LONG ISLAND BROADBAND EXPLORATORY COMMITTEE REPORT

October 24, 2016

Section 1. Introduction

In early 2015 the Island Institute commissioned Tilson Technology Management, a Portland based company, to survey broadband availability on Maine's year round islands. They produced a report on the current state of island Internet access and the potential for improving it. In November of 2015 the Institute sponsored a conference in Rockport to present the results of the Tilson Study. This conference highlighted the importance of broadband Internet access to the future of island communities and also discussed funding opportunities and the options Maine islands have for improving Internet access.

Why Broadband?

There are obvious benefits to high-speed Internet access ("broadband"). Content delivery to and from the Internet, including downloading or streaming entertainment, sharing photos and videos, takes less time and can support higher quality. For seasonal property owners, security systems with multiple cameras can be supported to allow remote monitoring.

A broadband system can also provide access to television programming, including local channels, with higher reliability than satellite (especially during rain and snow storms), and very low-cost nationwide telephone service.

Broadband allows more effective telecommuting. This would allow more island residents to work at home and seasonal residents to spend more time on-island.

Perhaps most significant to the future success of the island economy is that presently available speeds do not support effective videoconferencing and large file uploads. This tends to discourage people from living and working here. Potential on island work at home is not possible without broadband.

Educational benefits include better access to online resources that will become increasingly required for school assignments. Lack of broadband connectivity on the island would put our students (especially high school) at a disadvantage compared to their mainland-resident classmates.

Broadband availability has become a major selling point for today's home buyers and renters. A broadband system would make Long Island property more attractive to prospective buyers and renters and allow people to spend more time on-island. This is illustrated by the following recently received comment:

> "We are on Long Island seasonally, and live in Yarmouth year round. We would definitely spend more time out here if we could work more from our house, and many times we are forced to go back to Portland to have access to do our jobs." - C. R.

Telemedicine and telehealth are major new initiatives for rural communities. These initiatives allow patients to discuss their health issues with remote healthcare professionals and allow installed health-monitoring equipment to connect to healthcare facilities. The technology used by these initiatives requires broadband.

The Broadband Committee (BBEC)

Mark Greene, Ralph Sweet and Curt Murley attended the Island Institute conference in Rockport in November of 2015. When they returned they asked the Selectmen to create a committee to explore the options for improving Long Island's Internet access. The **Long Island Broadband Exploratory Committee** (**BBEC**) was created by the Selectmen in December of 2015 and charged with the task *"To explore the options for and feasibility of creating a broadband system for Long Island"*.

The committee started with three members in December: Mark Greene, Ralph Sweet and Curt Murley. Pierre Avignon joined us in February and Doug Grant joined us in May. Through the winter and spring we researched broadband technologies and met with the founders of Chebeague.Net, an Internet access system created over a period of years by Beverly Johnson and David Hill for Chebeague Island. We also met with Tilson to get more details on the preliminary plan for a fiber optic network for Long Island that was presented in the Tilson Study (see Appendix D of this report for the Long Island portion of this study). We have also met with Axiom Technologies, FairPoint, and Lincolnville Telephone Company.

There are several other potential broadband vendors/partners such as GWI, Cornerstone and Pioneer that have worked with small towns to provide broadband systems. We will meet with them if the town decides there is interest in moving forward.

At this point we feel that we have completed our initial assigned task and this is our report.

Section 2. Summary of Options for Internet Service on Long Island

In this section we list and give a brief description of the various ways the Internet can currently be accessed on Long Island. While some of this information is available in the 2015 Island Institute Study done by Tilson we are providing additional information here and in Appendix E to this report.

Note that Internet access speeds are specified in megabits per second (Mbps) and file sizes are specified in megabytes or gigabytes (1 byte is 8 bits). When accessing the Internet most of the data flow is coming **from** the Internet and is measured as download speed. Upload speed indicates the rate at which data flows **from** your computer **to** the Internet, for example, when sending pictures or work files.

In spite of the recent FairPoint DSL upgrade for some parts of the island, upload speeds are not increased and are still only up to 1 Mbps for all services offered. A comment from an islander to this committee illustrates this point:

> "...the upgrade to 15 Mbps speed on one of the FairPoint hubs allowed me to move my business home to the island this summer. It would have been impossible before that. In terms of future needs, much faster upload speeds would be my first priority. Because I need to upload large files, some as large as a GB or more...it can take hours." - J.P., Long Island resident.

Lack of adequate upload and download speeds will continue to limit present and future business, employment and educational opportunities on Long Island.

At 1Mbps upload speed (the maximum available on Long Island), a professional working from home would have difficulty doing their job. Large file transfers such as online disk backup would take hours to complete. Some large employers are unable to hire islanders for work-from-home positions because of inadequate Internet speeds.

Some Internet entertainment services such as Pandora (music), Netflix and Amazon Video (TV shows and movies) work by "streaming" the data, or flowing it continuously to the computer or TV as it is played. This means that an entire song, movie or TV show need not be downloaded before it can be played. Inadequate download speeds will cause pauses or interruptions during playing.

An additional factor to consider is that it is not uncommon today to have multiple users in the same household accessing the Internet at the same time. Depending on what the various users are doing they will be sharing the available download and upload speeds which effectively decreases the speed available to each user.

See Appendix F for more detail on Internet speeds required for various tasks.

Internet Availability

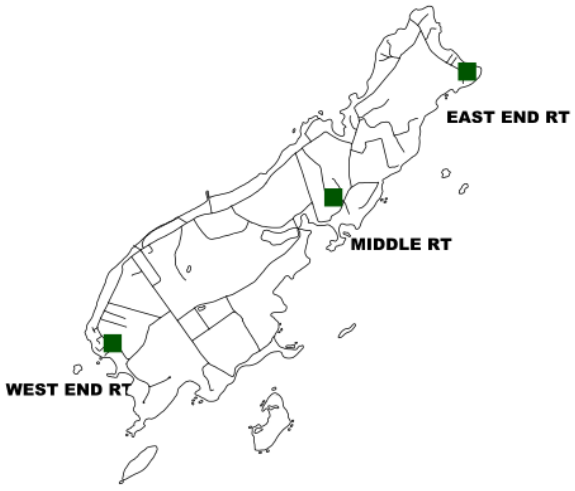
In the context of Internet access, “broadband” is used to mean any high-speed Internet access system that is able to transmit and receive data at a specific speed for multiple users simultaneously. The Federal government currently defines broadband to mean 25 Mbps download speed and 3 Mbps upload speed. The State of Maine’s current standard is “10/10” (10 Mbps download *and* upload). These standards continue to increase.

1. Long Island Community Library and School

The Maine School Library Network, which is a consortium consisting of almost 1000 schools and libraries across the state of Maine through which participants acquire Internet access services which are paid for using a combination of funding from the Federal E-Rate program and the Maine Telecommunications Education Access Fund, provides broadband Internet access for the library and school. This service provides the fastest download and upload speeds available on the island, up to 100 Mbps in both directions. Free public WiFi Internet access is available 24 hours a day in and around the library/school building.

2. FairPoint

FairPoint provides residential Internet access using ADSL (Asymmetric Digital Subscriber Line) technology via their telephone network from three remote terminals (RT) on the island. The RTs are located at the east and west ends and middle of the island and they are connected to each other and the mainland via fiber-optic cable. Depending on the user’s distance from an RT, FairPoint currently offers from 3 to 15 Mbps download speeds and up to 1 Mbps upload speed. This does not meet the Federal or Maine standards for broadband and is not available at every property.



Location of FairPoint Remote Terminals on Long Island

In a perfect world, our current DSL Internet provider would be the logical option to bring us forward in the future assuming there was a way to increase the speed of the system. However, broadband from FairPoint for Long Island is not in the cards nor does it appear to be so in most of Maine. The recent upgrades to our existing system are welcome but are at the limit of

FairPoint's copper wire based DSL technology. Until optical fiber is run to individual homes much higher speeds are not achievable. FairPoint currently has no plan to install a fiber-optic system on Long Island.

3. Redzone Wireless

Redzone Wireless provides wireless Internet access to portions of Long Island from their access point located on the water tower on Great Diamond island. Redzone coverage of Long Island is limited to those areas along Jerry Point Road and Island Avenue that have a line of sight view of the water tower unobstructed by trees.

Redzone recently reformulated their residential offerings with two packages: 10 down / 1 up and 20 down / 2 up. These do not meet the Federal or Maine standards for broadband. Redzone also offers three high speed business packages but these are not available on Long Island.

Expanded Redzone is an option, but like any wireless service they would need to deploy infrastructure on Long Island to extend the range of their signal and to compensate for lines of sight that are obstructed by landscape, buildings, trees, and seasonal foliage. This infrastructure would consist of multiple towers and antennas. Redzone recently expressed their interest, through the Island Institute, to do a study, at our cost, to develop a proposal for us. They mentioned figures between $300K and $700K for the cost of the wireless infrastructure that may be required.

4. Cell Phone

Cellular providers such as AT&T, Verizon Wireless, and T-Mobile offer Internet access via data plans. Access speeds are highly variable and depend on the strength and quality of the cell signal where you are located. Internet access is sold by the amount of data you download or upload in a period, not the rate at which the data can be downloaded or uploaded.

Generally, on the bay side of the island cell reception is OK but in other locations is poor to unavailable. In a few spots on the island speeds as high as 20 Mbps are occasionally possible.

Cellular operators are working to improve their data speeds, but their focus is on high-population areas, not rural areas like Long Island. Due to terrain, improving even basic voice cellular coverage on the whole island would require installation of at least one island cell tower. It is unlikely that cellular providers will undertake the cost of installing such towers to serve our small community.

5. Satellite

Although satellite TV (Dish Network, DirectTV) is widely available and an excellent option for delivering TV to the home, it is not such a good option for Internet service. Dish Network and DirectTV are designed as a one-way systems whereas Internet requires a two-way system. All satellite systems suffer significant degradation in heavy rain and snow storms.

Hughes Net offers two-way satellite Internet access to anyone on the island who can get an unobstructed view of their satellite. They offer plans with download speeds of 5-15 Mbps and

upload speeds of 1-2 Mbps none of which meet the Federal and Maine broadband standards. In addition, satellite Internet access incurs appreciable signal propagation delays due to the distance from earth to the satellites. This is a serious problem for interactive Internet tasks such as videoconferencing.

7. Cable TV

Comcast/Xfinity and Time-Warner advertise their high-speed Internet service heavily on TV, but they do not offer cable services on Long Island and have no plans to install cable on the island.

Section 3. Our Recommended Option for a Long Island Broadband Internet System

Introduction

In the course of our research we have looked at several existing and potential systems for providing broadband Internet to all our residents and businesses. This is a challenging task in most rural areas but even more so for an island. In this section we will briefly describe our recommended system and explain why we chose it over other options. It is important to note that the industry is in a period of rapid change. What follows is the best information we have at this time.

Criteria for System

Our criteria for a broadband system is threefold:

1) It must be available to all residents.
2) It must be available at a reasonable cost.
3) It must be as future proof as possible.

The meaning of the first criteria is clear.

As “reasonable cost” we have assumed a figure of $50-$80 per month per subscriber which includes broadband Internet, telephone and potentially TV. This range of figures includes both the cost of providing the service and the initial cost of building the system.

By “Future Proof” we mean that the system should be upgradeable, at a reasonable cost, to accommodate the higher Internet access speeds that will be required during its lifetime.

Recommended Option

Our recommended option for a broadband system for Long Island is fiber to the home (FTTH).

The infrastructure of this fiber to the home system has two parts.

The first part consists of a network of multi-fiber optical cables either buried along island roads or strung on utility poles. These cables would be connected to a system of connection points located within a few hundred feet of every residence, business, municipal and institutional building on the island. From these connection points individual fiber cables would be run to the premises of any subscriber wishing to connect to the system.

The second essential part of this system is the infrastructure needed to connect the island fiber network to the Internet. Ideally this would be done by an undersea fiber optic cable. FairPoint has an undersea fiber cable connecting Long Island to Portland but its capacity is unknown. If FairPoint’s fiber cable is not an option we could connect the network to the Internet via a dedicated microwave link to Portland.

Does a fiber to the home system satisfy our three criteria?

1. Does it make broadband Internet available to every resident, business owner and municipal and institutional user on the island?

Yes, the design of the system insures this.

2. Will the combined network construction costs and monthly subscriber rates be reasonable?

Estimating costs without an engineering study is very difficult but based on the cost of the FTTH system currently being built on Islesboro and Tilson and FairPoint estimates, a ballpark cost to construct a Long Island FTTH system would be $1,000,000.

As “reasonable cost” we have assumed a figure of $50-$80 per month per subscriber which includes broadband Internet, telephone and potentially TV. This range of figures includes both the cost of providing the service and the initial cost of building the system.

3. Is the fiber to the home future proof?

Predicting the future is always a tricky proposition but not impossible. The fiber to the home system we are recommending can provide a 1,000 Mbps symmetrical, both down and up, connection to the Internet for every subscriber. This speed is 40 times faster than the currently defined broadband speed of 25 Mbps. Additionally, the projected lifetime for this system will be 30-40 years.

In 2015 the current 25 Mbps download speed for broadband Internet was set. At that time experts predicted it would rise to 50 Mbps by 2020, i.e that it would double in 5 years. If this doubling continued every 5 years it would rise to 800 Mbps by 2040, which is 24 years from now and is still less than 1,000 Mbps. The maximum speed of fiber that has been in use for years has increased dramatically over these years due to improvements in the electronics that encodes and decodes the data carried by the fiber. We think that of all the existing and currently proposed Internet network systems, fiber to the home is the only future proof one.

Other Systems We Considered

1. FairPoint

Our most universal provider of current Internet services would be the logical option to bring us forward in the future. FairPoint DSL is universally available on the island at a reasonable cost but it cannot deliver broadband speeds, especially upstream (1 Mbps maximum). Telephone line DSL technology is old and will never be able to deliver even current broadband speed standards with FairPoint’s existing infrastructure on Long Island. Although FairPoint has indicated to us that they may be interested in building a fiber-to-the-home network on Long Island, they have

also told us that they prefer to own and operate systems that they build. In other words, we pay and they own.

2. A Wireless System

As noted in section 2 Redzone Wireless is currently able to deliver wireless Internet to a small part of Long Island from their antenna on the water tower on Great Diamond. In order to extend coverage to the entire island they would need to deploy infrastructure to compensate for lines of sight that are obstructed by landscape, buildings, trees and seasonal foliage. This infrastructure would consist of multiple towers and antennas.

Redzone recently expressed their interest, through the Island Institute, to do a study, at our cost, to develop a proposal for us. They suggested figures between $300K and $700K for the cost of the wireless infrastructure. Again, like the FairPoint system, we would pay and Redzone would own.

A general problem with wireless technology is that it is limited to line of sight transmission and subject to obsolescence as higher speeds are needed. Although its initial cost might be lower and is potentially available to all, we do not consider it a viable “future proof” option.

3. Cellular Service

Cellular service can indeed provide broadband Internet access if you have a good signal. However, speeds are not guaranteed or even advertised and you pay by the amount of data you download or upload, not the speed. In general cellular Internet service is not reasonably priced and is not generally available at serviceable strengths on Long Island. For these reasons alone we do not consider it a viable option for providing broadband Internet.

4. Satellite

Although satellite TV is widely available and an excellent option for delivering TV to the home, it is not such a good option for Internet service. It is designed as a one-way system whereas Internet requires a two-way system. Satellite can deliver decent download speeds but it is not designed to handle broadband speeds or interactive tasks.

5. Cable

Cable can provide broadband Internet access at a reasonable cost and is universally available where the infrastructure exists. However, cable infrastructure does not exist on Long Island and we have been assured by the two major cable operators in Southern Maine, Time Warner and Comcast, that they will not consider extending it to Long Island.

Section 4. Where We Go from Here

We recommend mailing this report to every property owner.

We recommend having a public meeting to present our recommendations and seek input from residents regarding what we should do.

The committee will continue to attend conferences and meet with potential vendors to explore broadband options for the island.

If the town decides that we should proceed with a broadband project, the following steps will be necessary:

1. Design the system

Multiple engineering firms in the state of Maine have designed similar systems. In the case of Long Island, we will need to compare the costs of underground versus aerial fiber deployment and the cost of building a microwave link to the mainland. Cost to design a system is generally in the range of $25-50k.

2. Determine business and funding model for the system

There are several options available:
- We pay for the system construction, then own, maintain, and operate it
- We pay for the system construction and own it, then contract with a third-party who operates and maintains it
- We pay for the system and turn it over to a third party which then owns, maintains and operates it.

The Town of Islesboro chose the second approach, which could also make the most sense for Long Island. The Islesboro system is being funded through a 20-year bond, which is being paid off partly by the monthly fees from the subscribers and partly through a small increase in the property tax. This is but one model that attempts to keep subscriber fees to a minimum.

If we move forward the committee will explore various funding models involving a mix of public and subscriber fees for building and operating the system.

3. Solicit bids to build the system

Several firms in Maine specialize in building these systems. In many cases, they will also do the design and credit the cost of the design work toward the cost of building the system.

4. Choose a partner to operate and maintain the system (assuming we pursue that business model)

The partner will be responsible for customer service, billing, troubleshooting, adding new services as they become available, etc. They will also handle transitioning telephone numbers to the system if we choose to have telephone service included.

Section 4. Appendices

Printed copies of these documents are available at Town Hall and the Library. Additionally this entire report is available on the town website.

A. **Why Broadband?** http://tinyurl.com/tolibbec-a

B. **Work-From-Home Possibilities** http://tinyurl.com/tolibbec-b

C. **Broadband Related Related Articles**
   1. **Rural America Joins the Web** http://tinyurl.com/tolibbec-c1
   2. **The Challenges of Closing the Digital Divide** http://tinyurl.com/tolibbec-c2
   3. **Digital Age is Slow to Arrive in Rural America** http://tinyurl.com/tolibbec-c3

D. **Island Institute Tilson Study - Long Island Section** http://tinyurl.com/tolibbec-d

E. **Additional Data Regarding Currently Available Internet Options** http://tinyurl.com/tolibbec-e

F. **How Much Speed Do I Need?** http://tinyurl.com/tolibbec-f