Vinalhaven Internet Planning Document

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Executive Summary

This report is the end product of a 2019 RFP solicited by the Town and the Vinalhaven Broadband Committee (Fox islands Broadband Task Force). The goal of this report is to present a high-level comprehensive overview of the two primary broadband infrastructure models that could meet the committee's goals of providing a fast, affordable, fiber-to-the-premise (FTTP) broadband solution to all locations on the island.

The Broadband Committee has been meeting for several years now, but the climate for implementing high speed broadband has never been more favorable than it is today. The coronavirus pandemic has made broadband disparities across the nation far more apparent, and both state and federal funding opportunities have increased as a result. Using the information compiled in this report, the committee intends to work with the Select Board and the community to generate consensus for the implementation of a universal FTTP solution for the island.

Benefits of Fiber

There is no question that fiber optic connections can bring tangible benefits to the island. With COVID-19, even those that might have been previously skeptical about the need for broadband, now know of the importance of a speedy, reliable connection for working or schooling from home. The current technologies being utilized by Spectrum and Consolidated Communications are finding their limitations as consumer demand increases. Whichever broadband infrastructure model the community chooses to pursue, the Broadband committee recommends a Fiber Optic internet system, which is

- A generational investment that will last 30 years or more
- Scalable and able to meet increasing demand
- The most reliable technology on the market today

Incumbents

The current providers of internet service on the island are Spectrum and Consolidated Communications. The Broadband Committee is determining if either provider would be interested in expanding service, and if they are a viable option that meet the goals of the community.

Already established providers on the island are a serious choice for the community to consider. In the past overtures to each incumbent have not been seriously considered. However, over the past few weeks, both have expressed interest in working with the Town.

- Spectrum would need to expand their network, which would likely save on cost as they would not need to replace their existing network.

    - As of the date this report was published, Spectrum had not presented the Town with a cost estimate to expand service on the island.
- Consolidated Communications would likely build fiber across the whole island, replacing their current DSL service with a fiber optic system.
    - Consolidated has provided the Town with a high-level cost estimate to install fiber optic service across the island.

New Providers

If either incumbent provider is unresponsive or does not provide a solution that meets the objectives of the Broadband Committee and the community, working with an Internet Service Provider (ISP) not currently on the island is an option. Conversations within the Broadband Committee have been mixed. Some are not excited about working with either Spectrum or Consolidated. Given their track record and past unresponsiveness to the Committee, there is a strong desire among members to explore other options.

Another intriguing alternative would be to partner with Fox Island Electric Cooperative (FIEC). Electrical coops are increasingly interested in expanding their revenue and operational viability by serving homes with internet. The benefits of this are explained in a memo (Appendix A) from the Broadband Committee, which was presented to the FIEC Board and the General Manager. Not unexpectedly, initial discussions left a lot of questions unanswered, including if both the Town and FIEC would find mutually agreeable terms to this type of partnership. While this is not something FIEC is in a position to seriously consider at this time, perhaps this relationship might be revisited as the Town moves toward concrete solutions.

Ownership Models

There are an increasingly large number of ownership models in Maine for the Broadband Committee to draw inspiration. Owning your own system does have benefits, most importantly having the ability to contract with the ISP of your choosing and having the ability to change ISP's if they are not performing to your satisfaction. Determining if the Town is going to work with the incumbent providers or consider a new provider will clarify ownership options. Generally speaking, there are four ownership models for the community to consider:

1. Owned and Operated by the community
2. Owned by the Town (either in part of fully), operated by Internet Service Provider
3. Owned by island investors, operated by ISP
4. Forming a public utility

Cost

Whether the community chooses to work with an incumbent provider, attract another ISP, or form a public utility, building a totally new system or expanding on current provider networks will require significant public subsidy. No provider will build out a system using entirely their own capital, the Return on Investment (ROI) would take too long. This is why the island's current providers have not already expanded (Spectrum) or improved (Consolidated) service on the island. Internet Service Providers will only take communities seriously if towns are willing to explore public finding options.

High Level Cost Estimates to build to all parts of island

Provider	Estimated Cost	Technology
Consolidated Communications	$3,300,000	Fiber
Spectrum	TBD	Coaxial copper cable
Axiom estimate	$3,900,000	Fiber

*Axiom estimate includes pole licensing and make-ready representing approximately $400,000, this cost could be avoided if the system is municipally owned.

Grants

There are a variety of federal and state grant opportunities for the Town to consider. It is likely these opportunities would not be available for Spectrum served areas of the island. However, given that service is poor or unavailable in the northern part of the island, a broadband project in that area is likely eligible for a grant from the state. For the Town to install FTTP broadband infrastructure across this part of the island is estimated to cost approximately $1.6M. Grant funding could reduce that cost significantly.

Recommendations

Based on research the Broadband Committee has done over the years and the information provided in this report, the Committee recommends the following:

Decisions	Recommendation
Technology choice	Fiber over copper-based technology
Working with Incumbents	More information needed, but strongly lean toward a public option with new ISP
Working with a new ISP	Yes, especially if we own our own
Ownership model	If not working with an incumbent provider, explore various models for what fits best
Should community own system	Yes, this is a good option, saves money, Town retains control over the long run
Cost	Will require capital from Town – Committee

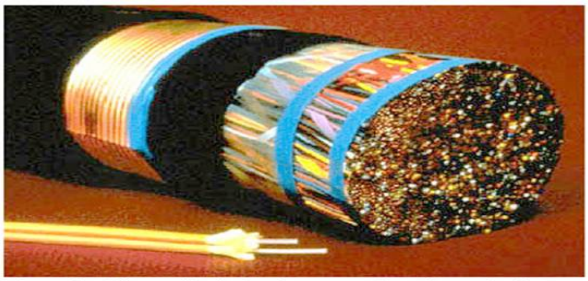
	recommends a municipal bond because of historically low rates
Grants	Likely eligible for some parts of project, a state grant through ConnectME
Detailed Engineering Study	Committee recommends a detailed engineering study based on final committee recommendations
Requests for Proposals	Committee strongly favors an RFP for final construction cost to obtain best price and meeting all goals of community

Why Fiber?

Fiber optic internet systems are built for the future and broadband committees often get questions about this technology choice and 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 co-axial cable (co-ax) (two technologies which are serving parts of the island 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 optic 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 to 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.

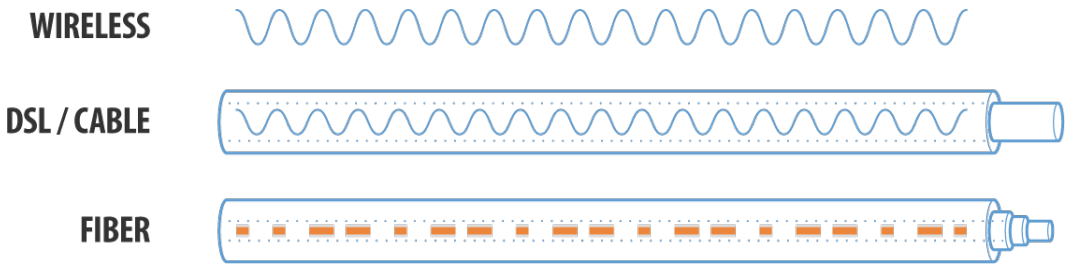
Homes that are being served by copper, either through DSL from the phone company, or with co-ax from the cable company have significant limitations in service because of how each technology works. In the case of DSL, not only is the driving technology outdated, but the old copper lines are susceptible 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.

In the case of coaxial cable, used by TV cable providers, capacity is still an issue, but for different reasons than with DSL. Compared to a fiber-optic system, cable is not nearly so scalable. For every step up in speeds, equipment needs to be upgraded both at the home and at the cable plant. Furthermore, cable systems were designed primarily to push data down to the customer, a significantly different model than the emerging needs for telecommuting and interactive video, which require high bandwidth for both downloading and uploading. Finally, there is a major concern with the fact that

cable is a shared system, meaning that the signal strength you receive is dependent on how much bandwidth is being drawn by other users that are also connected to that line of cable. Cable companies commonly oversaturate their subscriber networks by a ratio of up to 100:1, leading to inconsistent speeds for the end user.

How it works is the secret to higher speeds

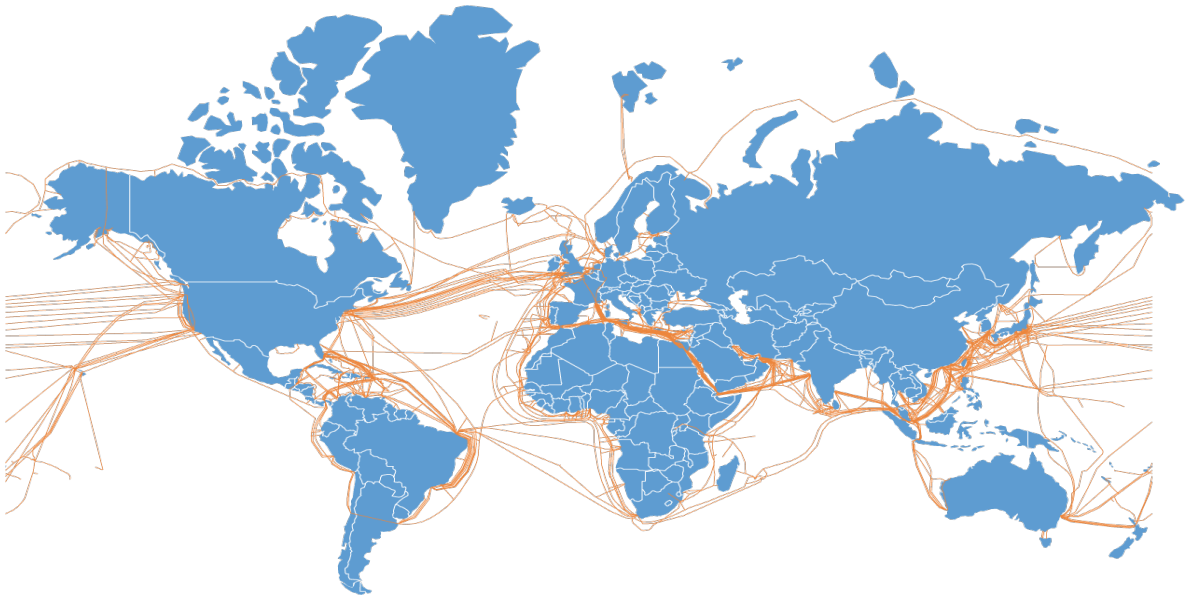


“Broadband” describes the fastest method of delivering high-speed internet to subscribers. While DSL and cable utilize existing phone and TV infrastructure to transmit data as frequency “vibrations” over copper wires, fiber networks transmit data using light over specialized cables that contain glass 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 – speeds 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.

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 a 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, and where costs to install fiber make wireless a serious consideration. In the case of Vinalhaven, wireless may be a low-cost solution to serve some of the smaller islands surrounding Vinalhaven.

Those solutions are outlined in Appendix B.

Will Fiber Become Obsolete Like other Technologies?



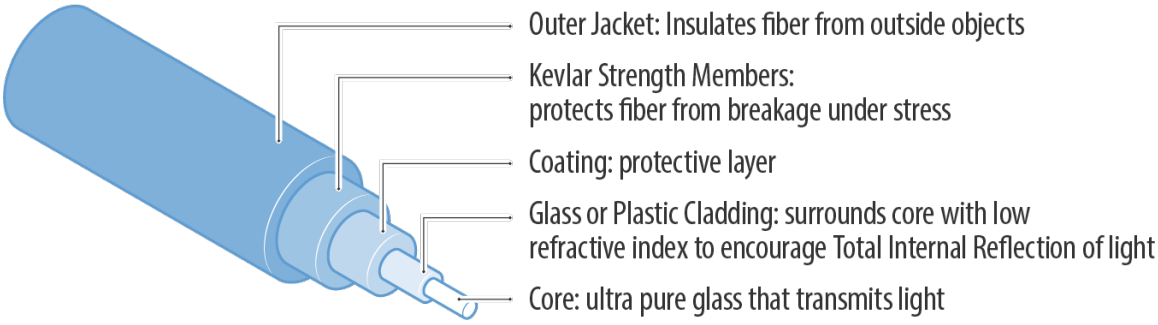
While we cannot predict the future, all indications are that fiber optics is here to stay for a very long time. Frankly, this technology has already been used for many, many years, which means that there are trillions of dollars of fiber installed globally. A whole industry has grown up around how to 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 80s, 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 FTTP (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. Most telecom observers believe that 5G cellular technology is many, many years away from possibly replacing even a traditional DSL or cable connection.

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.



Consumer Benefits

Speed and Capacity. Many experts say that FTTP connections are 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. FTTP 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 FTTP 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 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 with internet service is reliability. An connection has become a necessity, not a luxury. When connectivity is interrupted or slowed down unexpectedly or inexplicably, consumers are upset that they cannot accomplish their on-line tasks and about the resulting loss of productivity and time.

Community Benefits

Working from Home. As we've experienced during the coronavirus pandemic, having a reliable internet connection enables people to work remotely from home; online meetings and conferencing have become the norm.

Social Connection. Social isolation for those without reliable internet has been one of the major consequences of stay-at-home and physical distancing requirements during the coronavirus pandemic. Broadband enables users to maintain social connections through video communication platforms and online interactive services.

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 of data.

Entrepreneurship. Fiber helps induce 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 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 remote learning options that utilize interactive video and other online tools.

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

Summary

- Fiber is the only technology that has unlimited capacity, making it a futureproof investment.

- 5G and low-orbit satellite are years away from being widely available and will not meet the same reliability and capacity standards that fiber currently has.
- The benefits of fiber are undeniable.
- Fiber is the affordable choice.

Incumbent Providers

The Broadband Committee has reached out to island incumbent providers over the years and recently were able to gauge interest from both Consolidated Communications and Spectrum. To date Consolidated has given the town high level estimates of cost and Spectrum has promised the committee that a response will be forthcoming. Neither have given the town a formal proposal to expand service to date, nor has the Town requested one. Over the next few months, the committee will need to gauge the community's interest in working with one of the incumbent providers. There are both pros and cons to this approach to achieving an island-wide broadband solution.

Consolidated Communications (CCI)

CCI produced a couple of estimates of cost for the community. There was a conflict in the number of road miles taken from the Tilson Study produced back in 2015 and the information contained within the CCI database. CCI's quotes come with a couple of caveats and a recommendation. First, these are high level engineering costs and are intended to begin a dialog about a potential FTTP network on the island. These are quotes to bring fiber optics to every home, replacing the old DSL technology that CCI is using now.

CCI data on number of locations (1500) and road mileage estimate of 70 miles:

1. Backbone network covering all roads on the island estimated cost = $2.1M
2. Connections to the 1500 locations (road/pole to the house) estimated cost = $1.2M
3. Total estimated cost = $3.3M
4. Per premise cost = $2200

Tilson data on number of locations (1003) and road mileage estimate of 51.3 miles:

1. Backbone network covering all roads on the island estimated cost = $1.539M
2. Connections to all 1003 locations (road/pole to the house) estimated cost = $802,400
3. Total estimated cost = $2,341,400
4. Per premise cost = $2334

CCI recommends that the Town consider issuing an RFP outlining its design requirements and standards asking for a full engineering cost estimate. If the Town decides to work with CCI, CCI has been developing a new program that they have entered into with Long Island, where the Town would own the main fiber trunk and CCI would own the drops to each home. The Town would pay for the building of the system, and CCI would add a fee to the monthly subscriber rates that would pay back the loan/bond.

This approach has not been a formal offer to the Town but are the elements that the community might expect if it were to engage CCI.

Spectrum

Spectrum has worked with a handful of communities to build out their system. They have not made a formal offer to the Town to expand service. Typically, they would work with the Town to expand their current Spectrum service to other parts of the island, meaning they would expand their co-ax copper-based cable system to homes currently unserved by their service. They would likely not install fiber. It is unclear if they would be willing to expand service to areas that they would deem unprofitable. In any case, they tend to want to have a blended approach to financing (i.e. apply for state funding, use some of their own capital, and make up the difference with capital from the Town.) They have never entered into any agreement that returned any part of revenue back to the Town or entered into any agreement that would not give them 100% ownership of any new expansion.

Spectrum coverage area

As of the date this report was published, Spectrum has not presented the Town with a cost estimate to expand service on the island.

Working with incumbent providers – either Spectrum or Consolidated – could be beneficial in reducing the risks to the Town, and may be more comfortable for some who do not feel strongly about owning the infrastructure and who prefer a more

traditional approach where the private entity controls all aspects of the customer experience and is fully responsible for the expansion of service.

Many parts of the community have experienced challenges with the service (or lack of) provided by both incumbents. Given this factor, the prospect of a long-term commitment with a private company using a significant amount of public dollars might not be seen as in the best interest of the Town. This may push the community to strongly consider creating a relationship with a new provider that could provide more favorable terms, help reach the goals of the Broadband Committee, and allow the Town to own the system.

Benefits of Public Ownership

Public ownership models are increasing in popularity and several communities have implemented this approach because of the benefits of aligning with community goals and ensuring those goals are met by the ISP. This model is increasingly seen as a pathway for municipal leaders to have a stronger voice in what is happening in their community. While this model increases the responsibility of the Town, it also provides a much more collaborative approach with the ISP, which in turn brings better customer experiences, as well as the ability of the Town to change providers if agreements on service are not met. These changes in the relationship foster a better partnership where the ISP is much more accountable to the user experience and the community is much more committed to mutual success for both the Town and the provider. Several communities have implemented this approach and there are a number of communities in the planning stage of becoming the public owner of a broadband internet system that will be implemented over the next year.

The following represent real-world examples of various ownership models:

Owned and Operated by the community – Islesboro
Islesboro's model was the first in Maine and features several unique aspects.

- Town issued a $3.8M bond to fund construction
- 600 premises connected
- Town contracts with GWI to run the system
- Town maintains a list of subscribers and interacts with stakeholders, billing $360/year for a shared Gig of service across the island
- They have a volunteer committee to oversee the network

Owned by Town, operated by Internet Service Provider – Cranberry Isles
The Town successfully received a grant to pay for the system but has not yet received the funds.

- Town paid $1.2M through property taxes, which is the cost to build across 4 of the islands that make up the Cranberries
- To date, 180 premises connected
- Town entered into a long-term Public-Private partnership agreement with Axiom
- Axiom does all billing, maintenance, and tech support
- Axiom returns 5% of gross revenue back to the Town
- Various tiers of service, system is capable of 1Gig/1Gig to each home

Owned by island investors, operated by ISP – Cliff Island
This is the only model in Maine that is owned by private investors. Because Cliff Island is part of Portland, and Portland did not want to support Cliff's broadband effort with

municipal dollars, a group of islanders raised $350,000 from fellow islanders to pay for the fiber network, which was wired on the ground across the island to every home.

- Private investors are getting paid back by receiving $240/year for each subscriber
- Approximately 75 subscribers
- LLC entered into 10-year agreement with Axiom
- Axiom does all billing, maintenance, and tech support

Forming a public utility – Downeast Broadband
Calais and Baileyville have created an open access network that was envisioned to attract multiple providers to service the approximately 2000 homes passed. Currently, Pioneer Broadband is the only operator on the system.

- Towns took out a bond to pay for system
- Payback is expected through the fees collected by ISPs on the system
- Maintenance is performed by contract with Pioneer Broadband
- A utility board oversees system
- Buildout is still occurring, but 2000 homes passed is expected

Elements of a strong Partnership Agreement

Municipal responsibilities

- Own and insure the main backbone and fiber equipment
- Work closely with ISP on marketing efforts and take rates
    - Promote ISP and early commitments to the new system
- Commit to a long-term contract with the ISP to exclusively serve the community
- Develop and maintain expectations for ISP engagement and pricing for citizens

ISP responsibility

- Repair and maintain all fiber drops and home equipment at our cost
- Employ a local representative to support timely responses to customer issues
- Coordinate all operational and managerial responsibility for the system
- Return a % of gross revenue back to the community
- Maintain proper insurance as required of an ISP

Determining if public ownership is the preferred approach will be key to determining what next steps are taken. The Broadband Committee should focus on discussing the potential options for a municipally owned model.

Ownership Model Pros and Cons

Private Ownership Benefits	Private Ownership Concerns
The Town would not be responsible for anything All responsibility would be on the ISP	It is almost certain a public subsidy will be required to build out, so public money would be used to fund a system the Town would have little to no control over
This is a model that Spectrum & Consolidated traditionally use so if the Town works with an incumbent, this is the model to expect	While reducing risk, private ownership also cedes any leverage for pricing or customer service expectations to the incumbent
Keeps the status quo	No change If you like what you've got now, you'll be satisfied
Updated and increased coverage to underserved parts of the island	Must insist they serve every home; they typically are not willing to
In Spectrum's case the community would retain a cable TV option	Spectrum is expensive and streaming services through the internet such as Netflix are increasingly taking market share from traditional Cable TV

Public Ownership Benefits	Public Ownership Concerns
Locally owned means the Town and the community are committed to its success This typically drives additional takers of the service	The Town takes on additional responsibility
The Town has control over which ISP they choose and can change ISPs and work to create good pricing In short, the Town will have the leverage!	With leadership changes over time in the Town, the intent and purpose of the original goals can be lost or forgotten
The Town can insist on fiber optics and not worry about becoming obsolete for 20–30, even 40, years	Fiber can be 30% more expensive than other technologies to build
Saves money over the long run A long term investment Can avoid much of the make-ready cost, saving $100s of $1000s during construction	The subsidy may not cover the cost of the capital required to build the system

Recommendations

- The Broadband Committee should discuss the potential options for a municipally owned model.
- The Committee should engage the current providers to determine their interest in expanding service to the whole island and to review and discuss ownership models.
- The Committee should work with the community to set a clear goal about ownership and what the community would like to achieve.

- What are the elements of an ownership agreement that need to be addressed?
- Is there anything unique about Vinalhaven that can be leveraged in a relationship with an ISP?
- What are the most important goals that need to be met? (e.g. own your own system, equal access for all, enhanced business service offerings, provide a low income subsidy, etc.)

Construction Cost Estimates

Total Cost for Constructing New FTTP Infrastructure in Three Phases

A detailed breakdown of costs and expected revenue and expenses associated with each part of the plan is included in the Phases sections below. In our initial response to the RFP, Axiom assumed that there would be no make-ready or pole licensing cost. Upon further discussions with FIEC, we have now calculated the estimated cost of placing a new fiber line on the utility poles. "Make-ready" cost – estimated at $400,000 – potentially adds significantly to the total cost of the project. However, municipally owned projects are exempt from make-ready costs per a new law passed in 2019.

Construction

Option #1	Including all pole make-ready and licensing	$3.9M
Option #2	Grant for $1.3M reduces amount	$2.6M
Option #3	Grant plus avoid make-ready	$2.2M
Option #4	Grant plus avoid Make-ready plus State grant	$2M

The construction cost would pay for a fiber connection at any home that wants to be connected. A calculation of expected revenues and expenses has been computed to illustrate the expected viability of the project, as well as the cost of servicing the bond at each of the four options listed above. Looking at the Financial Modeling section will help the reader understand the commitment of the Town as the construction project costs decrease. Obviously, the smaller the amount bonded, the quicker one can expect to be cash flow positive.

Notwithstanding the challenges and additional costs of island work, this project would generate reasonable cash flow for a service provider once fully built and operational at the projected number of subscribers. In our modeling we have calculated a 30% profit for the ISP. However, all 4 options require some additional Town subsidy, at least for some period of time when the project is ramping up and while achieving the full take rate. If expected take rates or expenses change, you would expect a different calculation that would impact the project's operational viability. In order to ensure that we are not being overly optimistic with our revenue projections we have taken a conservative approach to our projections. However, given the number of potential customers and the poor service outside of Spectrum's service area, we expect significant interest in this potential project and that could shorten the length of time that a Town subsidy would be needed.

Be aware that the Revenue and Expense modeling shown is just one set of assumptions based on one ISP's (Axiom's) experience with over 25 planning processes and several deployments. Each ISP would have its own internal modeling and calculations.

Summary

- This is a viable project with significant cost share potential, if the Committee and Town officials seriously considered public ownership of the infrastructure.
    - Public ownership significantly reduces or eliminates make-ready cost.
    - Public ownership widens the opportunities for funding.
- There is strong opportunity to attract federal and state grant funding with an ISP partner.
- While the initial cost of the project is daunting, when you think of this project servicing the island for 30 years or more without requiring upgrades, it is actually very affordable.
- This is a high-level engineering study; additional work will need to be completed to have a firm price for construction.

Construction Phases

As suggested in the RFI, we have created a three-phase approach: North-Phase I, East-Phase II, and West- Phase III. These three phases can be combined or mixed-and-matched as Vinalhaven sees fit. While we have refined our cost from the RFP, a number of assumptions and estimates will need to be given additional due diligence if the project the green light. Different assumptions for the project are discussed and modeled in the next section, but some of those details are listed below.

Pole Licensing and Make-ready

A detailed memo on the process of pole licensing and make-ready has been given to the Broadband Committee. There are several factors to consider in looking at the pole licensing and make-ready costs associated with each phase.

Assumption #1: Pole Licensing and Make-ready

The process of accessing the utility poles to allow a new cable of fiber is called Pole Licensing and Make-ready. It's a two-step process. We have broken out estimated cost of the "Pole Licensing" from the "Make-ready".

Pole Licensing

If you are an eligible entity, you can apply to Consolidated Communications. When you apply, you send in a check for the total cost based on the number of utility poles that you would like to attach to. The formulas for calculating the cost of the license are known, so our calculations are accurate. However, there is a second licensing cost that is typically paid to the utility. That cost is not included yet as we would need to get clear guidance from FIEC regarding how much they charge. Depending on that amount, the listed cost of licensing could double.

Make-ready

Make-ready is the cost of "making ready" the poles to accept a new cable of fiber. Once the pole licensing fee has been received, the current attachment companies and the utility coordinate a meeting on island to look at every pole and determine the cost of moving the currently attached lines and to identify any issues with the poles that would require a pole to be replaced. Both make-ready costs and pole replacement costs are total estimates in our construction calculation. The actual known cost will only be fully understood once the process is undertaken and a thorough engineering study is conducted.

One last point on make-ready… Make-ready and estimated pole replacements add close to $1M to the pricing of construction. However, if the Town owned the infrastructure, a new law dictates municipally owned networks are not subject to the cost of make-ready, which would bring a substantial reduction in the total cost of the project.

Assumption #2: Cost of Working on the Island

In our pricing of construction, we have not added in common issues of working on islands such as barging cost and housing cost for crews coming from the mainland. These costs, in our experience, can affect the cost of a project and are always only estimates. They are not calculated here but are expected to be part of any construction bid.

Assumption #3: Revenue Numbers

Savvy readers will look at the estimated revenue numbers and will want to know what the underlying assumptions are because the viability and profitability of a project is based on the revenue and expense calculations. Axiom has worked on, and is delivering service to, several islands, and our experience from those projects inform our thinking on Vinalhaven and is reflected in the calculations presented.

Take Rate Assumptions

	Year-Round Resident Take Rate	Seasonal Take Rate
Year #1- Construction	0%	0%
Year #2	35%	40%
Year #3	40%	45%
Year #4	45%	50%
Year #5	50%	55%
Year #6	52%	60%

We assume that the least served parts, and areas outside of the Spectrum service area, will likely derive a higher take rate than those with relatively satisfactory service in the Phase II and III areas. Additionally, it may take longer to obtain the take rates we suggest, depending on a number of factors.

Seasonal Service

Axiom has developed a seasonal service rate that is different than what is traditionally offered by providers. Instead of paying for only the time a seasonal resident is on the island, our seasonal rate calculations give seasonal customers a 15% reduction on their year-round bill, and the service time is fixed from May 1 – October 31. This way seasonal customers in effect subsidize a larger portion of the operating cost of the system. We mention this approach because a substantial change in the way seasonal customers are charged could change the revenue and viability of the project, and we wanted to make sure that the Broadband Committee was aware of this relatively unique calculation.

Assumption #4: Fiber

In an earlier section, we highlight the benefits of fiber over other technology options. We propose a Fiber to the Premise (FTTP) plan that is capable of each subscriber receiving up to a Gig (1000Mbps) of service. Below is a quick summary of the practical reasons why we chose to base our construction pricing on FTTP.

- *Equal Access for All* – No matter where you live on Vinalhaven, any home would have access to the same speeds and reliability as any other resident.
- *Fast and Reliable* – The system would be built to withstand fluctuations in demand even during peak summer months, would deliver lightning fast speeds, and use the most reliable technology on the market.
- *Futureproof* – Fiber technology would mean that Vinalhaven never falls behind again. The system would need little to no upgrades over the next 20 years or more.
- *Symmetrical Service* – The system would deliver equal download and upload speeds.

Revenue and Expense Modeling for All Phases

As part of our commitment to help rural communities more fully understand what ISPs are facing serving a small community, we have created a revenue and operational expense budget that helps the community and the ISP better negotiate an operating agreement with whatever model of ownership the community chooses.

It's important to understand that these are simply an illustration of how we, Axiom, would envision the feasibility of operating a system and what potential customer rates could look like. The potential revenue is based on service levels, and take rates are based on over 25 planning and implementation projects, including those on several islands. These projections are intended for demonstration only. Each provider has their own unique revenue and cost models; these are Axiom's. However, these numbers can show generally what a provider might expect if the Town were to build a new fiber system and importantly, how much revenue, if any, a provider might return back to the Town, and what a provider might contribute to the capital cost of the build out.

Phase I – North

Orange Line= High Capacity Trunk – Green lines= Lower fiber count drops
Blue Dots= Homes and Business locations

Construction Cost Estimate – Phase I

Bill of Materials		$856,130
Pole Licensing		$19,585
Make-ready (estimate)		$190,575
Pole Replacement (estimate)	847 poles	$254,100
Regen Hardware & Installation		$133,785
Customer Premise Drop Cable		$30,360
Customer Premise Installation	70% take rate- 276 homes passed (83 YR/ 193 Seasonal)	$144,900
Total Phase I Budget		$1,631,436

Revenue Estimate

Rate Group	# of Subscribers	Monthly Rate	Annual Revenue
25/5Mbps	41	$69.99	$34,435
50/10Mbps	12	$79.99	$11,518
100/20Mbps	6	$109.99	$7,919
Seasonal		**Yearly rate**	
25/5Mbps	95	$713.99	$67,829
50/10Mbps	27	$815.99	$22,032
100/20Mbps	14	$1121.99	$15,708
TOTALS	193 (70%)		**$159,441**

- Seasonal rates are calculated at 85% of year-round subscriber rates for this model.
- The Rate Groups and monthly cost can be adjusted to determine feasibility at different levels.
- Take rate is the estimated number of homes we believe would purchase service. We believe a 70% take rate is achievable on this part of the island

Expense Estimate

Operating Expense Categories			Yearly Cost
Bandwidth			$27,864
Phone technical support			$2,518
Administrative support			$1,328
FC support (local)			$8,968
FC support (remote)			$34,151
Bond payment	(negotiated)		
	TOTAL		**$74,830**

Bandwidth is the cost of bulk wholesale internet.
Phone tech support is the estimated cost to maintain phone support for customers for the year.
Administrative support is the cost of billing/collections and support for billing questions.
FC (Field Crew) local is the cost of hiring a local person to conduct simple trouble shooting at the home.
FC (Field Crew) remote is the cost of dispatching field crew from the mainland to deal with more serious issues (i.e. breakage, splicing, etc.)

Phase II – East

Orange Line= High Capacity Trunk – Green lines= Lower fiber count drops
Blue Dots= Homes and Business locations

Construction Cost Estimate – Phase II

Bill of Materials		$703,358
Pole Licensing		$10,798
Make-ready (estimate)		$111,600
Pole Replacement (estimate)	496 poles	$148,800
Regen Hardware & Installation		$109,875
Customer Premise Drop Cable		$61,820
Customer Premise Installation	50% take rate- 562 homes passed (225 YR/ 337 Seasonal)	$210,750
Total Phase II Budget		$1,357,001

Revenue Estimate

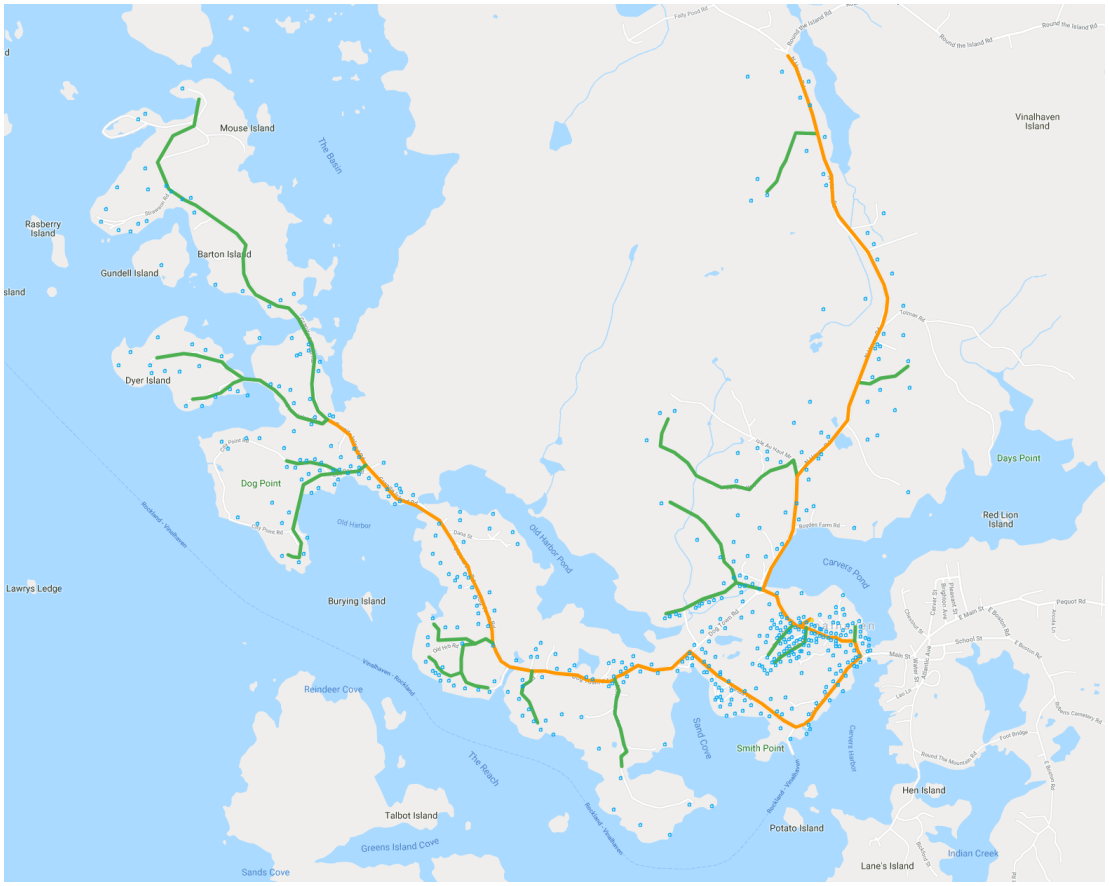
Rate Group	# of Subscribers	Monthly Rate	Annual Revenue
25/5Mbps	79	$69.99	$66,351
50/10Mbps	23	$79.99	$22,077
100/20Mbps	11	$109.99	$14,519
50/50Mbps-Business	5	$109.99	$6,599
Seasonal		**Yearly rate**	
25/5Mbps	118	$713.99	$84,251
50/10Mbps	34	$815.99	$27,744
100/20Mbps	17	$1121.99	$19,074
TOTALS	282 (50%)		**$240,615**

- Seasonal rates are calculated at 85% of year-round subscriber rates for this model.
- The Rate Groups and monthly cost may differ depending on provider and community goals.
- We believe a 50% take rate is achievable on this part of the island.

Expense Estimate

Operating Expense Category			Yearly Cost
Bandwidth			$55,728
Phone Technical support			$3,682
Administrative support			$1,941
FC support (local)			$13,103
FC support (Remote)			$49,899
Bond Payment	(negotiated)		
	TOTAL		**$124,352**

Phase III – West



Orange Line= High Capacity Trunk – Green lines= Lower fiber count drops
Blue Dots= Homes and Business locations

Construction Cost Estimate – Phase III

Bill of Materials		$585,978
Pole Licensing		$5,377
Make-ready (estimate)		$55,575
Pole Replacement (estimate)	247 poles	$74,100
Regen Hardware & Installation		$10,000
Customer Premise Drop Cable		$52,910
Customer Premise Installation	50% take rate- 481 homes passed (192 YR/ 289 Seasonal)	$180,375
Total Phase III Budget		$964,316

Revenue Estimate

Rate Group	# of Subscribers	Monthly Rate	Annual Revenue
25/5Mbps	67	$69.99	$56,272
50/10Mbps	19	$79.99	$18,238
100/20Mbps	10	$109.99	$13,199
50/50Mbps-Business	5	$109.99	$6,599
Seasonal		**Yearly rate**	
25/5Mbps	102	$713.99	$72,827
50/10Mbps	29	$815.99	$23,664
100/20Mbps	15	$1121.99	$16,830
TOTALS	241 (50%)		**$207,629**

- Seasonal rates are calculated at 85% of year-round subscriber rates for this model.
- The Rate Groups and monthly cost may differ depending on provider and community goals.
- We believe a 50% take rate is achievable on this part of the island.

Expense Estimate

Yearly Operating Expense Category			Yearly Cost
Bandwidth			$55,728
Phone Technical support			$3,682
Administrative support			$1,941
FC support (local)			$13,103
FC support (Remote)			$49,899
Bond Payment	(negotiated)		
	TOTAL		**$124,352**

Bandwidth is the cost of bulk wholesale internet.
Phone tech support is the estimated cost to maintain phone support for customers for the year.
Administrative Support is the cost of billing/collections and support for billing questions.
Local Field Crew is the cost of hiring a local person to conduct simple trouble shooting at the home. Field Crew (Remote) is the cost of dispatching Field Crew from mainland to deal with more serious issues- breakage, splicing, etc.

Phased Construction Key Points

- Economies of scale could reduce the project cost if all Phases were completed as one project rather than as three distinct projects.
- There are underserved areas in each of the Phases that include areas served by Spectrum.
- Take rate is critical to the overall viability of the project; the fewer the subscribers, the less viable the project.)
- Changes in the Seasonal Service pricing structure and competition with Spectrum would alter the financial modeling.
- Monthly operating expenses are generally fixed no matter the number of subscribers. In other words, there is not a direct correlation between subscriber counts and expenses.
- Because this is a high level estimate, a number of variables still remain in the cost sections of each phase.

More definitions for terms in this section can be found in Appendix C.

Financial Modeling

In order to ascertain the feasibility of a Fiber To The Premise (FTTP) project that would serve the whole island, we have evaluated four likely options for funding. These models demonstrate estimated revenue generated from subscribers against bonded debt service at various levels for 20 years. Options#1-4 show how a decrease in public subsidy would bring down the cost of construction, and subsequently the amount of the bond needed to complete the project.

Option #1- Full Construction Cost

- The Town bonds the full amount of construction at $3.9M for 20 years through a municipal bond.
- $0 revenue is achieved in Year 1 as build out is completed and subscribers begin to be hooked up.
- Cash Flow is the projected total amount available to pay down debt.
- Payments for the municipal bond are broken into two payments per year.
- Deficit is the difference between the anticipated debt service and projected cash flow.
- After Year 6, revenue and expenses stabilize, as does the projected deficit.
- In year 20, the Town comes close to positive cash flow, but does not achieve it

Date	2 payments per fiscal year	FY Total obligation	Total Revenue	Total Expenses	Cash Flow	Revenue Shortfall
11/1/21	$63,328					
5/1/22	$63,328	$126,656	$0	$0	$0	($126,656)
11/1/22	$260,965					
5/1/23	$61,154	$322,119	$414,851	$(302,101)	$112,750	($209,369)
11/1/23	$258,791					
5/1/24	$58,891	$317,682	$460,013	$(329,277)	$130,736	($186,946)
11/1/24	$256,528					
5/1/25	$56,558	$313,087	$515,854	$(389,954)	$125,899	($187,187)
11/1/25	$254,196					
5/1/26	$54,137	$308,334	$567,735	$(420,849)	$146,885	($161,448)
11/1/26	$251,775					

5/1/27	$51,637	$303,413	$609,178	$(445,449)	$163,728	($139,685)
11/1/27	$249,275					

Option #2 – Grant Reduces Amount of Phase I Cost by 80%

- $1.3M in grant funding reduces the total bond to $2.6M.
- $0 revenue is achieved in Year 1 as build out is completed and subscribers begin to be hooked up.
- After Year 6, revenue and expenses stabilize, as does the projected deficit.
- In year 15, the project becomes cash flow positive.

Date	Two payments per fiscal year	FY Total obligation	Total Revenue	Total Expense	Cash Flow	Revenue Shortfall
11/1/21	$42,417					
5/1/22	$42,417	$84,835	$0	$0	$0	($84,835)
11/1/22	$174,798					
5/1/23	$40,961	$215,759	$414,851	$(302,101)	$112,750	($103,009)
11/1/23	$173,341					
5/1/24	$39,445	$212,787	$460,013	$(329,277)	$130,736	($82,051)
11/1/24	$171,826					
5/1/25	$37,883	$209,710	$515,854	$(389,954)	$125,899	($83,810)
11/1/25	$170,264					
5/1/26	$36,262	$206,526	$567,735	$(420,849)	$146,885	($59,640)
11/1/26	$168,642					
5/1/27	$34,587	$203,230	$609,178	$(445,449)	$163,728	($39,501)
11/1/27	$166,967					

Option #3 – Grant Reduces Amount of Phase 1 by 80%; $0 Make-ready Cost

- $1.3M in grant funding plus avoiding over $400,000 in make-ready cost (applicable for municipally owned systems) reduces the total bond to $2.2M.
- $0 revenue is achieved in Year 1 as build out is completed and subscribers begin to be hooked up.
- After Year 6, revenue and expenses stabilize, as does the projected deficit.
- In year 7, the project becomes cash flow positive and would require no additional subsidy

Date	Two payments per fiscal year	FY Total	Total Revenue	Total Expense	Cash Flow	Revenue Shortfall
11/1/21	$36,686					
5/1/22	$36,686	$73,372	$0	$0	$0	($73,372)
11/1/22	$151,178					
5/1/23	$35,426	$186,605	$414,851	$(302,101)	$112,750	($73,855)
11/1/23	$149,919					
5/1/24	$34,115	$184,035	$460,013	$(329,277)	$130,736	($53,299)
11/1/24	$148,608					
5/1/25	$32,764	$181,373	$515,854	$(389,954)	$125,899	($55,473)
11/1/25	$147,257					
5/1/26	$31,362	$178,620	$567,735	$(420,849)	$146,885	($31,734)
11/1/26	$145,855					
5/1/27	$29,914	$175,769	$609,178	$(445,449)	$163,728	($12,041)
11/1/27	$144,406					

Option #4 – Best case

- A $1.3m federal grant for 80% of Phase I and a $200,000 grant from ConnectME, plus avoiding make-ready cost, reduces the total bond to $2M.
- For first 5 years, the project will operate at a small deficit but is cash flow positive in Year 6, and for the remainder of the 20-year bond, cash flows increase, easily covering the first 5 years of deficits.

Date	Two Payments per fiscal year	FY Total	Total Revenue	Total Expenses	Cash Flow	Revenue shortfall
11/1/21	$32,042					
5/1/22	$32,042	$64,085	$0	$0	$0	($64,085)
11/1/22	$132,042					
5/1/23	$30,942	$162,985	$414,851	$(302,101)	$112,750	($50,235)
11/1/23	$130,942					
5/1/24	$29,797	$160,740	$460,013	$(329,277)	$130,736	($30,004)
11/1/24	$129,797					
5/1/25	$28,617	$158,415	$515,854	$(389,954)	$125,900	($32,515)
11/1/25	$128,617					
5/1/26	$27,392	$156,010	$567,735	$(420,849)	$146,886	($9,124)
11/1/26	$127,392					
5/1/27	$26,127	$153,520	$609,178	$(445,449)	$163,729	**$10,209**
11/1/27	$126,127					

Financial Modeling Key Points

- A relatively small increase in the mill rate would cover the deficit and make this project achievable.
- As the cost of the bond is reduced, the project comes closer to breakeven.
  - In Option #3 by Year 6 the deficit is very small and is positive in Year 7.
  - In Option #4 cash flow is positive by Year 6.
- Estimated take rates were adjusted to be more conservative. Increased revenue could also reduce the size of deficits in the startup years.
  - Year 1 – no revenue
  - Year 2 – 35% year-round / 40% seasonal
  - Year 3 – 40% year-round / 45% seasonal
  - Year 4 – 45% year-round / 50% seasonal
  - Year 5 – 50% year-round / 55% seasonal
  - Year 6 – 52% year-round / 60% seasonal
- Estimated ISP profit is 30%.

- After Year 6, we expect take rates to stabilize. A 2% cancellation rate is assumed starting in Year 3.
- We increase expenses as more customers subscribe to the service.
- The pole licensing fee is included in the models, as well as all of the pole replacement cost.
- In the first three options we did not include a contribution from the state, but in Option #4 we included a $200,000 contribution. A 2020 $15M state bond will provide increased grant dollars to applicants.
- The municipal bond was calculated at a 20-year payback.

Grant Funding

What can communities do now to get ready and anticipate grant opportunities, and what grant opportunities are available? This section articulates several areas for the Town and Committee to focus on so they can be ready when grants become available. In addition, we have compiled a list of the grant funding options we are aware of to help with investigating potential sources of funding.

Goal: Be Ready

Funding

Vinalhaven is governed by an elected Select Board and through town meeting. An annual warrant is developed and approved months ahead of the actual meeting. Therefore, any spending for broadband would need to be explored and added to the warrant well in advance of town meeting. We recommend allocating $5000–$20,000 to be used for writing grant applications, for studies, or as match for a future grant opportunity. It is also important to get documentation from Town officials authorizing the Broadband Committee to explore any and all funding sources. The Committee should regularly report back to officials and the community as actions progress.

Plans

Starting early engagement with any possible Internet Service Provider is very important. Building trust and agreeing to common goals, roles, and responsibilities will go a long way when opportunities arise to work together.

Goals

It is important to consider and settle on the community's broadband goals. "My internet stinks" is not a goal. Typically, communities that do well are able to articulate the answer to this fundamental question: Why? Why should the Town focus on this? Why should we spend taxpayer dollars? Why is this important? The Broadband Committee must settle on and be able to articulate their goals not only to Town leaders, but to the broader community as well.

It is also important to find a champion – someone who is well respected and someone who will be listened to. This person could be an elected official or someone else who has significant influence in the community. This person can be critical to the success of any project.

Explore the Criteria of Funding Opportunities

The Broadband Committee should look at each of the potential funding sources listed below to see if the community and/or project meet the criteria. Whether the grant has a cash match requirement, will only serve areas with minimal speeds, or a host of other eligibility requirements, many small communities are not used to the level of intensity

required to successfully apply for a grant. Be prepared. Know what the requirements are and start to assemble the needed documentation to give your community the best chance of success.

Advisory Resources

Beyond Axiom, Peggy Schaffer, the Director of the ConnectME Authority is a good resource for communities. She is can be reached at Peggy.Schaffer@maine.gov.

The Island Institute is also another great resource. Kendra Jo Grindle is the Institute's main contact for broadband projects. As you get closer to implementation, she should be part of Committee discussions and a supporter of your efforts. She can be reached at kgrindle@islandinstitute.org

Grant Opportunities

The ConnectME Authority offers two types of grants: Infrastructure and Community Broadband Planning Grants. For the purposes of this report, the planning grant is not a consideration. We would recommend an Infrastructure grant. Details can be found at http://maine.gov/connectme/grants/

Axiom has extensive knowledge of these grants and has received many of these grants totaling over $1M.

- Grant proposals must meet the state standard of 10/10Mbps
- Grant limits are suggested, but in past years have typically been $100,000, which must be matched 1 to 1 with a combination of cash and in-kind services.
- The area targeted must be unserved (having no service) or underserved (service that is less than 25/3Mbps)

Typically this grant is open for applications March–April. Rulemaking for an additional $15M in bond money is underway, but not completed.

The Maine Community Foundation has regional grants to support a variety of community initiatives.

- Grants available up to $10,000
- Local decision makers by county
- Deadline February 15th of each new year

http://www.mainecf.org/GrantsNonprofits/AvailableGrantsDeadlines/CommunityBuildingGrantProgram.aspx

The Foundation also has grants up to $15,000 for Community Broadband related activities.

- Grants available up to $15,000
- Typically, 10 awards annually
- Application deadline October 15th

https://www.mainecf.org/apply-for-a-grant/available-grants-deadlines/community-broadband-grant-program/

Northern Boarder Regional Commission accepts grant applications from across the northern border regions of Maine, New Hampshire, Vermont, and New York.

- Requires at least a one to one cash match
- Project must be tied to quantifiable job creation
- Very competitive

http://www.nbrc.gov/
Contact Andrea Smith at (207) 624-9813 or andrea.smith@maine.gov for information on deadlines and program parameters.

Grant Funding Resources- Federal

U.S. Department of Agriculture (USDA) has several potential programs that would fund Broadband expansion opportunities. The most important of these is the Reconnect Program. We are expecting a third round of $550M to be divided into three categories: 100% grant, 50/50 grant/loans, and 100% loans. Each of these categories has slightly different criteria. This year Axiom was a significant contributor to three approved Reconnect applications–two 100% grant applications and one 50/50 application.

- Extremely difficult to apply for with lots of different document and eligibility requirements
- Most importantly, only 10% of homes in the proposed service area can have the capability of getting service of 10/1Mbps or higher
- Even in the 100% grant category, the municipality or applicant is required to have a 25% cash match

Details of the program can be found at https://www.usda.gov/reconnect/program-overview

After looking through the program overview and other details, please contact Mark Ouellette, the author of this report, as he is familiar with this opportunity and can try to answer questions: mark@connectwithaxiom.com Tim Brooks, USDA Regional staff, is also available to assist: timothy.brooks@usda.gov

USDA-RUS Programs offer a number of other potential opportunities to investigate By far the easiest to apply for is the Distance Learning and Telemedicine Grant. https://www.rd.usda.gov/programs-services/all-programs/telecom-programs.

U.S. Department of Commerce- Economic Development Administration (EDA) provides funding for economic development projects across the state of Maine. Maine projects are reviewed and administered by EDA's local representative, Alan Brigham at (215) 316-2965 or abrigham@eda.gov.

- Various funding programs

- Guidelines encourage regions to incorporate broadband investments in their regional strategies (CEDS)
- Funding requires match

Programs and eligibility can be found at www.eda.gov

U.S. Department of Commerce- Broadband USA is helping communities nationwide ensure they have the broadband infrastructure, digitally literate workforce, and engaged citizens they need to thrive in the digital economy.

- Provides direct (one-to-one) assistance to communities
- Resource rich website – no direct grants
- Building a self-assessment tool for communities

https://www2.ntia.doc.gov/

Action Items

- Identify additional key community members to work with the Broadband Committee to increase communication to citizens.
- Decide on an ownership model and identify potential ISP partners.
    - Reengage FIEC to determine their openness to a relationship.
    - Clarify if a working relationship with Spectrum and Consolidated Communications is desirable and feasible.
- Discuss the pros and cons of a phased approach to construction.
- Consider private island investors to support the project.
- Work on surrounding islands model/support/needs.
- Consider an engineering study to eliminate construction cost uncertainty.

Axiom will always be a resource and stands ready to support the committee as needed.

Contact for author of report, Mark Ouellette, with your questions.
mark@connectwithaxiom.com

Appendix A
Fox Island Electric Memo

Memo
To: Fox Island Electric Cooperative
From: Vinalhaven BB Committee on behalf of the Town of Vinalhaven
Date: January 31, 2020
Re: Broadband & The Co-op

Background:

The Broadband Committee was formed to address the issue of poor Broadband service in many parts of the island. Through a series of surveys and ongoing evaluation of each of the two internet service providers- Spectrum and Consolidated, internet reliability and access are a concern for many residents. This may come as a surprise to some, because some parts of the island (downtown) are better served than others. But the fact remains that better internet would create more economic opportunities, telehealth options and expanded entertainment choices. For many with no or extremely poor internet service it would allow those homes to participate more fully in 21st Century on-line activities, while also enhancing even the better served areas of the community.

Partnership possibility:

As part of our process we have hired a consultant, Axiom, who is working with us to develop a strategic plan to move the process forward. One of our interests is to discern the openness of the co-op to work with us to reduce costs and help us meet our two main goals:

- To provide equal service to all
- Own our Own

By reaching these two goals we will solve most of the issues facing us regarding internet connectivity.

As part of our due diligence we would appreciate exploring three ways in which the Coop could participate, while deriving revenue for your operations.

Using the undersea fiber- we are interested in exploring the possibility of a cost share to bring the fiber from North Haven to Vinalhaven, or at least have the opportunity to lease fiber strands from the co-op.

- Timeline for this project
- Cost of project
- Location of project for planning purposes

1. Utilize your manpower and equipment expertise. Electrical Co-ops across the U.S. are beginning to understand that they have the type of equipment and manpower expertise that can easily translate to fiber optic installation, maintenance and repair, and by providing those on-island services, it cannot only enhance user experience by correcting and

repairing quickly, but also enhance their bottom line by being paid from revenue from the new broadband system to perform these services.

- Enhances and expands on-island jobs
- Brings additional resources to the co-op
- Opens up new training opportunities for co-op employees

2. There are a growing number of electrical co-ops who are taking this approach to enhanced broadband one step farther and becoming internet providers for the community they serve. This is a significant pivot to their business, but all of the reasons that formed the electrical co-op in the first place apply for broadband.
    - Marketplace failure that is affecting a significant part of the community
    - Desire to take better control of their future communications needs by owning their own

    There are many examples of electrical Coops undertaking this approach. We have included a link: https://www.cooperative.com/programs-services/bts/Documents/Reports/Report-Broadband-Case-Studies-Summary-March-2019.pdf that is a case study of 12 electrical co-ops that have gotten into the broadband internet business that helps describe the challenges and successes of co-ops providing internet to its existing customer base.

Action item:

As the BB committee considers its options to bring world-class BB to Vinalhaven, partnering with the co-op could produce significant savings to both the capital and operating budgets, which would allow us to more easily and quickly build out service across the island. No matter how involved the co-op would be, the installation of a new fiber service would be on the existing utility poles.

- Pole ownership- do you have a map of the poles that you own exclusively? Conversely, do you have a list of joint-owned poles
    - We have not explored this, but joint-owned poles may require us to go through a pole licensing process
    - What is the relationship with Spectrum and Consolidated- as far as pole usage?

Final Thoughts and Next Steps

As the Broadband Committee works through all the aspects of bringing enhanced internet service across the island, many decisions cannot be made until we have a better understanding of the co-op's willingness to partner with us on any of the three possibilities described above. We would appreciate your most serious consideration and attention to these matters. Our intention is to complete the initial planning phase by the beginning of the summer, and we would greatly appreciate your efforts to evaluate your interest in our work.

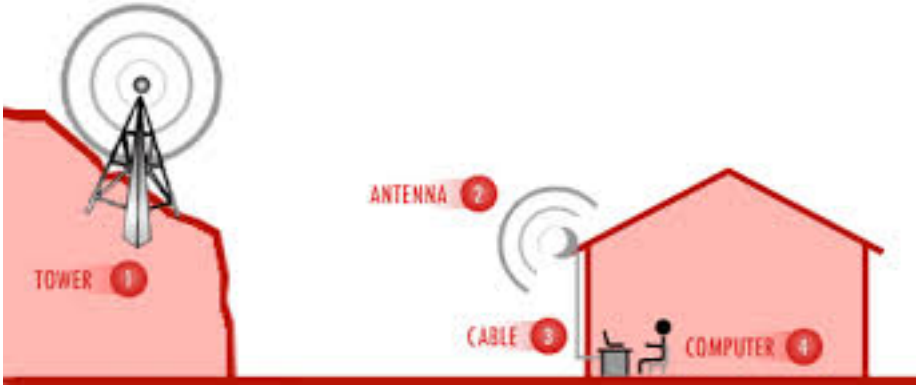
- Work together to present options to the co-op board
- Better understand the undersea cable cost and our ability to work together to find grant money to help defer the cost
- Develop a map of the poles on the island (if you don't already have one) that will help us understand how the service would be installed across the island

Appendix B
Serving Surrounding Islands

The surrounding islands that are part of the Vinalhaven community may want to obtain service if they are aware that new service is coming to main-island Vinalhaven. We have produced a very high-level cost estimate to serve some of these islands. A substantial amount of due diligence would need to be completed to determine a final cost, and our approach could be modified to fit the vision of the Committee and Town officials.

Wireless Solution

What we are proposing is to provide a wireless solution to the surrounding islands. This would likely reduce overall cost but would come with two noteworthy issues. First, this approach would require height to allow the signal to promulgate properly from the island to any subscriber in an outer island home. This would require two 100' towers to be constructed to serve these islands. Second, because the delivery would be wireless, where the home to be served is located would determine what level of service they might receive, with some more difficult-to-reach homes receiving less service than those located in more advantageous locations.

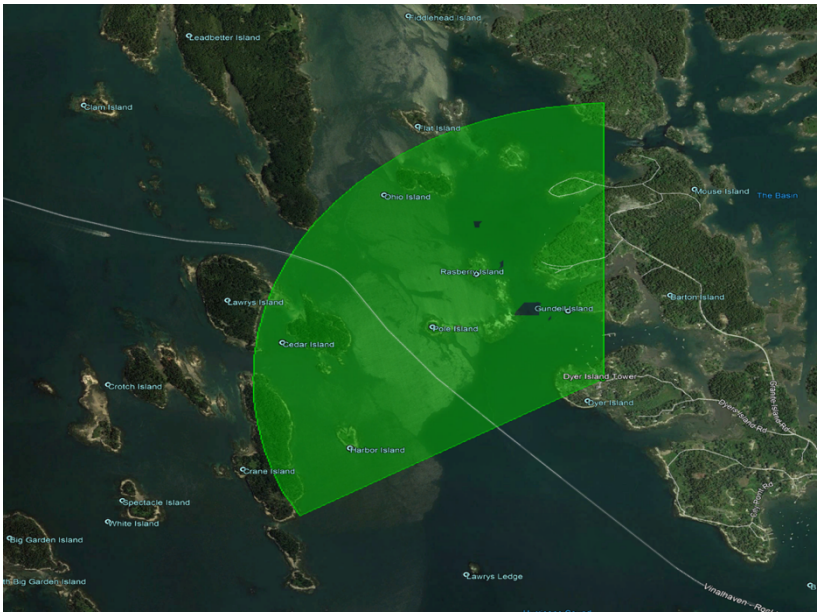


This is a simple illustration of how a home would receive this type of signal. The tower would hold the broadcast equipment and serve many homes. Each home being served would mount an antenna to receive and broadcast a signal back to the tower.

There are several other possible options that could be engineered. All would include towers, perhaps not as impactful as those proposed, and we could provide the exact same level of service to any island that would meet all of the speed and reliability of the system we are proposing for the main island of Vinalhaven. An alternative proposal would deliver a point-to-point signal to each island wanting service and then run fiber to each home. This is the approach Axiom took on Sutton Island, part of the Cranberries.

Below are a couple of pictures of how the signal from a tower would be able to serve many of the surrounding islands. This solution that includes two towers and equipment to serve 20 or so homes, would cost approximately $100,000.

Dyer Island Tower



Norton's Point Tower

Appendix C
Definitions of Terms

Bill of Materials – This category is the materials and equipment cost for the entire project, minus the CO/Regen Hardware & Installation and the cost of drop cable, which are separate line items in the budget.

Pole Licensing – This plan requires the placement of fiber optic cabling on existing utility poles across the community. In order to receive approval for installation, a many-step process over the course of several months is required. The process begins when a pole licensing application is submitted. The cost of the application is based on the number of utility poles the cabling would attach to.

Utility Pole Make-ready – Make-ready is the cost of making the poles ready (make-ready) to accept a new fiber cable. In order to install new fiber optics cable on utility poles, a licensing process is in place that evaluates each pole for readiness to accept a new cable. Each provider (other than the electrical utility) would move the current lines to accommodate a space for a new cable. The cost of this process is estimated in our calculations and can change depending on the application process costs associated with each pole.

Replacement Poles (10%) – We estimate that 10% of existing utility poles might need to be replaced. There are two major reasons for pole replacements. First, the amount of equipment or utility lines on a pole deem it necessary to increase the height of the current pole to allow for an additional line to be placed on it (i.e. the pole is too short). Second, the current pole is aged to the point where it would be unsafe to place the strain of an additional on the pole. We made an estimate (10%), but the actual evaluation of each pole will take place during the pole licensing process.

CO/Regen Hardware & Installation – CO refers to Central Office, which is a term that Internet Service Providers use to describe where the equipment that would be needed to power the system is housed and from where the internet would be distributed to each home. Regen hardware is the equipment that would be used to power the internet system and control each individual connection through this central system. These costs also include a heated and cooled utility shack that would house the equipment.

Customer Premise Cable – This is an estimated cost of the fiber to connect each home from the street.

Customer Premise Installations – These costs are associated with the equipment needed at each home. This is the cost to connect to 100% of the homes on the island.