

Broadband Infrastructure Inventory Study of Herkimer, and Oneida Counties, NY for Mohawk Valley Economic Development District, Herkimer, and Oneida Counties

December 17, 2021



ECC Technologies, Inc.

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Broadband Infrastructure Inventory Study of Herkimer and Oneida Counties, NY

December 17, 2021

1. Introduction

Broadband access has become one of the foundational resources that allows a community to compete and thrive in the 21st century. Infused into all aspects of our social and economic life, broadband connects computers, cell phones, television, and most modern communications.

Broadband powers emails, Internet searches, social media, online shopping, and information management. It enables business, education, medicine, government, and public safety to perform their functions efficiently. It is a critical component of economic development and a community's ability to attract and retain industry. Recent surveys show high-speed broadband is now as important to job creation and business locations as good transportation and skilled labor.

Telecommunications infrastructure and broadband service have transformed the way people, public organizations, and companies communicate, educate, work, and live. Broadband, and the fiber optic backbones that support it, have undeniably become the "interstate highway" of the 21st century.

The use of broadband service is becoming ubiquitous. By 2023, North America will have 345 million Internet users (92 percent of regional population), up from 328 million (90 percent of regional population) in 2018.¹

In 2020 and 2021, the world moved into lockdown to protect against the spread of the COVID-19 virus. This caused a major shift in the way we perform critical tasks including work from home (video conferencing and collaboration, virtual private network access to company systems), learning from home (video conferencing and collaboration and access to e-learning platforms), telemedicine (video conference with healthcare professionals and access to healthcare systems).

¹<https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html>

Covid also had personal impacts including shopping (ordering food and items for delivery or curbside pickup) and entertainment (video streaming, online gaming, social media). Fixed broadband traffic increased up to 60%, voice traffic increased up to 130% and Wi-Fi calling increased up to 80%.

People in the region have been enduring social distancing and self-isolation due to the pandemic. The situation has brought to light the importance of remote healthcare, learning, and working from home. The COVID-19 pandemic has exposed the nation's persistent broadband issues including availability, affordability, and speed of service exponentially.

As many people are quarantined in their homes, lack of access in rural areas is getting unprecedented attention with newly announced grant programs from both federal and state agencies. In 2015, the FCC set the standard for broadband access at 25Mb/s download by 3Mb/s upload.

A new standard of 100Mbps download is being discussed among industry analysts. Four US Senators called upon the Biden Administration to establish a "21st century definition of high-speed broadband" of 100Mb/s both download and upload. The FCC is likewise supporting a new standard above the current one.

Broadband, today, is considered infrastructure as critical as roads, electricity, and water. Inadequate broadband has become a barrier to community growth, competitiveness, and economic development. This has led to something called "The Digital Divide."

The fixed broadband deployment data is collected by the FCC twice annually from broadband providers offering services of at least 200 Kbps in one direction. The providers are required to report the level of broadband service available in each census block they serve. The FCC compiles this data in Form 477 which is publicly available. Although the FCC 477 data is a good starting point to determine service availability, it has built in inherent weaknesses which can overlook unserved or underserved addresses within census blocks. For instance, if a provider has one household served in a census block, the FCC interprets the entire census block is thus served. Also, the Form 477 information is at least 18 months old and as new network expansions in the Country are "turned up," many of the areas are still shown as less than 10 Mb/s speeds. The FCC data is often inconsistent with data from private reporting sources and sometimes the provider websites.

Figure 1, on the next page, represents the FCC 477 data set identifying the maximum advertised speeds offered by the Incumbent Local Exchange Carriers (ILECs) in Herkimer and Oneida Counties. Figure 2 displays the census blocks served by Cable TV (CATV) providers. This information will be used to make comparisons to the field inventory study.

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Figure 1 ILEC Maximum Advertised Download Speeds

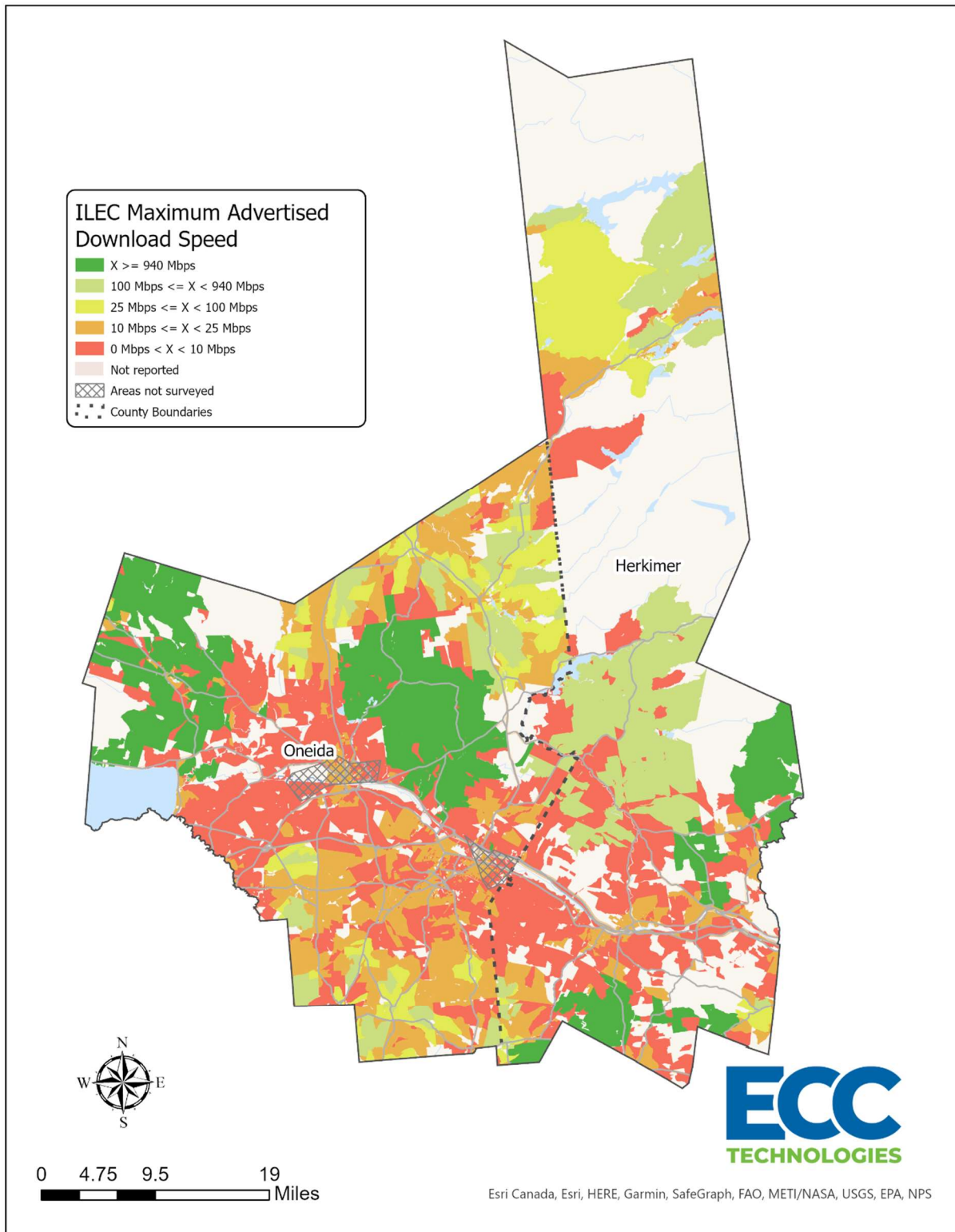
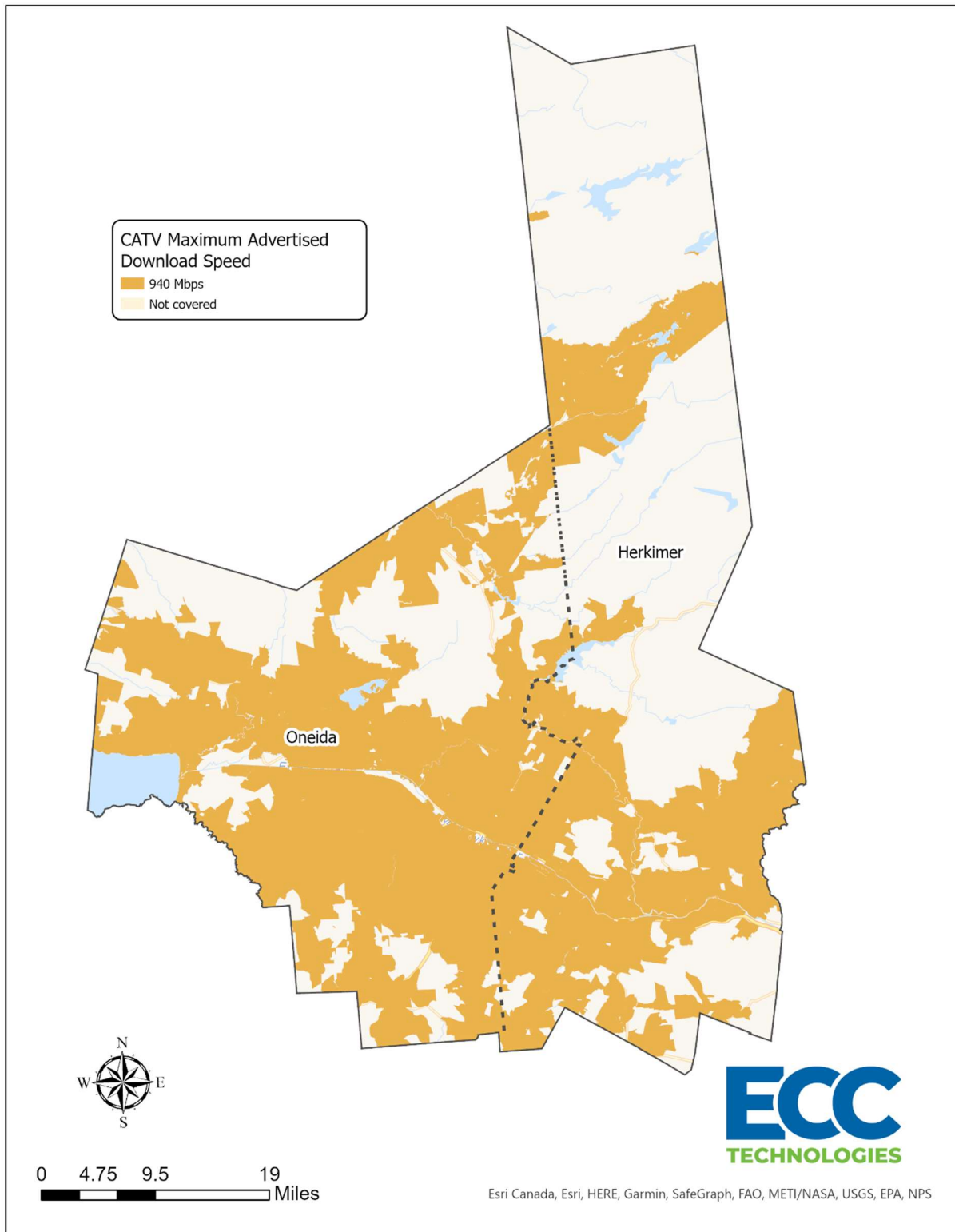


Figure 2 CATV Maximum Advertised Download Speeds



Therefore, to provide a more granular and accurate representation of where broadband is and is not in a community, there is a need to physically inventory broadband infrastructure and analyze the data collected from within the community.

The cross referencing of field study data with the results of a Broadband Availability & Adoption Tool (BAAT) campaign will further help define areas of need in a more granular manner and provide a basis from which to obtain partners and funding. This will be discussed in the summary BAAT campaign information at the project closeout.

1.1 Purpose of the Project

On February 26, 2021, the Mohawk Valley Economic Development District (MVEDD) contracted with ECC Technologies, Inc. (ECC) to perform a broadband study by conducting an inventory of existing fiber optic, coaxial assets and other broadband supporting infrastructure within Herkimer and Oneida Counties, New York.

The purpose of the study is to accurately identify areas of the Counties that are lacking in broadband infrastructure. In addition, the data collected from this effort will be able to be used in the next steps to develop a technological solution to address the lack of broadband in unserved and underserved areas of the Counties, obtain partners and funding to address these issues.

The inventory project included a field inventory of existing broadband infrastructure, namely the fiber optic, coaxial cable, and tower infrastructure. ECC's Outside Plant (OSP) team drove the roads in the Counties and to the extent possible, physically identified and documented the existing broadband infrastructure.

As per the agreed upon scope of work, ECC did not drive the cities, villages, and designated census areas within the Counties as these areas are typically served. Based upon the field data gathered, ECC designers created maps of the County's infrastructure into an ESRI GIS database.

This general infrastructure report documents our findings. The Counties are described in terms of existing fiber, coaxial and tower infrastructure, and potential fiber and wireless based broadband access. ECC has identified the different broadband providers in the area and describes their current levels of fiber infrastructure. ECC has created maps documenting, to the extent possible, the fiber, coax, and tower infrastructure in the Counties.

These maps consist of the following information, and will serve as the foundation to overlay future Initiatives:

1. Fiber optic cabling
2. Coaxial cabling
3. Central Office and remote terminals
4. Wireline boundaries
5. Wireless tower and water tower sites

The inventory and accompanying maps created not only show where fiber-based broadband exists today but provide insight into areas that need additional infrastructure for the expansion of broadband services. Critical broadband access/telecommunications infrastructure information is disclosed that can lay the foundation for broadband improvement plans.

The information compiled by ECC Technologies is presented in the following pages of this report. Much of this information has also been placed into an interactive electronic geographic information system (GIS) database and provided to MVEDD.

This database tool consists of interactive mapping elements that can be used to identify and locate the major telecommunications resources within the area for economic development and individual County planning purposes.

ECC Technologies, Inc. Contact Information:

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1.2 Research Methodology

To gather the information required for the study, ECC researched the major telecommunications providers listed below and performed field surveys, whereby an ECC engineer travelled the rural (outside towns and the city) roads in the Counties to identify and document outside plant (OSP) infrastructure. The following were identified:

1. Wireline Providers
2. Incumbent Local Exchange Carriers (ILECs)
3. CATV Cable TV/Modem Service Providers
4. Competitive Local Exchange Carriers (CLECs)
5. Network Services and Dark Fiber Providers
6. Communications Towers and Owners

Secondary research utilized publicly available databases managed by federal and state agencies and information purchased from telecom industry database research organizations.

Primary research was conducted by outside plant personnel field surveys for fiber optic and coax route identification via aerial and underground markers, networking equipment and tower locations.

The towers in each of the Counties were visited and digitally documented. ECC also obtained telecommunications industry data publicly available from the following federal, state, and local organizations: the FCC, PSC, Herkimer, and Oneida Counties.

Other resources included certain databases to which ECC has access, telecommunications industry research companies, telecommunications provider websites, and telecommunications industry professionals.

During the field study it was noted that ILEC's are no longer marking their buried fiber cables as "Buried Fiber Cable." All new installations are simply being marked as "Caution: Buried Cable." This is being done to avoid giving competitors the locations where the ILECs are expanding/deploying new fiber services.

1.3 GIS Mapping/Database

All infrastructure information discovered in the inventory phase has been integrated into a GIS model developed for and provided to MVEDD. This GIS database will be administered, stored, and updated by respective County planning staff to ensure security and continuity of the resource.

The GIS database of information was developed to support broadband and economic development initiatives. This information will be used by MVEDD, Herkimer and Oneida County Planning Departments for County and local level use. The maps included in this report represent the area's fiber optic cable, coaxial cable and vertical asset infrastructure documented in this study.

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2. Broadband Infrastructure Overview

2.2 The Importance of Broadband Today

The importance of Broadband would be difficult to overstate. Infused into all aspects of our social and economic life, broadband enables computers, cell phones, television, and most modern communications. Broadband powers email, Internet searches, social media, online shopping, and information management. It enables business, education, medicine, government, and public safety. It is a critical component of economic development and a community's ability to attract and retain industry.

Equally important from a business perspective, has been the development of related technologies including Software as a Service (SAAS), cloud storage and other network-based applications.

Recent surveys show high-speed broadband is now as important to job creation and business locations as good transportation, robust utilities, and skilled labor. It is crucial to make an assessment on the current state of telecommunications in each area to then be able to make plans for the future.

Telecommunications infrastructure and broadband service have transformed the way people, public organizations, and companies communicate, educate, work, and live. There is almost no facet of our daily lives that is not impacted by broadband technologies.

Broadband (and a fiber optic backbone to support broadband) has undeniably become the "interstate highway" of the 21st century. The use of broadband service is becoming ubiquitous. In fact, a 2015 study found that 43 percent of U.S. homes have four or more online devices, up from 32 percent over the previous 18 months.

Broadband is today considered infrastructure as critical as roads, electricity, and water. Inadequate broadband has become a barrier to community growth, competitiveness, and economic development. While some areas of the country have substantial broadband service availability, other areas have significant limitations in service. This lack of adequate service in areas is termed "The Digital Divide."

Industry studies report that end user demand for bandwidth is doubling every 3 years. The consumer need for speed and the FCC evolving definition of broadband service has changed greatly over the past 2 decades.

The Internet of Things (IOT)

The Internet of Things (IOT) is a term used to define the everything that is connected to the Internet. It is estimated that in 2018 there were 22 billion devices connected to the Internet. By the year 2030 the number will more than double to over 50 billion devices.²

IOT devices are commonplace today: Nest and Ecobee thermostats; Alexa devices; Wi-Fi enable appliances; automated reporting from vehicles; video doorbells and cameras; mood changing lightbulbs and more.

Residential

Residential bandwidth requirements continue to be among the most rapidly growing across the telecommunications industry. Residential capacity requirements will experience an increase year over year as high-definition TV and streaming video, web access, smart home technologies, gaming, and other progressive applications will continue to drive the residential broadband market.

Commercial

In commercial environments higher bandwidth needs are expected to skyrocket due to capabilities represented by SAAS and cloud applications. The Industrial Internet of Things (IIoT) represents additional demands on networks in the years ahead.

As the IIoT expands the volume of data on networks by several orders of magnitude, large amounts of sensors operating within different equipment environments, will collect and transmit data to be analyzed in real time by disparate systems. Examples include real time monitoring of “Smart” electric meters, warehouse floor sensors tracking movements of parts and subassemblies in manufacturing plants, location data for mobile phone mapping support and more.

Agriculture is a key driver of networked based applications and data usage. Rural broadband represents a challenge and an opportunity to help farms optimize fertilizer, water, and other required components to maximize yields and minimize losses.

Network based applications are actively providing farmers with optimized plowing and seeding patterns for fields based on real time data feedback, helping to increase yields and reduce waste and crop loss.

Modern data analytics systems and artificial intelligence (AI) will turn this raw data into actionable intelligence and will enrich the organizational decision-making processes, allow faster responses to real time requirements, and facilitate predictive and preventive maintenance.

²<https://www.statista.com/statistics/802690/worldwide-connected-devices-by-access-technology/#:~:text=By%20the%20end%20of%202018,in%20use%20around%20the%20world>

Government - Smart City

Many counties and cities are looking to new technology systems and upgrades to save taxpayer money and provide enhanced services. These technology transformations are increasing the economic vitality, safety and overall well-being of local citizens and businesses.

At the center of these upgrades are IoT applications. These applications and supporting devices are being deployed across the spectrum of modern-day society and are shaping the future of county and city management.

Cities that are looking to compete in the 21st century understand that they need to be a place where people want to live, work, play and raise families. These cities need to be part of an informational revolution - becoming more intelligent - that is taking place.

Cities around the United States and internationally are developing into “Smart Cities” at a rapid pace. The foundation of Smart Cities initiatives are fiber backbones and wireless technologies feeding IoT devices that utilize video, data, and voice technologies to provide advanced services to their residents and businesses. Once this foundational infrastructure is put in place, Smart City initiatives can take many forms.

Today there are several aspects of city life that can be improved by Smart City government-controlled technologies. These include remote, automated, and surveillance IoT based equipment and software (meters, sensors, and cameras among others) that provide for such things as enhanced traffic management and parking; public transportation; law enforcement and license plate reader (LPR); street and building lighting; utilities and energy management; free Wi-Fi access; and much more. With the number of new Smart City applications increasing at a yearly pace, in the future there will undoubtedly be thousands of applications for cities to consider.

2.3 The Digital Divide

On Feb 8, 1996, the Federal Communications Commission (FCC) created the Telecommunications Act to establish competition and facilitate growth in the telecommunications industry, which previously had been a government-regulated monopoly.

After the Telecommunications Act, telephone companies called Competitive Local Exchange Carriers (“CLECs”) emerged and were able to provide consumers with a choice of services. During this period other non-traditional telecommunications companies such as cable TV providers, network providers, and wireless providers (both cellular and fixed wireless) began to offer competitive broadband services to participate in the explosive growth of the Internet.

Digital Divide

Over twenty-five years have passed since the 1996 Telecommunications Act which succeeded in creating competition and increased availability of broadband access. Despite that success, a technology gap has

occurred between communities that have access to affordable broadband service and those that do not. This division, known as the Digital Divide, has split communities into broadband “haves” and “have nots.”

Many rural areas are characterized by lower population density and lower household incomes. These areas often have poor accessibility to broadband. Local counties and cities want to develop future potential but unfortunately do not show a return on investment for broadband providers.

In many instances, the difference between a household that has access to broadband service and one that does not can be less than a mile, but the cost to overcome this short distance can be more than a resident or business can afford.

Despite the increased need for broadband service, rural areas of the country still rely largely on copper-based infrastructure such as the incumbent telephone companies’ unshielded twisted pair copper wire or satellite connections for broadband connectivity.

Unfortunately upgrading copper’s limited bandwidth to the high bandwidth capacity of fiber has not been an area of focus for the telecommunications industry. This is due mainly to the high cost of installing fiber and the low population densities of rural areas that create lengthy return on investment models. Furthermore, the incumbent broadband providers are reluctant to invest in expensive telecommunications infrastructure upgrades, which do not show profitability.

Much of the infrastructure in place today in these areas has been in operation for more than 50 years. Most of the telecommunication’s industry is focusing elsewhere, with investment dollars being spent in high growth areas such as tier 1 and tier 2 cities, where fiber cable is densely installed. Comparable to the lack of electricity in rural areas of this country before the National Rural Electrification Act of 1936, many areas in New York State are being rapidly left behind.

Communities today increasingly compete to become a “Gigabit Community,” which is the new gold standard for areas that want to attract the people, jobs, businesses, and investment of the future.

Community involvement towards this goal enables the development of partnerships with counties, cities, local telecom incumbents, alternative broadband providers, and even electric companies to make new investments in broadband infrastructure.

Communities willing to take the time and effort to understand and develop public-private partnerships can often create successful plans with multiple partners to develop long-term investments to improve their communities. The Digital Divide is being bridged by communities that are willing to plan and co-operate to reach their growing broadband needs.

2.4 Broadband Infrastructure Overview

To set the stage, the following section is an introduction to the major providers and different types of infrastructure used in the Counties to deliver broadband service, as well as a summary map that shows the important infrastructure available. The broadband providers in Herkimer and Oneida Counties are

delivering service to the homes, businesses, and other organizations at varying degrees of access, performance, and cost. The infrastructures in use by the industry today are landlines consisting of copper, coaxial, or fiber, or wireless based technology utilizing strategically placed towers and satellite.

Wire line infrastructure includes telephone and cable TV cables, which are either buried in the ground or attached aurally to utility poles. Wire line cables can be twisted pairs of copper wire, coaxial, or fiber optic cable. The wire line infrastructure servicing Herkimer and Oneida Counties is primarily owned and operated by incumbent local exchange carriers Frontier Communications, Newport Telephone Company, TDS Telecom, Oneida County Telephone, and Verizon; cable provider Spectrum Communications; and power utility Otsego Electric Cooperative (OEC).

Traditional telephone copper cable is still the most used infrastructure serving homes and businesses across the Counties. Copper cable is used by the telephone companies to connect Central Offices to end users for the purpose of providing traditional voice and data services, typically referred to as broadband. It should be noted that copper cable has a very limited capacity for broadband service and is usually the reason why advanced telecommunications services are not available in certain areas. The limitation of providing broadband access over copper is a direct result of distance from the central office or remote terminal, the age, and the poor performance qualities inherent to the wire itself.

Digital Subscriber Line

Most of the residential telephone service in Herkimer and Oneida Counties is supplied by this copper cable that consists of numerous pairs of unconditioned twisted pair (UTP) copper wires. To provide a faster service over existing copper lines, the telephone carriers have developed digital services called DSL, or “digital subscriber line” technology, which is considered by some a low-end form of broadband. DSL uses an ordinary UTP line to deliver bandwidth services typically up to 10Mbps service. Depending on the type of DSL topology and equipment used, speeds up to 115Mbps can be reached over very short distances. Since its introduction into the telecommunications industry, DSL has become a very popular service for the incumbents because it requires only the addition of new end equipment and not the replacement of cable, which is very expensive. A drawback of the technology, however, is that it requires that customers be within three cable miles of the DSL equipment, and even that is no guarantee of service.

CATV Coaxial Cable

The cable TV (CATV) provider (Spectrum) utilizes a hybrid fiber optic/coaxial cable network to provide high quality video, high speed data, and voice services to their customers. In most cases the fiber provides a connection from the signal origination, referred to as the headend, to a node where an optical to electrical signal conversion is made. Then coaxial cable connects the node to the customer site. The high-performance characteristic of coaxial cable supports the transmission of telephone, video, and data. The CATV provider utilizes cable modem technology, which uses a single coaxial cable TV connection to a customer location to support the simultaneous transmission of voice, TV programing, and Internet. In

Where broadband access is available in most areas of Herkimer and Oneida Counties, it is via this hybrid fiber/coaxial infrastructure installed by the incumbent cable TV provider.

Fiber Optic Cable

Fiber optics is the technology used to transmit information as pulses of light through strands of fiber made of glass or plastic over long distances. Optical fibers are about the diameter of a strand of human hair and are typically bundled into a fiber-optic cable. Fiber optic cable can transmit more data over longer distances and faster than other mediums. It is this technology that provides homes and businesses with fiber-optic based internet, phone, and TV services.

A fiber-optic cable contains anywhere from a few to hundreds of optical fibers within a plastic casing. The fiber strands in the cable transfer data signals in the form of light and travel hundreds of miles significantly faster than those used in traditional copper based electrical cables. Because fiber-optic cables are non-metallic, they are not affected by electromagnetic interference that can reduce speed of transmission in other mediums.

Dark Fiber

Dark fiber is the term used in the industry to describe fiber optic strands (in the cable) that are leased or sold to the customer or end user without services delivered over them. Unlike fiber from a service provider, the end user must light and operate the fiber strands with their own electronics. This type of fiber is typically used to connect multiple locations together over an end user's private network. The advantage of dark fiber is that the end user has control over the type of technology and network used, however the end user is also responsible for operation and maintenance of the infrastructure.

Central Offices (COs)

The Central Office is a building, typically made of brick or concrete block, that the incumbent telephone company uses to place and operate voice, data, and video switching equipment. The equipment used in the local Central Office determines the level and availability of services within a certain area or "wire boundary" which is the extent to which the wires leaving the CO can reach.

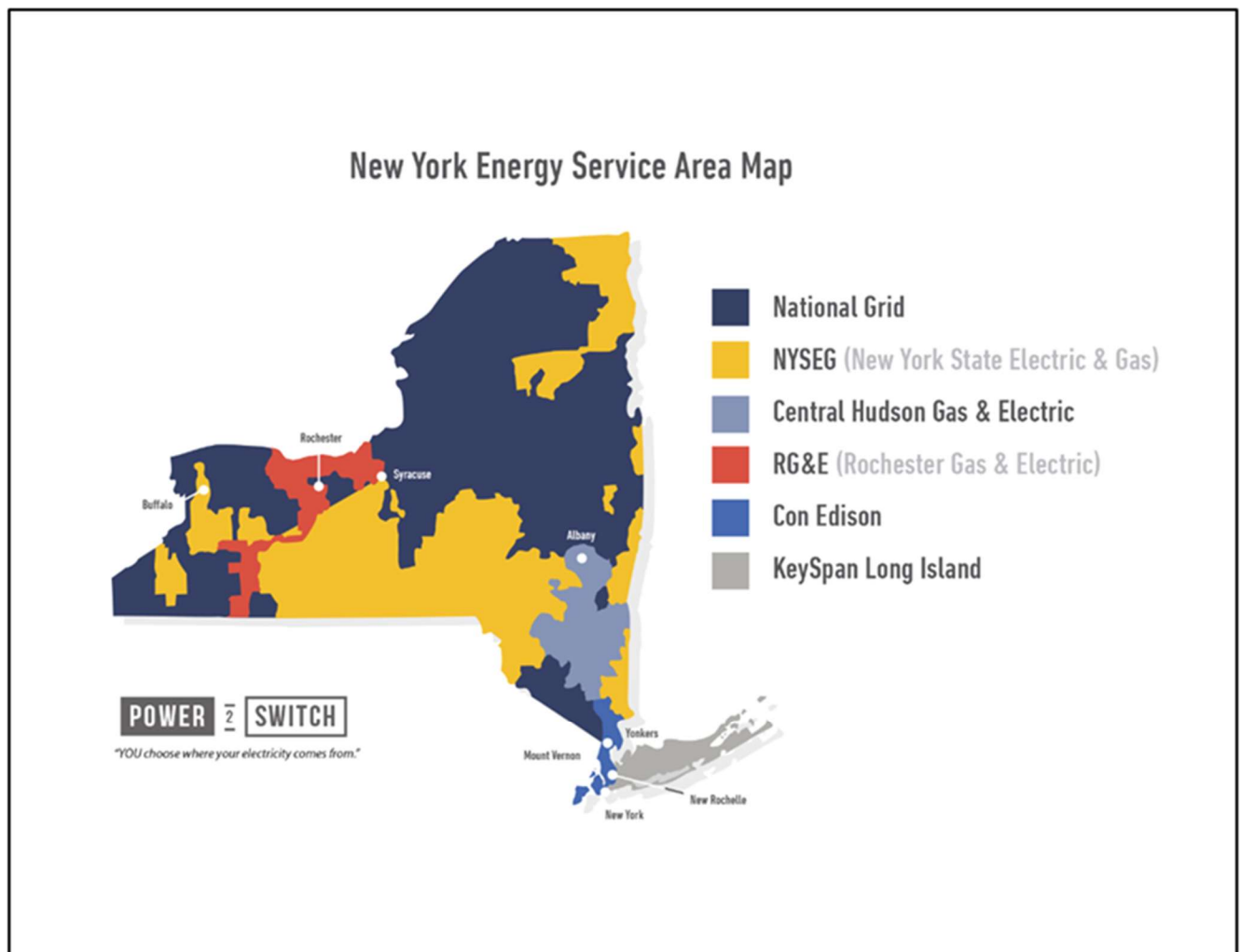
Utility Poles

Utility poles and telephone poles are generally owned by one of the following organizations: the local power companies, the incumbent telephone companies, or the municipal entities including villages and cities. Utility poles are used to carry electric power lines and telecommunications cables. The electrical power lines are generally located at the top of the pole and the telecommunication lines are attached on the sides. To be compliant with the National Electric Code (NEC) there must be 40" space of separation between a telecommunication line and a power line on the pole. The area that the telecommunication cable resides is known as the "comm space." Usually, aerially mounted fiber cable is tagged with an orange, blue, or yellow label so it is easily identified for maintenance or repair.

All poles have a limited number of telecommunications lines they can carry. These lines are attached on the pole one on top of the other. Therefore, a taller pole can accept more lines than a shorter one. Once lines are installed on a pole, adding a new line can require moving existing lines to make space for the new one. Moving the existing lines or replacing a pole to make room for another is called “Make Ready” work.

The poles in Herkimer and Oneida Counties are owned by the utility companies, which are National Grid, New York State Electric and Gas (NYSEG), Oneida-Madison Electric Cooperative, and Otsego Electric Cooperative; and ILEC’s Frontier, TDS Telecom, Newport Telephone Company, and Verizon.

Figure 3 Major Power Service Providers Serving New York State



Tower Structures in the Counties – Wireless and Water Towers

Wireless technologies are the fastest growing segment of the telecommunications industry. Wireless infrastructure supports cell phones, pagers, personal digital assistants (PDAs), mobile data terminals,

messaging, and Internet services. Wireless antennas or access points are located on wireless towers, tall buildings, and even water towers throughout the Counties. In some instances, the wireless infrastructure installed can offer connectivity in areas where landline infrastructure cannot.

Wireless bandwidth technologies are developing at a rapid pace. Hybrid solutions that are using fiber as the backhaul and wireless as the “last mile” are being tested and installed across the country. Using fiber cable to get close to the customer, new and emerging wireless technologies are bridging the gap by providing high bandwidth service over the last mile costly link to the customer home. These new hybrid systems can provide speeds of 50Mbps and more. Cellular companies and wireless Internet service providers (WISPs) are beefing up their networks in preparation of new wireless technologies that will allow them to connect to customers in rural environments.

The key to wireless providers accessing rural areas is the availability of fiber infrastructure and vertical assets where they can place their antennas. Even the incumbent telephone companies are beginning to take notice.

5G Mobile / Cellular Technology

Fifth generation cellular is quickly being deployed throughout the country with theoretical speeds of up to 20 Gbps download and 10 Gbps upload. 5G promises high speed data rates up to 4 Gbps and upload speeds of up to 200 Mbps.³ On October 27, 2020, the FCC established the 5G Fund for Rural America which will make up to \$9 billion available to bring 5G mobile broadband service to rural areas.

There are three types of 5G being deployed. They are a Low Band 5G, Mid Band 5G and millimeter Wave (mmWave) High Band 5G.

The Low Band 5G performance is only incrementally better than 4G service (about 20% faster) but has a greater reach from tower versus the Mid Band 5G and mmWave High Band 5G. Mid Band 5G offers approximately 6 times the speed of 4G. Although having a greater range than mmWave High Band 5G it has a shorter reach to customers from the tower. 5G technology has been designed to piggyback on the 4G network. Cellular carriers have leveraged the greater range, albeit the lesser performance of Low Band 5G and Mid Band 5G to provide greater 5G service coverage. Low Band and Mid Band 5G services are characterized by Verizon Wireless’ Nationwide 5G service.

The mmWave High Band 5G is the fastest type of 5G with actual speeds reaching approximately 10 times faster than 4G. It is characterized by very low latency and very high speeds. The tradeoff is that this version of 5G has a much shorter range.⁴ Where 4G is effective from 3 – 7 km from the cell tower, the range of mmWave High Band 5G is roughly 1,500 feet from each tower. Therefore, many antennas are required

3 <https://www.cellularsales.com/blog/5g-nationwide-vs-5g-ultra-wideband-whats-the-difference/>

4 <https://ces.tech/Articles/2020/October/Did-You-Know-There-Are-Three-5G-Network-Types.aspx>

to cover a given area. The mmWave High Band 5G is not widely available and is characterized by Verizon Wireless' Ultra-Wideband Service.

To become more ubiquitous across the country, additional High-band, Mid-Band and Low-Band frequency spectrum must be released to cellular providers by the FCC. The FCC is taking action to make additional spectrum available for 5G services. The auctioning of High-Band spectrum is a priority for the FCC with the release and auctioning of 5 gigahertz of 5G spectrum. Over 600 megahertz of spectrum will be released for Mid-Band 5G. The FCC is also acting to improve use of the Low-Band spectrum to enable wider coverage of 5G service.⁵

Many of the wireless towers in region have cellular equipment installed on them to provide cell phone-based coverage. The service coverage of a typical cellular equipped tower can be anywhere between one and ten miles depending on the equipment in use, how the equipment is set up, terrain, and the height of the towers.

Cellular service providers limit bandwidth and charges customers on a "data cap" rate, limiting the Mbps used per month. Once reaching the data cap, the providers typically allow for the purchase of additional data usage or throttle the effective speed of the service. This can equate to very expensive data plans for Internet usage.

Fixed Wireless

Fixed wireless broadband uses radio waves instead of cables, phone lines, or fibers. That makes fixed wireless a suitable option for providing internet access in hard-to-reach locations. Download speeds of up to 1 Gbps and upload speeds of up to 1Mbps are possible with the average download speeds being closer to 25 Mbps.⁶ Most Wireless Internet Service Providers enforce a data cap.

Fixed wireless is dependent upon a clear line of site. Hills, trees, and weather can influence the performance of the network.

Satellite

Satellite providers use geostationary satellites orbiting the Earth at the same speed of the Earth's rotation, allowing them to maintain a "fixed" position to transmit signals from the Network Operations Center (NOC) to a satellite dish mounted on a business or residential structure. Download speed plans providing up to 100 Mbps are possible with upload speeds of up to 3 Mbps.⁷

5 <https://www.fcc.gov/5G>

6 <https://beyondreach.com/2021/08/16/fixed-wireless-internet-speed>

7 <https://www.satelliteinternet.com/>

As with all satellite providers, one of the greatest issues with service is latency, which is typically 0.5 seconds in length. This can prove problematic with VPN connections or when users are engaging in time sensitive activities, such as video conferencing and live online gaming. Speed performance can also be negatively impacted by weather and line of site issues.

Most satellite internet plans have a monthly data limit. Once surpassing the data limit, speeds are dramatically reduced.

2.5 Broadband Service Providers

ILECs

ILECs or incumbent local exchange carriers are the legacy telephone companies that have provide telephone service and Internet access in government defined areas. ILECs are mandated by federal government to provide basic phone service and maintain the old copper lines - which they have used for decades to provide service. Over the past decade many ILECs have sold off underperforming, mostly rural, territories to other ILECs to cut costs and improve profits.

ILECs are large regional providers. The major ILECs in the U.S. include AT&T, CenturyLink, Frontier, Verizon, and Windstream.

Cable TV Provider

Although beginning in the late 1940's, it wasn't until the 1970's that the cable TV industry become mainstream. The original TV based network was supported by coaxial cable only. By 1990 57% of American households subscribed to cable TV.

In 1996 the cable modem was introduced and CATV providers started offering Internet service to its customers.⁸ At the end of the 90's and into the early 2000's the larger regional cable companies pumped billions of dollars into their respective distribution systems to develop a high-capacity hybrid network. These networks were comprised of fiber backbones and coax cable customer connections to improve bandwidth service and compete with the incumbents.

CLECs

As stated previously, Competitive Local Exchange Carriers or CLECs are a byproduct of the Telecommunications Act that lowered regulation of the formerly monopolized telecommunication industry. The "rules" of the Act included language that that allowed the CLECs use of the ILEC infrastructure to compete against them.

⁸ <https://www.ncta.com/cables-story>

These startup companies developed quickly and became a national presence in the late 1990's and 2000's. Many CLECs began building fiber infrastructure and providing service on their own networks. Most were business only focused including companies such as KMC, US LEC, Access Point, and others.

Due to many factors including expensive, insufficient, and dated Incumbent Local Exchange Carrier (ILEC) infrastructure, many CLECs have not been able to make a significant mark in the telecommunications marketplace, especially in rural areas. Most have either merged with other CLECs or have been bought out by the local ILEC. Subsequently there are only a handful of large nationally based CLECs.

Wireless Internet Service Providers (WISPs)

The wireless Internet service provider or WISP is a company that utilizes fixed (as opposed to mobile) wireless technology to connect their customers to the Internet. LARIAT, a non-profit rural telecommunications cooperative founded in 1992 in Laramie, WY, is often cited as the first WISP in the US, "going live" in 2003.⁹ According to BroadbandNow, an industry website based broadband tracking company, there are 1,714 WISPs operating in the US today.¹⁰

WISPs are generally small companies between 2 and 25 employees that utilize mountain top sites, buildings, and wireless and water towers as antenna access points. To reduce costs, WISPs will look to partner with municipalities and others to mount equipment on water towers and other vertical structures. WISPs provide a much-needed service in areas that incumbents have failed to serve.

Fiber Based Providers

Fiber based providers are companies that will either lease fiber from the incumbent or other fiber owners or build fiber to access customers themselves. Since fiber is expensive to install, these types of providers will look for high dollar, long-term contracts for their service from anchor customers that have multiple locations and high bandwidth needs.

Typical anchor customers of the fiber-based provider include local school districts, city and county government, large healthcare systems, and cellular providers. These types of customers help the fiber-based provider recoup a large portion of the initial cost to lease backbone and build additional lateral fiber.

Fiber-based providers are incentivized to enter a marketplace by cheap pole access from municipal or utility organizations for aerial installation and free Right-of-Way access for underground installation to reduce the cost of builds.

9 <https://www.mouser.com/blog/the-origin-and-need-for-wireless-internet-service-providers-wisps>

10 <https://broadbandnow.com/All-Providers>

Fiber-based providers can be business focused or business and residential focused. These providers will access the fiber to deliver services to their customer base.

Fiber to the Home or FTTH is becoming popular across the country with ILECs, CATV and other fiber-based providers using grant dollars and other sources of funding to bring Gigabit speeds to the residential market. In the broadband industry fiber is reviewed as the best solution for providing unmatched bandwidth and reliability. Many consumers are now looking for and even expecting fiber-based connections for any new service they procure.

Cellular Providers and 5G

Cell phones first hit the market in the 1983 and was offered by a company called Ameritech Mobile using the first generation or 1G technology. By 1985, there were 340,213 mobile phone subscribers; today there are almost as many active phones as there are people in the US, with an estimated 300 million in use.¹¹ Phones have evolved from large black boxes installed in be vehicles with hard wired antenna supporting only voice services to the small handhelds we have today.

Today's "smart phones" provide voice, text, Internet access, social media capabilities, and so much more. Current smart phones are nearly one thousand times faster than the Cray-2 Supercomputer of the 1980's and many times faster than the computer on board NASA's Perseverance Rover exploring Mars today.¹²

Initial commercial availability of cellular service did not include provisions for data transmission. Acoustic coupler devices were developed which allowed rudimentary communications across networks. Later, certain manufacturers such as EO and Apple, designed cellular specific terminals utilizing the analog network for rudimentary data communications. The shipping company UPS utilized this technology to deploy a national data collection network in the early 90s.

Mobile data advanced significantly in the mid 90's with the introduction of Cellular Digital Packet Data [CDPD]. This was a hybrid solution allowing digital data to be transmitted in the analog cellular channels, similar to DSL and landline telephones. The advent of fully digital networks (GSM, CDMA, and TDMA), allowed for a complete transition to full packet-based network capabilities of the modern cellular network.

5G stands for Fifth Generation of cellular technology. 5G promises to be a leap in order of magnitude of bandwidth service for data transmission in the cellular industry, with download speeds approaching 1 Gbps. However instead of distant cell 5G will utilize and require a mesh wireless technology setup that will introduce many access points over small areas.

¹¹ <https://www.steelintheair.com/wireless-industry-timeline/>

¹² <https://insights.samsung.com/2020/08/07/your-phone-is-now-more-powerful-than-your-pc-2/>

Cellular companies are currently looking at fiber connected access towers and access points that can be utilized to support 5G. Counties and municipalities across the country are being approached by these providers to make deals to assist in installation of 5G networks to vertical assets – rooftops, poles, and towers and more - ROW agreements and other things. With the changeover occurring in the cellular industry to 5G wireless technology, a large increase in bandwidth to the access point is necessary.

Satellite Providers

Historically satellite service has been a choice of last resort. Satellites that orbit the earth communicate with end user dish antennas pointed at the southern sky - synchronous satellites orbit above the equator - and mounted on the end user's property.

In the past satellite has been hampered by limitations including low bandwidth, expensive install and monthly costs, low monthly data allowances, tree coverage and weather fade. More recently companies such as Viasat and HughesNet offer higher bandwidth service at reasonable costs for bandwidth of 50 Mbps and 25 Mbps download respectively and 3 Mbps upload speeds.

Emerging satellite companies such as SpaceX and Amazon¹³ are promising much higher speeds and low latency supported by low Earth orbit (LEO) satellites. Download speeds between 100 Mb/s and 200 Mb/s and latency as low as 20ms should be available in most locations.¹⁴ In December, SpaceX, the company behind Starlink, took home \$886 million in federal funds to provide service to more than 600,000 locations across the country.¹⁵ Satellite technology, including the new Starlink service requires line of site and is impacted by weather and tree coverage.

Fiber to The Home (FTTH), and Low Earth Orbit Satellite are the current technologies of choice for broadband deployment. Significant rollout of 5G based upgrades by mobile providers is also driving new fiber requirements to link both existing and new cellular sites.

2.6 The Changing Definition of Broadband

A standard for broadband supporting download transmission rates of at least 200kbs was established in 1999. In 2004, the Federal Communications Commission (FCC) continued to use this standard as its definition of broadband. Unlike today, upload speeds were not considered during the development of these initial benchmarks. Business services in region included T1, ISDN, Frame Relay and SONET. Rural areas relied on DSL and satellite with some continuing to use dial-up Internet services.

¹³ <https://www.govtech.com/network/FCC-Approves-Amazons-10-Billion-Plan-for-Satellite-Internet.html>

¹⁴ <https://www.starlink.com/satellites>

¹⁵ <https://www.govtech.com/network/Experts-Closing-the-Digital-Divide-Will-Take-More-than-Satellites.html>

Since 2004, end user bandwidth demand and requirements have accelerated. These significant changes are driven by the accelerated use of the Internet including media intensive applications, increases in virtualization relative to work and education, cloud-based applications and storage and the deployment of television standards such as HDTV and 4K.

During this same period, the FCC has twice updated its definition of broadband. The first of these updates was in 2010 when broadband was redefined as 4Mbps download and 1Mbps upload. Five years later, in 2015, FCC Chairman Tom Wheeler, upped the standard to the current definition of 25 Mbps download and 3 Mbps upload. According to Wheeler at the time the increase was necessary due to “advances in technology, market offerings by broadband providers and consumer demand.”

The COVID-19 pandemic has exposed the nation’s persistent broadband issues including availability, affordability, and speed of service. Remote healthcare, work from home and home-schooling and other applications are driving bandwidth requirements up exponentially. Lack of access in rural areas is getting unprecedented attention with newly announced grant programs from both federal and state agencies. A new standard of 100Mbps download is being discussed among industry experts.

FCC Broadband Progress Report 2020

Every two years the FCC provides a progress report on the state of broadband service in the United States. In the 2020 report, the FCC found that in 2018, 5.6 percent of the American population did not have access to fixed terrestrial broadband service as defined by the FCC, which is 25 Mbps downstream by 3 Mbps upstream.¹⁶ This represents approximately 18.3 million people in the country. The report also found that fixed terrestrial service deployment in rural areas and Tribal lands lags that of urban areas. Over 22% of rural areas do not have access 25 Mbps/3 Mbps or mobile LTE at 10 Mbps/3 Mbps based on provider reported data.

Table 1 Deployment (millions) of Fixed Terrestrial 25/3 Mbps Services

	2014		2015		2016		2017		2018	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
United States	284.2	89.4%	287.9	89.9%	296	91.9%	304.5	93.5%	308.9	94.4%
Rural Areas	37.2	60.3%	38.3	61.5%	43	67.7%	47.0	73.7%	50.1	77.7%
Urban Areas	247.1	96.4%	249.6	96.7%	254	97.7%	257.5	98.3%	258.8	98.5%
Tribal Lands	2.2	57.1%	2.3	57.8%	3	63.1%	2.7	68.1%	2.9	72.3%
Pop. Evaluated	318.0	100.0%	320.3	100.0%	323	100.0%	325.7	100.0%	327.2	100.0%

¹⁶ <https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf>

According to a NY state report, the state ranks 2nd in the country in the citizens having FCC defined broadband or 25/3 Mbps, and 98.7% are considered served.¹⁷

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17 <https://www.osc.state.ny.us/reports/availability-access-and-affordability-understanding-broadband-challenges-new-york-state>

3. Efforts to Close the Digital Divide

Despite the increased need for broadband service, rural areas of the country still rely largely on copper-based infrastructure such as the incumbent telephone companies' unshielded twisted pair copper wire or satellite connections for broadband connectivity.

Unfortunately upgrading copper's limited bandwidth to the high bandwidth capacity of fiber has not been an area of focus for the telecommunications industry. This is due mainly to the high cost of installing fiber and the low population densities of rural areas that create lengthy return on investment models. Furthermore, the incumbent broadband providers are reluctant to invest in expensive telecommunications infrastructure upgrades, which do not show profitability.

Much of the infrastructure in place today in these areas has been in operation for more than 50 years. Most of the telecommunication's industry is focusing elsewhere, with investment dollars being spent in high growth areas such as tier 1 and tier 2 cities, where fiber cable is densely installed. Comparable to the lack of electricity in rural areas of this country before the National Rural Electrification Act of 1936, many areas in New York State are being rapidly left behind.

There are federally subsidized programs to expand local incumbent provider broadband such as the America Rescue Plan Act of 2021, Connect America Fund (also known as CAF), Rural Digital Opportunities Fund (RDOF) and the USDA ReConnect program. However, as broadband is not a publicly regulated service, like telephone service, there are no obligations for the provider to make new broadband investments in unprofitable areas.

Two of the initiatives driving broadband expansion into the rural communities of New York State include the 2016 Charter Communications/Time Warner Cable merger and the "New NY Broadband (grant) Program".

As part of the approval of the Charter Communications/Time Warner Cable merger, New York State required the newly merged company, doing business as Spectrum, to expand services to 145,000 households statewide by 2020. Ultimately, delays in Spectrum construction resulted in a revised schedule requiring the network expansion to be completed by September 30, 2021.

This requirement, intended to help expand the availability of broadband service in the state, will reach many homes but not all. There are claims Spectrum has inflated its expansion results. In Essex County, Lewis Town area, it has been reported that addresses claimed that were served were not.¹⁸

¹⁸ <https://www.timesunion.com/news/article/Charter-claims-Adirondack-internet-hookups-it-15682729.php>

3.1 New NY Broadband Grant Program

Over the past few years and coincidental with the Charter/Time Warner merger, New York State has offered three rounds of grant funding to support the deployment of broadband to unserved and underserved residences and businesses of New York State.

To date, nearly \$43M have been invested in broadband expansion in Herkimer and Oneida Counties through the New NY Broadband Program. Since 2015, six broadband providers have been awarded grants including Frontier Communications, Hughes Network Systems, Newport Telephone Company, Oneida County Rural Telephone, Otsego Electric Cooperative and Verizon. Tables 1 and 2 below show the breakout of New NY Broadband grant and total investment funds by County and provider.

Table 2 New NY Broadband Grant Investment in Herkimer County

Awardee	State Grant	Total Investment	Locations	Pct of Locations	Pct of Investments
Frontier Communications	\$934,113	\$1,167,641	264	5.2%	4.5%
Hughes Network Systems, LLC	\$378,003	\$631,453	2110	41.9%	2.4%
Newport Telephone Company, Inc.	\$8,043,305	\$10,054,133	1651	32.8%	38.7%
Otsego Electric Cooperative	\$718,750	\$1,344,586	169	3.4%	5.2%
Verizon	\$4,370,808	\$12,761,270	840	16.7%	49.2%
Totals	\$14,444,979	\$25,959,083	5,034	100.0%	100.0%

Table 3 New NY Broadband Grant Investment in Oneida County

Awardee	State Grant	Total Investment	Locations	Pct. of Locations	Pct. of Investment
Frontier Communications	\$1,335,989	\$1,877,836	425	12.1%	11.2%
Hughes Network Systems, LLC	\$289,005	\$425,162	1799	51.2%	2.5%
Newport Telephone Company, Inc	\$58,461	\$73,077	12	0.3%	0.4%
Oneida County Rural Telephone	\$3,285,883	\$4,107,359	588	16.7%	24.4%
Verizon	\$3,585,106	\$10,351,188	689	19.6%	61.5%
Totals	\$8,554,444	\$16,834,622	3,513	100.0%	100.0%

3.2 Rural Digital Opportunity Fund (RDOF)

Early last year, the FCC Regional Digital Opportunity Fund (RDOF) program replaced the Connect America Fund better known as CAF. This new \$20.4B grant program is based on two separate reverse or “lowest bid wins” auctions. The first auction was held in October of 2020 and targeted census blocks that are wholly unserved with fixed broadband at speeds of at least 25/3 Mbps.

The four award winners in Herkimer and Oneida Counties were Frontier, Space Exploration Technologies Corporation, or as it is better known, SpaceX, Rural Electric Cooperative (Otsego Electric) and Windstream. The second auction date has not been set.

Frontier, Rural Electric Cooperative and Windstream will be installing fiber to the home to provide a gigabit solution. In 2020, Frontier filed for bankruptcy. The company's restructuring plan to cut more than \$10 billion of debt was approved by a bankruptcy court in August 2020 and Frontier emerged from Chapter 11 in the first quarter of 2021.

SpaceX will be launching and utilizing next generation low earth orbit satellites to provide at least 25/3 Mbps service. This new service is known as Starlink and is currently in beta testing.

The Starlink website states speeds will be between 50Mb/s and 150Mb/s. However, a clear line of site between the Starlink dish and the satellite will need to be available. Unlike terrestrial fixed wireless services, weather can impact the performance of the connection.

The award amount is paid out to the winning bidder as yearly installments over a 10-year period. Under the RDOF rules the service provider winning the award has 3 years to complete 40 percent of their build and 6 years to complete the full build out.

There is concern, because the program allowed competitors to continuously underbid each other, to maintain or gain market share, many areas saw a "race to the bottom" that will potentially produce unsustainable business models.

Many fear that some of the companies that will take the money will not be able to construct the system they have committed to build. In January of this year, a letter signed by 160 Senators and House Representatives urged the FCC to be fastidious with its review and confirm that the winners can deliver on their respective system build out commitments.

Table 4 RDOF Awards in Herkimer County

Awardee	Award	Annual Award (10 Years)	Locations	Pct of Locations	Pct of Investment
Frontier Communications Corporation	\$287,692	\$28,769	1065	80.9%	88.2%
Rural Electric Cooperative Consortium	\$11,776	\$1,178	27	2.1%	3.6%
Space Exploration Technologies Corp.	\$26,880	\$2,688	224	17.0%	8.2%
Total	\$326,348	\$32,635	1316	100.0%	100.0%

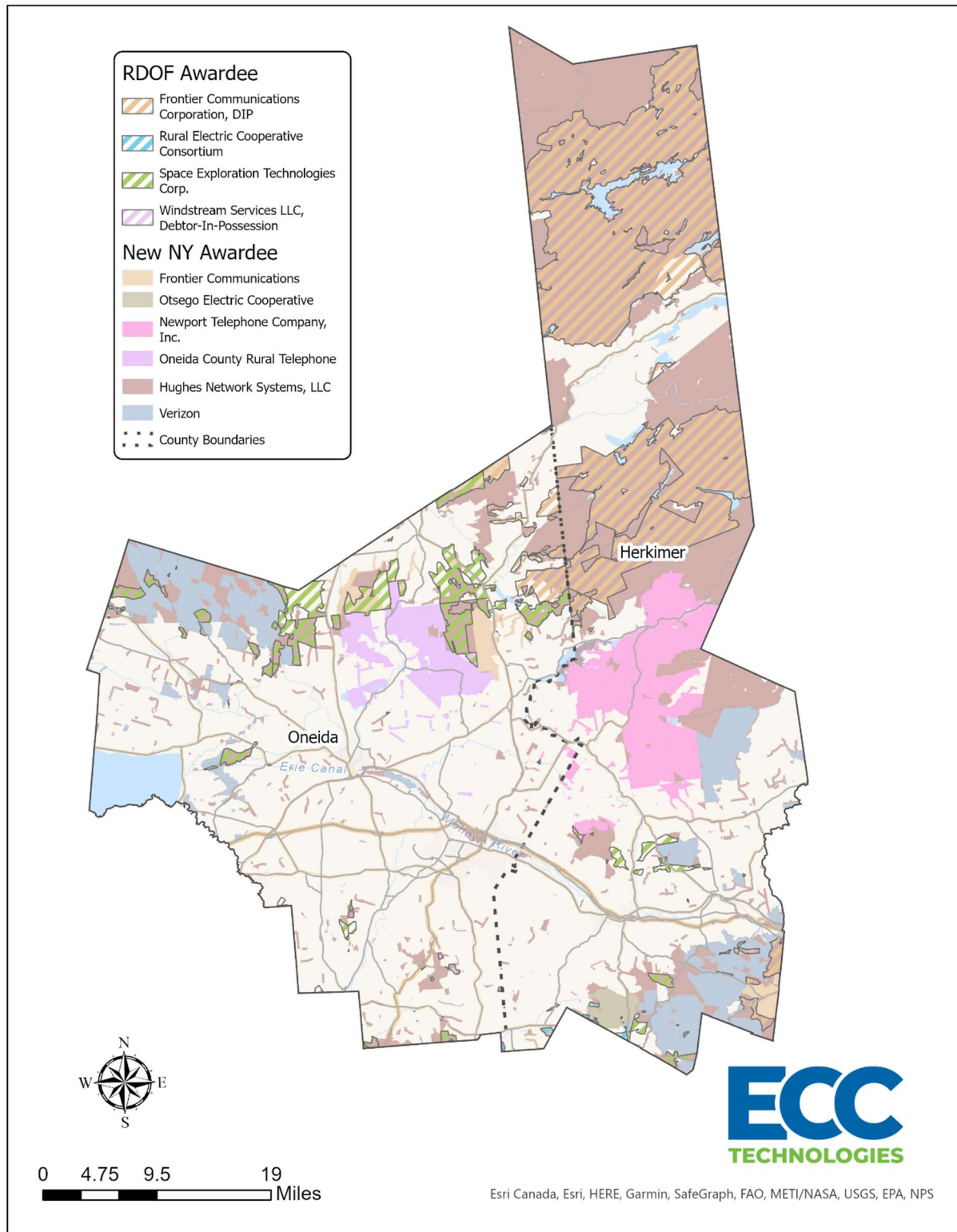
Table 5 RDOF Awards in Oneida County

Awardee	Award	Annual Award (10 Years)	Locations	Pct of Locations	Pct of Investment
Frontier Communications Corporation	\$83,801	\$8,380	376	25.9%	32.5%
Windstream Services LLC	\$3,451	\$345	13	0.9%	1.3%
Space Exploration Technologies Corp.	\$170,874	\$17,087	1065	73.2%	66.2%
Total	\$258,126	\$25,813	1454	100.0%	100.0%

A graphical representation of the census blocks awarded grant funding by the New NY Broadband Grant program and RDOF program is shown in Figure 4 on the next page.

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Figure 4 New NY Broadband and RDOF Grant Awardees



3.3 NTIA – Broadband Infrastructure Program

The National Telecommunications and Information Administration (NTIA) released a notice of funding opportunity on May 19 of this year for the Broadband Infrastructure Program. The program has \$288M in total funding with a minimum request of \$5M and a maximum of \$30M per application. There are no matching funds requirement. The total funding is available to the entire country so competition for this program is expected to be significant. Applications were being accepted until August 17, 2021. Municipalities and Cooperatives are eligible to apply with a private last mile partner.

It is anticipated the infrastructure bill will pass in some form in 2021 which promises to bring upwards of \$65 Billion in funding for Broadband Infrastructure expansion to unserved and underserved areas of the country. A major portion is expected to be overseen by the Commerce Department and its telecom division. The National Telecommunications and Information Administration (NTIA) will be responsible for making grants to states.

3.4 American Rescue Plan (ARP) Funding

On March 11, 2021, a national based \$1.9 trillion COVID-19 relief package was signed into law. Included in this funding is money that can be used for broadband infrastructure development at state and local levels.

The federal government carved out \$350B in what it calls the Fiscal Recovery Fund. This fund is split 60% for the states and 40% for local government. In dollars that equates to \$219.8 billion that will be distributed to states, as well as the \$130 billion for local governments and counties.

COVID also had personal impacts including shopping (ordering food and items for delivery or curbside pickup) and entertainment (video streaming, online gaming, social media). Fixed broadband traffic increased up to 60%, voice traffic increased up to 130% and Wi-Fi calling increased up to 80%.⁵

State and local governments can use some of this funding money to meet local needs including broadband development. The US funding response to COVID has provided what many are calling a once in a lifetime opportunity to tackle the rural area digital divide. Since this money is tied to federal funds there are federal rules that will apply.

Dated June 24, 2021, the Interim Final Rule states eligible projects to reliably deliver minimum speeds of 100 Mbps download and 100 Mbps upload. In cases where it is impracticable due to geographically and financially feasible the speeds can be 100/20 Mbps with the ability to upgrade.

Underserved areas are defined as locations where they do not have wireline connection that reliably delivers at least 25 Mbps download speed and 3 Mbps of upload speed. The term reliably has yet to be defined. Through this program, it is not expected that all homes in designated unserved or underserved areas will be served.

All costs of projects must be incurred by December 31, 2024. Overall project completion dates must be no later than the end of December 2026 for projects funded with the Fiscal Recovery Funds. Funds may be used for middle mile and/or last mile projects, with a focus on getting last mile services put in place.

4. Broadband Inventory

This section of the report is a result of the field inventory and secondary research data collected pertaining to broadband providers in Herkimer and Oneida Counties. The field inventory includes to the extent possible the broadband service providers and their supporting landline and wireless infrastructure in the two-county region. The data collected includes all relevant service providers including the incumbent service providers, the competitive service providers, the wide area network providers, and others. The report breaks out a section on Herkimer County followed by a section for Oneida County.

Each section will include additional information on specific provider infrastructure including fiber, wireline boundaries, Central Office locations, and wireless towers.

Voice, video, and data services are provided to the region's residents and businesses by a variety of companies using a range of technologies and infrastructures. Services can be provided over copper wire, coaxial cable, fiber optic cable, wireless technologies, and via satellite.

The incumbent telephone companies, or ILECs (incumbent local exchange carriers) and the incumbent cable TV providers are the primary owners of telecommunications infrastructure within the region. There are also a number of CLECs (Competitive Local Exchange Carriers) focused on businesses only, alternative fiber owners, three satellite providers, and several cellular companies.

Each of these providers uses different methods of delivering services to their customers, resulting in varying speeds and reliability. Typically, fiber provides the fastest, most reliable speeds, while coax, copper wire, wireless, and satellite provide the lowest and least reliable.

Copper wire is an older technology with limitations inherent to its structure; wireless speed and reliability are dependent on distance from the infrastructure and clear line of site; satellite can be compromised by weather or obstacles like foliage. These factors are important to bear in mind when determining whether businesses and residents truly have adequate access to effective Internet services.

5. Herkimer County Inventory

This section is an introduction to the major providers and different types of infrastructure used in Herkimer County to deliver broadband service. A summary map that shows the available and important infrastructure is also included.

The broadband providers in Herkimer County are delivering service to homes, businesses, and other organizations at varying degrees of access, performance, and cost. The infrastructure in use by the industry include landlines consisting of copper, coaxial, fiber optic, or wireless based technology utilizing strategically placed towers and satellite.

To begin the analysis of Herkimer County, it is important to understand what and where the providers claim to provide service. According to the FCC 477 data, the following two maps show the maximum advertised download speeds offered to customers in respective census blocks. Figure 5 represents the speeds offered by the ILEC's in the county. Figure 6 represents the speeds offered by the Cable TV provider.

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Figure 5 FCC 477 Data Showing ILEC Maximum Advertised Download Speeds

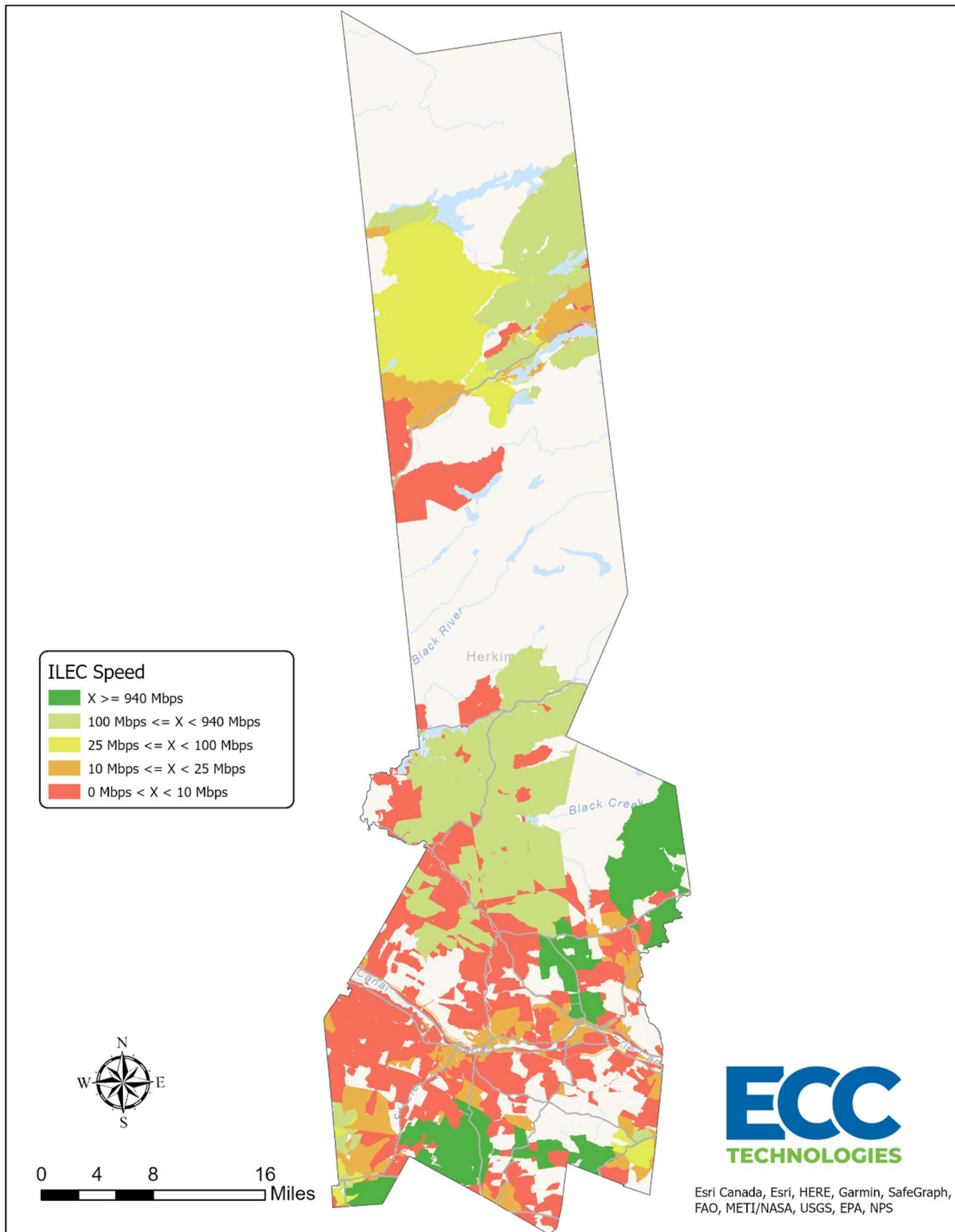
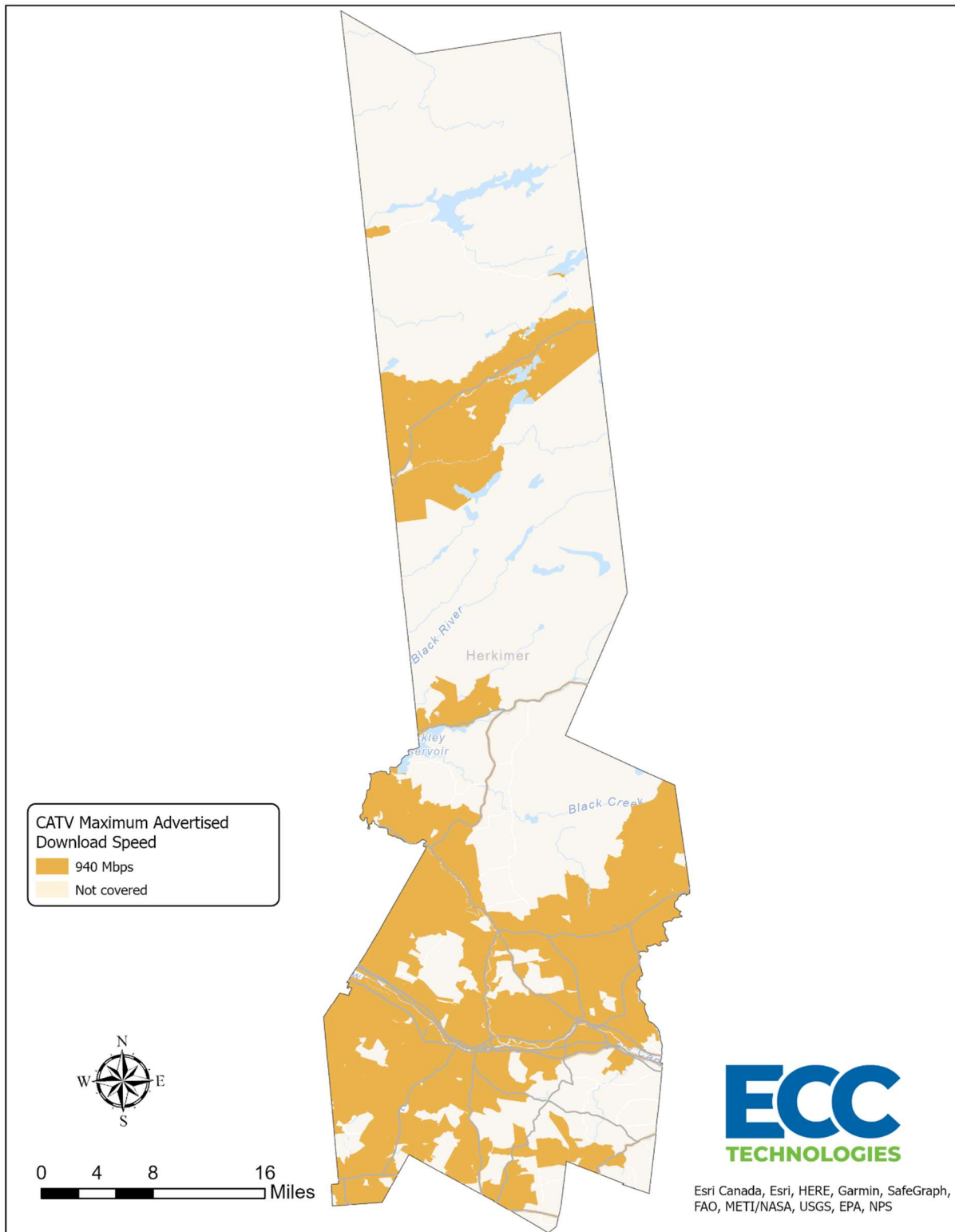


Figure 6 FCC 477 Data of CATV Maximum Advertised Download Speeds in Herkimer County



5.1 Incumbent Local Exchange Carriers (ILEC's)

The telephone company, or ILEC (incumbent local exchange carrier) and the incumbent cable TV providers are the primary owners of telecommunications infrastructure within the County. There are also several Competitive Local Exchange Carriers (CLECs) – all but one focused on businesses services only. There are no Wireless Internet Services Providers (WISP's) identified as serving the County. However, three satellite providers, and several cellular companies offer services within Herkimer County.

The wireline infrastructure for Herkimer County is primarily owned and operated by Incumbent Local Exchange Carriers (ILEC's) which include Frontier Communications, Newport Telephone Company, Verizon, and Windstream. Frontier has two Central Offices located within Herkimer County while 9 central offices are located outside of the County but provide services to customers within the County. Newport telephone has three Central Offices serving the County. Verizon has eight Central Offices servicing Herkimer County. However, only five are located within the County boundaries. Windstream has one CO located within the County.

Below in Table 6, is a chart based on the 477 reporting that shows the different providers in the County and the type of service they are providing by number of census blocks. This chart does not include cellular or satellite providers. Note the codes and definitions of service type can be found in Appendix A.

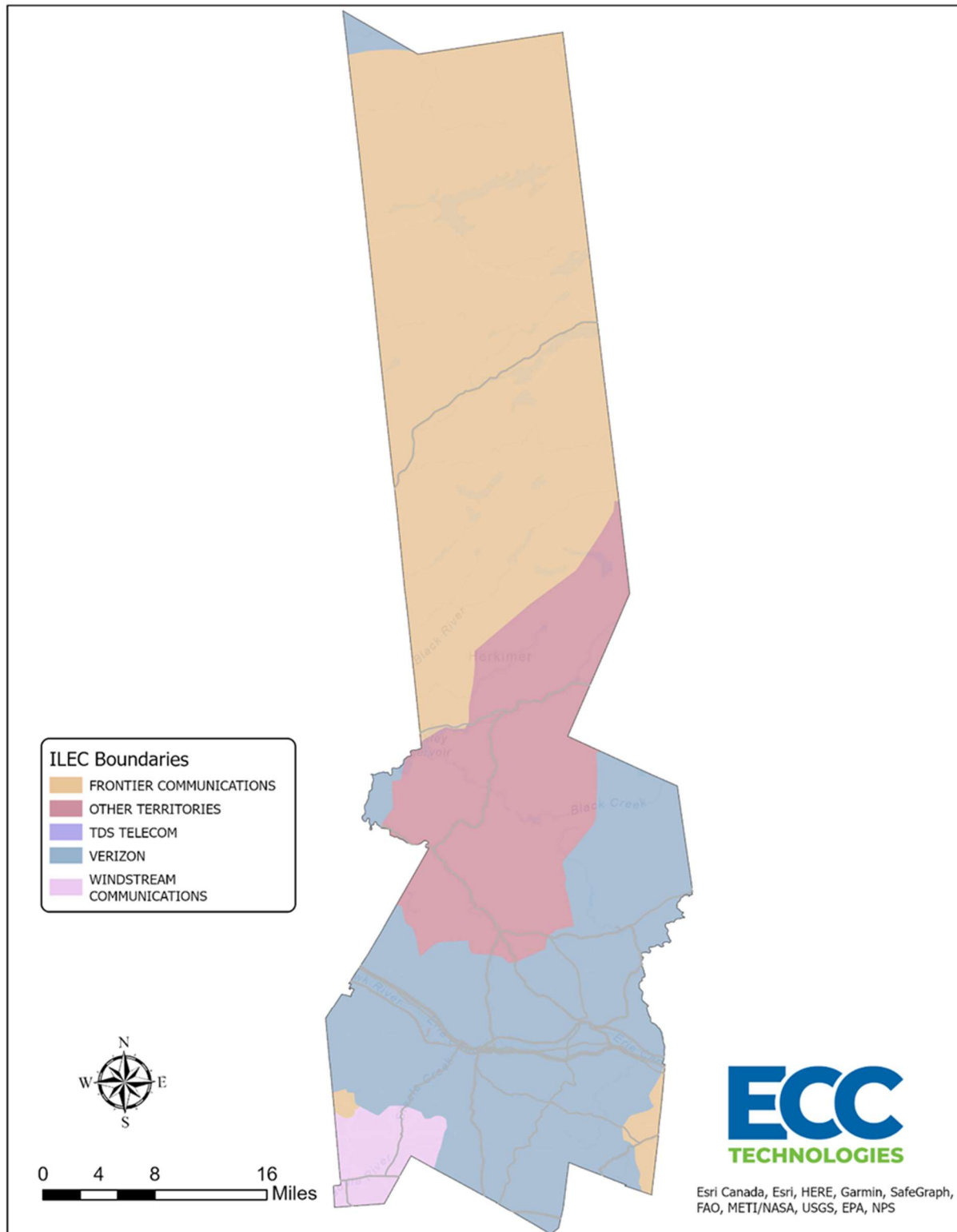
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Table 6 Providers in Herkimer County by Type of Service and Number of Census Blocks Served

Type of Org.	Business Only	Provider Name	10-DSL	11-DSL	12-DSL	30-other copper	43-Coax	50-Fiber	70-Fixed Wireless
CLEC	X	Broadview Networks Holdings, Inc. (Windstream)				1			
Cable		Charter Communications					2397	77	
CLEC	X	Crown Castle Fiber LLC						3	
CLEC	X	EarthLink Business, LLC (Windstream)	1					1	
CLEC	X	FirstLight Fiber						11	
ILEC		Frontier Communications Corporation	238	272	138			12	
CLEC	X	InterGlobe Communications, Inc.				1			
CLEC	X	Level 3 Communications, LLC (CenturyLink)				2		2	
CLEC	X	MCI Communications Corporation (Verizon)				5			
CLEC		Newport Telephone Company, Inc.(Middleburgh Telephone)	507					214	
CLEC	X	Northland Networks (Oneida County Rural Telephone)						524	
CLEC		OEConnect, LLC (Otsego Electric Cooperative)						68	
CLEC	X	PAETEC Communications, Inc. (Windstream)		11				3	
ILEC		Verizon New York Inc.	1145					36	
ILEC		Windstream New York, Inc.	73	62	88				

A discussed earlier in the report, the ILEC is responsible for development and maintenance of the cabling and switching equipment needed to deliver local telephone and broadband related services to the communities in their territory. Figure 6 shows the ILEC's and their respective service territories in Herkimer County.

Figure 7 Herkimer County ILEC's and Service Territory Map



The table below describes the telecommunications services currently available at each of the ILEC's Central Offices. These services are supported by the switch technology at the location of the Central Office and may or may not be available to a customer within the exchange. The service is dependent upon the cabling infrastructure available and the distance from the serving Central Office. The service information is based on the provider's 477 reporting as of June 2020.

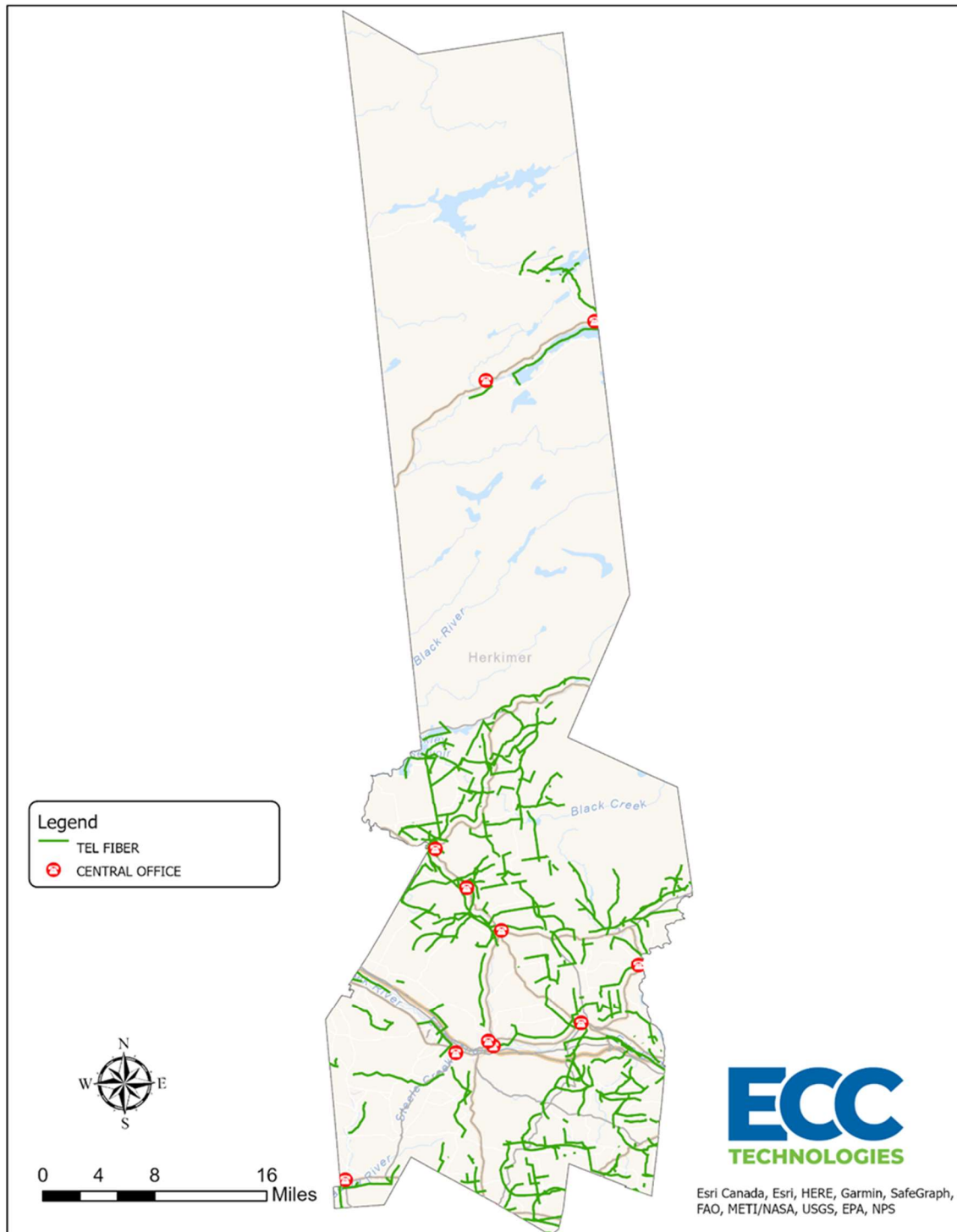
Table 7 Herkimer County Central Offices with Services

Central Offices		Copper	Fiber	Future RDOF Awarded
Frontier Communications	Locations	DSL	FTTH	Fiber
CROGHAN (Out of County)	6920 Bank St	115 Mbps		1 Gigabit
CLAYVILLE (Out of County)	2298 DEWING AVE	12 Mbps		
EAGLE BAY	RTE 28	115 Mbps		1 Gigabit
FORESTPORT (Out of County)	12218 WOODHULL RD	115 Mbps		
FORT PLAIN (Out of County)	MOHAWK ST & CENTER ST	70 Mbps		
LONG LAKE (Out of County)	LAKE RD	115 Mbps		
LOWVILLE (Out of County)	SHADY AVE	25 Mbps		
LYONS FALLS (Out of County)	6819 McAlpine St	25 Mbps		
OLD FORGE	3057 STATE ROUTE 28	115 Mbps		
REMSEN (Out of County)	9624 LINCOLN AVE	25 Mbps		
ST JOHNSVILLE (Out of County)	MECHANIC ST	70 Mbps		
Newport Telephone Co	Locations	DSL	FTTH	
MIDDLEVILLE	MIDDLEVILLE	400 Mbps	500 Mbps	
NEWPORT	3077 BRIDGE ST	400 Mbps	500 Mbps	
POLAND	POLAND	400 Mbps	500 Mbps	
Verizon	Locations	DSL	FTTH	
BARNEVELD (Out of County)	128 MAPPA AVE	15 Mbps		
DOLGEVILLE	N SIDE HELMER	15 Mbps		
HERKIMER	203 N PROSPECT ST	15 Mbps		
ILION	60 MORGAN ST	15 Mbps		
LITTLE FALLS	N WILLIAMS ST	15 Mbps		
RICHFIELD SPRINGS (Out of County)	16 W James St	15 Mbps		
YORKVILLE (Out of County)	1 W WHITESBORO ST	15 Mbps		
WILLOWVALE (Out of County)	RED HILL	15 Mbps		
Windstream	Locations	DSL	FTTH	
WEST WINDFIELD	MAIN ST	200 Mbps		

FCC Form 477-based services information was reported by carriers prior to the award of the fiber to the home grants. Since the providers have committed to 1 Gigabit service, that bandwidth speed will be available in the future, or already is offered in those select areas.

On the following page is Figure 7, an ILEC map, showing the four main providers' fiber infrastructure and Central Offices. Based on this map, the general availability and level of Internet service provided by the ILECs can be made. As with all the outside plant (OSP) field generated maps, this map is considered confidential information and careful consideration should be given before it is copied or distributed.

Figure 8 ILEC Fiber and Central Office Infrastructure



Frontier

Frontier is the incumbent telephone company for the northern third of Herkimer County. Frontier has two Central Offices that serve the County. According to their website and the FCC 477 database, Frontier can provide DSL and some fiber based residential Internet service that ranges from 1 to 115 Mbps down depending on customer location, as well as phone and TV service (DISH).

According to the New NY Grant website, Frontier has received over \$934K in state grant funds to provide FTTH service in previously underserved areas of the County. Table 8 below is a chart that lists the grant award, total investment, and number of homes to be served by Frontier in Herkimer County.

Table 8 New NY Broadband Grant Awards by Town in Herkimer County

Location	State Grant	Total Investment	Locations Addressed
Danube	\$28,306	\$35,383	8
Stark	\$321,986	\$402,482	91
Webb	\$583,821	\$729,776	165
Total	\$934,113	\$1,167,641	264

Table 9 identifies the RDOF award of over \$2.9M to service 1,065 addresses with fiber to the home internet service in Herkimer County.

Table 9 RDOF Grant Award to Frontier In Herkimer County

RDOF Awardee	Locations	Assigned Support (10 years)
Frontier Communications Corporation	1,065	\$2,982,815.17

Newport Telephone Company

Newport Telephone Company is one of New York States oldest independent telephone companies. Founded in 1913, Newport Telephone Company serves approximately 240 square miles in Herkimer, Oneida, and Hamilton Counties. Newport Telephone Company is the incumbent telephone company for the central third of Herkimer County. The company has three Central Offices that serve the County. According to their website and the FCC 477 database, Newport Telephone can provide DSL up to 6Mbps and some fiber based residential Internet service with speeds up to 400 Mbps down depending on customer location, as well as phone service.

According to the New NY Grant website, Newport Telephone Company has received over \$8M in state grant funds to provide FTTH service to 1,651 homes in previously underserved areas of the County. Table

10 below lists the grant award, total investment, and number of homes to be served by Newport Telephone Company in Herkimer County.

Table 10 New NY Broadband Grant Awards to Newport Telephone Company by Township

Location	State Grant	Total Investment	Locations Addressed
Fairfield	\$365,383	\$456,729	75
Herkimer	\$24,359	\$30,449	5
Newport	\$326,409	\$408,011	67
Norway	\$1,958,455	\$2,448,069	402
Ohio	\$3,468,706	\$4,335,883	712
Russia	\$1,797,686	\$2,247,108	369
Schuyler	\$102,307	\$127,884	21
Total	\$8,043,305	\$10,054,133	1651

Verizon

Verizon's corporate headquarters is in New York City with a regional business office located in Syracuse, NY. Verizon is the incumbent telephone company that covers the southern third of Herkimer County.

Verizon offers voice, data services, DSL, cloud services and managed network services to the businesses and residents in their area of the region.

Verizon offers service from their five Central Offices (CO's) in the region.

According to the FCC report, Verizon offers DSL services of up to 15 Mbps in the County.

Table 11, on the following page, shows funds awarded to Verizon through the New NY Grant, which were over \$4.3M. In addition, the table shows Verizon's total investment of over \$12.7M including the grant dollars and then the number of addresses to be serviced.

Table 11 New NY Grant Awarded to Verizon in Herkimer County

Location	State Grant	Total Investment	Locations Addressed
Columbia	\$88,457	\$231,139	17
Danube	\$822,128	\$2,395,876	158
Fairfield	\$364,234	\$1,138,461	70
Herkimer	\$5,203	\$13,005	1
Little Falls (C)	\$15,610	\$38,893	3
Little Falls (T)	\$218,540	\$631,171	42
Manheim	\$244,557	\$749,055	47
Salisbury	\$515,131	\$1,525,437	99
Stark	\$842,942	\$2,518,805	162
Warren	\$1,254,006	\$3,519,428	241
Total	\$4,370,808	\$12,761,270	840

Windstream

Windstream has its headquarters in Little Rock, Arkansas and they have a business office in Syracuse, NY. Over the past number of years Windstream has bought several CLEC's including EarthLink, Paetec, and Broadview, resulting in ownership of long-haul fiber as well as local access. They provide Internet service as well as phone and TV service (DISH) to a very small section of Herkimer County near the Southwest corner of the County in the town of Winfield. Windstream exited Chapter 11 bankruptcy in September 2020.

Windstream has one central office in the County. According to their website and the FCC 477 database, Windstream can provide DSL based residential Internet service that ranges up to 200 Mbps down.

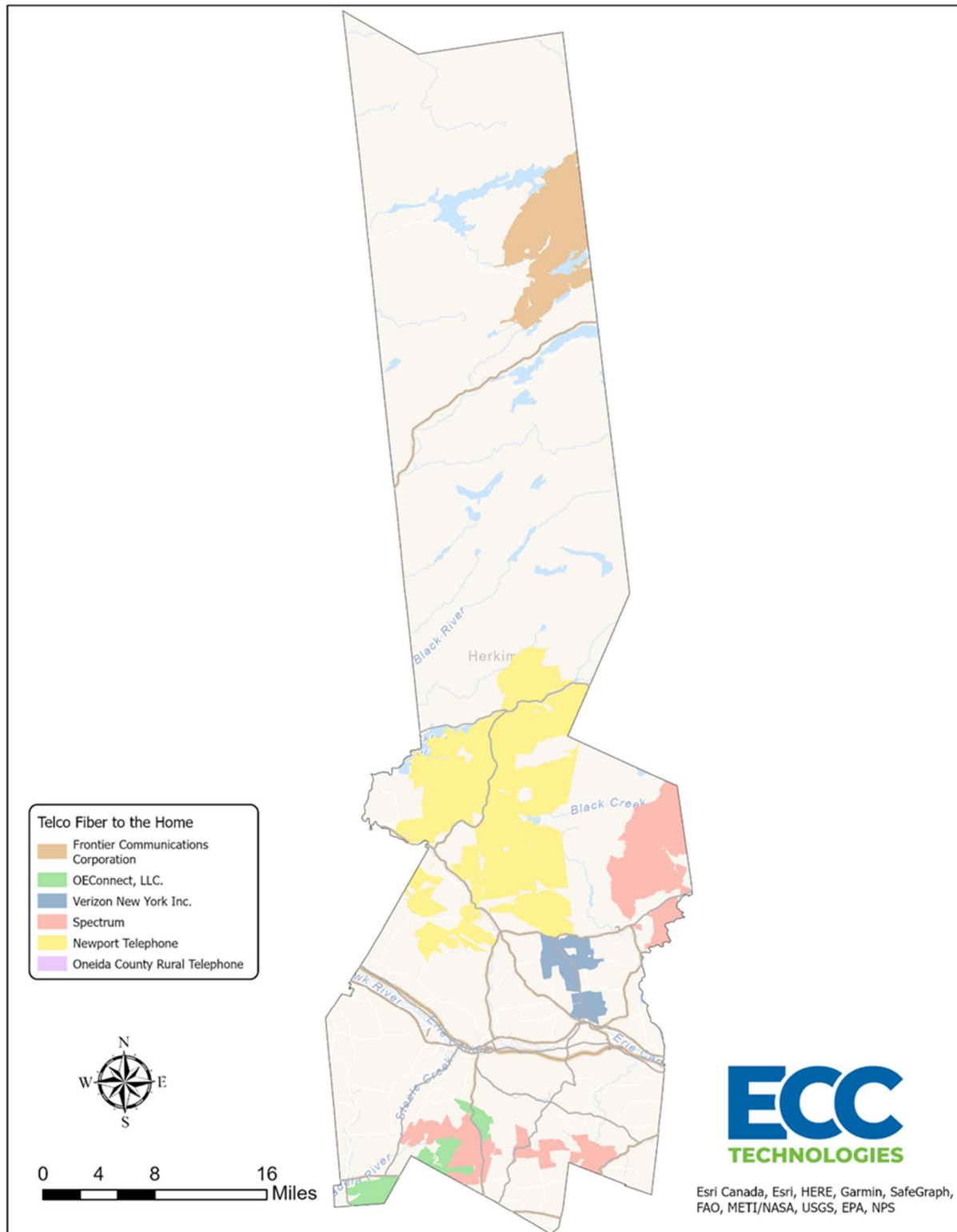
Telephone Company Fiber to the Home Areas

The map on the next page illustrates the areas where Fiber to the Home infrastructure has been constructed within the County based on 477 reporting. These installations are primarily in the TDS Telecom and Verizon areas. However, Frontier has a small footprint in the town of Victory. For these areas, fiber based last mile infrastructure allows for any future level bandwidth service an end user might require.

New Visions Communications also has FTTH in the County and is covered later in this section.

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Figure 9 FTTH areas in Herkimer County



5.2 Competitive Local Exchange Carriers (CLECs)

CLECs are telephone companies created to compete with the Incumbent Local Exchange Carriers (ILECs). CLECs arose because of the Telecommunication Act of 1996, which was intended to promote competition among long distance and local phone service providers.

The term is used to differentiate between new or potential competitors and established local exchange carriers. ECC identified eight CLEC type companies in Herkimer County. These CLECs include AT&T, FirstLight, Development Authority of the North Country (DANC), ION, Northland Communications (OCT Oneida County Rural Telephone), (Verizon) under the name MCI and Otsego Electric Co-operative. It should be noted that some of the CLEC fiber infrastructure was not tagged and could not be identified in the field. We have still included the infrastructure on our maps.

Otsego Electric Cooperative

Otsego Electric Cooperative (OEC) operates in the very southern portion of Herkimer County in the towns of Columbia and Winfield. They offer fiber to the home services under the name OEConnect. Residential plans start with Basic 100Mbps service, Family Plan at 250 Mbps and the Ultimate Gig Plan at 1Gbps. Otsego Electric Cooperative was awarded \$718,750 in grant funding to expand FTTH service to 169 locations. Table 12 shows the addresses, grant award and total investment by town of the New NY Broadband Grant program awarded to OEC.

Table 12 New NY Broadband Grant Awarded to OEC

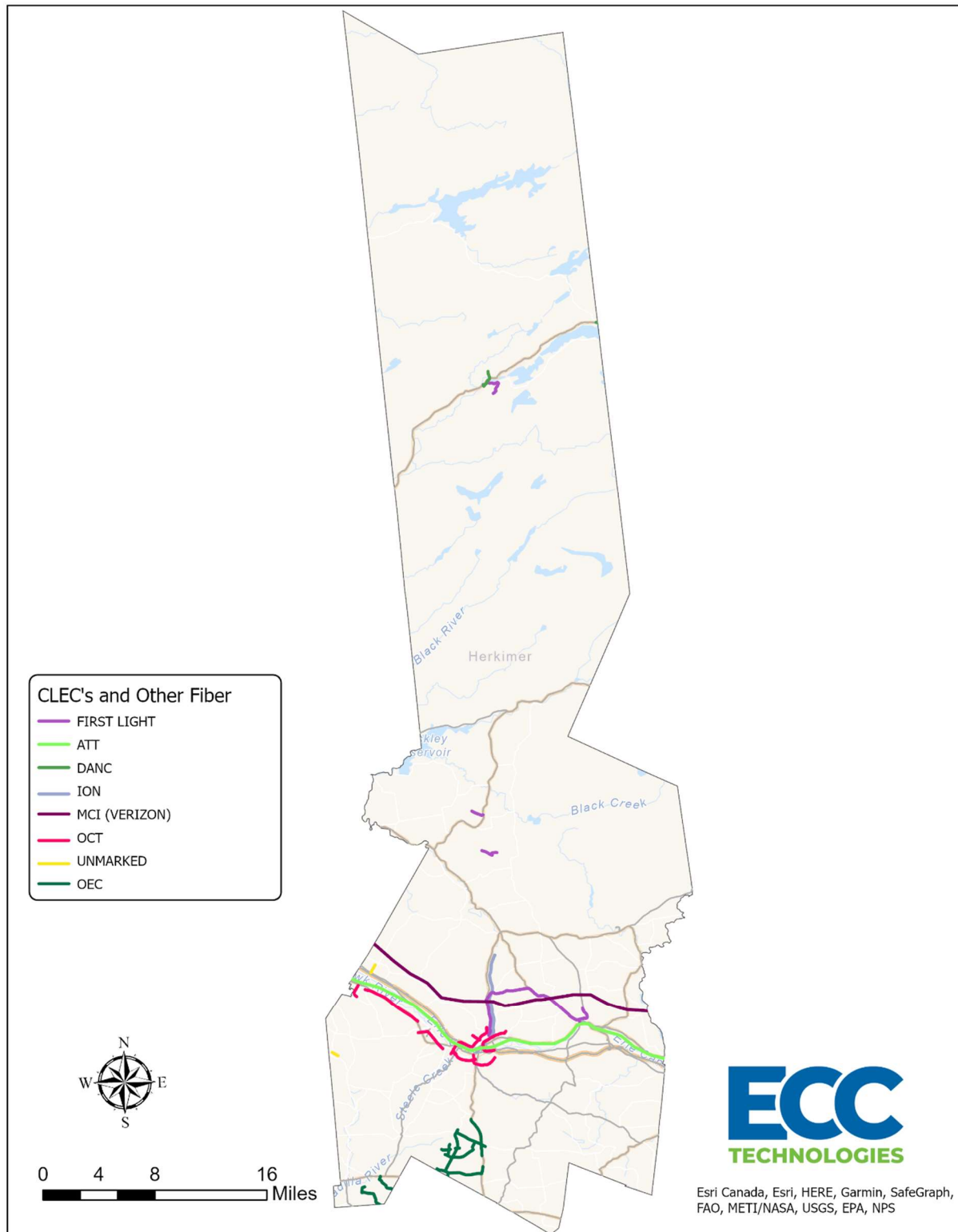
Location	State Grant	Total Investment	Locations Addressed
Columbia	\$634,253	\$1,235,440	155
Winfield	\$84,497	\$109,146	14
Total	\$718,750	\$1,344,586	169

OEC also was awarded \$158,502 to provide FTTH to 39 addresses in Herkimer County through the RDOF program.

The map of Figure 9, on the next page, shows the different CLECs operating in Herkimer County.

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Figure 10 CLEC's Operating in Herkimer County



5.3 Cable TV Broadband Provider

Cable providers, like all service providers, will typically build and provide new service where they deem it profitable. Should a company or residential customer purchase a service in an outlying area, and be willing to pay for the installation, the cable provider will expand access, providing service along that new route to businesses and residents. Cable providers offer their service via fiber optic or coaxial cable. Spectrum Communications (formerly Charter) is the cable TV provider offering services in Herkimer County.

Spectrum (Charter)

Spectrum is a national cable TV provider provides commercial and residential triple play services of voice, Internet, and cable TV. They are the largest provider of this type in the region.

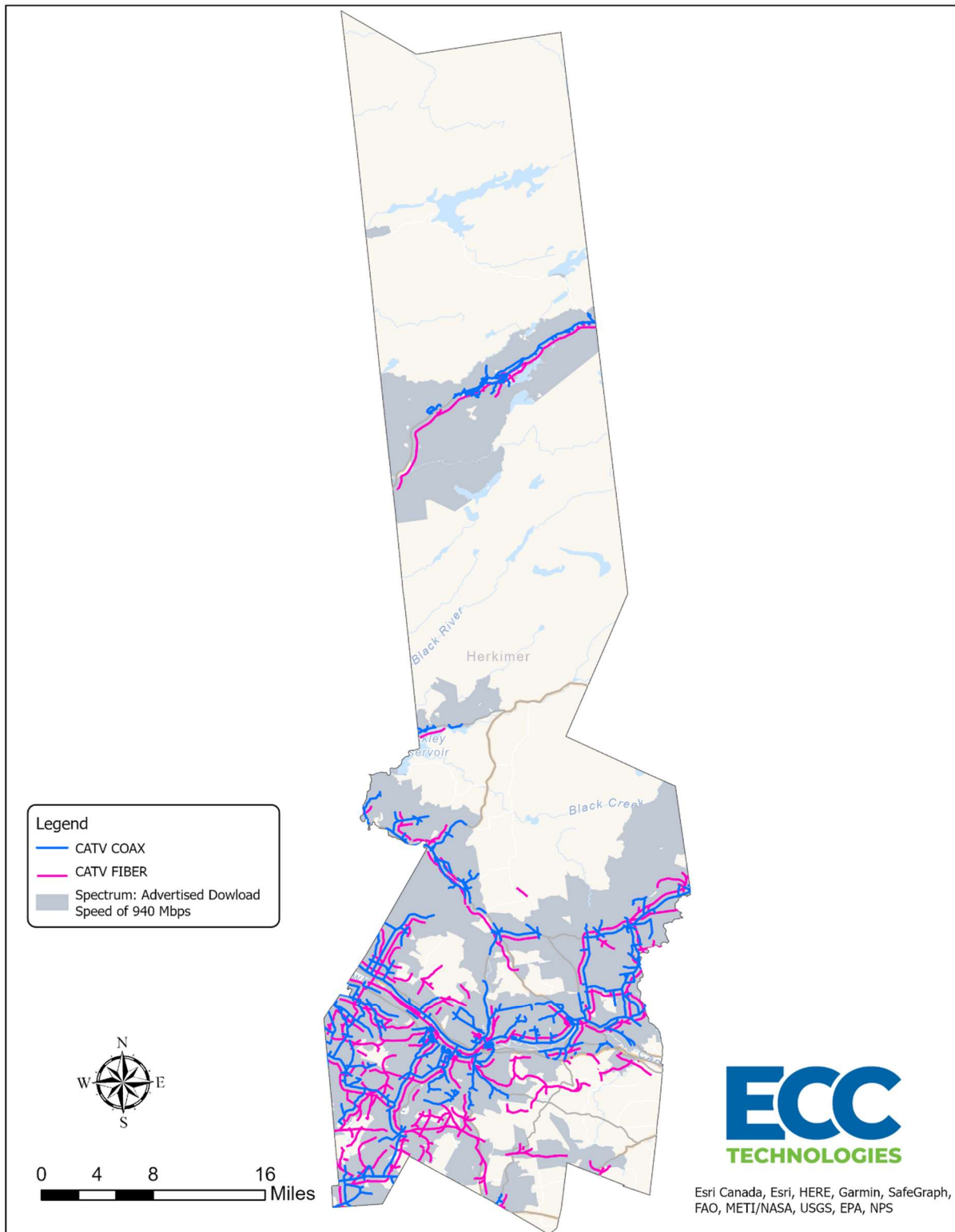
According to their website, Spectrum provides residential triple play services of voice, Internet and cable TV at prices starting at \$103 per month in the area. Business service costs are provided on an Individual Case Basis (ICB) and typically include installation fees. Spectrum's 477 based info states they provide up to 940 Mbps service in their territory.

As part of the Charter Communications/Time Warner Cable merger that formed Spectrum, New York State required Spectrum to expand its network to pass 145,000 unserved and underserved homes in rural areas of the State. As of July 19, 2019, Spectrum had expanded its service area to 65,000 of the required 145,000 homes. Though not made publicly available, Spectrum has been given until September 2021 to complete its expansion by the State of New York.

Figure 11 shows the Spectrum service area with the fiber optic and coaxial infrastructure identified in the field inventory.

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Figure 11 CATV Service Area and Infrastructure in Herkimer County



5.4 Wireless Tower Structures

Wireless technologies are the fastest growing segment of the telecommunications industry. Wireless infrastructure supports cell phones, pagers, personal digital assistants (PDAs), mobile data terminals, messaging, and Internet services. Wireless antennas or access points are located on wireless towers, tall buildings, and even water towers throughout the region. In some instances, the wireless infrastructure installed can offer connectivity in areas where landline infrastructure cannot. A chart showing the number of towers in each county by owner can be found at the end of this section.

There are 44 wireless tower structures identified either through field inspection, GIS database research, or registered with the FCC data base. Of all the tower sites identified, there are 33 wireless towers registered on the FCC website.

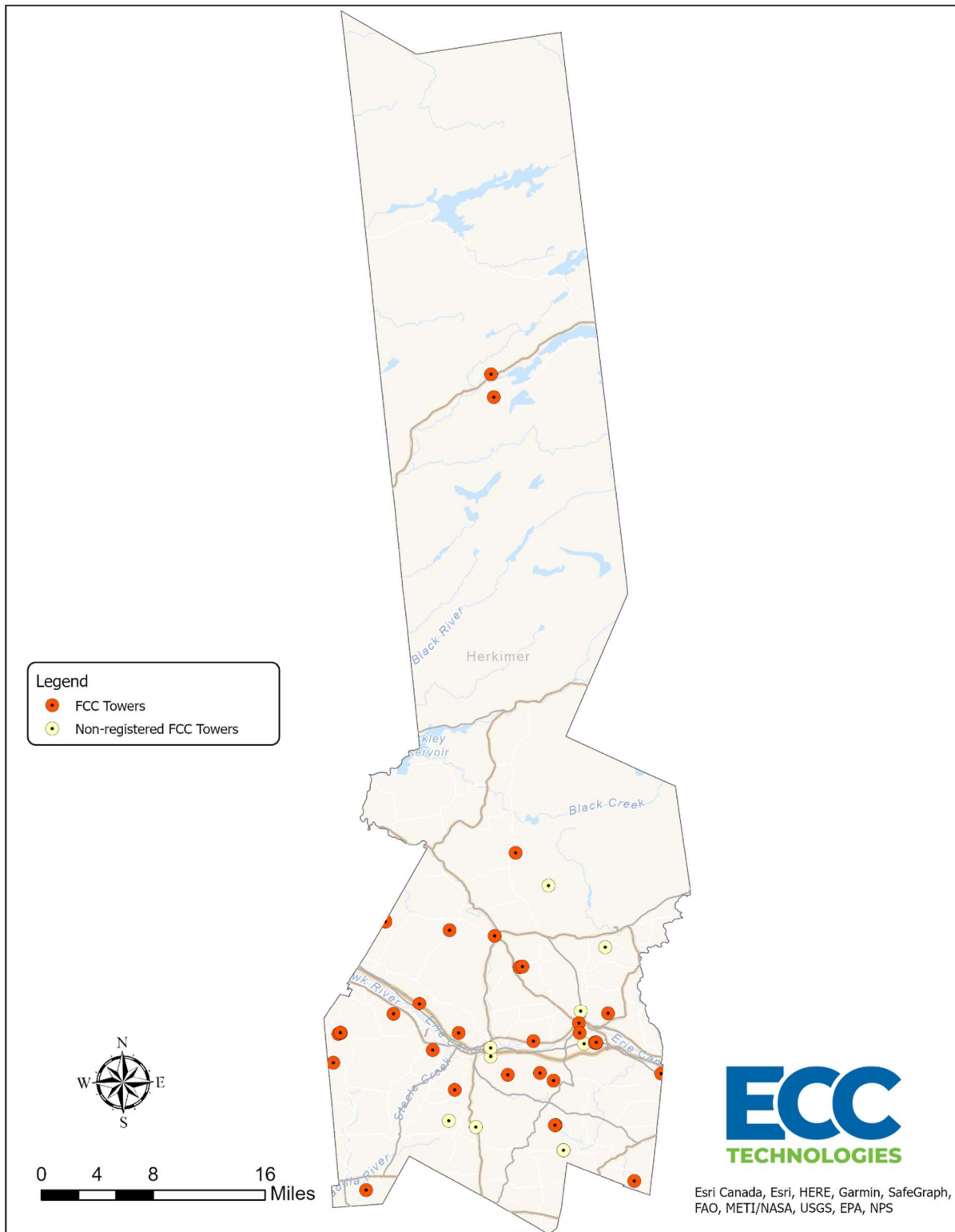
Many of the towers are located alongside major roadways and population centers, with the highest concentration of towers installed in and around major transportation routes including Interstate 90, Routes 28 and 29.

The height of the FCC registered towers is up to 324 feet above ground. Owners of the registered wireless towers in the County are shown in Table 11 below. Figure 12 on the next page shows the locations of towers in Herkimer County.

Table 13 Herkimer County Communications Towers Registered with the FCC

Owner Name	Herkimer
Adaptable Commercial Properties, Inc	1
American Towers LLC	9
AT&T Mobility Spectrum LLC	1
CCATT LLC	2
Central New York News, Inc.	1
CORNEYS ELECTRONICS INC	1
County of Herkimer	1
Crown Atlantic Company LLC	3
Crown Castle International	5
Eastern Gas Transmission and Storage, Inc.	1
Galaxy Utica Licensee LLC	1
GENERAL COMMUNICATIONS CONSULTING CORP.	1
Horvath Towers V, LLC	2
Mars Hill Broadcasting	1
PI Tower Development, LLC c/o LendLease Americas, Inc	1
Roser Communications Network, inc.	2
SBA COMMUNICATIONS	2
SBA Towers, LLC	1
SBA Towers II LLC	1
SectorSite Tower Assets, LLC	1
Tennessee Gas Pipeline Company L.L.C.	1
TowerNorth Development, LLC	1
Vertical Bridge Towers III, LLC	1
WKTV, LLC	1

Figure 12 Communications Towers in Herkimer County



Below are examples of two vertical structures in the region. These pictures are linked to the GIS mapping information and are important to Wireless Internet Service Providers (WISPs) and others as they highlight availability of vertical assets that could support the installation of antennas and access point equipment. This information will be provided electronically to MVEDD.

Figure 13 Guyed Lattice Pole Tower



Figure 14 Lattice Tower



5.5 Cellular Providers

There are three national cellular service providers with complete or partial coverage in Herkimer County with varying connection speeds. The providers' website coverage maps for AT&T Wireless, T-Mobile, and Verizon Wireless. They provide 5G and 4G LTE coverage.

Cellular providers use radio frequencies to complete phone calls, send text messages, and transmit data from the nearest cell tower to the phone in use. Antennas on the towers both transmit and receive signals from mobile phones.

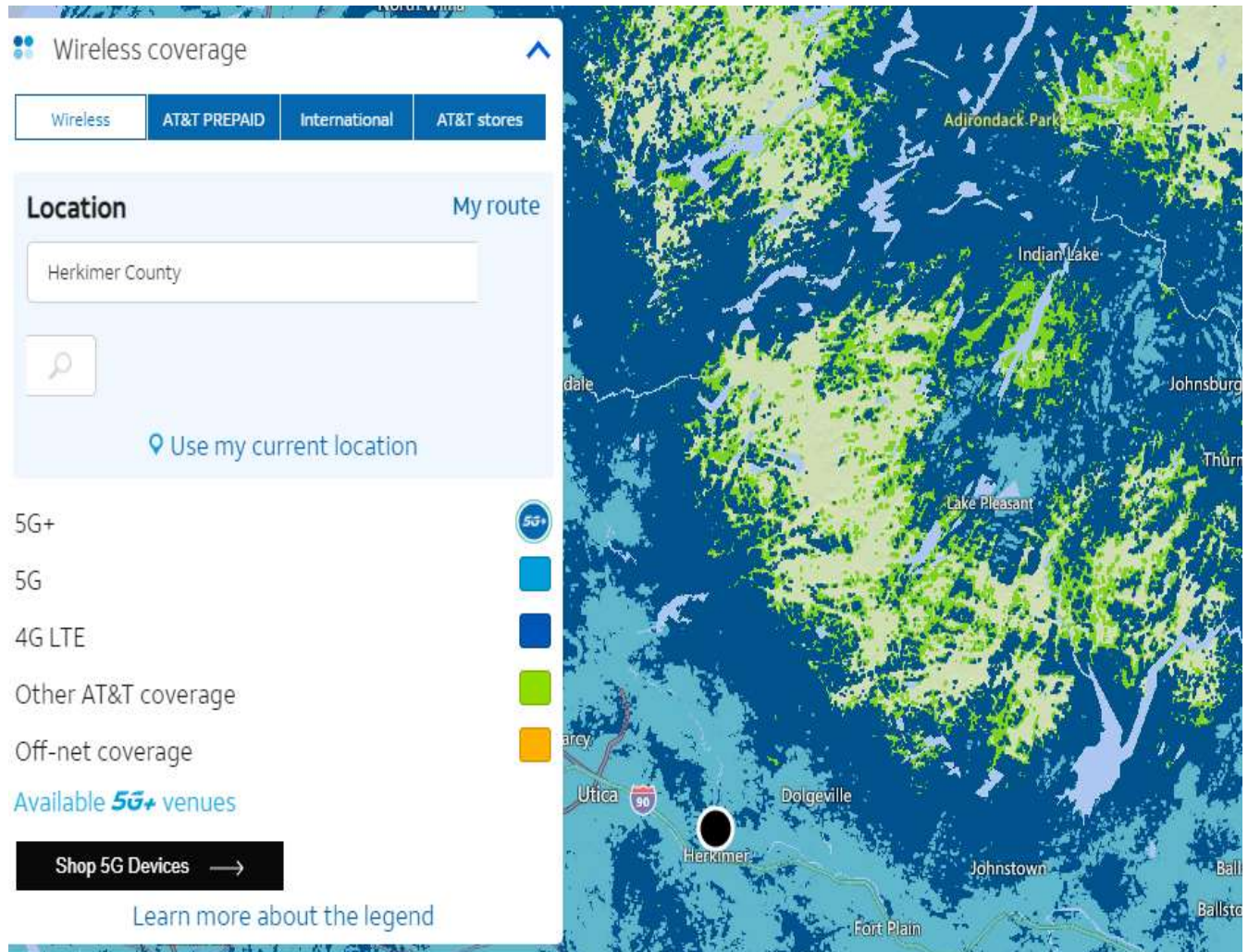
Cellular signals can be impacted by distance of the phone from the tower, building wall thickness, hills, or other structures. Clear line-of-sight is not necessary for cellular service to work but will increase call clarity and data transmission speed.

Each respective provider's website shows their 5G, mm Wave 5G and 4 G service availability areas. AT&T has complete 4G coverage with 5G in most of the County. AT&T does not offer 5G+ in Herkimer County yet.

T-Mobile has 5G Ultra coverage throughout the central area with 5G Extended, 4G and 3G/2G elsewhere. There are some small areas of no coverage along the southern border of the County.

Verizon has 5G Nationwide coverage in most of the county and 4G elsewhere of the County. They have not yet deployed their 5G Ultra-wideband service yet in the County.

Figure 15 AT&T Cellular Coverage Map in Herkimer County¹⁹



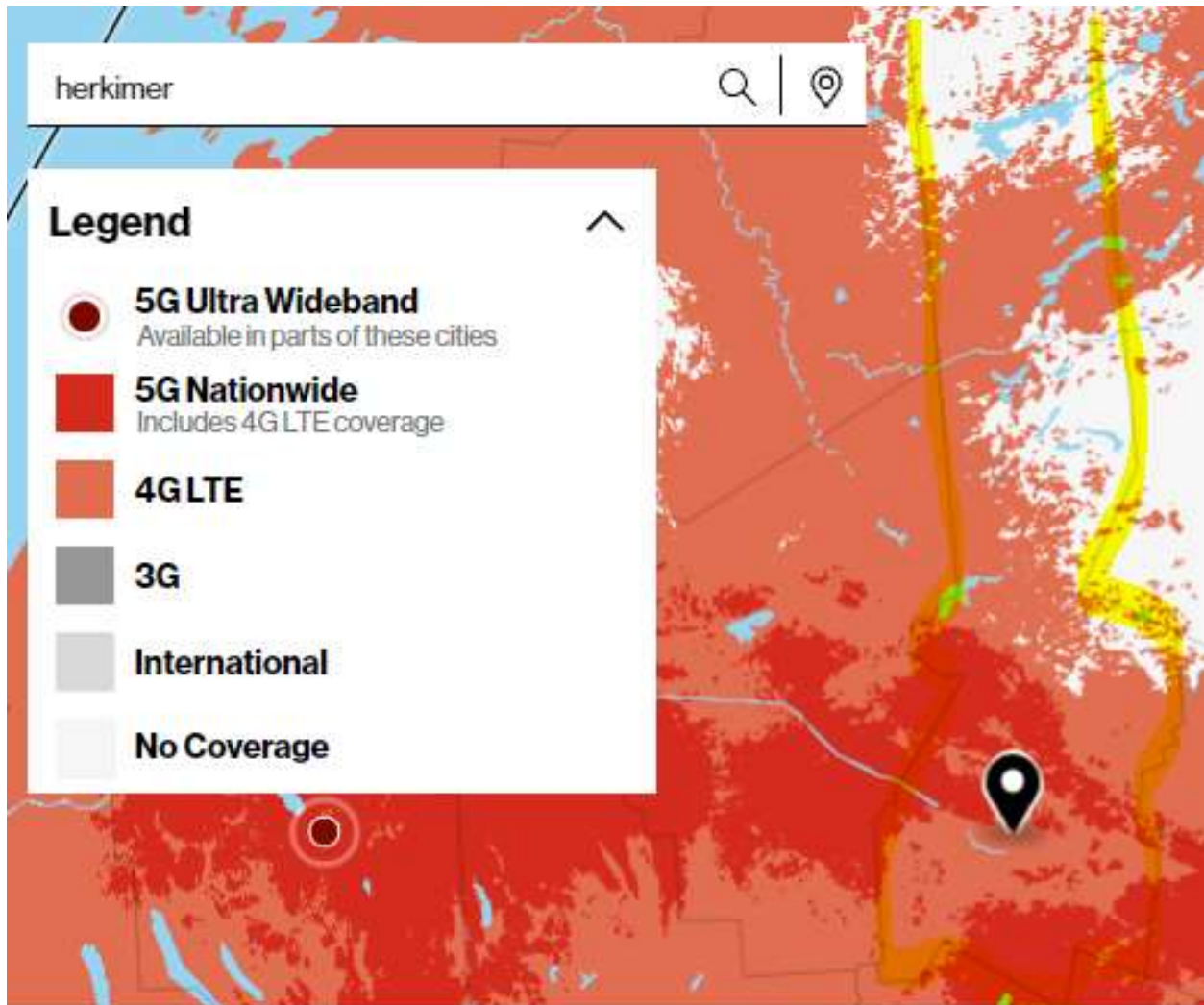
¹⁹ <https://www.att.com/maps/wireless-coverage.html>

Figure 16 T-Mobile Cellular Coverage Area²⁰



²⁰ <https://www.t-mobile.com/coverage/coverage-map>

Figure 17 Verizon Wireless Cellular Coverage in Herkimer County²¹



²¹

https://www.verizon.com/coverage-map/?CMP=afc_m_p_cj_na_ot_21_99_affiliate-100357191_11365093&cjevent=360ae8b4469811ec828630d50a82b82a&vendorid=CJM&AID=11365093&SID=oc5A05L8E/cFroff6SHThPsQhFEhBBRoxEEgDIlrkGHuJd+gaavpjHiU+jliYBjz&PUBID=100357191&cjdata=MXxOfDB8WXw

5.6 Satellite Providers

As discussed in the main section of the report there are two satellite companies reporting 100% coverage throughout the Herkimer County area. The New NY Broadband Program funding will enable HughesNet to provide its next generation Internet service to areas it has targeted.

Below is a chart that shows the New NY Broadband grant to HughesNet and its total investment. Also shown are the number of addresses to be served by village or township.

Table 14 Herkimer County - New NY Grant Awards to HughesNet by Township

Location	State Grant	Total Investment	Locations Addressed
Columbia	\$20,633	\$33,225	98
Danube	\$17,483	\$26,358	101
Fairfield	\$4,883	\$7,428	25
Frankfort	\$788	\$1,834	3
German Flatts	\$16,538	\$32,352	70
Herkimer	\$6,930	\$15,285	32
Litchfield	\$2,993	\$5,257	15
Little Falls (C)	\$630	\$900	4
Little Falls (T)	\$4,095	\$7,184	21
Manheim	\$9,608	\$13,725	61
Newport	\$315	\$450	2
Norway	\$473	\$675	3
Ohio	\$46,147	\$71,629	287
Russia	\$29,767	\$47,435	151
Salisbury	\$21,420	\$42,959	123
Schuyler	\$16,380	\$39,886	59
Stark	\$20,160	\$36,452	103
Warren	\$32,917	\$60,510	167
Webb	\$123,953	\$185,209	773
Winfield	\$1,890	\$2,700	12
Total	\$378,003	\$631,453	2110

5.7 Next Steps

Summary of Actions

Herkimer County has options to consider when evaluating how best to move forward with resolving unserved and underserved regions within the County. There is no single option that is consistent across all communities and therefore the County must weigh each option to determine which option or combination of options will provide the best outcome for the County and its residents. In most if not all options, the County may be required to commit a level of financial support to assist in subsidizing the build out of infrastructure needed to support and expand Broadband Services to the targeted areas. It should be known that in each option the question of ownership of investments once made, will be explored. ECC believes that it would be in the best interest of Herkimer County and its residents to release a Request for Proposal (RFP) to interested providers for one or more of the following options.

Herkimer County may have access to broadband grant opportunities.

The County can pursue broadband grant opportunities for rural area broadband access, such as those periodically provided by the USDA, NTIA, New York State, Grants for Public Safety, and others. A helpful website to search is, <https://broadbandusa.ntia.doc.gov/new-fund-search> which references the NTIA database of all federal grant programs that have to do with broadband. These types of funding opportunities are often overlooked but can be very helpful in spurring local efforts. Grant opportunities may require the County to select a provider to partner with.

The County should initiate and continue with service provider interactions.

Hold meetings with the incumbent and alternative service providers on a regular basis to develop a sense of partnership and discuss possible collaborative options. Working with the providers identify opportunities and responsibilities to expand broadband and develop desired solutions within the County.

The County can establish incentives.

Develop incentives to entice expansion of services. Provider's business models will typically support a buildout to a certain number of homes per mile. Each provider will have a different number based upon their operational costs and expected revenues. If the homes passed do not meet the financial metrics defined in their business models, then they are generally not going to invest in building out.

For example, cable providers will consider expanding their network to areas of roughly 12 homes per mile or greater. In many of these areas the density of homes per mile could be 6 or less. If the County has a desire to address these low-density areas, the County could offer to provide funding support to lessen the burden of building the infrastructure needed to reach these low-density areas. This should be done on a competitive basis via an RFP.

Consider County controlled options.

Through the use of County funded grants, tax programs, right of way, franchise agreements and use of County assets such as tall building and tower space, the County can work with the service providers to promote access and competitive services throughout the County. Also, the American Rescue Plan Act of 2021 has provided funds to Counties and municipalities which could be used to fund broadband expansion.

The County should evaluate the use of Public Private Partnerships (PPP).

The County should consider the creation of public/private partnerships to fill in the gaps within the County. Data from this inventory combined with the results of the Broadband Availability and Adoption Tool survey can be an effective way to draw in additional carriers to compete for services or partner with the County to apply for grant funding.

An example of the use of the Inventory and BAAT tools employed by this study has identified not only areas but individuals as well who desire to acquire Broadband services. Essentially the BAAT programs provide marketing data that providers can use to minimize the risks of investment. By having this information, the County will be able to have direct, and accurate discussions with interested service providers on not only where to invest but provide a list of addresses for residents who are seeking to acquire Broadband Services.

During the development of the PPP or as may be found in any of these options discussed to date, the County will have an opportunity to play as large or small a role as desired. Choosing a larger role, the County may opt to fund, own, and operate the infrastructure, inviting many providers or even the County in some cases to provide competitive services. On a smaller role, the County may opt to provide an incentive to providers for each unserved home passed which will serve to lessen the build out costs of the provider. The County may have no ownership or ongoing responsibility in this case.

5.8 Analysis

Following our evaluation of the infrastructure within Herkimer County, understanding the grant award investments that have been made and the resulting plans to expand broadband within the County, we can clearly begin to see areas of the County that need additional help in the expansion of broadband availability.

We next selected the census blocks served only by HughesNet and not by any other provider. In so doing, a limited set of Census Blocks are revealed which can be prioritized and targeted for funding. It is estimated new infrastructure is needed along 378 miles of road to service 1,681 underserved addresses. A budget of nearly \$20.8M is estimated to build 378 miles of infrastructure.

Public/private partnerships between the County and Service Providers can focus on technical solutions and funding for these areas. There are many grant and investment options which could be brought to bear to fund these solutions as well as infrastructure funds which may be available.

The following maps depict Broadband infrastructure available in the County as well as where grants have previously been awarded and where grant eligible unserved areas are located. Upon review of the RDOF awards it appears that many of the unserved areas in the County will be served. The County should continue to communicate with the RDOF awardees on a regular basis as to determine build out schedules etc. Should the County find that RDOF awardees are not meeting expectations, the County may choose to solicit alternative providers though one or more of the recommended options.

The County is currently in development of a County wide solution via a request for proposal that will solicit proposals from Broadband Providers to invest in the needed infrastructure in unserved areas of the County. It is anticipated that the County will incentivize providers to build out to these areas at a rapid and meaningful pace.

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Figure 18 Herkimer County - Broadband Infrastructure

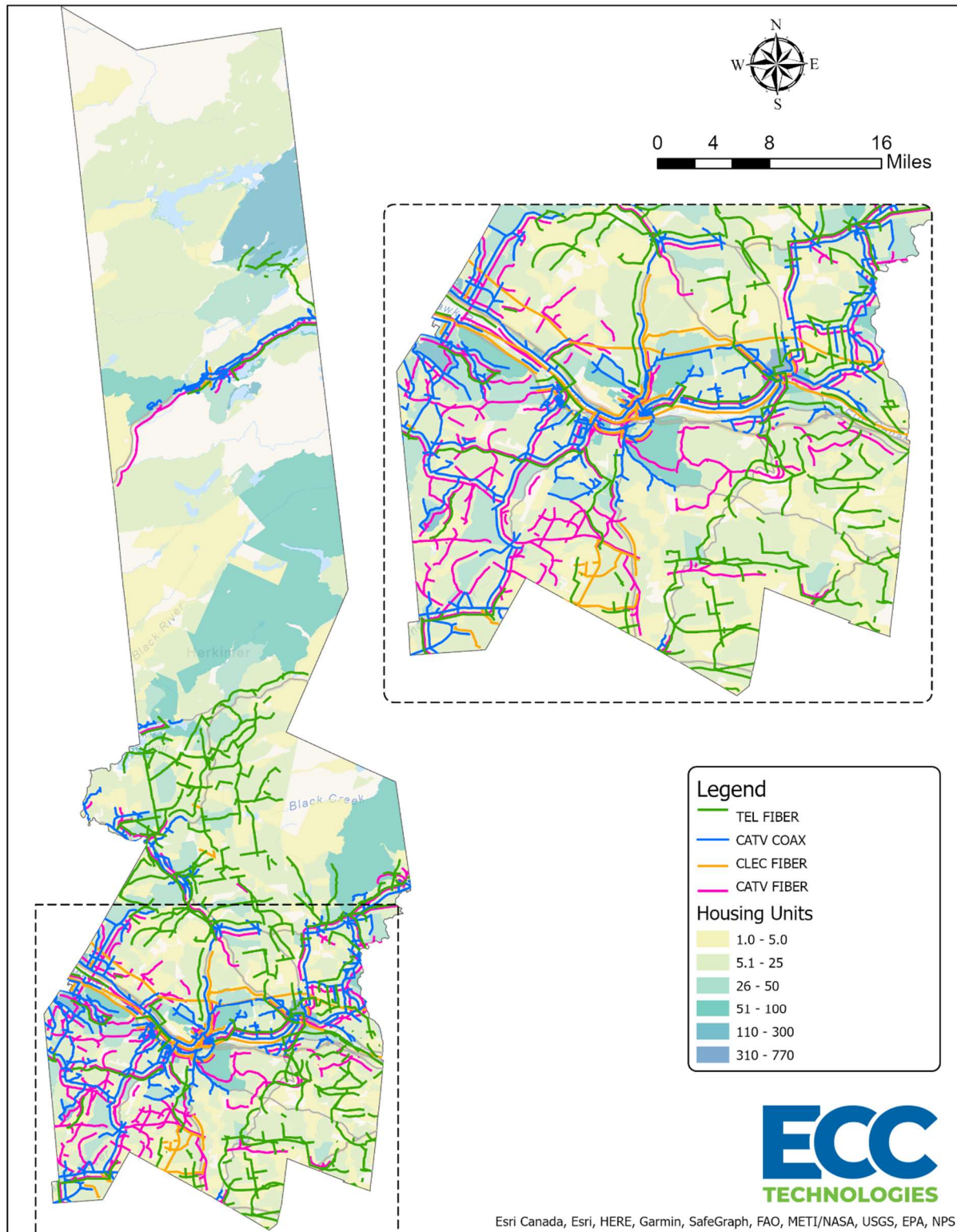


Figure 19 Herkimer County - Roads and Addresses Without Broadband Infrastructure

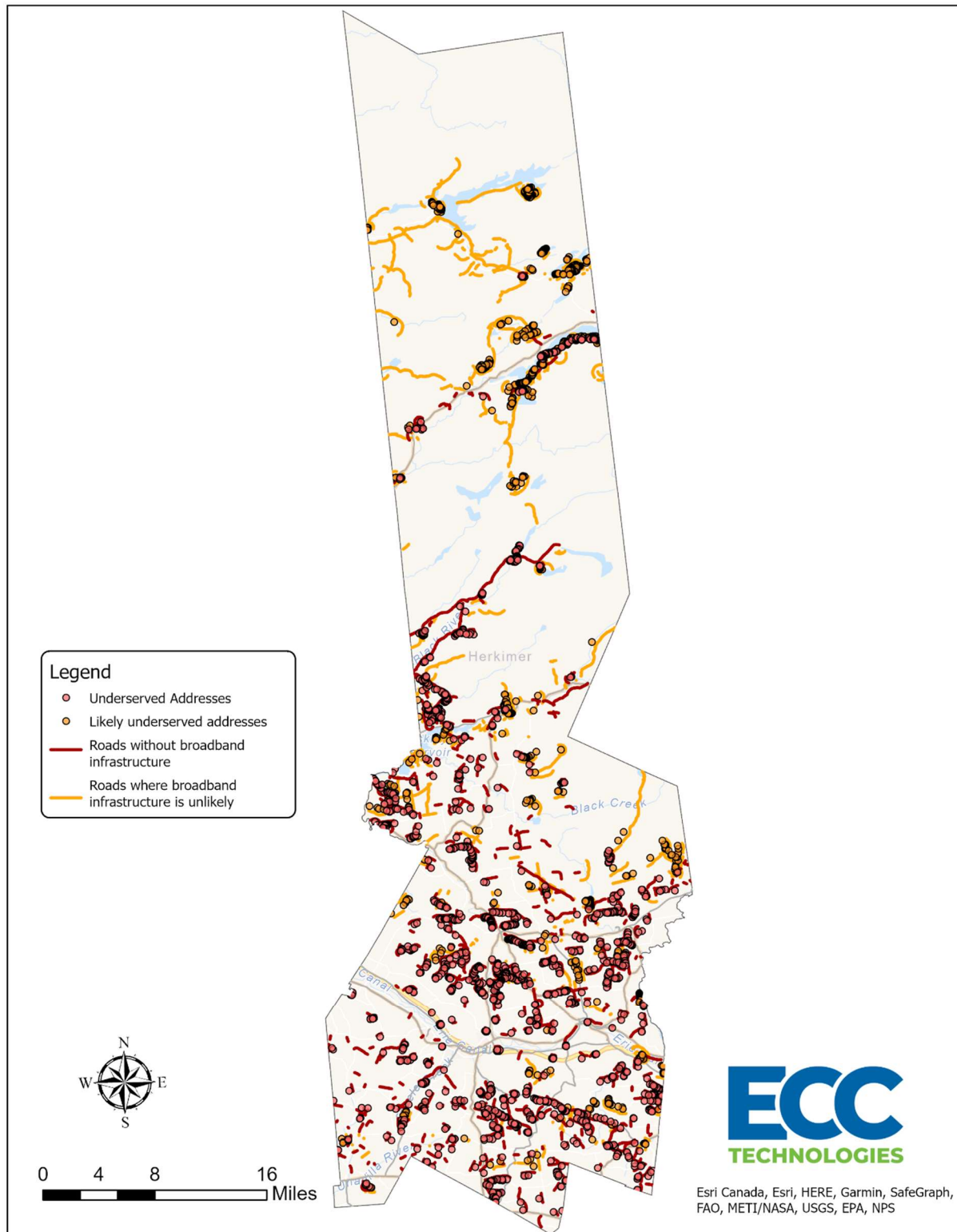


Figure 20 Herkimer County - New NY Broadband and RDOF Grant Award Areas

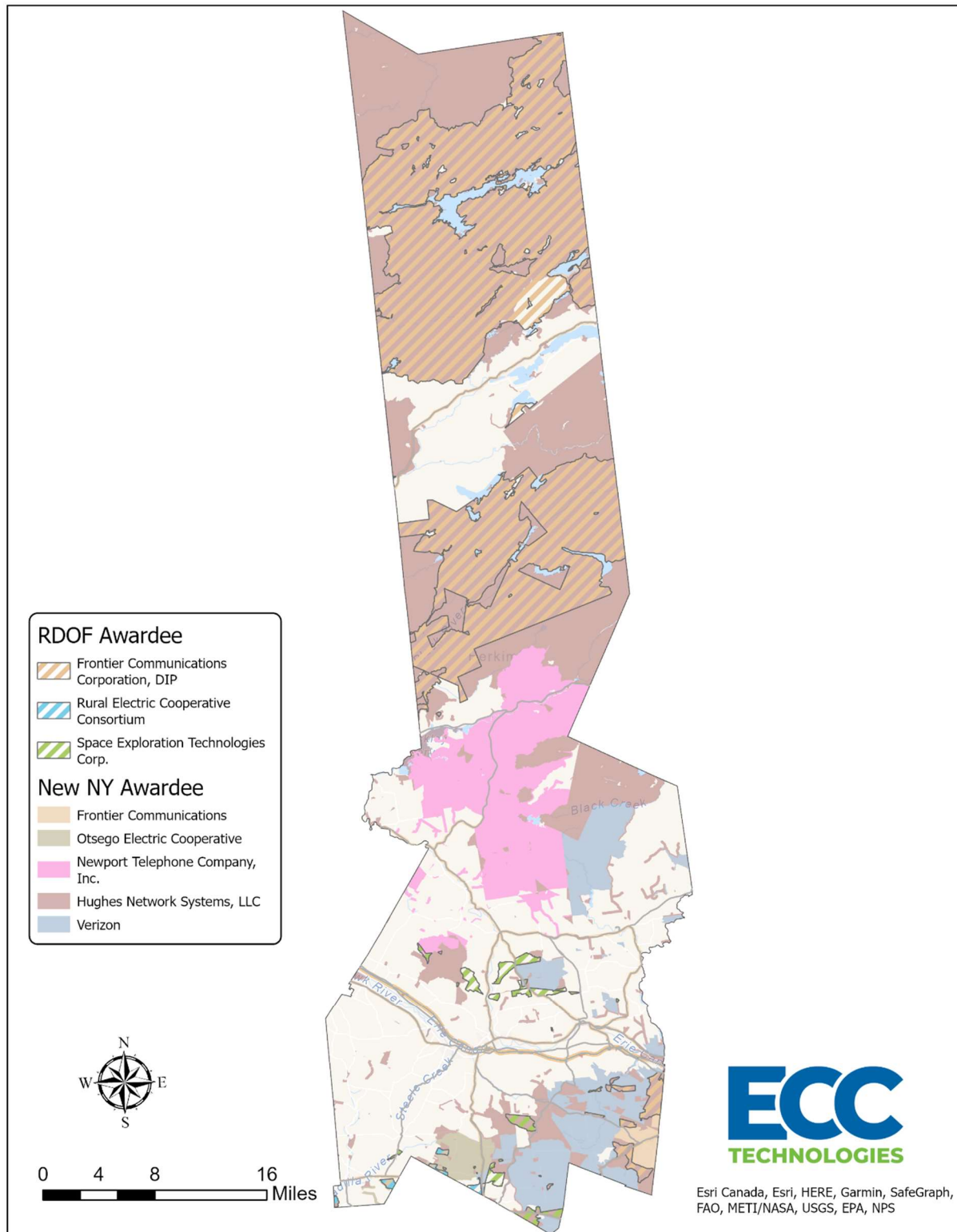
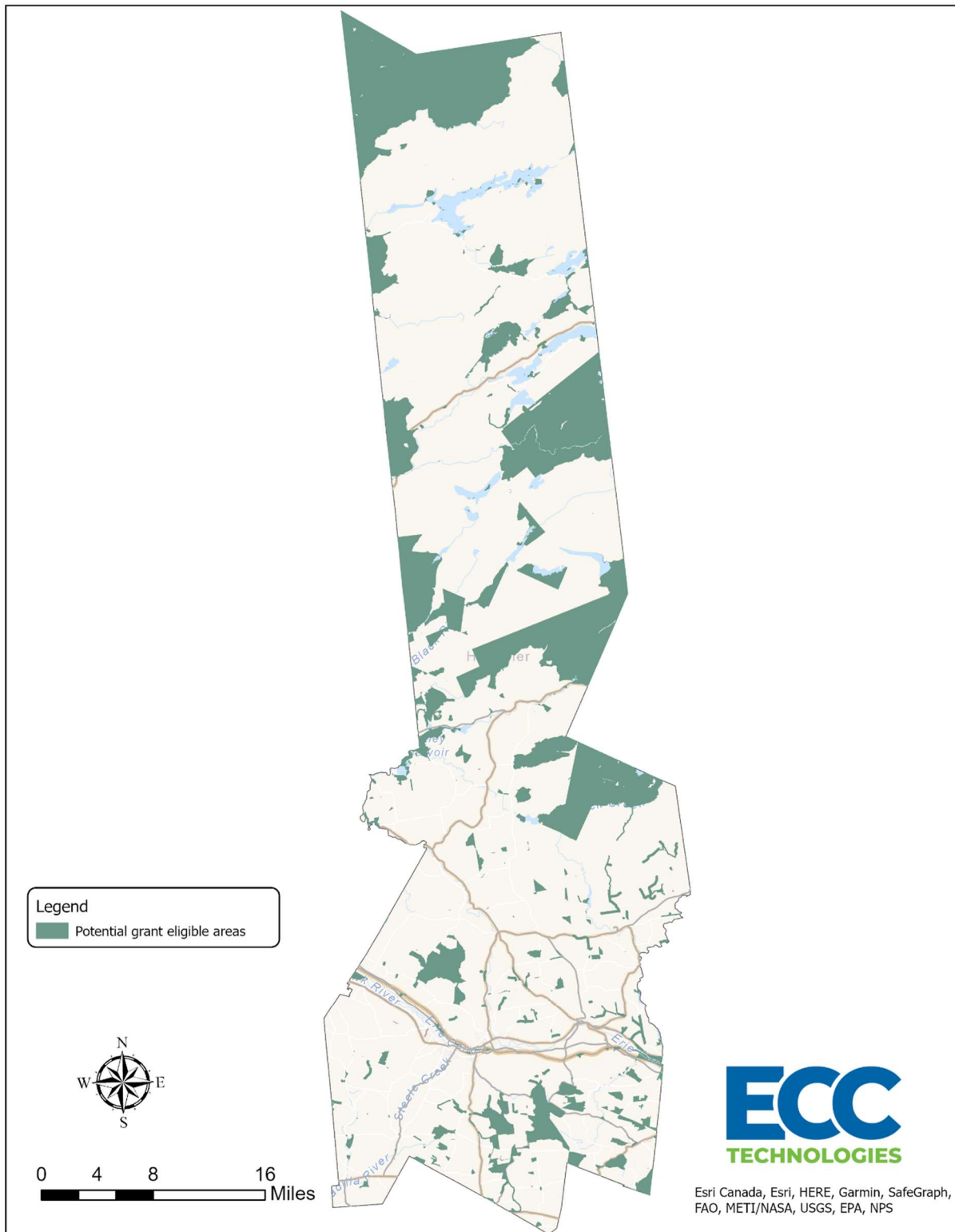


Figure 21 Herkimer County - Potential Grant Eligible Areas



5.9 Broadband Providers and Speeds by Town and Zip Code

The following pages list internet providers, type of service offered, coverage area and the maximum speed advertised for Herkimer County by municipality. This information was gathered by keying in zip codes from an online database at BroadbandNow.com that utilizes the FCC 477 information.

There are a few towns and villages listed that are outside the County but have zip code-based areas encroach within the County. The zip code map is shown below for illustrative purposes and can be used as a key to assist with identifying provider service.

Figure 22 Herkimer County Zip Code Map

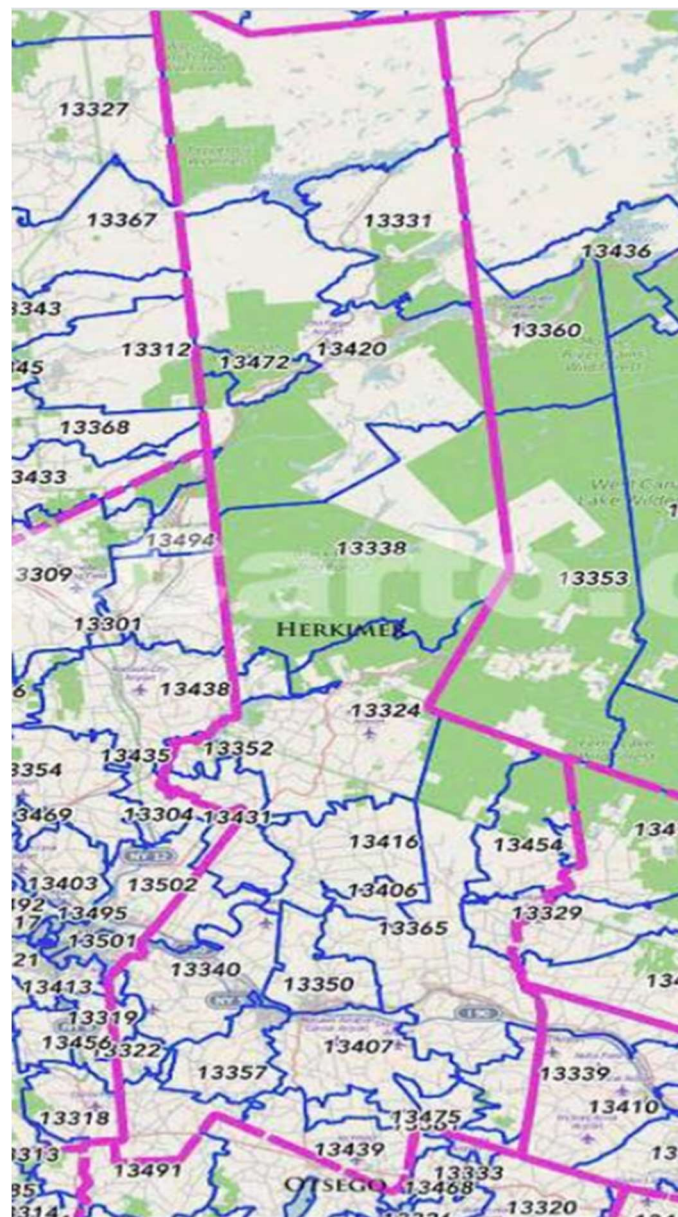


Table 15 Herkimer County - Summary of Internet Providers by Zip Code

Herkimer County Locations			Zip Code
Summary of Internet Providers in Cold Brook			13324
Provider	Type	Coverage	Speed
Newport Telephone	DSL and Fiber	98.7%	400 Mbps
Spectrum	Cable	23.5%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Newport Telephone	Fiber	89.2%	500 Mbps
Spectrum Business	Cable	12.0%	940 Mbps
Summary of Internet Providers in Dolgeville			13329
Provider	Type	Coverage	Speed
Spectrum	Cable	79.3%	940 Mbps
Frontier Communications	DSL	10.8%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	72.4%	115 Mbps
Spectrum Business	Cable and Fiber	59.3%	940 Mbps
Verizon	DSL	90.8%	15 Mbps
Summary of Internet Providers in Eagle Bay			13331
Provider	Type	Coverage	Speed
Frontier Communications	DSL	89.4%	115 Mbps
Spectrum	Cable	60.9%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100.0%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	9.0%	940 Mbps
Summary of Internet Providers in Frankfort			13340
Provider	Type	Coverage	Speed
Spectrum	Cable	95.6%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	20.4%	-- Mbps
Verizon	DSL	92.5%	15 Mbps

Summary of Internet Providers in Herkimer			13350
Provider	Type	Coverage	Speed
Spectrum	Cable	99.5%	940 Mbps
Newport Telephone	DSL	1.2%	6 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable and Fiber	100%	940 Mbps
Northland Communications	Fiber	31.3%	-- Mbps
Verizon	DSL	96.2%	15 Mbps

Summary of Internet Providers in Ilion			13357
Provider	Type	Coverage	Speed
Spectrum	Cable	98.1%	940 Mbps
Windstream	DSL	6.4%	100 Mbps
OEConnect	Fiber	1.1%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable and Fiber	100%	940 Mbps
Northland Communications	Fiber	5.9%	-- Mbps
Verizon	DSL	93.9%	15 Mbps

Summary of Internet Providers in Jordanville			13361
Provider	Type	Coverage	Speed
Spectrum	Cable	34.0%	940 Mbps
OEConnect	Fiber	9.0%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable and Fiber	100%	940 Mbps
Verizon Business	Copper	1.6%	4.0 Mbps
Verizon	DSL	47.9%	15 Mbps

Summary of Internet Providers in Little Falls			13365
Provider	Type	Coverage	Speed
Spectrum	Cable	83.5%	940 Mbps
Newport Telephone	DSL	1.2%	6 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	92.3%	940 Mbps
Verizon	DSL	83.4%	15 Mbps

Summary of Internet Providers in Middleville			13406
Provider	Type	Coverage	Speed
Newport Telephone	DSL and Fiber	100%	400 Mbps
Spectrum	Cable	95.9%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	79.0%	940 Mbps
Newport Telephone	Fiber	36.3%	500 Mbps
Verizon	DSL	6.3%	15 Mbps

Summary of Internet Providers in Mohawk			13407
Provider	Type	Coverage	Speed
Spectrum	Cable	85.6%	940 Mbps
OEConnect	Fiber	1.9%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	80.5%	940 Mbps
Northland Communications	Fiber	1.2%	-- Mbps
Verizon	DSL	88.1%	15 Mbps

Summary of Internet Providers in Newport			13416
Provider	Type	Coverage	Speed
Newport Telephone	DSL and Fiber	99.7%	400 Mbps
Spectrum	Cable	60.2%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Newport Telephone	Fiber	84.4%	500 Mbps
Spectrum Business	Cable	29.7%	940 Mbps

Summary of Internet Providers in Old Forge			13420
Provider	Type	Coverage	Speed
Spectrum	Cable	95.5%	940 Mbps
Frontier Communications	DSL	94.1%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Northland Communications	Fiber	98.0%	-- Mbps
Spectrum Business	Cable and Fiber	95.0%	940 Mbps

Summary of Internet Providers in Poland			13431
Provider	Type	Coverage	Speed
Newport Telephone	DSL and Fiber	99.5%	400 Mbps
Spectrum	Cable	84.1%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	73.6%	940 Mbps
Newport Telephone	Fiber	41.4%	500 Mbps

Summary of Internet Providers in Salisbury Center			13454
Provider	Type	Coverage	Speed
Spectrum	Cable	97.2%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100.0%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps

Summary of Internet Providers in Thendara			13472
Provider	Type	Coverage	Speed
Frontier Communications	DSL	100%	115 Mbps
Spectrum	Cable	95.8%	940 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable and Fiber	100%	940 Mbps
Frontier Business	DSL	99.6%	115 Mbps

Summary of Internet Providers in Van Hornesville			13475
Provider	Type	Coverage	Speed
Viasat Internet (formerly Exede)	Satellite	100%	50 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Fiber	100%	940 Mbps
Verizon	DSL	100%	15 Mbps

Summary of Internet Providers in West Winfield			13491
Provider	Type	Coverage	Speed
Spectrum	Cable	77.8%	940 Mbps
Windstream	DSL	75.0%	200 Mbps
OEConnect	Fiber	21.5%	1,000 Mbps
Frontier Communications	DSL	20.3%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	46.2%	115 Mbps
Windstream	Fiber	0.00%	-- Mbps

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6. Oneida County Inventory

This section is an introduction to the major providers and different types of infrastructure used in Oneida County to deliver broadband service. A summary map that shows the available and important infrastructure is also included.

The broadband providers in Oneida County are delivering service to homes, businesses, and other organizations at varying degrees of access, performance, and cost. The infrastructure in use by the industry include landlines consisting of copper, coaxial, fiber optic, or wireless based technology utilizing strategically placed towers and satellite.

To begin the analysis of Oneida County, it is important to understand what and where the providers claim to provide service. According to the FCC 477 data, the following two maps show the maximum advertised download speeds offered to customers in respective census blocks. Figure 23 represents the speeds offered by the ILEC's in the county. Figure 24 represents the speeds offered by the Cable TV provider.

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Figure 23 Oneida County - FCC 477 Data Showing ILEC Maximum Advertised Download Speeds

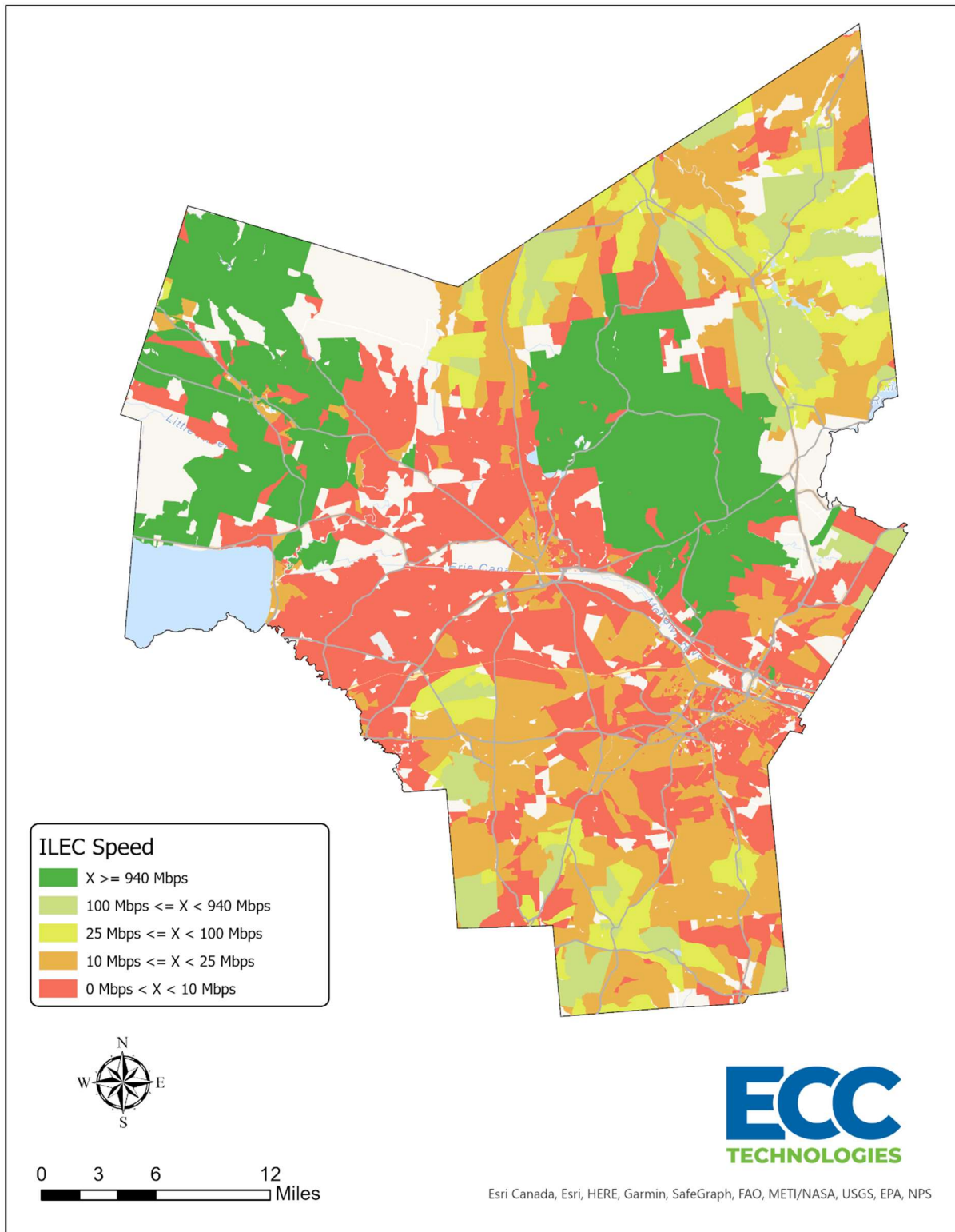
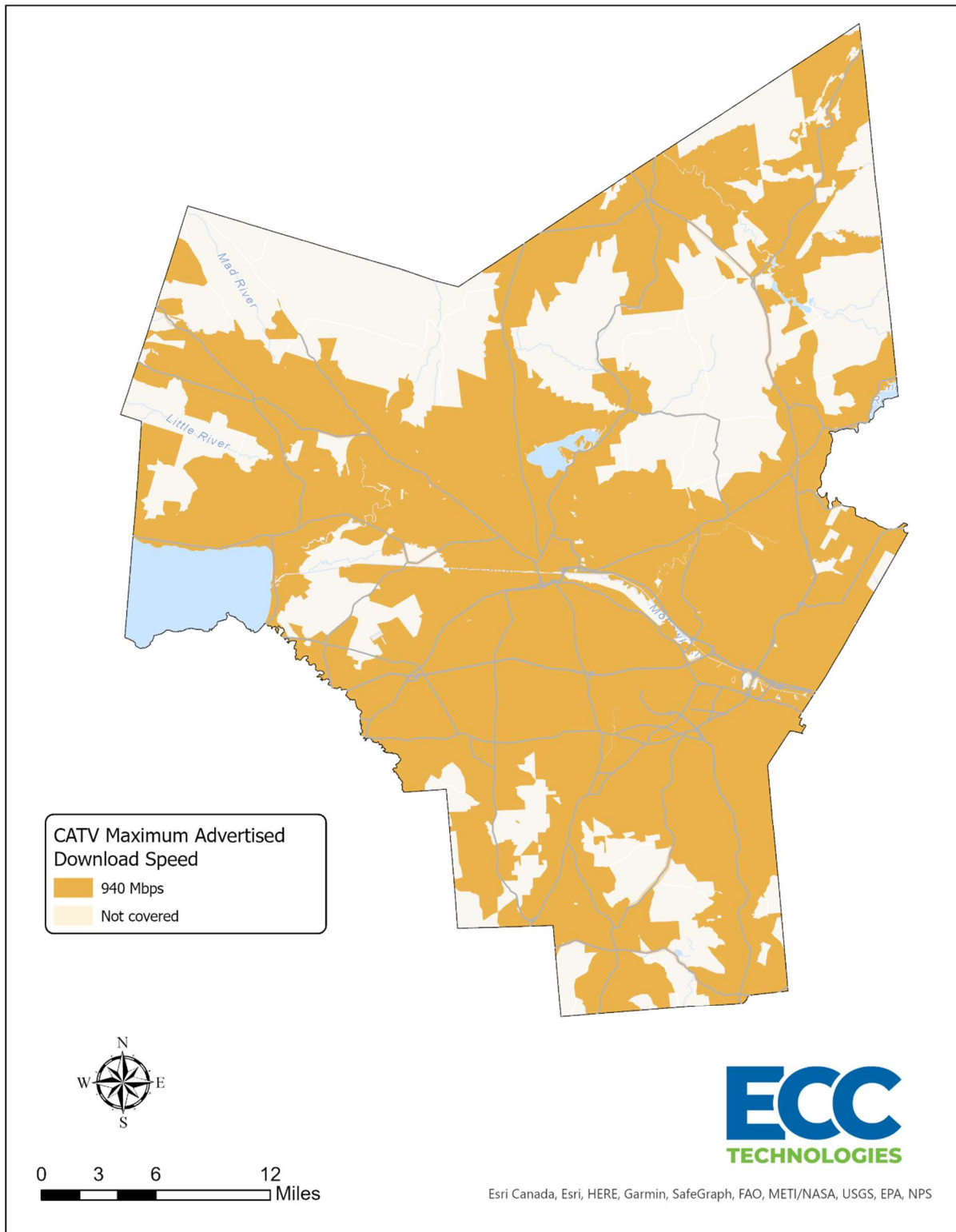


Figure 24 Oneida County - FCC 477 Data of CATV Maximum Advertised Download Speeds



6.1 Oneida County - Incumbent Local Exchange Carriers (ILEC's)

The telephone company, or ILEC (incumbent local exchange carrier) and the incumbent cable TV providers are the primary owners of telecommunications infrastructure within the County. There are also several Competitive Local Exchange Carriers (CLECs) – all but one focused on businesses services only. There are no Wireless Internet Services Providers (WISP's) identified as serving the County. However, three satellite providers, and several cellular companies offer services within Oneida County.

The wireline infrastructure for Oneida County is primarily owned and operated by Incumbent Local Exchange Carriers (ILEC's) which include Frontier Communications, Verizon, and Windstream. Frontier has five central offices located within Oneida County while five other central offices are located outside of the County but provide services to customers within the County. Verizon has eight Central Offices servicing Oneida County. However, five central offices located outside of the County boundaries provide service to customers in the County. Windstream has two CO's outside of the County servicing customers within the County.

Below in Table 16, is a chart based on the 477 reporting that shows the different providers in the County and the type of service they are providing by number of census blocks. This chart does not include cellular or satellite providers. Note the codes and definitions of service type can be found in Appendix A.

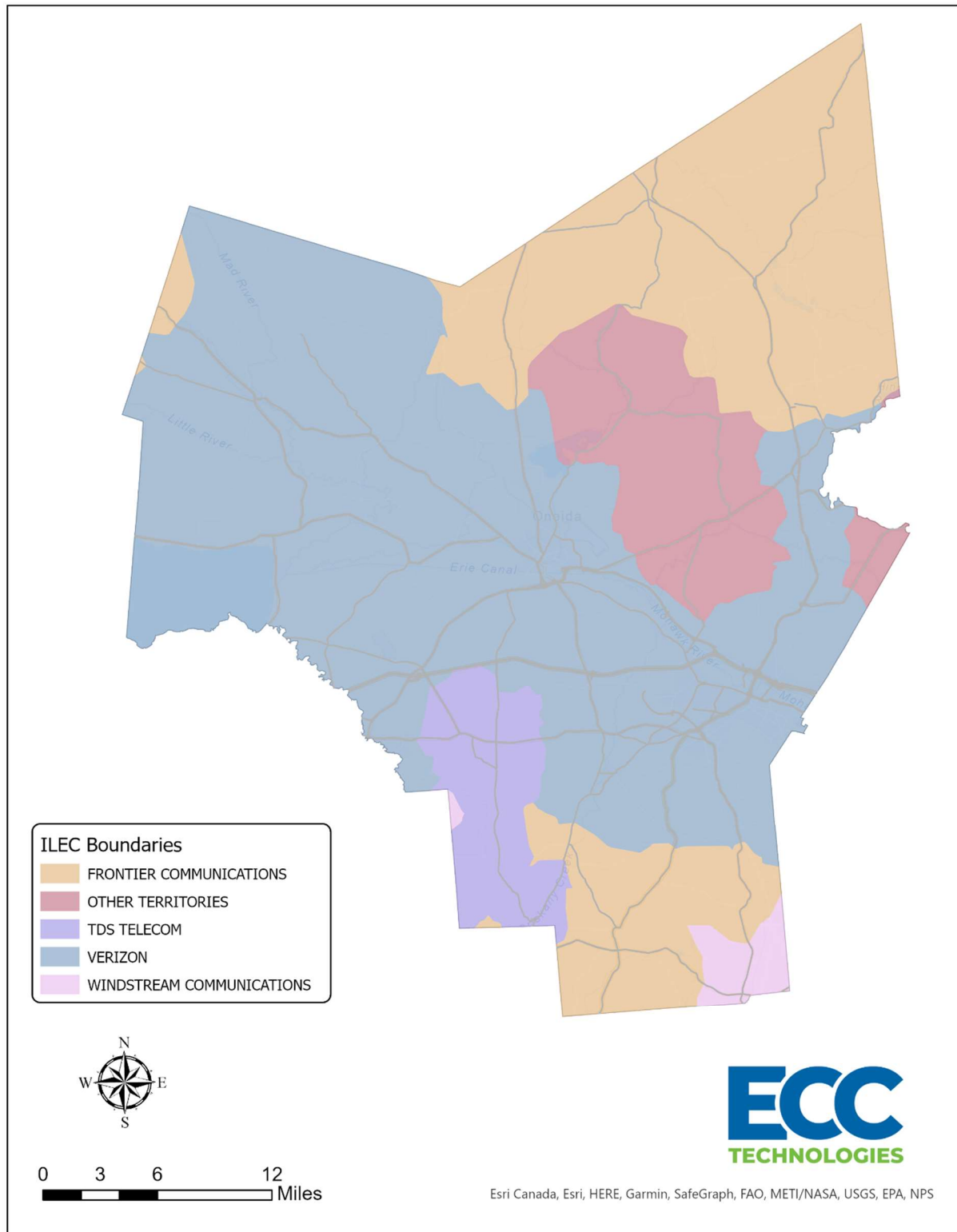
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Table 16 Oneida County - Providers by Type of Service and Number of Census Blocks Served

Type of Org.	Business Only	Provider Name	10-DSL	11-DSL	12-DSL	30-other copper	43-Coax	50-Fiber	70-Fixed Wireless
CLEC		Armstrong Telephone Company-NY						1	
CLEC	X	Broadview Networks Holdings, Inc. (Windstream)				2			
Cable		Charter Communications, Inc.					2555	23	
CLEC	X	Crown Castle Fiber LLC						47	
CLEC	X	EarthLink Business, LLC (Windstream)	1						
CLEC	X	FirstLight Fiber						31	
ILEC		Frontier Communications Corporation	933	1000	540			17	
CLEC	X	Level 3 Communications, LLC (CenturyLink)				2			
CLEC	X	MCI Communications Corporation (Verizon)				4			
CLEC	X	Northland Networks (Oneida County Rural Telephone)						664	
CLEC		OEConnect, LLC (Otsego Electric Cooperative)						35	
CLEC	X	PAETEC Communications, Inc. (Windstream)		14				6	
CLEC		TDS TELECOMMUNICATIONS CORPORATION (Telephone & Data Systems)		6	8				
ILEC		Verizon New York Inc.	927					2	
ILEC		Windstream New York, Inc.	52	137	366			28	
CLEC	X	XO Communications Services, LLC (Verizon)				1			

A discussed earlier in the report, the ILEC is responsible for development and maintenance of the cabling and switching equipment needed to deliver local telephone and broadband related services to the communities in their territory. Figure 25 shows the ILEC's and their respective service territories in Oneida County.

Figure 25 Oneida County - ILEC's and Service Territory Map



The table below describes the telecommunications services currently available at each of the ILEC's Central Offices. These services are supported by the switch technology at the location of the Central Office and may or may not be available to a customer within the exchange. The service is dependent upon the cabling infrastructure available and the distance from the serving Central Office. The service information is based on the provider's 477 reporting as of June 2020.

Table 17 Oneida County - CENTRAL Offices with Services

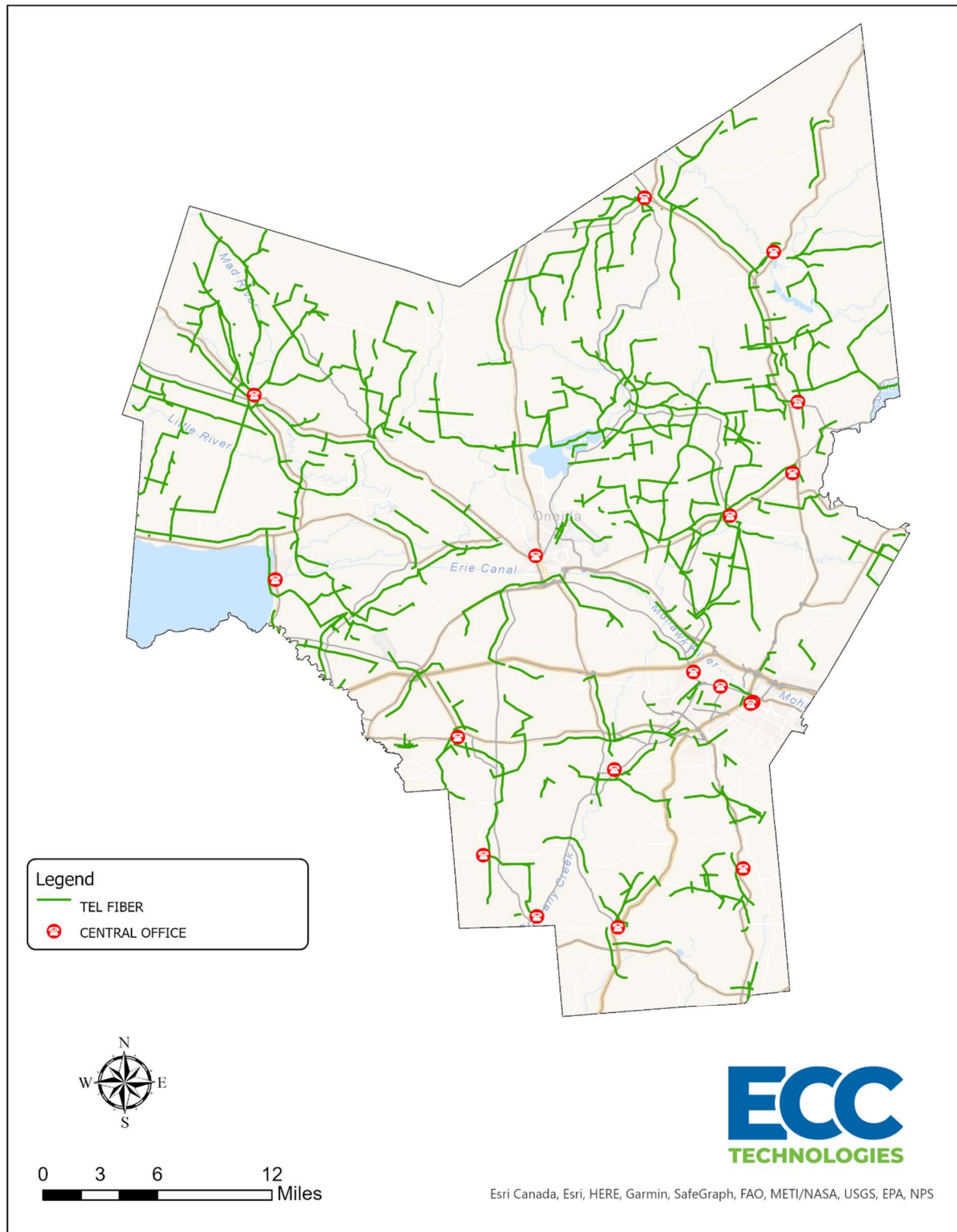
Central Offices		Copper	Fiber	Future RDOF Awarded
Frontier Communications	Locations	DSL	FTTH	Fiber
BOONVILLE	136 ERWIN ST	115 Mbps		1 Gigabit
FORESTPORT	12218 WOODHULL RD	115 Mbps		
REMSEN	9624 LINCOLN AVE	115 Mbps		1 Gigabit
WATERVILLE	129 WHITE ST	115 Mbps		
OLD FORGE (Out of County)	3057 STATE ROUTE 28	115 Mbps		
CLAYVILLE	2298 DEWING AVE	115 Mbps		
BROOKFIELD (Out of County)	S ACADEMY ST	30 Mbps		
NORTH BROOKFIELD (Out of County)	N BROOKFIELD RD	30 Mbps		
MADISON (Out of County)	NORTH ST	30 Mbps		
WILLIAMSTOWN (Out of County)	STONE HILL RD	30 Mbps		
Verizon	Locations	DSL	FTTH	
BARNEVELD	128 MAPPA AVE	15 Mbps		
CAMDEN	1 LIBERTY ST	15 Mbps		
CLINTON	19 Kirkland Ave	15 Mbps		
ROME	137 N WASHINGTON ST	15 Mbps		
SYLVAN BEACH	S/S PROSPECT	15 Mbps		Above baseline (25/3)
UTICA	280 GENESEE ST	15 Mbps		
WHITESBORO	51 POWELL AVE	15 Mbps		
WILLOWVALE	S/S RED HILL N.HART	15 Mbps		
Oneida (Out of County)	125 Lenox Ave	15 Mbps		
BRIDGEPORT (Out of County)	N SIDE HWY 31	15 Mbps		
CANASTOTA (Out of County)	N/S HICKORY ST	15 Mbps		
CLEVELAND (Out of County)	N SIDE OF BRIDGE ST	15 Mbps		
Windstream	Locations	DSL	FTTH	
WEST WINDFIELD	MAIN ST	232 Mbps		
MUNNSVILLE	MAIN ST	125 Mbps		
Oneida County Rural Tel Co	Locations	DSL	FTTH	
HOLLAND PATENT	MAIN ST		1 Gbps	
Vernon Tel Co	Locations	DSL	FTTH	
VERNON	HIGHWAY #5 VERNON		1 Gbps	Above baseline (25/3)
KNOXBORO			1 Gbps	
Oriskany Falls Tel Co	Locations	DSL	FTTH	
ORISKANY FALLS	101 S MAIN ST	25 Mbps	1 Gbps	Above baseline (25/3)

FCC Form 477-based services information was reported by carriers prior to the award of the fiber to the home grants. Since the providers have committed to 1 Gigabit service, that bandwidth speed will be available in the future, or already is offered in those select areas.

On the following page is Figure 26, an ILEC map, showing the providers' fiber infrastructure and Central Offices. Based on this map, the general availability and level of Internet service provided by the ILECs can be made. As with all the outside plant (OSP) field generated maps, this map is considered confidential information and careful consideration should be given before it is copied or distributed.

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Figure 26 Oneida County - ILEC Infrastructure



Frontier

Frontier is the incumbent telephone company for the northern third of Oneida County. Frontier has two Central Offices that serve the County. According to their website and the FCC 477 database, Frontier can provide DSL and some fiber based residential Internet service that ranges from 1 to 115 Mbps down depending on customer location, as well as phone and TV service (DISH).

According to the New NY Grant website, Frontier has received over \$1.3M in state grant funds to provide FTTH service in previously underserved areas of the County. Table 18 below is a chart that lists the grant award, total investment, and number of homes to be served by Frontier in Oneida County.

Table 18 Oneida County - New NY Broadband Grant Awarded to Frontier by Town

Location	State Grant	Total Investment	Locations Addressed
Ava	\$250,522	\$403,522	80
Boonville	\$247,390	\$398,478	79
Forestport	\$59,499	\$95,836	19
Remsen	\$275,988	\$344,985	78
Steuben	\$483,801	\$604,751	163
Western	\$18,789	\$30,264	6
Total	\$1,335,989	\$1,877,836	425

Table 19 identifies the RDOF award to Frontier of over \$83K to service 376 addresses with fiber to the home internet service in Oneida County.

Table 19 Oneida County - RDOF Grant Award to Frontier

RDOF Awardee	Locations	Assigned Support (10 years)
Frontier Communications Corporation	376	\$83,801

Newport Telephone Company

Newport Telephone Company is one of New York States oldest independent telephone companies. Founded in 1913, Newport Telephone Company serves approximately 240 square miles in Oneida, Herkimer, and Hamilton Counties. Newport Telephone Company is the incumbent telephone company for the town of Deerfield. According to their website and the FCC 477 database, Newport Telephone can provide DSL up to 6Mbps and some fiber based residential Internet service with speeds up to 400 Mbps down depending on customer location, as well as phone service.

According to the New NY Grant website, Newport Telephone Company has received over \$58K in state grant funds to provide FTTH service to 12 homes in previously underserved areas of the County. Table 20 below lists the grant award, total investment, and number of homes to be served by Newport Telephone Company in Oneida County.

Table 20 New NY Broadband Grant Awards to Newport Telephone Company by Township

Location	State Grant	Total Investment	Locations Addressed
Deerfield	\$58,461	\$73,077	12
Total	\$58,461	\$73,077	12

Verizon

Verizon's corporate headquarters is in New York City with a regional business office located in Syracuse, NY. Verizon is the incumbent telephone company that covers the southern third of Oneida County.

Verizon offers voice, data services, DSL, cloud services and managed network services to the businesses and residents in their area of the region.

Verizon offers service from their five Central Offices (CO's) in the region.

According to the FCC report, Verizon offers DSL services of up to 15 Mbps in the County.

Table 21, on the following page, shows funds awarded to Verizon through the New NY Grant, which were over \$3.5M. In addition, the table shows Verizon's total investment of over \$10.3M including the grant dollars to serve 689 addresses.

Table 21 New NY Broadband Grant Awards to Verizon by Township

Location	State Grant	Total Investment	Locations Addressed
Annsville	\$1,025,059	\$3,094,274	197
Camden	\$119,677	\$416,131	23
Florence	\$1,607,834	\$4,511,624	309
Lee	\$145,694	\$416,894	28
Rome	\$36,423	\$119,274	7
Verona	\$551,555	\$1,463,654	106
Vienna	\$98,864	\$329,337	19
Total	\$3,585,106	\$10,351,188	689

Windstream

Windstream has its headquarters in Little Rock, Arkansas and they have a business office in Syracuse, NY. Over the past number of years Windstream has bought several CLEC's including EarthLink, Paetec, and Broadview, resulting in ownership of long-haul fiber as well as local access. They provide Internet service as well as phone and TV service (DISH) to a very small section of Oneida County in the town of Bridgewater. Windstream exited Chapter 11 bankruptcy in September 2020.

Windstream services Oneida County from two Central Offices based outside of the County. One is in West Windfield in Herkimer County and the other is in Munnsville in Madison County. According to their website and the FCC 477 database, Windstream can provide DSL based residential Internet service that ranges up to 232 Mbps down.

Table 22 - RDOF Award to Windstream

RDOF Awardee	Locations	Assigned Support (10 years)
Windstream Services LLC	13	\$3,451

Oneida County Rural Telephone Company

Oneida County Rural Telephone Company (OCT) is a small independent telephone company operating in Holland Patent, Steuben, Remsen, Floyd, Boonville, and parts of Westernville in Oneida County. The company provides voice services and broadband services with DSL and fiber to the home options. DSL is offered at speeds up to 15Mbps. The fiber to the home service is offered in various speed tiers from 100Mbps to 1Gbps.

The company has a single central office located in Holland Patent.

Table 23, below, shows funds awarded to OCT through the New NY Grant, which were nearly \$3.3M. In addition, the table shows OCT's total investment of over \$4.1M including the grant dollars to serve 588 addresses.

Table 23 - New NY Broadband Grant Awards to OCT by Township

Location	State Grant	Total Investment	Locations Addressed
Ava	\$39,118	\$48,897	7
Floyd	\$469,412	\$586,766	84
Marcy	\$33,529	\$41,912	6
Steuben	\$1,464,118	\$1,830,150	262
Trenton	\$100,588	\$125,735	18
Western	\$1,179,118	\$1,473,899	211
Total	\$3,285,883	\$4,107,359	588

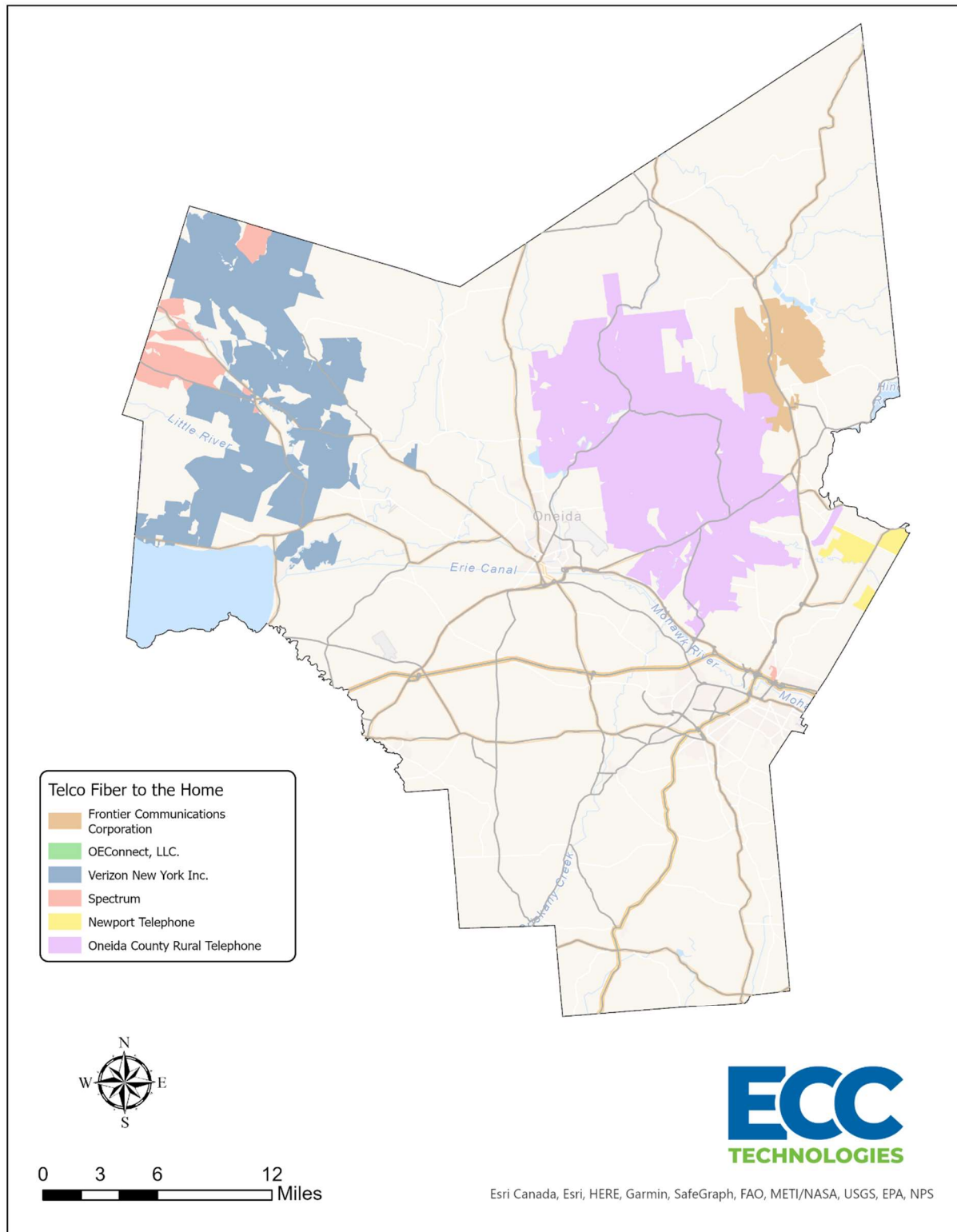
Telephone Company Fiber to the Home Areas

The map on the next page illustrates the areas where fiber to the home (FTTH) infrastructure has been constructed within the County based on 477 reporting. Oneida Rural Telephone Company is the predominant fiber to the home provider in the County servicing Holland Patent, Steuben, Remsen, Floyd, Boonville, and parts of Westernville. Frontier offer fiber to the home services in Ava, Boonville Forestport, Steuben, Western and Remsen while Vernon Telephone Company offers FTTH in Vernon and Knoxboro. Oriskany Falls Telephone Company offers 1Gbps FTTH service in Oriskany Falls.

Verizon has been awarded New NY Broadband grant funds to construct FTTH to 689 addresses in the northwestern portion of the County including Camden, Florence, Annsville, Lee, Rome, Verona and Vienna.

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Figure 27 Oneida County - FTTH areas

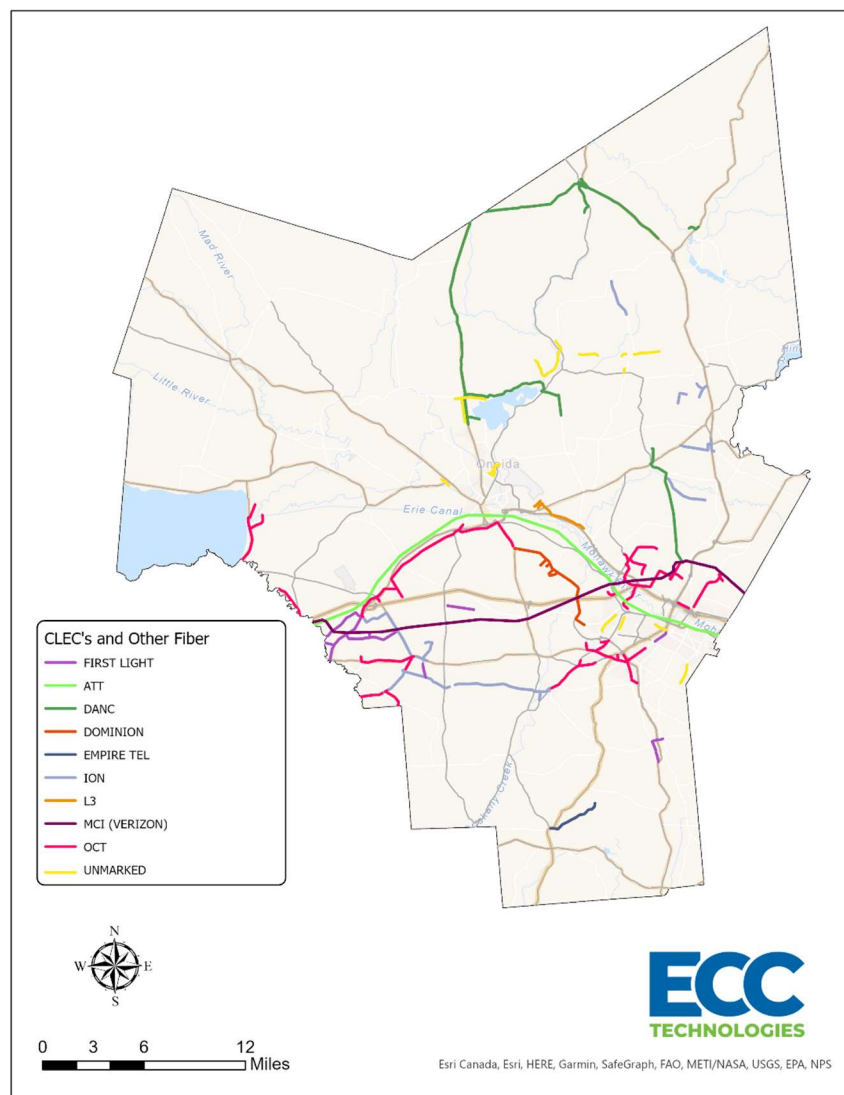


6.2 Oneida - Competitive Local Exchange Carriers (CLECs)

CLECs are telephone companies created to compete with the Incumbent Local Exchange Carriers (ILECs). CLECs arose because of the Telecommunication Act of 1996, which was intended to promote competition among long distance and local phone service providers.

The term is used to differentiate between new or potential competitors and established local exchange carriers. ECC identified nine CLEC type companies in Oneida County. These CLECs include AT&T, FirstLight, Development Authority of the North Country (DANC), ION, Northland Communications (OCT Oneida County Rural Telephone), (Verizon) under the name MCI. It should be noted that some of the CLEC fiber infrastructure was not tagged and could not be identified in the field. We have still included the infrastructure on our maps.

Figure 28 CLEC Infrastructure in Oneida County



6.3 Cable TV Broadband Provider

Cable providers, like all service providers, will typically build and provide new service where they deem it profitable. Should a company or residential customer purchase a service in an outlying area, and be willing to pay for the installation, the cable provider will expand access, providing service along that new route to businesses and residents. Cable providers offer their service via fiber optic or coaxial cable. Spectrum Communications (formerly Charter) is the cable TV provider offering services in Oneida County.

Spectrum (Charter)

Spectrum is a national cable TV provider provides commercial and residential triple play services of voice, Internet, and cable TV. They are the largest provider of this type in the region.

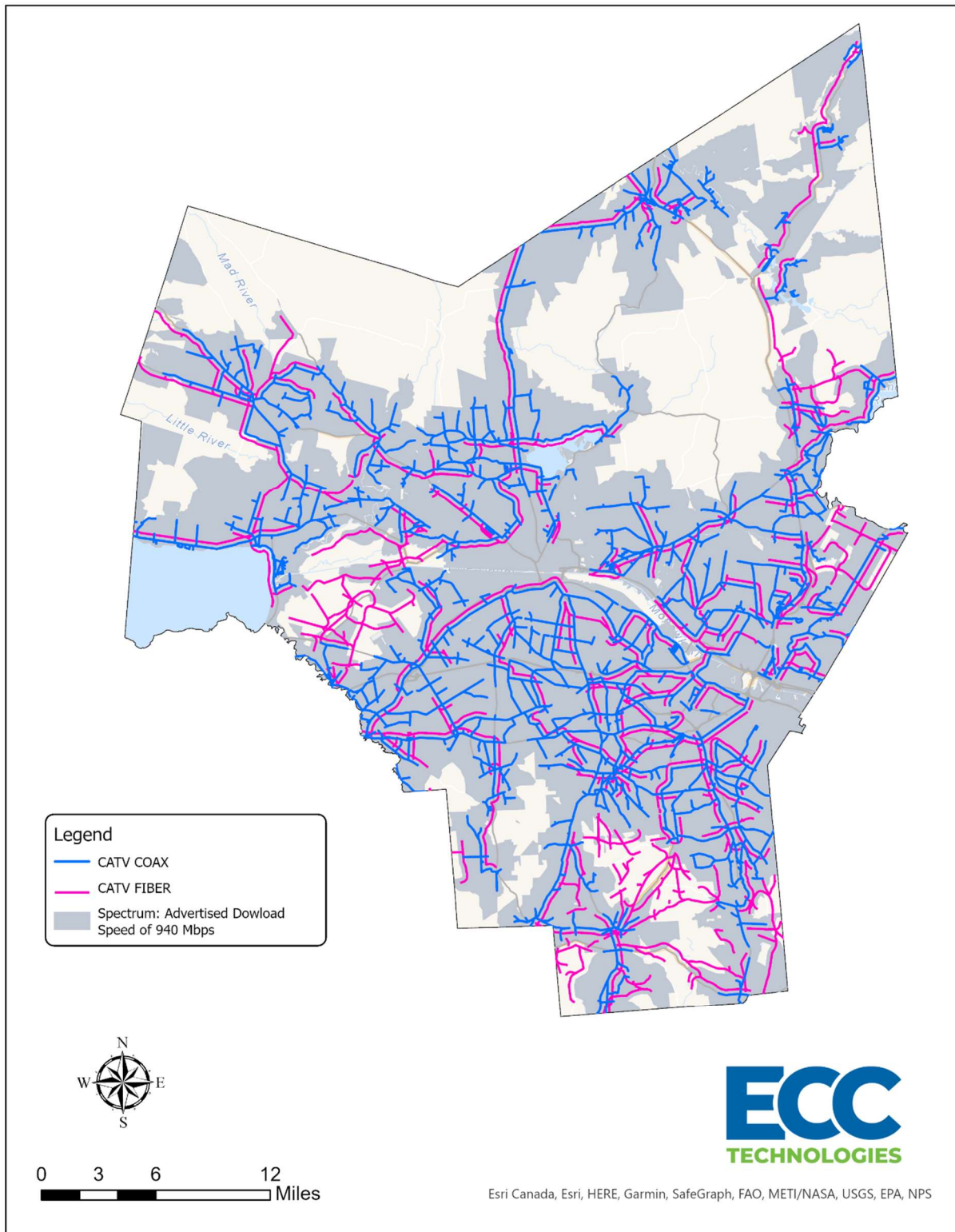
According to their website, Spectrum provides residential triple play services of voice, Internet and cable TV at prices starting at \$103 per month in the area. Business service costs are provided on an Individual Case Basis (ICB) and typically include installation fees. Spectrum's 477 based info states they provide up to 940 Mbps service in their territory.

As part of the Charter Communications/Time Warner Cable merger that formed Spectrum, New York State required Spectrum to expand its network to pass 145,000 unserved and underserved homes in rural areas of the State. As of July 19, 2019, Spectrum had expanded its service area to 65,000 of the required 145,000 homes. Though not made publicly available, Spectrum was given until September 2021 to complete its expansion by the State of New York.

Figure 29, on the next page, shows the Spectrum service area with the fiber optic and coaxial infrastructure identified in the field inventory.

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Figure 29 CATV Service Area and Infrastructure in Oneida County



6.4 Wireless Tower Structures

Wireless technologies are the fastest growing segment of the telecommunications industry. Wireless infrastructure supports cell phones, pagers, personal digital assistants (PDAs), mobile data terminals, messaging, and Internet services. Wireless antennas or access points are located on wireless towers, tall buildings, and even water towers throughout the region. In some instances, the wireless infrastructure installed can offer connectivity in areas where landline infrastructure cannot. A chart showing the number of towers in each county by owner can be found at the end of this section.

There are 44 wireless tower structures identified either through field inspection, GIS database research, or registered with the FCC data base. Of all the tower sites identified, there are 33 wireless towers registered on the FCC website.

Many of the towers are located alongside major roadways and population centers, with the highest concentration of towers installed in and around major transportation routes including Interstate 90, Routes 28 and 29.

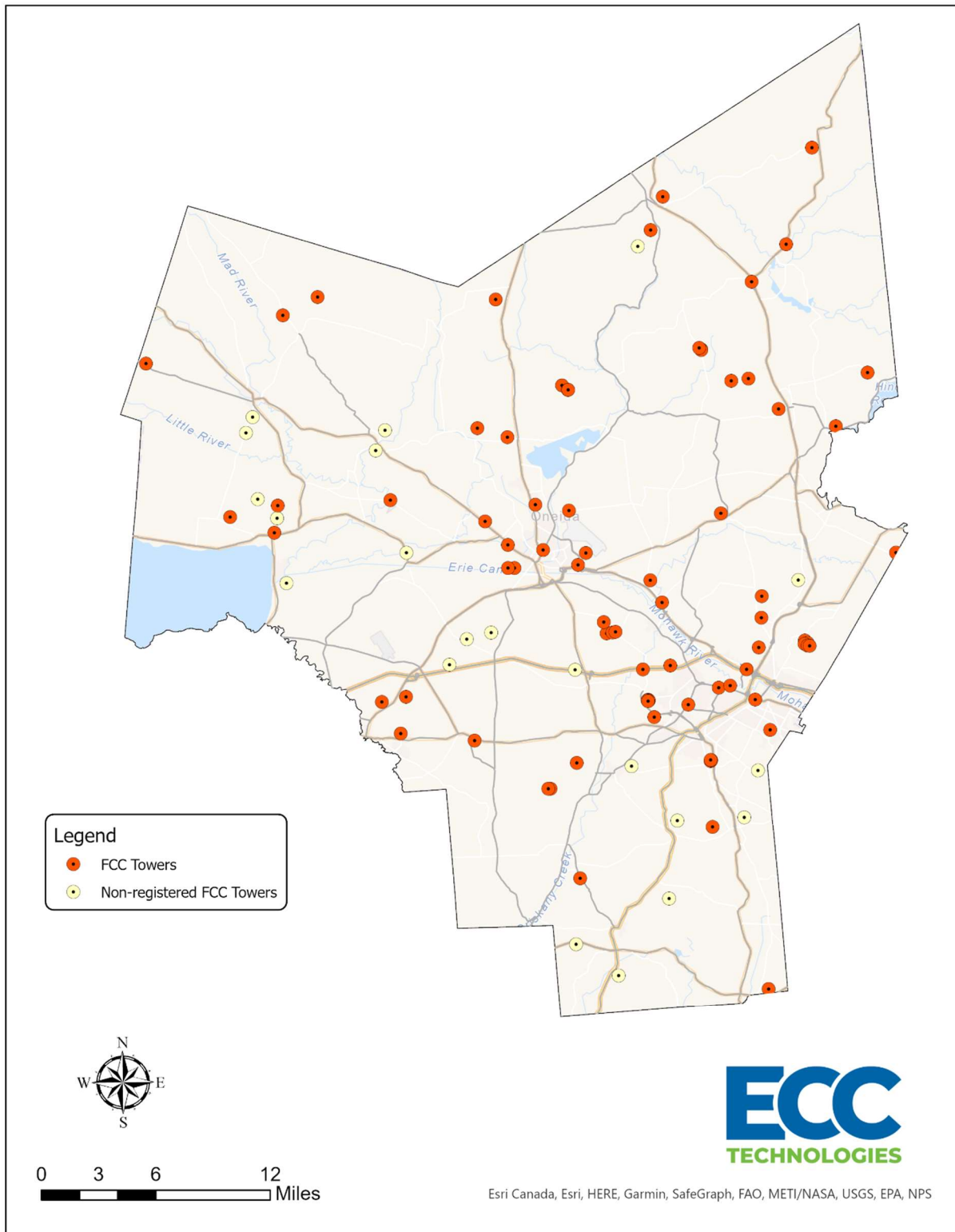
The height of the FCC registered towers is up to 304 feet above ground. Owners of the registered wireless towers in the County are shown in Table 24 on the next page. Figure 30 shows the locations of towers in Oneida County.

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Table 24 Oneida County Communications Towers Registered with the FCC

Owner Name	Oneida
Adaptable Commercial Properties, Inc	2
American Towers LLC	32
APC Towers, LLC	1
AT&T Mobility Spectrum LLC	3
BELL ATLANTIC MOBILE SYSTEMS OF ALLENTOWN, INC	5
Communication Enhancement, LLC	2
Crown Atlantic Company LLC	10
Crown Castle International	17
Galaxy Utica Licensee LLC	4
Good Guys Broadcasting, Inc.	1
Horvath Communications	1
Horvath Towers V, LLC	1
MID STATE COMMUNICATIONS & ELECTRONICS	1
Mission Broadcasting, Inc.	1
National Grid USA Service Company, Inc	1
NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION	1
ONEIDA, COUNTY OF	5
PHOENIX TOWER INTERNATIONAL	1
POWER AUTHORITY OF THE STATE OF NEW YORK	1
ROME, CITY OF	1
SBA COMMUNICATIONS	1
SBA Towers II LLC	1
SBA Monarch Towers I, LLC	1
SBC TOWER HOLDINGS LLC	2
SpectraSite Communications, LLC. through American Towers, LLC.	2
Spectrum Northeast, LLC	1
SRC, Inc.	1
STATE UNIVERSITY OF NEW YORK	1
STC Five, LLC	1
TOWNSQUARE MEDIA LICENSEE OF UTICA/ROME, INC.	4
TUNE IN BROADCASTING, LLC	1
Vertical Bridge NTCF, LLC	1
Vertical Bridge Towers III, LLC	1
WKTV, LLC	1
WOLF Radio, Inc.	1

Figure 30 Communications Towers in Oneida County



Below is an example of a monopole tower in the region. Pictures are linked to the GIS mapping information and are important to Wireless Internet Service Providers (WISPs) and others as they highlight availability of vertical assets that could support the installation of antennas and access point equipment. This information will be provided electronically to MVEDD.

Figure 31 Monopole Tower in Oneida County



6.5 Cellular Providers

There are three national cellular service providers with complete or partial coverage in Oneida County with varying connection speeds. The providers' website coverage maps for AT&T Wireless, T-Mobile, and Verizon Wireless. They provide 5G and 4G LTE coverage.

Cellular providers use radio frequencies to complete phone calls, send text messages, and transmit data from the nearest cell tower to the phone in use. Antennas on the towers both transmit and receive signals from mobile phones.

Cellular signals can be impacted by distance of the phone from the tower, building wall thickness, hills, or other structures. Clear line-of-sight is not necessary for cellular service to work but will increase call clarity and data transmission speed.

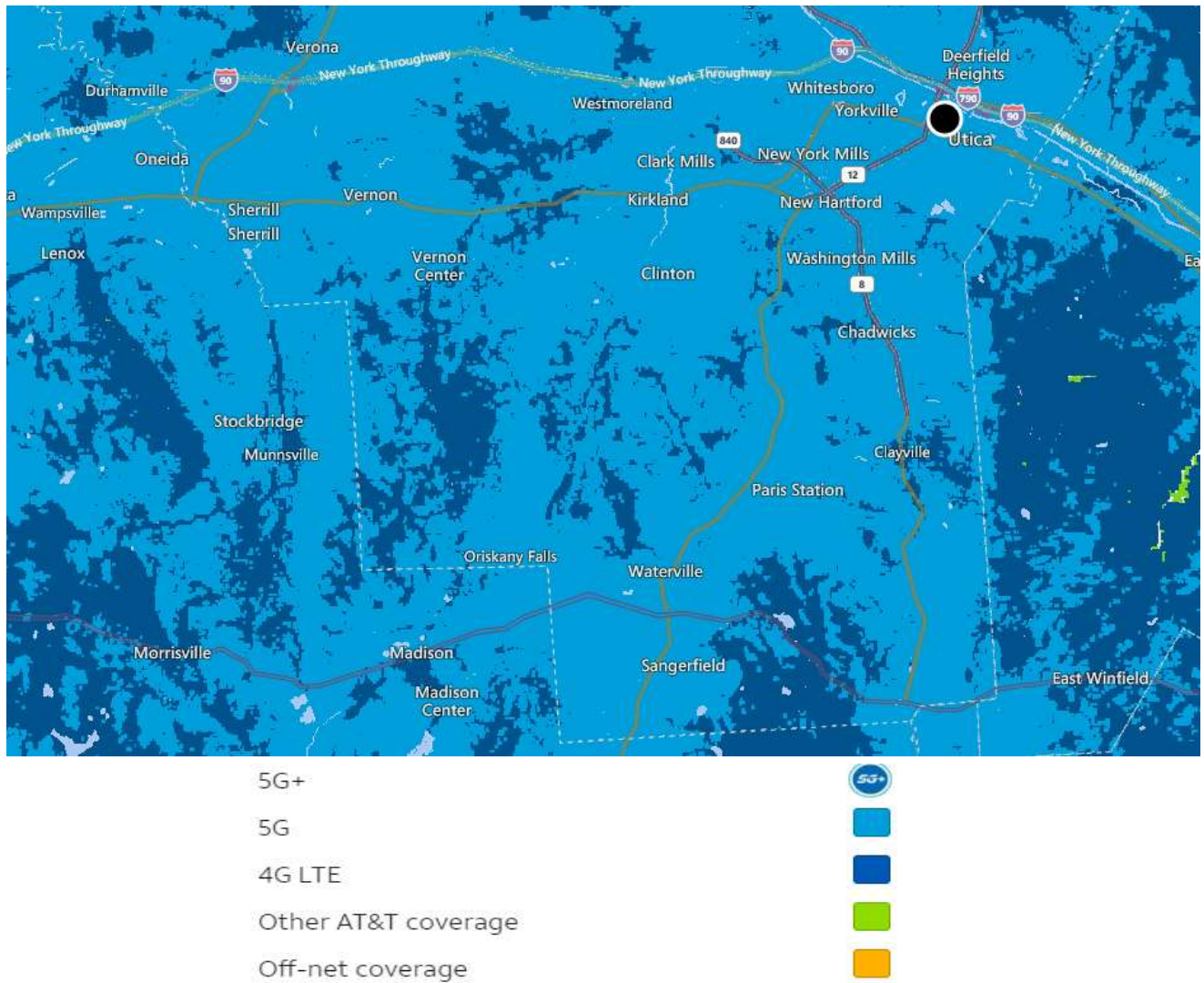
Each respective provider's website shows their 5G, mm Wave 5G and 4 G service availability areas. AT&T has complete 4G coverage with 5G in most of the County. AT&T does not offer 5G+ in Oneida County yet.

T-Mobile has 5G Ultra coverage throughout the central area with 5G Extended, 4G and 3G/2G elsewhere. There are some small areas of no coverage along the southern border of the County.

Verizon has 5G Nationwide coverage in most of the county and 4G elsewhere of the County. They have not yet deployed their 5G Ultra-wideband service yet in the County.

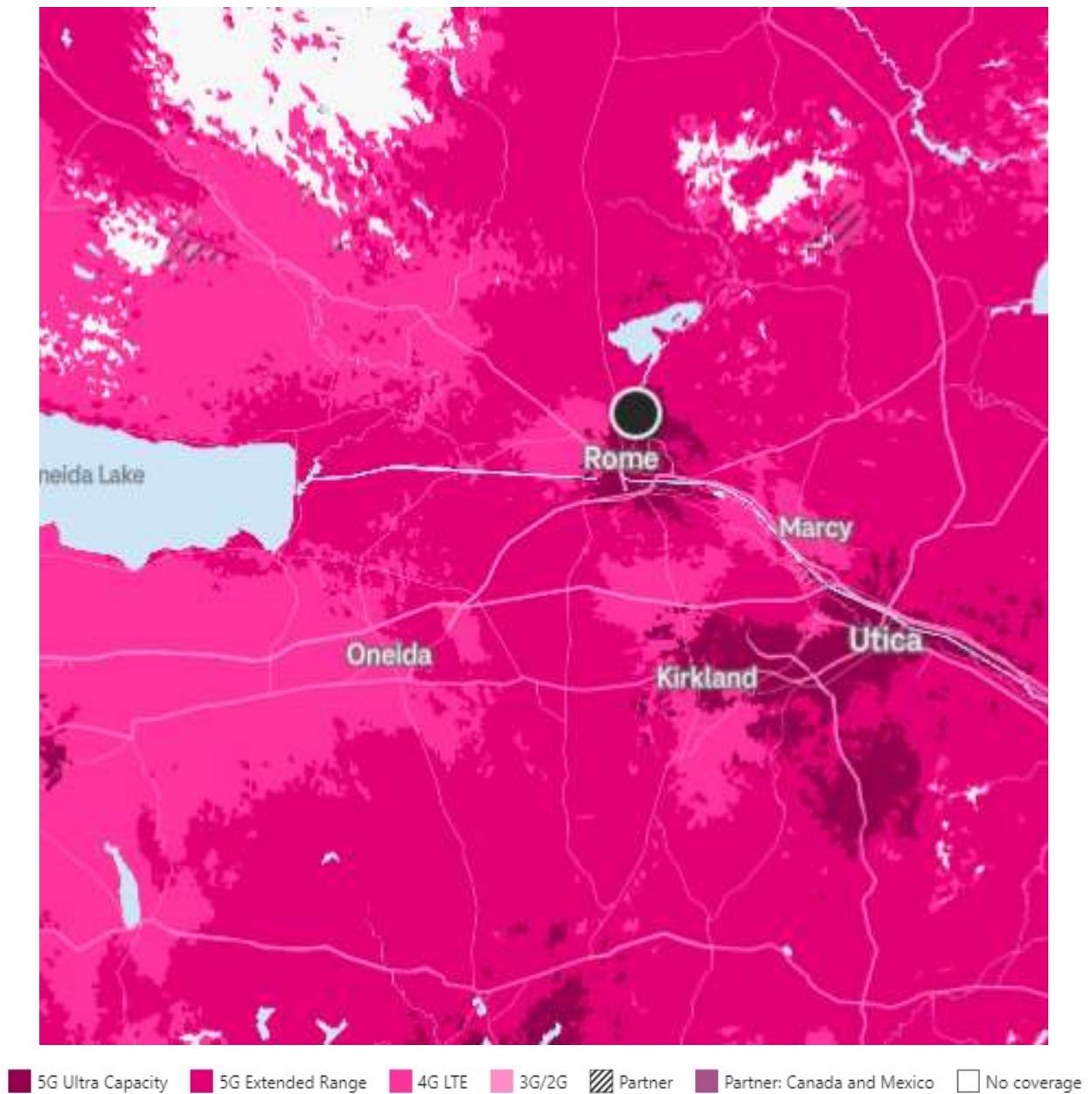
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Figure 32 AT&T Cellular Coverage in Oneida County²²



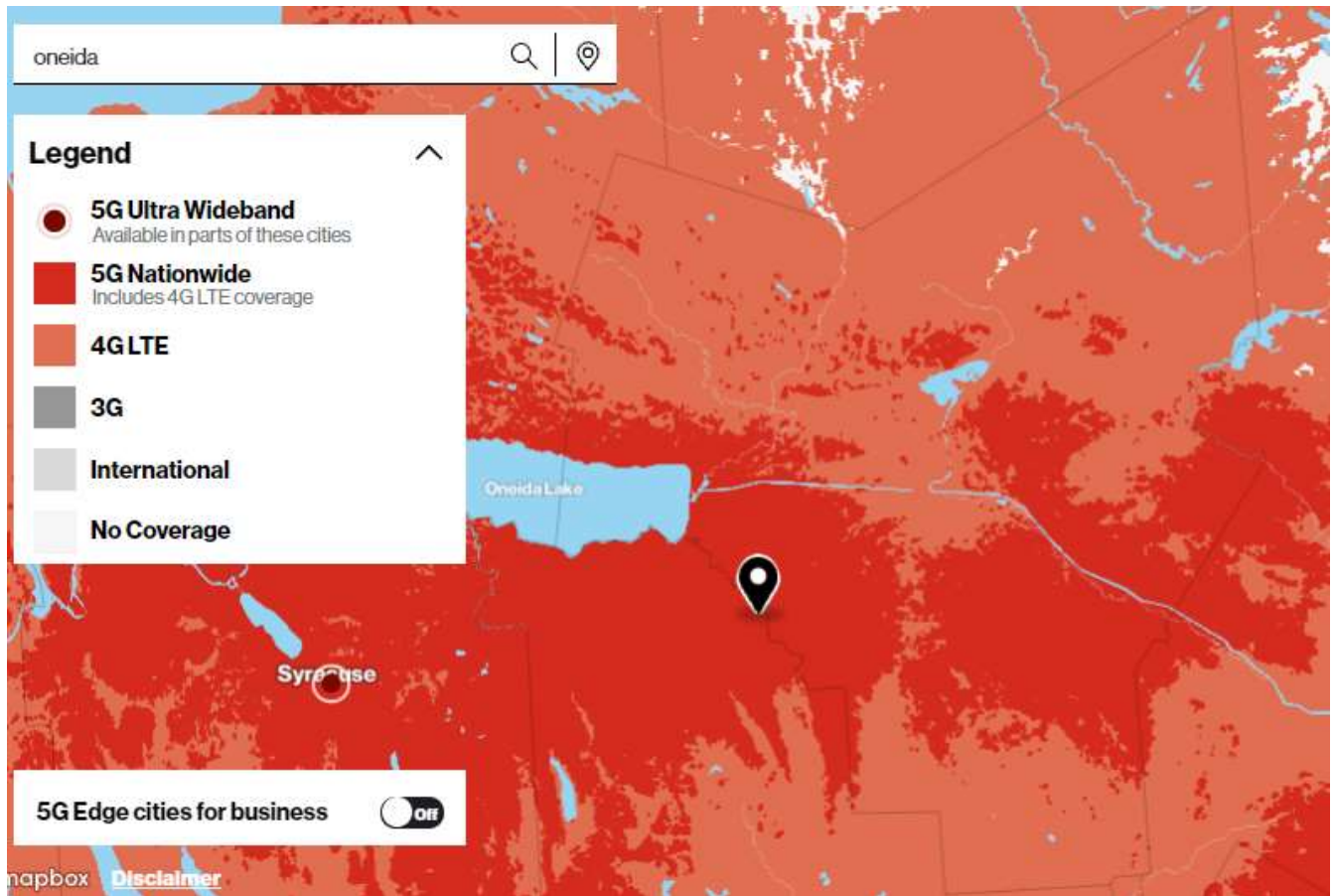
²² <https://www.att.com/maps/wireless-coverage.html>

Figure 33 T-Mobile Coverage in Oneida County²³



²³ <https://www.t-mobile.com/coverage/coverage-map>

Figure 34 Verizon Wireless Coverage in Oneida County²⁴



6.6 Satellite Providers

As discussed in the main section of the report there are two satellite companies reporting 100% coverage throughout the Oneida County area. The New NY Broadband Program funding will enable HughesNet to provide its next generation Internet service to areas it has targeted.

Below is a chart that shows the New NY Broadband grant to HughesNet and its total investment. Also shown are the number of addresses to be served by village or township.

²⁴

https://www.verizon.com/coverage-map/?CMP=afc_m_p_cj_na_ot_21_99_affiliate-100357191_11365093&cjevent=360ae8b4469811ec828630d50a82b82a&vendorid=CJM&AID=11365093&SID=oc5A05L8E/cFroff6SHThPsQhFEhBBRoxEEgDIrkGHuJd+gaavpjHiU+jliYBjz&PUBID=100357191&cjdata=MXxOfDB8WXw

Table 25 New NY Broadband Grant Award to HughesNet

Location	State Grant	Total Investment	Locations Addressed
Annsville	\$16,537	\$23,625	105
Augusta	\$4,410	\$6,300	28
Ava	\$5,512	\$8,388	34
Boonville	\$25,830	\$38,281	163
Bridgewater	\$7,402	\$11,088	46
Camden	\$11,970	\$17,100	76
Deerfield	\$6,142	\$9,293	35
Florence	\$25,042	\$35,854	159
Floyd	\$157	\$225	1
Forestport	\$53,865	\$83,051	330
Kirkland	\$7,245	\$10,350	46
Lee	\$22,050	\$31,500	140
Marcy	\$3,307	\$5,053	18
Marshall	\$11,182	\$16,183	68
New Hartford	\$157	\$225	1
Oriskany	\$157	\$225	1
Paris	\$10,395	\$14,850	66
Remsen	\$16,065	\$22,950	102
Rome	\$9,765	\$13,950	62
Sangerfield	\$10,552	\$17,127	63
Steuben	\$6,300	\$9,513	39
Trenton	\$3,622	\$5,175	23
Utica	\$1,575	\$2,277	5
Vernon	\$3,307	\$4,725	21
Verona	\$8,977	\$12,825	57
Vienna	\$14,175	\$20,304	89
Westmoreland	\$2,835	\$4,050	18
Whitestown	\$472	\$675	3
Total	\$289,005	\$425,162	1799

6.7 Next Steps

Summary of Actions

Oneida County has options to consider when evaluating how best to move forward with resolving unserved and underserved regions within the County. There is no single option that is consistent across all communities and therefore the County must weigh each option to determine which option or combination of options will provide the best outcome for the County and its residents. In most if not all options, the County may be required to commit a level of financial support to assist in subsidizing the build out of infrastructure needed to support and expand Broadband Services to the targeted areas. It should be known that in each option the question of ownership of investments once made, will be explored. ECC believes that it would be in the best interest of Oneida County and its residents to release a Request for Proposal (RFP) to interested providers for one or more of the following options.

Oneida County may have access to broadband grant opportunities.

The County can pursue broadband grant opportunities for rural area broadband access, such as those periodically provided by the USDA, NTIA, New York State, Grants for Public Safety, and others. A helpful website to search is, <https://broadbandusa.ntia.doc.gov/new-fund-search> which references the NTIA database of all federal grant programs that have to do with broadband. These types of funding opportunities are often overlooked but can be very helpful in spurring local efforts. Grant opportunities may require the County to select a provider to partner with.

The County should initiate and continue with service provider interactions.

Hold meetings with the incumbent and alternative service providers on a regular basis to develop a sense of partnership and discuss possible collaborative options. Working with the providers identify opportunities and responsibilities to expand broadband and develop desired solutions within the County.

The County can establish incentives.

Develop incentives to entice expansion of services. Provider's business models will typically support a buildout to a certain number of homes per mile. Each provider will have a different number based upon their operational costs and expected revenues. If the homes passed do not meet the financial metrics defined in their business models, then they are generally not going to invest in building out.

For example, cable providers will consider expanding their network to areas of roughly 12 homes per mile or greater. In many of these areas the density of homes per mile could be 6 or less. If the County has a desire to address these low-density areas, the County could offer to provide funding support to lessen the burden of building the infrastructure needed to reach these low-density areas. This should be done on a competitive basis via an RFP.

Consider County controlled options.

Through the use of County funded grants, tax programs, right of way, franchise agreements and use of County assets such as tall building and tower space, the County can work with the service providers to promote access and competitive services throughout the County. Also, the American Rescue Plan Act of 2021 has provided funds to Counties and municipalities which could be used to fund broadband expansion.

The County should evaluate the use of Public Private Partnerships (PPP).

The County should consider the creation of public/private partnerships to fill in the gaps within the County. Data from this inventory combined with the results of the Broadband Availability and Adoption Tool survey can be an effective way to draw in additional carriers to compete for services or partner with the County to apply for grant funding.

An example of the use of the Inventory and BAAT tools employed by this study has identified not only areas but individuals as well who desire to acquire Broadband services. Essentially the BAAT programs provide marketing data that providers can use to minimize the risks of investment. By having this information, the County will be able to have direct, and accurate discussions with interested service providers on not only where to invest but provide a list of addresses for residents who are seeking to acquire Broadband Services.

During the development of the PPP or as may be found in any of these options discussed to date, the County will have an opportunity to play as large or small a role as desired. Choosing a larger role, the County may opt to fund, own, and operate the infrastructure, inviting many providers or even the County in some cases to provide competitive services. On a smaller role, the County may opt to provide an incentive to providers for each unserved home passed which will serve to lessen the build out costs of the provider. The County may have no ownership or ongoing responsibility in this case.

6.8 Analysis

Following our evaluation of the infrastructure within Oneida County, understanding the grant award investments that have been made and the resulting plans to expand broadband within the County, we can clearly begin to see areas of the County that need additional help in the expansion of broadband availability.

We next selected the census blocks served only by HughesNet and not by any other provider. In so doing, a limited set of Census Blocks are revealed which can be prioritized and targeted for funding. It is estimated new infrastructure is needed along 519 miles of road to service 2,740 underserved addresses. A budget of nearly \$28.5M is estimated to build the required 519 miles of infrastructure.

Public/private partnerships between the County and Service Providers can focus on technical solutions and funding for these areas. There are many grant and investment options which could be brought to bear to fund these solutions as well as infrastructure funds which may be available.

The following maps depict Broadband infrastructure available in the County as well as where grants have previously been awarded and where grant eligible unserved areas are located. Upon review of the RDOF awards it appears that many of the unserved areas in the County will be served. The County should continue to communicate with the RDOF awardees on a regular basis as to determine build out schedules etc. Should the County find that RDOF awardees are not meeting expectations, the County may choose to solicit alternative providers though one or more of the recommended options.

The County is currently in development of a County wide solution via a request for proposal that will solicit proposals from Broadband Providers to invest in the needed infrastructure in unserved areas of the County. It is anticipated that the County will incentivize providers to build out to these areas at a rapid and meaningful pace.

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Figure 35 Oneida County - Broadband Infrastructure

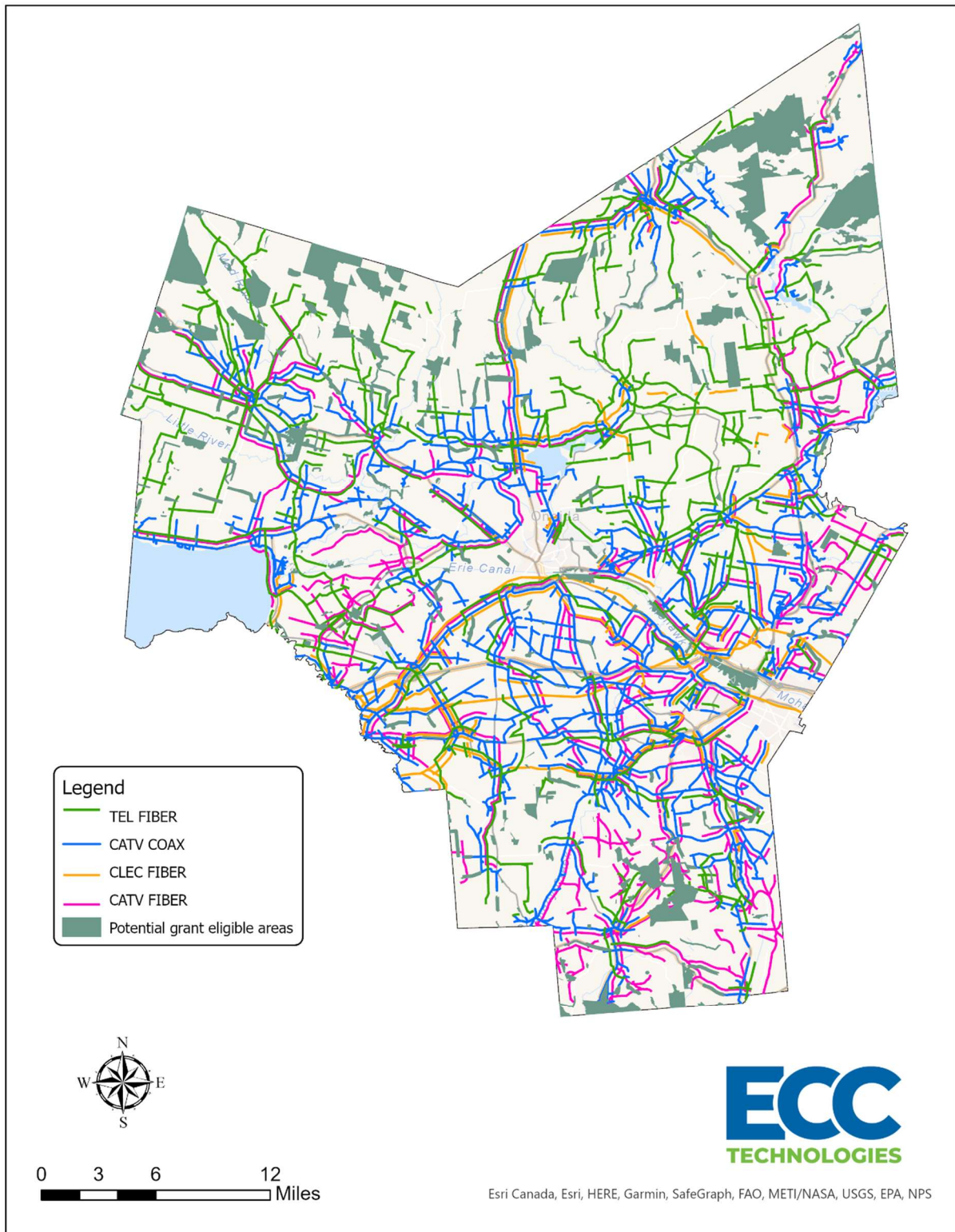


Figure 36 Oneida County - Roads & Addresses without Broadband Infrastructure

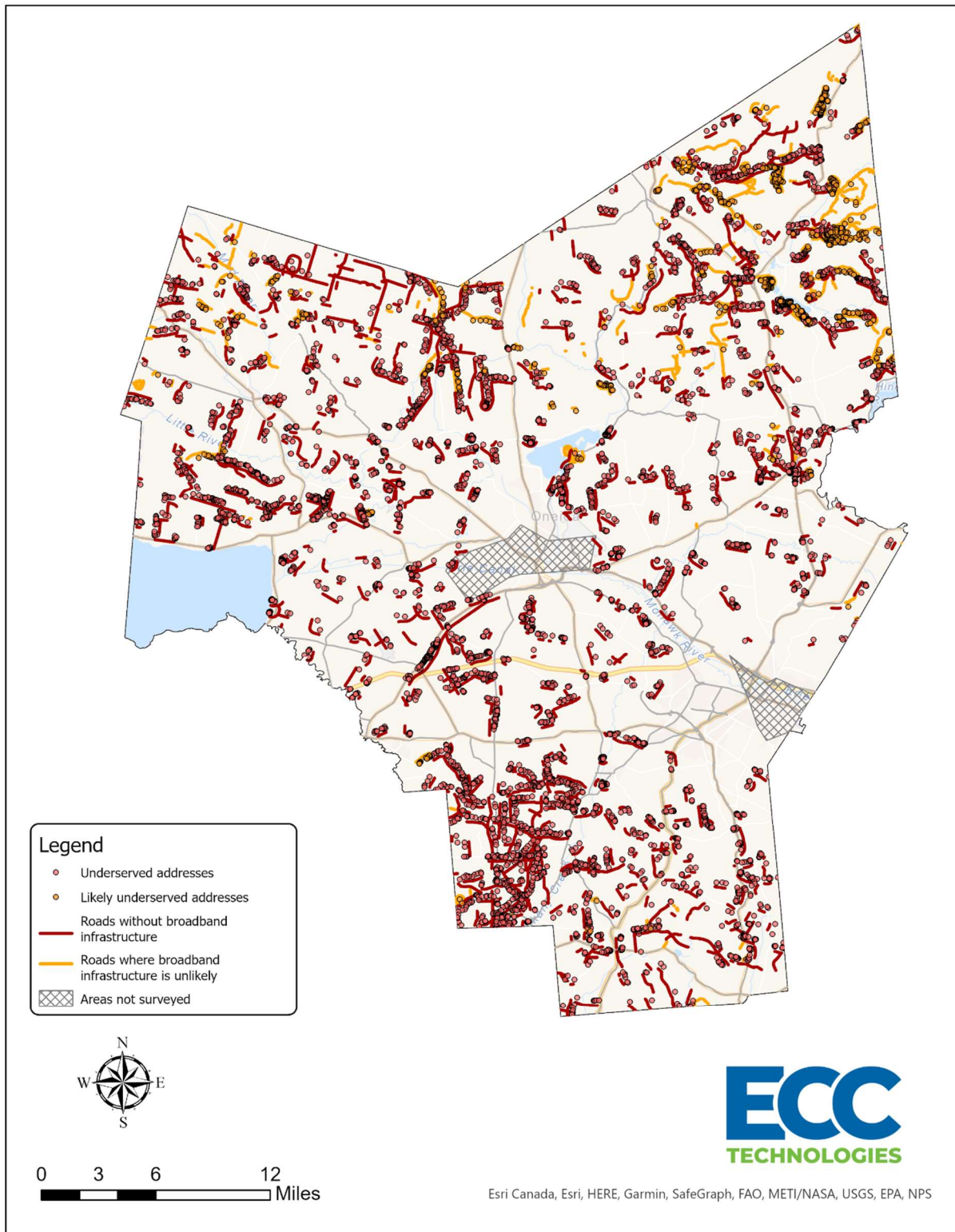
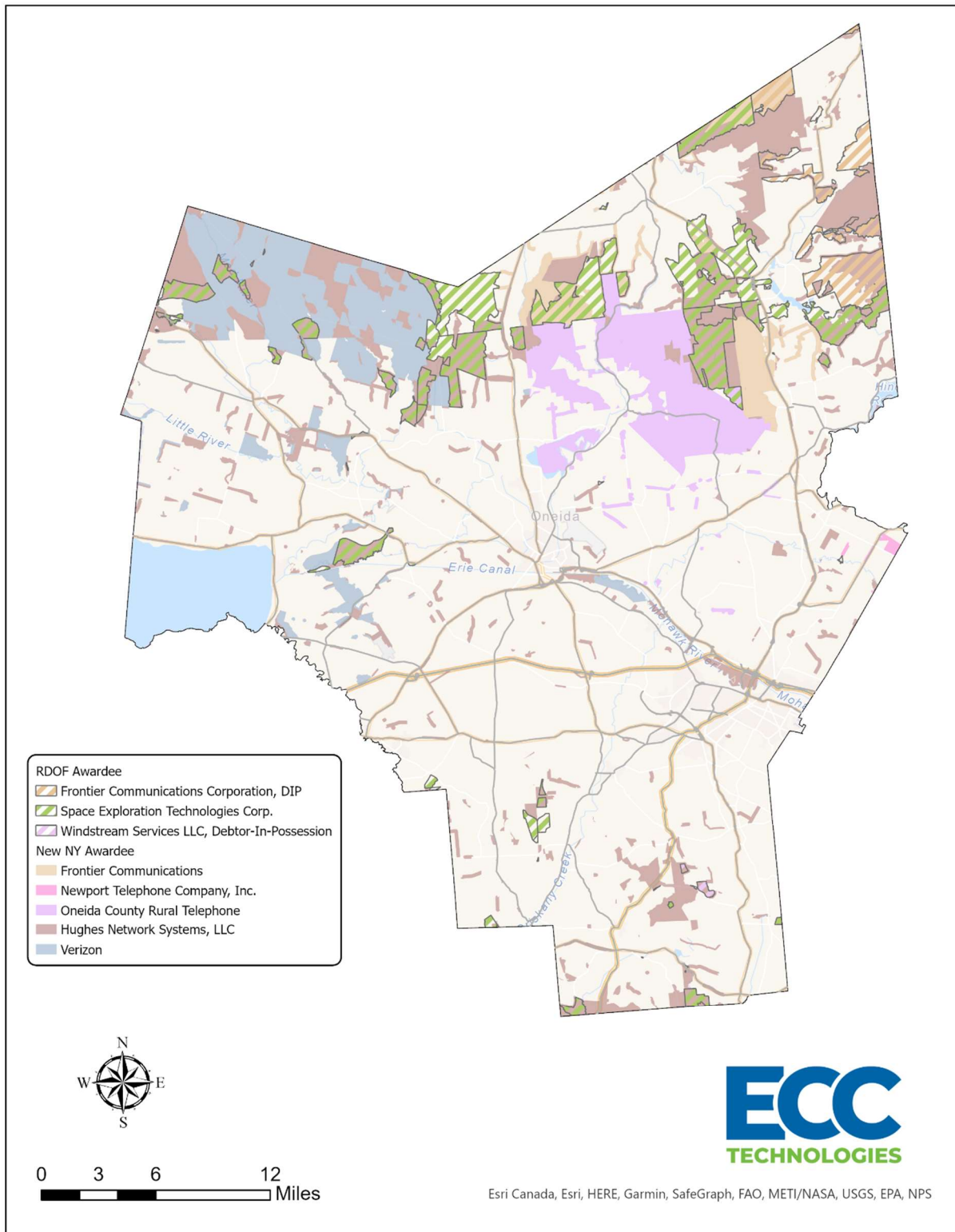


Figure 37 Oneida County - New NY Broadband & RDOF Grant Award Areas



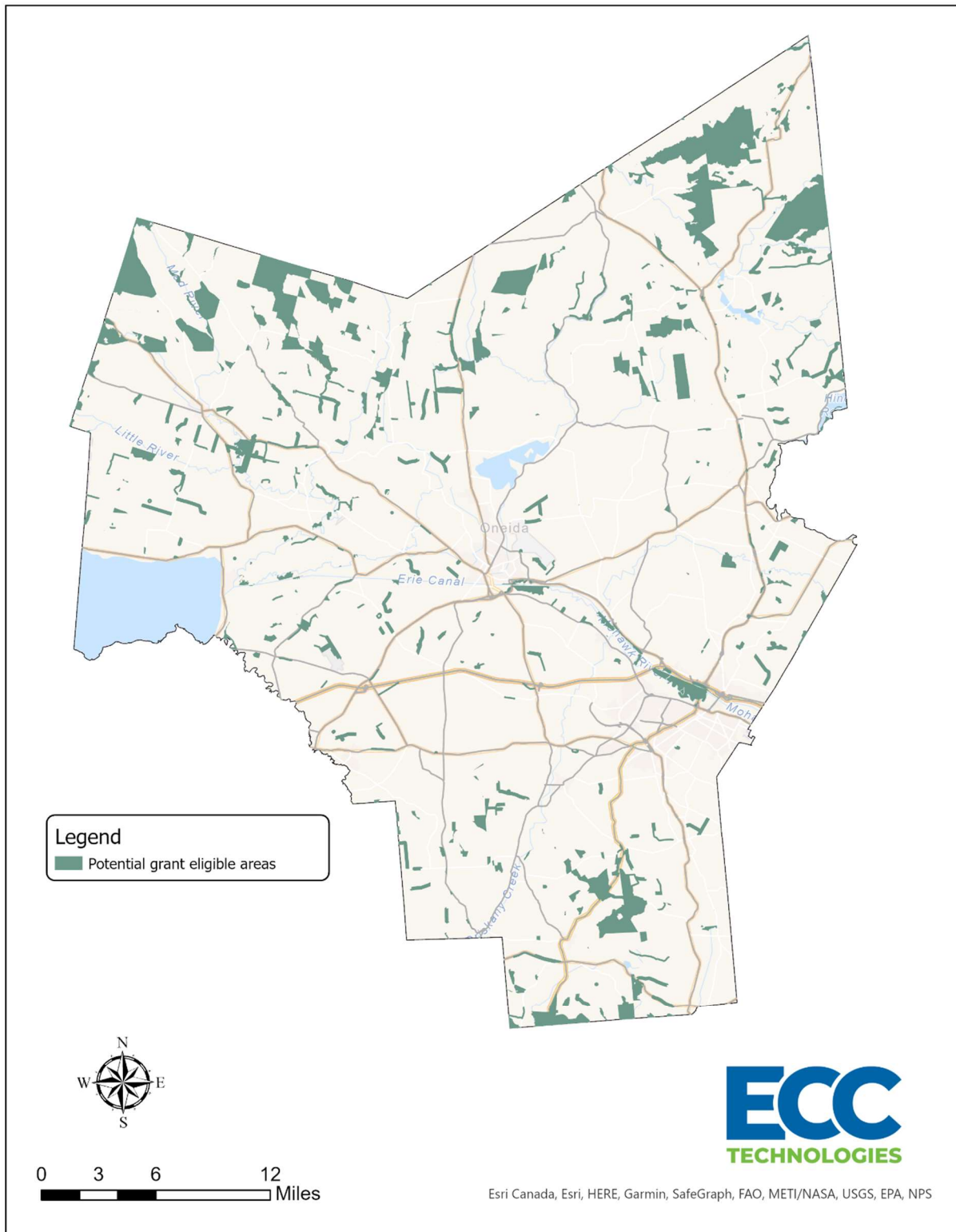


Table 26 Oneida County - Summary of Internet Providers by Zip Code

Oneida County Locations			Zip Code
Summary of Internet Providers in Durhamville			13054
Provider	Type	Coverage	Speed
Verizon	DSL	98.8%	15 Mbps
Spectrum	Cable	70.2%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	52.0%	940 Mbps
Northland Communications	Fiber	15.0%	-- Mbps
Summary of Internet Providers in North Bay			13123
Provider	Type	Coverage	Speed
Verizon	DSL	95.9%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Summary of Internet Providers in Sylvan Beach			13157
Provider	Type	Coverage	Speed
Verizon	DSL	98.4%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Summary of Internet Providers in Verona Beach			13162
Provider	Type	Coverage	Speed
Verizon	DSL	100%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	72.6%	-- Mbps

Summary of Internet Providers in Alder Creek 13301

Provider	Type	Coverage	Speed
Frontier Communications	DSL	98.0%	115 Mbps
Spectrum	Cable	32.7%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	30.4%	940 Mbps

Summary of Internet Providers in Ava 13303

Provider	Type	Coverage	Speed
Verizon	DSL	52.7%	15 Mbps
Spectrum	Cable	82.7%	1,000 Mbps
Frontier Communications	DSL	27.8%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	80.0%	1,000 Mbps
Frontier Business	DSL	64.5%	115 Mbps

Summary of Internet Providers in Barneveld 13304

Provider	Type	Coverage	Speed
Spectrum	Cable	93.9%	1,000 Mbps
Newport Telephone	DSL	8.5%	6 Mbps
Newport Telephone	Fiber	1.9%	400 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	21.4%	1,000 Mbps
Newport Telephone	Fiber	9.1%	500 Mbps

Summary of Internet Providers in Vienna 13308

Provider	Type	Coverage	Speed
Verizon	DSL	82.4%	15 Mbps
Spectrum	Cable	97.2%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps

Summary of Internet Providers in Boonville 13309

Provider	Type	Coverage	Speed
Frontier Communications	DSL	84.5%	115 Mbps
Spectrum	Cable	79.1%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	67.8%	940 Mbps
Northland Communications	Fiber	14.4%	1,000 Mbps
Uniti Fiber	Fiber	1.3%	-- Mbps

Summary of Internet Providers in Bridgewater 13313

Provider	Type	Coverage	Speed
Spectrum	Cable	100%	1,000 Mbps
Windstream	DSL	79.3%	100 Mbps
Frontier Communications	DSL	3.0%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	19.5%	115 Mbps

Summary of Internet Providers in Camden 13316

Provider	Type	Coverage	Speed
Spectrum	Cable	74.4%	1,000 Mbps
Verizon	DSL	84.4%	15 Mbps
King Street Wireless	Fixed Wireless	6.2%	1.0 Mbps
Frontier Communications	DSL	2.9%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	58.6%	940 Mbps
Frontier Business	DSL	9.5%	115 Mbps
Spectrum Business	Fiber	9.3%	940 Mbps
Verizon Business	Copper	0.0%	3.0 Mbps

Summary of Internet Providers in Cassville			13318
Provider	Type	Coverage	Speed
Spectrum	Cable	87.9%	1,000 Mbps
Windstream	DSL	49.0%	100 Mbps
Frontier Communications	DSL	48.7%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	72.0%	115 Mbps

Summary of Internet Providers in Chadwicks			13319
Provider	Type	Coverage	Speed
Verizon	DSL	100%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
CenturyLink Business	Fiber	2.5%	1,000 Mbps

Summary of Internet Providers in Clark Mills			13321
Provider	Type	Coverage	Speed
Verizon	DSL	98.0%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	99.3%	940 Mbps

Summary of Internet Providers in Clayville			13322
Provider	Type	Coverage	Speed
Verizon	DSL	7.3%	15 Mbps
Spectrum	Cable	94.9%	1,000 Mbps
Frontier Communications	DSL	85.6%	115 Mbps
Windstream	DSL	11.9%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	97.1%	940 Mbps

Summary of Internet Providers in Clinton			13323
Provider	Type	Coverage	Speed
Verizon	DSL	94.4%	15 Mbps
Spectrum	Cable	98.2%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	99.4%	940 Mbps
Northland Communications	Fiber	29.3%	-- Mbps
Spectrum Business	Fiber	6.8%	940 Mbps
Verizon Business	Copper	3.7%	45 Mbps
CenturyLink Business	Fiber	0.4%	1,000 Mbps

Summary of Internet Providers in Deansboro			13328
Provider	Type	Coverage	Speed
Verizon	DSL	7.4%	15 Mbps
Spectrum	Cable	91.3%	1,000 Mbps
Frontier Communications	DSL	77.7%	115 Mbps
TDS Telecom	DSL	30.0%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	93.3%	115 Mbps

Summary of Internet Providers in Forestport			13338
Provider	Type	Coverage	Speed
Frontier Communications	DSL	84.1%	115 Mbps
Spectrum	Cable	73.6%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	62.9%	940 Mbps

Summary of Internet Providers in Franklin Springs			13341
Provider	Type	Coverage	Speed
Verizon	DSL	100%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps

Summary of Internet Providers in Hinckley 13352

Provider	Type	Coverage	Speed
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps

Summary of Internet Providers in Holland

Patent 13354

Provider	Type	Coverage	Speed
Verizon	DSL	2.9%	15 Mbps
Spectrum	Cable	73.2%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Northland Communications	Fiber	100%	1,000 Mbps
Spectrum Business	Cable	60.8%	940 Mbps

Summary of Internet Providers in Knoxboro

13362

Provider	Type	Coverage	Speed
Spectrum	Cable	100%	1,000 Mbps
TDS Telecom	DSL	100%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps

Summary of Internet Providers in Lee Center

13363

Provider	Type	Coverage	Speed
Verizon	DSL	93.1%	15 Mbps
Spectrum	Cable	95.6%	1,000 Mbps
Frontier Communications	DSL	11.8%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	49.3%	115 Mbps
Northland Communications	Fiber	6.6%	-- Mbps
Crown Castle Fiber	Fiber	1.6%	1,000 Mbps

Summary of Internet Providers in Marcy			13403
Provider	Type	Coverage	Speed
Verizon	DSL	78.8%	15 Mbps
Spectrum	Cable	99.9%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	82.9%	1,000 Mbps
CenturyLink Business	Fiber	3.2%	1,000 Mbps
Windstream	Fiber	3.9%	1,000 Mbps
Spectrum Business	Fiber	3.4%	940 Mbps

Summary of Internet Providers in New Hartford			13413
Provider	Type	Coverage	Speed
Verizon	DSL	95.7%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	40.6%	-- Mbps
CenturyLink Business	Fiber	14.6%	1,000 Mbps
Spectrum Business	Fiber	6.0%	940 Mbps
Verizon Business	Copper	5.6%	3.0 Mbps
GTT Communications	Copper	1.6%	-- Mbps

Summary of Internet Providers in New York Mills			13417
Provider	Type	Coverage	Speed
Verizon	DSL	99.2%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	59.8%	-- Mbps
CenturyLink Business	Fiber	10.0%	1,000 Mbps
Spectrum Business	Fiber	3.1%	940 Mbps

Summary of Internet Providers in Oriskany			13424
Provider	Type	Coverage	Speed
Verizon	DSL	98.2%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	68.0%	-- Mbps
CenturyLink Business	Fiber	27.9%	1,000 Mbps
Spectrum Business	Fiber	17.3%	940 Mbps

Summary of Internet Providers in Oriskany Falls			13425
Provider	Type	Coverage	Speed
TDS Telecom	DSL	99.2%	100 Mbps
Spectrum	Cable	73.3%	1,000 Mbps
Frontier Communications	DSL	11.9%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	36.9%	115 Mbps

Summary of Internet Providers in Prospect			13435
Provider	Type	Coverage	Speed
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps

Summary of Internet Providers in Remsen			13438
Provider	Type	Coverage	Speed
Frontier Communications	DSL	67.4%	115 Mbps
Spectrum	Cable	61.8%	1,000 Mbps
Newport Telephone	DSL	1.6%	6 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	61.9%	940 Mbps
Northland Communications	Fiber	12.6%	1,000 Mbps

Summary of Internet Providers in Rome			13440
Provider	Type	Coverage	Speed
Verizon	DSL	100%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
CenturyLink Business	Fiber	92.9%	1,000 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	96.5%	1,000 Mbps
T2 Technologies	Copper	80.0%	50 Mbps
Spectrum Business	Fiber	9.0%	940 Mbps
Crown Castle Fiber	Fiber	7.2%	1,000 Mbps

Summary of Internet Providers in Rome			13441
Provider	Type	Coverage	Speed
Verizon	DSL	100%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
CenturyLink Business	Fiber	92.9%	1,000 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	96.5%	1,000 Mbps
T2 Technologies	Copper	80.0%	50 Mbps
Spectrum Business	Fiber	9.0%	940 Mbps
Crown Castle Fiber	Fiber	7.2%	1,000 Mbps

Summary of Internet Providers in Sauquoit			13456
Provider	Type	Coverage	Speed
Verizon	DSL	81.0%	15 Mbps
Spectrum	Cable	97.1%	1,000 Mbps
Frontier Communications	DSL	30.0%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Frontier Business	DSL	46.0%	115 Mbps
Crown Castle Fiber	Fiber	38.3%	1,000 Mbps
Spectrum Business	Fiber	1.0%	940 Mbps
CenturyLink Business	Fiber	0.2%	1,000 Mbps

Summary of Internet Providers in Sherrill			13461
Provider	Type	Coverage	Speed
Verizon	DSL	85.0%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	6.9%	-- Mbps

Summary of Internet Providers in Stittville			13469
Provider	Type	Coverage	Speed
Verizon	DSL	3.0%	15 Mbps
Spectrum	Cable	99.1%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	98.3%	1,000 Mbps

Summary of Internet Providers in Taberg			13471
Provider	Type	Coverage	Speed
Verizon	DSL	70.5%	15 Mbps
Spectrum	Cable	76.8%	1,000 Mbps
Frontier Communications	DSL	3.2%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	91.5%	940 Mbps
Frontier Business	DSL	7.1%	115 Mbps

Summary of Internet Providers in Vernon			13476
Provider	Type	Coverage	Speed
Verizon	DSL	21.2%	15 Mbps
Spectrum	Cable	98.5%	1,000 Mbps
TDS Telecom	DSL	94.5%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	42.5%	-- Mbps
FirstLight	Fiber	2.7%	-- Mbps

Summary of Internet Providers in Vernon Center			13477
Provider	Type	Coverage	Speed
Verizon	DSL	5.7%	15 Mbps
TDS Telecom	DSL	98.7%	100 Mbps
Spectrum	Cable	80.9%	1,000 Mbps
Windstream	DSL	4.9%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	33.0%	-- Mbps

Summary of Internet Providers in Verona			13478
Provider	Type	Coverage	Speed
Verizon	DSL	97.2%	15 Mbps
Spectrum	Cable	93.0%	1,000 Mbps
TDS Telecom	DSL	7.0%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	88.4%	940 Mbps
Northland Communications	Fiber	33.7%	-- Mbps
Spectrum Business	Fiber	1.9%	940 Mb

Summary of Internet Providers in Waterville			13480
Provider	Type	Coverage	Speed
Frontier Communications	DSL	86.8%	115 Mbps
Spectrum	Cable	75.9%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	45.2%	940 Mbps
Windstream	Fiber	0.3%	50 Mbps
Spectrum Business	Fiber	0.0%	940 Mbps

Summary of Internet Providers in Westdale			13483
Provider	Type	Coverage	Speed
Verizon	DSL	59.4%	15 Mbps
Spectrum	Cable	55.5%	1,000 Mbps
Frontier Communications	DSL	35.6%	115 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	80.6%	940 Mbps
Spectrum Business	Fiber	80.6%	940 Mbps
Frontier Business	DSL	67.7%	115 Mbps

Summary of Internet Providers in Westernville			13486
Provider	Type	Coverage	Speed
Verizon	DSL	8.6%	15 Mbps
Spectrum	Cable	64.7%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Northland Communications	Fiber	100%	1,000 Mbps
Spectrum Business	Cable	33.0%	940 Mbps

Summary of Internet Providers in Westmoreland			13490
Provider	Type	Coverage	Speed
Verizon	DSL	94.9%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
TDS Telecom	DSL	32.1%	100 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Spectrum Business	Fiber	8.8%	940 Mbps

Summary of Internet Providers in Whitesboro			13492
Provider	Type	Coverage	Speed
Verizon	DSL	99.3%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	40.4%	-- Mbps
CenturyLink Business	Fiber	9.9%	1,000 Mbps

Summary of Internet Providers in Woodgate 13494

Provider	Type	Coverage	Speed
Frontier Communications	DSL	91.7%	115 Mbps
Spectrum	Cable	89.8%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Frontier Business	DSL	100%	115 Mbps
Spectrum Business	Cable	84.4%	940 Mbps

Summary of Internet Providers in Yorkville 13495

Provider	Type	Coverage	Speed
Verizon	DSL	100%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	58.5%	-- Mbps
CenturyLink Business	Fiber	2.9%	1,000 Mbps

Summary of Internet Providers in Utica 13501

Provider	Type	Coverage	Speed
Verizon	DSL	98.6%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	47.6%	-- Mbps
CenturyLink Business	Fiber	10.3%	1,000 Mbps
Spectrum Business	Fiber	6.9%	940 Mbps
FirstLight	Fiber	2.0%	1,000 Mbps
Verizon Business	Copper	1.4%	15 Mbps

Summary of Internet Providers in Utica			13502
Provider	Type	Coverage	Speed
Verizon	DSL	98.6%	15 Mbps
Spectrum	Cable	100%	1,000 Mbps
Viasat Internet (formerly Exede)	Satellite	100%	100 Mbps
HughesNet	Satellite	100%	25 Mbps
Spectrum Business	Cable	100%	940 Mbps
Northland Communications	Fiber	47.6%	-- Mbps
CenturyLink Business	Fiber	10.3%	1,000 Mbps
Spectrum Business	Fiber	6.9%	940 Mbps
FirstLight	Fiber	2.0%	1,000 Mbps
Verizon Business	Copper	1.4%	15 Mbps

Appendix A - FCC Technology Codes

Technology Codes Used in Form 477 Fixed Broadband Deployment Data

Below is a list of 2-digit technology codes used in the FCC Form 477 data and their associated technologies. The technologies indicate the portion of the Internet access connection that terminates at the end user's location (premises).

Code Technology of Transmission

10	Asymmetric xDSL (Up to 8.1Mbps/896 Kbps)
11	ADSL2, ADSL2+ (Up to 12 Mbps/1 Mbps, 24 Mbps/1 Mbps) ²⁵
12	VDSL
20	Symmetric xDSL*
30	Other Copper Wireline (all copper-wire based technologies other than xDSL; Ethernet over copper and T-1 are examples)
40	Cable Modem other than DOCSIS 1, 1.1, 2.0, 3.0, or 3.1
41	Cable Modem – DOCSIS 1, 1.1 or 2.0
42	Cable Modem – DOCSIS 3.0
43	Cable Modem – DOCSIS 3.1
50	Optical Carrier / Fiber to the end user (Fiber to the home or business end user, does not include “fiber to the curb”)
60	Satellite
70	Terrestrial Fixed Wireless
90	Electric Power Line
0	All Other

²⁵ <https://www.differencebetween.com/difference-between-adsl2-and-adsl2-adsl2-plus/>