CONNECTED NATION

ALCONA COUNTY, MICHIGAN

Technical Report and Recommendations

December 14, 2021

Introduction

The Alcona County Economic Development Corporation's (Alcona County EDC) vision for the County is to ensure citizens have access to an improved broadband infrastructure and that every resident should have access to robust, affordable high-speed internet. This vision can only be realized and advanced by understanding the existing broadband landscape in Alcona County, Michigan. Ultimately, access to gigabit+ broadband infrastructure is the desired outcome, but this will require incremental steps to achieve this aspirational goal.

By way of comparison, "Broadband" and "High-Speed Internet" definitions have changed over the past 7-10 years. In 2014 the Federal Communications Commission (FCC) definition of broadband was 4 Mbps x 1 Mbps. Several states and municipalities use 10 Mbps x 1 Mbps as an obtainable milestone in rural areas as that tier is the commitment speed used in certain federal programs. In its 2015 Broadband Progress Report, the FCC voted to change the definition of broadband to 25 Mbps x 3 Mbps. Alcona County's aspirational broadband improvement and expansion goals have even greater speeds envisioned. In this case, the high-speed internet connectivity goal for Alcona County is defined as 100 Mbps download x 10 Mbps upload; more closely aligned to the U.S. Treasury's requirements under recent grant programs.

Broadband availability is an essential infrastructure for twenty-first century communities as it empowers a community to access applications ranging from healthcare and education to business and government services. A high-speed internet connection is critical for families, students, businesses, and institutions to participate in the ever-evolving digital economy. Communities, particularly those in rural and suburban areas, often struggle with economic recession, attrition, disinvestment, apathy, and overall community decline.

To combat these factors, communities must retain leadership, stem youth and family outmigration, increase civic engagement, increase community and economic development activity, and support local human capital development. Robust broadband access, and its meaningful adoption and use can significantly impact these underlying aspirations, given the prominent role that broadband and technology play across economic sectors and within the daily lives of residents, businesses, and institutions.

The COVID-19 virus outbreak has raised awareness on the importance of residential broadband as consumers, who may have relegated their internet use to the workplace, found themselves working from home. Access issues were compounded by supply chain delays, resulting in extended installation periods and many consumers gravitating to using their mobile phone as a Wi-Fi hotspot.

Students, whether K-12 or college, discovered that virtual learning was becoming the new normal. CARES Act funds were distributed across the state of Michigan and bulk purchases of mobile hotspots and cellular multiplexers (e.g., CradlePoint units) were

commonplace. Both instances led to a broadband paradigm shift as consumers began to take advantage of 4G networks with (pre) 5G speeds and were less concerned with wireline services. All the while some mobile companies were decommissioning their 3G networks as they prepared for the launch of 5G. Unfortunately, "decommissioning" meant that some consumers (those still using a 3G phone) lost access to their mobile connection until they upgraded to a new phone or hotspot.

Wireline services, on the other hand, thrived like never before. This has been especially true in rural areas where mobile service was less reliable. Cable and telephone companies found it difficult to keep up with the demand for new services through the pandemic, and constantly maintaining their existing networks became more challenging as supply and demand switched positions.

While the number of installation requests have gone up, so too did the number of troubleshooting calls. Networks that were already nearing their saturation point began to stretch to their limits. In many cases, this was less a "last mile" infrastructure problem and more of a "capacity" problem. In other words, the demand exceeded the supply and broadband operators began increasing their backhaul capacity to satisfy local demand (if additional backhaul capacity was available).

The Alcona County EDC recognized that the broadband landscape was rapidly changing, not always for the better, and initiated an action plan to cultivate a project that could improve the broadband landscape in the County.

With financial support provided by the Northeast Michigan Council of Governments (NEMCOG) through an Economic Development Grant, the Alcona County project took its biggest step to date: initiating an outside plant (OSP) audit and radio frequency (RF) sweep of the County. From August 25 through September 23, 2021, Connected Nation's (CN) Engineering and Technical Services (ETS) team members conducted a "boots-on-the-ground" OSP audit to identify and map the key components comprising the internet networks.

The telecommunications field analysis and OSP audit included driving every accessible road (private and posted roads excluded), mapping the location (aerial or underground) of all wireline network facilities including the copper used for digital subscriber line (DSL), hybrid fiber coaxial (HFC), fiber-to-the-home (FTTH), fiber optic transport (middle-mile and proprietary long-haul transport), and, upon arrival at a wireless tower site, the completion of a radio frequency (RF) sweep (see section titled Analyzing Fixed Wireless Providers).

During this exercise, CN focused on the identification of areas within the County that (i) did not have access to broadband as defined by the FCC, (ii) did not have access to high-speed internet connectivity, (iii) may impede infrastructure expansion due to natural features; and (iv) contained dark and lit middle-mile, proprietary, or long-haul transport fiber.

The actual distribution plant routes were mapped and compared against the FCC Form 477 census block reporting. This process aided in the final data visualization and analysis. By isolating this type of data, and comparing it with the actual OSP audit

results, CN determined that numerous areas were subject to census block overstatement.

Initial Desktop Research

Prior to commencing the OSP audit, CN conducted rigorous due diligence throughout the public domain and reviewed the following locations in search of data relevant to Alcona County:

1. Federal Communications Commission: Form 477 broadband deployment data which was vintage June 2020 at the time of the review process. The FCC has recently released a December 2020 public dataset of Form 477 since the initial review, with data available at: https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477.

2. FiberLocator: This subscription-based, fiber optic service location program was used to examine commercially available fiber optic providers and their respective fiber routes (see maps at Appendix III: Fiber Routes). This list of long-haul providers (typically proprietary transport) and metro fiber providers (middle-mile dark and lit services) included:

    - ACD
    - AT&T
    - CenturyLink
    - Everstream
    - Frontier
    - MERIT Network
    - Peninsula Fiber Network
    - Windstream
    - Zayo Network

Through its extended research of FiberLocator, CN identified 3 buildings that appeared to be connected to fiber optic circuits. These locations included:

   a. 3358 S. State Road, Glennie, MI 48737 (Everstream)
   b. 1956 S. Everett Road, Harrisville, MI 48740 (Everstream)
   c. 311 N. Lake Street, Harrisville, MI, 48740 (Everstream)
       ** 214 W. Main Street, Harrisville, MI 48740 was identified as a Peninsula Fiber lit address during the actual outside plant audit.

3. Universal Service Administrative Company (USAC): An examination of the Connect America Fund (CAF) Deployment map (available at https://data.usac.org/publicreports/caf-map/) was used to determine if any portion of the communities, or nearby locations, had been subsidized by the federal government as part of the CAF program. These areas are generally considered to be deemed "high-cost remote and rural" by the FCC. Networks were required to be

updated so that consumers would be able to receive internet services with speeds of at least 10 Mbps x 1 Mbps.

4. Tower Coverage.com: This website, used by wireless internet service providers (WISPs) to illustrate their coverage areas, was reviewed to determine if any WISPs, who were new to the area or that had failed to file their required FCC Form 477 data, were present in any of the market areas.

5. United States Department of Agriculture (USDA): A review of the Telecommunications Program Funded Service Areas Map sought to identify providers who had been awarded grants, low cost loans, or both.

6. FCC Universal Licensing System: CN conducted research to determine the status of any potential Educational Broadband Service (EBS) licensees in the state that may hold FCC spectrum authorizations, where coverage areas may extend into Alcona County.

7. 4G/5G Mobile Services: CN reviewed maps from the three major carriers, AT&T, T-Mobile, and Verizon, to determine if 4G/5G services were available in Alcona County. 4G/5G services are reported by three major carriers and their interactive maps can be found at:

   a. AT&T: https://www.att.com/maps/wireless-coverage.html
   b. T-Mobile: https://www.t-mobile.com/coverage/coverage-map
   c. Verizon: https://www.verizon.com/coverage-map/

Broadband and Service Providers

Broadband access refers to the infrastructure that enables a high-speed internet connection. There are two primary types of broadband connections: fixed and mobile.

Fixed broadband is delivered to a user via several technology platforms including HFC from the local cable television provider, DSL over copper wires from the incumbent local exchange carriers (ILECs), fiber optics which can include middle-mile and transport as well as fiber-to-the-"X"(where x can be "home", "node", "curb", "premise", etc.), and fixed wireless. Fixed broadband is designed for stationary use at a fixed location such as a home, business, or institution (see examples at Appendix II: Infrastructure).

Mobile broadband is a wireless technology used to connect portable devices (telephone, tablets, laptops, etc.) to the internet. These networks are designed to provide seamless connectivity as the user moves from one location to the next while accessing the web from a portable device. There is a direct comparison to mobile and fixed wireless as it relates to geographic coverage; when a mobile provider cannot design a network with ubiquitous coverage, a fixed wireless internet service provider (WISP) would be unlikely to do so. Mobile operators own the licenses for lower frequencies, with higher power levels (e.g., 600 MHz – 1,000 MHz) that are more ideal for

penetrating dense foliage than are the frequencies used by WISPs. Additionally, even mobile frequencies such as the 1,900 MHz – 2,100 MHz bands transmit with higher power levels, affording them better coverage.

The eventual deployment of fifth generation, or 5G, wireless services will likely have little immediate impact in Alcona County and, if available, such networks will be designed to push immense amounts of data across the mobile network in areas with higher population densities (e.g., Harrisville). 5G promises to offer massive capacity, high-speed data and extremely low latency. The capacity boost is expected to be four times faster than existing 4G and/or 50 times faster than Wi-Fi.

5G speeds may vary from one application to another and be different among devices; keeping in mind that true 5G devices are now only recently becoming available. With theoretical speeds anticipated at 20 Gbps, real-world speeds will initially be much slower. In September 2016, during a lab test conducted by T-Mobile and Ericsson, the duo reported speeds of 12 Gbps, whereas T-Mobile's average 4G data rate is 13 Mbps.

Consumers in the area seem to want more, as revealed from anecdotal discussions, but often could not state with certainty what level of service they subscribed to. In some conversations, it was difficult to determine if the consumer had fixed service or was dissatisfied with mobile coverage.

The federal broadband map, managed by the FCC, clearly overestimates coverage, and does not account for federal auctions, federal subsidies, outstanding grant and/or loan applications, etc.

With these thoughts in mind, CN was engaged by the Alcona County EDC to conduct a county wide analysis culminating in a detailed report with suggested recommendations and actionable items designed to help reshape the broadband landscape in the County.

General Commentary Regarding Service Providers

The broadband infrastructure in Alcona County is typical of many counties in the U.S. where providers have deliberately focused their capital investments in areas with the highest population density, the most ideal demographics, and areas with the least number of geographic impediments. A common pattern in counties of this size is an HFC network provider (also offering entertainment television) competing directly with an ILEC offering DSL service. When there is a third provider in the area, it is commonly a fixed wireless provider. In the case of Alcona County, there is a WISP, but the notable 3rd provider is Allband who offers limited fiber-to-the-home (FTTH).

The entire list of Alcona County providers can be found at Appendix I: Broadband Providers.

Incumbent Local Exchange Carriers (ILECs)

Alcona County is primarily served by four incumbent local exchange carriers: Allband Communications Cooperative, AT&T, CenturyLink, Inc., and Frontier Communications (the geographic incumbent); see ILEC Boundaries map on page 8.

Allband Communications Cooperative (Allband), like all ILECs, offers plain old telephone service (POTS), voice over internet protocol (VoIP), and has apparently decommissioned its DSL service and offers a limited FTTH service with speeds of 100 Mbps x 50 Mbps. Allband also likely operates as a competitive local exchange carrier (CLEC) as it is providing service outside of its ILEC exchange boundary.

AT&T's DSL coverage is almost entirely relegated to the area between Cedar Lake Road and Lake Huron, from the southern Alcona County border to Wismiller Road. AT&T reports speeds of up to 18 Mbps x 768 Kbps in most of that area, except for Pinetree Drive where service appears to be limited to 6 Mbps x 512 Kbps asymmetric digital subscriber line (ADSL). This type of DSL service, under ideal circumstances, can deliver 24 Mbps x 3 Mbps, which is slightly less than the federal definition of broadband.

The ILEC boundary runs westward approximately 7 miles, in an area only 1/10 of a mile in height (adjoining the south–central "unassigned" area) and can be found just under the Frontier North, Inc. (Lincoln) exchange boundary. No evidence of ADSL could be found within that unique area.
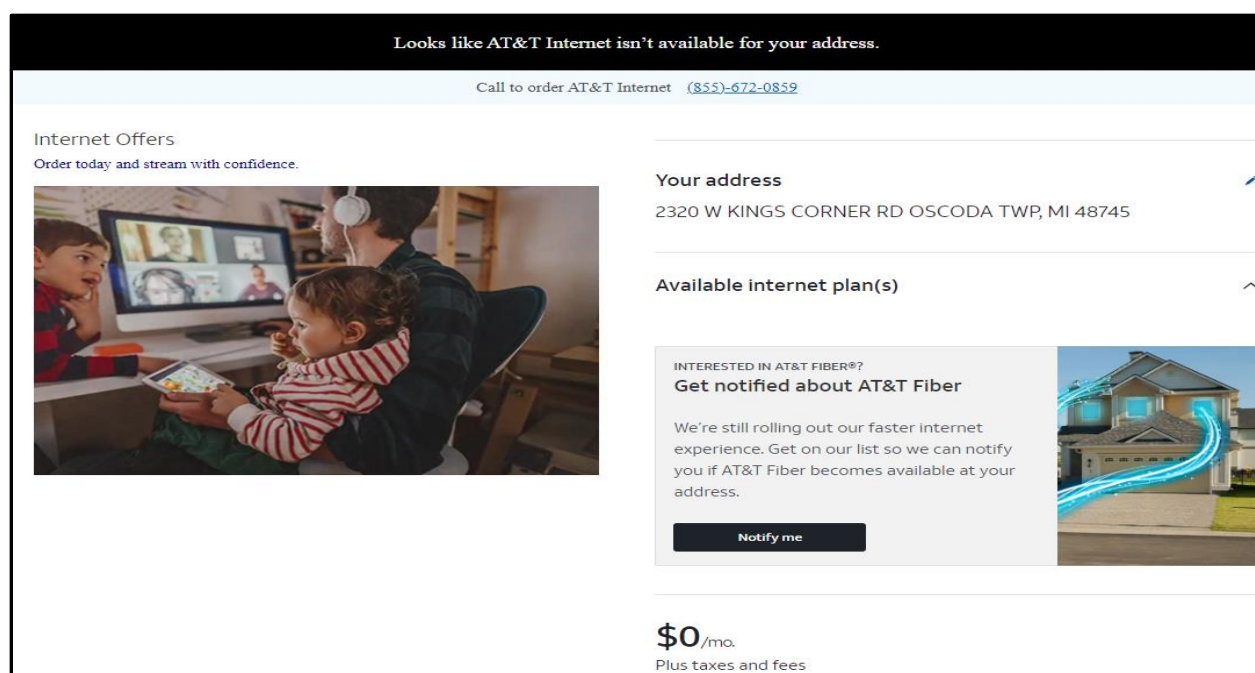
CenturyLink (identified in the field as CenturyTel of Michigan, Inc.), found in the southwest corner of the county offering ADSL along the Sunny Lake area, with federal reported speeds of 10 Mbps x 1 Mbps, as well as very high–speed digital subscriber line (VDSL) serving Cheviers, Curtisville, and Glennie. CenturyLink is likely utilizing vectoring; a transmission method that employs the coordination of line signals for noise

cancellation, reduction of crosstalk levels, improvement of performance and is considered VDSL2+. Speeds reported to the FCC, by CenturyLink, for the area seem reasonably accurate based on the equipment identified in the field (Calix E3–48 sealed access nodes).
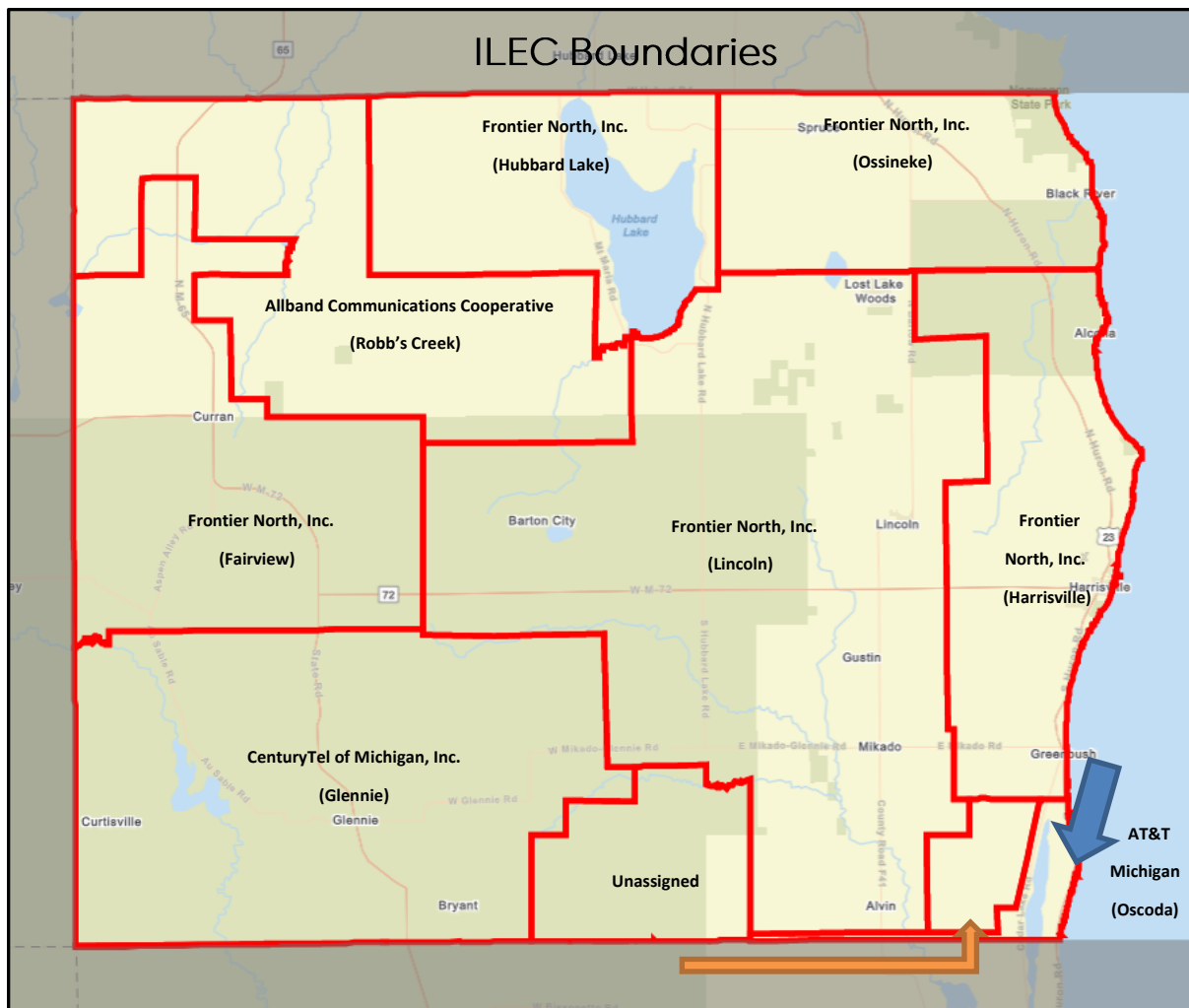
At the time of the engagement between Alcona County EDC and CN, Frontier North, Inc. reported limited coverage in the County (in and near Curran) with speeds starting at 10 Mbps x 1 Mbps, to 50 Mbps x 5 Mbps, up to 100 Mbps x 10 Mbps. Both desktop research and the OSP audit suggest that Frontier is in the process of expanding their network. Today, Frontier reports service in their Fairview, Harrisville, Lake Hubbard, Lincoln, and Ossineke exchanges.

The map, on the next page, illustrates the locations of the digital subscriber line access multiplexers (DSLAMs) located during the OSP audit (composite for all ILECs). Subsequent review of the recently released FCC Form 477 data (vintage December 2020) suggests extensive expansion across the County. This assumption was also supported during the review of the USAC CAF deployment map.

Composite Location of ILEC DSLAMs
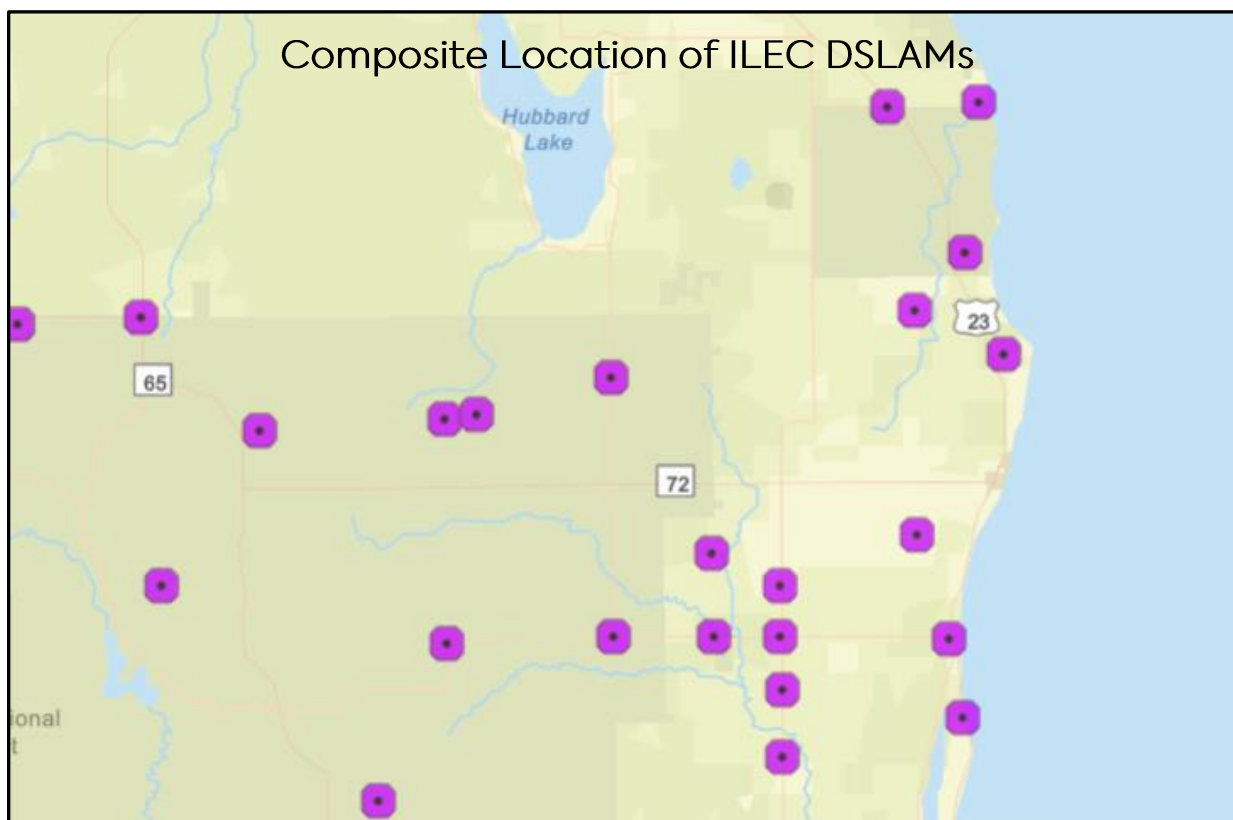
Non-ILEC Providers

Charter (d.b.a. Spectrum) provides HFC service to the majority of the Lake Huron facing homes, the town of Lincoln, the area surrounding Hubbard Lake and the homes in the Lost Lake Woods community. The HFC network is fiber-fed, has noticeable fiber nodes scattered throughout the network, and delivers speeds of up to 940 Mbps x 35 Mbps.

Lakeshore Broadband provides fixed wireless service using point-to-point radio connections (many transmitting from the Coville Road tower site).

M33 Access offers FTTH (originating in Fairview) starting at the western border of the County, traveling east along N M 72, and terminating at the intersection of W M 72 and Reeves Road.

Mobile connections on T-Mobile and Verizon were generally unstable due to the terrain and dense foliage and speeds were commonly less than 10 Mbps, while AT&T's coverage was only slightly better.

Analyzing Fixed Wireless Providers

CN also conducted an RF sweep, the method of scanning a radio frequency band to detect signals being transmitted through the airwaves from locations such as towers, rooftops, water tanks, utility poles, or other vertical assets.

The process is implemented using a radio receiver, known as a spectrum analyzer, which contains a tunable receiver for each specific radio band and/or frequency. As the radio frequency of the receiver is changed to scan (sweep) a desired spectrum band, a display indicates the power of the signals received at each frequency. The spectrum analyzers used on this project included an Avcom PSA-37-XP unit (see image at right) and a SignalHawk SH-60S-TC portable handheld unit. RF sweeps assist the field engineers and may lead to the discovery of previously unidentified or unknown wireless internet service providers (WISPs) that are offering service within the County.
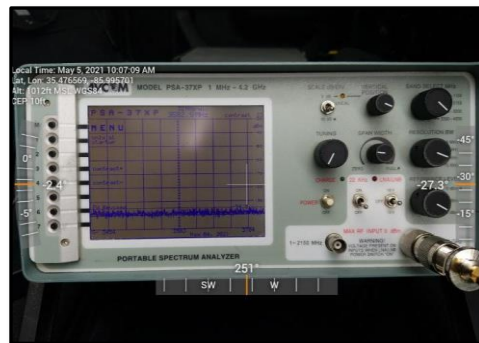
The RF spectrum sweep included the following bands:

- o 902–928 MHz: Industrial, Scientific & Medical
- o 2300 MHz: Wireless Communications Service
- o 2412–2472 MHz: Industrial, Scientific & Medical
- o 2495–2690 MHz: Broadband Radio Service/Educational Broadband Service
- o 3550–3700 MHz: Citizens Broadband Radio Service (CBRS)
- o 5150–5250 MHz: Unlicensed National Information Infrastructure
- o 5250-5350 MHz: Unlicensed National Information Infrastructure
- o 5725–5875 MHz: Industrial, Scientific & Medical

An actual RF sweep sample can be found at Appendix II – Infrastructure (see illustration of "SignalHawk RF Analysis – AT&T Fixed Wireless."

Connect America Fund
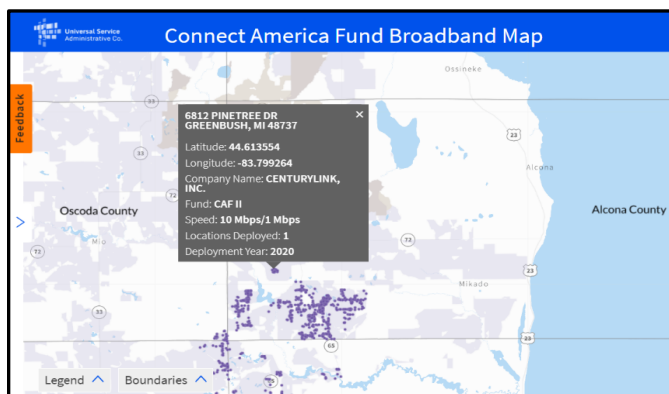
It is necessary to understand the obligations and network expansion projects, within the County, related to providers participating in the CAF program. Some providers are receiving, or have received, federal subsidies to expand internet service.

CAF recipients typically agreed to the delivery of minimum throughput speeds of 10 Mbps download by 1 Mbps

upload; see sample map at left illustrating CAF II deployments. CAF recipients, and their related deployment activities, can be found at the USAC CAF broadband map located at https://data.usac.org/publicreports/caf-map/.

CAF recipients in Alcona County include Allband (25 Mbps x 3 Mbps), CenturyLink (deployments of 10 Mbps x 1 Mbps), and Frontier (deployments of 10 Mbps x 1 Mbps).

Rural Digital Opportunity Fund

Federal subsidy recipients, such as those that were winning bidders of the Rural Digital Opportunity Fund (RDOF) can be found at https://www.fcc.gov/reports-research/maps/rdof-phase-i-dec-2020/. This includes CenturyLink, Inc., Mercury Wireless, Inc., and Rural Electric Cooperative Consortium.

Mercury Wireless may discover that the combination of undulating terrain and dense foliage will be problematic when designing a fixed wireless network that can satisfy their RDOF obligations. This will be especially true in areas containing groves or forests of pine trees.

United States Department of Agriculture

Broadband providers who received a grant or loan through the USDA rural development/telecommunications programs (Broadband Infrastructure Program, Community Connect, ReConnect, etc.), or are considered as a "protected borrower" can be viewed at https://ruraldevelopment.maps.arcgis.com/apps/webappviewer/index.html?id=93ba783edf5b407c9641b2f8653e8c1d.

This includes the Allband Communications Cooperative.

NOTE: Prior to November 11, 2021, the USDA map listed Northern Michigan University as an applicant to provide fixed wireless service in portions of Alcona County (see map on next page). Neither the proposed coverage area nor information regarding NMU appears on the USDA map as of this report.

Northern Michigan University's proposed fixed wireless application
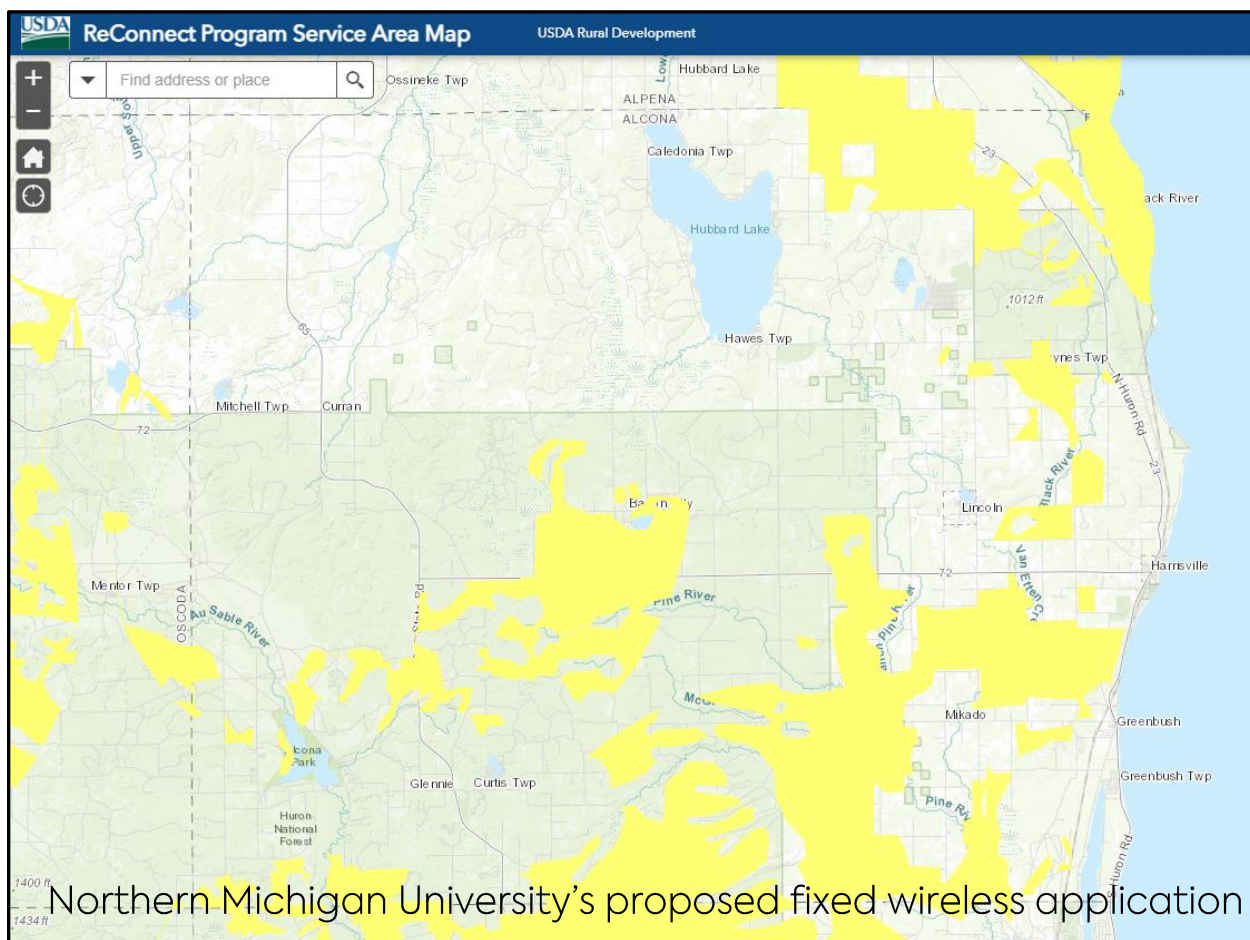
Connecting Minority Communities

Alcona County does not contain any eligible educational anchor institutions (or related census tracts) that would qualify for funding under the Connecting Minority Communities program (https://broadbandusa.maps.arcgis.com/apps/dashboards/1725df85c8b94d0ab91f5807bcc91c39).
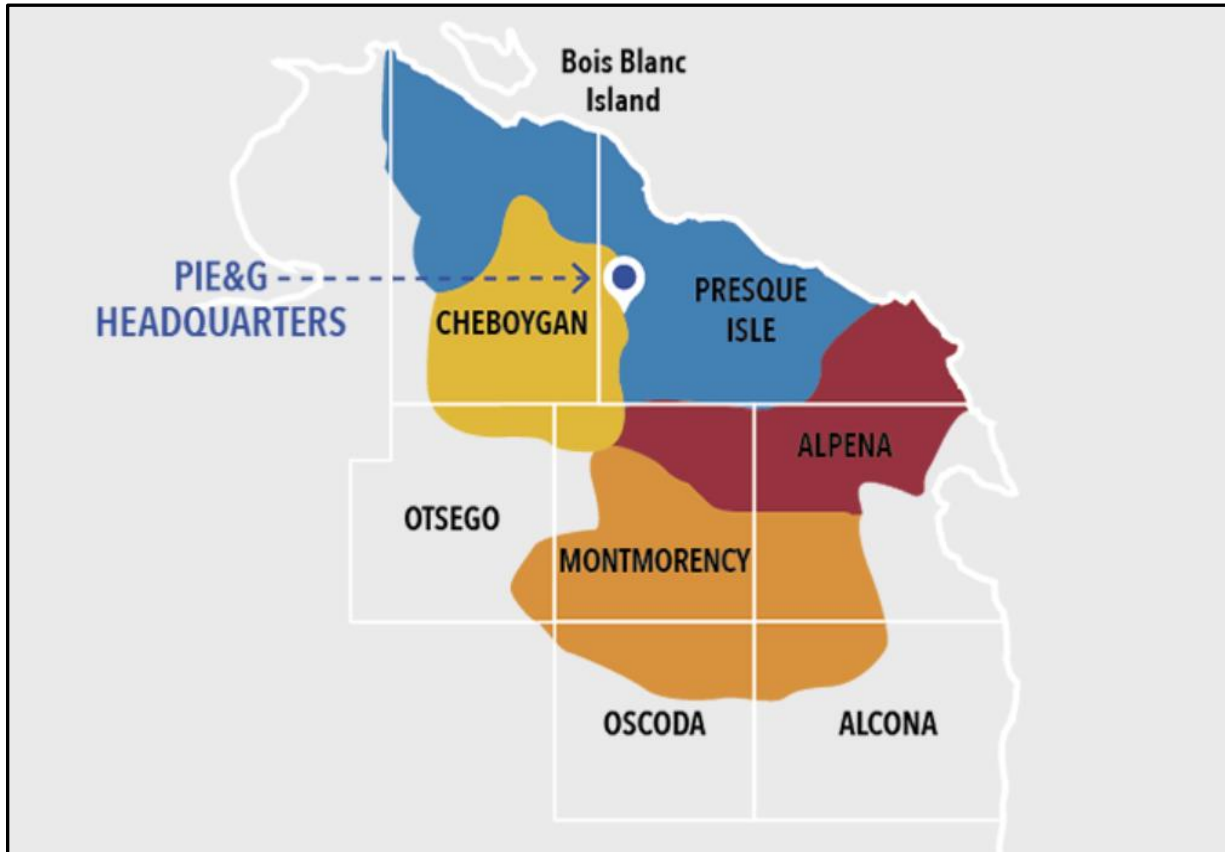
Other Considerations

Finally, it is equally as important to conduct due diligence on other activities within, or nearby, the County. Such is the case with Presque Isle Electric & Gas Cooperative (PIE&G). Information on their website suggests that a fiber expansion to the Beaver Lake substation is scheduled to commence Q1 2025 and is to be completed by Q1 2026 (https://www.pieg.com/fiber-construction-timeline/).

This fiber project may present the most unique broadband expansion opportunity and should be included in discussions as soon as possible to determine PIE&G's level of interest in offering FTTH. Currently, it is assumed that the "fiber expansion" is means in which to connect PIE&G's electrical substations to a more improved supervisory control

and data acquisition (SCADA) system. SCADA is a computer-based system for gathering and analyzing real-time data to monitor and control equipment that deals with critical infrastructure, and time-sensitive events, such as electric consumption and distribution. Such SCADA networks may also serve as aggregation points for collecting data from "smart meters".

As evidenced by the map below, PIE&G's fiber expansion will enter the northwest corner of the County and may overbuild areas operated by Allband.

PHASE 1	PHASE 2	PHASE 3	PHASE 4
Begins Q1 2022, tentative completion Q1 2023	*Begins Q1 2023, tentative completion Q1 2024*	*Begins Q1 2024, tentative completion Q1 2025*	*Begins Q1 2025, tentative completion Q1 2026*
Substations included:	Substations included:	Substations included:	Substations included:
Onaway (ON)	Cheboygan (CN)	Posen (PS)	Beaver Lake (BV)
Canada Creek (CC)	Hammond Bay (HB)	Grand Lake (GL)	Atlanta (AA)
Black Lake (BL)	Millersburg (MB)	Alpena (AP)	Lewiston (LW)
Tower (TW)	Hawks (HK)	Hillman (HN)	
Fingerboard (FB)	Hagensville (HG)	Avalon (AV)	
Mullet Lake (ML)			

Census Data

The U.S. Census Bureau's[1] July 2019 population estimate for Alcona County is 10,405. The population per square mile for the County is 16.2 (2010 Census) across an area of 674.59 square miles of land (2010 Census).

According to the U.S. Census Bureau, Alcona County's population has experienced an 11.6% decline since 2000.

Census data also suggests that 88.80% of the occupied housing units are owner occupied with median values of $112,000.

Additional census data indicates that 83.2% of all homes own a computer and that 71.60% of all homes have an Internet subscription (broadband being debatable).

NOTE: Census data reports an 18.00% poverty rate within Alcona County.

Emergency Broadband Benefit

As strategies are formulated regarding ways to improve broadband access, adoption, and use, it will be important to know, and understand, which providers are participating in the Emergency Broadband Benefit (EBB) program (https://www.fcc.gov/broadbandbenefit).

Census data suggests that this type of financial support program may be beneficial in overcoming adoption issues and could improve computer ownership.

The Alcona County providers, and their respective participation, is as follows:

Broadband Provider Name	Service Type	Offering Connected Devices
Allband Communications Coop.	Fixed	Yes
AT&T	Fixed/Mobile	No
CenturyLink	Fixed	No
Mercury Broadband[2]	Fixed	No
Spectrum (Charter)	Fixed	No

CONCLUSION

There are several steps that Alcona County can take to close the Digital Divide in the area. These include both near-term and long-term actionable items that constitute the County's "play book" of best practices.

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[1] https://www.census.gov/quickfacts/alconacountymichigan
[2] Rural Digital Opportunity Fund auction winner in portions of Alcona County.

Near-Term Goals and Action Items

CN recognizes that making changes, particularly those that involve the improvement of infrastructure, policy changes, or ongoing digital literacy training, cannot happen overnight. These changes reflect long-term policy decisions and often take time to implement. At the same time, there are several steps that local leaders can take to begin rapidly improving technology access, adoption, and use in the community.

- Work with incumbent providers
- Identify, contact, and attract potential broadband providers
- Develop a broadband education campaign
- Purchase and install Wi-Fi access points that can be strategically placed in locations such as the Harrisville Harbor Playground, ball park, or similar locations throughout the County

Long-Term Goals and Action Items

In addition to the priority efforts described above, there are several long-term goals that Alcona County can target and begin to put in place. The following is a list of some potential tasks that will help grow and sustain broadband connectivity in the long run:

- Develop Public-Private Partnerships to deploy broadband service
- Develop a telehealth partnership
- Develop a locally funded broadband grant program
- Fund the development of a county-wide dark fiber ring
- Review the "telecommunications" regulations of each community, and the County, to find ways to streamline permitting

RECOMMENDATIONS

CN developed an interactive map that displays the routes of each broadband service provider and their respective platform types. The map can be accessed at https://connectednation.org/michigan/alcona-infrastructure/interactivemap.

To help facilitate broadband expansion, Alcona County leadership may need to engage in discussions with the local incumbents to better understand potential limitations (e.g., return on investment models, ILEC exchange boundaries, cable franchising restrictions, lack of adequate backhaul infrastructure, etc.) as well as greenfield (new, untouched territory) or brownfield (limited competition territory) opportunities.

The next several sections will offer recommended action items that can be utilized in Alcona County to address these subjects.

WORK WITH INCUMBENT BROADBAND PROVIDERS

GOAL: To develop trusted, lasting relationships with the incumbent provider community that results in improved broadband access across the County.

DESCRIPTION: Gone are the days when large incumbent broadband providers employ local general managers, plant managers, customer service departments, and have decision making staff engaged in the local community. Over the years, these companies were subject to a litany of federal or state regulations/deregulations, mergers, acquisitions, and the need to increase their profit margin. Streamlining and consolidation became a necessity. It became more common for "local staff" to be relegated to service technicians and bills are now often paid online or at a drop box. The trade-out meant that the customer service and support staffing turned from "local" to "regional" or even state level management. The local service technicians can often serve as a source to identify the appropriate regional or state management team in charge of the actual decision-making process. This is especially true of AT&T, CenturyLink, Charter, Frontier, and Windstream. CN can also assist in identifying the decision makers at each company and make introductions to Alcona County leadership.

Once the appropriate contact is identified, CN recommends that open, candid dialogue is often the best guiding and strategic principle.

ACTIONS:

1. Developing an agenda of discussion topics
2. "Invite" participation, do not "demand" participation
3. Provide the discussion items in advance of the meeting
4. Stick to a stringent timeline like any other structured public meeting
5. Level set expectations – no one feels comfortable walking into a meeting unprepared

RESPONSIBLE PARTIES:

- Alcona County EDC
- Community and business leaders
- Civic leaders and organization members
- Community Anchor Institutions
    - Public Safety
    - Healthcare
    - Libraries
    - Schools
- NEMCOG

IDENTIFY PROVIDERS PRIOR TO ISSUING AN RFP OR RFQ

DESCRIPTION: Once the Alcona County leadership has held open discussions with the incumbent providers, the issuance of a request for information (RFI) may be unnecessary. The incumbent broadband providers may have expressed why they are unable, or unwilling, to expand/improve services. Companies do not wish to expend significant staff hours preparing responses to RFIs given the fact that they rarely result in a selection or a contract award. Therefore, the issuance of a request for proposal (RFP) or request for quote (RFQ) may be a necessary step to improve the broadband infrastructure or increase connectivity options.

ACTIONS: A request for proposal (RFP) or request for quote (RFQ) should clearly state the facts and goals, address the desired outcomes, outline timelines for issuance, contain questions and answers, deadlines for receipt and forms of receipt, acceptable formats, scoring criteria, etc., and should refrain from being overly "prescriptive." Legal requirements should be included but should not be so extensive as to intimidate the recipient and dissuade the number of respondents.

The RFP should be clear regarding potential city and county-owned assets that are available or can otherwise be made available for use in the process, along with any commitments or obligations related to permitting, rights-of-way or other "in-kind" contributions that the city or county is willing to provide to encourage and advance the plan.

The second option is to define the overarching goals of the project while stimulating creativity in the responses. A recent RFP issued by the city of Victoria, Texas can be found at https://www.victoriatx.gov/785/Broadband. CN was engaged by the city of Victoria to assist with several aspects of their RFP. The city of Victoria recently posted this success story on LinkedIn: https://www.linkedin.com/feed/update/urn:li:activity:6828726836130910208/

RESPONSIBLE PARTIES:

- Alcona County EDC
- Community and business leaders
- Community Anchor Institutions
- Legal Counsel
- NEMCOG

RESOURCES: There are numerous resources that can be used to identify potential providers (see the example list below). In addition, CN can provide a list of broadband providers within Alcona County (or adjacent counties) as well as companies that have expressed an interest related to such expansion opportunities.

Michigan Department of Licensing and Regulatory Affairs:
https://mpsc.force.com/itsp/SearchRegistredProviders?CompanyName=

Telecommunications Association of Michigan (TAM):
http://www.telecommich.org/about-tam

Wireless Internet Service Providers Association (WISPA):
https://members.wispa.org/members/directory/search_bootstrap.php?org_id=WISP

DISCUSS AND EXPLORE THE DEVELOPMENT OF A DARK FIBER RING

Many towns across the U.S. are investing in, encouraging, or developing through public-private-partnership, dark fiber rings around their communities and/or county. Some of these initiatives include partnerships with the local school districts and, in times like these, such collaborative partnerships are paying unexpected dividends.

Fiber optic cables are constructed of numerous strands of glass fibers, approximately equal in diameter to the size of a human hair, that transmit data via light at high speed. Dark fiber cable strands can be leased to individuals or companies to establish all kinds of connections. Clients can lease unused strands to create their own privately operated network and can tailor the network to adapt to the service platform of their choice.

PROS: The P3 model leverages the best of both the public and the private sectors. Today, many municipalities finance and build basic infrastructure, manage rights-of-way, and maintain infrastructure every day. Why not benefit, socially and financially, from a dark fiber network that can underscore a "Smart Cities" initiative, be used as a supervisory control and data acquisition (SCADA) network, connect municipal offices, hospitals and health care facilities, libraries, public safety agencies, as well as the local school districts?

Dark fiber is one of the most efficient ways to move large amounts of data. Because it enables, for example, local government to appropriate individual strands of fiber for their exclusive use and enables local government(s) to share information directly from point to point, as opposed to sharing information via the internet. Using dark fiber can also provide an excellent layer of redundancy, thereby supporting continuity of services by the government during times of crisis.

CONS: The number one downside to dark fiber is the high upfront cost. Negotiating pole attachment agreements can be burdensome, especially when the poles are owned by local incumbent broadband providers trying to run their network. The most expensive part of a network is not the number of fibers in the cable – it's the labor for trenching and hanging the fiber on the poles and the recurring pole attachment fees.

The network model may not scale easily due to the difficulty in anticipating the fiber count needed to meet current and future demands.

Most strand leases are for infinite capacity over a long period through a contract known as an indefeasible right of use (IRU). An IRU usually does not include a right to terminate by either party.

Obviously, a municipality should ask themselves "what happens when there is a physical break in the network?" Municipalities must consider having trained staff on hand, or having a contractor on emergency retainer, to immediately repair any broken (unleased) strands in the event that the fiber optic cable is physically severed.

DEVELOP PUBLIC-PRIVATE PARTNERSHIPS TO DEPLOY BROADBAND SERVICE

GOAL: Leverage existing community assets in partnership with private-sector carriers or local cooperatives to expand broadband network deployment.

DESCRIPTION: Public-private partnerships (P3s) take many forms, limited only by the imagination and legal framework in which the county operates and the degree in which the private sector partner is regulated. Some legal subdivisions issue bonds to fund construction of a network, which they lease to private carriers, with the lease payments covering the debt service. Others create nonprofit organizations, or include nonprofit organizations in the partnership, to develop networks in collaboration with private carriers. The political subdivision may provide seed investment to jumpstart construction of networks that the private sector is unable to cost-justify on its own.

Including nonprofit entities, such as a rural electric cooperative, may accelerate the deployment of a dark fiber ring as the cooperative already owns, or will install, most of utility poles (thus eliminating the need to negotiate pole attachment agreements), has already obtained many of the necessary permits, has experience and staff capable of installing the fiber (whether via trenching or hanging the fiber on the poles) and, perhaps most important, operates under a different mindset and ROI model.

Under a P3 model, the private sector is allowed to do what they already do well: operate the day-to-day business functions, market the product, provide customer service, facilitate installations and network diagnostics, not to mention network repair.

This model represents a scalable option for local communities that lack the expertise to operate a communications network (note we did not say telecommunications) but want to own and control the assets as a means of ensuring access to additional network capacity.

ACTIONS:
1. Determine Priorities: Competition, enhanced service, equity and service to all, public control over infrastructure, risk avoidance, redundancy, etc.

2. Examine models of partnership:
   - **Model 1**: Private Investment, Public Facilitation: Make available public assets like fiber and conduit, share geographic information systems data, streamline permitting and inspection processes, offer economic development incentives to attract private broadband investment.
   - **Model 2**: Private Execution, Public Funding: Identify revenue streams that can be directed to a private partner, issue RFP for private turnkey execution.
   - **Model 3**: Shared Investment and Risk: Evaluate using assets to attract private investment, evaluate funding new assets to attract private investment, evaluate building new fiber assets to businesses and/or homes for leasing to private ISPs.

3. Understand key legal considerations for localities looking to build a broadband partnership: review authority issues, understand the legal tools and instruments that could shape the partnership, and negotiate the agreement.

RESPONSIBLE PARTIES:
- Local units of government
- Broadband providers
- Community anchor institutions
- Residents and businesses

RESOURCES:
- The Urban Land Institute's Ten Principles for Successful Public-Private Partnerships: https://americas.uli.org/ten-principles-for-successful-publicprivate-partnerships%E2%80%A8/
- Building rural broadband from the ground up: http://bit.ly/2dx4MBw.
- United States Department of Agriculture: https://bit.ly/2yUGikq
- FCC Rural Health Care Program – https://bit.ly/2KQuGl4

EDUCATIONAL CAMPAIGN

GOAL: To create a more informed and educated consumer by providing easy-to-understand information regarding high-speed internet (broadband) connections including but not limited to: a) informing residents and businesses of broadband service provisions; b) provider package selection; c) device selection and understanding the devices in the home; d) troubleshooting common issues regarding speed and lost connections; e) how to verify consumers are getting what they've paid for; f) how to enroll in the Emergency Broadband Benefit program, and g) when to call their provider versus the city/county to lodge a complaint.

DESCRIPTION: As it's important to have a quality broadband connection, it's also important to understand what makes a good connection, meets your needs, and ensures we're doing our part to ensure a quality connection.

Educating and informing the general population about connectivity, how to troubleshoot their connections, and ways to maximize their own Wi-Fi networks are a few ways that a community can help with broadband networks and the perceived quality of those networks.

The community will work to determine several outreach items to include informational handouts, videos, social media posts, and other items to be used locally to educate and inform the public of high-speed internet connections and common connectivity issues. These materials should help consumers with understanding and selecting broadband services, how to troubleshoot common issues, and how to assess the quality of the services that they subscribe to.

Community leaders will determine the most effective formats for materials and outreach, and work with a team to develop those resources. Once those resources have been created, a "blitz" style media launch should be deployed to ensure that members of the public become aware, are educated, and have access to the created materials. Working with local media outlets, utilities, public agencies, and or other local businesses, will also be a significant way to help distribute and educate the community.

ACTIONS:
1. Develop a communications plan.
2. Identify local spokesperson to assist with voice overs and videos.
3. Determine communication types that will best meet the needs of the community.
4. Develop communications collateral.
   a. Fact Sheets
   b. Website Updates
   c. Utility Bill Inserts

        d. Video Scripts
        e. Social Media Posts
        f.   Blog Posts

5. Launch all communications through a "media blitz."
6. Monitor and support community questions, and potentially develop additional materials in response to community feedback.

RESPONSIBLE PARTIES:
- Community and business leaders
- Civic leaders and organization members
- Community Anchor Institutions
  - Healthcare
  - Libraries
  - Schools
- Local Businesses
- Local Media

RESOURCES:

An example of an easy to customize FAQ is shown below:

Internet Quick Fix Tips and Tricks

We've all dealt with internet issues from time to time. It can be a real headache if you work from home, or your son or daughter is trying to get homework done.

Or, let's be real, you're actually trying to watch the next episode of your favorite show on your streaming device and the internet isn't performing to your satisfaction. That's why the City/County of _____ wants to make it easier for you to fix the problem fast—without waiting to hear back from a technician or sitting on hold for part of your day. We've consulted with some experts, including Connected Nation, a national nonprofit that works to identify innovative solutions to expand and improve broadband (high-speed internet) to all communities, and we've gathered some "quick fix" tips and tricks to try before your call your local provider (or the city) when your connection drops or your speed slows down. Here are just a few:

Tips for Restoring Lost Connections

1) Power-cycling: Unplug the power from router, wait 60 seconds, plug it back in so it can reset and recalibrate. After plugging it back in and ensuring that all physical cables and connections are securely in place, check the lights on the router. They should all be green. If one is amber, there is a connection loss somewhere along the network or within your home. Each light should be labeled so, if you do need to call

your broadband provider, be sure to tell the customer service representative which light is amber when you call to report your problem.
If that doesn't immediately solve the issue, repeat the process with the device that is having problems.

2) If your router is more than 5 years old you should probably replace it. It's likely not capable of delivering the maximum speed that you may be subscribing to.
3) Check to ensure that Wi-Fi on your device is turned on. If it's not,try cycling your phone in and out of airplane mode.
4) Check the wired connections going into your router, modem, television and your computer. Sometimes, these connections come loose and may simply need to be reseated to solve the problem.

Tips for Improving Your Internet Speed

1) Check for malware or viruses on your devices regularly. There is free software available to keep your device clean such as Avast, AVG, Microsoft Windows Defender, Sophos, etc.) as well as subscription or fee-based software (e.g., Norton, MacAfee, Kaspersky, Bitdefender, Malwarebytes, etc.)
2) Change the settings on your ancillary devices to improve speeds on your primary devices. Devices like Roku, Fire TV Stick, other streaming set-top boxes, or gaming devices can be set to lower data consumption without a large loss in quality. Check the manufacturer's website for additional "how to" tips.
3) Protect your internet network with a password so no one else can use it. Most routers come out of the box with security codes pre-generated and often located near the device's serial number or may even have a very generic log-in and password until you add your own. Make sure to add a password that is not easy for someone else to figure out. Avoid using your birthday, anniversary, your dog's name, and so on, and try to create a password that combines unique numbers and symbols that can be easy to remember (e.g., I'm57&forgetful!) although we strongly advise that you write these down and store them in an easy to remember location. Also, avoid using the same password for everything.

If those tips did not solve your problem, do not worry. We have got a whole list of simple solutions with even more details that will save you time and trouble. Just head over to the following link to check out the City/County FAQ: _____ .

A successful example of these FAQs, as well as short education videos, can be found at: https://www.prospertx.gov/broadband-service-improvements/.

IDENTIFYING FUNDING OPPORTUNITIES

Funding opportunities come in all shapes and sizes and come and go on various cycles. The most extensive funding comes from the federal level in the form of grants, loans,

and/or subsidies made available from numerous federal agencies and programs that support the expansion of broadband in unserved and underserved communities.

The NTIA maintains a list of these funding mechanisms at the site below: https://broadbandusa.ntia.doc.gov/new-fund-search.

As with any funding source, it is very important to become acquainted with the funding program, and often it is good to develop relationships with the funding agency or organization. A great example is to develop a relationship with the Telecom General Field Representative (GFR) from USDA. GFRs work extensively with communities and providers on the various funding programs that USDA offers: https://www.rd.usda.gov/contact-us/telecom-gfr.

Periodically unique, yet limited, broadband grant opportunities surface that could benefit Alcona County. One such example is the Connecting Michigan Communities (CMIC) grant program (https://www.michigan.gov/dtmb/0,5552,7-358-82547_56345_91154---,00.html).

It is also important to develop relationships with local philanthropies, and potential private funders. Since the onset of the COVID-19 pandemic, connectivity has become exponentially more important to nearly every facet of life. One positive result, however, is that groups and organizations who would not have previously considered funding broadband projects, may now see connectivity in a different light as they continue to seek ways to provide services and support their mission in your community and region.

PERFORM AN ANALYSIS OF LOCAL TELECOMMUNICATION POLICIES AND ORDINANCES

GOAL: Ensure that local policies and ordinances are conducive to wired and wireless broadband build-out.

DESCRIPTION: High capital investment costs, including permit processing, pole attachment costs, and lack of effective planning and coordination with public authorities, negatively impact the case for deployment. For example, the FCC's National Broadband Plan concludes that, "the rates, terms, and conditions for access to rights-of-way [including pole attachments] significantly impact broadband deployment." The costs associated with obtaining permits and leasing pole attachments and rights-of-way is one of the most expensive cost functions in a service provider's plans to expand or upgrade service, especially in rural markets where the ratio of poles to households goes off the charts. Furthermore, the process is time consuming. "Make ready" work, which involves moving wires and other equipment attached to a pole to ensure proper spacing between equipment and compliance with electric and safety codes, can take months to complete. Community and provider collaboration to solve problems involving local pole attachment and other right-of-

way issues is one of the most effective opportunities to encourage faster, new deployment of infrastructure.

ACTIONS:

1. Speak with providers and determine barriers they face at a local and county level.
2. Review local policies, ordinances, and other barriers to broadband deployment and consult with community leaders, providers, utilities, and other members of the community to ensure that they are supporting policies (local ordinances, pole attachments, rights-of-way) that are conducive to broadband build-out. Develop an awareness campaign targeting local government leaders to inform them of the benefits of broadband to the entire community.
3. Compare local policies to those in other communities where broadband build-out has been more successful.
4. Continue to review best practices regarding broadband build-out policies to determine that your community remains up to date on its policies.

RESPONSIBLE PARTIES:
●   Local units of government, particularly planning and zoning officials
●   Broadband providers
●   County government, particularly road commissions
●   Utility companies and pole owners
●   Others with right-of-way jurisdiction

RESOURCES:
●   The Importance of Telecommunications and Telecommunications Research: https://www.nap.edu/read/11711/chapter/3
●   An In-Depth Guide to Municipal Broadband: https://www.otelco.com/resources/a-municipal-broadband-guide/

COMPETITIVE APPLICATION PROCESS – GRANT PROGRAM

GOAL: With federal funding pouring in, create a county specific grant pool, to provide financial incentive/support to broadband providers willing to expand their networks. A competitive grant program would allow the selection of project(s) that create the most value by satisfying the needs of the consumers within high demand, underserved or unserved areas. Grant funding often changes the dynamics of a provider's ROI model and can be the catalyst that makes a difference for local broadband providers.

DESCRIPTION: Alcona County would develop a funding source and subsequent grant application protocol. Broadband providers apply for grant funding and each application is graded, based on its merits, and winning applicants are awarded funds to be reimbursed upon successful completion of construction and activation of the broadband network. Scoring rubrics would be developed to include such parameters as proposed locations, service and pricing levels, project scalability, community support, technical capabilities of the applicants, proof of financing, budget, and sustainability. An open public comment period, which occurs following the application submissions, allowing interested parties to contest and/or protest an applicant/application. Such protests might be filed by consumers or by companies claiming that the proposed service area is already adequately served by a broadband provider.

ACTIONS:
1. Develop a grant development and review committee
2. Develop the Grant application, and guidelines
3. Promote the Grant within the region and among provider associations.
4. Grant:
   a. Open the application window
   b. Review applications
   c. Open the public comment period
   d. Award Grants
5. Grant oversight and reporting.

RESPONSIBLE PARTIES:
- Community and business leaders
- Civic leaders and organization members
- Citizens
- Local Government
- Broadband Providers
- Community Anchor Institutions

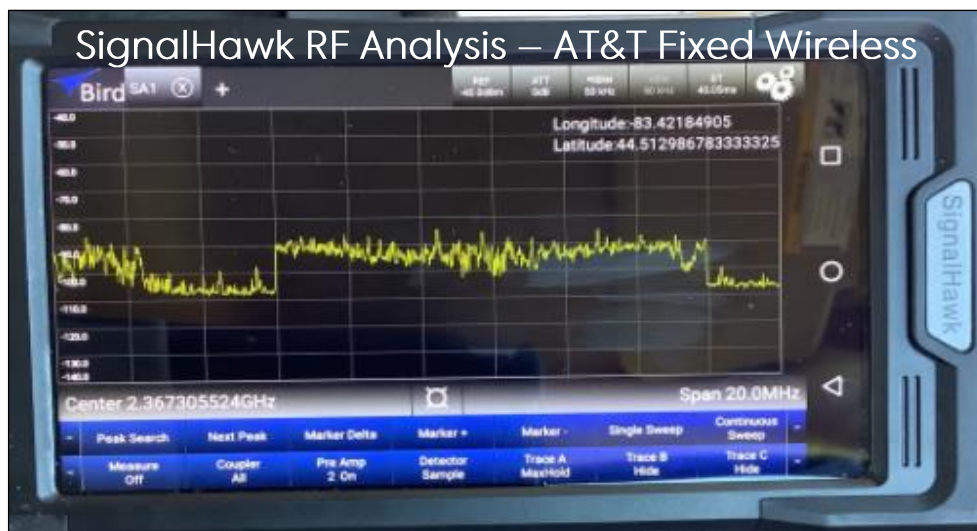**RESOURCES:**

- Connecting Michigan Communities, Michigan:

https://www.michigan.gov/dtmb/0,5552,7-358-82547_56345_91154---,00.html
- Border-to-Border Grant Program, Minnesota: https://mn.gov/deed/programs-services/broadband/grant-program/
- Broadband Accessibility Grants, Tennessee: https://www.tn.gov/ecd/rural-development/tennessee-broadband-grant-initiative/tnecd-broadband-accessibility-grant.html

Appendix I: Broadband Providers

Provider	Technology	Website
AT&T	DSL & Fixed Wireless	https://www.att.com/
Allband Communications	DSL & FTTH	https://www.allband.org
CenturyLink d.b.a. Lumen	DSL	https://www.centurylink.net
Charter d.b.a. Spectrum	Cable	https://www.spectrum.com/
Frontier Communications	DSL	https://frontier.com/
Lakeshore Broadband	Fixed Wireless	https://www.lsbb.net
M33 Access	FTTH	https://www.m33access.com

Appendix II: Infrastructure

CenturyLink VDSL Node

Local Time: Sep 19, 2021 11:49:49 AM
Lat, Lon: 44.517907, -83.695755
Alt: 798ft MSL WGS84
CEP 13ft

SignalHawk RF Analysis – AT&T Fixed Wireless

Date & Time: Thu, Sep 09, 2021, 15:54:02 EDT
Position: +044.858605° / -083.587232° (±16.4ft)
Altitude: 743ft (±31.2ft)
Datum: WGS-84
Azimuth/Bearing: 140° S40E 2489mils True (±65°)
Elevation Angle: -00.2°
Horizon Angle: +00.9°
Zoom: 1.0X
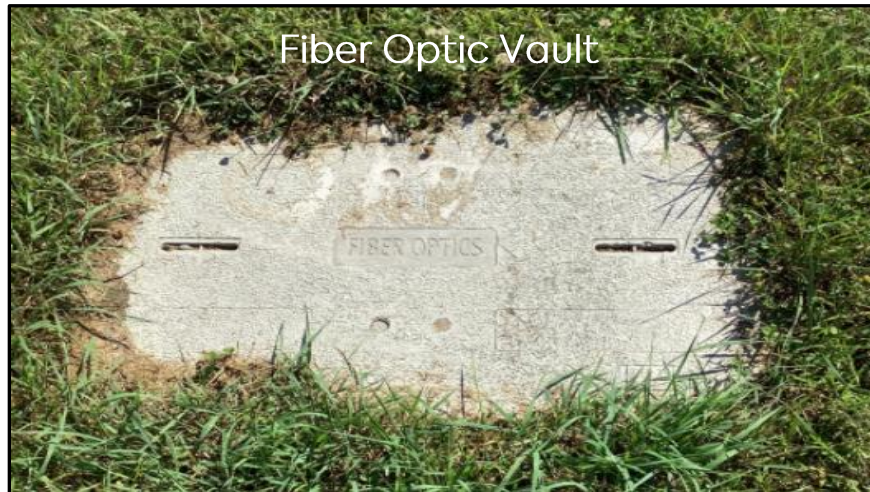
Frontier North, Inc. Central Office (CO)

Fixed Wireless CPE

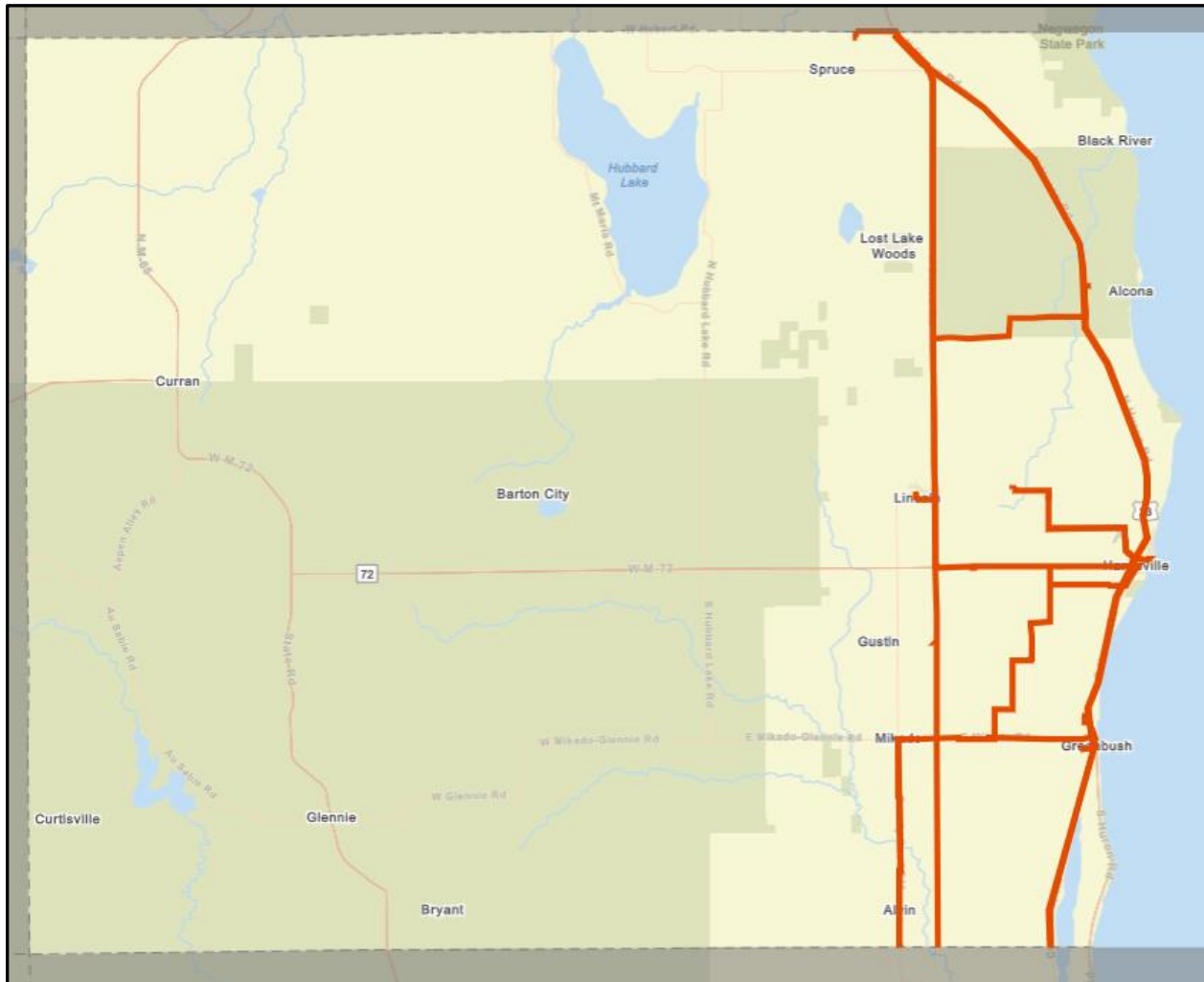Recently Installed Fiber Mux, Cross Connect, DSLAM
Frontier North, Inc.

Fiber Optic Vault

Appendix III: Fiber Routes

Middle-Mile & Long-Haul Fiber Routes

The map above illustrates the aggregate generalized routes of middle-mile and transport fiber routes either (i) extracted from the public domain, (ii) extracted from FiberLocator; or (iii) confirmed during the OSP audit. As previously discussed, during local presentations to the Alcona County EDC and County Commissioners meetings, not all routes could be verified. Strands of dark fiber, owned by one company, might be leased to another company and the latter company may not have route markers or other identifiable assets. This is referred to as fiber "piggybacking".

Appendix IV: Broadband Glossary and Table of Units

The following is reproduced from a resource provided by the National Telecommunications and Information Administration (NTIA)

Alphanumerics

3G: The term for the 3rd generation wireless telecommunications standards usually with network speeds of less than 1 Mbps.

4G: The term for 4th generation wireless telecommunications standards usually with network speeds greater than 1 Mbps.

5G: The term for emerging 5th generation wireless telecommunications standards usually associated with network speeds of up to 1 Gbps or more.

A

ADSL (Asymmetrical Digital Subscriber Line): A form of internet service communications technology that delivers constantly accessible data transmissions over copper telephone lines. ADSL is a common version of DSL and has download speeds between 2 and 6 Mbps and upload speeds reaching 512 Kbps.

Asymmetrical Bandwidth: A connection in which the maximum transfer rate is different for download and upload speeds.

ATM (Asynchronous Transfer Mode): A transmission method where information is re-structured into packets. It is asynchronous since the recurrence of packets from an individual user is not necessarily periodic.

B

Backbone: A major high-speed transmission line that strategically links smaller high-speed internet networks across the globe.

Backhaul: The portion of a broadband network in which the local access or end user point is linked to the main internet network.

Bandwidth: The capability of telecommunications and internet networks to transmit data and signals.

Bit: The base unit of information in computing. For our purposes, also the base unit of measuring network speeds. A single piece of information is equal to 1 bit. Network speeds tend to be measured by bits per second—using kilo (1,000), mega (1,000,000), and giga (1,000,000,000). A bit is a part of byte; they are not synonyms. Bit is generally abbreviated with a lower-case b.

Broadband: The term broadband commonly refers to high-speed internet access that is always on and faster than traditional dial-up access. Broadband includes several high-speed transmission technologies, such as fiber, wireless, satellite, digital subscriber line, and cable. For the Federal Communications Commission (FCC), broadband capability requires consumers to have access to actual download speeds of at least 25 Mbps and actual upload speeds of at least 3 Mbps.

Broadband Adoption: The use of broadband in places where it is available, measured as the percentage of households that use broadband in such areas.

Burstable: Authorizes a connection to exceed its specified speed, normally up to a set maximum capacity for a period of time.

Burst Speed: A method which momentarily allots additional bandwidth to consumer's services for short periods of time.

C

Cable Modem System: Cable television companies have offered internet access via their cable system for more than a decade. The network architecture uses a loop that connects each subscriber in a given neighborhood, meaning they all share one big connection to the internet.

Central Office: A telecommunication company's building where consumers' phone lines are attached to equipment that connects a consumer to other consumers in that central office or other central offices across the globe.

Community Anchor Institutions: Schools, libraries, medical and health care providers, public safety entities, institutes of higher education and other community support organizations that provide outreach, access, equipment, and support services to facilitate greater use of broadband service by the entire population and local governments.

Conduit: A reinforced tube through which cabling runs. Conduit is useful both to protect fiber optic cables in the ground and because one can place the conduit underground when convenient and later "pull" the fiber cabling through the conduit.

D

Dark Fiber: Fiber that is in place but not being used for broadband services. ("non-lit" fiber, also see "Lit Fiber").

Digital Divide: The gap between those of a populace that have access to the internet and other communications technologies and those that have limited or no access.

Digital Equity: Recognizes that digital access and skills are now required for full participation in many aspects of society and the economy. Digital Equity links Digital Inclusion to social justice and highlights that a lack of access and/or skills can further isolate individuals and communities from a broad range of opportunities.

Digital Inclusion: Implies that individuals and communities have access to robust broadband connections; internet-enabled devices that meet their needs; and the skills to explore, create, and collaborate in the digital world.

Digital Literacy: The ability to leverage current technologies, such as smartphones and laptops, and internet access to perform research, create content, and interact with the world.

Digital Skills: Any skills related to operating digital devices or taking advantage of digital resources.

DOCSIS (Data Over Cable System Interface Specification): The international telecommunications standard for cable signaling data and spectrum sharing. DOCSIS standards evolve over time. DOCSIS Standard 3.1 is the most recent version.

DSL (Digital Subscriber Line): A form of technology that utilizes a two-wire copper telephone line to allow users to simultaneously connect to and operate the internet and the telephone network without disrupting either connection.

E

EDGE: Enhanced Data Rates for GSM Evolution: An upgraded 2G mobile standard offering faster data transfer speeds. Connections may fall back on this if 3G or 4G aren't available—on smartphones it will usually be indicated by an 'E' next to the signal meter.

E-Government Services: The government's use of web-based and information technology resources to connect with citizens and provide online services and resources.

F

Fiber (Also referred to as Fiber Strand): A flexible hair-thin glass or plastic strand that is capable of transmitting large amounts of data at high transfer rates as pulses or waves of light.

FTTH or FTTP (Fiber to the Home or Fiber to the Premise): The delivery and connection of fiber optics directly to a home or building.

Fixed Broadband: High-speed data transmission to homes and businesses using technologies such as T1, cable, DSL, fiber, and fixed wireless. Excludes mobile broadband and non-terrestrial services.

Fixed Wireless Broadband Access: The use of wireless devices/systems in connecting two fixed locations, such as offices or homes. The connections occur through the air, rather than through fiber, resulting in a less expensive alternative to a fiber connection.

I

Internet Service Provider (ISP): A company that provides users (individuals or businesses) with access (a connection) to the internet and related services.

Interconnection: The linking of numerous telecommunications networks to exchange user traffic.

L

Last Mile: The technology and process of connecting the end customer's home or business to the local network provider.

Lit Fiber: An active fiber optic cable capable of transmitting data.

LMDS (Local Multipoint Distribution Service): A wireless broadband service that uses microwave signals to render communications service—voice, data, internet—to customers within the last mile.

Loan: The giving of money or property in exchange for payment of the principal amount plus interest.

Local Area Network (LAN): A group of connected network devices that are on a high-speed connection and typically within the same building or location.

LTE (Long Term Evolution): A 4G wireless broadband technology that provides speeds up to 100 Mbps download and 30 Mbps upload.

M

Middle Mile: The connection between a local network, also called a "last mile" connection, and the backbone internet network.

Mobile Broadband: A type of internet connection designed for use "on-the-go" with seamless connectivity from one geographic location to the next.

N

Network Infrastructure: The hardware and software components of a network that provide network connectivity and allow the network to function.

O

Open Access Network: Networks that offer wholesale access to network infrastructure or services provided on fair and reasonable terms with some degree of transparency and nondiscrimination.

P

Point of Presence: The particular place or facility where local internet service providers connect to other networks. Distance from the Point of Presence can affect service availability and pricing.

Public Computer Center (PCC): A facility that is open to the public and provides broadband access, education, support, and training relevant to community needs. PCC locations include, but are not limited to, community colleges, libraries, schools, youth centers, employment service centers, and centers in public housing developments, among many others, that provide broadband access to the general public or specific vulnerable populations, such as low-income, unemployed, older adults, children, minorities and people with disabilities.

R

Rights-of-Way (ROW): ROW are legal rights to pass through property owned by another. ROW are frequently used to secure access to land for digging trenches,

deploying fiber, constructing towers and deploying equipment on existing towers and utility poles.

S

Service Area: The entire area within which a service provider either offers or intends to offer broadband service.

SDSL (Symmetrical DSL): A technology that permits the symmetrical transfer of data over copper telephone lines. The transmission bandwidth for uploads and downloads is equal.

SONET (Synchronous Optical Network): An American National Standards Institute standard for the simultaneous transmission of data over optical fiber.

Spectrum: A conceptual tool used to organize and map the physical phenomena of electromagnetic waves. These waves propagate through space at different radio frequencies, and the set of all possible frequencies is called the electromagnetic spectrum.

T

Tier 1 Internet Network: A network of internet providers that form a superhighway that allows users access to every other network on the internet.

Tier 2 Internet Network: A network of smaller internet providers that allow users to reach some portion of the internet but that still purchase IP transit.

Telecommunication Service(s): Includes regulated and unregulated services offered to customers for the transmission of 2-way interactive communication and associated usage. A telecommunication service is not a public utility service (from the Michigan Telecommunications Act).

Telemedicine: The use of high-speed, high-capacity internet to support long-distance health care services, patient and provider education, and enhanced health care administration.

V

VoIP (Voice over Internet Protocol): A technology that allows users to send and receive voice calls using an internet connection instead of a phone line.

W

Wi-Fi (Wireless Fidelity): A technology that uses radio transmissions to enable electronic devices to connect to a wireless local area network (LAN).

WISP: An ISP that provides service through a wireless network.

Table of Units

Units Associated with Broadband	
Bit	Smallest unit of digital information
Byte	Equal to 8 bits
Bps	Bits per second
Kbps	Kilobits per second (1000 bits per second)
Mbps	Megabits per second (1 million bits per second)
Gbps	Gigabits per second (1 billion bits per second)
Tbps	Terabits per second (1 trillion bits per second)