



BROADBAND EVALUATION COMMITTEE

Recommendation for the Board of Selectmen

Summary

The East Haddam Broadband Evaluation Committee recommends that the Town of East Haddam pursue a feasibility study to determine the cost and logistics of installing a Municipal Automated Open Access Fiber Optic Network. This network will increase affordability and access, and will be funded by subscribers. In addition, the committee recommends that the town begin a comprehensive education campaign to communicate the benefits of a fiber network, seek out funding opportunities including State & Federal Grants, and reach out to potential partners in the region with similar goals.

Respectfully Submitted by the East Haddam Broadband Evaluation Committee

September 2021

What is the Broadband Evaluation Committee and Why was it formed?

The East Haddam Broadband Evaluation Committee (BEC) was formed to evaluate the practicality of establishing broadband service and determine the best method to provide this service for the citizens and businesses of East Haddam. The COVID-19 Pandemic revealed many weaknesses, disparities, and shortcomings of the internet service available to the citizens of East Haddam. In addition to the numerous homes and businesses with subpar service, 10.7% of East Haddam households have no internet service – many lacking access due to the remote location of their homes.

The Broadband Evaluation Committee seeks a solution that will lower costs, improve network speed and reliability, increase economic development, and create new opportunities for public safety, education, healthcare, emergency communications, and overall quality of life for the citizens of East Haddam.

What is Broadband and Why is it Important?

Broadband service is high speed internet. According to the FCC, the definition of broadband internet is a minimum of 25 Mbps download and 3 Mbps upload speeds. Broadband provides high speed internet access via multiple types of technologies including fiber optics, wireless, cable, DSL, and satellite. Fiber Optic is currently the fastest form of broadband and significantly outperforms even the fastest DSL & Cable connections.

The CT State Legislature recently passed *An Act Concerning Equitable Access to Broadband* (HB 6442) which adopts Governor Lamont's goal to "Achieve universal access to broadband internet download speeds averaging one gigabit per second and upload speeds of 200 megabits per second by 2027." The State determined that Internet Access is an essential part of 21st Century life.

Our citizens rely on internet service to work from home, attend school, file for unemployment, stay in touch with loved ones, and perform many routine tasks that we now associate with our day-to-day lives. It is imperative that every East Haddam citizen have access to fast, reliable, and affordable high-speed internet.

What does the committee recommend?

The Broadband Evaluation Committee recommends moving forward with a feasibility study to determine the logistics of installing a high-speed fiber-optic network in East Haddam. After evaluating all currently available service models, the committee recommends pursuing an Automated Open Access model as this model provides the most affordable and accessible high-speed internet service.

The Town would oversee the installation and maintenance of the broadband infrastructure, but any Internet Service Provider can use the Fiber Optic Network to provide high-speed service to our citizens. Increased competition amongst ISPs equals lower prices for subscribers, and town-run infrastructure ensures all citizens will be able to participate if they choose to.

In addition to moving forward with the study, the Committee also recommends that the town begin a comprehensive education campaign to educate citizens on the benefits of a municipal Fiber Optic network, and investigate funding opportunities to support the project.

How much will this cost and how will it be funded?

Homeowners will have the option to subscribe to the new Fiber Optic service which will lower their monthly internet bill and dramatically increase their speeds. The subscription fee will include maintenance for the fiber optic infrastructure, and will reimburse any associated construction costs. There are numerous funding opportunities, including State & Federal grants, that can offset the cost of this project. Regionalization can also play a role in reducing cost, where a multi-community partnership may spread universal costs over more subscribers.

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Introduction

The Broadband Evaluation Committee (BEC) was established by the East Haddam Board of Selectman during its May 19, 2021 meeting. The purpose of this committee was stated in the Selectman's motion:

RESOLVED: That the Board of Selectmen appoint a committee of five (5) persons, effective May 20, 2021, to undertake and complete, within ninety (90) days of the date of their first meeting, a study and evaluation of the practicality of establishing broadband service and how to provide this service for the citizens and businesses of East Haddam.

The charges for the BEC were to:

- Evaluate the pros and cons of establishing broadband service in the Town of East Haddam
- Estimate the cost for this service
- Recommend the best method to provide the service
- Evaluate and enumerate the potential savings to the citizens
- Determine the impact of improved internet service to the quality of life for our citizens
- Judge the impact to the Town's finances by the establishment of broadband service and of the effect on economic development.

In response to this charge, the BEC set three primary goals for its work:

1. Create a report for the Town of East Haddam that details options and recommendations for a town-wide broadband network.
2. Educate the community on the capabilities of Fiber Optic technology, and its potential benefits to the citizens of East Haddam.
3. Identify funding opportunities.

In order to consider the appropriate recommendation, the BEC commenced with self-education regarding the scale of the issue, the technologies available for communities like ours, and the ways in which other communities have solved this issue. The BEC also identified a set of strategic priorities to guide its work and recommendations.

In this report, the committee outlines its strategic priorities, gives context for solutions considered, and provides details of potential broadband options. As charged, the committee also provides information concerning the economic and quality of life impact broadband might provide. Finally, the committee offers its recommendations along with some next steps the selectmen may wish to consider.

The Importance of Broadband

Broadband service is high speed internet. According to the FCC, the definition of broadband internet is a minimum of 25 Mbps download and 3 Mbps upload speeds. Broadband provides high speed internet access via multiple types of technologies including fiber optics, wireless, cable, DSL, and satellite. Fiber Optic is currently the fastest form of broadband and significantly outperforms even the fastest DSL & Cable connections.

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speeds averaging one gigabit per second and upload speeds of 200 megabits per second by 2027.” The State had determined that Internet Access is an essential part of 21st Century life.

Our citizens rely on internet service to work from home, attend school, file for unemployment, stay in touch with loved ones, and perform many routine tasks that we now associate with our day-to-day lives. Businesses, including retailers, manufacturers and professional services, rely on consistent internet for client communication, business management tools, and business technologies. It is imperative that every East Haddam citizen have access to fast, reliable, and affordable high-speed internet, not unlike other essential utilities such as electricity, heat and clean water.

Comparison of Technologies for Delivering Internet Access

Meeting a community’s broadband access needs requires an understanding of the technology and media available for this purpose and the potential advantages of each technology. Any investment by the Town requires an understanding of how these choices will ultimately impact cost, access and reliability.

One source for some of this information is a slide presentation given by Jeff Christensen, President of Entry Point Networks, at his June 28, 2021 presentation to the BEC. A full copy of the slide deck is included in Appendix A.

Available Media for Internet Access

The primary media used for internet access today in the United States includes DSL, Coaxial Cable, Wireless and Fiber Optic cable.

DSL stands for Digital Subscriber Line and it is one of the technologies used to provide Internet connectivity to homes and businesses. DSL uses existing telephone lines and a transceiver to bring a connection into a home or business and allows the household to use the Internet and make telephone calls at the same time. DSL is asymmetrical (the download speed is much faster than the upload speed), is typically shared between 32 or 64 homes, and is capable of download speeds up to 100 Mbps. However, most consumers accessing the internet via DSL experience speeds between 5 – 25 Mbps.

Coaxial Cable uses copper cable designed with one physical channel that carries the signal surrounded by a layer of insulation and then another physical channel, both running along the same axis – hence the coaxial name. Coaxial cable is primarily used by cable TV companies to connect transmission facilities to customer homes and businesses to deliver cable T.V. and internet access. Coaxial Cable is asymmetrical, is typically shared between 32 or 64 homes, and is capable of download speeds up to 940 Mbps. A limitation of coaxial cable is that the signal begins to degrade after 360 feet.

Fiber Optic Cable sends information down strands of glass known as optical fibers which are about the size of a human hair. These fiber optic strands can transmit 25 Tbps today and researchers have successfully demonstrated a transmission experiment over 1045 km with a

data-rate of 159 Tbps. Fiber-optic cables carry information between two places using optical (light-based) technologies which convert electrical information from the computer into a series of light pulses. Fiber Optic Cable is capable of symmetrical speeds up to 25 Tbps and the signal can travel as far as 60 kilometers without degrading. Because the difference in capacity between fiber optics and alternative media is so significant, fiber optics should be the foundational media for any new broadband infrastructure project when financially feasible.

Wireless Internet access is made possible via radio waves communicated to a person's home computer, laptop, smartphone, or similar mobile device. Wireless Internet can be accessed directly through providers like AT&T Wireless, Verizon Wireless, T-Mobile or by a wireless Internet Service provider (WISP).

5G is the 5th generation of technology used in cellular networks and refers to a standard for speed and connection. Because of the extensive marketing around the emergence of 5G, many people wonder whether 5G will replace fiber optic cables. In fact, 5G depends on fiber optic infrastructure. All wireless technologies work better the faster they get back to fiber optics. The emergence of 5G is very early but there is a potential revenue opportunity for 5G carriers to operate on City infrastructure and contribute to the ongoing cost of network operations. Cellular networks can be symmetrical or asymmetrical and are sometimes capable of download speeds up to 2,000 Mbps.

Wi-Fi is common in homes and commercial buildings and is a way to deliver a network connection from a network hub over a wired connection to wireless devices via a wireless access point. Most people access the internet over a wireless connection, but it is important to remember that wireless connectivity ultimately depends on a wired connection and wireless access works best the faster it gets back to a wire.

Strategic priorities

Developing a large-scale fiber optic network is a significant public works project and information technology project. The following key strategic ideas should be used to guide any development:

Strategic Priorities for a Municipal Fiber Network: AFFORDABILITY AND ACCESSIBILITY

1. **Foster Competition and Choice** – The Town of East Haddam seeks to promote initiatives that will increase the number of internet service providers and types of services that are available to residents, thus improving affordability for residents and businesses.
2. **Solve the Digital Divide** – According to the 2020 U.S. Census, 10.7% of East Haddam residents do not have access to a broadband internet service. The Town of East Haddam seeks to promote policies and initiatives that will make internet access universally available and affordable.

3. **Promote Abundant Bandwidth and Network Reliability**– The Town of East Haddam seeks solutions that move from the current practice of treating bandwidth as a scarce commodity toward policies and programs which treat bandwidth as an abundant resource as well as promote network attributes that will increase speed and reliability for residents, businesses and government institutions.
4. **Foster Innovation and Economic Development** – By providing an affordable, accessible, and reliable broadband network, the Town of East Haddam seeks to retain and expand existing businesses as well as attract new businesses. Furthermore, the Town of East Haddam seeks to realize the innovations in technology for our public safety and educational institutions.
5. **Establish Local Control over Essential Infrastructure** – The national economy is now an information economy and the importance of digital infrastructure continues to grow. The Town of East Haddam has an interest in ensuring that residents and businesses have robust digital infrastructure and promoting initiatives that will give the Town greater influence over this important infrastructure.

Strategy Funding Considerations

The following should be the guiding principles for the business model of the proposed municipal broadband system:

1. Nobody will be forced to participate. Subscription will be on a voluntary, opt-in basis.
2. The ongoing operation of the network must be self-sustaining and not dependent on any kind of subsidy from the Town. Participants will be responsible for the cost of maintenance, operation, outages, and construction
3. The Town may contribute to get the network started, but any contributions from municipal finances will be paid back over time.
4. The Town will explore regional solutions to reduce network management and operations cost as well as grants and other types of funding from public and private entities.

Municipal Broadband Models

The BEC evaluated several Municipal Broadband Models deployed in other parts of the country, as possible solutions for the Town of East Haddam. The summary of each option, along with pros and cons of each choice, are detailed below:

Private Sector Owner & Operator, Single ISP

Summary: A private builder designs, builds and operates a network. The private entity is also the sole ISP on the network – replicating the incumbent model.

Pros: A private builder and operator assumes all the risk and does the work of overseeing design, project management, construction, customer acquisition and operations. This model increases the choices available to consumers with minimal obligation or burden for the city.

Cons: The new operator is replicating the incumbent model. There is no local control over infrastructure and ISP choices increase by just one new provider. There is no guarantee that the operator will address the digital divide. The network can be sold to another operator.

Predominate model used throughout the United States.

Private Sector Owner & Operator, Open Access

Summary: A private builder designs, builds and operates a network. The private entity uses an Open Access model rather than the incumbent model for service delivery.

Pros: A private builder and operator assumes all the risk and does the work of overseeing design, project management, construction, customer acquisition and operations. This model provides an increase in the choices available to consumers at almost no cost to the city. Risk exposure to the city is very low. The private builder/operator builds and stabilizes the network and may give the city the option to acquire the network after an agreed upon number of years for a premium price above the actual cost to develop.

Cons: There is no local control over infrastructure. There is no guarantee that the operator will address digital divide issues. A private owner will be free to sell the network to a new operator that may or may not be aligned with community objectives for the network.

An example of this model is Fullerton, CA (SiFi).

City Owned and Operated, Single ISP

Summary: The City owns and operates the network and is also the sole service provider on the network.

Pros: This model can be successful when incumbent operators have some combination of the following: monopoly or near monopoly status, high prices, poor infrastructure, slow speeds, a poor reputation, and widespread customer resentment.

Cons: A single ISP does not significantly expand choice or competition. There have been very few City Owned & Operated, Single ISP deployments that have been successful. The City is essentially replicating the incumbent model and competing against the incumbent head-to-head. This model leaves the City vulnerable to the incumbent dropping their price to influence the municipal take-rate and destabilize the municipal network.

Examples of this model include Sandy, OR and Monmouth, OR.

Municipal Electrical Utility Owned & Operated, Single ISP

Summary: The Municipal Electrical Utility owns and operates the network and is also the sole service provider on the network.

Pros: The most common municipal model that has been successful using a Single ISP approach has been the Electrical Utility model. A measure of this success can be attributed to the fact that the Electrical Utility has the advantage of having an established reputation in the community. Also, electrical Utilities often have financial, customer service, and engineering expertise that may be beneficial to the network and the skill set for Outside Plant personnel for a municipal network is similar in kind to the existing range of skills in an Electrical Utility. The likelihood of success increases in instances where the incumbent operator has monopoly or near monopoly status, higher than average prices, poor infrastructure, slow speeds, a poor reputation and/or widespread customer resentment.

Cons: A single ISP does not significantly expand choice. Expertise in network operations will need to be enhanced or developed. This model is essentially replicating the incumbent model and involves competing against the incumbent head-to-head. This model leaves the City / Electrical Utility vulnerable to the incumbent dropping their price to impact the take-rate and destabilize the network.

Examples of this model include Chattanooga, TN and Longmont, CO.

Automated Open Access

Summary: Automated Open Access is a model where the network operator places electronics at both ends of the network and subscribers can dynamically select service providers in real-time. Software Defined Networking is used to automate various network management tasks.

Pros: Multiple service providers can deliver services simultaneously and independently across a single wire. When a subscriber selects a new service provider, the provisioning is done using automation and therefore happens on-demand. The automated provisioning creates a marketplace for services which includes ISP's and private networks for other services. The ability to switch service providers on demand increases choice and competition. This network model also includes the ability to provide local network resilience via local communications if connections over the middle mile are down.

Cons: Town takes on responsibility for maintaining the broadband infrastructure.

Examples of this model include Ammon, ID

State of Connecticut and Local Town/Regional Initiatives

The BEC also gathered information about how other communities in the state of Connecticut are grappling with and solving the problem of broadband access for their citizens. The Connecticut Legislature's passage of H.B 6442, "An Act Concerning Equitable Access to Broadband", has prompted significant discussion around how the state will reach its goal of reaching all citizens with 1Gig of Broadband by 2027.

The state has an Office of State Broadband within the Connecticut Office of Consumer Counsel with Attorney Burt Cohen serving as the Broadband Policy Coordinator. The Connecticut Conference of Municipalities, also known as CCM, has an interest in bringing broadband to Connecticut towns and cities, and took a position with respect to the State statute. CCM advised that there were several towns and cities in the State of Connecticut that were either already using fiberoptics or were in the process of installing them. The towns of West Hartford and Glastonbury and the City of New London are either already utilizing fiberoptics or are in the process of beginning construction. A representative of the BEC had the opportunity to speak with representatives of those towns to learn more.

Based on these conversations, the BEC identified essentially four models being used in Connecticut.

1. The first utilizes a private company to install and service the network at a flat rate to provide internet services. See the discussion on Go Net Speed below.
2. The second is an effort at regionalization by involving as many neighboring towns as possible to share costs. See discussion on Northwest Connect below.
3. The third is where towns are individually expanding on the fiberoptic that was provided to them by the State. See the discussion on Plainville.
4. The fourth is where in depressed areas with limited access, cities through various funding are trying to bring limited fiberoptic to distressed areas of the city to assure access to the internet. See the discussion on New London.

West Hartford/Glastonbury/Avon

Go Net Speed currently services West Hartford, Glastonbury, Avon and other areas in that portion of the State (see article link in Appendix B). Go Net Speed actually is the company that installs the fiber optic cables and maintains them. At a flat rate of \$90.00 per month, Go Net Speed will bring you one gigabyte of internet to a home. They have no involvement in phone and all services are through the internet, such as streaming services, etc. They have no involvement in providing content, which the user determines on their own and the user pays for directly. This company will go to any municipality that expresses an interest and it is expanding significantly in the State of Connecticut. It already has 2021 and 2022 years booked as to locations in which it is expanding. For the time being, it seems unlikely it would expand to a rural area such as East Haddam, but it should be noted that companies such as this exist. For \$90.00 per month, this company assumes the risk of putting in the fiber optic cables, running the system and providing you with one gigabyte of band width.

Northwest Connect

Northwest Connect consists of approximately 25 towns in the northwest areas of the State. They have already joined together, have developed a website and their intention is to bring fiber optic through the 25 towns and cities on a regional cooperative basis. Of note, some of these towns apparently have full access to cable, internet and others do not, which as noted below, may become a factor. Nonetheless, there is already an established regional network that is attempting to bring in fiber optic to that portion of the State. These would be essentially municipal owned fiber optic networks through a regionalization plan.

Plainville

The Town of Plainville, like every town in the State of Connecticut, received a fiber optic connection from the State of Connecticut. In Plainville, they are currently installing fiber optics throughout the Town to connect all municipal and municipal-related structures to the existing fiber optic lead brought in by the State (see article link in Appendix B). This is all being done by the Town. Once they connect all town and town related structures, their next plan is to expand to businesses and residences based on demand and need. This would appear to be a truly single municipal-owned fiber network system.

New London

The City of New London is considered a distressed area and certain parts of the inner city have inadequate internet access. New London intends to seek funding for a limited fiber optic network to serve a pre-determined section of the City and population. Available funding will dictate the size of the City of New London's system. Apparently, a similar approach is being taken by the City of New Haven. According to our research funding for these projects is being sourced from private donors.

Next Steps

It is clear the question of community-wide access to robust broadband is a complex issue. There are currently towns in Connecticut trying to build upon the existing fiberoptic connection they have from the State to expand within their town and then potentially expand outward to residences and businesses. There is at least one significant regionalization taking place in the northwest section of the State which intends to be a regionally owned broadband network.

Private vendors are working on these questions but may not have an interest in ensuring all citizens have access. There is no evidence that their profit-centric thinking will lead to services in the most remote parts of our state, including towns like East Haddam. We believe it is in the town's best interest to be proactive.

While the state is committed to broadband, the State is not assisting towns in bringing fiberoptic networks into communities. It is simply requiring that everyone in the State have access, as reflected in the State legislation. The Town of East Haddam needs to carefully consider its next steps and cannot rely on the state to have an interest in fixing this issue for us.

Our need to proceed is based partly on the State's assessment that 1.) The Town of East Haddam is considered to be adequately served. Everyone who wants to be connected to internet through Comcast can, 2.) The Town's service is considered to be adequate, and 3.) The Town is not considered to be low income. For these reasons it is not likely that East Haddam will receive infrastructure funding from the state.

Our best opportunity to support the residents and businesses of the Town of East Haddam lies in conducting our own feasibility study to determine the logistics of installing a high-speed fiber-optic network in East Haddam. This will provide the most comprehensive understanding of the long-term costs and viability of offering our own municipal broadband network.

Given what we know now, of particular interest is an opportunity to fully explore an Automated Open Access model as an affordable and accessible high-speed internet service. The town would oversee installation and maintenance, but any Internet Service Provider can use the Fiber Optic Network to provide high-speed service to our citizens. Increased competition amongst ISPs equals lower prices for subscribers, and town supervised infrastructure ensures all citizens will be able to participate if they choose to.

To accompany the feasibility study, the BEC Committee also recommends that the town begin a comprehensive education campaign to educate citizens on the benefits of a municipal Fiber Optic network.

The Town of East Haddam will also need to continue to understand opportunities for funding to support both the feasibility costs and, ultimately, the building of a municipal broadband network. American Rescue Plan Act (ARPA) money may be available to the Town to cover the cost of the feasibility study. The Town would have the option of issuing a Request for Proposal (RFP) for a consultant to provide recommendations on how best to move forward. There are commercial entities with deep expertise who will do this, or the town may select a consultant who has no relationship with any particular provider or construction company for an independent analysis. The BEC anticipates that the study, which may cost as much as \$20K, could be partially funded through grants, sponsors and other interested parties, and that this funding could ultimately be returned to the Town through subscriber fees once a system is in place.

In light of the choices above and the complexity of the solutions, the BEC highly recommends the investment in a comprehensive analysis so the Town of East Haddam can take proactive steps toward meeting this fundamental resource need.

Appendix A: Entry Point Networks Presentation to the Broadband Committee

<https://www.youtube.com/watch?v=UgGWCRMo-x0&t=1946s>

Appendix B: References & Helpful Links:

Ammon, Idaho: <https://www.youtube.com/watch?v=tSQVvFY4IPI&t=373s>

Jeff Christensen Ted Talk: <https://www.youtube.com/watch?v=vELWxp3OOUA&t=160s>

Article on Comcast Next Generation Network: <https://www.lightreading.com/aiautomation/comcasts-next-gen-network-activity-didnt-slow-down-in-2020-exec-says-/d/d-id/767822>

<https://www.lightreading.com/cable-tech/cablelabs-prepares-to-take-docsis-40-to-test/d/d-id/771442?>

Go Net Speed Website: [GoNetspeed - Bring High-Speed Fiber Optic Internet Service To Your Community](#)

Article on Town of Plainville: <https://www.telecompetitor.com/plainville-begins-building-municipal-fiber-network/>