

TOWN OF LIBERTY GROVE PUBLIC MEETING

Technology Committee *via Zoom*

Date: Monday, December 6, 2021

Time: 4:00 pm

Place: Liberty Grove Town Hall, 11161 Old Stage Road *Via Zoom

Agenda:

1. Call to order
2. Roll call
3. Approve Agenda
4. Approve Minutes: 11/1/2021
5. Public input
6. Status Reports:
 - a. EV charger installation at the Community Center
 - b. 2021 Business Continuity Project
 - c. 2022 PSC Grant Project
 - d. DCEDC Broadband Engineering Study
7. Presentation by Kurt Kiefer on Baileys Harbor Broadband efforts
8. Joining Baileys Harbor for Broadband Efforts
 - a. Finley Study Extension
 - b. Liberty Grove Community Broadband interest survey
9. 2023 PSC Grant Application and Funding
10. Remaining 2021 Technology Budget Funds
11. Future meeting
12. Adjourn

****All agenda items will include discussion and possible action. Deviation from listed order may occur****

****Audience members must ask for permission, during public input, to speak on agenda items ****

Anastasia Bell, Clerk/Treasurer

Members of the Town Board or any other Town Committee, who are not members of the body whose meeting agenda is published in this notice, are entitled, as any other citizen of the Town of Liberty Grove, to attend this meeting in an unofficial capacity. It is possible the attendance of one or more non-members may create a quorum of the membership of another body. Such a quorum is unintended, and the non-members are not meeting for the purpose of exercising the powers or duties attendant upon their membership on any Town Committee or Board.

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Meeting ID: 821 0019 1450

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To find your local number visit <https://zoom.us/u/atMFqvZKe>. To join the meeting by telephone dial one of the numbers below based on your location.

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Town of Liberty Grove
Minutes of the Technology Committee meeting on November 1, 2021
(This meeting was posted correctly)

Agenda:

1. Call to order
2. Roll call
3. Approve Agenda
4. Approve Minutes: 9/20/2021
5. Public input
6. Status reports:
 - a. WiFi and EV charger installation at the Community Center
 - b. DCEDC Broadband Engineering Study
 - c. 2021 Business Continuity Project
 - d. 2022 PSC grant application
 - e. 2022 Technology Committee budget
7. Survey of Town residents for Broadband access desire
8. Review Technology Committee Support Request Form
9. Future meeting
10. Adjourn

Chair David Studebaker called the meeting to order at 4:02pm. Committee members Cathy Ward, John Dwonch, and Dan Watts were present along with Administrator Walter Kalms, Clerk/Treasurer Anastasia Bell and 1 member of the public via Zoom.

Studebaker moved, Ward second to approve the agenda as posted. Passed 4-0. Committee member Les Keeper connected to the meeting.

Ward moved, Watts second to approve the 9/20/2021 minutes as presented. Passed 5-0.

Public Input – None.

WiFi & EV Charger – Kalms reported that WPS has been on-site and we are waiting for the electrician to repair and/or trench the connection to the electrical panel.

DCEDC Broadband Study – Studebaker reported that the results will be released 11/10/2021 to DCEDC and they will schedule a public release after that and the report may include information which will be beneficial for co-op formation.

Business Continuity Project – Keeper reported he continues to create the backbone of the document, the office is working on the inventory, and the draft will be available for the next meeting.

2022 PSC Grant – Studebaker reported the application was approved for the \$637,000 pilot project. The next step will be to get a signed contract with the PSC and Nsight will need to survey the route and determine the necessary engineering.

2022 Technology Budget – Studebaker reported that \$55,000 is in capital and \$3,085.78 is for operating expenses. The focus will need to be on using the budgeted funds most effectively in

achieving high-speed access throughout the Town. He requested to know the remaining 2021 funds and if any expenses are expected for the Continuity Plan for the next meeting.

Broadband Survey – Studebaker indicated that we currently have no statistical data on the revenue stream or market analysis. The DCEDC study may have information for each municipality, and it is unknown if the Town will have access to the New North survey which is being conducted.

Technology Request Form – Studebaker noted this form could create a formal mechanism for other committees of the Town to request technology-related assistance and may assist to create a long-range Technology Plan. It was the consensus to remind Committee chairpersons that the Technology Committee can assist if needed as the budget proposals are created each year.

The next Technology Committee meeting will be Monday, December 6, 2021 at 4:00pm.

Studebaker moved, Dwonch second to adjourn at 5:26pm. Passed 5-0.

Respectfully Submitted,
Anastasia Bell, Clerk/Treasurer



Broadband Infrastructure Engineering Assessment Report

Executive Summary

Door County, Wisconsin

November 5, 2021



**Finley Engineering
CCG Consulting**

Financial Sponsors

Public Sector

County of Door
Town of Liberty Grove
Town of Sevastopol
Town of Baileys Harbor
Town of Egg Harbor
Town of Brussels
Town of Jacksonport
Washington Island Electric Cooperative
Town of Sturgeon Bay
Town of Clay Banks
School District of Sturgeon Bay
Southern Door County School District

Private and Nonprofit

Door County Economic Development Corporation
Renards Cheese/Rosewood Dairy
Door County Medical Center
Raibrook Foundation

Executive Summary

Finley Engineering and CCG Consulting submit this Broadband Infrastructure Engineering Assessment that provides our findings and recommendations for bringing better broadband to Door County, Wisconsin. This project was enabled by the Door County Economic Development Corporation, which listed the goals of the assessment to:

- *Understand what is currently available, where does the infrastructure serve, capacity, and who owns the infrastructure.*
- *Voids or deficiencies in service.*
- *Options in providing service both in the short-term and long-term along with possible financing plans and strategies.*

This report documents how we undertook the investigation of broadband. There are hundreds of facts included in the report that document our findings, and the accumulation of these facts led us to reach four primary conclusions about the state of broadband in the county:

- There is almost no broadband competition in the county. Most residents and businesses told us that they felt the ISP they are using is their only realistic option.
- We also conclude that the state of broadband in the county is negatively affecting your economic prosperity. Examples of the negative impacts of poor broadband abound in the county. Many businesses don't have good enough broadband to support even basic business needs, and in the most extreme example, there are businesses that can't maintain good enough broadband to process credit cards. There are numerous inns, hotels, and condos in the county that don't have the broadband being expected by guests today, imperiling one of your primary industries. Business owners complain that they can't take work home due to inadequate home broadband. During the pandemic, businesses struggled with employees trying unsuccessfully to work from home. Many residents are unable to participate in the work-at-home economy, which is one of the fastest areas of economic growth in many rural communities.
- The quality of broadband is largely a matter of geographic happenstance – location dictates broadband availability:
 - The businesses and residents in towns where Charter/Spectrum provides broadband said that broadband is adequate. But we heard many stories about problems caused by inadequate upload speeds and recurring short outages.
 - The broadband in areas without Charter/Spectrum can best be described as dismal. We heard horror stories from residents and businesses about broadband that barely works in the winter and that largely disappears during peak tourist season. We heard from numerous residents who said they have no broadband options at home.
- We heard across the board that broadband performance by all ISPs degrades during the peak of the tourist season. Even large businesses served by fiber see a noticeable slowdown. While we would normally suspect this to indicate poor backhaul reaching the

county, we think it's more likely that the last-mile networks of the ISPs are not robust enough to meet peak demand.

Our first phase of the investigation was market research to understand currently availability of broadband in the county today. We communicated with residents and businesses through surveys and interviews to understand the broadband needs throughout the county. We looked at publicly available data that documents prices and broadband availability in the county. Our engineers drove extensively through the county to identify the infrastructure used to provide existing broadband.

We also looked at the county from a wider perspective. For example, the FCC defines broadband as a customer connection that provides speeds of at least 25 Mbps download and 3 Mbps upload. We found that ISPs in the county have misrepresented the broadband they are providing in the county – the FCC believes that almost everybody in the county has access to 25/3 Mbps broadband. We find it likely that almost nobody outside of the towns can get broadband at that speed.

The report dives deeper into identifying the broadband gaps in the county. The most obvious gap is the broadband availability gap described above. We heard from residents who can't afford broadband, meaning the county, like most of the country, has a broadband affordability gap.

The next phase of the assessment quantified the cost of bringing better broadband to the county. Finley Engineering considered both wireless and fiber solutions for improving broadband.

- Finley quantified a cost of \$4.5 million as the minimum amount needed to bring better fixed broadband to the county. We do not recommend this option for many reasons. First, a wireless solution is not scalable as the first step towards gigabit broadband and so fails one of your prime goals. We also don't see this as a workable broadband option. The terrain and heavy foliage in the county make it nearly impossible to deliver a high-quality wireless connection. Wireless technology will also likely not be eligible for grant funding.
- Finley then looked at fiber design options. They settled on a passive optical network (PON) design that could deliver gigabit broadband to every home and business in the county and which could easily be supplemented to offer 10-gigabit broadband. Finley designed a network consisting of 25 neighborhood cabinets that are interconnected in a mesh to provide redundancy. Finley determined that 1,574 miles of fiber are needed to serve the whole county, with 1,092 miles needed to serve the rural parts of the county. The cost of the assets needed to bring fiber to the whole county is over \$130 million, with the costs for the rural areas at over \$76 million.

We knew before we started that any fiber built in the rural areas would require grant funding. Our analysis shows that the amount of grant money required to build the rural areas is highly dependent upon the likely customer penetration rate on a new fiber network. Customer revenues help to pay for fiber, and the greater the customers, the smaller the needed grants. If an ISP expects to subscribe only 45% of the rural customers, the needed grants are over \$39 million. The needed grants drop to \$33 million for an expected 50% customer penetration. We may be entering a time when grants of that magnitude might become available. The largest source of major grant funding on the horizon is the infrastructure bill proposed by Congress.

The report concludes with specific recommendations on the next steps to take after receiving this report. The most important recommendation is to share this with the ISPs that could be your partners in bringing the needed broadband. We have done the engineering in such a way as to provide cost estimates for an ISP interested in building fiber to a portion of the rural area. An idea worth thoughtful consideration is to bring a collaborative approach to getting better broadband. There are separate amounts of funding available to local governments, ISPs, schools and libraries, rural health care, and others that would be most effective if pooled.

Findings

Following are our primary findings:

Existing ISPs. The county has a wide array of ISPs today. There are three different incumbent telephone companies that serve portions of the county using DSL technology over telephone copper wires – AT&T, CenturyLink, and Frontier. Charter/Spectrum is the incumbent cable company in the county and provides broadband over HFC technology in Sturgeon Bay, Jacksonport, Egg Harbor, Fish Creek, Ephraim, Sister Bay, and Ellison Bay. There are several wireless ISPs serving parts of the county using fixed wireless broadband, including Door County Broadband, Mercury Network, Astrea, and SonicNet. There are two companies providing high-orbit satellite broadband - Viasat and HughesNet. There are residents of the county using the low-orbit satellite broadband being offered by Starlink in beta test mode. Some rural homes get home broadband using mobile broadband from AT&T, Verizon, U.S. Cellular, and Cellcom.

Existing Broadband Prices

As might be expected with so many different ISPs, broadband prices vary widely. Following is a summary of the prices for the predominantly used residential broadband products. Note that prices are not always directly comparable since ISPs differ on charges for things like modems. As will be discussed throughout the studies, many of the existing ISPs don't come close to achieving the advertised speeds.

- AT&T sells DSL for \$60 per month plus \$10 for the DSL modem.
- CenturyLink DSL starts with a list price of \$47 for 7 Mbps DSL. The price for 12 Mbps DSL is \$52, and 20 Mbps is \$62. CenturyLink adds up to \$6.95 per month for the DSL modem.
- Frontier charges \$44.95 for 6/1 Mbps, \$54.95 for 12/1 Mbps, and \$59.95 for 18/1.5 Mbps. For all products, a modem is \$10.
- Charter/Spectrum's basic broadband product is \$69.99 per month for up to 200 Mbps, with an optional \$9.99 for a WiFi router. Charter/Spectrum offers faster speed tiers.
- Door County Broadband prices start at \$54.95 for 4/1 Mbps, \$64.95 for 6/2 Mbps, \$74.95 for 8/2.5 Mbps, and \$84.95 for 10/2 Mbps.
- SonicNet charges \$52.95 for 5 Mbps and \$73.85 for 12 Mbps.
- Other wireless ISPs don't quote rates online.

The Study Areas. We studied two different geographic footprints. We looked at the cost of bringing broadband to the whole county. We also then looked at bringing broadband only to the rural areas. We defined rural areas as everywhere that doesn't isn't served by Charter/Spectrum,

which serves Sturgeon Bay, Jacksonport, Egg Harbor, Fish Creek, Ephraim, Sister Bay, and Ellison Bay.

Market Demand Assessment

Residential Survey. We conducted an online residential survey that attracted 995 responses. This was one of the highest numbers of responses that we've gotten in an online survey. It's important to note that this is not a statistically valid sample, meaning that the results tell us a lot about how the public feels about broadband and the ISPs, but that the percentage derived for factual questions (such as the percentage of people that use a specific ISP) are not numerically reliable. Following are the key results of the survey:

- 85% of survey respondents use broadband at home.
- 15% don't have home broadband, and 71% of those say that broadband is not available at their home.
- For residents that claim a home broadband connection, 25% use Charter/Spectrum, 26% use DSL from the telephone companies, 21% use fixed wireless technology, and 18% use satellite broadband. 10% of respondents use their cellphones for home broadband.
- There is a high level of dissatisfaction with broadband. 51% of respondents are unhappy with download speeds. 39% are unhappy with ISP customer service. 61% of respondents are unhappy with the value received for the price paid for broadband.
- 73% of respondents said that somebody is working from home at least part-time. This includes 18% of households that have somebody working from home full-time. 54% of respondents said they would work from home more with better broadband.
- 18% of respondents have school-age children at home. 64% of these households said that home Internet was not good enough to support the students during the pandemic.
- 99% of respondents have a cellphone. 41% of respondents say that they don't have good cellular coverage at home.
- The average price being paid for broadband is \$86 per month.
- 81% of respondents support the idea of funding a better broadband solution. Another 18% might support better broadband but need more information. Only 1% of respondents do not support the idea.
- 62% of respondents said they would buy broadband and pay the same price as today from a new network if it was faster. Another 23% said they would probably buy from a new network.

Business Survey and Interviews. We reached out to businesses through an online survey and also by interviewing some businesses in depth. Altogether we heard from 123 businesses.

We found two distinct sets of businesses in the county when it comes to broadband service – those located in towns or close to several major highways can get decent broadband, while everybody else has poor broadband. Businesses that are able to subscribe to Charter/Spectrum broadband are far happier, and twenty-one Charter/Spectrum customers were happy with existing broadband. It's a different story for businesses that can't get Charter/Spectrum. Some of them have the worst broadband stories imaginable, where they have trouble doing even low bandwidth functions like taking credit card payments. Many of these businesses describe a broadband nightmare, and poor

broadband is clearly hurting their businesses. One restaurant went so far as to relocate to get close to the highway to get better broadband.

We also identified what we could best describe as a seasonal broadband problem. Businesses and residents complained about how broadband bogs down during the tourist season. When the county needs broadband the most, it slows down, and service is degraded across the board. This most likely means that the ISPs have not upgraded networks to keep up with demand. Since broadband usage continues to increase at an exponential rate, this problem is likely to get worse every year.

As might be expected, a lot of the businesses we heard from are hotels, motels, inns, and bed & breakfasts. They universally said that there was not enough broadband to keep guests happy. Guests show up expecting to keep in touch with the office and to stream videos in the evening. Many of these establishments said that guests were quite unhappy with the broadband. We heard a lot of conjecture from businesses that the lack of broadband is a leading reason that the county is mostly seeing older visitors, and many businesses worry about the future of tourism in the county.

We heard horror stories from retail stores. Many struggled with taking credit cards, which can be particularly devastating to stores that take a lot of payments to sell basics. Even stores like galleries that make fewer sales have to take credit card payments manually and send them in later when broadband is working. That means they're taking a chance on having transactions that are not accepted or even fraudulent.

There are a number of businesses in the county that sell online, and the lack of broadband really hurts their businesses. They can't host retail websites locally, they have trouble taking credit card payments, and they have trouble working with shipping information that is in the cloud.

Perhaps the most common complaint we heard was from business owners who have even worse broadband at home than at the businesses. They are unable to take work home and end up bringing home broadband needs to the office.

The schools have adequate broadband on fiber. But the school system was badly impacted by the pandemic. A significant percentage of students were unable to connect to the schools from home. The school system solved some of this problem by distributing cellular hotspots – but then found that cellular coverage was so poor in parts of the county that the hotspots didn't function.

Speed Tests. The Wisconsin Department of Public Information (DPI) offers a speed test to anybody living in Wisconsin. DPI uses the MLabs speed test, which is one of the most common and popular speed tests in the country. We got access to 19,712 speed tests results. Following is a summary of the DPI speed tests.

	Technology	Tests	Download (Mbps)	Upload (Mbps)
Charter	Cable Modem	11,844	67.06	9.82
AT&T	DSL	84	11.37	5.16
CenturyLink	DSL	472	12.14	2.47
Frontier	DSL	1,193	7.25	0.93
Door County Broadband	Fixed Wireless	5,493	4.61	1.99
Satellite	Satellite	515	12.60	1.53
Cellcom	Cellular	106	18.32	2.28
US Cellular	Cellular	5	0.77	0.27

Broadband Gaps. Door County has a significant broadband availability gap, and the county is a story of broadband haves and have-nots – there is almost nobody in the middle. A handful of anchor institutions and large businesses have broadband provided by fiber. Fiber broadband is expensive and is only available in limited circumstances.

Charter/Spectrum offers broadband speeds in the towns that most customers find adequate. The biggest complaint about Charter/Spectrum was problems working and schooling at home during the pandemic. This is due to sluggish upload speeds.

The rural homes and businesses in the county have poor broadband and virtually nobody has broadband that meets (or even comes close) to the FCC-defined broadband definition of broadband at 25/3 Mbps. It's worth noting that the poor quality of rural broadband was magnified during the COVID-19 crisis as employees and students tried to function from home.

We note in our analysis that ISPs, including Frontier, CenturyLink, and Door County Broadband overstate broadband capabilities when reporting to the FCC. The FCC believes that most of the residents in the county, including the rural ones, can buy 25/3 or faster broadband. In the past, this has diverted broadband grant money from the county. Hopefully, this won't make a difference with new federal grants, but it's an issue worth keeping an eye on.

Like most places, there are also other broadband gaps such as an affordability gap, a computer gap, and a computer training gap. The report discusses ways that the County might want to tackle these issues as you also tackle the more important availability gap.

Summary of Broadband Issues

The study highlighted the following broadband issues:

- Rural Broadband speeds are far below the FCC 25/3 Mbps definition of broadband. The average MLab speed tests for every ISP other than Charter/.Spectrum showed average broadband speeds of 6/2 Mbps.

- The pandemic highlighted an upload broadband crisis. There are problems connecting to schools, working from home, using video calling services, or using cloud software. Even Charter/Spectrum upload speeds less than 10 Mbps. Every other ISP was slow.
- 11% of homes said they had no reasonable broadband option.
- We heard across-the-board that speeds on all of the broadband networks in the county bog down during tourist season, to the point in many cases where broadband is unusable.
- 87% of residents want faster speed. 83% of residents and most businesses want more choice of broadband provider. 76% want better reliability.

Engineering Analysis.

The telecom industry uses the term passing to mean any home or business that is near enough to a network to be considered as a potential customer. Finley Engineering primarily used the county's GIS database to count passings. We refined business passing using tools like Google Maps. In the assessment, we settled on the following as the count of potential passings.

<u>Passings</u>	<u>Rural</u>	<u>Total County</u>
Residential	11,685	25,086
Business Customers	<u>1,031</u>	<u>2,599</u>
Total	12,716	27,685

The report considered both wireless and fiber broadband as ways to bring better broadband to the county. In many places, we've recommended fixed wireless broadband as a first step towards getting fiber everywhere.

Wireless Design. We quantified the cost of building a state-of-the-art fixed wireless network at \$4.5 million. We did not explore this option further for several reasons. First, because of the terrain and heavy foliage in the county, there are rural customers that likely can't be reached with fixed wireless. The capacity of the network would not enable serving all of the likely customers. More importantly, the average broadband speed delivered to homes would likely be around 50 Mbps, with some locations getting as much as 100 Mbps. Wireless technology is currently not eligible for funding by most grants.

Fiber Design. We then turned our attention to fiber technology. We considered both common fiber technologies and selected Passive Optic Network (PON) technology as the best solution for the county. This can deliver gigabit fiber to everybody today and is easily upgraded to offer 10-gigabit broadband by adding circuit cards.

The network was designed using the following primary assumptions:

- The network was designed to pass every home and business in each scenario.
- The fiber would be on poles or buried in the same manner as existing utilities.
- The network is designed to accommodate future growth.
- We sized the fiber to fit the needs of each route using industry-standard fiber sizes of 12, 24, 48, 72, 144, and 288 fibers.
- The total county design places 25 large cabinets around the county to act as neighborhood hubs.

- When possible, we try to design redundancy into a network to provide fiber route diversity so that if a main fiber is cut, a neighborhood node will continue to operate. The layout of the county did not lend itself to a logical fiber ring, so the network is designed in a mesh such that every neighborhood hut is connected to two other neighboring huts. Under this configuration, a neighborhood node can't be taken out of service by a single fiber cut.
- The county was separated into 61 neighborhood passive optical nodes (PONs) that are each connected to one of the 25 regional cabinets.

Finley Engineering identified the following required miles of fiber construction for the two scenarios:

	<u>Miles</u>	<u>Cost</u>	<u>Cost / Mile</u>
Total County	1,574 miles	\$99,571,592	\$63,260
Rural Study Area	1,092 miles	\$60,298,125	\$55,218

This highlights that fiber construction is generally more expensive, on a per-mile basis, in towns compared to rural areas. This is due to several reasons. It's typically more expensive to build fiber in a city when construction involves cutting into paved streets – that's something that can usually be avoided in rural construction. The cost of fiber is also a lot higher due to the density of homes, which means tightly packed access points into the fiber network. That means a lot more labor-intensive splicing for both buried and aerial fiber.

Note that Finley Engineering has designed the most efficient network possible for the county. For instance, the mesh that connects neighborhood huts is highly efficient since all service areas have been designed at an ideal size. If communities tackle building individual local fiber solutions, the network will be less efficient, and the overall cost of building the network on a piecemeal basis would be higher than the design in this study.

Asset Costs. Below is a summary of the cost of the needed assets to support the two fiber options we studied. It's worth noting that these costs represent connecting 50% of the households and businesses in the county. The investments will vary from these numbers if a different number of customers are added to the network.

	<u>Whole County</u>	<u>Rural Only</u>
Fiber	\$ 99,571,592	\$60,298,125
Drops	\$ 15,476,075	\$ 7,435,255
Electronics	\$ 12,360,410	\$ 5,889,393
Huts	\$ 1,248,328	\$ 1,191,328
Operational Assets	<u>\$ 1,816,915</u>	<u>\$ 1,330,596</u>
Total	\$130,473,319	\$76,144,696
Passings	27,685	12,716
Cost per Passing	\$ 4,713	\$5,988

We must caution that the supply chain in the telecom industry is under extreme stress. There have been substantial price increases for fiber and fiber materials over the last year, and it seems that

costs for fiber components are still rising. The above numbers are conservatively high and include a boost of 20% for material costs compared to the prices in the market at the time that we began this report. Some economists think the country is experiencing a price bubble and that costs will eventually return to normal. We felt obligated for the purposes of this assessment to be conservative. We think it's important to plan for high costs in this economy – if costs start to return to normal, it will be easier to fund a network than is predicted by our projections.

Our Approach to the Financial Analysis. Our next task was to create financial projections showing how an ISP might fare if they financed and built the fiber solutions. The purpose of this analysis was twofold. First, we wanted to quantify the amount of grant funding that might be needed to get a network funded. Next, we wanted to show that an ISP could be reasonably profitable if they can attract the needed grant funding. We used the following approach in estimating the revenues and costs for operating a new fiber network for each of the three scenarios:

- The financial projections were made on an incremental basis, meaning we only considered new network costs, new operating expenses, and new revenues.
- A base model was created for each operating model. The models assume that a commercial ISP would offer broadband over a new network.
- We arbitrarily chose a market penetration rate of 50% for all residential and business customers. We don't know how many customers a new fiber business might attract and picked this penetration rate as conservative but typical of similar fiber markets. Note that in the whole county study that this is a composite penetration rate, assuming that the penetration rate would be lower in areas that compete against Charter/Spectrum and higher in the rural areas.
- The base models assumed financing with loans with a 25-year term.
- We included the engineering cost estimates provided by Finley Engineering, which we believe to be conservatively high.
- All studies include an estimate of future asset costs that are needed to maintain and upgrade the network over time. We've assumed that electronics wear out and need to be replaced periodically during the studied time frame.
- Broadband was priced at a modest discount from the existing market prices. The base fiber product was set at \$60. The expectation is that the Internet speeds offered on the network will be significantly faster than the speeds available in the county today.
- The estimates of operating expenses represent our best estimate of the actual cost of operating the fiber business and are not conservative. Most operating expenses are adjusted for inflation at 2.5% per year.

Key Financial Results. The assumptions used in creating the various financial forecasts are included in Section III.C of the report. The results of the financial analysis are included in Section III.D of the report. A summary of the financial results is included in Exhibit II. Following are the key financial findings of our analysis.

- Building Fiber to Only the Rural Areas Requires Substantial Grant Funding. We expected when we started the assessment that grant funding would be required to help fund broadband in the rural parts of the county. Grants are almost always needed to fund broadband to rural areas with low housing density. The analysis allowed us to quantify the amount of grants that are needed. It turns out that the amount of grant required varies significantly depending upon the expected customer penetration rate. Following are the

grants required for the fiber business to break even. In this case, breakeven is defined as a business that always maintains positive cash flow after the initial financing.

Penetration Rate	Assets Needed	Grant Needed	Grant Percent of Assets
45%	\$68.9 M	\$40.9 M	59%
50%	\$70.1 M	\$33.7 M	48%
55%	\$71.3 M	\$26.4 M	37%
60%	\$72.5 M	\$19.2 M	26%
65%	\$73.7 M	\$11.8 M	16%

A commercial ISP will want to do better than breakeven and would to make a return on any investment made into the business. Some municipalities also expect a return. ISPs calculate returns in a myriad of ways, so we didn't try to layer a return expectation across our models. But a commercial ISP will expect more grants than shown above (or might expect local grants over and above the amounts above if those represent state and federal grants).

Since the ultimate customer penetration rate has such a significant impact on the amount of grants needed to fund broadband, we think that it's vital for anybody thinking of pursuing a grant to pin down broadband demand. The two ways this can be done are a statistically valid survey or a canvass.

- Grants Would be Smaller for an ISP Building the Whole County. Consider the following table that shows the amount of breakeven grant required for somebody willing to build fiber to the whole county.

Penetration Rate	Assets Needed	Grant Needed	Grant Percent of Assets
45%	\$127.9 M	\$29.0 M	23%
50%	\$130.5 M	\$14.0 M	11%
55%	\$133.3 M	\$ 0.0 M	0%

The levels of required grants are smaller for two reasons. First, there is an economy-of-scale benefit from more customers - there is more revenue and margin driven from customer revenues. But more importantly, the lower housing density in the towns results in a lower investment per customer, and it is more profitable to serve the towns. The lower grants shown in the second table are mostly due to profits from the towns being used to subsidize the rural areas.

- Seasonality. One of the biggest challenges in bringing broadband to the county is figuring out how to deal with seasonality. The report shows that there is a significant impact of providing a seasonal discount. The fear is that there are a lot of part-time visitors to the county that will not want broadband if they have to pay for it all year. But the cost of connecting and serving a part-time resident is almost the same as a full-time resident, and so providing discounts end up creating a subsidy of full-time residents propping up part-

time residents. The report discusses the many ways that other communities have dealt with the issue, which range from only charging customers for the months they are in the market to the other extreme where some communities provide no seasonal discounts. There is also a risk of becoming unprofitable if too many part-time people want fiber but only pay for part of a year. This question requires a policy decision, and there is no easy answer.

- The Fiber Business is Sensitive to Other Key Variables. While customer penetration rate seems to be the most important variable, all scenarios are sensitive to variations in other key variables. This would include changes to variables like interest rates, loan terms, prices, and the cost of building the network. The report quantifies and describes these impacts for both the whole county and rural area scenarios.

It's important to note that changes to most variables are additive. If there is an improvement from getting more customers than expected and also for getting a lower interest rate than expected, the impacts of these changes can roughly be estimated by adding together the impact of each change. An actual fiber business is rarely going to exactly perform like any of the key variables included in the projected forecasts for the business – so ISPs must be diligent in keeping track of changes to key variables.

Funding Options. As mentioned above, any broadband expansion into rural areas will require substantial grant funding. The most likely grant funding is going to come from various federal broadband grants. There are several substantial grant programs already underway, with a few more opportunities coming at the end of this year with a new round of ReConnect grants and a big EDA grant program. But the only funding source that is probably large enough to tackle bringing broadband to most of the county will likely be from an infrastructure stimulus bill from Congress.

There also will hopefully continue to be some substantial state broadband grants. For example, the state is getting a substantial cash infusion from the \$1.9 trillion American Rescue Plan Act that can be used to improve broadband. The legislature has already approved a \$125 million broadband grant program for early 2022, but this is likely to be increased from additional inflows of federal funding.

Finding an ISP Partner. The report discusses the ways that other local governments have used to attract an ISP partner or partners to bring better broadband.

Regulatory Hurdles. The RFP asked us to look at regulatory hurdles in Wisconsin that might make it harder to find a broadband solution. The good news is that broadband is lightly regulated both at the federal level and in Wisconsin. There are no hurdles we can see that would hinder a commercial ISP from bringing better broadband. However, there are restrictions on municipal broadband providers. Local governments have to jump through several regulatory hoops to be able to provide broadband. Our advice is that the county should be careful to follow the rules if any broadband solution includes local governments having any say in how an ISP operates in the county.

RECOMMENDATIONS / NEXT STEPS

We recommend the following next steps after this report is delivered.

Consider a Collaborative Effort to Get Better Broadband

All parts of the county want better broadband. The rural areas need better broadband desperately, but there is also unhappiness with broadband in the towns. Since the broadband business has significant economy-of-scale (meaning the more customers, the more efficient), then finding a whole-county solution is the lowest cost way to move forward. That doesn't mean that finding a whole-county solution is the only path forward – but it's the lowest cost long-term solution.

There are a lot of stakeholders in the county that can contribute towards a solution. There has already been grant funding made that can be used for broadband to the towns and the County. The state broadband office will be offering substantial grants to build broadband – mostly in rural areas. There should be huge grant funding coming from the federal government. But there are other stakeholders that could contribute. The federal infrastructure bill will allow for some funding for electric smart grid. There is grant funding currently available for school, libraries, and rural health care facilities. If sufficient grant funding is available, there are likely ISPs willing to invest in the county. Pooling all possible sources of funding from all stakeholders is the most efficient funding approach.

The first step should be for the primary stakeholders in the county to meet to determine the best path forward. There is no single best path forward, but a disjointed approach could leave some part of the county still unserved.

For example, there is a collaboration formed in the Upper Peninsula of Michigan for this exact purpose. The coalition there has been created to include the schools, libraries, local towns and townships, the county governments, and rural healthcare facilities. This collaboration is also working closely with the electric cooperative and the area tribes. The members of the collaboration in Michigan have access to funding of some sort that can be used for broadband. The towns, townships, and counties all have ARPA funding. The schools have access for the first time to use E-Rate Funds to build or lease infrastructure (in the past was mostly used to buy broadband capacity). The libraries have access to a range of funding opportunities. Rural healthcare facilities have a situation similar to the schools with the Universal Rural Healthcare Fund. None of these funding sources is enough to build broadband – and it's not even enough when added together to build the last mile fiber the community wants. But the coalition understands that they can help influence ISPs to build what is needed by providing local matching grants and by agreeing to be long-term customers for an ISP or ISPs that will work with them. The county and local governments within the county also have funding from the ARPA legislation that could be used to help provide matching grants for any ISP.

The funding opportunities for the next several years are unprecedented and offer a once-in-a-lifetime opportunity to get better broadband to all parts of Door County. Each of your group of stakeholders can contribute something towards the ultimate goal – and the accumulation of those amounts can make a difference in getting fiber built everywhere in the county.

It's not easy to form such a coalition. I recommend that you talk to the folks in Michigan to hear the effort they've undertaken to make this work. This means getting as many of the community stakeholders on board before they spend money elsewhere that would have been better used for fiber. In the case of Michigan, an actual consortium has been created to formalize the effort – and that takes a lot of local work. The consequence of not considering this might be the difference between getting fiber everywhere and not. No one stakeholder in the county can make this happen, but there is huge power in working collectively so that all of the stakeholders in the county are working towards the same goal.

Reach out to Potential ISP Partners

One of the primary purposes of this assessment was to quantify the cost of building broadband in the county for the benefit of any ISPs that might consider building broadband in the rural parts of the county. We think your immediate first step should be to reach out to potential ISP partners. That begins by sharing the results of this report. ISPs will be interested in much of the research we've done. ISPs likely have not made the kind of detailed cost estimates that were done for this assessment. The assessment also includes financial projections that will help an ISP better understand potential profitability.

It might be difficult to find a single ISP willing or able to serve all of Door County. Even with grant funding, the amount of money that will be required by an ISP to build fiber everywhere in the county is substantial and beyond the means of many small ISPs. It's not unusual in large counties for multiple ISPs to serve different parts of the county.

Sometimes the potential ISPs that are interested in a given county are obvious, and most broadband solutions come from local ISPs. However, we have been surprised at times when an ISP comes to a county that is not local, so the County might want to consider a wider search for ISPs. There is a more thorough discussion of this process in Section IV.B. of this report.

Identify Staffing Resources

The various recommendations made in this report require somebody to tackle the work and spearhead the effort. Finding a broadband solution takes a focused and persistent effort, so it's important to identify staffing. We've seen many efforts to get broadband fizzle when nobody was dedicated to the community engagement tasks. We've seen the following ways that communities have done this well.

- Dedicate Staff. The communities that have done this the best have dedicated at least one staff person to concentrate on community engagement. The biggest challenge in doing this is usually finding the funding. The person undertaking this task needs to be a big believer and advocate of broadband for it to be successful. This is not a permanent position, but rather somebody dedicated to this effort for some fixed time. This is also not a 9 to 5 job with a lot of demands placed on evenings and weekends.

A county in Minnesota found a broadband solution because the mayor of one of the smallest towns in the county told his economic development director that getting

broadband was his only priority. This one person met with everybody imaginable in the county, including city governments, county governments, state representatives, and every civic and social group imaginable. After two years of tireless effort, the county found a broadband solution. This would never have happened without this one dedicated staff position.

- Volunteers. Volunteers are also an important part of this effort. There are typically people living in areas with no broadband who are willing to volunteer to help find a solution. In the example given above of the Minnesota county, the one staffer assembled a group of active volunteers who helped with the effort to engage the public. These folks created email lists, went canvassing door-to-door talking about the need for broadband, and showed up at every government meeting to stress that they wanted a broadband solution. It's important that any volunteer effort has some structure and working with a staff person can make sure such a group stays focused. The County needs to be prepared to fund efforts that the volunteers think are needed. In the case of the Minnesota county, the volunteers engaged in several rounds of postcard mailings asking homeowners to pledge support for broadband.
- Broadband Task Force. A more formal solution is to create a committee of citizens who are willing to work to get better broadband. A Broadband Task Force generally is composed of citizen volunteers and a few elected officials. These groups meet regularly and work towards finding a broadband solution. It's normal that such a group would report back regularly to the County government about their progress. Such a group can collectively take on the needed community engagement tasks, and we've seen effective committees do this well. It's not unusual for a Broadband Task Force to solicit help from volunteers.

Such groups are usually given a budget but also restrained by needing to have expenditure pre-approved. A Task Force might use funds to collect data needed to advance broadband. I've seen funding approved for such things as statistically valid surveys, for pledge card drives, and for hiring a consultant to answer their questions.

We could write pages on the dos and don'ts of operating a successful citizen's advisory group. The one issue I've seen with a Task Force is if the citizen group has a different vision of the right broadband solution than the government – they are often impatient and want to see results. Most governments have already experienced this in working with citizen groups on other topics. The main keys for success are to make sure that the group has a specific agenda, a specified budget, and the specific authority to meet their goals. Citizen groups can accomplish great things if they are directed to do so – but can stray if not given good direction.

As a final note, many communities are using the federal ARPA funding to pay for staffing to investigate broadband and other eligible infrastructure issues.

Get Creative in Finding Grants

This report mostly alludes to grants that can help to directly build broadband infrastructure. But there is a lot of additional grant monies available that can help in the broadband effort.

As an example of how we are currently flooded with grant opportunities, there are nearly a dozen grants that can be used to assist libraries. The biggest is a \$200 million grant to the Institute of Museum and Library Services. This is an independent federal agency that provides grant funding for libraries and museums. \$178 million of the \$200 million will be distributed through the states to libraries. The Wisconsin share of this grant is \$3.3 million. This is by far the largest federal grant ever made directly for libraries. There are other grants that can be used to pay for hotspots, modems, routers, and laptops.

There are currently federal grants aimed at issues like broadband adoption and training, which can be used to buy computers for homes without them and which can be used to create basic computer literacy training.

If Congress passes a broadband infrastructure bill, there will be numerous additional grant opportunities. For example, the current draft infrastructure bill includes funding to improve the electric grid – and part of that money could be used to build fiber to substations. The federal grants also include money for smart city and smart government initiatives. We suspect that an infrastructure bill will spawn dozens of one-time grant programs that could be helped to provide a broadband solution with enough creativity in putting grants together.

Consider a Statistically Valid Survey

One of the most important ways that a community can help attract ISPs is to help them understand the potential for operating a successful broadband business in the area. The biggest concern that every ISP has about a new market is knowing if they can get enough customers to be successful. Rural areas differ widely in the willingness of people to subscribe to broadband. We've worked in rural communities in just the last few years where the demand for broadband varied between 60% and nearly 90% - and it's vital for an ISP to understand where your communities fall within that wide range.

We've seen local governments undertake research to help ISPs understand the market better. This assessment included an extensive online survey, which will help an ISP understand the powerful desire in the county for better broadband. We got almost 1,000 responses to that survey.

A useful next step might be to conduct a statistically valid survey. Such a survey can be used to predict the most likely range of customer broadband penetration should somebody build a broadband network. We've found over the years that if a survey is conducted in a way to be statistically valid that the results provide a good prediction of the likely customer penetration rates.

There are a few factors that are vital for getting an accurate and believable survey. First, the questions asked must be unbiased and can't lead respondents into answering in a given way. It's also important for a survey to be random if you want the results to represent the whole County. For example, since the goal is to predict broadband penetration rates, it's just as important to hear from those who don't want broadband as it is to hear from those who do.

It's also essential to have confidence in the survey results, and this speaks to the accuracy of the answers obtained in the survey. Most business and political surveys are designed to provide an accuracy of 95% plus or minus 5%. That accuracy would mean that if you were to ask the same questions to 100% of the people in the area that the results should not vary by more than 5% from what was obtained in the survey. That is a high level of accuracy, but other levels of accuracy are possible by varying the number of completed surveys. For most communities, a survey with between 365 and 380 completed surveys will produce this desired accuracy.

Surveys have gotten a bad name due to political surveys. There are several reasons that a political survey can produce different results than what is seen in an election. The primary reason is that respondents might not truthfully answer all of the questions for many different reasons. We've found that we don't see this kind of bias in broadband surveys because the topic doesn't trigger emotional responses – folks generally tell the truth about the topic.

The last factor to consider is a phenomenon called survey fatigue. If the survey asks too many questions or takes too long, then a lot of people will hang up in the middle of the survey. An ideal survey is done in 5 minutes and no longer than 10 minutes.

There are two usual methods used to conduct a statistically valid survey of a whole community – either by knocking on doors or by telephone. The effort required to knock on doors is massive, especially in a rural area. You'd have to go to homes randomly, meaning hitting all corners of the rural county. You'd have to knock on doors of all types, from the smallest to the largest homes.

It's far easier to administer the survey by telephone, but it makes no sense these days to do a telephone survey using the white pages and calling just landlines. We know that the households keeping landlines are older and more conservative, and their responses on a survey probably don't represent all households in an area. A valid telephone survey needs a list of telephone numbers that include cellphone numbers.

We must caution, though, that undertaking a statistically valid survey in Door County might not be easy. If an ISP wants to consider bringing broadband to rural parts of the county, then a survey should only be given to people in rural areas. That's a lot harder to undertake than you might think because if the survey is to be conducted by telephone, then you'd somehow need to gather a large number of telephone numbers from rural residents.

Pledge-Card Drives. An alternative to a survey would be to conduct a pledge card drive. This would be some sort of system where customers could pledge to buy service if an ISP were to build a new network. A pledge card drive works best when you can cite specific products and prices. For instance, if an ISP was partnering with a county to come to a certain area, then naming that ISP and disclosing their products and prices provide a more believable response. We've seen communities do pledge card drives and then see more than 95% of homes that said they would buy broadband actually buy it when it became available.

Be Prepared to Challenge the FCC Broadband Maps.

Many federal grant programs rely on the FCC “maps” that are derived from the Form 477 data that the FCC gathers from ISPs. We’ve shown in this report that the FCC broadband maps are badly overstated in nearly the entire rural areas of the county. Several ISPs are claiming broadband speeds that look to be much faster than what has been reported in the Wisconsin state-sponsored speed tests.

There is a significant and negative consequence to poor FCC mapping. In the past, this mapping has diverted potential broadband grants away from the county. A good example of this is when Door County Broadband challenged the maps for the FCC’s RDOF awards in 2020 and successfully kept that funding away from 516 Census blocks in the county. From what we can see, the Door County Broadband challenge does not look valid. There are nearly 5,500 speed tests for Door County Broadband in the state speed test database. Door Counties speeds look to about the same speed as DSL, at around 5 Mbps download and 2 Mbps upload – far below the RDOF challenge threshold of 25/3 Mbps.

Some current federal grants still start with the assumption that grant funding should go first to areas with speeds under 25/3 Mbps. According to the FCC database, much of the rural county has speeds greater than 25/3 Mbps - in reality, there are likely few if any rural customers in the county receiving speeds greater than 25/3 Mbps.

The county needs to get proactive with the FCC and the ISPs to try to fix this issue. The FCC has promised new mapping, and that mapping will include a challenge process. The county should get prepared to challenge the maps vigorously if currently overstated broadband speeds carry into the new maps. Meanwhile, the county might want to get as many people in the rural areas as possible to take the Wisconsin speed tests. It would also be hugely beneficial if you could get the raw speed test data from the state, which would allow seeing the high and low speeds from each ISP in various portions of the county.

Review Local Policies Related to Fiber Construction.

One factor that always worries ISPs is that there will be local rules, ordinances, and processes that will slow down the construction process and add cost to the fiber construction process.

Door County should coordinate a review of the following kinds of policies to see if there are ways to be friendlier to ISPs. Changing these processes might require new ordinances or new internal procedures. Local governments need to remember that any changes made to accommodate a new ISP should also apply to the incumbent ISPs operating in the county. Some of the areas that should be investigated include:

- Granting rights-of-ways to construct a network.
- Issuing permits to construct a network.
- Locating existing underground utilities where fiber is to be buried.
- Inspecting and approving that construction is following the permits.
- Requiring things like traffic control during the construction process.

- Requiring other kinds of agreements like franchise agreements or rights-of-way agreements.
- Requiring records of what's been constructed.

It's likely that different parts of the county have different local rules governing these kinds of tasks. We always recommend that the various local governments get together to review any such requirements, with the goal of modifying ordinances or processes that would hinder fiber construction.

Educate the Public

We saw a huge amount of interest from the general public as they participated in this assessment. You should determine the best way to inform the public of the results of this report and gain support for moving towards a broadband solution. One important aspect of community engagement is to provide useful information to the public to help them better understand broadband issues. It also means providing basic information that explains broadband in ways the public can understand. We've seen communities tackle public education in some of the following ways.

- Publish This Feasibility Report. While not a lot of people will wade the whole way through a report of this size, it has been written for the layperson.
- Hold Public Meetings. Meetings can be held to explain the results of this report, or meetings could be more generic and be aimed at explaining the broadband issues. It's worthwhile to have elected officials at public meetings to directly hear the kinds of issues that households have due to the lack of broadband. It's vital to advertise heavily to drive attendance at meetings. CCG and Finley Engineering have been to a community meeting where only one resident attended and to other meetings that were standing room only in a large room.
- Broadband Website. Many communities that are looking for broadband solutions create a broadband web page. Such a page can be used to educate as well as inform. For example, a common educational feature is to have a lengthy section with responses to "Frequently Asked Questions." It's important that if you create a broadband website that you keep it current. You want the public to think of this site as a resource.
- Gather a List of Broadband Proponents. One valuable tool is to create a database of local broadband proponents – citizens who say they support fiber. Having a list of emails, home addresses, and phone numbers can be useful when you want to ask for public support for specific tasks or want to notify people of upcoming meetings.
- Broadband Newsletter. Cities often create a newsletter dedicated to broadband. These newsletters are aimed at educating the public on topics related to broadband and also to keep the public informed on the progress of the effort to get better broadband.
- Outreach Meetings. One of the most successful ways to reach the public is what CCG calls outreach. This means sending a spokesperson to meetings of local organizations to talk about better broadband. This can be any sort of group – PTAs, church groups, service organizations, youth groups, etc. Most organizations will allow time for a short presentation. It's vital to have a prepared presentation to get across whatever message you want the public to know. These outreach meetings are best done by those who are strong broadband proponents – this could be one of the tasks assigned to a Broadband Task Force or given to willing volunteers.

Lobby for Larger State Broadband Grant Funding. It's going to be a lot easier to fund rural broadband projects in Wisconsin if the State steps up and increases the annual amount of broadband funding. Although the State increased grants for the 2021 grant cycle to \$125 million, there are numerous other states that are setting up state grant programs of \$400 million or even greater. The State needs to hear that one of their best roles will be to provide matching grants for federal grants.

Increasing broadband grant funding means lobbying state legislators to the problems caused by the lack of broadband. Legislators all heard a lot about poor broadband during the worst of the pandemic, but the pressure needs to be stay focused on the legislature to give rural broadband a higher priority and more funding. State legislators must hear loudly and often that the current level of funding is not enough if they want to see the broadband issue solved. Another good argument to use in lobbying is that anything that helps the rural areas also brings in more revenue for the State.

Be Prepared to Support Grant Filings

Many state or federal grant programs require a showing of local community support. Door County should be prepared to help an ISP by gathering government and resident support for the grant applications. This means soliciting as many letters of support as possible to support a fiber grant. We've seen counties go even further and have undertaken a local pledge drive to gather a large number of signatures to support a fiber project.

Be Persistent

It's the rare county where one ISP comes forward and provides a broadband solution for the whole county. That means that even if Door County finds a broadband solution to cover part of the county that the effort is not done, and you will need to continue with the above tasks until everybody in the county has broadband.

Tackle the Other Broadband Gaps

Most of the above suggestions concern solving the broadband availability gap – meaning getting faster broadband in the rural parts of the county. However, even when a broadband solution is found, the county is still going to suffer from issues of broadband affordability, the lack of computers in homes, and the lack of digital literacy for a lot of citizens. The county needs to put effort into solving these gaps along with solving the availability gap.

Tackle the Affordability Gap

This is probably the hardest gap to solve. Broadband is priced too expensively for many homes, and affordability efforts look for ways to bring less expensive broadband to the homes that most need it.

Get Involved with Low-Income Subsidy Programs

There are both existing programs and a new federal subsidy that can help homes save money on broadband. We're always surprised about how many eligible homes don't take advantage of these programs. The County can take two roles in maximizing the benefits of these programs by first making sure the public knows about the programs and pressuring all ISPs in the County to take part in the programs. We've learned that most ISPs don't aggressively advertise the low-income programs and that many eligible households don't participate. The first step is to review the requirements for households to participate with the various programs. You also should poll ISPs to see who intends to participate in federal low-income programs.

Charter/Spectrum (Spectrum) Internet Assist. Charter/Spectrum (Spectrum) has a low-income program called Internet Assist that provides broadband to qualifying households. The program offers speeds of 30 Mbps, a free modem, no data caps, and an optional in-home WiFi service at \$5 a month. Charter/Spectrum provides Internet Assist for \$14.99 per month.

Households must have one or more members that receive one of the following assistance programs: National School Lunch Program (NSLP), Community Eligibility Provision (CEP) of the NSLP, or Supplemental Security Income (for applicants age 65+ only).

Federal Lifeline Program. CenturyLink, Nsight Telservices, Mercury Networks Corporation, and Frontier Communications participate in the FCC's Lifeline program that is part of the Universal Service Fund. With the program, a customer can receive a discount of \$9.25 per month off a telephone bill or a broadband bill for qualifying customers. The program is cost-neutral to the ISPs – customers get the discount, and the FCC pays the difference to the ISPs.

To qualify, a customer must participate in one of the following programs: Medicare, SNAP (formerly Food Stamps), SSI, Federal Section 8 housing, VA Veterans pension, or VA survivor's pension. The FCC has recently established a web portal where participating carriers can check the eligibility monthly of households to meet one of the above tests.

FCC Emergency Broadband Benefit (EBB) Program. The EBB program went into effect in May 2021. The funding came from the \$1.9 trillion American Rescue Plan Act. The program was funded for \$3.2 billion. The program will last until six months after the end of the federally declared Covid-19 emergency period or until the funds run out of money.

The EBB provides a discount of up to \$50 per month towards broadband service for eligible households and up to \$75 per month for households on qualifying Tribal lands. Eligible households can also receive a one-time discount of up to \$100 to purchase a laptop, desktop computer, or tablet from participating providers.

if they contribute more than \$10 and less than \$50 toward the purchase price. The Emergency Broadband Benefit is limited to one monthly service discount and one device discount per household. For a household to get this discount, its ISP must be a plan participant. A household applies through its ISP.

A household is eligible if a member of the household meets one of the criteria below:

- Has an income that is at or below 135% of the Federal Poverty Guidelines or participates in certain assistance programs, such as SNAP, Medicaid, or Lifeline.
- Is approved to receive benefits under the free and reduced-price school lunch program or the school breakfast program, including through the USDA Community Eligibility Provision in the 2019-2020 or 2020-2021 school year.
- Received a Federal Pell Grant during the current award year.
- Experienced a substantial loss of income due to job loss or furlough since February 29, 2020, and the household had a total income in 2020 at or below \$99,000 for single filers and \$198,000 for joint filers; or
- Meets the eligibility criteria for a participating provider's existing low-income or COVID-19 program.

In the infrastructure bill that is working its way through Congress, the EBB program would be funded for many more years, but the amount of the monthly discount lowered to \$30. However, that bill is not yet law. If it doesn't pass, the EBB program probably runs out of funding sometime in 2022.

Support Local Affordability Efforts

There are nonprofit organizations around the country that are tackling the affordability issue. One of the more ambitious such efforts is being made by Mobile Beacon.¹ This is a nonprofit that works nationwide to bring low-cost mobile broadband to nonprofit organizations around the country, and through those local nonprofits brings low-cost broadband to low-income people.

There are numerous solutions being used by the nonprofits working with Mobile Beacon. One common effort was discussed above, which is to provide portable WiFi hotspots that are distributed from libraries. Mobile Beacon has also negotiated a deal with Sprint (now T-Mobile) to provide low-cost cellular broadband to students and others that is priced as low as \$10 per month for an uncapped cellular broadband connection.

¹ <https://www.mobilebeacon.org/>

An interesting study² was done looking at the impact of bringing broadband to low-income homes for the first time in the Twin Cities in Minnesota through the Mobile Beacon effort.

- 94% of Mobile Beacon subscribers use the Internet daily, and 82% say they use the Internet several hours a day.
- The average home with Mobile Beacon used 41 GB of data per month. Students used an additional 25 GB per month. People searching for jobs used 14 GB more per month.
- The Mobile Beacon broadband had an immediate impact on students. Parents report that students spend an average of more than 4 hours per week doing homework on the Internet.
- The new Internet connection allows adults in low-income homes to get training. 32% of adults in the Mobile Beacon program were taking online courses.

Bridging the Broadband Skills Gap

Even if better broadband becomes available, there are many residents of the county that don't possess the basic computer skills needed to take part in the modern digital world. The county should consider finding ways to provide more computer training. This can be done in a wide variety of ways:

- Allow the Schools to be Used After-Hours for Training Adults. A number of communities use computer training centers that already exist in schools to hold after-hours training for adults.
- Develop Training Course in the Libraries. A number of communities have developed computer training programs through their libraries.

Find Solutions for the Homework Gap and Computer Gap

We heard that a lot of students could not engage in online learning from home during the pandemic. There are ways that other communities have tackled the issue – some of these solutions are underway in the county, but such efforts ought to be made more permanent.

Take-Home Computers for all School Kids. The most common solution is schools that send computers home with students. In some school systems these computers can only be used to connect to the school system network, making them homework-only computers. But other school systems have recognized that these might be the only computer in a home and let students and their families use the computer for other purposes. The biggest problem with school-provided computers are students that don't have a broadband connection at home.

Lending Mobile Hot Spots. There are many communities that are lending mobile hot spots to citizens through the libraries much the same way they lend books. A person can check out a hot spot for some period like a week or ten days, which will provide broadband that can be used with computers or tablets.

² Bridging the Gap. https://www.mobilebeacon.org/wp-content/uploads/2017/05/MB_ResearchPaper_FINAL_WEB.pdf

This program requires two things. First, Door County would need to buy mobile hot spots and be prepared to continue to fund them into the future. You'd also need to partner with one of the big cellular companies to provide free or inexpensive bulk cellular data to power the hot spots. Other communities have been successful in creating such partnerships. It's worth noting that these hot spots will only work where there is cellular broadband available – so you should try to put together a map of where cellular works and doesn't work – much like mapping landline broadband as described above.

Get Computers into Homes that Need Them. Communities tackle this in two ways. One is to give or lend laptops or tablets to students. Some school districts provide computers to every student while others provide them selectively to students that need them. The other alternative is to find a local nonprofit that is willing to tackle the computer issue. Most home and business computers last 3-5 years, and nonprofits have found that older computers can be upgraded fairly inexpensively and then placed in homes that need them. Such an effort can be a lot of work, but many communities have found groups willing to tackle the issue.

One such program is the nonprofit E2D³ (End the Digital Divide) in Charlotte, North Carolina. The organization refurbishes laptops contributed by businesses in the Charlotte area and gives them to students. The organization has taken a several-prong approach to make this happen:

- They solicit used laptops from businesses in the Charlotte area. Most big businesses replace laptops every few years, and most of them have been ending up in the landfill. Now a number of businesses send all their used laptops to E2D.
- Used laptops need to be refurbished, and E2D started several computer labs in area high schools where they hire students at a decent wage to refurbish the computers and install new software. The purpose of these labs is not only to get the laptops ready to distribute, but they provide technical training for kids that is helping them move on towards college or a technical career.
- Households that get a new computer also get a live tutorial and technical support to best take advantage of the new laptops.
- Finally, the Charlotte area has a lot of homeless families, and there are thousands of homeless kids in the area. E2D has partnered with Sprint to provide mobile hot spots and data plans that are providing broadband access to homeless students and others with no broadband.

Another organization that works nationwide to fund computers is Minneapolis-based nonprofit PCs for People⁴. They provide PCs to households that need them and work with other entities, including Mobile Beacon and E2D. Door County or some local nonprofit could connect with PCs for People to find ways to get computers into the hands of the neediest households in the County. A local nonprofit could also mirror what's been done elsewhere.

³ <https://www.e-2-d.org/>

⁴ <https://www.pcsforpeople.org/>

Create More Public Hot Spots. Door County can fund more public hotspots. Outdoor hot spots are particularly effective since students can sit in cars and use them any time of the day or night. Door County can start this process by extending the WiFi at County buildings to the outside areas surrounding the buildings. To the extent that County buildings already have decent broadband, the concept is to share it with the public. It's particularly easy to make bandwidth available to the public in the evenings when the government offices are closed, and the bandwidth isn't being used – sharing this bandwidth usually adds no cost to what is paid for broadband.

A more aggressive plan would be to create public hotspots in each rural neighborhood that doesn't have good broadband – the places where citizens need it the most. However, it might be a challenge to find the bandwidth needed to support such hot spots. You might be able to partner with the incumbent ISPs or cellular carriers which might have broadband that isn't otherwise available to the public.

Reward Businesses for Providing Public Hotspots. We've seen communities that reward businesses for creating good public hot spots. The reward can be anything from public recognition and awards to some sort of break on local taxes and fees.

End Executive Summary

Broadband

*Where We Are Now and
Where We Can Go*

Presentation Goals

- Understanding of current status
- Focus of Governor's Task Force recommendations
- Update on County efforts
- Awareness of
 - Technology options
 - Funding opportunities
 - Examples from elsewhere

What is the State of Wisconsin doing?

PSC Broadband Office

- Broadband policies to encourage broadband investments
- Broadband Expansion Grant Program

Governor's Task Force on Broadband Access

- Created in July 2020
- Complements "2021 Year of Broadband" initiative
- Report delivered June 2021

Current Status of Wisconsin

- 394,000 Wisconsinites lack broadband access, of which 385,000 are in rural areas
- Represents 22 percent of all rural Wisconsinites compared with only 17 percent nationally

Importance of Data

- We have a problem in part due to poor quality of data
- FCC definition of who is served impacts rural areas disproportionately
- Some estimates say there are twice as many unserved or underserved as currently reported

Getting Better Data - Department of Public Instruction Example

- Common survey questions
- Easy to administer tools schools and parents were familiar with
- Over 335,000 students reported to date
- At least 65,000 students lack access due to one of three reasons:
 - No provider at their residence
 - Lack of affordable rates, or
 - Service quality that is so poor as to not allow for learning to occur
 - Gibraltar School District reports 7 percent of students lack access
- Data tools and maps
- Worked with partners including the ISPs to coordinate efforts to connect families during the pandemic and beyond

Access Alone is not Sufficient - *Speeds Matter*

- Bandwidth speed must match uses which require more speed
- DPI survey question - Can you use the Internet for streaming class?
 - Over 25,000 students statewide said “No,” and 165,000 said “Not always”
 - Gibraltar School District reports half of all students have internet performance issues, more than 1 of 7 students reported “No”
- [Speed test campaign](#) conducted
 - Between January and April 2021
 - 400,000 tests reported
 - [Dashboard](#) and [mapping tool](#) created for community planning

Speed Test Results - *Northern Door County* (in median Mbps)

FCC Definition of Broadband = 25 Mbps Download Speed

DOWNLOAD SPEEDS	Baileys Harbor	Egg Harbor	Ellison Bay	Ephraim	Fish Creek	Sister Bay
AT&T	4.8					
Charter Spectrum		16.2	25.2	37.4	134.5	101.6 / 67.7
Door County Broadband	2.9	5.0	2.1		4.0	6.4 / 3.4
Frontier	2.8	6.3 / 4.3	1.9		4.6	4.0
Hughes Net		2.6	1.0			18.4

Speed Test Results - *Northern Door County* (in median Mbps)

FCC Definition of Broadband = 3 Mbps Upload Speed

UPLOAD SPEEDS	Baileys Harbor	Egg Harbor	Ellison Bay	Ephraim	Fish Creek	Sister Bay
AT&T	0.5					
Charter Spectrum		6.9	10.7	9.8	10.8	11.0 / 6.7
Door County Broadband	1.4	1.9	1.6		1.6	2.2 / 1.6
Frontier	0.7	0.9 / 0.7	0.7		0.9	0.6
Hughes Net		0.7	2.1			1.9

Governor's Broadband Task Force - *Report Recommendations*

- Eliminate Digital Equity Gap
- Future-Proof Technology Public Investments
- Provide Financial Support to Solve the Problem

Recommendation - *Eliminate Digital Equity Gap*

- Ensure we close the digital equity gap for all. This includes three components:
 - Access - building infrastructure
 - Affordability - providing low cost options when needed, also by subsidizing rural broadband infrastructure
 - Adoption - helping people understand how to access and use the resource

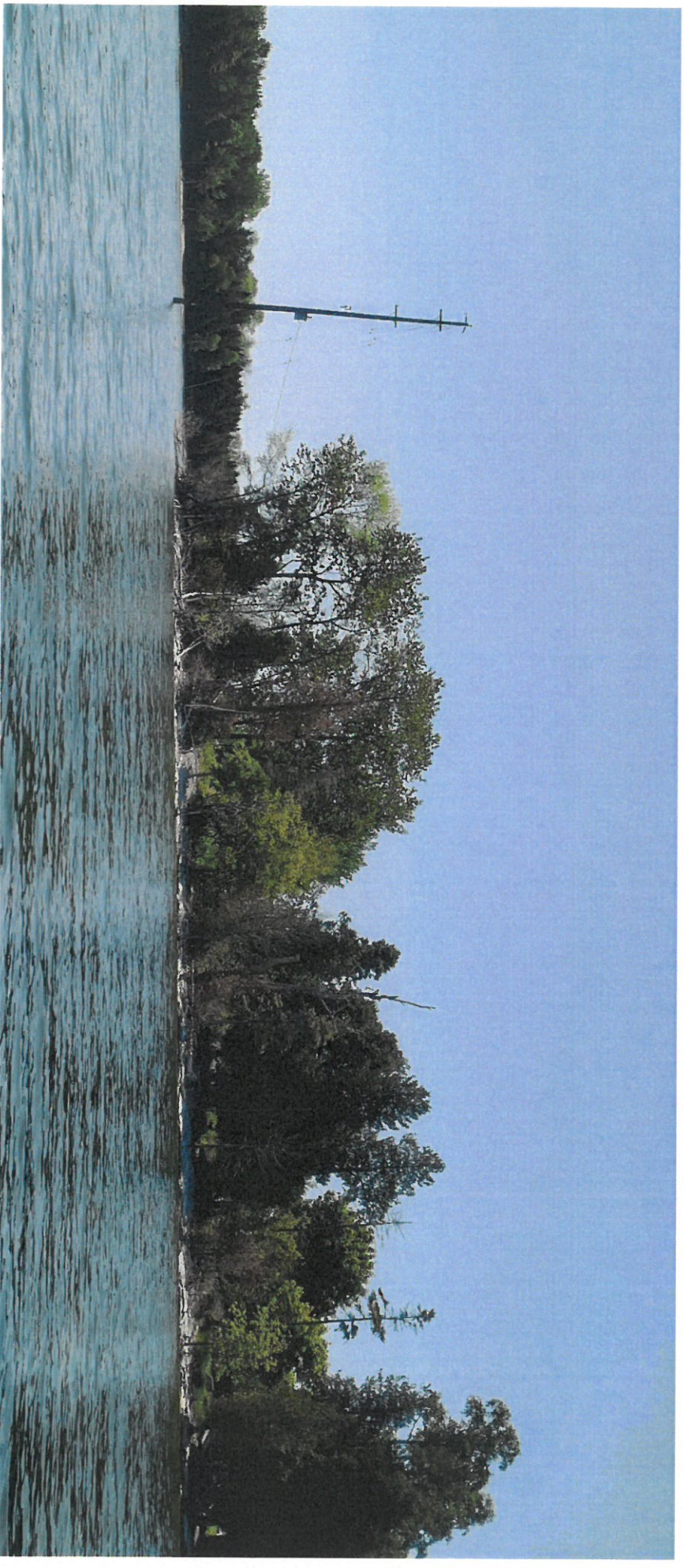
Recommendation - *Future-Proof Technology*

- Fiber is the goal wherever possible, alternate technologies to fill gaps
- Only fiber can guarantee 1 Gbps down **AND** up speeds, yet only 17 percent of Wisconsinites have access to those speeds now
- Digital economy demands more; consider business uses in Northern Door
- Ever expanding uses, e.g., Internet of Things
- Impacts of population and student enrollment declines
- Pandemic's impact on remote work
- Federal funds and PSC Expansion Grants strongly support fiber strategy
- Historical context - Electricity in 1930's, telephone in 1940's/50's
- Generational value
- Once in a (many?) lifetime opportunity is ***NOW***

Broadband Technology Comparison

	Download Speed	Upload Speed	Latency (ms)	Obstacles	Upgrade Costs
Fiber	1000	1000	10-20	No	No
Cable	500-1000	5-50	15-40	No	Yes
DSL	10-20	1-5	30-65	No	Yes
Fixed Wireless	50-200	1-10	30-50	Yes	Yes
Satellite (LEO)	50-100	20-40	30-90	Yes	Yes

Recommendation - *Future-Proof Technology*



Recommendation - *Provide Financial Support*

- The rural broadband problem is essentially a financial and capital issue
- Treat rural broadband issue as infrastructure just like sewer, water, roads, school buildings, fire stations and equipment
- Long-term paybacks are acceptable, e.g., 20-30 years
- Blend funding from all sources including local, state, federal, and private
- Ensure local community needs are met with public investments

So, What Funds are Available?

- A lot - but keep in mind, this is a *once in a lifetime opportunity*
- American Rescue Plan
 - State - \$2.5 billion total - \$100 million dedicated to broadband (so far)
 - Local
 - Door County - \$5.3 million
 - Municipalities and towns in the county - \$2.9 million (Baileys Harbor ~\$115,000)
 - Primary use for funds includes broadband
 - Schools
 - Door County school districts - \$4 million total (Gibraltar ~\$600,000)
 - Broadband connectivity is allowable
 - US Treasury Department - Capital Projects Fund - \$10 billion

So, What Funds are Available? *Part 2*

- Current federal broadband programs
 - US Department of Commerce - National Telecommunications and Information Agency (NTIA)
 - US Department of Agriculture - Rural Utility Services (RUS)
 - FCC e-Rate Program for schools and libraries allows for fiber construction projects
 - Rural Development Opportunities Fund (RDOF)
- State of Wisconsin - FY 2022-23 Budget
 - \$125 million in broadband bonds
 - Board of Commissioners of Public Lands (BCPL) Trust Fund Loan Program

What Funds **MAY** Become Available?

- Proposed US Infrastructure Bill
 - \$65 billion; Wisconsin share if allocated per capita would be ~\$800 million
 - When will we know? Likely before the end of 2021

What is Door County Doing?

- Door County Economic Development Corporation (DCEDC) broadband study
 - Contracted with a highly reputable, nationally recognized firm
 - Funders include DCEDC, local governments, school districts
 - Engineering analysis - *Who has what where?*
 - Market analysis - *Who wants what and what are they willing to pay?*
 - Funding models - *How do we pay for it?*
 - Business models - *Who provides service?*
 - Report due in October
 - Steering committee created to work with consultant
 - Sharing results with stakeholders and the public
 - Creating an implementation plan

What about Baileys Harbor?

- Suffers from poor service, historically under-resourced provider; similar to other areas across Wisconsin
- Entrepreneurial opportunities and stakeholders
- Must determine level of public commitment given the perceived value of service
- Ensure public goals are achieved under any agreement with a partner
- Could learn a lot from the Washington Island fiber project currently underway
- Begin exploring possible private/public partnership business models including cooperatives

How Much Would Fiber Cost in Baileys Harbor and How Long will it Take?

- Estimated FTTN costs for the entire town - \$5.25 million
 - Fiber backbone - \$3.25 million
 - Service lateral connections - \$1.5 million
 - Hardware and equipment - \$500k
 - At 40 percent local contribution monthly payments are under \$10,000; taxes on \$200,000 property are ~\$50 per year
- Timeline - implementation in phases over a span of 3 to 5 years

Are There Successful Wisconsin Examples?

- A few of the many - and growing number of - examples:
 - Town of Drammen (Eau Claire County) - 2 providers, 12 businesses, 256 residences, \$1.45 million PSC grant w/ \$1.45 million local match
 - Boulder Junction (Vilas County) Phase 2 of 3 - 1 provider, 19 businesses, 585 residences, \$2.225 million PSC grant w/ \$2.734 million local match
 - Taylor County - 74 miles, 34 public and community sites, \$9.5 million, no grant funding
 - Washington Island fiber project

Broadband

*Where We Are Now and
Where We Can Go*

BAILEYS HARBOR BROADBAND COMMITTEE

BROADBAND GOALS

- Fiber optic cable available to all businesses, residences, schools, & other gov't
- Minimum of 100 Mbps up **and** down, i.e., symmetrical; top speed 1 Gbps
- Keep monthly costs affordable for all, between \$50-\$100 per month plus discounted rate for qualified households
- Free drop of 500 feet to user

OTHER TOWNS' EFFORTS

- Washington Island Electric Cooperative, with the support of the Town of Washington and the Washington Island School District, has begun an island-wide fiber to the premise broadband project. Their plans could be fully accomplished within as few as three years.
- Liberty Grove has committed their entire American Rescue Plan funding to broadband. They have also joined a partnership with a local ISP and the Washington island Electric Cooperative for a fiber broadband project that will serve Northport and Gills Rock.
- Jacksonport is forming a broadband committee

BROADBAND SYSTEM

- DCEDC Engineer's report in October will describe the system and its costs (by individual municipality and other geographies)
- Mainly aerial installation due to geology of the county; Wisconsin Public Service repoling project helps reduce preparation (i.e., "make ready") expenses of the project
- Fiber to the home; gateway connection box installed at the premise
- Interior modem provided
- System will have **excess** strands of fiber which provides significant future flexibility; additional strands are cheap if done up front
- The project will certainly be completed in phases and over roughly 3-7 years

COST OF THE SYSTEM (Baileys Harbor)

- Approximately \$6 million – 40% debt; 60% grants
- Debt service averaging \$50 per property unit per year on a \$200,000 property

GRANT FUNDING

- American Recovery Program:
 - State monies - Governor Evers has allocated \$100 for rural broadband; additional funds may yet be allocated as the state received in total \$2.5 billion
 - County monies - ~\$5.3 million
 - Municipal monies - Baileys Harbor ~\$115,000 (all 19 Door County municipalities combined have ~\$2.7 million)

- School District monies - Gibraltar SD ~\$500,000 (all four County school districts combined have ~\$4 million from the last round of funding, plus they can access the FCC E-rate program for discounted loans)
- With the passage of the ARP bill, the US Treasury was funded with \$10 billion for capital improvement projects. Broadband infrastructure is a key focus area. Wisconsin's state allocation is \$189 million.
- Wisconsin state biennial budget includes \$129 million for broadband through long-term bonds.
- US Congress continues to work on a federal infrastructure bill; the US Senate has passed a version that allocates \$65 billion for broadband, for which Wisconsin's share per capita could be \$800 million.

ADDITIONAL STEPS

- Complete detailed pre-engineering analysis using the DCEDC data to specify project parameters, phases, timing, etc.
- Work with other lakeside towns to explore collaborations around network development projects once the DCEDC study is released.
- Determine who will manage the system
 - Explore other local and regional potential ISP partners.
 - Investigate a broadband cooperative business model to serve as the ISP; the Washington Island Electric Cooperative and the UW-Madison Law School Innovation & Entrepreneurship Center are resources to assist.
- Explore long-term funding options including bonds, the state trust fund loan program, and the new bonding available within the state biennial budget

Kurt Kiefer - Broadband Committee Chair
email: kkiefer18@gmail.com

Does Baileys Harbor have a broadband problem?

In a word, yes. Speed test studies done recently report that the current internet service provided to residents averages 4 Mbps down and 1 Mbps up. The FCC definition of broadband is 25 Mbps down and 3 Mbps up. Based on these data, Baileys Harbor can be defined as unserved. That classification is critical for many funding programs.

What will it take to improve broadband access in Baileys Harbor?

The main ingredient is funding. It is estimated based on industry cost standards that to serve every premise in Baileys Harbor with a fiber connection would be roughly \$5.25 million, plus or minus about 20 percent. These cost estimates are affirmed by the Door County Economic Development Corporation broadband study. Interestingly, these estimates are similar to what the Town of Baileys Harbor spent when building the sewage treatment facility in the early 1990's. With inflation accounted for, the cost of placing fiber at every premise in the Town is less than half of what it would take to build the sewage treatment facility in today's dollars.

What technology is being explored for broadband in Baileys Harbor?

The preferred technology is fiber. The DCEDC broadband study is also recommending this approach. It is the only technology that guarantees 1 Gbps symmetrical (i.e., both download and upload speeds are the same). This speed is also very fast (e.g., a two hour movie would download in six seconds.) Fixed wireless, cellular, and satellite are all slower and significantly impacted by line of sight issues. With the topology and trees in Door County these other technologies are severely challenged. Fiber is also very similar to other historical technologies that have been adopted like electricity and telephones. Following those models of the past provides a great path for solving the broadband problem today. On a related note, fiber is guaranteed to be useful for at least 30 years, and likely much longer, just as electricity was nearly a century ago. Many places in the country are still relying on those same power lines. For a more detailed comparison of the various technologies please look here:

<https://docs.google.com/document/d/1ziCjIUZ1W0XZr7SRd1YNILlgNjoS1av5pUfjwnAqmXw/edit?usp=sharing>

What funds are available to help with implementing broadband in Baileys Harbor?

Right now, there are more funds available from state and federal sources as there ever have been. The federal relief programs have provided funds to every municipality and county in the nation. There are also several new federal grant programs that have been funded for broadband. Healthcare institutions have access to federal funds as do schools and libraries. The State of Wisconsin adopted a \$129 million bonding program in its most recent biennial

budget for use by localities for broadband projects. It is our goal to obtain as much as 60 percent in grant funding such that the local cost is only 40 cents on the dollar.

How can I stay up to date on the broadband effort in Baileys Harbor?

The Broadband Ad Hoc committee meets regularly and agenda and minutes are posted here:

<https://baileysharborwi.org/agendas-minutes/>

Also, feel free to contact the Committee Chairperson, Kurt Kiefer, at kkiefer18@gmail.com. We are always interested in getting more people involved in the efforts.

You can subscribe to notices from the Committee - or any other Town Committee - here:

<https://baileysharborwi.org/subscribe-to-updates/>

Here is a slide presentation that also highlights much of the broadband information. This presentation will be updated as information and activities warrant them.

Fiber vs The Rest

Fiber speeds continue to be superior to every other broadband technology. There are two elements to consider when discussing speed - bandwidth and latency. Bandwidth is measured in download and upload speeds, usually megabits per second (Mbps). Latency is measured in milliseconds (ms).

Fiber connections are far better at achieving high bandwidth speed compared to other technologies. Fiber can easily achieve 1,000 Mbps (or 1 Gigabit per second, Gbps), for both the download and upload speeds. This is called synchronous speed when the down and up are the same. It's those uploads speeds that matter more and more for the uses we are making in our homes and business - most specifically anything involving two-way video, e.g., video meetings, video chats, telehealth, online school, etc. Video takes a lot of bandwidth, and with those uses it has to go both down and up.

Cable can achieve up to 1,000 Mbps down but is likely to be between 10-500 Mbps. Cable's upload speeds are not synchronous, and upload is what's needed when doing video meetings and chatting. Cable users also "share" their connection on a block, so speed slows during busy use times like evenings when everyone is trying to use it (or during a pandemic even during the day when many work from home folks are sharing it on their block, street, or apartment building). The typical cable upload speed range is between 5 and 50 Mbps.

Starlink has been reported to achieve 50-100 Mbps download speeds, and upload speeds between 20-40 Mbps. Starlink suggests that their speeds will improve with more satellites and ground stations, but each new station still requires a fiber connection which reinforces the argument in favor of more fiber, even if it is for the "backend" needs like this one.

Traditional DSL technology like that provided by Frontier or CenturyLink get download speeds around 10-20 Mbps, and upload speeds between 1-5 Mbps. These involve using the old copper lines from the telephone systems for Internet access. There have been newer types of DSL created, but the systems used in Door County are not those.

Fixed wireless providers like Door County Broadband have download speeds between 5-15 Mbps, and upload speeds between 1-3 Mbps. Newer fixed wireless technologies claim to be able to achieve up to 1 Gbps download speeds, and there may be truth to that. However, they have their own obstruction and range issues, just like satellite technologies.

Latency is the other measure that matters when using the Internet. High latency (i.e., slow response times) can make even fast connections feel slow. It's the wait time between screens refreshing. It also matters more as additional devices connect to the Internet like our appliances and other items in our homes. Slow responses mean poor and even completely lost signal connections. Video streaming, video meetings and chatting, and even web browsing are all impacted by latency. In a business, these can mean catastrophe when processing transactions such as those at a point of sale device. Latency of below 20 ms is great and above 150 ms is poor.

Fiber connections generally perform around 10-20 ms. That compares with cable at around 15-40 ms, and DSL at around 30-65 ms. Latency for high orbit satellites, like HughesNet, can be 200 ms or higher. Starlink users are reporting latencies between 30-90 ms, but that is expected to decrease to 20-40 ms as they expand their network.

The cost of fiber is indeed higher than other technologies, in particular fixed wireless. Cost per user is the main argument made against fiber. This has been the case under traditional commercial lending models and shareowner driven payback requirements. Markets work well, and the broadband market demonstrates that. The only way in which fiber becomes cost effective in rural and more sparsely populated areas like Door County is to subsidize the initial outlay needed to build the infrastructure network. In this regard, it is very similar to water treatment facilities or even the rural electrification efforts of the 20th Century. When treated as a public infrastructure asset, fiber networks make sense economically. A 20 to 30 year payback and return on investment is acceptable, just as it is for school buildings, fire stations, harbors, and roads. Fiber fits squarely into this realm. It's useful life can extend for 30, 50 or even 100 years. The public investments will be paid back over those horizons, and generations to come will reap the benefits.

In the end, the only completely future proof technology is fiber to every home and premise. Creating a partnership between the local governments and local private sector providers holds the greatest potential for ensuring high quality, affordable Internet access to every county resident and business. Furthermore, it creates high quality jobs right here in the county, both as the network is built as well as after with staff needed to run the business as well as the new workers the high speed broadband attracts to our community. Given the once in at least a generation investments being proposed today, now is the time. We can't let this one pass us by.

2021 Approved Budget	2021 Technology Budget
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1/27/2021 - GR Park Wifi	-\$72.28	\$3,000.00
2/2/2021 - GR Park Wifi	-\$72.28	
3/24/2021 - GR Park Wifi	-\$72.28	
4/21/2021 - GR Park Wifi	-\$72.28	
6/2/2021 - GR Park Wifi	-\$72.28	
6/25/2021 - GR Park Wifi	-\$72.28	
8/4/2021 - GR Park Wifi	-\$72.28	
8/4/2021 - DCEDC Study supporting funds from 10/21/20	\$4,000.00	
8/4/2021 - DCEDC Study	-\$4,000.00	
8/18/2021 - GR Park Charging Station	-\$240.00	
9/1/2021 - GR Park Wifi	-\$72.28	
9/21/2021 - GR Park Wifi	-\$72.28	
11/3/2021 - GR Park Wifi	-\$72.28	
11/24/2021 - GR Park Wifi	-\$72.28	
12/___/2021 - GR Park Wifi	-\$72.28	
		\$1,892.64

End of year 2019	Tech Capital	
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1/1/2020 - from 2020 budget	\$75,400.00	\$96,435.18
10/21/20 - DCEDC Broadband Study support	-\$1,000.00	
12/2020 - 2018 Grant expenses	-\$65,131.71	
		\$105,703.47
1/1/2021 - from 2021 budget	\$12,000.00	
3/3/2021 - 2018 Grant expenses (pd to DCB)	-\$16,930.97	
6/28/2021 - moved to encumbered projects for PSC grant application	-\$75,000.00	
End of year 2021		\$25,772.50

End of year 2019	Encumbered Tech Projects	
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Install screen in small meeting room in 2020 (not possible COVID)	\$0.00	\$3,000.00
Moved from Tech operating for WC car charger & Wifi installation (waiting for electric)	\$0.00	
10/21/2020 Board moved to support DCEDC broadband study from Tech Encumbered(\$3,000)	\$0.00	
10/21/2020 Board moved to support DCEDC broadband study from Tech Capital	\$1,000.00	
		\$4,000.00
6/28/2021 - Board designated ARPA funds (yr 1) for 2022 PSC Grant Application	\$91,951.33	
6/28/2021 - from Tech capital for PSC grant	\$75,000.00	
7/21/2021 - Install screen in small meeting room (paid from 2021 office budget)	\$0.00	
8/4/2021 - DCEDC for broadband study	-\$4,000.00	
		\$166,951.33
6/28/2021 - Board designated ARPA funds (yr 2) for 2022 PSC Grant Application	\$91,951.33	
End of year 2022		\$258,902.66