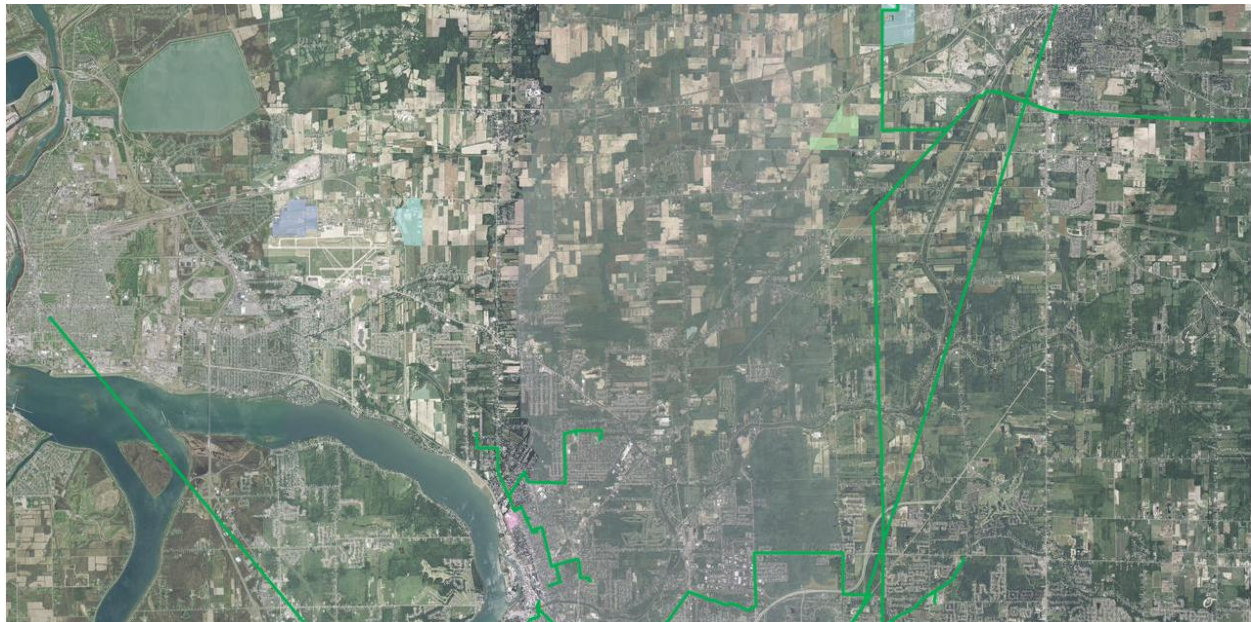


Figure A-4: Windstream (Intellifiber) Fiber Routes



B. Fiber Route Maps of Providers in the Airport Focus Area

Figure B-5: Level 3 Fiber Routes

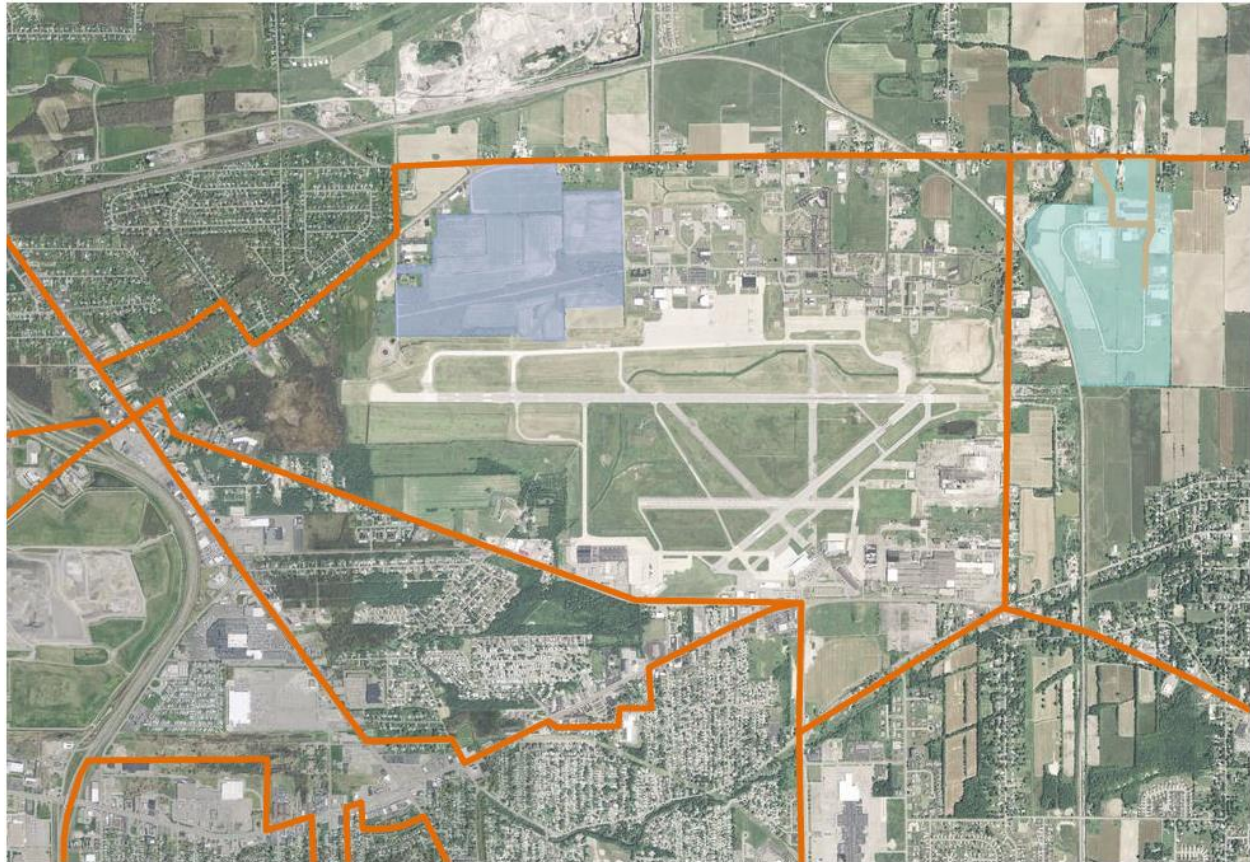


Figure B-6: Fibertech Fiber Routes

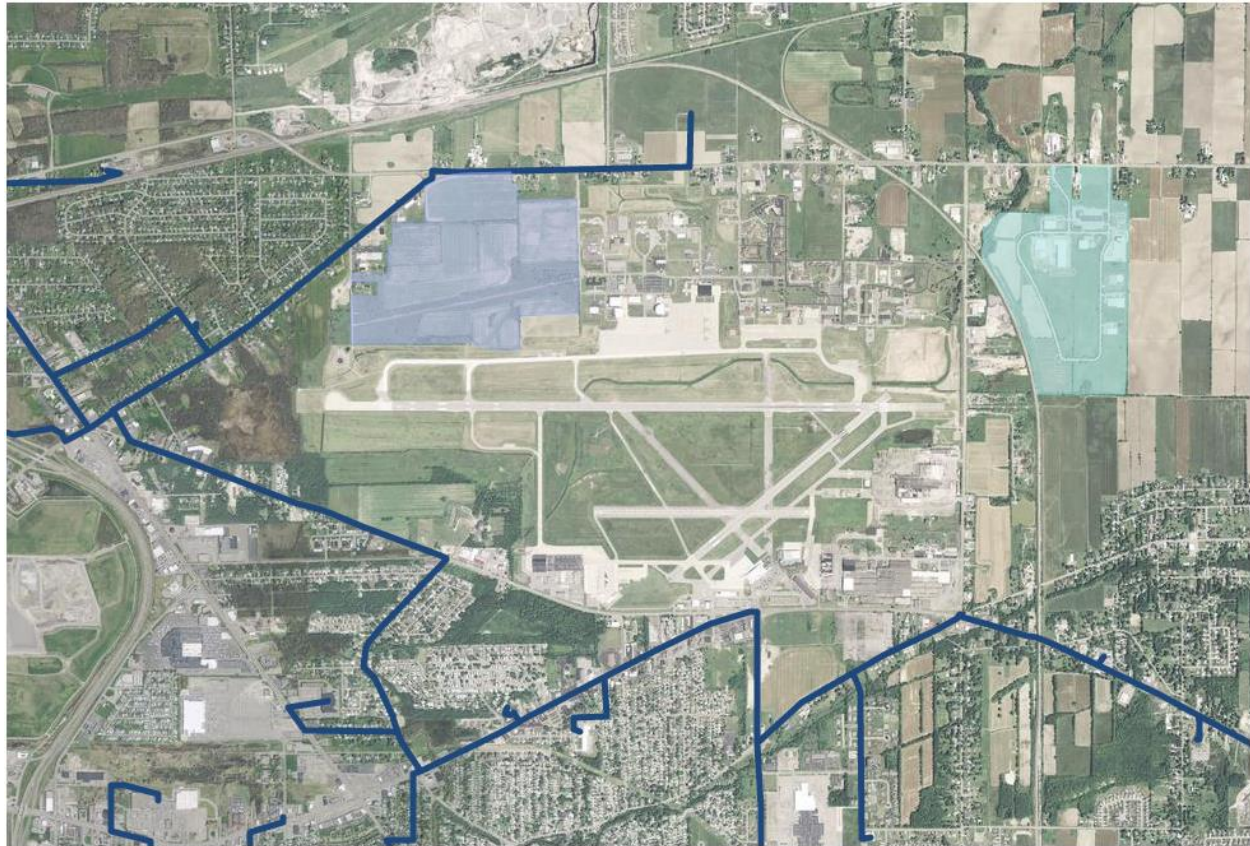


Figure B-7: Frontier ILEC Region (est) and Fiber Corridor

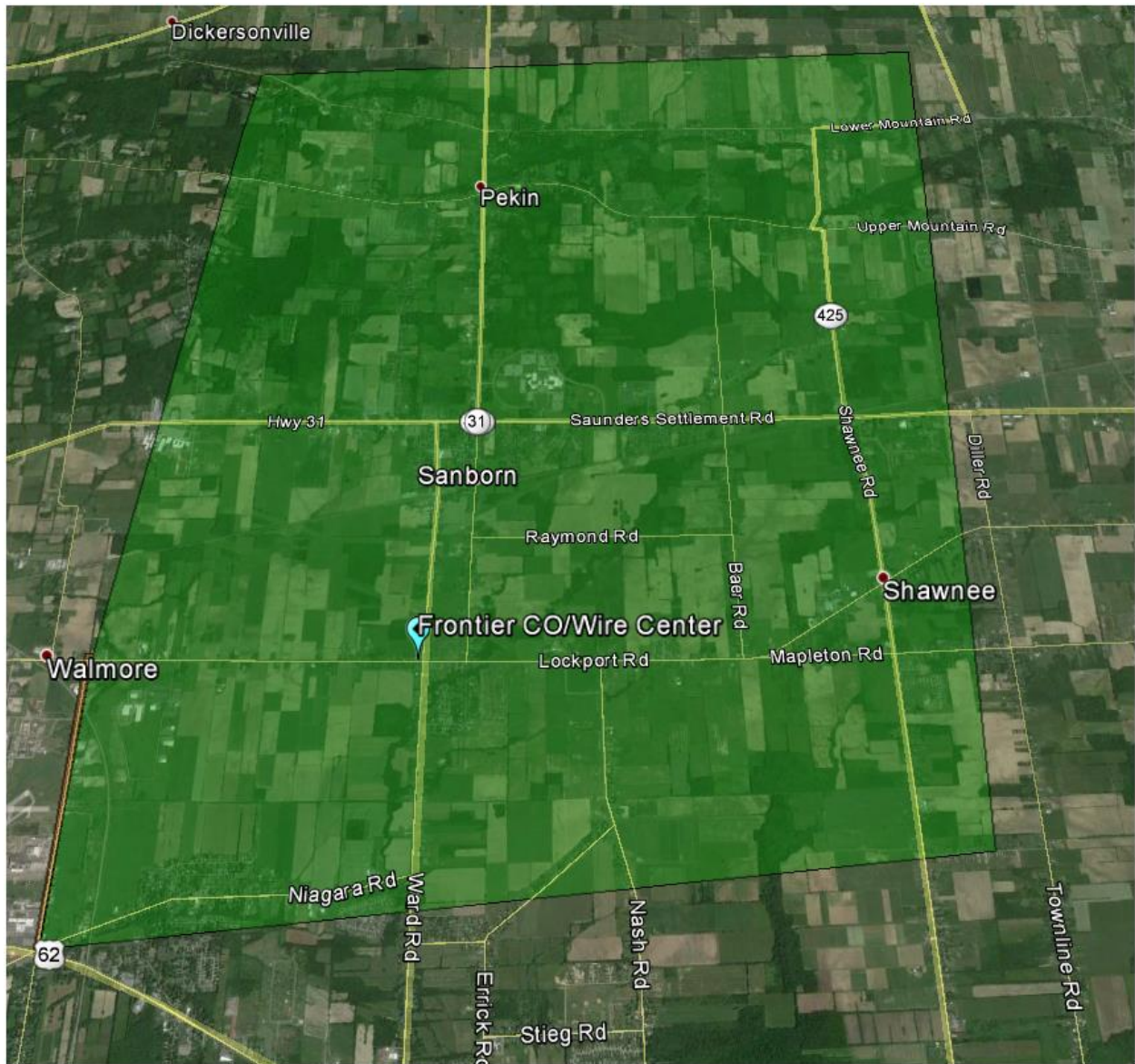
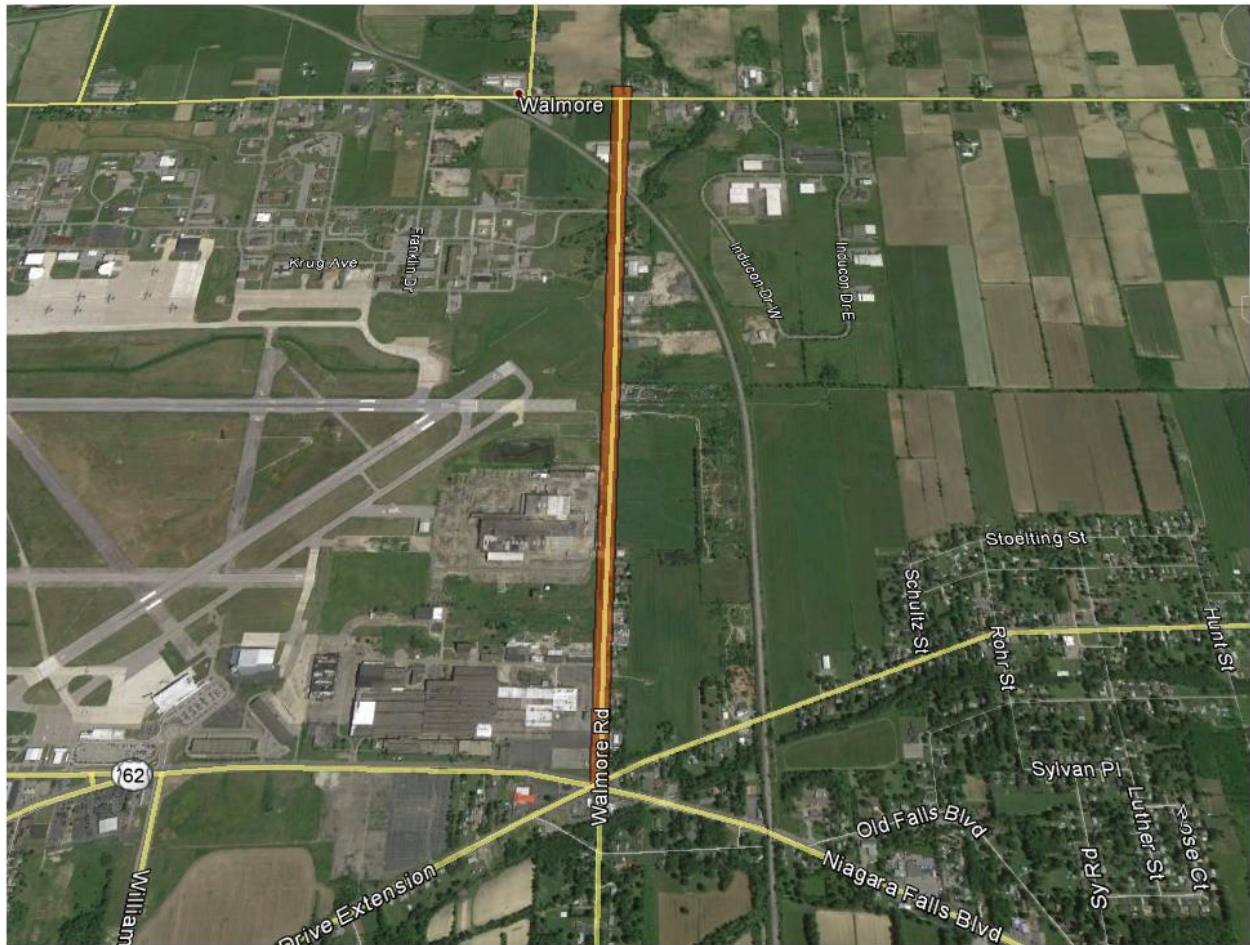


Figure B-8: Frontier Fiber Corridor - Walmore Road

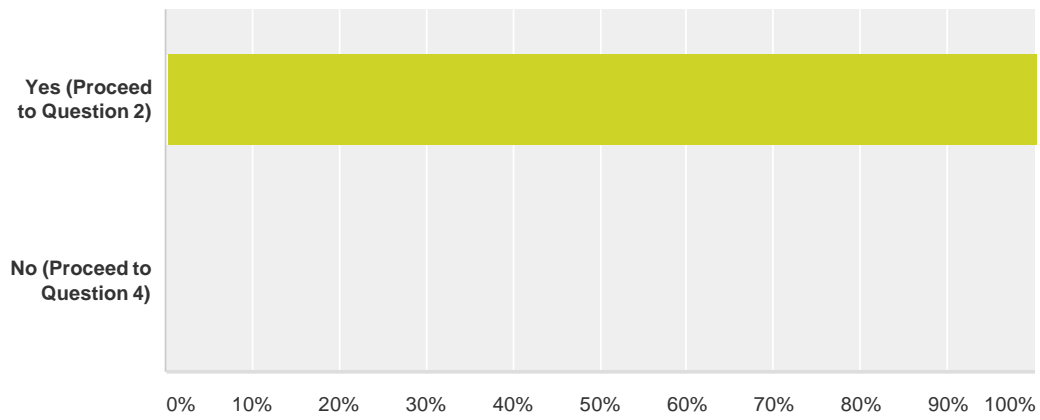


D. Niagara County Business Survey

Results of the business survey are provided in this section and begin on the following page. The survey contained 13 questions, and 43 Niagara County businesses participated.

Q1 Do you have Internet service at your place of business?

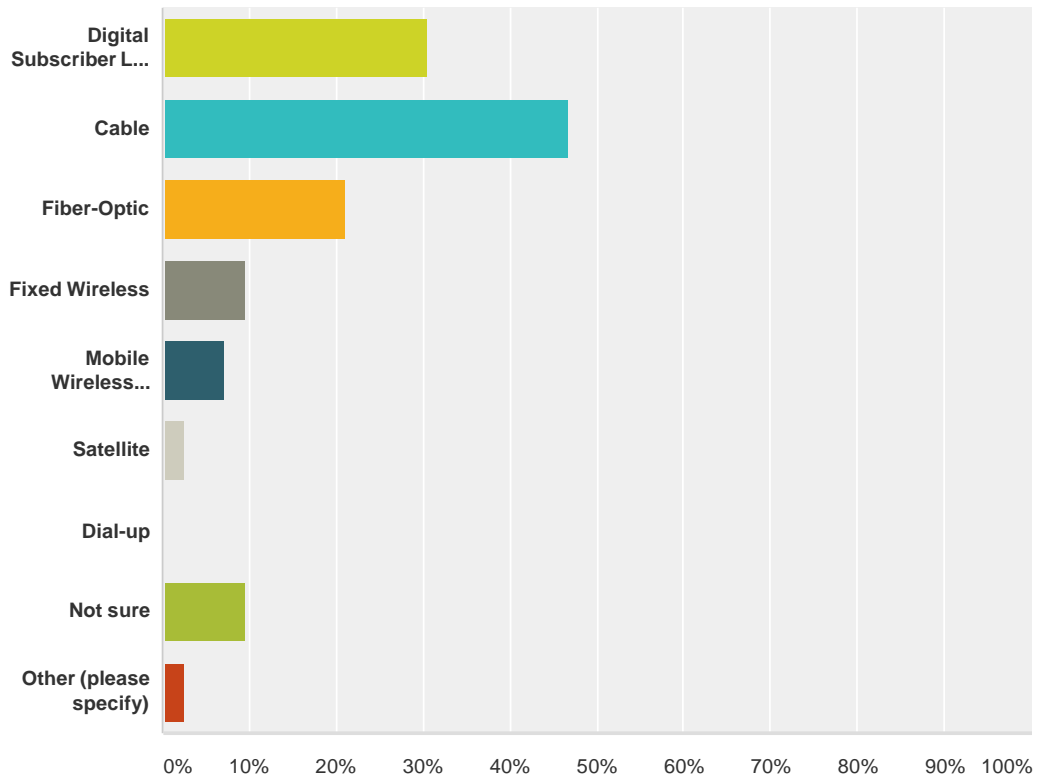
Answered: 43 Skipped: 0



Answer Choices	Responses
Yes (Proceed to Question 2)	100.00% 43
No (Proceed to Question 4)	0.00% 0
Total	43

Q2 What type of Internet service do you have at your business? (Choose all that apply)

Answered: 43 Skipped: 0



Answer Choices	Responses	Count
Digital Subscriber Line (DSL)	30.23%	13
Cable	46.51%	20
Fiber-Optic	20.93%	9
Fixed Wireless	9.30%	4
Mobile Wireless (cellular)	6.98%	3
Satellite	2.33%	1
Dial-up	0.00%	0
Not sure	9.30%	4
Other (please specify)	2.33%	1
Total Respondents: 43		

Q3 Please click the link below and click “Begin Test”. Let the Internet speed test run for a few moments and then fill in the information below. Speedtest Link - Click Here

Answered: 42 Skipped: 1

Answer Choices	Responses	
Download Speed:	97.62%	41
Upload Speed:	92.86%	39
Internet Service Provider:	90.48%	38

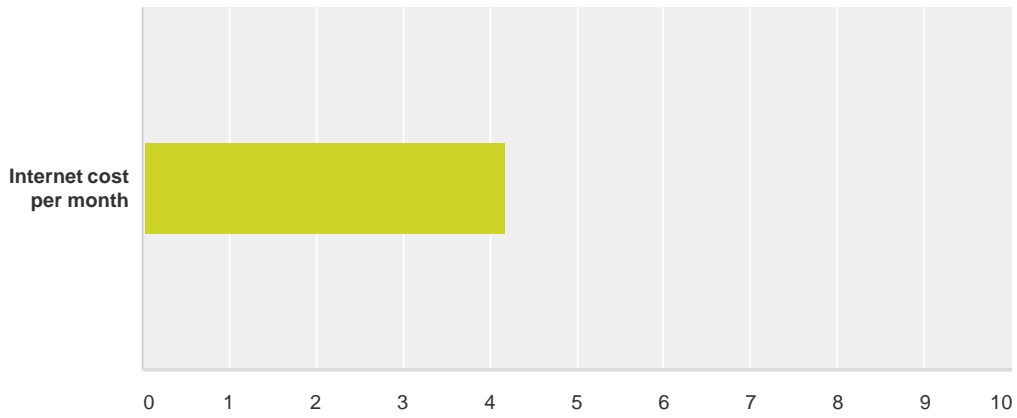
Q4 Please provide the physical address of your business. This information will solely be used to determine the availability of broadband in Niagara County.

Answered: 42 Skipped: 1

Answer Choices	Responses	
Business Name	100.00%	42
Street Address	95.24%	40
City	97.62%	41
Zip Code	95.24%	40

Q5 What do you currently pay for your Internet service per month?

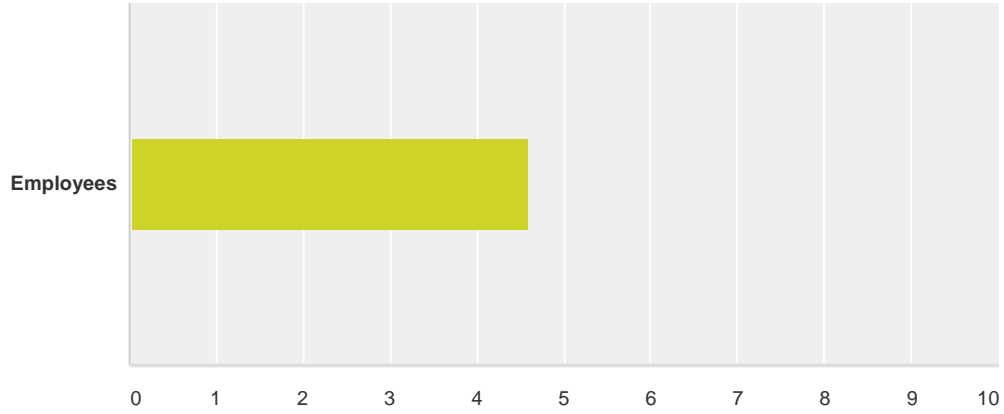
Answered: 39 Skipped: 4



	Less than \$49.99	\$50.00 - \$99.99	\$100.00 - \$149.99	\$150.00 - \$199.99	\$200.00 - \$249.99	\$250.00 - \$299.99	More than \$300.00	Total	Weighted Average
Internet cost per month	10.26% 4	23.08% 9	17.95% 7	7.69% 3	2.56% 1	7.69% 3	30.77% 12	39	4.15

Q6 How many employees does your business have (Niagara County locations only)?

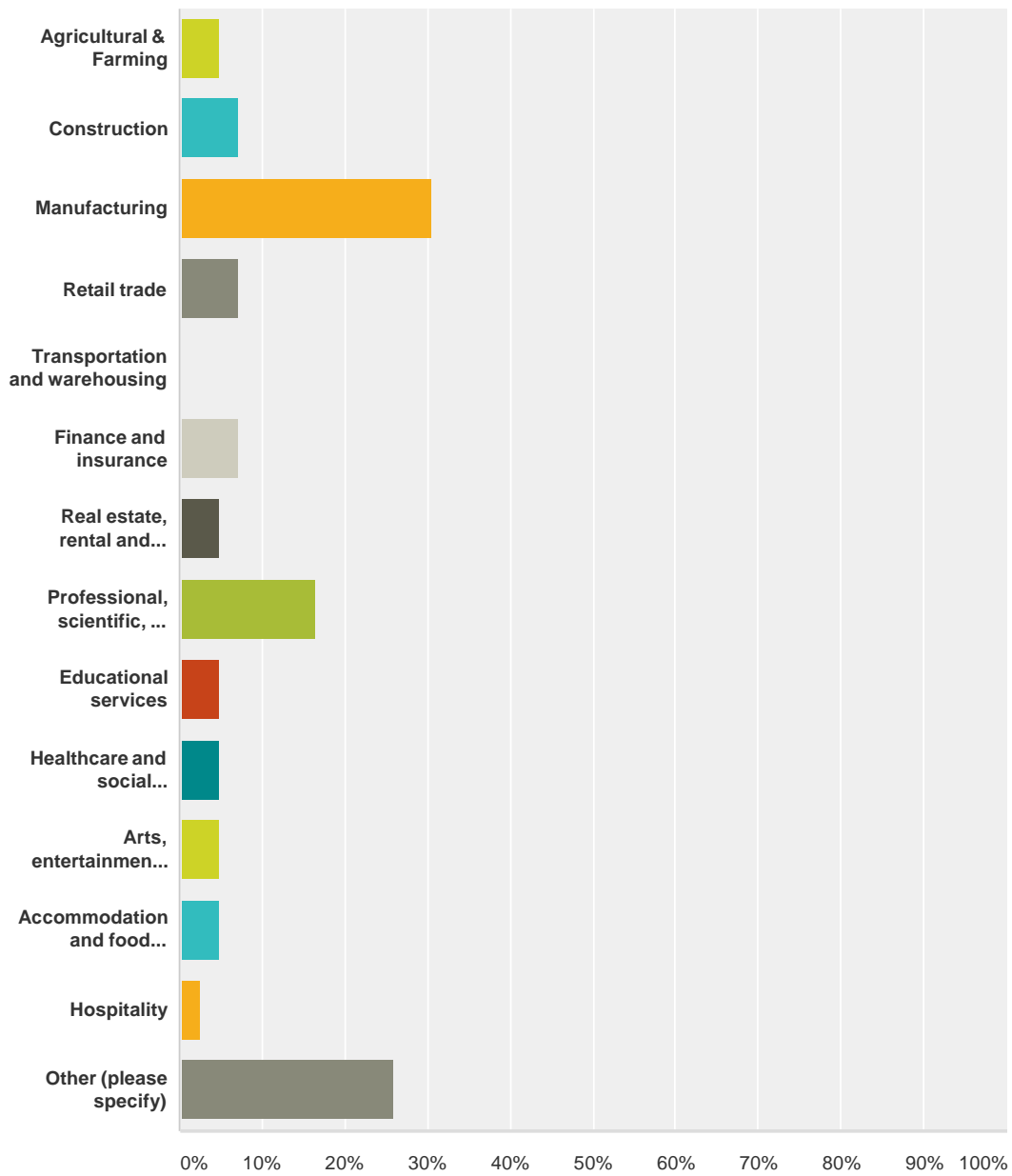
Answered: 42 Skipped: 1



	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	More than 100	Total	Weighted Average
Employees	45.24% 19	4.76% 2	4.76% 2	0.00% 0	7.14% 3	11.90% 5	0.00% 0	0.00% 0	0.00% 0	7.14% 3	19.05% 8	42	4.57

Q7 Which industry would you classify your business under? Check all that apply.

Answered: 43 Skipped: 0



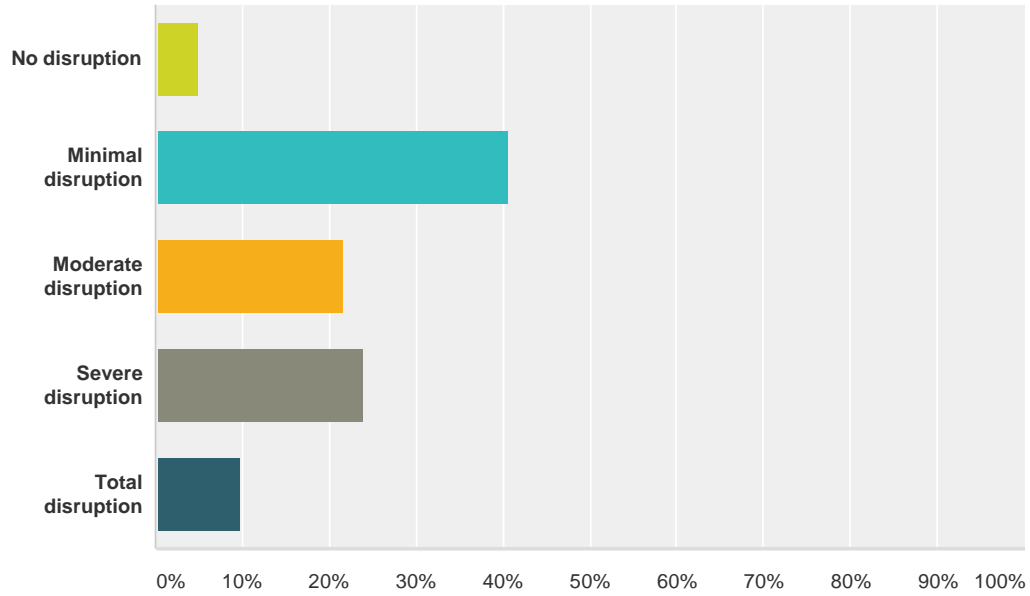
Answer Choices	Responses	
Agricultural & Farming	4.65%	2
Construction	6.98%	3
Manufacturing	30.23%	13
Retail trade	6.98%	3
Transportation and Warehousing	0.00%	0

Niagara County Business Broadband Survey

Finance and insurance	6.98%	3
Real estate, rental and leasing	4.65%	2
Professional, scientific, and technical services	16.28%	7
Educational services	4.65%	2
Healthcare and social assistance	4.65%	2
Arts, entertainment, and recreation	4.65%	2
Accommodation and food services	4.65%	2
Hospitality	2.33%	1
Other (please specify)	25.58%	11
Total Respondents: 43		

Q8 What kind of impact do Internet problems (including reliability and speed issues) have on your business?

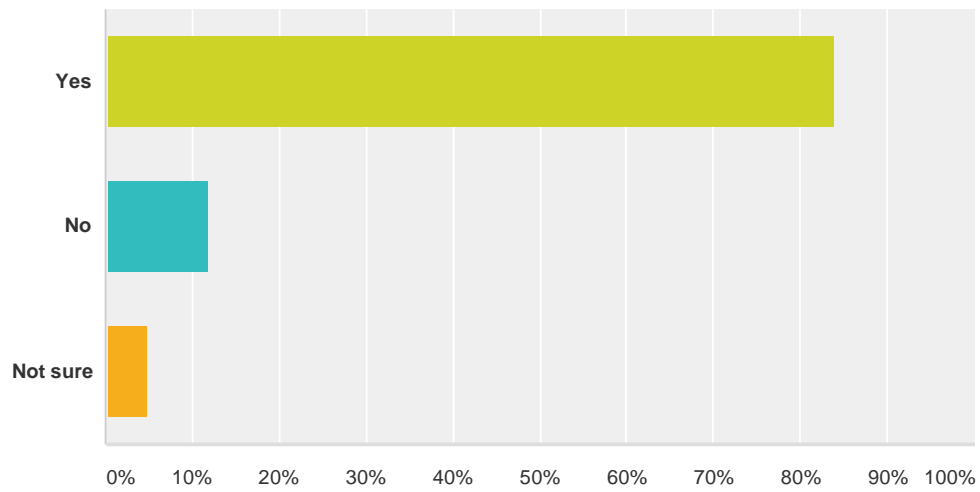
Answered: 42 Skipped: 1



Answer Choices	Responses	
No disruption	4.76%	2
Minimal disruption	40.48%	17
Moderate disruption	21.43%	9
Severe disruption	23.81%	10
Total disruption	9.52%	4
Total		42

Q9 Are your current Internet services fulfilling all of your business needs?

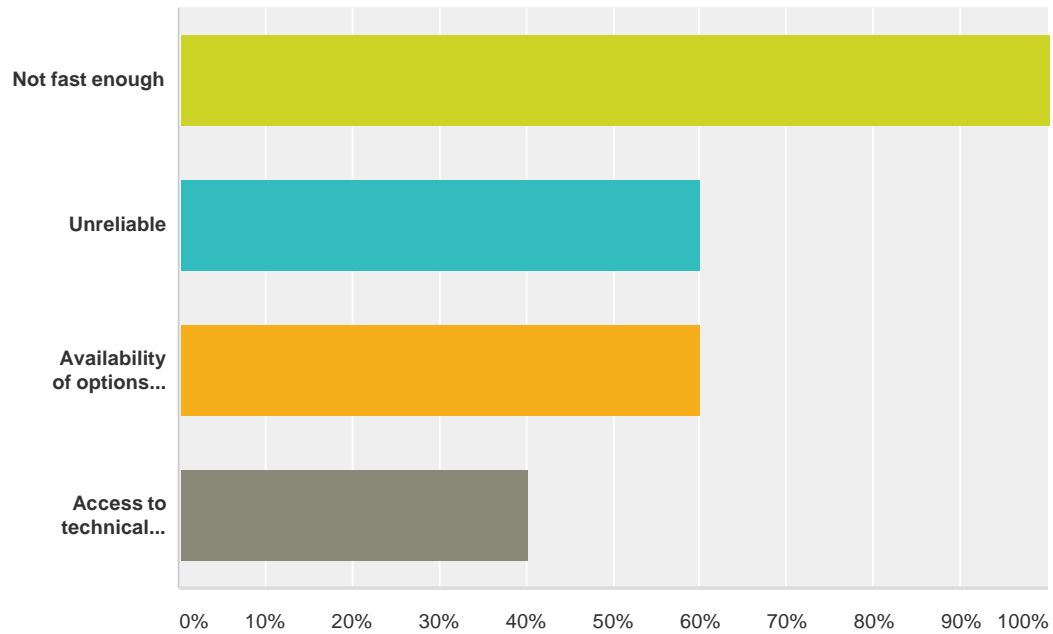
Answered: 43 Skipped: 0



Answer Choices	Responses	
Yes	83.72%	36
No	11.63%	5
Not sure	4.65%	2
Total		43

Q10 If you answered “no” to Question 9, in what way is your Internet insufficient? (Check all that apply)

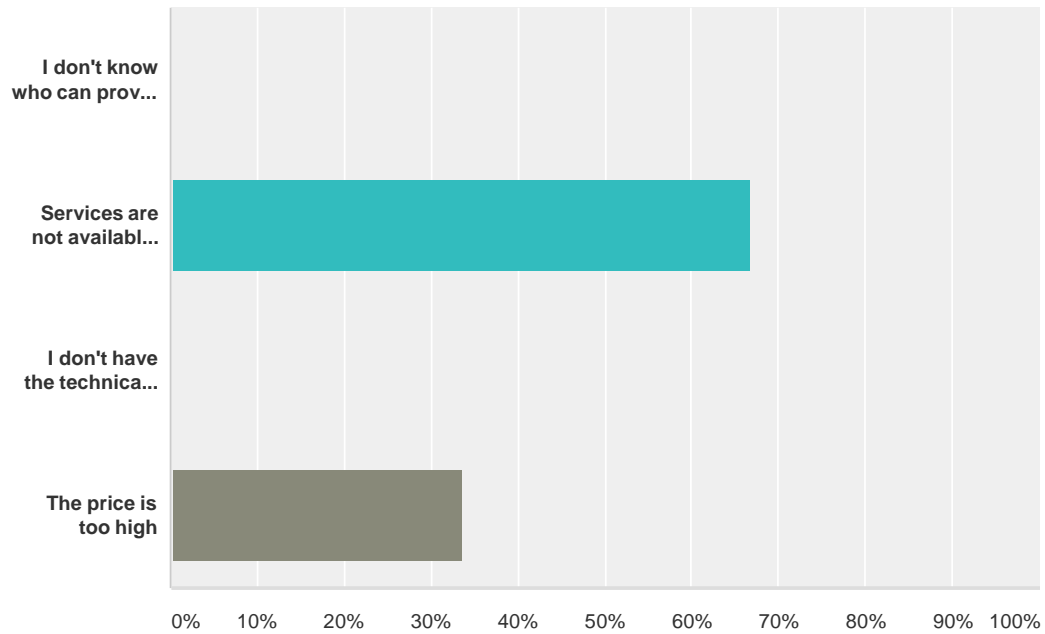
Answered: 5 Skipped: 38



Answer Choices	Responses
Not fast enough	100.00% 5
Unreliable	60.00% 3
Availability of options (service type, bandwidth)	60.00% 3
Access to technical support	40.00% 2
Total Respondents: 5	

Q11 If you answered "No", to Question 9, why haven't you upgraded your Internet services?

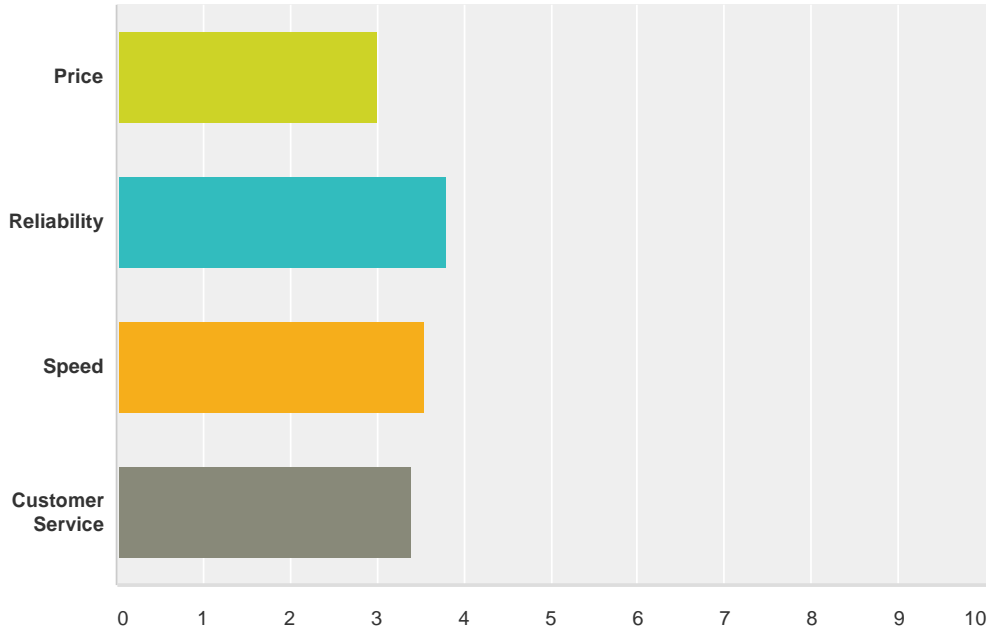
Answered: 3 Skipped: 40



Answer Choices	Responses
I don't know who can provide services in my area	0.00% 0
Services are not available in my area	66.67% 2
I don't have the technical skills necessary	0.00% 0
The price is too high	33.33% 1
Total	3

Q12 Please rate your current Internet services (5 = most satisfied, 1 = least satisfied):

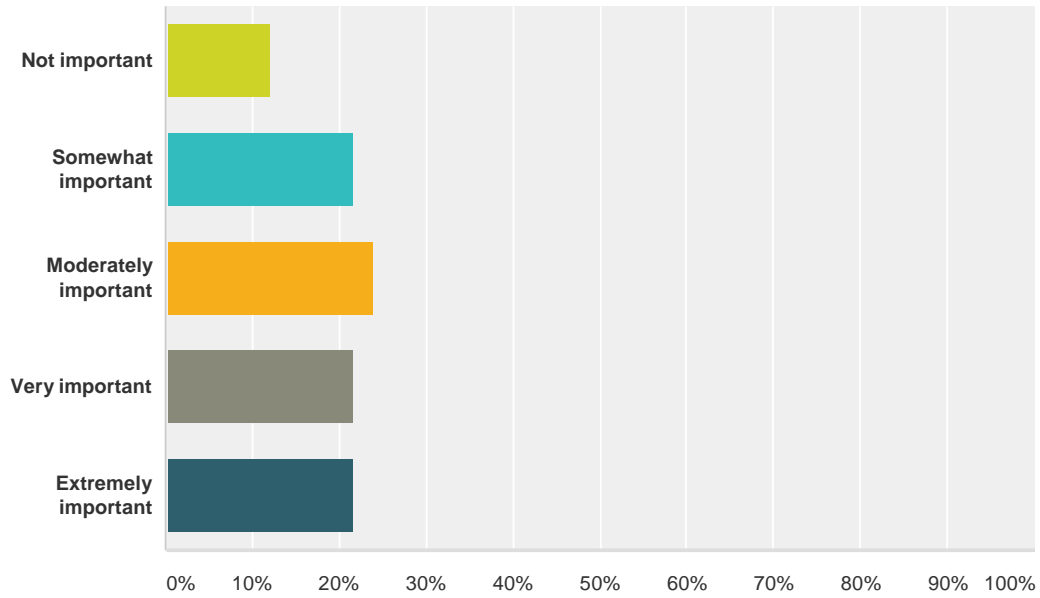
Answered: 43 Skipped: 0



	1	2	3	4	5	Total	Weighted Average
Price	9.52% 4	26.19% 11	33.33% 14	19.05% 8	11.90% 5	42	2.98
Reliability	2.33% 1	4.65% 2	25.58% 11	48.84% 21	18.60% 8	43	3.77
Speed	4.65% 2	9.30% 4	32.56% 14	34.88% 15	18.60% 8	43	3.53
Customer Service	4.76% 2	14.29% 6	30.95% 13	38.10% 16	11.90% 5	42	3.38

Q13 Please complete the following statement: Having multiple choices of Internet and broadband providers for my business is _____.

Answered: 42 Skipped: 1



Answer Choices	Responses
Not important	11.90% 5
Somewhat important	21.43% 9
Moderately important	23.81% 10
Very important	21.43% 9
Extremely important	21.43% 9
Total	42

E. Universal Service Administrative Company (USAC) E-Rate Analysis

Barker Central School District					BEN 124771									
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested Amount	Funded	Disbursed	Util. %	Discount	Contract Award Date	Service Start Date	Service End Date	Contract End Date
2014	968078	2627546	143001192	AT&T Corp.	T	\$279.22	\$279.22	\$0.00	0%	60%		07/01/2014	6/30/15	
2014	968078	2627567	143001359	Verizon New York Inc.	T	\$5,819.11	\$5,819.11	\$0.00	0%	60%		07/01/2014	6/30/15	
2014	968078	2627568	143000677	Verizon Wireless (Cellco Partnership)	T	\$1,317.89	\$1,317.89	\$0.00	0%	60%		07/01/2014	6/30/15	
2013	914322	2491968	143001192	AT&T Corp.	T	\$279.22	\$279.22	\$140.81	50%	60%		07/01/2013		
2013	914322	2491969	143001359	Verizon New York Inc.	T	\$5,801.33	\$5,801.33	\$5,388.69	93%	60%		07/01/2013		
2013	914322	2491970	143000677	Verizon Wireless (Cellco Partnership)	T	\$903.02	\$903.02	\$903.02	100%	60%		07/01/2013		
2012	853438	2320312	143001192	AT&T Corp.	T	\$408.31	\$408.31	\$201.06	49%	60%		07/01/2012	6/30/13	
2012	853438	2320313	143001359	Verizon New York Inc.	T	\$5,612.69	\$5,612.69	\$5,473.55	98%	60%		07/01/2012	6/30/13	
2012	853438	2320314	143000677	Verizon Wireless	T	\$1,132.78	\$1,132.78	\$971.78	86%	60%		07/01/2012	6/30/13	
2011	784425	2122342	143001192	AT&T Corp.	T	\$266.40	\$266.40	\$235.38	88%	60%		07/01/2011	06/30/2012	
2011	784425	2122345	143001359	Verizon New York Inc.	T	\$5,824.80	\$5,824.80	\$5,699.62	98%	60%		07/01/2011	06/30/2012	
2011	784425	2122349	143000677	Verizon Wireless	T	\$871.20	\$871.20	\$779.93	90%	60%		07/01/2011	06/30/2012	

Lockport City School District					BEN: 124809									
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested	Funded	Disbursed	Util. %	Discount	Contract Award	Service Start Date	Service End Date	Contract End Date
2014	954133	2592881	143031873	Custom Tel LLC	T	\$7,549.14	\$7,549.14	0	0%	81%	01/29/2013	07/01/2014		06/30/2016
2014	954133	2592882	143031873	Custom Tel LLC	T	\$6,804.00	\$6,804.00	0	0%	81%	01/29/2013	07/01/2014		06/30/2016
2014	954133	2592883	143017391	Choice One Communications of Ni	T	\$11,833.32	\$11,833.32	0	0%	81%		7/1/14	06/30/2015	
2014	954133	2592884	143018525	USA Mobility Wireless, Inc.	T	\$279.94	\$279.94	0	0%	81%		7/1/14	06/30/2015	
2013	913807	2489769	143017391	Choice One Communications of Ni	T	\$10,754.57	\$10,754.57	\$8,048.83	75%	74%		7/1/13	06/30/2014	
2013	913807	2489770	143031873	Custom Tel LLC	T	\$11,812.09	\$11,812.09	\$5,646.13	48%	74%	01/29/2013	7/1/13		6/30/16
2013	913807	2489771	143031873	Custom Tel LLC	T	\$6,216.00	\$6,216.00	\$5,698.00	92%	74%	1/29/13	7/1/13		6/30/16
2013	913807	2489772	143018525	USA Mobility Wireless, Inc.	T	\$352.98	\$352.98	\$232.66	66%	74%		7/1/13	06/30/2014	
2012	839634	2277853	143017391	Choice One Communications of Ni	T	\$30,945.32	\$30,945.32	\$28,025.72	91%	71%		7/1/12	06/30/2013	
2012	839634	2277854	143018525	USA Mobility Wireless, Inc.	T	\$434.52	\$434.52	\$285.03	66%	71%		7/1/12	06/30/2013	
2011	782869	2118546	143017391	Choice One Communications of Ni	T	\$25,030.08	\$25,030.08	\$22,419.82	90%	72%	1/12/09	7/1/11		06/30/2012
2011	782869	2118550	143017391	Choice One Communications of Ni	T	\$7,344.00	\$7,344.00	\$7,340.72	100%	72%	1/12/09	7/1/11		06/30/2012
2011	782869	2118553	143018525	USA Mobility Wireless, Inc.	T	\$457.92	\$457.92	\$440.64	96%	72%		07/01/2011	6/30/12	

Niagara Falls School District					BEN: 124869										
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested	Funded	Disbursed	Util. %	Discount	Contract Award	Service Start Date	Service End Date	Contract End Date	
2014	968650	2636435	143001359	Verizon New York Inc.	T	\$44,562.96	\$44,562.96	0	0%	90%		7/1/14	06/30/2015		
2014	968650	2636436	143000677	Verizon Wireless (Cellco Partnersh	T	\$12,391.80	\$12,391.80	0	0%	90%		7/1/14	06/30/2015		
2013	903798	2458637	143017391	Choice One Communications of Ni	T	\$45,515.05	\$45,515.05	\$45,515.05	100%	85%		07/01/2013	06/30/2014		
2013	903798	2458639	143000677	Verizon Wireless (Cellco Partnersh	T	\$10,587.50	\$10,587.50	\$10,587.50	100%	85%		07/01/2013	06/30/2014		
2012	853436	2320307	143017391	Choice One Communications of Ni	T	\$43,654.88	\$43,654.88	\$41,606.79	95%	85%	01/27/2011	07/01/2012		06/30/2014	
2012	853436	2320309	143000677	Verizon Wireless	T	\$11,810.58	\$11,810.58	\$11,810.58	100%	85%		7/1/12	06/30/2013		
2011	809406	2197372	143001192	AT&T Corp.	T	\$16,702.56	\$16,702.56	\$16,702.56	100%	84%		07/01/2011	06/30/2012		
2011	809406	2197455	143017391	Choice One Communications of Ni	T	\$55,581.12	\$40,311.63	\$40,311.56	100%	84%	01/27/2011	7/1/11		6/30/14	
2011	809406	2197483	143019523	Time Warner ResCom of New York T	T	\$33,163.20	\$33,163.20	\$30,634.80	92%	84%	10/31/02	07/01/2011		06/30/2012	
2011	809406	2197512	143000677	Verizon Wireless	T	\$11,148.48	\$11,148.48	\$11,148.48	100%	84%		7/1/11	06/30/2012		
2011	809406	2417012	143001359	Verizon New York Inc.	T	\$15,269.54	\$15,269.54	\$15,269.53	100%	84%	07/01/2011	7/1/11		03/31/2012	

Niagara Wheatfield School District														
BEN: 124835														
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested	Funded	Disbursed	Util. %	Discount	Contract Award Date	Service Start Date	Service End Date	Contract End Date
2014	966106	2627686	143001192	AT&T Corp.	T	\$44.84	\$0.00	NF	0	0%	54%	07/01/2014	6/30/15	
2014	966106	2627707	143021460	Level 3 Communications, LLC	T	\$5,117.58	\$0.00	NF	0	0%	54%	07/01/2014	6/30/15	
2014	966106	2627710	143001359	Verizon New York Inc.	T	\$807.02	\$0.00	NF	0	0%	54%	07/01/2014	6/30/15	
2014	966106	2627711	143000677	Verizon Wireless (Celloco Partnersh	T	\$2,889.76	\$0.00	NF	0	0%	54%	07/01/2014	6/30/15	
2014	966106	2627711	143030766	Windstream Communications, Inc.	T	\$17,061.26	\$0.00	NF	0	0%	54%	07/01/2014	6/30/15	
2014	992034	2707438	143001192	AT&T Corp.	T	\$44.84	\$44.84		0	0%	54%	07/01/2014	6/30/15	
2014	992034	2707439	143021460	Level 3 Communications, LLC	T	\$5,117.58	\$5,117.58		0	0%	54%	07/01/2014	6/30/15	
2014	992034	2707440	143001359	Verizon New York Inc.	T	\$807.02	\$807.02		0	0%	54%	07/01/2014	6/30/15	
2014	992034	2707441	143000677	Verizon Wireless (Celloco Partnersh	T	\$2,889.76	\$2,889.76		0	0%	54%	07/01/2014	6/30/15	
2014	992034	2707442	143030766	Windstream Communications, Inc.	T	\$17,061.26	\$17,061.26		0	0%	54%	07/01/2014	6/30/15	
2013	899243	2444527	143001192	AT&T Corp.	T	\$45.88	\$45.88		\$44.51	97%	54%	07/01/2013	6/30/14	
2013	899243	2444528	143021460	Level 3 Communications, LLC	T	\$5,046.04	\$5,046.04		\$5,046.04	100%	54%	07/01/2013	6/30/14	
2013	899243	2444530	143001359	Verizon New York Inc.	T	\$826.26	\$826.26		\$826.26	100%	54%	07/01/2013	6/30/14	
2013	899243	2444531	143000677	Verizon Wireless (Celloco Partnersh	T	\$4,002.70	\$4,002.70		\$2,776.22	69%	54%	07/01/2013	6/30/14	
2013	899243	2444532	143030766	Windstream Communications, Inc.	T	\$18,357.71	\$18,357.71		\$17,270.95	94%	54%	07/01/2013	6/30/14	
2012	846314	2298350	143001192	AT&T Corp.	T	\$49.54	\$49.54		\$44.37	90%	53%	7/1/12	6/30/13	
2012	846314	2298351	143021460	Level 3 Communications, LLC	T	\$4,980.13	\$4,980.13		\$4,953.28	99%	53%	7/1/12	6/30/13	
2012	846314	2298352	143030766	Windstream Communications, Inc.	T	\$25,819.37	\$24,711.14		\$17,079.26	69%	53%	7/1/12	6/30/13	
2012	846314	2298354	143001359	Verizon New York Inc.	T	\$794.55	\$794.55		\$794.55	100%	53%	7/1/12	6/30/13	
2012	846314	2298355	143000677	Verizon Wireless	T	\$3,866.37	\$3,866.37		\$3,629.66	94%	53%	7/1/12	6/30/13	
2011	809259	2196903	143001192	AT&T Corp.	T	\$48.00	\$48.00		\$47.45	99%	50%	07/01/2011	06/30/2012	
2011	809259	2196941	143021460	Level 3 Communications, LLC	T	\$4,734.00	\$4,734.00		\$4,691.10	99%	50%	07/01/2011	06/30/2012	
2011	809259	2196966	143030766	Windstream Communications, Inc.	T	\$24,018.00	\$23,712.00		\$20,386.90	86%	50%	07/01/2011	06/30/2012	
2011	809259	2196992	143001359	Verizon New York Inc.	T	\$750.00	\$750.00		\$729.20	97%	50%	07/01/2011	06/30/2012	
2011	809259	2197022	143000677	Verizon Wireless	T	\$2,808.00	\$2,808.00		\$2,808.00	100%	50%	07/01/2011	06/30/2012	

Royalton Heartland School District														
BEN 145517														
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested Amount	Funded	Disbursed	Util. %	Discount	Contract Award Date	Service Start Date	Service End Date	Contract End Date
2014	960869	2610651	143017391	Choice One Communications of New York Inc.	T	\$8,406.02	\$8,406.02	\$3,615.90	43%	46%		7/1/14	06/30/2015	
2014	960869	2610652	143018525	USA Mobility Wireless, Inc.	T	\$80.87	\$80.87	\$60.60	75%	46%		7/1/14	06/30/2015	
2014	960869	2610653	143001359	Verizon New York Inc.	T	\$2,307.42	\$2,307.42	\$2,307.42	100%	46%		7/1/14	06/30/2015	
2014	960869	2610654	143000677	Verizon Wireless (Celloco Partnership)	T	\$1,126.41	\$1,126.41	0	0%	46%		7/1/14	06/30/2015	
2013	903790	2458561	143018525	USA Mobility Wireless, Inc.	T	\$87.90	\$87.90	\$87.90	100%	50%		7/1/2013	06/30/2014	
2013	903790	2458562	143001359	Verizon New York Inc.	T	\$8,846.94	\$8,846.94	\$3,053.11	35%	50%		7/1/2013	06/30/2014	
2013	903790	2458563	143000677	Verizon Wireless (Celloco Partnership)	T	\$1,379.40	\$1,379.40	\$812.31	59%	50%		7/1/2013	06/30/2014	
2012	839765	2278195	143017391	Choice One Communications of New York Inc.	T	\$9,941.74	\$9,941.74	\$7,840.54	79%	47%		7/1/12	06/30/2013	
2012	839765	2278196	143018525	USA Mobility Wireless, Inc.	T	\$82.63	\$82.63	\$34.43	42%	47%		7/1/12	06/30/2013	
2012	839765	2278197	143000677	Verizon Wireless	T	\$1,481.80	\$1,481.80	\$523.34	35%	47%		7/1/12	06/30/2013	
2011	802291	2174046	143017391	Choice One Communications of New York Inc.	T	\$14,256.00	\$14,256.00	\$7,626.47	53%	44%		07/01/2011	06/30/2012	
2011	802291	2174047	143018525	USA Mobility Wireless, Inc.	T	\$73.92	\$73.92	\$73.92	100%	44%		07/01/2011	06/30/2012	
2011	802291	2174048	143000677	Verizon Wireless	T	\$1,520.64	\$1,520.64	\$1,273.04	84%	44%		07/01/2011	06/30/2012	

Newfane Central School District														
BEN 124823														
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested Amount	Funded	Disbursed	Util. %	Discount	Contract Award Date	Service Start Date	Service End Date	Contract End Date
2014	960870	2610655	143001113	AT&T Corp	T	\$2,143.96	\$2,143.96	\$0.00	0%	58%		07/01/2014	6/30/15	
2014	960870	2610656	143000677	Verizon Wireless (Celloco Partnership)	T	\$2,204.44	\$2,204.44	\$0.00	0%	58%		07/01/2014	6/30/15	
2013	898462	2442284	143001113	AT&T Corp	T	\$2,741.75	\$2,741.75	\$1,981.80	72%	57%		07/01/2013	06/30/2014	
2013	898462	2442285	143000677	Verizon Wireless (Celloco Partnership)	T	\$2,169.17	\$2,169.17	\$2,169.17	100%	57%		07/01/2013	06/30/2014	
2012	855680	2327782	143001113	AT&T Corp	T	\$2,525.23	\$2,525.23	\$2,260.20	90%	58%		07/01/2012	6/30/13	
2012	855680	2327783	143000677	Verizon Wireless	T	\$2,205.48	\$2,205.48	\$2,205.48	100%	58%		07/01/2012	6/30/13	
2011	821495	2237147	143001113	AT&T Corp	T	\$2,130.60	\$2,130.60	\$2,063.78	97%	53%		07/01/2011	06/30/2012	
2011	821495	2237149	143000677	Verizon Wireless	T	\$1,704.48	\$1,704.48	\$1,704.48	100%	53%		07/01/2011	06/30/2012	

Starpoint Central School District					BEN 124811									
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested Amount	Funded	Disbursed	Util. %	Discount	Contract Award Date	Service Start Date	Service End Date	
2014	981998	2676842	143021460	Level 3 Communications, LLC	T	\$2,644.08	\$2,644.08	\$0.00	0%	40%		07/01/2014	06/30/2015	
2014	981998	2676843	143001359	Verizon New York Inc.	T	\$904.18	\$904.18	\$0.00	0%	40%		07/01/2014	06/30/2015	
2014	981998	2676844	143000677	Verizon Wireless (Cellco Partnership)	T	\$554.16	\$554.16	0	0%	40%				
2013	910385	2479381	143021460	Level 3 Communications, LLC	T	\$5,527.58	\$5,527.58	\$2,675.15	48%	40%		07/01/2013	06/30/2014	
2013	910385	2479382	143001359	Verizon New York Inc.	T	\$882.58	\$882.58	\$882.58	100%	40%		07/01/2013	06/30/2014	
2013	910385	2479383	143000677	Verizon Wireless (Cellco Partnership)	T	\$924.48	\$924.48	\$721.66	78%	40%		07/01/2013	06/30/2014	
2012	836510	2270094	143030335	Cricket Communications, Inc.	T	\$216.00	\$216.00	\$0.00	0%	40%		7/1/12	06/30/2013	
2012	836510	2270095	143021460	Level 3 Communications, LLC	T	\$5,856.00	\$5,856.00	\$5,357.03	91%	40%		7/1/12	06/30/2013	
2012	836510	2270096	143018525	USA Mobility Wireless, Inc.	T	\$148.51	\$148.51	\$0.00	0%	40%		7/1/12	06/30/2013	
2012	836510	2270097	143001359	Verizon New York Inc.	T	\$861.79	\$861.79	\$860.91	100%	40%		7/1/12	06/30/2013	
2012	836510	2270098	143000677	Verizon Wireless	T	\$908.59	\$908.59	\$776.63	85%	40%		7/1/12	06/30/2013	
2011	811545	2204058	143030335	Cricket Communications, Inc.	T	\$436.80	\$436.80	\$0.00	0%	40%		07/01/2011	06/30/2012	
2011	811545	2204101	143021460	Level 3 Communications, LLC	T	\$8,112.00	\$8,112.00	\$5,555.37	68%	40%		07/01/2011	06/30/2012	
2011	811545	2204148	143018525	USA Mobility Wireless, Inc.	T	\$312.00	\$312.00	\$124.88	40%	40%		07/01/2011	06/30/2012	
2011	811545	2204176	143001359	Verizon New York Inc.	T	\$825.60	\$825.60	\$825.60	100%	40%		07/01/2011	06/30/2012	
2011	811545	2204215	143000677	Verizon Wireless	T	\$2,025.60	\$2,025.60	\$1,310.55	65%	40%		07/01/2011	06/30/2012	

Wilson Central School District					BEN 124845									
Funding Year	471	FRN	SPIN	Service Provider	Service*	Original Requested Amount	Funded	Disbursed	Util. %	Discount	Contract Award Date	Service Start Date	Service End Date	Contract End Date
2014	960908	2610714	143017391	Choice One Communications of New York Inc.	T	\$5,029.56	\$4,726.15	\$4,252.76	90%	60%	2/28/13	07/01/2014		6/30/16
2014	960908	2610715	143001359	Verizon New York Inc.	T	\$3,246.91	\$2,476.37	\$0.00	0%	60%		07/01/2014	6/30/15	
2013	931750	2546499	143017391	Choice One Communications of New York Inc.	T	\$8,971.75	\$8,971.75	\$4,512.13	50%	54%	02/28/2013	07/01/2013		6/30/16
2012	866971	2362946	143001359	Verizon New York Inc.	T	\$9,370.14	\$9,370.14	\$9,370.14	100%	54%		07/01/2012	6/30/13	
2011	815427	2216393	143001359	Verizon New York Inc.	T	\$8,236.08	\$8,236.08	\$8,236.08	100%	54%	1/22/09	07/01/2011		06/30/2012

F. Service Provider Contact List

ISP	Contact	Title	Email	Phone
Verizon	John Heckman	OSP Design Engineer	john.c.heckman@verizon.com	O: 716.840.8603 C: 716.628.9816
Time Warner	Mark Meyerhofer	Director Government Relations	mark.meyerhofer@twcable.com	O: 716.686.4446 C: 716.289.3100
Frontier	Claudia Maroney	General Manager	Claudia.Maroney@FTR.com	O: 607-243-5707 C: 607-316-7097
Fibertech	AJ Luzerne	Enterprise Market Manager	ajluzze@fibertech.com	O: 585.697.5138 C: 585.739.5138
Level 3	Todd Himes	Account Manager II	todd.himes@level3.com	O: 407.754.0102 C: 321.696.2245
Transwave	David Bassanello	Sales Manager	dave@transwave.net	O: 716. 626.9020

G. Public Policy Templates

Sample General Plan Communications Policies (Mono County)

Proposed Mono County General Plan Communication Policies

I. ISSUES / OPPORTUNITIES / CONSTRAINTS

Communications

1. Telecommunications infrastructure and services are critical components for long-term growth and sustainability for the County, as they provide the basic resources necessary for businesses to operate and add to the quality of life for residents. Increasingly, business success is tied to online accessibility, including e-commerce solutions, discoverability, and the overall necessity of high-quality broadband capable of high speeds with symmetric up and down transfer rates. Of equal importance is broadband to residents for access to online education, research, employment, health care, and government resources.
2. Historically, Mono County has suffered from a lack of quality broadband due to our rural nature and low population with dispersed community areas. With the installation of Digital 395 (see III.C. Definitions for more information) in 2013, however, capacity issues will be resolved and new opportunities will arise.
3. With the rapid advances in mobile device technology, both providers and subscribers are increasingly looking to mobile solutions to help fill communication gaps and provide alternatives to typical fixed deployments. While the mobile alternatives are extremely valuable at fulfilling their role, they are not a panacea for solving broadband issues throughout the county.
4. The primary issues with the mobile broadband solution are the data caps that are placed on customers, the overall cost of the service, and the typical requirement of a long-term contract in order to receive the service. While these are hurdles typically overcome by those looking to utilize this technology as a secondary method for accessing the Internet, for those who are looking at it as their primary, they may be insurmountable.
5. For the most part, some form of cellular coverage exists in almost every community; however, it is carrier dependent. AT&T and Verizon are the two main carriers, whose coverage models overlap, but do not provide the same coverage in all of the same areas. In addition to some communities not having cellular service, there are significant sections of our primary highway corridors without coverage, which poses safety concerns and convenience issues for travelers.
6. With Digital 395, cellular coverage throughout the county may improve as new sites are developed and existing sites improved with upgraded technology that adopts a fiber-fed backhaul. This development pattern is important, and should be considered strategically and implemented thoughtfully in order to meet goals and objectives while adhering to policies and parameters.
7. Within the context of non-mobile broadband technology, Mono County continues to struggle with the basic aspects of accessibility, reliability, and adoption. These three aspects are closely related to each other, as the region as a whole has been starved of quality Internet until very

recently. Where service is accessible (mainly in the major community areas), the reliability and usability of that service has not always been great enough to motivate everyone to adopt. Coupled with the demographics of the region (a mix of income levels, education, age, and ethnicities), a portion of the population still does not use the Internet.

8. Outside of the Town of Mammoth Lakes and the community of June Lake, most communities do not have more than one Internet Service Provider. For the most part, smaller communities are serviced by a single fixed wireless provider (Schat.net), leaving only one other small, wireline provider (Escape Broadband) to compete with the bigger companies offering wireline service – Suddenlink and Verizon.

9. Due to limited competition, the market in each community has been dominated by a single (non-mobile) carrier, which limits consumer choice, stifles competition, and does not afford redundancy. In addition, business use of Internet is limited to residential grade service plans, with only a small number of T1 type connections, or similar higher speed service offerings. In general, this has not only resulted in those businesses being confined to Mammoth or June Lake, but also made it difficult or financially impractical for businesses to get higher speeds or symmetric service offerings.

10. A high priority is placed on broadband market development, and the engagement of Mono County in the regional deployment of this critical infrastructure. Participation in local, regional, statewide, and federal efforts that are aimed at the improved diffusion of broadband and communications technology is an important part of achieving the goals and objectives.

II. DEFINITIONS

Communications

1. Digital 395: A 583-mile long Middle Mile fiber optic project between Carson City, NV and Barstow, CA. This project was jointly funded by the U.S. Department of Commerce under the American Recovery and Reinvestment Act of 2009 (ARRA), and a ratepayer fund dedicated to broadband development known as the California Advanced Services Fund which is administered by the California Public Utilities Commission.

2. California Broadband Cooperative: A not-for-profit telephone cooperative that will serve as the long-term owner and operator of the Digital 395 network.

3. Praxis Associates, Inc.: A recognized California-based fiber optic development firm responsible for securing the funding and serving as the lead on the design, management, and construction of the Digital 395 project.

4. Middle Mile: In utilities and telecommunication networks, this is the core portion of the infrastructure that provides the high-capacity, long-haul routes from points of origin for service to local service providers and smaller distribution networks.

5. Last Mile: In utilities and telecommunication networks, this is the local network that delivers service to consumers, as developed and carried out by Internet Service Providers (ISPs).

6. Anchor: As it relates to Digital 395, these are government, education and medical facilities, and service provider points of interconnect where services are provided by Digital 395.
7. Node: As it relates to Digital 395, these are locations along the fiber route where hardware is located that amplifies signal in the fiber, routes traffic on the network, and provides points of interconnect.
8. Fiber Access Point (FAP): Typically located in underground vaults, these are points of access to fibers broken out from the Digital 395 backbone for the purpose of providing a point of interconnect for future middle or last mile services.
9. Network Interface Device (NID): A piece of technology installed at anchors where the Digital 395 network is terminated and can be interfaced with a local network.
10. Mobile Wireless: A general term used to describe broadband service that is offered typically by cellular carriers via 3G, 4G, LTE or similar types of networks to smartphones, tablets, and other mobile technology.
11. Fixed Wireless: A term used to describe broadband service that is offered by an Internet Service Provider via wireless infrastructure that is installed on premise and aimed at a repeater site.
12. Wireline: A general term that is used to describe a connection to the Internet which is provided via hardware, as in the case of DSL, Cable, or Fiber based technologies.

II. POLICIES

Communications

Broadband Distribution and Quality of Service

Goal 1. Facilitate the distribution of the best broadband service possible, to as many users within community areas and key transportation corridors as possible, in a timely and cost effective manner that minimizes impacts to visual and natural resources.

Objective 1.A. Work with providers to deliver the best service possible to Mono County residents, businesses, and visitors.

Policy 1.A.1. Providers shall develop new infrastructure projects using the best available technology that meets or exceeds current industry standards and is consistent with Goal 2.

Action 1.A.1.a. Providers shall meet or exceed standards set by the California Advanced Services Fund (CASF) for 'Served' communities.¹⁰

¹⁰ California Advanced Services Fund is a division of the California Public Utilities Commission (CPUC) and is responsible for increasing broadband adoption in hard to reach areas of California. More information at <http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/CASF/index.htm>.

Action 1.A.1.b. Encourage new infrastructure projects to use high-capacity wireline solutions (such as Fiber-to-the-Premise). Providers should demonstrate a justification for alternative technologies requirements when wireline is impractical.

Policy 1.A.2. Providers shall develop and deliver services that improve accessibility to high quality broadband while protecting consumers and ensuring fair and equal access to those utilizing services within the County.

Action 1.A.2.a. Ensure Internet Service Providers (ISPs) possess a current Business License, and be current on all applicable Franchise Licenses, taxes, and fee payments.

Action 1.A.2.b. ISPs shall furnish and uphold Customer Service Standards that provide privacy protection, clear service and billing procedures, reliability, or a similar service level agreement, and means by which to contest service not meeting said standards.

Action 1.A.2.c. The County should work with providers to establish and maintain consumer awareness information and materials. Periodically review and publish information on local providers based on service standards, including but not limited to coverage area, speeds, etc.

Objective 1.B. Deploy broadband to as many community areas and key transportation corridors as possible, and pursue additional providers to increase competition, and improve quality of service.

Policy 1.B.1. Work with providers and other entities to develop projects that deliver broadband service to all communities.

Action 1.B.1.a. Establish and maintain a list of high priority communities that can be referred to when providers are looking to build new projects.

Action 1.B.1.b. Actively seek out providers and other reasonable alternatives to establish broadband service in unserved communities throughout the County.

Action 1.B.1.c. Coordinate and work with Eastern Sierra Connect Regional Broadband Consortium (ESCRBC) and other entities to locate funding opportunities for providers interested in building projects in 'unserved' and 'underserved' communities.

Action 1.B.1.d. Pursue additional providers or other reasonable alternatives to improve the quality of service, competition, and reliability in communities throughout the County.

Action 1.B.1.e. Look for opportunities to establish access to broadband in other rural or outlying areas for the purpose of enhancing Health & Safety or Economic Development purposes where traditional approaches or solutions are impractical.

Policy 1.B.2. Establish free WiFi in public spaces including County buildings, parks, community centers, and in commercial corridors in community areas.

Action 1.B.2.a. Provide free WiFi for public use in County offices and facilities.

Action 1.B.2.b. Work with service providers to establish free WiFi in commercial corridors and other public areas to support and promote local businesses.

Action 1.B.2.c. Limit speeds on public WiFi networks so as not to compete with residential or business connections offered by local service providers.

Design and Placement of Communications Infrastructure

Goal 2. Ensure deployment and implementation minimizes impacts to visual and natural resources. Provide development standards for communication infrastructure located throughout the County.

Objective 2.A. Minimize the impact on the environment and scenic resources of communications projects and infrastructure.

Policy 2.A.1. Providers shall utilize distribution practices that cause the least amount of long-term/significant environmental and visual impacts, including the use of design and screening tactics (also see Mono County Design Guidelines).

Action 2.A.1.a. Projects shall comply with requirements in Chapter 11, Section 11.010, of the Land Use Element.

Action 2.A.1.b. To support utilization of existing infrastructure and co-location, the County should maintain a database of existing communications infrastructure that can be referenced when evaluating projects and prior to permitting, and that is available to providers.

Action 2.A.1.c. Encourage placement of towers outside of community areas.

Policy 2.A.2. Underground existing overhead infrastructure when possible.

Action 2.A.2.a. Seek and utilize Rule 20, grant funds, public-private partnerships, or other creative funding opportunities, such as loans or mortgages, to underground infrastructure.

Action 2.A.2.b. Utilize a community-based public planning process to help identify and prioritize future undergrounding projects; review area plans for existing community direction.

Action 2.A.2.c. Establish an inventory and set of priorities for each community for future undergrounding projects based on areas of high preference or priority, as driven by public safety, reliability, community benefit (commercial cores, downtowns, etc.), or visual blight issues.

Action 2.A.2.d. Maintain an inventory of all underground districts and past funded projects in the County.

Policy 2.A.3. Utilize existing permit review procedures, such as the Land Development Technical Advisory Committee, to ensure project compliance and engage interested County departments, including Information Technology (IT), and other stakeholders.

Objective 2.B. Develop and manage underground infrastructure as 'basic infrastructure' that adheres to standards, is available for public use, and is managed as an asset in line with other public property.

Policy 2.B.1. Underground infrastructure shall be installed in accordance with standards specified in Chapter 11, 11.010, regarding placement, material, and method, and should adhere to other best practices.

Action 2.B.1.a. Conduit in public streets should be placed a minimum depth of three feet.

Action 2.B.1.b. Conduit installed for the purposes of Middle-Mile or long-haul routes, or that is installed in major streets or arterials should be the equivalent minimum of 4" in diameter.

Action 2.B.1.c. Conduit installed for the purposes of Last-Mile or distribution routes should be a minimum of 1½" in diameter.

Action 2.B.1.d. Conduit should be installed at the intersection of streets that is the equivalent of at least 4" in diameter and made accessible via vaults or similar appropriate means.

Action 2.B.1.e. Encourage the use of microduct or similar technology in conduit installations so as to segregate providers.

Action 2.B.1.f. A reasonable amount of space shall be retained by the owner of the underground infrastructure for the purpose of their potential future use.

Action 3.B.1.g. Allow developers who install conduit to recover their costs through renting or leasing space in conduit at a fair and competitive price until the point that the cost of installation is paid off.

Strategic Planning For Communications Infrastructure

Goal 3. Plan for the improvement and expansion of the communications infrastructure network by seeking cost-effective and efficient solutions.

Objective 3.A. Utilize County property and rights-of-way, or other public spaces and resources, for communication sites or infrastructure.

Policy 3.A.1. The County shall provide sites or space for communication facilities, including cabinet structures, pedestals, antennas, etc. where appropriate and feasible.

Action 3.A.1.a. Develop and maintain an inventory of viable sites, permissible uses, associated costs, power and backhaul access, and other relevant information on County property and rights-of-way.

Action 3.A.1.b. Consolidate and co-locate facilities on County property or rights-of-way without interfering with County infrastructure, and design new facilities and projects taking into consideration future communication infrastructure.

Action 3.A.1.c. Review locations of Digital 395 Fiber Access Points (FAPs) within County Rights of Way and determine how providers may utilize or access FAP and install necessary infrastructure in Right of Way.

Policy 3.A.2. Projects conducted on County property, including rights-of-way, shall follow a 'Dig Once' objective.

Action 3.A.2.a Install conduit in public streets during construction/re-construction for future communications infrastructure use.

Action 3.A.2.b. Accommodate construction of conduit laterals leading to private property for potential future use.

Policy 3.A.3. Interested parties shall be notified of any opportunity for installing additional conduit or infrastructure in open trenches in County right-of-way.

Action 3.A.3.a. Look for opportunities to place new conduit through joint utility trenches.

Action 3.A.3.b. Require formal notification of utilities and interested parties of a joint trench opportunity prior to issuance of permit for construction work.

Action 3.A.3.c. Require installation of secondary or tertiary conduit whenever new conduit is being installed in public Rights of Way to accommodate future use/growth.

Policy 3.A.4. Underground infrastructure in County rights-of-way shall be accessible and remain available for use by qualified providers.

Action 3.A.4.a. Accept offers of dedication for underground infrastructure from private developers and maintain conduit in the public's interest.

Action 3.A.4.b. Work with special districts, quasi-public entities, or third-party companies and vendors for long-term ownership or management of underground conduit, so long as the infrastructure remains available to the public at a fair price and in an open and competitive manner.

Policy 3.A.5. Leverage existing broadband infrastructure, including Digital 395, before constructing new infrastructure.

Action 3.A.5.a. Lease existing bandwidth, dark fiber, or conduit space from California Broadband Cooperative when network routes parallel Digital 395 infrastructure.

Policy 3.A.6. Collaborate with public land managers and other agencies to provide infrastructure locations consistent with Mono County's policies and regulations.

Action 3.A.6.a. Encourage use of public land for site location and pursue opportunities with federal agencies, special districts, or local agencies.

Action 3.A.6.b. Work with land management agencies to ensure knowledge and understanding of future development plans, County General Plan policies and guidelines, and find opportunities to synchronize policies and objectives between entities.

Objective 3.B. Design communication infrastructure for future use into County projects.

Policy 3.B.1. Communication projects shall be added to the County Comprehensive Capital Facilities Plan for consideration through the established process for prioritization and funding.

Policy 3.B.2. The County shall consider communications conduit as a standard aspect of a street and shall take advantage of opportunities to install infrastructure when appropriate.

Action 3.B.2.a. Conduit shall be incorporated in the design and cost estimate phases of new street, sidewalk, or other related transportation projects.

Action 3.B.2.b. Establish dedicated revenue account(s) to be funded through leases or rents of County property for communications infrastructure, and to be made available for future conduit development and maintenance projects.

Action 3.B.2.c. When funding is not available for conduit, look for alternative sources including grants, special districts, public-private partnerships, private funding, or improvement district(s) in advance of actual construction effort.

Objective 3.C. Evaluate opportunities and establish a plan for future communications infrastructure needs and development opportunities.

Policy 3.C.1. Utilize existing committees, such as the Collaborative Planning Team, to coordinate and review communication development projects in neighboring jurisdictions or with a regional perspective.

Action 3.C.1.a. Work to develop a common set of standards and protocols for permitting, design, etc. that ensure consistency for providers and ensure the best delivery of service to our constituents.

Action 3.C.1.b. Evaluate Capital Improvement Plans (CIPs) for potential integration of broadband/communication projects.

Policy 3.C.i2. Work with the private sector to identify future projects.

Action 3.C.2.a. Work with cellular providers and third party tower developers to gain an understanding of future development intentions.

Objective 3.D. Develop and maintain a comprehensive inventory of communications, and related infrastructure for planning purposes.

Policy 3.D.1. The County shall establish and maintain a GIS database containing information and data on existing infrastructure. (Basic infrastructure information is also located in the Master Environmental Assessment [MEA]).

Action 3.D.1.a. Develop and maintain an inventory of communication infrastructure, capacity, and relevant characteristics for underground conduit, cell tower sites, and other facilities, with a focus on County properties and rights-of-way.

Action 3.D.1.b. Develop and maintain a list of priority “unserved” and “underserved” areas throughout Mono County in need of broadband and engage Last-Mile Providers with the intent of developing projects in those areas.

Action 3.D.1.c. Develop and maintain an inventory of cell phone coverage gaps, shadow areas, and potential locations (when/if identified).

Action 3.D.1.d. Catalog potential projects and future development plans in a GIS database for internal reference purposes and planning efforts.

Action 3.D.1.e. Acquire maps, data, and other relevant information from special districts and service districts throughout the County who provide service to local residents.

Action 3.D.1.f. Inventory and develop a publicly accessible dataset that contains the best known locations for infrastructure that may be used by future providers, as well as public sites anticipated to be problematic.

Objective 3.E. Improve and expand the communications network to meet critical public needs, improve government services, and support vibrant communities and local economies.

Policy 3.E.1. Leverage Digital 395 and other broadband and communications resources to improve public safety.

Action 3.E.1.a. Implement an Emergency Services Network using Digital 395 that connects the satellite facilities of emergency services personnel within Mono County, as well as surrounding jurisdictions with the intent of improving the exchange of information between all parties.

Action 3.E.1.b. Utilize the Emergency Services Network to improve Enhanced 911 services by coordinating information shared between dispatch and responders.

Policy 3.E.2. Improve cellular coverage area and establish redundant communications in communities.

Action 3.E.2.a. Direct future providers to key transportation corridors and community areas without cellular service due to coverage gaps or shadow areas. (See Action 3.D.1.c.)

Policy 3.E.3. Utilize Digital 395 and technology as a whole to improve government accountability and accessibility, improve efficiency, and reduce environmental and fiscal impacts.

Action 3.E.3.a. Develop and/or promote use of video conferencing, virtual meetings, a ride-share program, and other methods to reduce trips between County offices and to non-County locations.

Action 3.E.3.b. Budget for, install, and make available video conferencing equipment at County locations, such as community centers, libraries, and satellite offices.

Action 3.E.3.c. Utilize mobile data terminals or other similar computing devices to provide service to customers in the field.

Action 3.E.3.d. Explore and utilize paperless approaches for meetings, public information, and publication of reports, etc.

Action 3.E.3.e. Develop policies and guidelines for County staff to work remotely or telecommute when appropriate.

Action 3.E.3.f. Utilize the Internet, including websites, emails, and other similar communication vehicles to disseminate information to constituents and the general public.

Action 3.E.3.g. Provide access to public meetings via the Internet, "Public, Education, and Government (PEG) Access Channels", or other similar communication vehicles.

Policy 3.E.4. Develop a broadband economic development strategy for Mono County.

Action 3.E.4.a. Develop information and products including marketing collateral, white papers, case studies, and other relevant materials that can assist with the promotion of technology-focused business in Mono County.

Action 3.E.4.b. Develop a strategic outreach and marketing plan utilizing the developed materials and targeting technology focused businesses.

Action 3.E.4.c. Promote telecommuting as a viable method allowing visitors to stay in the region longer and work remotely, and attract new permanent residents to relocate to the area and work from Mono County.

Action 3.E.4.d. Promote workforce development and educational opportunities to train local residents and stakeholders about benefits and uses of technology, focused on the expansion of existing business and development of new business ventures.

Action 3.E.4.e. Utilize the broadband network to attract new businesses and promote business development.

Policy 3.E.5. Perform a business opportunity analysis study.

Action 3.E.5.a. Evaluate locations in the County that would be viable for various types and sizes of new technology businesses.

Action 3.E.5.b. Evaluate issues, opportunities, and constraints pertaining to business development in various locations of the County.

Action 3.E.5.c. Consider changes to policies that may hinder or otherwise complicate development of technology or green business development, including waiving of permit or licensing fees.

Action 3.E.5.d. Evaluate broadband adoption and digital literacy programs and initiatives to support business retention and expansion.

Objective 3.F. Build support and funding for improving and expanding the communication infrastructure system through collaboration.

Policy 3.F.1. Support programs and initiatives that improve broadband adoption and digital literacy.

Action 3.F.1.a. Work with regional broadband consortia, state and national initiatives, and local service providers to offer broadband to low-income, at-risk, and under-/un- served populations.

Policy 3.F.2. Leverage and support the California Broadband Cooperative, Eastern Sierra Connect Regional Broadband Consortium, and other similar not-for-profit broadband organizations to help achieve County goals and objectives.

Action 3.F.2.a. Maintain a County seat on the Eastern Sierra Connect Regional Broadband Consortium and maintain the County's interest in regional broadband development and adoption programs.

Action 3.F.2.b. Appoint a non-elected representative to the Board of Directors for the California Broadband Cooperative.

Policy 3.F.3. Seek grants and other funding opportunities for communication infrastructure projects consistent with these General Plan Policies.

Sample Development Standards (Mono County)

DEVELOPMENT STANDARDS

Chapter 11 – Utilities

Sections:

11.010 Placement of Utility Infrastructure

11.020 Alternative Energy Systems

11.010 Placement of Utility Infrastructure.

A. Exemption for Regulated Public Utilities.

The provisions of this section shall not apply to distribution and transmission lines owned and operated as part of the statewide electrical network regulated by the California Public Utilities Commission (PUC). The authority for this exemption is set forth in the California Constitution, Article XII, Section 8, which vests exclusive regulatory authority over the distribution and transmission lines of these utilities in the California Public Utilities Commission. However, the County shall work with the PUC and applicant to cooperatively meet the standards set forth in Section F.

B. Uses Permitted.

Underground facilities for the distribution of gas, water, sewer, telephone, television, communications and electricity shall be allowed in all designations.

C. Definitions.

For the purposes of this section, the following definitions shall apply:

"Individual development" means an individual development project, such as a single-family residence and/or Accessory Dwelling Unit, a garage, a single commercial use, one apartment building, or similar uses. It does not mean a subdivision, land division, condominium development, or development of more than one detached unit at the same time.

"Overhead utility lines" means utility distribution lines and service laterals that are installed above ground, either overhead, in an above ground conduit, or in some other manner.

"Subdivision" means the division of any unit or units of improved or unimproved land as further defined in Section 02.1520 and the Mono County Subdivision Ordinance.

"Utility" means gas, water, sewer, telephone, television, communications and electricity.

"Wireline" is a general term that is used to describe a connection to the Internet which is provided via hardware, as in the case of DSL, Cable, or Fiber based technologies.

D. Utility Distribution Lines to Individual Development.

Utility distribution lines to an individual development shall be installed underground, unless the applicant has obtained a Director Review Permit with Notice for overhead installation, in the manner specified in Chapter 31, Director Review Processing. For projects that require a use permit, the application for overhead utility lines shall be processed as part of the use permit application.

Prior to considering issuance of a permit, planning staff shall work with the applicant to site and design the project in a manner that avoids or minimizes the use of overhead lines, and that avoids or minimizes the impacts of overhead lines. Consideration should be given to combining lines and co-locating with other applicable facilities whenever possible.

In granting a permit for overhead utility lines, the Community Development Director (Director) or the Planning Commission (Commission) shall make one of the following findings, in addition to the required Director Review or Use Permit findings:

1. The overhead line placement will not significantly disrupt the visual character of the area. In making this determination, the Director or the Commission shall consider the following:
 - a. In areas without a number of existing overhead lines in the immediate vicinity, would overhead lines create the potential for a significant cumulative visual impact; i.e., would allowing an overhead line be likely to result in future requests for additional overhead lines in the area? If so, it may be determined that an overhead line will have a significant impact on the visual character of the area.
 - b. Does the topography or vegetation in the area effectively screen the proposed lines? If so, then an additional line may not significantly disrupt the visual character of the area.
 - c. Are there other potential alignments that would have less visual impact?
 - d. Does the project reduce the overall number of overhead lines and poles in the area; are the lines co-located with existing facilities; and/or do design features such as height of lines, size, color, reflectivity, tension in line, or other features reduce visual impacts? If so, it may be determined that an overhead line will not have a significant impact on the visual character of the area.

The Director or the Commission may consider additional information pertaining to the visual character of the area which is deemed relevant to the application.

2. The placement of utility lines above ground is environmentally preferable to underground placement. In making this determination, the Director or the Commission shall consider the following:
 - a. Will underground placement disturb an environmentally sensitive area, including but not limited to the following: cultural resource sites, significant wildlife habitat or use areas, riparian or wetland areas, or shallow groundwater? If so, above-ground placement may be preferable.
 - b. Will overhead placement cause impacts to sensitive species, such as the Bi-State Distinct Population Segment of Greater Sage-Grouse, or other environmental impacts? If so, above-ground placement may not be preferable, or perch deterrents and other mitigations may be required (see sage-grouse policies in C/OS).

- c. Will underground placement require disturbance of a waterway, including perennial, intermittent and seasonal streams? If so, above-ground placement may be preferable.
- d. Will underground placement increase the utility line's exposure to environmental hazards, such as flood hazards, fault hazards or liquefaction? If so, above-ground placement may be preferable.
- e. Are there other potential alignments that would avoid potential environmental impacts?

The Director or the Commission may consider additional information pertaining to the environmental sensitivity of the area which is deemed relevant to the application.

- 3. The installation of underground utilities would create an unreasonable financial hardship on the applicant due to the unique physical characteristics of the property. In making this determination, the Director or the Commission shall consider the following:
 - a. Is the cost of the line to be installed excessive?
 - b. Will the installation of underground utilities require trenching under a stream bed?
 - c. Will the installation of underground utilities require unreasonable trenching or blasting through rock?
 - d. Are there alternate alignments that would eliminate or significantly lessen the financial hardship?

The Director or the Commission may consider other site specific financial hardships deemed relevant to the application.

- 4. The exclusive purpose of the overhead line is to serve an agricultural operation.

For the purposes of this section, agricultural operations are defined as use of the land for the production of food and fiber, including the growing of crops and grazing of livestock. Above-ground utility lines may be permitted for agricultural uses such as pumps and similar uses.

E. Utility Distribution Lines for Subdivisions.

Utility distribution lines for all subdivisions and land divisions shall be installed underground, unless a specific hardship can be demonstrated (see # 3 above). If a specific hardship can be demonstrated, overhead installation may be allowed subject to approval of a variance (see Ch. 33, Variance Processing).

Subdivisions may be required to underground the feeder distribution line to the subdivision. An assessment district, or a similar mechanism, may be established for this purpose as a condition of the tract map approval.

F. Utility Distribution Lines for All Other Communication Infrastructure

All other types of utility distribution lines shall be installed underground, unless the applicant has obtained a Director Review Permit with Notice for overhead installation, in the manner specified in Chapter 31, Director Review Processing. For projects that require a use permit, the application for overhead utility lines shall be processed as part of the use permit application. Projects located in the County right-of-way shall also require an encroachment permit from the Public Works Department.

Prior to considering issuance of a permit, planning staff shall work with the applicant to site and design the project in a manner that avoids or minimizes the use of overhead lines, and that avoids or minimizes the impacts of overhead lines. Consideration should be given to combining lines and co-locating with other applicable facilities whenever possible. If overhead installation is necessary, all of the findings in Section 11.010D 1-4 shall be evaluated to provide justification. In addition, the following requirements shall be applied:

1. Within Scenic Highway corridors, a variance (see Ch. 33, Variance Processing) and/or deviation authorization from the California PUC is required prior to approval of overhead construction.
2. In County rights-of-way other than Scenic Highway corridors, a use permit must be obtained prior to allowing overhead construction.

G. Use Permit.

Other utility (municipal, private, and if applicable, public utilities not regulated by the PUC) distribution lines, transmission lines and corridors, towers, electrical substations, repeater stations, pumping stations, and uses accessory thereto, including microwave facilities, may be allowed in all districts subject to first securing a use permit, in the manner specified in Chapter 32, Use Permit Processing.

H. Exceptions.

In the event that any regulations of the Public Utilities Commission or any other agency of the state with jurisdiction over utilities conflicts with the provisions of land use designations and the land development regulations, the regulations of the state shall apply, to the extent that the same are conflicting.

I. Locational Requirements.

Whether or not a utility is subject to any permitting requirements as delineated in subsections A to G, above, all new utility distribution lines, transmission lines, corridors, rights of way, towers, electrical substations, repeater stations, pumping stations, cell/communication towers and uses accessory thereto, including microwave facilities, shall comply with the policies of this General Plan and applicable area or specific plans.

J. Cellular and Wireless Towers

Towers erected for the purposes of providing communications through wireless or cellular technologies are permitted in all land use designations subject to a use permit. These towers shall exhibit substantial compliance with the following, unless such substantial compliance would result in an effective prohibition of the provision of wireless communication facilities, or in unreasonable discrimination against a provider of wireless communication facilities, as defined in the Telecommunications Act of 1996:

1. Visual mitigations strategies included in the Mono County Design Guidelines.
2. Cellular and wireless towers shall bond for the reclamation of the site in the event that the infrastructure has not been utilized for a period of three years. Infrastructure shall be removed within one year of abandonment.
3. Towers shall be sited only when there is an identified service provider who has proved a need for the facility.
4. Facilities shall be co-located to minimize the number of towers, and new sites shall include capacity for additional providers to utilize the facility.

5. New sites shall reference the County's inventory of shadow areas and coverage gaps, when available, and provide coverage maps/data demonstrating a reduction in areas without coverage.
6. Height shall be mitigated by locating towers on high ground but below ridgelines or hill tops. Heights greater than 60' may be allowed in Public Facilities (PF) Land Use Designations subject to the following use permit finding, but in no case shall the height exceed 80':
 - a. The additional height shall not result in substantial detrimental effects on the enjoyment and use of surrounding properties.

In addition, at least one of the two following findings must be made in the use permit, and in no case shall additional height be granted above the minimum necessary to provide for the finding:

- b. The increased tower height is necessary to provide line-of-sight and service coverage that significantly reduces shadow areas and coverage gaps as demonstrated by coverage maps/data, and/or
 - c. The increased tower height is necessary to support multiple carriers on one tower with adequate line-of-sight and service coverage as demonstrated by coverage maps/data.
7. Perch deterrents and other sensitive species mitigations shall be required consistent with C/OS policies.
8. Cell tower operators shall be required to verify compliance with the FCC's RF Emission Standards.

K. Installation of Conduit and Wireline Infrastructure

Conduit and wireline for the purposes of providing communications infrastructure are permitted in all land use designations, and shall be installed underground and co-located with existing facilities or utilize existing wireline unless a Director Review Permit or Use Permit has been obtained. Projects located in the County right-of-way shall also require an encroachment permit from the Public Works Department. New conduit and wireline infrastructure shall be subject to the following requirements in addition to the applicable permit:

1. Evidence of need for new conduit or wireline infrastructure shall be demonstrated. Applicants should reference the County's communication infrastructure database, when available.
2. New conduit in the County right-of-way shall contain tracer wire, or be mapped with GPS, or have accurate georeferenced as-built digital drawings, or be otherwise locatable using standard devices or means. Data must be submitted to the County at completion of construction.

3. New wireline infrastructure shall be placed in existing underground conduit before installing new conduit or overhead lines. Overhead lines shall be subject to Section F.
4. All new, large-scale, commercial underground infrastructure shall be filed with the Underground Service Alert (USA).
5. Sites shall be reclaimed and all infrastructure removed within 180 days of abandonment or cessation of use.

L. Commercial Communication Infrastructure on Private Property

A Director Review Permit (Ch. 31, Director Review Processing) must be secured prior to locating commercial communication infrastructure on private property for reasons other than personal consumption by the property residents.

Sample Telecom Infrastructure Improvement Ordinance (Santa Cruz County)

ORDINANCE NO. _____

0589

ORDINANCE ADDING CHAPTER 12.25 TO SANTA CRUZ COUNTY CODE RELATING TO TELECOMMUNICATIONS INFRASTRUCTURE IMPROVEMENTS

The Board of Supervisors of the County of Santa Cruz ordains as follows:

SECTION I

Chapter 12.25 of the Santa Cruz County Code is enacted to read as follows:

TELECOMMUNICATIONS INFRASTRUCTURE IMPROVEMENT ORDINANCE

Sections:

12.25.010 Purpose and Findings.

12.25.015 Definitions.

12.25.020 Telecommunications Infrastructure Improvement.

12.25.025 Implementation.

12.25.030 Exemptions.

12.25.035 Enforcement.

12.25.040 Violations.

12.25.045 Severability.

12.25.050 Effective Date.

12.25.055 No Conflict with Federal or State Law.

12.25.060 Preemption.

12.25.010 Findings and intent.

A. It is the intent of the County of Santa Cruz, in enacting Chapter 12.25, to streamline and simplify the process of installing and upgrading telecommunications equipment throughout the County, and to encourage improvement and modernization of telecommunications infrastructure.

B. Access to modern telecommunications infrastructure is vital for communication, education and economic development.

C. It is the desire of the County to foster a fair and level playing field for all market competitors that does not disadvantage or advantage one service provider or technology over another.

D. The County seeks to promote widespread access to the most technologically advanced telecommunications services for all County residents and businesses in a nondiscriminatory manner regardless of socioeconomic status.

E. It is the responsibility of the County to protect and control access to public rights-of-way.

F. The County has a duty to ensure that all service providers utilizing County property, facilities or rights-of-way comply with all applicable state and local health, safety and other laws.

G. It is consistent with the County's goals and values to encourage investment in telecommunications infrastructure to help close the digital divide. 0590

H. It is necessary to update County policies and practices to recognize the authority of the California Public Utilities Commission as established in state and federal statutes.

I. It is the desire of the County to assess fees sufficient to recover the actual costs of providing services but not to discourage improvement of necessary infrastructure.

12.25.015 Definitions.

A. For the purposes of this Chapter, the following definitions apply:

1. "Telecommunications" refers to data, voice, video or other information provided by wire, fiber optic cable or other technology.
2. "Facilities" and "Infrastructure" refers to wires, cables, conduit, switches, transmission equipment or other equipment for use in transmitting or processing telecommunications services or for providing support or connection to such equipment.
3. "Rights-of-way" refers to the area upon or adjacent to any County-owned road, highway or rail line or along or across any of the waters or lands owned or controlled by the County.
4. "Service providers" refers to any person, company, corporation or other entity providing data, voice, cable, video or other information services by wire, fiber optic cable or other technology.
5. "Excavation" refers to any process which removes material from the ground through digging, drilling, boring or other activity for the purpose of installing utilities, infrastructure or other structures or equipment.
6. "Conduit" refers to a tube, duct or other device or structure designed for enclosing telecommunication wires or cables.
7. "Reconstruction" refers to any project which repairs or replaces fifty percent or more of an existing road, highway or rail line.

12.25.020 Telecommunications Infrastructure Improvement

In recognition of the need to provide local residents and businesses within the community with the infrastructure required to meet their telecommunications needs, all construction, reconstruction or repaving of a County right-of-way will include provisions for the installation of telecommunications cable, conduit and other related equipment wherever practical and feasible. Where appropriate, telecommunications infrastructure shall be installed in or adjacent to County rights-of-way in conformance with current County standards. County staff will work with contractors to identify most cost-effective approach consistent with County requirements. If a project includes excavation in or adjacent to a County right-of-way, installation of or upgrades to telecommunications cable, conduit or other infrastructure will be included as needed. All installations shall conform to the size, shape, location and other specifications as determined by the Director of Public Works.

12.25.025 Implementation.

No less than 60 days before this ordinance takes effect, the County of Santa Cruz shall e-056 mail, fax, mail or deliver a copy of it to all telecommunications service providers and other affected entities doing business within the unincorporated County of Santa Cruz.

12.25.030 Exemptions.

A. The Director of Public Works, or the director's designee, may exempt projects from the requirements of this chapter where compliance is found to be not practical or feasible. Requests for an exemption shall be in writing, and the Director's or the director's designee's decision shall be final.

B. An exemption application shall include all information necessary for the Director of Public Works or the director's designee to make a decision, including but not limited to documentation showing factual support for the requested exemption.

C. The Director of Public Works or director's designee may approve the exemption application in whole or in part, with or without conditions.

12.25.035 Enforcement.

Enforcement of this ordinance shall be as follows:

A. The Director of Public Works, or designee, shall have primary responsibility for enforcement of this ordinance and shall have authority to issue citations for violation of this chapter. The Director, or designee, is authorized to establish regulations or administrative procedures to ensure compliance with this chapter.

B. A person or entity violating or failing to comply with any of the requirements of this chapter shall be guilty of an infraction.

C. The County of Santa Cruz may seek legal, injunctive, or any other relief to enforce the provisions of this chapter and any regulation or administrative procedure authorized by it.

D. The remedies and penalties provided in this chapter are cumulative and not exclusive of one another.

E. The Director of Public Works or designee may inspect the premises of any construction, reconstruction, repaving or excavation project to verify compliance with this ordinance.

12.25.040 Violations.

Violations of this ordinance shall be enforced as follows:

Violation of this chapter is hereby declared to be a public nuisance. Any violation described in the preceding paragraph shall be subject to abatement by the County of Santa Cruz, as well as any other remedies that may be permitted by law for public nuisances, and may be enforced by injunction, upon a showing of violation.

12.25.045 Severability.

If any word, phrase, sentence, part, section, subsection, or other portion of this chapter, or any application thereof to any person or circumstance is declared void, unconstitutional, or invalid for any reason, then such word, phrase, sentence, part, section, subsection, or other portion, or the proscribed application thereof, shall be severable, and the remaining provisions of this chapter, and all applications thereof, not having been declared void, unconstitutional or invalid, shall remain in full force and effect. The County of Santa

Cruz hereby declares that it would have passed this title, and each section, subsection, sentence, clause, and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases had been declared invalid or unconstitutional. 0592

12.25.050 Effective Date.

This ordinance shall become effective three (3) months after the date of final passage by the County of Santa Cruz Board of Supervisors.

12.25.055 No Conflict with Federal or State Law.

Nothing in this ordinance shall be interpreted or applied so as to create any requirement, power, or duty in conflict with any Federal or State law.

12.25.060 Preemption.

The provisions of this chapter shall be null and void if State or Federal legislation, or administrative regulation, takes effect with the same or substantially similar provisions as contained in this chapter. The Board of Supervisors shall determine whether or not identical or substantially similar statewide legislation has been enacted or regulations issued.

SECTION II

This ordinance shall take effect and be in force six months from the date of adoption.

PASSED AND ADOPTED this _____ of _____ 20____, by the Board of Supervisors of the County of Santa Cruz by the following vote:

AYES: SUPERVISORS
NOES: SUPERVISORS
ABSENT: SUPERVISORS
ABSTAIN: SUPERVISORS

Chairperson of the Board of Supervisors

Attest: _____
Clerk of the Board

APPROVED AS TO FORM:



Office of County Counsel

Sample Joint Trenching Agreement

EXHIBIT D

JOINT TRENCH AGREEMENT

THIS JOINT BUILD AGREEMENT ("Agreement"), effective the ___ day of _____, 200___, is made by and between _____, a _____ corporation with an office at _____ ("Lead Company"), and _____, a _____ corporation with an office at _____ ("Participant").

WHEREAS, each party intends to install, construct, own and operate underground conduit facilities ("Facilities") in connection with each party's respective operations; and

WHEREAS, to minimize the costs of constructing separate trenches and Facilities, the parties are willing to jointly construct such trenches and Facilities and to share the costs of such construction in accordance with the terms and conditions set forth herein;

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions and obligations contained herein, and intending to be legally bound hereby, the parties hereby agree as follows:

1. **Certain Definitions.** For purposes of this Agreement, the following terms are defined as follows. This is not intended as an exhaustive list of all defined terms used in this Agreement.

- (i) "Acceptance Testing" shall have the meaning attributed to it in Section 4(F).
- (ii) "Access Point" shall mean an opening, individually owned by a particular party, in the Joint Build by which the party may enter for the purpose of installing and maintaining Facilities (i.e. manhole or handhole).
- (iii) "Affiliate" shall mean any Person controlling, controlled by, or under common control with another Person.
- (iv) "Authorizations" shall have the meaning attributed to it in Section 3.
- (v) "Completion Notice" shall have the meaning attributed to it in Section 4(F).
- (vi) "Conduit" shall mean a structure containing one or more Innerducts.
- (vii) "Innerduct" shall mean a single enclosed raceway acceptable for communications cables.
- (viii) "Drawings" shall have the meaning attributed to it in Section 4(A).
- (ix) "Facilities" shall mean Innerducts, Conduits, Access Points and associated equipment, devices and hardware that are supplied by, or installed or designed for, a particular party.
- (x) "Governmental Authority" shall mean any federal, state or local government, or any agency or instrumentality thereof, having competent jurisdiction over the Facilities, the Joint Build or the parties hereto.

EXHIBIT D

(xi) "Joint Build" shall mean a trench and any combination of poles, Ducts, Conduits, Access Points, manholes, vaults and other Facilities to be constructed hereunder pursuant to the Scope of Work.

(xii) "Lead Company" shall mean the party who is responsible for managing the Work for the Joint Build.

(xiii) "Participant" shall mean a party other than Lead Company who is responsible for paying its portion of the Project Costs in consideration for its participation in the Joint Build and ownership rights in a certain defined portion of said Joint Build.

(xiv) "Person" shall mean an individual, association, partnership, corporation, or other legally recognized entity.

(xv) "Project Costs" shall mean all labor, transportation, supervision, materials and other direct costs associated with the Work relating to the Joint Build, other than the costs which will be borne entirely by one party pursuant to this Agreement or the Scope of Work.

(xvi) "Scope of Work" means the written description of the Work and the respective responsibilities of Lead Company and Participant. The Scope of Work as specified on Exhibit A is incorporated herein and becomes, upon execution by the parties hereto, a part of this Agreement.

(xvii) "Specifications" shall have the meaning attributed to it in Section 4(F).

(xviii) "Work" shall mean all necessary installation, management, engineering, placement, make-ready and preparatory work required for the construction of the Joint Build.

2. Order of Precedence of Contract Documents. In the event of a conflict or inconsistency between this Agreement and the terms set forth in the Scope of Work, the terms of the Scope of Work shall prevail.

3. Governmental Authorities. Each party agrees to comply with all applicable laws, rules, and regulations relating to the installation, maintenance and use of its Facilities. Each party will file the necessary applications and take all further action required in order to obtain, prior to the commencement of construction under the Scope of Work, all rights, easements, licenses, permits, approvals, agreements and other authorizations required by any Governmental Authority and any other third party agreements necessary to complete the Work contemplated by this Agreement and to occupy and use the right-of-way occupied by the Facilities constructed hereunder (collectively "Authorizations"). Each party shall provide written evidence of such Authorizations to the other party upon request.

4. Prosecution of Work.

(A) Approval of Drawings and Costs; Execution of Scope of Work. Prior to the commencement of Work on the Joint Build, Lead Company shall provide Participant with a copy of the engineering drawings it intends to use when it commences the Work ("Drawings") and the cost breakdown of Participant's share of the Project Costs. Participant shall have twenty (20) business days after receipt of the Drawings and the cost breakdown to either accept or reject the Drawings or the cost breakdown by delivery of a written notice (reasonably detailed, in the case of a rejection) to Lead Company. In the event Participant rejects the Drawings or the cost breakdown, Lead Company shall

EXHIBIT D

promptly resolve any objection or deficiency to the reasonable satisfaction of Participant. If the parties cannot reach an agreement on the Drawings or the cost breakdown, Participant may terminate this Agreement as provided in Section 14, whereupon Participant shall reimburse Lead Company for the reasonable costs it incurred that arose out of Participant's agreement to participate in the Joint Build. If Participant fails to reject the Drawings or the cost breakdown within such twenty (20) day period, the Drawings and the cost breakdown shall be deemed acceptable by Participant and Lead Company shall proceed with the Work. Within thirty (30) days after Participant's acceptance of the Drawings and the cost breakdown, Lead Company shall prepare the Scope of Work, which Lead Company and Participant shall execute within ten (10) days thereafter.

(B) Management of the Work. Upon acceptance of the Drawings, Lead Company shall be responsible for all Work thereunder, including the hiring and management of any contractor and subcontractors and the acquisition of all required construction permits. Lead Company shall provide Participant with a copy of all construction permits it obtains. Lead Company shall perform such Work in a good and workmanlike manner and in accordance with the specifications of this Agreement, the Scope of Work, the Occupational Safety and Health Act, the National Electrical Safety Code, the National Electrical Code, applicable industry standards, and laws and regulations of applicable Governmental Authorities. Lead Company and Participant shall timely pay each invoice it receives from Lead Company's contractor, subcontractors and material suppliers who supplied the labor and/or materials for the Work. Furthermore, Participant shall reimburse Lead Company for all costs of removing any liens placed on the Joint Build (including reasonable attorneys' fees and costs) which arise from non-payment or late payment to subcontractors or suppliers due to failure of Participant to make timely payments hereunder. Lead Company shall be solely responsible for removing any liens which arise from its failure to make timely payments in any other instance. Upon the commencement of the Work, Lead Company shall designate an authorized representative in connection with the Work, and shall prepare and provide to Participant a construction schedule and progress report from time-to-time, but not less than once every thirty (30) days. Participant shall have the right, but not the obligation, to inspect the Work from time-to-time prior to its completion, subject to the restrictions and consent of any Governmental Authority or other third party which owns or controls the real property rights-of-way upon which the relevant portion of the Joint Build is constructed.

(C) Project Costs. The Project Costs will be shared by the parties in the manner set forth in the Scope of Work.

(D) Management Fee. Participant shall pay to Lead Company a fee in the amount of ___% of Participant's share of Project Costs to cover Lead Company's costs for managing and supervising the Work for the Joint Build in accordance with the terms of the Scope of Work.

(E) Materials. Except as otherwise set forth in the Scope of Work (Exhibit A), each party shall arrange for the purchase and delivery of its materials required for the construction of the Joint Build as set forth in the Scope of Work. All materials supplied shall comply with the agreed upon specifications.

(F) Acceptance Testing. The Joint Build shall meet the technical specifications ("Specifications") set forth in Exhibit A, the Scope of Work. Upon completion of the Joint Build, Lead Company shall perform testing on the Joint Build to determine whether it complies with these Specifications ("Acceptance Testing"). Lead Company shall provide Participant with five (5) days prior written notice of the date and time of the Acceptance Testing and Participant shall have the right, but not the obligation, to be present for observation of the Acceptance Testing. When Lead Company reasonably determines that the Joint Build is installed and operating substantially in conformity with the

EXHIBIT D

Specifications set forth in the Scope of Work, Lead Company shall provide written notice of the same to Participant ("Completion Notice"). Upon receipt of a Completion Notice, Participant may inspect the Work performed by Lead Company and shall have thirty (30) days to either accept or reject the Completion Notice by delivery of written notice to Lead Company, specifying, if rejected, its grounds for such rejection. In the event Participant rejects the Completion Notice, Lead Company shall correct any such deficiencies on the Joint Trench Build as soon as practicable and a retest shall be performed. Upon completion of such retest, Lead Company shall provide another Completion Notice to Participant. The foregoing procedure shall apply again and successively thereafter until Lead Company has remedied all deficiencies in the Work. If Participant fails to reject a Completion Notice within the thirty (30) day period, the Work shall be deemed accepted by Participant, and Lead Company shall have no further liability related to Acceptance Testing of such Joint Build.

(G) Location of Joint Build. The specific location of the Joint Build shall be as designated in the Scope of Work (Exhibit A). Lead Company shall provide Participant with "as-builts" in a mutually acceptable electronic format that depict the construction and location of the Joint Build, within ninety (90) days after acceptance of the Completion Notice.

(H) Changes. In the event that a party seeks changes in, additions to, or deletions from the Work and/or the Scope of Work, the party seeking changes, additions or deletions shall promptly notify the other party in writing of (i) the proposed changes, additions or deletions; (ii) the estimated cost of the proposed changes, additions or deletions; (iii) the effect of the proposed changes, additions or deletions upon the scheduled completion of the Work; (iv) whether additional Authorizations are required as a result of the proposed changes, additions or deletions; and (v) the effect of the proposed changes, additions or deletions upon the other party's share of Project Costs. If both parties agree to the proposed changes, additions or deletions, the Lead Company shall promptly proceed with the performance of the Work as so modified. The Project Costs and time for performance of the Work shall be equitably adjusted as necessary to reflect the impact of the agreed upon changes, additions or deletions on the Work and/or the Scope of Work.

5. Ownership. All Facilities installed and designated for Participant as set forth in the Scope of Work shall be and remain the property of the Lead Company; provided that upon the payment by Participant of its share of the Project Costs, said Facilities shall become the property of Participant. After acceptance of the Completion Notice, each party shall take all necessary precautions to protect the other party's Facilities from any physical damage and to keep such Facilities in the same manner as such party protects its own Facilities.

6. Maintenance and Restoration.

(A) General. After completion and acceptance of the Joint Build, each party shall be responsible for performing (at its own cost) all maintenance and repairs of its Facilities. Such maintenance and repairs shall be performed in a good and workmanlike manner, in accordance with the specifications of this Agreement, the Scope of Work, the National Electrical Safety Code, the National Electrical Code, applicable industry standards, and regulations of applicable Governmental Authorities.

(B) Access. Subject to any limitations contained in the Scope of Work, each party shall have access to its Facilities on a 24-hours per day, 7-days per week basis as necessary for the proper maintenance and/or restoration thereof; provided, however, such access shall be coordinated with the other party. Before beginning any non-emergency, inspections or scheduled maintenance, each party shall give the other at least twenty-four (24) hours advance notice. Notwithstanding the foregoing, following acceptance, each party shall have unlimited access to its individually owned Access Points as

EXHIBIT D

designated in the Scope of Work, without the requirement of prior notice to the other party. If both parties require simultaneous access to the Joint Build, then the parties shall reasonably and equitably coordinate such access.

(C) Emergency Maintenance. Subject to any limitations contained in the Scope of Work, in the event of an emergency, each party shall have the right to perform maintenance and/or restoration of its Facilities and such party shall use its best efforts to notify the other party as soon as practicable of such efforts. If both parties require simultaneous access to the Joint Build, then the parties shall reasonably and equitably coordinate such access in a manner that will accommodate the needs of both parties.

(D) Damages. Each party shall indemnify and hold harmless the other party for any losses, costs or damages to such other party's property (including, without limitation, its Facilities) arising from the indemnifying party's negligence or intentional misconduct in its maintenance or restoration efforts.

7. Relocation. In the event that a Governmental Authority requires the transfer, rearrangement or relocation of any portion of the Joint Build, the parties shall each pay their pro rata share (proportionate to their percentage of ownership of the Joint Build or portion thereof to be relocated) for all reasonable costs of the transfer, rearrangement or relocation. The parties shall use their best efforts to identify an alternate location for the Joint Build. In the event the parties are unable to agree on a suitable alternate location for the Joint Build, then either party may terminate this Agreement with respect to such Joint Build (or portion thereof) and shall promptly remove its Facilities located therein.

8. Representations and Warranties. Each party represents and warrants that it has full right and authority, including any requisite corporate authority, to perform its respective obligations under this Agreement; the execution of this Agreement is not violative of its charter, by-laws or any law, regulation or agreement by which it is bound or to which it is subject; no litigation or governmental proceeding (other than the Authorizations required by any Governmental Authority to occupy and use the locations and rights-of-way for the Facilities constructed herein) is pending or threatened in writing which might have a material adverse effect on this Agreement, the transaction contemplated by this Agreement or the rights of the parties hereunder. Each party further warrants that it shall carry out its obligations hereunder in a professional and workmanlike manner. Except for the foregoing and except as otherwise provided in the Agreement, neither party makes any warranty to the other, and each party expressly disclaims all further warranties, including without limitation, the implied warranties of merchantability or fitness for purpose.

9. Taxes. Each party shall pay its pro rata share of any present or future taxes, fees, charges or assessments which Lead Company is required or obligated to pay by reason of the construction or ownership of the Joint Build or the installation, operation or maintenance of the Facilities. After acceptance, each party shall be responsible for any taxes imposed by a Governmental Authority relating to such party's respective Facilities.

10. Term. This Agreement shall become effective as of the date written above and, if not earlier terminated in accordance with the provisions hereof, shall remain in effect until acceptance of the Completion Notice by Participant.

11. Billing and Payment. All undisputed amounts due Lead Company or its contractor under this Agreement shall be paid by Participant within forty-five (45) days following receipt of invoices

EXHIBIT D

along with a detailed accounting of such amounts. If any undisputed amount is not paid to within such period, Participant shall be required to pay a late charge of one and one-half percent (1½%) per month times the amount unpaid or, if that late charge is unlawful, the maximum rate permitted by law. Participant must identify and explain in detail its dispute with any invoice item within forty-five (45) days of the receipt of such invoice. The parties shall proceed in an amicable manner to resolve such dispute for at least thirty (30) days, after which either party shall have the right to seek redress of such dispute by other legally available means. In no event shall either party be entitled to bill the other party more frequently than once each month for any amounts due under this Agreement. The foregoing payment provisions apply to any amounts Lead Company owes Participant pursuant to applicable provisions of this Agreement. With the final payment of its share of the Project Costs, Participant shall receive final lien waivers from all contractors and suppliers performing work and/or providing materials to the Joint Build. If the lien law applicable to the Joint Build or portion thereof provides for delivery of lien releases following payment, then Lead Company shall deliver same to Participant within two (2) business days after the time period for delivery required by such law.

(A) Payment Default. Undisputed amounts owed to Lead Company or Lead Company's contractor not paid within forty-five (45) days of receipt of an invoice may be deemed in default ("Payment Default") by Lead Company at its sole discretion, upon written notice to Participant. Any such Payment Default may, at Lead Company's sole discretion, be grounds for termination of this Agreement by Lead Company. In case of such termination, Lead Company shall automatically assume ownership of all Joint Build property and materials, including, without limitation, any Facilities supplied by Participant, and Participant shall have no right of reimbursement, refund or compensation for such assumption whatsoever. Such right of assumption is in addition to, and in no way limits, Lead Company's other available rights at law or in equity, arising from or related to the Payment Default by Participant.

(B) Costs. In the event of a Payment Default, and in addition to its rights set forth above, Lead Company and Lead Company's contractor shall be entitled to recover from Participant its reasonable costs of collection, including reasonable attorneys' fees and court costs.

12. Indemnification. Except to the extent such claims are caused by the negligence of a party indemnified hereunder, each party ("Indemnitor") shall defend, indemnify and hold harmless the other party ("Indemnitee") from and against and shall pay all losses, damages, liabilities, penalties, fines, assessments, claims and actions, and all related expenses (including reasonable attorneys' fees and expenses and the costs of litigation) by reason of injury or death to any person, damage to any property or any other occurrence arising out of, resulting from or in any manner caused by or related to: (i) the negligence or intentional misconduct of the Indemnitor in the installation, maintenance, operation, presence, use or removal of any Facilities; (ii) infringement of copyright, libel, slander, or unauthorized use of information arising out of, resulting from or in any manner caused by the operation or use of Indemnitor's Facilities; (iii) Indemnitor's failure to secure necessary Authorizations from any applicable Governmental Authority and any necessary rights-of-way from owners of property; or (iv) infringement of patents with respect to the manufacture, use and operation of Indemnitor's Facilities. Any party seeking indemnification hereunder ("Indemnitee") shall promptly notify the other party ("Indemnitor") of the nature and amount of such claim and the Indemnitee shall consult with the Indemnitor respecting the defense and satisfaction of such claim, including the selection of and direction to legal counsel, and the Indemnitee shall not pay or settle any such claim without the prior written consent of the Indemnitor, which consent shall not be unreasonably withheld. To the extent such limitation is legally enforceable, in no event shall either party be liable for any punitive, consequential, incidental, special damages or lost profits incurred or alleged to have been incurred by anyone.

EXHIBIT D

13. **Insurance.** During the term of this Agreement, each party shall obtain and maintain, and shall require any of its permitted subcontractors to obtain and maintain, the following insurance, naming the other party as an additional insured: (i) Commercial General Liability insurance with minimum limits of: \$2,000,000 general aggregate limit; \$1,000,000 each occurrence sub-limit for all bodily injury or property damage incurred in any one occurrence; \$1,000,000 each occurrence sub-limit for personal injury and advertising; \$2,000,000 products/completed operations aggregate limit, with a \$1,000,000 each occurrence sub-limit for products/completed operations; (ii) worker's compensation insurance in amounts required by applicable law and employer's liability insurance with minimum limits of \$100,000 for bodily injury-each accident, \$500,000 for bodily injury by disease-policy limits and \$100,000 for bodily injury by disease-each employee; (iii) and automobile liability insurance covering death or injury to any person or persons, or damage to property arising from the operation of vehicles or equipment, with limits of not less than \$1,000,000 combined single limits per occurrence, which coverage shall extend to all owned, hired and non-owned vehicles.

(A) **Self-insurance.** Both parties expressly acknowledge that a party shall be deemed to be in compliance with the provisions of this Section if it maintains an approved self-insurance program providing for a retention of up to \$ [insert dollar amount].

(B) **Certificates.** Unless otherwise agreed, all insurance policies shall be obtained and maintained with companies rated B+-VII or better by Best's Key Rating Guide and each party shall, upon request, provide the other party with an insurance certificate confirming compliance with the requirements of this Section 13. Such certificates shall provide for thirty (30) days' advance written notice to the other party for any cancellation, material change, reduction of coverage or non-renewal.

(C) **Liability.** The obtaining and maintaining of insurance coverage in accordance with this Section 13 shall not be construed as in any way limiting or eliminating a negligent (or intentionally wrongful) party's liability to indemnify the other party in accordance with the applicable provisions of this Agreement for losses suffered by such other party.

14. **Termination.** In the event a party fails to observe or perform any of the material terms and provisions of this Agreement and such failure continues for a period of thirty (30) days after written notice from the other party (or such longer period as may be necessary if such failure cannot reasonably be cured within such 30 day period, provided that such party promptly and diligently undertakes efforts to bring about such cure and thereafter proceeds, in good faith, to cure such failure; which in no event shall exceed sixty (60) days) ("Default"), the non-defaulting party may, in addition to any and all other remedies allowed by law, terminate this Agreement in its entirety. Upon termination of this Agreement for Default, Lead Company shall continue to complete the Work to a reasonable stopping point, and each party shall pay for its pro rata share of the Project Costs and management fees through the completion of such Work. The right of termination described in this provision is in addition to, and does not in any way limit or eliminate, the right of termination for a Payment Default as provided in Section 11 above.

15. **Condemnation.** Upon receipt of a formal notice of condemnation or other taking by eminent domain, each party shall notify the other party immediately of any such proceeding that is threatened or filed against any portion of the Joint Build. In the event and to the extent of any condemnation or other taking by eminent domain of all or any part of the Joint Build, or any property or rights relating thereto, then the proceeds thereof shall be apportioned on a pro rata basis as set forth in the Scope of Work.

EXHIBIT D

16. Waiver of Compliance. Failure of either party to enforce or insist upon compliance with any of the terms or conditions of this Agreement shall not constitute a waiver or relinquishment of any such terms or conditions. To the contrary, the same shall remain at all times in full force and effect.

17. Limitations. Except as set forth in this Agreement, nothing shall in any way restrict, modify, or alter either party's absolute right to lease, sell, dispose of or utilize, in its sole discretion, its Facilities which are subject to this Agreement. The party leasing, selling or disposing of its Facilities shall either (i) include the maintenance and restoration language in paragraph 6 of this Agreement in any agreement to lease, sell or dispose of the Facilities or (ii) make such lease, sale or disposal specifically subject to such provisions.

18. Assignment. Neither Party may assign or otherwise transfer this Agreement or its duties and obligations contained in this Agreement without the prior written consent of the other, which consent shall not be unreasonably withheld or delayed; provided, however, neither party shall be required to obtain the consent of the other for any corporate reorganization, assignment or transfer of this Agreement or the rights herein granted to any Affiliate, any purchaser of all or substantially all of the assets of such party, or any person with which or into which such party may merge or consolidate. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective permitted successors and assigns.

19. Sublease. Nothing shall in any way restrict, modify, or alter either party's right to lease, sublease, license, sell, dispose of or utilize, in its sole discretion, its Facilities which are subject to this Agreement. All sublessees and licensees shall use the Facilities in a manner consistent with this Agreement and the agreement between such party and the proposed subtenant or licensee (which agreement is hereinafter referred to as the "Lease", the said subtenant or licensee being hereinafter referred to as "Lessee") shall in all respects be subject to the terms and conditions of this Agreement. For purposes of this Agreement, all acts and omissions of the Lessee shall be deemed acts and omissions of the party who owns or controls such Facilities. Notwithstanding the foregoing, the rights of the parties to grant Leases shall be subject to the restrictions, contractual or otherwise, imposed by any Governmental Authority or other third party which owns or controls the real property rights of way upon which the relevant portion of the Joint Build is constructed.

20. Notices. All notices shall be in writing and shall be delivered by certified mail return receipt requested or any other generally accepted delivery system that is capable of providing proof of delivery. Any such notice shall be deemed effective on the date of receipt. All notices shall be addressed to the parties as specified below:

If to _____: Address & Contact

If to _____: Address & Contact

A party may change the above addresses to which notices are sent by giving written notice of such change to the other party in accordance with the provisions of this Section 20.

21. Severability. In the event that any term or provision of this Agreement is declared to be illegal, invalid or unconstitutional, then that provision shall be deemed to be deleted from this Agreement and have no force or effect and this Agreement shall thereafter continue in full force and effect, as modified.

EXHIBIT D

22. Confidentiality. Both parties hereby agree that if either party provides confidential or proprietary information to the other party ("Proprietary Information"), such Proprietary Information shall be held in confidence, and the receiving party shall afford such Proprietary Information the same care and protection as it affords generally to its own confidential and proprietary information (which in any case shall be not less than reasonable care) in order to avoid disclosure to or unauthorized use by any third party. The parties acknowledge and agree that all information disclosed by either party to the other in writing in connection with or pursuant to this Agreement shall be deemed to be Proprietary Information.

(A) All Proprietary Information, unless otherwise specified in writing, shall remain the property of the disclosing party, shall be used by the receiving party only for the intended purpose, and such written Proprietary Information, including all copies thereof, shall be returned to the disclosing party or destroyed after the receiving party's need for it has expired or upon the request of the disclosing party. Proprietary Information shall not be reproduced except to the extent necessary to accomplish the purpose and intent of this Agreement, or as otherwise permitted in writing by the disclosing party.

(B) This provision shall not apply to any Proprietary Information which (i) becomes publicly available other than through the disclosing party; (ii) is required to be disclosed by a governmental or judicial law, order, rule or regulation; (iii) is independently developed by the receiving party; or (iv) becomes available to the receiving party without restriction from a third party.

(C) Either party may disclose Proprietary Information to its employees, agents, lenders, funding partners and legal and financial advisors and providers to the extent necessary or appropriate in connection with the negotiation or performance of this Agreement or in obtaining financing, provided that each such party is notified of the confidential and proprietary nature of such Proprietary Information and is subject to or agrees to be bound by similar restrictions on its use and disclosure.

(D) Neither party shall issue any public announcement or press release relating to the execution of this Agreement without the prior approval of the other party.

(E) In the event either party shall be required to disclose all or any part of this Agreement in, or attach all or any part of this Agreement to, any regulatory filing or statement, each party agrees to discuss and work cooperatively, in good faith, with the other party, to protect, to the extent possible, those items or matters that the other party deems confidential and that may, in accordance with applicable laws, be deleted therefrom. The confidentiality provisions of this Article shall survive expiration or termination of this Agreement.

23. Joint Work Product. This Agreement is the joint work product of the parties hereto; accordingly, in the event of ambiguity no presumption shall be imposed against any party by reason of document preparation.

24. Force Majeure. Neither party shall be liable to the other for any failure of performance under this Agreement due to causes beyond its control (except for the fulfillment of payment obligations as set forth herein), including, but not limited to: acts of God; fire, flood or other catastrophes; adverse weather conditions; material or facility shortages or unavailability not resulting from such party's failure to timely place orders therefor; lack of transportation; the imposition of any governmental codes, ordinances, laws, rules, regulations or restrictions; national emergencies; insurrections; riots, wars; or strikes, lock-outs, work stoppages or other labor difficulties; provided however, that the party unable to perform its obligations shall promptly notify the other party in writing of such delay and said time period shall be extended for only the actual amount of time said party is so delayed. An act or omission shall

EXHIBIT D

not be deemed to be "beyond its control" if committed, omitted or caused by such party, or its employees, officers, agents or affiliates, or by any corporation or other business entity that holds a controlling interest in said party, whether held directly or indirectly.

25. Public Relations. This Agreement shall not be construed as granting to either party the right to use any trademarks, service marks or trade names of the other party, or otherwise refer to the other party in any marketing, promotional or advertising materials or activities. Without limiting the generality of the foregoing, neither party shall disclose (i) the terms of this Agreement, (ii) the existence of a particular Joint Build or any contractual relationship between the parties, or (iii) issue any publication or press release relating directly or indirectly to (i) or (ii) above without the other party's prior written consent.

26. Dispute Resolution.

(A) Any controversy or claim, whether based on contract, tort or other legal theory (including, but not limited to, any claim of fraud or misrepresentation) ("Claims"), arising out of or related to this Agreement, or any Scope of Work, or its breach shall be resolved in accordance with the dispute resolution procedure contained in this Section 26 and the then current rules of the American Arbitration Association, unless the parties agree in writing otherwise.

(B) The disputing party shall give written notice to the other party of any and all Claims as soon as possible after the event giving rise to such Claim. Pending the final resolution of any Claim, Lead Company shall continue to proceed with the performance of the contract in accordance with its terms pending resolution of the dispute. In such event, Participant shall continue to pay Lead Company in accordance with this Agreement for undisputed amounts.

(C) Either party may submit the matter to mediation with a professional mediation service selected by mutual agreement of the parties. Good faith mediation is a condition precedent to arbitration. Persons with authority to resolve the dispute shall be present at the mediation. Unless the parties agree otherwise, the mediation shall take place in the city in which the Facilities involved in the Claim are located. Such mediation shall be conducted in accordance with the Voluntary Construction Mediation Rules of the American Arbitration Association, unless the parties agree in writing otherwise.

(D) If the parties do not resolve the dispute through mediation or if 90 days have passed since the parties submitted the dispute to mediation and the parties are not in active negotiations, either party may submit the dispute to arbitration. If the parties cannot agree on an arbitration service, such service shall be provided pursuant to the American Arbitration Association Construction Industry Arbitration Rules. The award may be confirmed and enforced in any court of competent jurisdiction. Unless the parties agree otherwise, the arbitration shall occur in _____, California.

(E) The parties shall each bear the expenses of their share of the dispute resolution process. The costs of mediation and arbitration, including the fees and expenses of the mediator and arbitrator, shall be paid equally by the parties. Each party shall bear the cost of preparing and presenting its case, including its own attorney fees, expert witness fees, and travel-related expenses.

(F) The parties agree that neither an arbitrator nor a judge shall have the power or authority to make any award that provides for punitive, exemplary or other types of damages that are waived or prohibited by this Agreement. The parties expressly waive all punitive damages and other damages waived in this Agreement.

EXHIBIT D

27. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of California, exclusive of its choice of law provisions.

28. Survival. Any and all provisions of this Agreement which, by their nature, would reasonably be expected to be complied with or performed after the expiration or termination of this Agreement, including, without limitation, the maintenance obligations set forth in Section 6 hereof, shall survive and be enforceable after the expiration or termination of this Agreement.

29. Entire Agreement. This Agreement and the Scope of Work contains the entire agreement between the parties and supersedes all prior oral or written agreements with respect to the subject matter hereof. This Agreement may not be amended or modified except by a written instrument executed by the parties hereto.

30. No Partnership. The parties acknowledge and agree that this Agreement does not create a partnership between, or a joint venture of, the parties.

31. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original and all of which together shall constitute one agreement.

EXHIBIT D

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized officers to execute this Agreement as of the date set forth above.

Company Name:

By: _____

(Print Name)

Title: _____

Date Signed: _____

Company Name:

By: _____

(Print Name)

Title: _____

Date Signed: _____

EXHIBIT D

SCOPE OF WORK

_____ (Project Name) _____

This Scope of Work is entered into this ____ day of _____, 20____, by and between _____, a _____ corporation (“_____”) and _____, a _____ corporation (“_____”) as an addendum to the Joint Build Agreement dated _____, 20____. Upon execution by the parties hereto, this Scope of Work shall be attached to and become a part of the Joint Build Agreement. In the event of a conflict or inconsistency between this Scope of Work and the terms set forth in the Joint Build Agreement, the terms of this Scope of Work shall in all cases prevail. All capitalized terms not otherwise defined in this Scope of Work shall have the meaning set forth in the Joint Build Agreement.

1. Project Description:

1.1 _____ shall be Lead Company and _____ shall be Participant (hereinafter collectively “the Parties”).

1.2 The “Project” consists of engineering and construction of a Joint Build of approximately _____ linear feet, in the proposed route and (if applicable) consisting of the various components thereof (such components being referred to herein as “Segments”), all as described in Exhibit A hereto (“Route Description & Route Map”). Unless otherwise agreed between the Parties, all underground Segments of the Project shall be constructed in accordance with the trench detail set forth in the engineering/construction drawings that (a) already have been completed and referenced in Exhibit A hereto and copies of which have been provided to each Party and each Party acknowledges receipt thereof, or (b) when completed and agreed to by the Parties, shall be provided to each Party. Lead Company’s and Participant’s manholes/handholes will be placed along all underground Segments of the Project in locations to be agreed upon between the Parties, which locations shall be noted in the agreed upon engineering/construction drawings. Manholes/handholes will be placed for each party as needed. Placement of fiber optic cable is not included in this Scope of Work and each party is individually responsible for the placement of fiber optic cables. Prior to installation, Lead Company and Participant will agree to material specifications.

1.3 In the event that any investigation, site monitoring, containment, cleanup, removal, restoration or other remedial work of any kind or nature is reasonably necessary or desirable under any applicable local, State or governmental or non-governmental entity or person because of, or in connection with the discovery of historical artifacts within the Project; or the current or future presence, suspected presence, release or suspected release of a hazardous substance in or into the air, soil, groundwater, surface water, soil, at, on, about, under or within the Project (or any portion thereof), the Lead Company shall immediately stop the Work and promptly inform Participant of the findings. Work will not continue until a remedial plan has been agreed to in writing by Lead Company and Participant.

1.4 Each Party acknowledges and agrees that the proposed route as set forth in Exhibit A hereto is subject to a change due to Force Majeure as provided in the Agreement. When any party discovers that such a change is required, such party will immediately notify the

EXHIBIT D

other party. Notwithstanding anything to the contrary contained in the Agreement, to the extent any such change is required to a particular Segment, immediately after becoming aware thereof, the Parties shall negotiate in good faith to reach agreement as to a mutually acceptable change to the affected Segment(s). If no agreement can be reached within thirty (30) days after the commencement of such negotiations, then at any time thereafter, unless and until the parties reach agreement on such change, either Party may terminate its participation in the affected Segment at a reasonable and mutually agreed upon physical point adjacent to such Segment or within such Segment and shall pay to the other non-terminating Party the terminating party's share of all Project Costs incurred as of the date of such termination with respect to the terminated Segment, plus the terminating Party's share of demobilization and restoration costs incurred as a result of such termination.

- 1.5 Lead Company will provide field engineers to inspect the entire Project while under construction. Participant will be entitled to conduct field inspections where applicable. If Participant chooses to conduct field surveys, Participant must follow all safety regulations set by any Governmental Authority and all safety regulations set by the sub-contracting company on site.
2. Construction Schedule:
 - 2.1 Lead Company will complete construction of the Project with all work required to be performed under this Scope of Work by the dates set forth in Exhibit B ("Construction Schedule"). However, the Construction Schedule shall be suspended and extended to the extent necessary by reason of Force Majeure as provided in the Agreement, or by Paragraph 1.3 as set forth above in this Scope of Work. For purposes of this Paragraph, a "working" day shall be defined as Monday through Friday with the exception of recognized holidays.
 - 2.2 At the start of the Project, Lead Company will notify Participant within 7 days of the project kick-off meeting so that Participant can arrange for an inspector to attend.
 - 2.3 Lead Company shall provide Participant with an overall project schedule identifying critical path items (i.e. engineering, permitting and construction) every two weeks.
 - 2.4 If by reason of Force Majeure as provided in the Agreement or Paragraph 1.3 in this Scope of Work, the date of completion set forth in the Construction Schedule will be delayed, or is reasonably likely to be delayed for more than thirty (30) days after such completion date, the Parties shall immediately after becoming aware thereof negotiate in good faith to reach agreement as to a mutually acceptable course of action to mitigate the impact of such delay on the Project. If no agreement can be reached within thirty (30) days after the commencement of such negotiations, then at any time thereafter, unless and until the parties reach agreement on such course of action, either Party may terminate this Scope of Work at a reasonable and mutually agreed upon point in time and location within the affected Segment(s) and pay to the non-terminating Party the terminating Party's share of all Project Costs incurred as of the date of such termination, plus the terminating Party's share of demobilization and restoration costs incurred as a result of such termination.
 3. Project Costs:

EXHIBIT D

- 3.1 Project costs shall be allocated and paid as set forth in Exhibit D (“Cost Sharing Basis”).
 - 3.2 Estimated Project costs for each Party (including material costs) are as set forth in Exhibit E (“Estimated Costs”).
 - 3.3 In the event that Participant fails to timely pay any amounts owed to Lead Company or Lead Company’s contractor under this Scope of Work, Lead Company shall retain ownership of Participant’s Conduit pursuant to Paragraph 5 of the Joint Build Agreement. Once Participant pays the amounts due under to this Scope of Work (plus the amounts due under a settlement agreed to by both parties in writing of disputed amounts, if applicable), Participant shall receive title to Participant’s Conduit.
 - 3.4 In the event that Lead Company and Participant agree to allow additional party(ies) to participate in any Segment of the Project, the costs will be allocated among Participant, Lead Company and such other party(ies) in such manner as set forth in Exhibit D.
 - 3.5 If at any time during the construction, circumstances arise that are beyond the control of either of the Parties that result in a cost increase of more than ten percent (10%) of the estimated Project Costs, the Parties shall confer and attempt in good faith to determine by mutual agreement whether to terminate construction or modify the construction plans. If no agreement can be reached, either party may terminate this Scope of Work at a reasonable and mutually agreed upon point. The terminating Party shall pay to the other Party the terminating Party’s share of all Project Costs incurred as of the date of such termination, plus the terminating Party’s share of demobilization and restoration costs incurred as a result of such termination.
4. Specifications:
- 4.1 Lead Company’s current (as of the date of this Scope of Work) Outside Plant Specifications, a copy of which has previously been provided to Participant, are incorporated herein by this reference and the Work performed hereunder shall be in compliance therewith, except to the extent such Specifications are modified by this Scope of Work as depicted in Exhibit C (“Supplemental Specifications”).

5. Points of Contact/Escalation Procedures:

	Lead Company	Participant
First Level	_____	_____
Second Level	_____	_____

IN WITNESS WHEREOF, the parties hereto have executed this Scope of Work on the day and year written above.

EXHIBIT D

By: _____

Title: _____

Date: _____

By: _____

Title: _____

Date: _____

EXHIBIT D

EXHIBIT A

To Scope of Work

(Name of Project)

ROUTE DESCRIPTION & ROUTE MAP

Route description to include Participant's # and size of ducts, length of route, estimated # of manholes, manhole arrangement in the header.

Describe route with linear feet on each street, which is tied to Construction schedule.

Attach map

EXHIBIT D

EXHIBIT B
Scope of Work
(Name of Project)

CONSTRUCTION SCHEDULE

Segment	Length	Begin	End
	(Miles)	Construction	Construction

EXHIBIT D

EXHIBIT C
To Scope of Work
(Name of Project)

SUPPLEMENTAL SPECIFICATIONS

1. Lead Company shall ensure that Contractor will obtain all necessary permits before proceeding with construction.
 2. Lead Company shall ensure that all manholes/handholes will be free of debris, adequately sealed, and covers shall be secured as required by their manufacturer.
 3. Participant has arranged for delivery of its materials as follows:

 4. Lead Company shall provide one (1) floppy disk or CD-ROM of as-builts in the current format utilized by the Lead Company for as-builts.
 5. Manhole Specifications/Requirements
 6. [IF APPLICABLE:] Lead Company shall ensure that Contractor warrants that all Work to be furnished under this Agreement shall conform in all respects to the requirements of the Agreement or this Scope of Work; are free from any defects in workmanship; and are free of defects causing caving or sinking of the trench or the paving for a period of two (2) years following acceptance of the Work.
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EXHIBIT D
To Scope of Work
(Name of Project)

COST SHARING BASIS

This Exhibit sets forth the Cost Sharing Basis between the parties.

TERM	DEFINITION	COMPENSATION
Materials	This line item includes all direct materials required for underground construction. Example materials include conduit, quad duct, duct plugs, manholes, handholes, innerduct, HDPE, and steel pipe (bridge attachments). Bridge attachment material will be prorated since a single hanger may be used for multiple conduits.	Each participant to pay 100% of the cost of all Materials used for its respective conduit system(s).
Indirect Costs	This line item includes all costs incurred by the Lead Company's general contractor that are not Underground Labor and Common Materials as defined below. Examples of Indirect Costs include, but are not limited to, engineering, permitting, generation of as-builts, and inspection services.	Each participant to share equally in these costs based on the number of total participants for the total footage of participation.
Underground Labor & Common Materials	This line item includes all direct labor to install Materials. Examples of labor that are part of this include trenching, boring, bridge attachments, placing conduit, restoration, manholes/handhole placement. Common materials include bore casings, bridge attachment hardware, trench tape, etc.	Each participant to pay percentage based on the Equity Cost Sharing Formula set forth in this Exhibit.
General Contractor's Fee	This line item covers costs for Lead Company's general contractor's General and Administrative expenses and mark-up. This includes, but is not limited to the allocation of the general contractor's corporate overhead and is apportioned to the build as a percentage cost.	Each participant to pay percentage based on the Equity Cost Sharing Formula set forth in this Exhibit.
Lead Company Management Fee	This line item is the Lead Company's management fee. This management fee covers cost of capital, oversight, bonds and insurance required for the Lead Company by jurisdictional authorities, staff to write and administer contracts and management costs. The management fee applies to all costs	The percentage of this fee to be indicated in each Joint Build Agreement and to be paid by each participant company as noted.

EXHIBIT D

	set forth in this Exhibit except for materials provided by the Participant.	
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Equity Cost Sharing Formula:

Each participant pays its pro rata share of the cost of Underground Labor and Common Materials based on the number of conduit for that participant and the size of the conduit.

EXHIBIT D

EXHIBIT E
To Scope of Work
(Name of Project)

PROJECT COST ESTIMATE

(TO BE ATTACHED AS EXCEL SPREADSHEET)

EXHIBIT D

JOINT TRENCH AGREEMENT

THIS JOINT BUILD AGREEMENT ("Agreement"), effective the ___ day of _____, 200___, is made by and between _____, a _____ corporation with an office at _____ ("Lead Company"), and _____, a _____ corporation with an office at _____ ("Participant").

WHEREAS, each party intends to install, construct, own and operate underground conduit facilities ("Facilities") in connection with each party's respective operations; and

WHEREAS, to minimize the costs of constructing separate trenches and Facilities, the parties are willing to jointly construct such trenches and Facilities and to share the costs of such construction in accordance with the terms and conditions set forth herein;

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions and obligations contained herein, and intending to be legally bound hereby, the parties hereby agree as follows:

1. **Certain Definitions.** For purposes of this Agreement, the following terms are defined as follows. This is not intended as an exhaustive list of all defined terms used in this Agreement.

- (i) "Acceptance Testing" shall have the meaning attributed to it in Section 4(F).
- (ii) "Access Point" shall mean an opening, individually owned by a particular party, in the Joint Build by which the party may enter for the purpose of installing and maintaining Facilities (i.e. manhole or handhole).
- (iii) "Affiliate" shall mean any Person controlling, controlled by, or under common control with another Person.
- (iv) "Authorizations" shall have the meaning attributed to it in Section 3.
- (v) "Completion Notice" shall have the meaning attributed to it in Section 4(F).
- (vi) "Conduit" shall mean a structure containing one or more Innerducts.
- (vii) "Innerduct" shall mean a single enclosed raceway acceptable for communications cables.
- (viii) "Drawings" shall have the meaning attributed to it in Section 4(A).
- (ix) "Facilities" shall mean Innerducts, Conduits, Access Points and associated equipment, devices and hardware that are supplied by, or installed or designed for, a particular party.
- (x) "Governmental Authority" shall mean any federal, state or local government, or any agency or instrumentality thereof, having competent jurisdiction over the Facilities, the Joint Build or the parties hereto.

H. Glossary of Terms

3G - Third Generation	The third generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.
4G - Fourth Generation	The fourth generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.
ADSL - Asymmetric Digital Subscriber Line	DSL service with a larger portion of the capacity devoted to downstream communications, less to upstream. Typically thought of as a residential service.
ADSS - All-Dielectric Self-Supporting	A type of optical fiber cable that contains no conductive metal elements.
AMR/AMI - Automatic Meter Reading/Advanced Metering Infrastructure	Electrical meters that measure more than simple consumption and an associated communication network to report the measurements.
ATM - Asynchronous Transfer Mode	A data service offering used for interconnection of customer's LAN. ATM provides service from 1 Mbps to 145 Mbps utilizing Cell Relay Packets.
Bandwidth	The amount of data transmitted in a given amount of time; usually measured in bits per second, kilobits per second (kbps), and Megabits per second (Mbps).
Bit	A single unit of data, either a one or a zero. In the world of broadband, bits are used to refer to the amount of transmitted data. A kilobit (Kb) is approximately 1,000 bits. A Megabit (Mb) is approximately 1,000,000 bits. There are 8 bits in a byte (which is the unit used to measure storage space), therefore a 1 Mbps connection takes about 8 seconds to transfer 1 megabyte of data (about the size of a typical digital camera photo).
BPL - Broadband over Powerline	A technology that provides broadband service over existing electrical power lines.
BPON - Broadband Passive Optical Network	BPON is a point-to-multipoint fiber-lean architecture network system which uses passive splitters to deliver signals to multiple users. Instead of running a separate strand of fiber from the CO to every customer, BPON uses a single strand of fiber to serve up to 32 subscribers.
Broadband	A descriptive term for evolving digital technologies that provide consumers with integrated access to voice, high-speed data service, video-demand services, and interactive delivery services (e.g. DSL, Cable Internet).
CAD - Computer Aided Design	The use of computer systems to assist in the creation, modification, analysis, or optimization of a design.
CAI - Community Anchor Institutions	The National Telecommunications and Information Administration defined CAIs in its SBDD program as "Schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities." Universities, colleges, community colleges, K-12 schools, libraries, health care facilities, social service providers, public safety entities, government and municipal offices are all community anchor institutions.
CAP - Competitive Access Provider	(or "Bypass Carrier") A Company that provides network links between the customer and the Inter-Exchange Carrier or even directly to the Internet Service Provider. CAPs operate private networks independent of Local Exchange Carriers.

Cellular	A mobile communications system that uses a combination of radio transmission and conventional telephone switching to permit telephone communications to and from mobile users within a specified area.
CLEC – Competitive Local Exchange Carrier	Wireline service provider authorized under state and Federal rules to compete with ILECs to provide local telephone service. CLECs provide telephone services in one of three ways or a combination thereof: 1) by building or rebuilding telecommunications facilities of their own, 2) by leasing capacity from another local telephone company (typically an ILEC) and reselling it, and 3) by leasing discrete parts of the ILEC network referred to as UNEs.
CO – Central Office	A circuit switch where the phone lines in a geographical area come together, usually housed in a small building.
Coaxial Cable	A type of cable that can carry large amounts of bandwidth over long distances. Cable TV and cable modem service both utilize this technology.
CPE – Customer Premise Equipment	Any terminal and associated equipment located at a subscriber’s premises and connected with a carrier’s telecommunication channel at the demarcation point (“demarc”).
CWDM – Coarse Wavelength Division Multiplexing	A technology similar to DWDM only utilizing less wavelengths in a more customer-facing application whereby less bandwidth is required per fiber.
Demarcation Point (“demarc”)	The point at which the public switched telephone network ends and connects with the customer’s on-premises wiring.
Dial-Up	A technology that provides customers with access to the Internet over an existing telephone line.
DLEC – Data Local Exchange Carrier	DLECs deliver high-speed access to the Internet, not voice. Examples of DLECs include Covad, Northpoint and Rhythms.
Downstream	Data flowing from the Internet to a computer (Surfing the net, getting E-mail, downloading a file).
DSL – Digital Subscriber Line	The use of a copper telephone line to deliver “always on” broadband Internet service.
DSLAM – Digital Subscriber Line Access Multiplier	A piece of technology installed at a telephone company’s Central Office (CO) and connects the carrier to the subscriber loop (and ultimately the customer’s PC).
DWDM – Dense Wavelength Division Multiplexing	An optical technology used to increase bandwidth over existing fiber-optic networks. DWDM works by combining and transmitting multiple signals simultaneously at different wavelengths on the same fiber. In effect, one fiber is transformed into multiple virtual fibers.
E-Rate	A Federal program that provides subsidy for voice and data circuits as well as internal network connections to qualified schools and libraries. The subsidy is based on a percentage designated by the FCC.
EON – Ethernet Optical Network	The use of Ethernet LAN packets running over a fiber network.
EvDO – Evolution Data Only	EvDO is a wireless technology that provides data connections that are 10 times as fast as a traditional modem. This has been overtaken by 4G LTE.
FCC – Federal Communications Commission	A Federal regulatory agency that is responsible for regulating interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Rock Falls, and U.S. territories.
FDH – Fiber Distribution Hub	A connection and distribution point for optical fiber cables.

FTTN – Fiber to the Neighborhood	A hybrid network architecture involving optical fiber from the carrier network, terminating in a neighborhood cabinet with converts the signal from optical to electrical.
FTTP – Fiber to the premise (or FTTB – Fiber to the building)	A fiber-optic system that connects directly from the carrier network to the user premises.
GIS – Geographic Information Systems	A system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.
GPON- Gigabit-Capable Passive Optical Network	Similar to BPON, GPON allows for greater bandwidth through the use of a faster approach (up to 2.5 Gbps in current products) than BPON.
GPS – Global Positioning System	a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.
GSM – Global System for Mobile Communications	This is the current radio/telephone standard developed in Europe and implemented globally except in Japan and South Korea.
HD – High Definition (Video)	Video of substantially higher resolution than standard definition.
HFC – Hybrid Fiber Coaxial	An outside plant distribution cabling concept employing both fiber-optic and coaxial cable.
ICT – Information and Communications Technology	Often used as an extended synonym for information technology (IT), but it is more specific term that stresses the role of unified communications and the integration of telecommunications, computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.
IEEE – Institute of Electrical Engineers	A professional association headquartered in New York City that is dedicated to advancing technological innovation and excellence.
ILEC – Incumbent Local Exchange Carrier	The traditional wireline telephone service providers within defined geographic areas. Prior to 1996, ILECs operated as monopolies having exclusive right and responsibility for providing local and local toll telephone service within LATAs.
IP-VPN – Internet Protocol-Virtual Private Network	A software-defined network offering the appearance, functionality, and usefulness of a dedicated private network.
ISDN – Integrated Services Digital Network	An alternative method to simultaneously carry voice, data, and other traffic, using the switched telephone network.
ISP – Internet Service Provider	A company providing Internet access to consumers and businesses, acting as a bridge between customer (end-user) and infrastructure owners for dial-up, cable modem and DSL services.
ITS – Intelligent Traffic System	Advanced applications which, without embodying intelligence as such, aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.
Kbps – Kilobits per second	1,000 bits per second. A measure of how fast data can be transmitted.
LAN – Local Area Network	A geographically localized network consisting of both hardware and software. The network can link workstations within a building or multiple computers with a single wireless Internet connection.
LATA – Local Access and Transport Areas	A geographic area within a divested Regional Bell Operating Company is permitted to offer exchange telecommunications and exchange access service. Calls between LATAs are often thought of as long distance service. Calls within a LATA (IntraLATA) typically include local and local toll services.

Local Loop	A generic term for the connection between the customer's premises (home, office, etc.) and the provider's serving central office. Historically, this has been a copper wire connection; but in many areas it has transitioned to fiber optic. Also, wireless options are increasingly available for local loop capacity.
MAN – Metropolitan Area Network	A high-speed intra-city network that links multiple locations with a campus, city or LATA. A MAN typically extends as far as 30 miles.
Mbps – Megabits per second	1,000,000 bits per second. A measure of how fast data can be transmitted.
MPLS – Multiprotocol Label Switching	A mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table.
ONT – Optical Network Terminal	Used to terminate the fiber-optic line, demultiplex the signal into its component parts (voice telephone, television, and Internet), and provide power to customer telephones.
Overbuilding	The practice of building excess capacity. In this context, it involves investment in additional infrastructure projects to provide competition.
OVS – Open Video Systems	OVS is a new option for those looking to offer cable television service outside the current framework of traditional regulation. It would allow more flexibility in providing service by reducing the build out requirements of new carriers.
PON – Passive Optical Network	A Passive Optical Network consists of an optical line terminator located at the Central Office and a set of associated optical network terminals located at the customer's premise. Between them lies the optical distribution network comprised of fibers and passive splitters or couplers. In a PON network, a single piece of fiber can be run from the serving exchange out to a subdivision or office park, and then individual fiber strands to each building or serving equipment can be split from the main fiber using passive splitters / couplers. This allows for an expensive piece of fiber cable from the exchange to the customer to be shared amongst many customers, thereby dramatically lowering the overall costs of deployment for fiber to the business (FTTB) or fiber to the home (FTTH) applications.
PPP – Public-Private Partnership	A Public-Private Partnership (PPP) is a venture funded and operated through a collaborative partnership between a government and one or more private sector organizations. In addition to being referred to as a PPP, they are sometimes called a P3, or P ³ .
QoS – Quality of Service	QoS (Quality of Service) refers to a broad collection of networking technologies and techniques. The goal of QoS is to provide guarantees on the ability of a network to deliver predictable results, which are reflected in Service Level Agreements. Elements of network performance within the scope of QoS often include availability (uptime), bandwidth (throughput), latency (delay), and error rate. QoS involves prioritization of network traffic.
RF – Radio Frequency	a rate of oscillation in the range of about 3 kHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals.
Right-of-Way	A legal right of passage over land owned by another. Carriers and service providers must obtain right-of-way to dig trenches or plant poles for cable systems, and to place wireless antennae.
RMS – Resource Management System	A system used to track telecommunications assets.

RPR – Resilient Packet Ring	Also known as IEEE 802.17, is a protocol standard designed for the optimized transport of data traffic over optical fiber ring networks.
RUS – Rural Utility Service	A division of the United States Department of Agriculture, it promotes universal service in unserved and underserved areas of the country with grants, loans, and financing. Formerly known as “REA” or the Rural Electrification Administration.
SCADA – Supervisory Control and Data Acquisition	A type of industrial control system (ICS). Industrial control systems are computer controlled systems that monitor and control industrial processes that exist in the physical world.
SNMP – Simple Network Management Protocol	An Internet-standard protocol for managing devices on IP networks.
SONET – Synchronous Optical Network	A family of fiber-optic transmission rates.
Steaming	Streamed data is any information/data that is delivered from a server to a host where the data represents information that must be delivered in real time. This could be video, audio, graphics, slide shows, web tours, combinations of these, or any other real time application.
Subscribership	Subscribership is how many customers have subscribed for a particular telecommunications service.
Switched Network	A domestic telecommunications network usually accessed by telephone, key telephone systems, private branch exchange trunks, and data arrangements.
T-1 – Trunk Level 1	A digital transmission link with a total signaling speed of 1.544 Mbps. It is a standard for digital transmission in North America.
T-3 – Trunk Level 3	28 T1 lines or 44.736 Mbps.
UNE – Unbundled Network Element	Leased portions of a carrier’s (typically an ILEC’s) network used by another carrier to provide service to customers. Over time, the obligation to provide UNEs has been greatly narrowed, such that the most common UNE now is the UNE-Loop.
Universal Service	The idea of providing every home in the United States with basic telephone service.
Upstream	Data flowing from your computer to the Internet (sending E-mail, uploading a file).
UPS – Uninterruptable Power Supply	An electrical apparatus that provides emergency power to a load when the input power source, typically main power, fails.
USAC – Universal Service Administrative Company	An independent American nonprofit corporation designated as the administrator of the Federal Universal Service Fund (USF) by the Federal Communications Commission.
VDSL – Very High Data Rate Digital Subscriber Line	A developing digital subscriber line (DSL) technology providing data transmission faster than ADSL over a single flat untwisted or twisted pair of copper wires (up to 52 Mbit/s downstream and 16 Mbit/s upstream), and on coaxial cable (up to 85 Mbit/s down and upstream); using the frequency band from 25 kHz to 12 MHz.
Video on Demand	A service that allows users to remotely choose a movie from a digital library whenever they like and be able to pause, fast-forward, and rewind their selection.
VLAN – Virtual Local Area Network	In computer networking, a single layer-2 network may be partitioned to create multiple distinct broadcast domains, which are mutually isolated so that

	packets can only pass between them via one or more routers; such a domain is referred to as a Virtual Local Area Network, Virtual LAN or VLAN.
VoIP - Voice over Internet Protocol	An application that employs a data network (using a broadband connection) to transmit voice conversations using Internet Protocol.
VPN - Virtual Private Network	A virtual private network (VPN) extends a private network across a public network, such as the Internet. It enables a computer to send and receive data across shared or public networks as if it were directly connected to the private network, while benefitting from the functionality, security and management policies of the private network. This is done by establishing a virtual point-to-point connection through the use of dedicated connections, encryption, or a combination of the two.
WAN - Wide Area Network	A network that covers a broad area (i.e., any telecommunications network that links across metropolitan, regional, or national boundaries) using private or public network transports.
WiFi	WiFi is a popular technology that allows an electronic device to exchange data or connect to the Internet wirelessly using radio waves. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards".
WiMax	WiMax is a wireless technology that provides high-throughput broadband connections over long distances. WiMax can be used for a number of applications, including "last mile" broadband connections, hotspot and cellular backhaul, and high speed enterprise connectivity for businesses.
Wireless	Telephone service transmitted via cellular, PCS, satellite, or other technologies that do not require the telephone to be connected to a land-based line.
Wireless Internet	1) Internet applications and access using mobile devices such as cell phones and palm devices. 2) Broadband Internet service provided via wireless connection, such as satellite or tower transmitters.
Wireline	Service based on infrastructure on or near the ground, such as copper telephone wires or coaxial cable underground or on telephone poles.