Phase II
Technology Plan

Monhegan Plantation

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Phase I- Background

Monhegan Plantation was the first community in Maine to be granted and complete Phase I of a feasibility study in October 2018 that the ConnectME Authority funded. The Phase II funding was released based on the findings in Phase I. As a reminder to community members, the Phase I report can be requested from Monhegan's Broadband Committee or the First Assessor.

Phase I Summary

The Phase I report contained four components:

Surveys

The community undertook an extensive survey on the island to understand the needs and desires around better internet connectivity. Overwhelming results were the willingness of the community to move forward with a plan and to implement a solution.

Current Providers

The Broadband Committee met with broadband providers to better understand their willingness to invest, upgrade or enhance the current internet situation on the island. The committee was not encouraged with those conversations, and believes the community needs to move in a different direction, away from current providers.

Assets and Municipal procedures

Axiom has had extensive conversations with the community about what municipal barriers exist to building a new network. We are not aware of any ordinance that would prohibit or impede a network design. The Plantation is open to utilizing any municipal assets, determined by a final design and how a network would be deployed.

Digital Inclusion

The Digital Inclusion Plan is a roadmap to help the community drive internet subscription rates and support local citizens with access and on-line learning that they can apply directly into their everyday lives. The Monhegan Plantation Digital Inclusion Report is provided by the National Digital Equity Center, www.digitalequitycenter.org.

During the Phase I process, the community set three important **goals** that any new internet service must meet.

- Equal Access to All- All citizens of the Plantation must have access to the same speeds and reliability as their neighbor, or friends in other parts of the island
- Scalable- The new system must be built to last a long time, and meet the increased demands of subscribers over that time with no to minimal reinvestment
- Affordable- Any new service needs to be reasonably priced

Phase II- Executive Summary

The Monhegan Broadband Committee was formed to investigate the feasibility of upgrading or replacing their current broadband delivery system. Over time, the two current providers (Consolidated Communications and RedZone) were interviewed and the Committee members were not satisfied with what each proposed. In the case of Consolidated, it was clear that their efforts were focused on other, more lucrative parts of their service coverage areas in Northern New England. In the case of RedZone, there was some healthy skepticism that an upgraded wireless solution would be lasting or that all homes that wanted service could get service. Both technologies had limiting factors that did not meet the goals of the committee.

One of the challenges of designing a new system is to ensure that every home has access to the same speeds and reliability as all the other homes on the island. The current systems do not do this, and where you geographically have your home on the island dictates the level of service you receive. In many cases, this varies wildly. Fairness was important to the committee, so that these inconsistencies are eliminated with any new internet system. This goal strongly dictated our recommendations.

Second, the Broadband Committee felt that any new system would need to be built to last. There was some indication in the meetings that Axiom attended that past projects that the Plantation had compromised on ended up costing more than expected or had not performed up to the standard Plantation assessors and citizens had hoped. This project would need to perform as advertised and last for many years, without further investment in the future. This goal also dictated our recommendation to the committee.

Last, the cost to the eventual subscribers needed to be affordable. We believe our revenue models that balance the operational cost vs. revenue, would give a provider like Axiom a reasonable profit, give the community a world-class system for decades and keep pricing in line with traditional norms are all achievable.

Fiber

In order to achieve the goals of the committee and to ensure that speed and reliability issues are eliminated, we recommend a fiber optics system on the island that would bring fiber optic cabling to each home. We would deliver this service by constructing a tower on the island and delivering bulk internet wirelessly on an FCC licensed point-to-point link from the mainland to Monhegan. Once the signal reached the island, the internet would be delivered though the fiber cabling that would be laid along the water line routes and deliver service to each home.

The estimated cost of the system is $880,000.

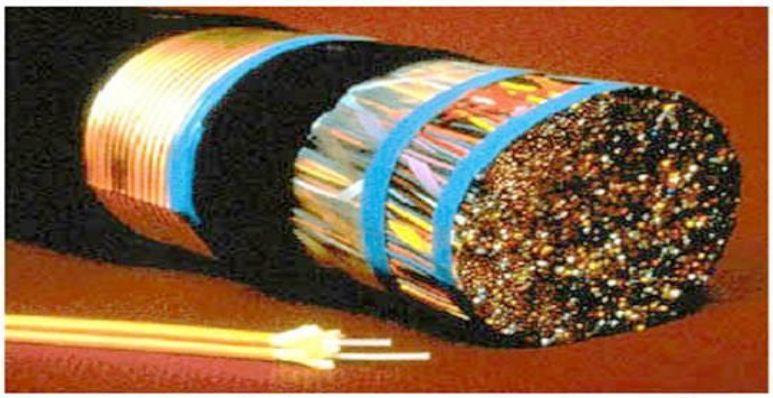
The next section explains why fiber is superior to all other technology and is the best choice for the island.

Benefits of Fiber Optics

Fiber optic internet systems are the future and Broadband Committees often get questions about the technology choice or the need for such systems. This section will help community members understand the benefits of fiber optics and its superiority over other technologies, including DSL and wireless. Both DSL and wireless are serving the majority of your community now.

- Fiber is a long-term investment in a community's future
- Fiber supports 21st century economic opportunities
- Fiber leapfrogs communities that are left behind to the front of the pack
- Fiber, over the long run, is a less expensive technology

One of the major concerns with fiber systems is the up-front cost. However, over time, other technologies would need to be replaced, upgraded or will be deemed obsolete. On the other hand, fiber will allow you to scale the bandwidth delivered as needed, all while using the same fiber distribution network over a period of decades.



The optical fiber cable in the foreground has the equivalent capacity of the copper cable in the background.

Just one visual example will underscore the capabilities of a fiber connection verses a legacy copper network connection. With today's technology, one fiber the thickness of a human hair can carry more data that 4,000 top-speed DSL lines.

DSL

Homes that are being served by copper or wireless, either through DSL from the phone company or through a wireless system now deployed on the island have significant limitations in service because of how each technology works. In the case of DSL, not only is the driving technology outdated, but the old copper lines are susceptible to corrosion that can severely impact the reliability of a subscriber connection.

Furthermore, DSL is severely limited in the distance it can push a signal (3-mile maximum), meaning those homes furthest from the telco equipment are faced with connections that often cannot reach even a paltry 3Mbps download speed.

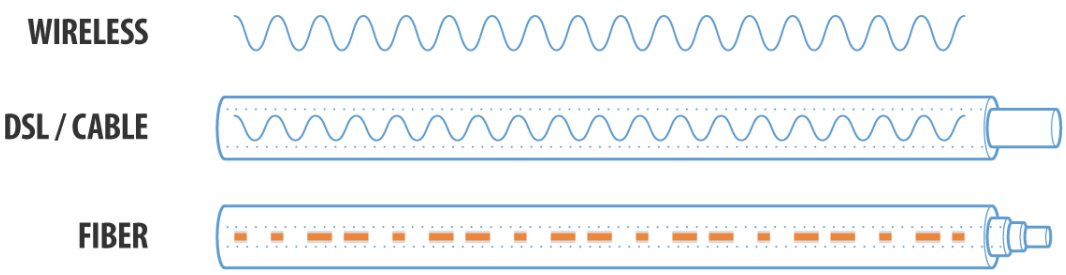
Additionally, DSL systems were not designed to carry heavy internet use in both directions (to and from the home), a significantly different model than the emerging needs for telecommuting and interactive video, which require high bandwidth in both directions.

Wireless

Wireless is an interesting choice and is certainly being considered in major urban markets where the density of buildings makes fiber optic cabling expensive and complicated. Wireless service, while reliable, is not as reliable as fiber optics and can be susceptible to weather conditions and movement of outdoor equipment due to wind. Wireless also requires a direct line of sight; obstructions are not a friend of a wireless signal. While it has the capability to be as fast as fiber, reliability concerns and reliance on line of sight make wireless installations best suited to very dense urban, or certain rural situations where the physical environment allows for reliable, high speed wireless systems that require line of sight, and where cost considerations make wireless a serious alternative.

In the case of Monhegan, given the significant elevation changes, geographical conditions, and tree density, creating a wireless system that would serve every home is a significant challenge and would be expensive and difficult to achieve. In addition, wireless systems would be hard pressed to deliver more than a 50Mbps connection in the most optimal conditions, in the case of your conversations with the current wireless system provider, they were promising 20Mbps connections. These levels of service and reliability issues around wireless would likely mean several investments in upgraded technology, while fiber would stay in place for decades. A fiber system would have the capability to deliver up to 1Gigabyte (1000Mbps) to the home on day one and would also deliver symmetrical service (same upload and download speeds, an important distinction in emerging on-line technology that requires high upload speeds.

How it works is the secret to higher speeds



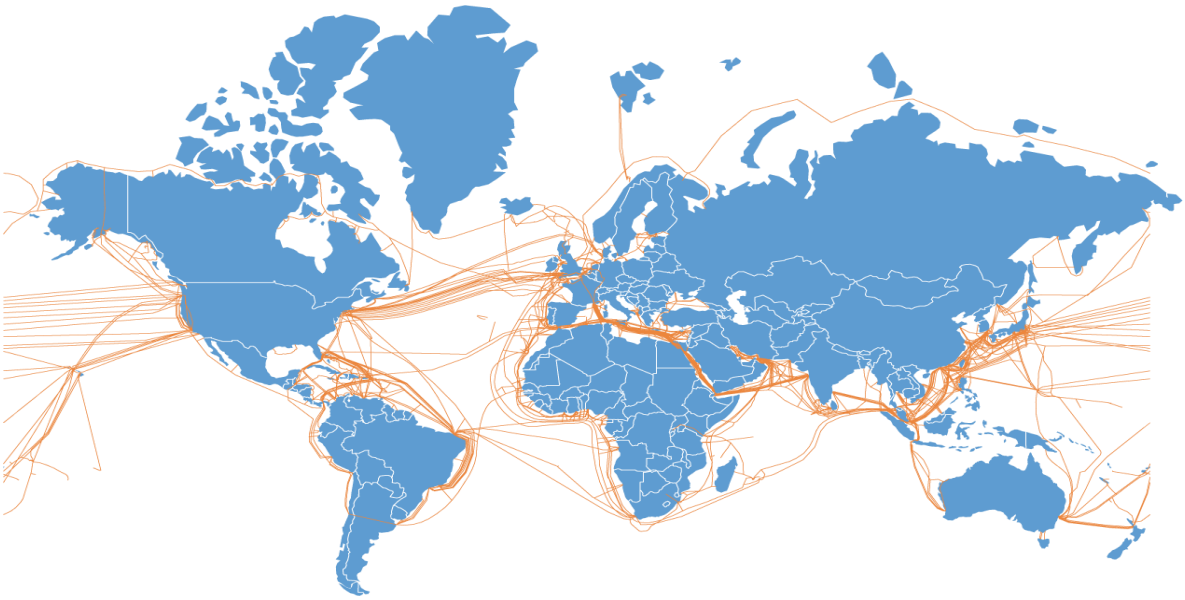
"Broadband" describes the fastest method of delivering high-speed internet to subscribers. While DSL and cable utilize existing phone and TV infrastructure to transmit data as frequency "vibrations" over copper wires, fiber networks transmit data using light over specialized cables that contain glass fiber strands. Light moves at 186,000 miles per second, and this is what enables speeds of 1 Gig (1000Mpbs) or much more per connection- 100 times faster than a 10Mbps DSL connection and 10 times faster than a 100Mbps cable connection. In addition, both DSL and cable suffer from the limits of their own technology, making them less than ideal choices into the future.

5G

All of us have been hearing about 5G, the new cellular service that is going to begin replacing 4G on our cellular phones. Will this be something that could replace our current internet systems in the future? The answer is unlikely, and while you can find differing opinions about the promise of 5G technology, we do not believe 5G will ever replace a fiber connection, and many industry experts

believe that the technology is many years away from replacing even a traditional DSL or cable connection. The technology being developed for the 5G network does not translate well outside of very dense urban areas. First, the technology requires what is referred to as "deep fiber", meaning that the fiber required to power a 5G network needs to be brought essentially to the curb, where the last few hundred feet would be served wirelessly with 5G technology. If you are going to deploy fiber that close, why not just go all the way to the premise? Second, the frequency that 5G is going to be broadcast suffers from line of sight concerns, just like most of the other wireless technologies, making it less than ideal in rural settings where lots of obstructions can severely impact wireless signals. There are other issues, but Axiom believes the 5G is not a solution worth waiting for.

Will Fiber Become Obsolete Like other Technologies?



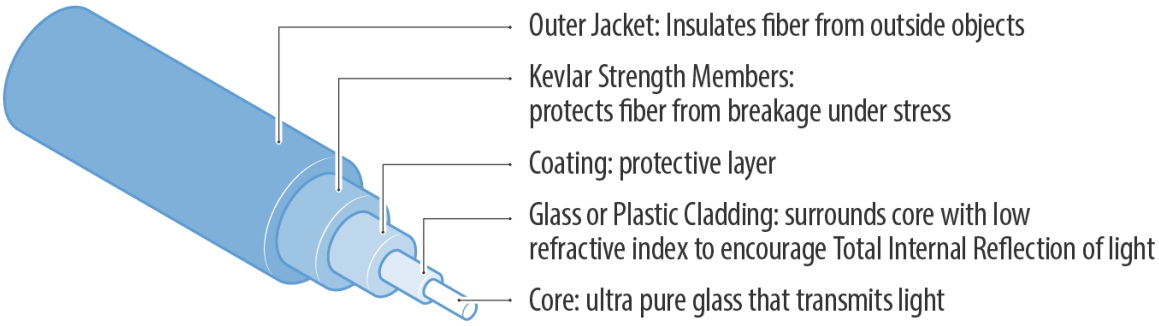
While we cannot predict the future, all indications are that fiber optics is here to stay for a very long time. Frankly, this technology has already been used for many, many years, which means that there are trillions of dollars of fiber installed globally. A whole industry has grown up around how to utilize fiber to its fullest capacity to make all of our lives better. This industry has proven very good at developing new electronics to push more and more data through existing fiber lines.

Most people think of fiber as a new technology, but in reality, it has been used for "backbone" connectivity as far back as the 1980s, with hundreds of fiber optic cables running across the sea floor all around the world.

What is new, is that fiber is starting to be used to serve homes in places like Austin and Chattanooga and right here in Maine on the islands of Islesboro and Cranberry Isles, where FTTH (Fiber-to-the Home) networks are being deployed. Because of the extensive network of fiber already deployed and continuing to be deployed, it is very unlikely that we would see any major shift in market forces that would make fiber optics obsolete.

What is in a fiber-optic cable?

An individual optical fiber (the size of a human hair) is surrounded by several layers of material that strengthen and protect the fiber. A fiber-optic cable can have any number of "fibers" ranging from 1 to several 100s.



Benefits of Fiber Technology

Speed and Capacity. Many experts say that FTTH is the only technology with enough bandwidth to support the projected consumer demands over the next decade.

Future proof. Because of fiber's capabilities, new technological innovations are being invented every day to utilize fiber's superior ability to transport tremendous amounts of data at blazingly fast speeds. Technologies such as 3D holographic high definition television and gaming will someday be everyday items in households around the world. FTTH will be able handle the estimated 30 gigabit-per-second needs of such equipment… and this is just one technology. Think about the new ways that you use the internet that seem commonplace now that were not even conceived of 10 years ago.

One delivery system. Right now, a consumer can receive telephone, video, audio, television and almost any type of data transmission using a single seamless FTTH connection. That trend will continue as consumers are given an increasing array of a la carte choices for how they receive their various communication and data and streaming choices. Subscribers are also realizing that receiving bundled services through a fiber connection can save money.

Reliability. Fiber is the most reliable connection you can have. In surveys across the state of Maine, the #1 complaint is reliability. An internet connection has become a necessity, not a luxury. When connectivity is interrupted, slowed down unexpectedly or inexplicably consumers are furious that they cannot accomplish the on-line task, leading to a significant loss of productivity or time.

Community Benefits

Job Creation- There are many examples of fiber networks creating jobs by either supporting existing businesses or attracting new ones

Business Attraction- When we say business attraction, we really mean businesses that are looking for the kinds of connections that can move large amounts of data, quickly- architects, designers, banks and other heavy users

Entrepreneurship- Fiber helps induce young people to locate and work from anywhere

Telemedicine- The medical field and how patients and providers interact is undergoing seismic changes. One of those changes is the way patients are able to be seen, treated, monitored and are increasingly being given tools to manage their own health care, right from their home. A fiber connection has the capacity to manage these data transmission uses, which in turn facilitates our elders aging in place

Education- Creating equal access for all eliminates "the homework gap" for those students that are increasingly required to complete assignments on-line but are unable to do so from their home because of a lack of an adequate internet connection. Adult learners also benefit from on-line learning options that utilize interactive video or other tools that those with better connections can access.

Increased Home Values- A Broadband Communities study indicated that FTTH networks increase the value of a $300,000 home by an average of $5,000-$6,000. Another study by the FTTH Council in conjunction with the University of Colorado showed that homes with a FTTH connection are worth, on average, 3.1% more than homes that do not have a fiber connection

Fiber Plan

The fiber plan proposed would bring fiber connections to every home on Monhegan Island that wants it and would accomplish several technical goals.

- Equal Access to All- no matter where you live, your home or business would have access to the same speeds and reliability as any other resident
- The system would be built to withstand large fluctuations in demand that occur in the summer months when seasonal residents and tourist arrive and at other peak usage times
- Our recommendation for the system technology is often referred to as “active Ethernet”- more details of the technology as you read on

Cost

Power Plant renovations		$30,000
Electronic Equipment		$53,840
Monhegan Tower		$90,050
Benner Hill Tower		$63,550
Trunk & Drop Fiber and installation equipment		$454,572
Job Supplies and Island transport expense		29,800
Project Management Expenses		$158,000
Total estimated budget		$879,812

Components of Cost of Project

Power Plant Renovations

Refers to the cost of renovations at power plant for electronic equipment, including power meter heating/cooling unit and internal wiring.

Electronic Equipment

Is the equipment that would be used to power the internet system and control each individual connection through this central system.

Monhegan Tower

Is the cost to install a 100’ tower on the island and includes ½ of the cost of the radio link and redundant link

Benner Hill Tower

Is he cost to bring fiber to the site, ½ the cost of the radio link and redundant link, as well as installing a backup generator and propane tank.

Trunk and Drop Fiber

This category includes all of the cost to install the fiber across the island and to the home as well as associated equipment for home installation.

Job Supplies & island transport costs

This category is a bit of a mishmash but includes fiber tools and miscellaneous equipment as well as estimated barging and shipping costs to the island

Project Management

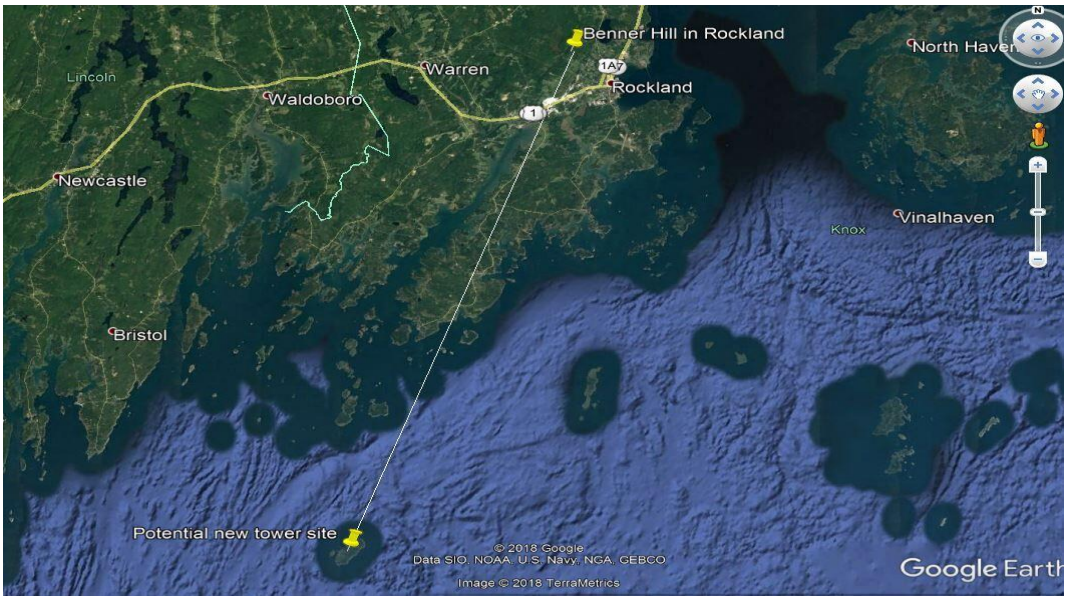
Refers to the day to day management of the installation of the equipment, equipment sourcing and purchasing, the overall trouble shooting and time and percentage of completion management, the attachment details for each subscriber and the details around the connectivity choices of each subscriber. In a nutshell, the day-to-day operations management and oversight of the construction project.

Internet Delivery System to the Island

An important component of the plan is to engineer a link from the mainland that would reliably deliver bulk internet to Monhegan. This is commonly referred to as backhaul. This part of the project requires several elements, including a Point-to-Point 6 GHz FCC licensed link from Benner Hill in Rockland to a newly constructed tower on Monhegan. This link, because it is licensed through the FCC will be highly reliable and will not have interference. We expect the recommended equipment to transmit up to a Gigabyte (1000Mbps) of bulk internet to the island. The link is line of sight and has been engineered to obtain optimal performance and reliability.

The first map depicts the aerial path of the signal from Benner Hill to our proposed tower sight on Monhegan. The second map is the proposed tower location on the electrical co-op land. Benner Hill has three potential towers that could feasibly hold the in-shore dish. Likely there would be fiber, electrical and minimal construction costs for any of the three towers. Once a provider is chosen, additional due diligence would need to occur to determine the best of the three available. Nevertheless, we are confident any of the three towers will serve the island reliably.

Map of Point-to-Point Link



Proposed tower sight on Monhegan

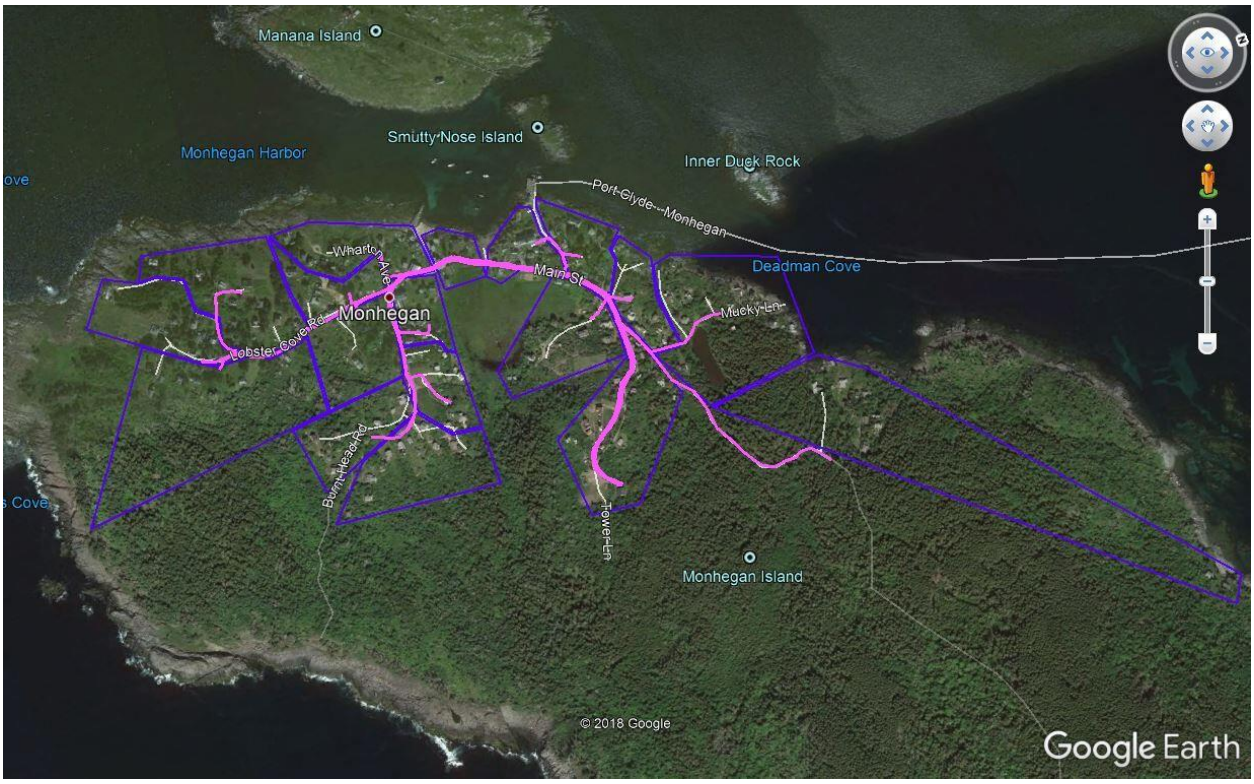
Axiom investigated the existing Verizon tower and water towers for feasibility of accepting the required dish size. Because of the distance from shore and specific height requirements, we do not believe that either the water towers or Verizon tower would have the space and/or support the load of the dish required. While the dish is heavy and would require serious mounting, more importantly is the effect of wind on the dish and its corresponding tower requirements to handle that resistance. The Verizon tower already supports a 6' dish, and we suspect Verizon would not allow a mounting of a second 6' dish on their tower with the possibility of compromising the integrity of the tower. In the case of the water towers, both are not really constructed to seriously be candidates to hold such a dish.

The location of the proposed tower is sensitive to the view shed that islanders would experience, minimizing the amount of tower that citizens would see, and placing in a location that would make the tower as unobtrusive as possible. It also offers benefits that save costs. By collocating at the power plant, there is no need for backup generators, which is a significant savings. We also save significantly by utilizing an existing building to house the regeneration equipment. Otherwise the project would need to include the purchase, barging and placement of a telco shack that would otherwise be needed to house the equipment.

Island Distribution

Once the signal reaches the island, it needs to be distributed to every home. Our proposal is to deliver that signal in the most reliable way, through fiber optic cabling. The cabling would come from the tower through a designed cable plan that would adhere to the existing water lines as much as possible. The included map gives you a sense of the pathway of the main line of fiber (pink) and the "deliver zones" of where the trunk would branch off to serve all of the homes in that zone.

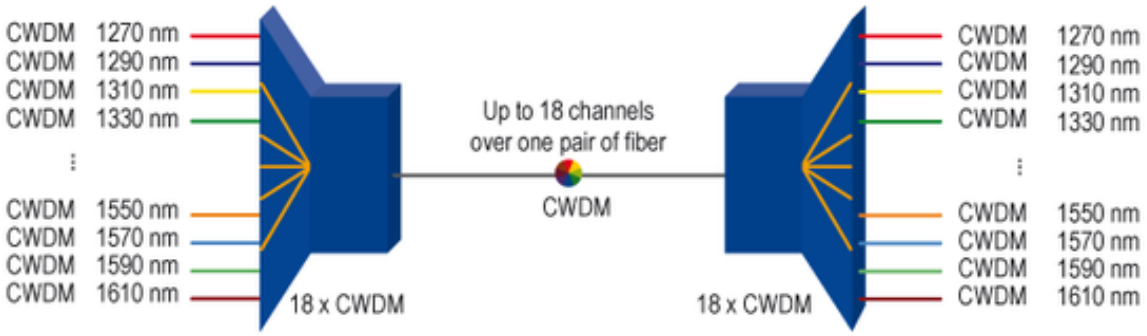
Main Fiber Path & Delivery Zones



This means fiber would be laid on the ground to each home. The homeowner would be responsible to bury the line at their expense, or work with the constructor to find the best path to their home. The pricing does not include buried cable on homeowner property. We have made a best effort attempt at understanding where buried cable would be required in public right of ways and accommodated for that in our cost calculations. These recommendations should be considered as preliminary and could be adjusted as the constructor does more due diligence on the exact location of the water lines or the town has additional input into a final design.

Additionally, the map does not depict each connection from the trunk fiber to the individual homes, it would make the maps unreadable. However, we have built into our pricing model connections to every home or business that wants service. If your home looks like it may be unserved by the new system, this mapping was not meant to depict that information. Again, any premise is capable of receiving a connection from this construction design.

Technology - Coarse Wavelength Division Multiplexing (CWDM)



Our cost estimates use a fiber technology hardware called Coarse Wavelength Division Multiplexing (CWDM). This equipment allows up to 18 connections over a single fiber pair by having each connection operate on a separate light wave. This allows individual premise connections over that fiber that can carry up to 10Gbps (10,000Mbps), depending on the hardware used.

What does this mean for communities deploying this technology?

- Saves cost, because size of trunk cable has potential to be sized differently (smaller)
- Allows for inexpensive connections up to a Gigabit to each business or home and can increase to 10Gigs (10,000Mbps) with off-the-shelf hardware upgrades. Even 10G CWDM transceivers are relatively inexpensive today at about $100/each
- Scalable and futureproof, can easily accommodate 1Gbps to each home today and can scale easily to 10Gbps per home in the future

The CDWM solution saves cost, but not at the sacrifice of performance. First, the trunk line that will serve as the main line of fiber that is used to create “drops” (fiber connections) to each premise does not need to be as large, saving space and easier handling. Using CDWM allows the trunk line size and weight and cost to be reduced, while still offering excellent scalability.

With inexpensive optics, up to 1Gbps (1000Mbps) could be offered to each home today. Unlike with cable, or even other fiber technologies (xPON), this is not a shared connection – the network truly supports a full Gig to each home. As time passes, we imagine a day when more than a Gig of service would be needed at each premise. At that time, optical equipment can easily be switched out to offer up to 10Gbps (10,000Mbps) of service for a robust upgrade that is both easy and inexpensive.

When looking at future proofing a network, this design allows for almost unlimited speed and capacity increases without changing the actual fiber deployment methodology on the street. As fiber has become the chosen technology for connectivity, equipment providers continue to innovate by changing the hardware on each end of the fiber to increase capability, without having to reinvest in a whole new system. We are comfortable recommending a system that will easily last 20 years or more with relatively small, if any, equipment upgrades over the life of the fiber.

Key Takeaways from this section of the report:

- Fiber is expensive, but will cost less than other technologies over the life of the fiber- likely several decades
- The technology proposed is futureproof- as demand grows for faster and increasing capacity, this fiber solution can easily be scaled
- This technology allows for true symmetrical service- equal upload and download speeds- a key feature that is becoming increasing important in the digital economy

Potential Revenue for Internet Service Provider

As part of our commitment to our mission to help rural communities more fully understand what ISPs are facing serving a small community, we have created a revenue model that helps the community and the ISP better negotiate an operating agreement through the Public-Private Partnership or through a Public Utility that could manage the fiber network.

For the provider, understanding that some form of revenue return to the community is achievable and important to show good faith is a long-term agreement.

For Monhegan Plantation, understanding the costs associated with running such a system and the limited number of customers to make a profit helps to better understand what the ISP can reasonably contribute, while still making a profit.

The estimates are Axiom derived, each provider has their own operational cost decisions and revenues are based on pricing and the number of subscribers who take service.

Potential Annual Revenue	Number of Subscribers	Monthly rate	Revenue per month	Revenue per year
25M/5M	12	$69.99	$839.88	$10,078.56
50M/10M	6	$79.99	$479.94	$5,759.28
100M/20M	2	$109.99	$219.98	$2,639.76
Seasonal 25M/5M	45	$59.49	$2,677.12	$32,125.41
Seasonal 50M/10M	22	$67.99	$1,495.81	$17,949.76
Seasonal 100M/20M	7	$93.49	$654.44	$7,853.29
	Year-Round Revenue			$18,477.60
	Seasonal Revenue			$57,928.45
	Total Annual Revenue			**$76,406.05**
	Total Monthly Gross Revenue			**$6,367.17**

- Each rate of service category are approximate estimates of what we think each category will attract for subscribers.
- Seasonal rates are calculated as a 15% reduction in year-round residential rates, which may be much different depending on provider, as well as the monthly cost of service
- The number of customers is determined as a 75% take rate (three of four homes past would take service) for a total number of customers that we estimate would take service is 94.

Operating expenses can vary widely by provider. Several unknowns would also change the expense calculations, these are based on ownership by the ISP. If the system is owned by Monhegan Plantation, some expenses might be part of the Plantation's responsibility to upkeep the system, or a revenue sharing or a leasing model would have ISPs contributing to the utility on a monthly basis and are unknown at this time. In the case of Axiom being the operator, we typically return 5% of gross revenue back to the town, but other provider may have different models. These important details are usually addressed in a Public-Private Partnership Agreement.

Important takeaways to consider:

- How important take rate is to the overall profitability of the project (less subscribers, less viability)
- Understand that the monthly operating expenses are generally fixed, no matter the number of subscribers (there is not a direct correlation between subscriber counts and expenses)
- A publicly owned entity is feasibility should be considered

The next section explores the basic choices of how the Plantation might engage with ISPs and what kinds of ownership structures are possible.

Ownership Models

Internet service is an unregulated, market-driven utility meaning that internet service providers are not subject to federal or state oversight. As frustration has grown in communities across Maine and the United States with the current internet options available and providers not willing to build into areas that are marginally or unlikely profitable, many communities are looking to create better relationships with ISPs to get what their constituents are demanding- better broadband. As the Broadband Committee explores how they might proceed we suggest three basic models for you to consider.

Each model can take multiple forms and we include some basic questions that Plantation assessors and the Broadband Committee can explore to help determine the best fit. There are good national resources that will explain and give examples of projects across the United States that might be models to explore.

Private

This is what you essentially have now, operators (ISPs) who deliver service based on market profitability and customer demand, with pricing and service levels entirely dictated by the ISP. This is an avenue that you explored by interviewing the two current providers. Does not appear from those interviews that the Broadband Committee is interested in moving forward with either for various reasons in the Phase I report. This approach offers little to no control once the system is in place and handed over to the ISP for operation.

This approach leaves the community where it started, does not meet many of the goals of the committee, but potentially could enhance service with little risk or effort to the Plantation.

Questions to be considered:

- Do we want to leave the system in private hands with no opportunity to discuss service levels and pricing?
- Can we legally hand over an infrastructure project to a private entity after using public dollars to build it?
- Would a private entity contribute to the cost of the construction with the promise to own and operate exclusively on the network?

Public-Private

This model can have several options, but in general as the project finds potential funding, an RFP would be issued for contractor services to build the network and/or operate it once it was built. In this scenario, a public-private partnership agreement (franchise) would be negotiated with a private operator who would take responsibility for the network maintenance and upkeep in exchange for operating and serving customers on the network exclusively.

A Service Level Agreement would be part of the negotiated Public-Private Partnership Agreement and would spell out potential service speeds and cost tiers to the subscribers, as well as other details, such as response times for break/fix. There is less risk to the community, but the public-private partnership contract becomes critical to spelling out who is responsible for what. This is the model being used in the Town of Cranberry Isles and Cliff Island. This model is best in smaller communities where there are not enough customers to promote competition. This model gives the community control over the network, and therefore, its operations. Retaining ownership or control of the

network gives the community leverage on a host of issues, but most importantly allows the community to switch operators if agreements are not kept.

Questions in this model include:

- Is there a revenue model that can help pay for the initial capital cost of the network build?
- Does the public entity retain some level of the maintenance of the system, to reduce cost and risk to the operator? Or vice versa, is the maintenance fully the responsibility of the ISP which in turn could raise prices or not make the operation of the system attractive enough for potential operators?
- Would this be a long-term contract (10 years or more)?

Public

If the project is in whole, or in part built, with public money, either state, federal or local, the issue of who will own the network will be a question that will need to be answered. There are examples nationally of networks that were poorly managed by either a public entity or a licensed private operator that the public entity contracted with to provide the services and maintenance on the network. There are also many success stories.

There was a law change in Maine that allows a region or band of communities to come together to form a Broadband utility. It is based on regional cooperatives with a local Board of Directors who would manage the system and contract out various aspects of the network operation. Recently, the communities of Calais and Baileyville and Our Katahdin (Millinocket, East Millinocket and Medway) have formed this type of Broadband utility to manage the construction and operation of a new FTTH project in each community that they hope to build. This is a model that is being utilized in Islesboro, where the town maintains ownership, and has hired a network operator (GWI) for a fixed yearly fee to operate the network.

There are various resources to help communities explore this option. Broadband Magazine offers an online resource section for municipalities looking to explore this option. They have a tab that is labeled “Municipal” that has a host or resources for communities to explore. That website is located here: www.bbpmag.com

If the community were to create a publicly driven entity there are several questions that would need to be answered including:

- What would the financial oversight look like and would, for example, the entity be formed separately from the Plantation?
- How will the system built be maintained and operated?
- Is the City willing to consider operating such a system?
- Would the operations and oversight be handled by an experienced operator?
- Does the Plantation have the wherewithal to manage and operate the system?

Final Thoughts

As the community considers next steps, we would highlight several decision points for the committee to consider.

Grants

Axiom understands that there is a new grant program through the USDA Rural Utility Service and that the committee is starting to put together an application that would be based on this report and the cost of the new system. Axiom has put together a fact sheet that we have attached to this report on the e-Connectivity Pilot Program for your review. All of the resources are on-line, and a number of webinars are scheduled over the next few weeks (once the government is open again). If we can clarify any information in this report, do not hesitate to reach out.

Cost Comparisons

We understand that fiber systems cost more up front, and that the committee should consider alternatives. We also believe strongly that the fiber system will be less expensive over its long life and require little to no upgrades. So, while costing 3x to 5x more than a wireless or DSL system upgrade, it will produce much higher customer satisfaction for a much longer period of time.

- Ability to save costs by allowing a subscriber to receive video, phone and internet all over one pipe, allowing user to eliminate satellite TV service and landline phone, if they choose to do so
- Will potentially attract families with children who would live on an island but need strong connectivity
- Will allow year-round residents to create their own economy and function more fully in an increasingly digital economy
- Gives the island better connectivity than you can get in New York City

Public-Private Partnership

In considering your ownership options, we favor a Public-Private Partnership agreement with one builder/operator. This allows the community and the chosen ISP to work hand in hand to deliver the best service to the Island.

Public-Private Partnership Agreements (PPPA) can be structured and contain any information that the two parties would consider relevant to creating a long lasting, mutually beneficial document that revolves around two main points. For the ISP, the ability to make a reasonable profit through the operation of the system, helping the community understand that demands on the ISP are not limitless and many can make a marginally profitable situation less appealing or even jeopardize the ISPs ability to make a profit at all. On the flip side, the community really wants to preserve ownership and hold the ISP to a standard of service and commitment to upkeep and enhancement of the technology to ensure that the internet delivery system is truly always on the forefront of technology and delivering world-class service levels to subscribers for the life of the contract and beyond.

For Axiom, these two fundamental ideas are expressed in its Broadband deployment kit:

The elements of a Public-Private Partnership Agreement could include these elements:

ISP Commitments:

- Strong federal, state, local and foundation connections with a track record to attract those resources to accomplish the community's goals
- A commitment to contributing some % of profits, once the network is fully built, into a Community Technology Fund, that would be used to accomplish mutually agreed upon goals
- A commitment to the community to reevaluate technology equipment every three years
- Three months of Digital Literacy at our expense, during the build out
- Potentially add additional Community Hotspots, Digital Literacy classes and other resources at our expense or through the Technology Fund and other funding sources as they are identified
- Build infrastructure to help the community reach 21st Century connectivity and maintain that infrastructure in perpetuity

Community Commitments:

- Commit to identifying funding sources that would cover a % of build cost
- Creating a yearly funded Technology Fund for the next 10 years
- Working with Axiom to identify community barriers to deployment
    - Creating, in perpetuity, right of way access and right of first refusal for mutually agreed upon plans for deployment

- Working to address any code enforcement barriers to deployment
- Become a champion of Axiom by leveraging community assets (like website) to help promote customer take rate and Axiom community involvement
- A commitment to Axiom to resource new equipment as mutually agreed upon to keep equipment upgraded to current standards
- A point person to work with the Axiom point of contact to ensure seamless, ongoing communications through the process of building the network and beyond
- Help identify key person in community to be trained to assist with subscriber connectivity issues in a timely manner

Each provider is different and what we outline above is the way Axiom would approach an agreement. This is meant to give the Monhegan Broadband Committee some ideas on how you might approach an agreement with an ISP, whether that is Axiom or some other provider through an RFP process.

Axiom will remain a resource to Mohegan Plantation long after this report and is happy to answer questions or attend meetings.

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FACT SHEET
e-Connectivity Pilot Program
http://reconnect.usda.gov

Basics:

- 100% grant requests are due April 29, 2019
- 50% loan/ 50% grant requests are due May 29, 2019
- $200,000,000 available for grants

Eligibility:

- Current service in area less than 10/1Mbps
- 100% of homes in area being proposed must have less than 10/1Mbps, and all proposals must meet a minimum of 25/3Mbps.
- 25% match needed
- Projects must be financially feasible, meeting a "Current Ratio" of 1.20 (the current assets divided by the current liabilities
- Must be located in rural area of population less than 20,000 or contiguous to an urban area of less than 50,000.
- There is a mapping tool that identifies areas that are not eligible

Who may apply:

- State and local governments
- For profit corporations, LLCs
- Indian Tribes
- Non-Profits
- Cooperative or mutual organizations

Funding Criteria:

- **Rurality of Proposed Funded Service Area (25 points)**. Points will be awarded for serving the least dense rural areas measured by the population of the proposed funded service area per square mile. If multiple service areas are proposed, the density calculation will be made on the combined areas as if they were a single area. For population densities of six or less, 25 points will be awarded. For population densities greater than six, zero points will be awarded. The density calculation is as follows: Total Population of Proposed Funded Service Area / Total Square Miles of Proposed Funded Service Area.

- **Farms Served (20 points)**. Applicants will receive one point for each farm that pre-subscribes for broadband service up to a maximum of 20 points. Applicants proposing to serve farms and ranches must have the executive head of the farm or ranch sign the pre-subscription form, available under Forms & Resources, and must submit the pre-subscription forms as part of the application. Points will not be awarded if pre-subscription forms are not included as part of the application to support the number of farms pre-subscribing for service.

- **Performance of the Offered Service (20 points)**. For projects that are proposing to build a network capable of providing 100 megabits per second (Mbps) symmetrical service (same

speeds download and upload) to all premises, 20 points will be awarded. A certification from a licensed Professional Engineer must certify that the proposed system can deliver these speeds to every premises in the proposed funded service area. The certification form, available under Forms & Resources must be signed by a Professional Engineer.

- **Businesses (15 points).** Applicants will receive one point for each business that pre-subscribes for broadband service up to a maximum of 15 points. Applicants must have the owner of the business sign the pre-subscription form, available under Forms & Resources, and submit the pre-subscription forms as part of the application. Points will not be awarded if pre-subscription forms are not included as part of the application to support the number of businesses pre-subscribing for service.

- **Healthcare Centers (15 points).** For every healthcare center served, one point will be awarded up to a maximum of 15 points. Healthcare centers, such as hospitals, clinics, and pharmacies, will be counted using the GIS layer provided in the RUS Mapping Tool.

- **Educational Facilities (15 points).** For every educational facility served, one point will be awarded up to a maximum of 15 points. Educational facilities , such as public and private schools, libraries, and technical colleges will be counted using the GIS layer provided in the RUS Mapping Tool.

- **Critical Community Facilities (15 points).** For every critical community facility served, one point will be awarded up to a maximum of 15 points. Critical community facilities will be counted using the GIS layer provided in the RUS Mapping Tool.

- **Tribal Lands (5 points).** For applications where, at a minimum, 50 percent (%) of the geographical area of the proposed funded service area(s) is to provide service on tribal lands, five points shall be awarded. Tribal lands will be analyzed using the GIS layer maintained by the U.S. Census. Tribal land areas will be tabulated using the GIS layer provided in the RUS Mapping Tool.

- **State Broadband Activity (20 points).** For projects that are in a State that has a broadband plan that has been updated within the previous five years of the date of publication of this Funding Opportunity Announcement (FOA), ten points will be awarded. An additional five points will be awarded for projects located in states that allow any utilities service provider to deliver broadband service. An additional five points will be awarded for projects located in states that commit to expediting right-of-way environmental permitting.

  Applicants will be required to submit evidence from the appropriate State official that a broadband plan has been implemented and updated, that there are no restrictions on utilities providing broadband service, and that procedures are in place for expediting right-of-way and environmental requirements. If service is proposed in multiple states, then evidence must be submitted from each state to receive the appropriate points.

Other Details:

- All applications must be filed electronically
- The electronic application is not yet available, but there is plenty of work to be done starting now

- Specific authorization gives preference to those areas that 90% do not meet the 10/1Mbps standard, for the purpose of a 100% grant request, 100% of the homes must be under or unserved
- Pre-application expenses are eligible for funding, up to 5% of total award
- Applicants must be registered with Dunn and Bradstreet and SAM
- Applicants are limited to ONE application (meaning Axiom cannot be the lead applicant on multiple applications)
- 2 years of audited financials
- Must provide an environmental and National Historic Preservation questionnaire