



# Maine West Regional Technology Plan

Sections I-V

Introduction and Background to the Report

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Submitted by:

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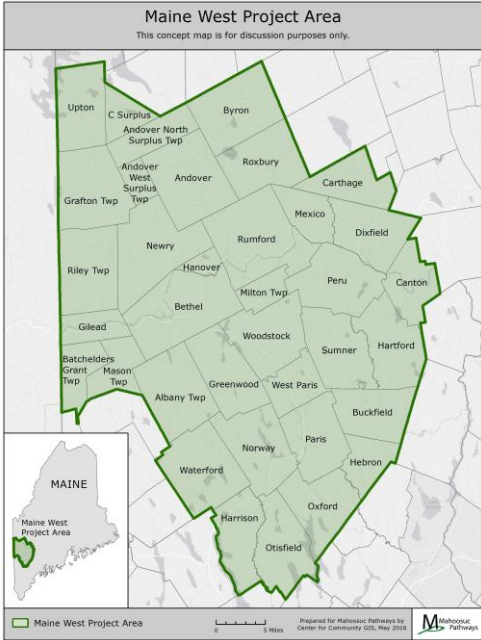
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# I. Maine West

Development of this plan was funded by a grant from the ConnectME Authority secured by the Northern Forest Center on behalf of Maine West – a partnership of local and regional organizations dedicated to addressing systemic rural challenges and enhancing community well-being in western Maine through increased collaboration across the economic, education, health and conservation sectors.

Focused in the Oxford Hills, River Valley and Bethel areas of northern Oxford County, Maine West advances its mission through a three-part, multi-sector program strategy:

- **Broadband Access & Adoption** – Identify and advance local and regional strategies to expand access to and utilization of broadband internet services to create jobs and support public safety, education, healthcare, tourism and overall quality of life.
- **Active Communities** – Improve local health outcomes, encourage youth and school groups to get outside and exercise, promote recreation on local conservation lands, and position rural communities as attractive places to live and raise families.
- **Educational Aspirations & Attainment** – Work with area school districts to develop new programs to expand learning opportunities and improve the linkages between schools, communities and local businesses.



Development of this plan was coordinated by Maine West partner Community Concepts Finance Corporation as part of its county-wide economic development program, and represents a first step in advancing a regional Broadband Access & Adoption strategy for the Maine West area. Moving ahead, Maine West partners are committed to working with local communities, businesses, and non-profits to implement recommendations outlined in this report and help the Maine West area capitalize on the promise of digital technology to enhance rural quality of life.

## MAINE WEST PARTNERS

- Northern Forest Center (coordinator)
- Community Concepts Finance Corp.
- Androscoggin River Watershed Council
- Bethel Area Chamber of Commerce
- Appalachian Mountain Club
- Bethel Area Non-Profit Collaborative
- Mahoosuc Pathways
- Mahoosuc Land Trust
- Oxford County Wellness Collaborative
- Trust for Public Land
- Appalachian Trail Conservancy
- Western Foothills Land Trust
- U. Maine Coop. Ext., Bryant Pond 4-H Camp
- Cathy Newell (at large/ Adult Ed)
- Steve Wight (at large)

To learn more about Maine West and its regional program strategy, or to access resources identified in this report visit: [www.mainewest.org](http://www.mainewest.org)

## II. Axiom & Its Vision for the Future

Axiom is a telecommunications and professional services company specializing in last-mile, rural deployments.

*Axiom believes every connection counts.*

Axiom believes that broadband access is vital in today’s digital age to create and sustain jobs and provide equal opportunity healthcare and education to all. We strive to create economic opportunity for everyone and to advance rural telecommunications models that are sustainable, scalable and replicable.

*Axiom’s Company mission is to deliver strategic and customized rural broadband deployment solutions to remote communities everywhere.*

Since our beginnings with the first fixed wireless internet connection in Washington County over 13 years ago, Axiom has grown to be a leading authority on rural broadband planning and deployments with innovative out of the box thinking that can save money, time and headaches. We work closely with leaders and area residents to design and deliver products and solutions specifically designed for each community’s needs.

*Axiom uses the best combination of product solutions to help build networks.*

Our deployment framework provides a methodology that allows for flexibility, but at the same time adheres to a clearly defined path. This helps ensure that the best product mix and execution is used for each community. Axiom is unique in Maine because we utilize the technologies that we recommend in our own network that includes Fiber Optics, Fixed Wireless, and DSL while always pushing the boundaries to test and deploy new technologies that include TV White Space with Microsoft as our partner and licensed LTE wireless technology that can reach customers in the remotest and most difficult areas to serve.

***“At Axiom, we believe rural broadband deployment is about much more than a fast connection- it is about people’s livelihoods, education and well-being”***

## Axiom's vision for the future

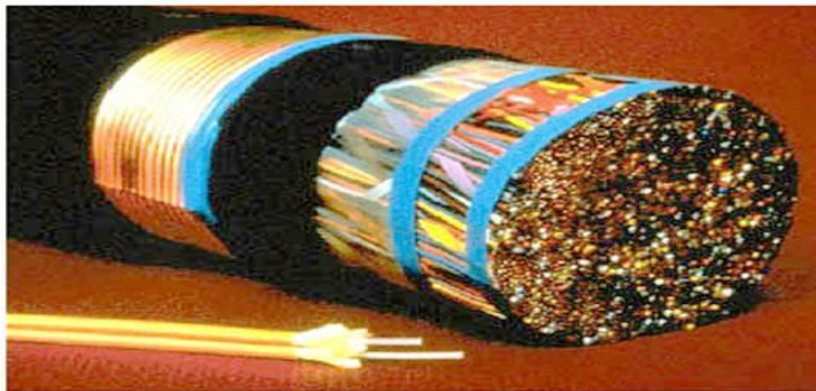
Communities across Maine West are looking for solutions to help preserve their way of life. But in the digital age that we live in healthcare, education, job growth, even shopping and entertainment, are impacted by the type of broadband connections available to the citizens who live, work and play in each and every one of your communities. At the end of the day, people just expect the broadband connection to work, they do not care about the technology (DSL, Cable, Wireless or Fiber) but rather if the connection does what they need to it to do.

We believe that all of you reading this report have an opportunity to change the economic status of the Maine West area by investing in regional and individual community projects that will bring business prosperity and social fairness and give individual citizens the tools they need to create their own economy through better internet connections.

Right now, the majority of the connections in the region are either DSL or Cable, and both run on essentially the same technology. These technologies have limitations that make them less than ideal, although they are making some strides in addressing the needs of their customers.

In many regions across Maine fixed wireless technology is deployed to address difficult and expensive to reach rural areas but is not ideal without line of sight from the home to the tower on which the equipment is broadcasting.

An emerging tool that widely viewed as the standard to replace these less than optimal technologies is Fiber Optics as a last-mile connection solution. For many years fiber has been used to transport large amounts of data at the speed of light across the world. Because it is expensive, it is only in the past few years that it this technology has begun to be used to directly connect the internet to each home or business.



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

Fiber optics is more expensive than other technologies to deploy, however, it is also much more futureproof with a life of 20, 30 even 40 years or more – often making this costlier investment up front, the least expensive option over time.

While expanding or enhancing current technologies may make sense today, rapid changes in how the internet is being used is driving decision making

toward a more permanent solution, that can withstand the increased demand and reliability that only fiber will allow.

**Business Development.** Much of the region has micro- or home-based businesses and the lack of better connectivity is hurting their prospects to grow. The location of a home or small business dictates the reliability, speed and cost of the connection. High-speed internet is one tool that can address the economic lag that is created by lack of connectivity.

**Business Attraction.** Communities across Maine look to bring new businesses to their communities, helping to rebuild Main Street and bring vibrancy to their downtowns. However, in rural communities the challenge is to differentiate themselves from other, equally attractive places. We often hear that a business will not move to a location with a poor internet connection.

**Workforce Development.** Because Maine is one of the oldest states in the nation, we often struggle with keeping our young people or attracting new families to our communities. World class connectivity allows working-age families, who can increasingly work from anywhere, to move to Maine for our way of life while still maintaining a job elsewhere.

**Telemedicine.** We have already mentioned that we are an aging state, and that will require better solutions for our seniors who wish to stay in their homes longer and are increasingly able to receive care through tools that are fully enabled by a robust internet connection.

**Education.** Lifelong learners and our children are increasingly being left behind by not being able to do their homework or educational work online because of the lack of connectivity, expanding what is commonly called the Digital Divide.

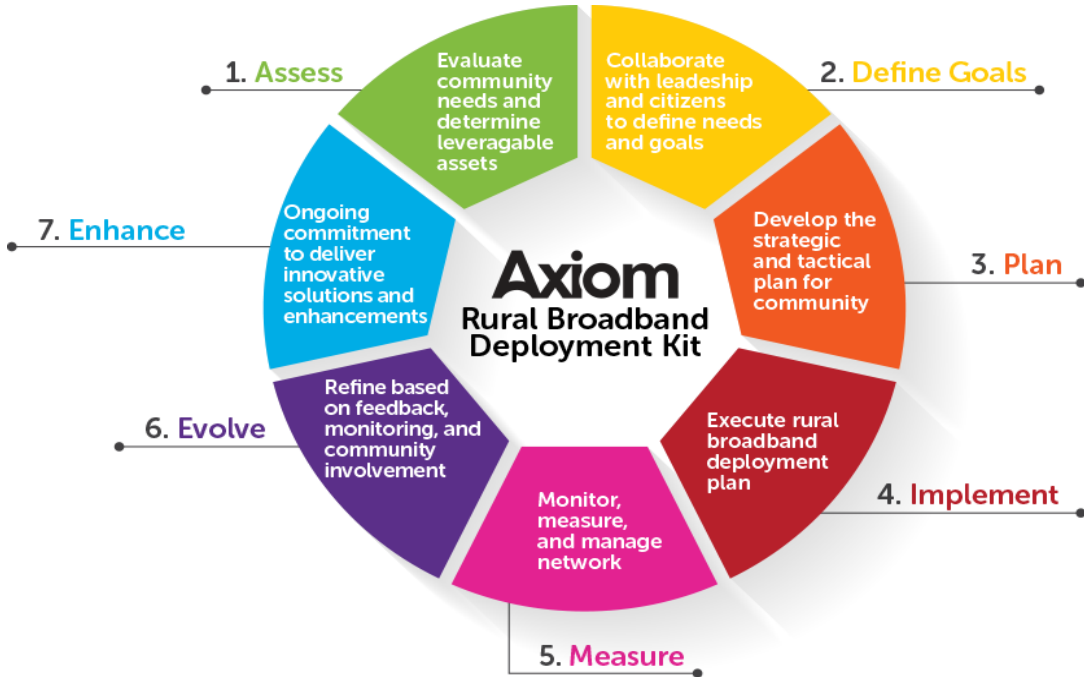
The technology tradeoff is cost versus capability. If the region wants to transform itself and build a 21<sup>st</sup> Century economy and leapfrog much of Maine and the rural U.S., Axiom strongly recommends fiber as the technology to consider. It helps Maine West reach all of its goals, makes the region even more attractive than it is already, and will support future internet demand with little to no upgrades. The region currently has a significant amount of fiber that with some concrete steps and this vision can be utilized to better serve homes and businesses.

While we recommend the use of fiber wherever feasible and practicable, we recognize the cost and other factors that might lead a community to consider other technologies or expanding current provider coverage as a lower cost option.

See Appendix A for a more complete explanation of the long-term benefits of investment in fiber optic networks.

### III. Study Background and Structure of Report

Axiom uses a planning and deployment methodology that helps move partners through the process of planning, building and managing a Broadband Deployment Project. For the purposes of this report, we have worked both regionally and at the community level through the first 3 steps of this process and begun to look for opportunities to implement Step 4 projects. Steps 5-7 are beyond the scope of our planning work but are a visual guide on how projects are managed once they are constructed and operational.



#### Assess

Work with existing Internet Service Providers to obtain coverage areas and assess any gaps in coverage that needs to be addressed. Identify any assets that exist and might be utilized.

#### Define Goals

We interviewed almost all 25 communities in the Maine West area and worked with them to develop goals on what they would like to achieve. We also asked each community to form a Broadband Committee as a mechanism to disseminate information to the community about Broadband connectivity in their town and to be a champion for future investments.

#### Plan

The plan for Maine West includes:

- As much documented mapping as available for current provider coverage areas in the region



- Fiber plans for those communities that requested them
- Wireless solutions for communities looking for a low-cost solution for unserved or underserved areas
- HotSpots that can serve high-traffic areas, or as a limited replacement for poor cellular data service
- A series of regional recommendations
- A Digital Inclusion Plan that addresses four components:
  - Affordable Internet
  - Affordable Computers
  - Digital Literacy
  - Public computer access

## Implementation

The planning document is meant to provide a springboard for implementing local and regional recommendations. We provide a menu of options, based on the goals of the community, to identify actionable projects to help communities build their internet capacity. To this end, we have included a list of potential federal and state grant programs that towns or the region may consider for funding these projects.

Axiom stands ready, long after this planning phase is completed, to answer questions, attend meetings and work with Maine West or any community to implement these recommendations. This document is a beginning to a process of bringing better internet connectivity to the region or individual communities.

## IV. Technology Terms

Like other industries, the internet technology sector and Internet Service Providers use a set of common terms to the industry that are not commonly understood by the public. This section is designed to give definition to the terms you will encounter throughout this document.

**Mbps** – Megabits per second are a unit of measurement for bandwidth and throughput on a network. Practically speaking, the higher the Mbps, the better user experience will occur or the more devices that can use the same connection easily and without lag or interruption.

**Broadband** – Is a general term used to define high speed internet connections to the premise. The Federal Communications Commission defines Broadband minimally as a 25/3Mbps connection.

**Download vs Upload Speeds** – An internet connection has two speeds that indicate “download” and “upload” speeds. The service level always has the download speed first and the upload speed second (e.g. 25/3Mbps; 25 indicates download, 3 indicates upload).

Most connections are designed to download much faster than upload since the majority of online activities, like loading web pages or streaming video consists of downloads. Upload speed is how fast you send data from your computer to others.

**Symmetrical service** – Internet connections that have the same download and upload speeds (e.g. 25/25Mbps).

**DSL** – Digital Subscription Lines is a term used for internet connections using your copper telephone lines.

**Fixed Wireless** – Is the use of a microwave wireless signal to connect two fixed locations, typically from a tower to a subscriber’s home.

**Fiber Optics** – refers to the transmission of information through a flexible fiber of glass using pulsating light.

**Cable** - also called coaxial cable (thicker copper than DSL) to transmit telephone, television and internet signals.

**Public-Private Partnerships**– For the purpose of this document is defined as a contractual relationship between an Internet Service Provider (ISP) and a community that delineates each other’s roles and responsibility in owning and operating a network.

## Technology comparison

Technology	Pros	Cons	Cost
<b>DSL (Digital Subscriber Line)</b>	<ul style="list-style-type: none"> <li>▪ Already covering most of county</li> <li>▪ Can reach low density areas effectively, but requires equipment upgrades</li> </ul>	<ul style="list-style-type: none"> <li>▪ Old Technology</li> <li>▪ Copper is susceptible to corrosion</li> <li>▪ Distance the signal can push is limited (3 miles)</li> <li>▪ Very limited bandwidth (less than 25Mbps)</li> <li>▪ Not symmetrical</li> </ul>	\$70,000 per new Remote terminal
<b>Cable</b>	<ul style="list-style-type: none"> <li>▪ Recent upgrades are able to achieve over 100Mbps</li> <li>▪ Provider is open to expansion</li> <li>▪ Reliable</li> <li>▪ Can bundle, phone data and TV</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not as scalable, expensive to upgrade</li> <li>▪ Not truly symmetrical- limited on how bandwidth can be pushed in both directions</li> <li>▪ Shared system, demand on system effects user experience</li> <li>▪ Expensive to consumer</li> </ul>	A recent quote to serve 5-7 homes in a 2-mile stretch was \$250,000
<b>Fixed Wireless</b>	<ul style="list-style-type: none"> <li>▪ Reach areas not covered by current providers</li> <li>▪ Lower cost solution</li> <li>▪ Line of Sight best application for Wireless</li> </ul>	<ul style="list-style-type: none"> <li>▪ Can be affected by weather</li> <li>▪ Less reliable than fiber</li> <li>▪ No guarantee that all homes can be served in an area</li> <li>▪ Terrain and other factors affect the signal</li> </ul>	\$100,000-\$150,000 per 100 connections
<b>Fiber</b>	<ul style="list-style-type: none"> <li>▪ Current technology allows for up to 1Gig (1000Mbps) of service to each home</li> <li>▪ Easily and inexpensively scalable</li> <li>▪ Top reliability among all technologies</li> <li>▪ Futureproof- 20 years or much longer</li> <li>▪ Symmetrical- built for the future</li> <li>▪ Can deliver data, phone and streaming TV content</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up-front costs are much more expensive</li> <li>▪ Financial model is more difficult to achieve in very rural applications</li> <li>▪ Often requires subsidy of outside (taxpayer) dollars to deploy</li> </ul>	\$30,000 per mile, \$800-\$1000 per connection to the home

## V, Internet Providers

The Maine West region has several internet providers who use two main types of connections from the internet to the subscriber premise – DSL and Cable. Spectrum offers co-ax cable connections that can deliver high-speed internet, phone and television. Consolidated Communications and FirstLight offer DSL service to homes and generally cover the more rural parts of the Maine West area. All three do have fiber in the region, but it is expensive to access and is typically reserved for business use. We are aware that other Internet Service Providers also provide internet service, including GWI and satellite services, such as HughesNet.

### Spectrum

**(Formerly Time Warner Cable)** Spectrum serves some area communities, typically in their downtown, or more populated residential areas. Since becoming Spectrum, company officials have been reaching out to communities to renew their franchise agreement. Spectrum, like many cable TV operators, has non-exclusive rights to offer their television service to a specific town or territory in the form of a Franchise Agreement. These agreements typically return a certain percentage of the revenue collected from subscribers back to the municipality while the cable operator is typically required to reach a specific threshold of numbers of homes served.

Many of these agreements are out of date and were signed many years ago. Renewing these agreements can provide an opportunity the community to review the old document to ensure that Spectrum is living up to the terms of that agreement, while simultaneously, giving the community a leverage point for further negotiations to expand service, or adjust franchise fee payments to the town.

Many Maine West communities are currently in negotiation with Spectrum and results of those negotiations will emerge over the next few months.

Spectrum has service in the following communities:

Andover	Bethel	Buckfield	Dixfield	Woodstock
Greenwood	Otisfield	Newry	Norway	West Paris
Roxbury	South Paris	Waterford		

Spectrum's main offering is cable TV delivered through co-ax cable. Internet and phone service is also offered as part of Spectrum's Triple Play. Spectrum also offers on-demand fiber service, typically on a case-by-case basis and only to businesses. Recently, Spectrum has been aggressively increasing Broadband service speeds to the home, going from a 50Mbps to a 100Mbps offering, and a second plan that offers up to 120Mbps. Legacy Time Warner customers can keep their current plans, but Spectrum has rolled out these new plans across the state and only offers the two tiers of internet to new customers.

Because of the way that Spectrum's technology works, the internet service that each home receives can vary depending on usage from other homes along the cable route. At heavy use times (i.e., after school or in the evening), speeds can be slowed considerably by the demand on a finite amount of bandwidth that can travel along that route.

### Consolidated Communications (formerly FairPoint Communications)

Consolidated is an ILEC (Incumbent Local Exchange Carrier) that provides local phone service via the Telecommunications Act of 1996. Over time, ILECs like Consolidated have evolved to offer internet service (i.e., DSL) over the same infrastructure that provides local phone service.

Consolidated has service in the following communities:

Rumford	Dixfield	Norway	Oxford	Mexico
South Paris	Paris	Waterford	Peru	Hanover

DSL is a technology that has several limitations but is also available in more remote areas. Currently, through an influx of federal dollars, Consolidated Communications continues to upgrade eligible census blocks throughout the state. For Oxford County, those upgrades have been completed and Consolidated reports no new upgrades will occur in 2018. For those that received upgrades, new offerings allow for up to 25Mbps and minimum speeds of 10Mbps. Because of the age of the copper and the rural nature of their service, reliability and speeds can vary widely. The farther away from the equipment a subscriber is, the lower the maximum speeds are available, and reliability can also suffer.

However, as mentioned, DSL offerings from Consolidated often serve remote areas where no other alternative (other than satellite or cellular hotspots) can bring service, making Consolidated DSL service indispensable in many areas in Maine.

In addition, Consolidated Communications operates an extensive fiber optic network in Maine and offers fiber service to businesses that need this type of connectivity.

### FirstLight (formally Oxford Networks)

FirstLight is also an ILEC and their technology (DSL) and service offerings are typically comparable to Consolidated. Offerings to residents range from 20Mbps to 3Mbps or less, dependent on the location of their equipment and the quality of the lines. They have aggressively worked on obtaining business customers with a robust fiber optic trunk through western Maine and beyond. In our discussions with FirstLight they are focused on utilizing their fiber assets and are aggressively marketing to businesses, while not indicating any desire to enhance their DSL.

FirstLight has service in the following communities:

Buckfield	West Paris	Bethel	Sumner
Canton	Greenwood	Bryant Pond	Andover