ATTACHMENT A

Precertification Checklist

A community must answer each of these items, in the format below, to be certified for the planning grant process. A "no" answer is perfectly acceptable; this is stakeholder and information gathering process. Once certified, a community will be eligible to participate in the competitive process to receive funds from the ConnectME Authority for a broadband planning grant.

1. Create a Community Broadband Team

- Provide list of members, including name and title:
  - Must include at least one representative from municipal government for each community seeking certification
  - If it is known that a non-profit or economic development entity will ultimately be seeking a grant using this precertification, should include one member of that non-profit
  - Members could include residents and representatives with experience in health care, business, and education.

Please see attached: 1. The Lakes Region Broadband Partnership

- Must designate single point person for communications with ConnectME for certification process, provide email address to ConnectME.

Tom Bartell, Executive Director Windham Economic Development Corporation
thbartell@windhammaine.us

2. Hold at least one Community Broadband Meeting

Beginning in May, 2015, representatives of the towns of Windham, Raymond, Gray, Standish, and St. Joseph's College, a major anchor institution located in Standish, conducted a series of meetings to assess community interest/needs for broadband capabilities. The intersection of Routes 35 and 114, in Standish, is the Lakes Region Broadband Partnership's closest point for connection to the Three-Ring Binder.
Please see attached: 2. Meeting Details.

- Send emails to broadband providers currently serving your community and invite them to the community meeting.
- Share results of ConnectME Mapping for this community.

Each of the broadband providers presented maps of their services within the region.

- Questions for attendees:
  - Which providers are currently serving your community?

    Fairpoint Communications, OTT Communications, Time Warner, and GWI.

  - Which providers attended your meeting?

Fairpoint Communications, OTT Communications, Time Warner, and GWI.

- How do the mapping results compare with members' actual experiences?

  The maps provided by the providers fairly represented the understanding and experience of the committee members.

- Does existing broadband access meet your needs?

  No.

- If it is inadequate in what ways does it fall short?

  Inadequate availability; inadequate speed; inadequate reliability; excessive cost.

- If you have broadband, how do you use it now?

  Please refer to the answer for #3, first bullet point, below.

- Provide documentation showing meeting dates, notes, agenda and number of attendees, emails to providers and responses to the questions above.

  Please see attached: 2. Meeting Details

- [ConnectME may need to provide guidance/suggestions on how address areas of this section]

3. Identify Key Documents/Existing Efforts

- Does the municipality use broadband to deliver municipal services? Describe the services, and how broadband is used to deliver these services. (e.g., town office has a broadband connection it uses to submit information to state government, police department uses broadband to communicate with state or federal databases or assessors' office make access to property records and maps available to the general public)

  Members of the Lakes Region Broadband Partnership use broadband access, through local providers, for delivery of services in varying degrees. Consensus of the municipalities is they are grossly underserved for broadband access.

  Municipalities provide the public with information that is pertinent to their function and the governmental/citizen relationship. Services range from websites that offer information regarding local property records, tax issues, public meetings, permitting processes, and local events to voter registration, electronic registration of vehicles, watercraft, and dogs; issuance of marriage licenses, birth and death certificates, hunting and fishing licenses, and connection to social media. Public safety departments use their fiber connection for life saving communication. Broadband is used as a network connection between different inter-municipality facilities. Libraries provide digital access to the public. Broadband allows staff and citizens the opportunity for research, communications, and connection to the greater world.

Local school districts are afforded expanded opportunities for on-line student education and enrichment; additional resources for adult education programs that will help bridge the digital divide, and added possibilities for teachers and administrators. SAD 6, in Standish, has a single 1 Gb/s pipe connected to the Three Ring Binder project and located at Bonny Eagle Middle School. The remainder of their schools are served via fiber from local providers.

St. Joseph's College utilizes its current broadband connection as a vital part of its function and existence. Administration uses it for communication, research, recruitment, finance, management and planning. The academic program benefits through study and research, cloud based file storage, on-line learning capabilities for 3,000 plus students, and library services. Students use broadband recreationally for music and video streaming, social media, on-line gaming, and video calling.

- Is there local or regional economic development plans in which broadband could play a role? If so, provide a list of these documents.

Town of Windham:

- Economic Development Strategic Plan
- 21st Century Downtown Plan
- Route 302 North Plan
- South Windham / Little Falls Revitalization Plan

Town of Gray:

- Gray Village Area Master Plan
- Route 26 Corridor Rezoning Project
- Route 26 Corridor Collabrative
- Targeted Market Analysis
- Gray Comprehensive Plan

Town of Raymond:

- 2014 Report to Town of Raymond Citizen Survey
- Business Focus Group
- Raymond Comprehensive Plan

Town of Standish:

- Standish Corner District Village Plan
- Sebago Lake Village Plan
- Steep Falls Village Plan
- Standish Comprehensive Plan

- Does the town have a cable franchise agreement?

Yes, the towns within the Broadband Partnership have cable franchise agreements.

- Are there any on-going community projects focusing on the digital divide or information technology (public access through schools or libraries, training, improving access to broadband, etc.?)

  The Lakes Region Broadband Partnership has been actively working on the process for regionally accessing the Three-Ring Binder since May, 2015 and is currently applying for the ConnectME Community Planning Broadband Grant.

  Libraries within each of the Broadband Partnership towns offer public access.

  Adult Education programs in SAD 6 (Standish), RSU 14 (Windham/Raymond), and Gray offer a range of computer literacy courses from basic introduction to more advanced instruction. As an example, the Adult Ed program in RSU 14 provides classes as well as serving as a test/proctor site for the Microsoft Office certification tests and other high-stakes/web-based tests. The Network Maine system, provides programs a way of hosting a class in one location and broadcasting it to many other locations. Students attend class at the adult ed program closest to home – watching and interacting with their classmates around the state. This system is also used by programs to provide professional development training to adult ed administration and instructors.

- Is there a TIFF or other economic development grant for all or part of the area to be served?

  Yes. Windham has three TIFs covering several locations in the area to be served. Part of the area that may be served is located in the Town of Raymond TIF District. Standish has the Standish Corner TIF. Gray may be able to use the Northbrook TIF.

- Does the town have a municipal electric company? If not, what electric utilities serve the area?

  None of the Broadband Partnership towns has a municipal electric company. Central Maine Power provides the electric utilities.

4. Identify potential Community Anchor Institutions

- Provide a list of potential community anchor institutions.
- Community anchor institutions are entities such as schools, libraries, hospitals and other medical providers, public safety entities, institutions of higher education. Anchor institutions can also be community support organizations that facilitate greater use of broadband by vulnerable populations, including low-income, the unemployed, and the aged.

  Town of Windham:
  - Municipal Offices, Public Safety, Library, Public Works
  - RSU14 High School, Primary School, Middle School, Elementary School
  - Cumberland County Dispatch Center calls are sent to Windham
  - Mercy Quick and Primary Care, Orthopedic Associates, Multiple smaller medical offices

  Town of Raymond:
  - Town Offices , Raymond Public Safety Buildings, Raymond Village Library
  - RES Elementary, JSMS Middle School (RSU 14)
  - Raymond Redi-Care Clinic

Town of Gray:
- Municipal Offices, Library, Schools
- Main Department of Transportation (MDOT)
- Maine Turnpike Authority (MTA)
- Maine State Police

Town of Standish:
- Municipal Offices, Public Safety, Public Works
- Steep Falls Library
- Richville Library
- SAD 6 High School, Middle School, Elementary Schools
- St. Joseph's College
- Saco Bay Orthopedic
- Steep Falls Family Medical

- Provide a list of commercial institutions that could benefit from lower cost, higher bandwidth, and/or improved reliability of broadband.

  In each partnership community the commercial corridors would benefit through provision of broadband to existing businesses, and because of the potential to attract new commercial development. Existing commercial institutions are listed:

  Town of Windham:
  - Windham Weaponry
  - System Architecture
  - Hardy pond Construction
  - Lighthouse Imaging
  - Enterprise Development Business Park

  Town of Raymond:
  - Sabre Yachts
  - The Route 302 business corridor in general.
  - Dielectric Communications Tower

  Town of Gray:
  - Northbrook Business Campus
  - Howell's Gun ad Archery Center
  - Bean and Allen
  - Patient Advocates
  - Entercon
  - Narrow Gauge Railroad – coming soon

  Town of Standish:
  - Colonial Marketplace
  - New England Castings Building
  - Gorham Savings Bank
  - Norway Savings Bank

5. Create a Vision Statement

- A Vision Statement is created by Community Broadband Team with input from public at the Community Broadband Meeting, with the goal to take a first step toward being able to set a direction for the community's future broadband efforts.

Lakes Region Broadband Partnership Precertification Checklist

Following release of the Tilson Report, High Speed Broadband in the Lakes Region, the Partnership met and developed the following Vision statement:

The Lakes Region Broadband Partnership envisions symmetrical gigabit services to every premise in the region and as a priority the establishment of services in our business corridors and downtowns within two years. Digitally aware citizens will have increased opportunities to access information and services via an enhanced broadband network as well as the opportunity to participate in digital education through a larger partnership of providers and programs. Public computer access will be broadened throughout the region, and programs will be available for citizens of limited means to access the equipment, training and broadband services necessary in the 21st Century.

- The statement should describe the role broadband would play in this community's future, using input from the other steps in the precertification process.
    - Identify specific priority areas (*e.g.*, connecting community anchor institutions, ensuring older citizens can age in place, closing the "homework gap", providing affordable high speed connections to a business park).

    Specific priorities for development of a regional broadband network:
    - Establish a sustainable method of financing and operating a regional broadband network.
    - Install infrastructure for connection to the Three-Ring Binder.
    - Provide access which is not currently available, through extension of the network infrastructure; and by increasing internet capacity, speeds, reliability, and affordability.
    - Support and expand existing commercial corridors; attract the development of innovative technologies; stimulate small local business; foster entrepreneurship; and strengthen workforce digital capabilities.
    - Enhance access to governmental, educational and medical information, services and support for a multi-generational community demographic.
    - Enrich citizen exposure to the digital universe through provision of additional opportunities for digital education and utilization.

- Explain how this effort conforms to other planning documents/published visioning efforts on other issues in your community.

  In addition to Comprehensive Master Plans, each municipality member of the Partnership has taken steps to develop ongoing plans and visions that are intended to guide their progress in a way which is supportive and beneficial to the lives of the citizenry, encourages economic development and job diversity, and contributes to establishing a sense of place.

  The 2014 Report to the Town of Raymond Citizen Survey noted internet and social media were citizen's most frequently used communication tools to get important information. Investigating options for alternative high speed internet service and/or providers (e.g. fiber optics) was supported by 57.5% of survey respondents. Expanding economic development efforts were supported by 61.1% of survey respondents. The Town of Raymond 2015 Business Focus Group

Report recommended continued participation in working toward regional broadband infrastructure.

Windham's 21st Century Downtown Master Plan and South Windham / Little Falls Revitalization Plan establish a vision of creating a place where people want to live and work that will encourage a mix of residences and commercial ventures. The Windham Economic Development Strategic Plan calls for the expansion of infrastructure to and within the North Windham Downtown and our South Windham Village in support of economic development and to help provide a sense of place for people to live, work and play.

Gray's Village Area Master Plan notes a lack of public infrastructure to support economic development as an opportunity to change. The Route 26 Corridor Study is a collaborative effort between the Town of Gray and MaineDOT to understand future options for a segment of Route 26 and to explore the implications of additional commercial development. Gray is also in the process of rezoning sections of Route 26.

Standish's Standish Corner District Village Plan, Sebago Lake Village Plan, and Steep Falls Village Plan examine the town's three village areas and explore the possibilities for enhancing residential, commercial and recreational uses, growth areas, and design. Rails to Trails Mountain Division Plan users who would pass through Standish would be able to access broadband at the adjacent libraries.

Expanded broadband accessibility is a necessary component to the realization of the goals contained in each town's plans. Broadband access will attract new and diverse employment and businesses in our communities. It will provide social and educational opportunities for our families. It will provide the digital infrastructure that allows social service agencies, medical professionals, and other support services to make it possible for seniors to age in place and all of us to take advantage of telemedicine. High speed broadband access has become an expectation of today's society.

Lakes Region Broadband Partnership Precertification Checklist

Attachments

1. The Lakes Region Broadband Partnership List

Representatives from Municipal Governments * Also a resident of a stakeholder town.

Deborah Cabana	Town Manager, Town of Gray, Maine*
Kathy Tamborelli	Planner, Town of Gray, Maine
Richard Bibber	Planning Board, Town of Gray, Maine*
Don Willard	Town Manager, Town of Raymond, Maine*
Laurie Forbes	Information Technology Committee, Town of Raymond, Maine*
Gordon Billington	Town Manager, Town of Standish, Maine*
Tony Plante	Town Manager, Town of Windham, Maine*
David Nadeau	Town Councilor, Town of Windham, Maine*
Ben Smith	Planning Director, Town of Windham, Maine
Elisa Trepannier	Assistant Assessor & GIS Technician, Town of Windham, Maine*
Tom Trautlein	Systems Administrator, Town of Windham, Maine*

Economic Development Entity * Also a resident of a stakeholder town.

Tom Bartell	Windham Economic Development Corporation, Executive Director*
John McInnis	Windham Economic Development Corporation, Board of Directors*
Jean Bibber	Chair, Town of Gray Community Economic Development Committee*
Lacy Antonson	Member, Town of Gray Community Economic Development Committee*
Colette Tweten	Member, Town of Gray Community Economic Development Committee*
Aimee Senatore	Executive Director, Sebago Lakes Region Chamber of Commerce
Tina Christopherson	President, Sebago Lakes Region Chamber of Commerce & RSU 14 Adult Ed

Residents, Representatives, & Local Businesses

Richard Cabana	Resident, Town of Gray, Maine
Travis Kennedy	Office of Senator Angus King
Nadeen Daniels	Cumberland County Government, Maine
Patrick Corey	State Representative, District 25, Windham
Bob Nadeau	USDA Rural Development
Yvonne Berry	Vice President & Chief Financial Officer, St. Joseph's College, Standish, Maine
Eric Phillips	Information Technology, St. Joseph's College
John Murray	Network Administrator, St. Joseph's College, Standish, Maine
Bob Hickey	Technology Director, RSU 14 Windham Raymond Schools
Aaron Hamlin	Technology Coordinator, RSU 14
Jim Damicis	Senior Vice President, Camoin Associates
Vince Micale	President and CEO System Architecture
David Richard	Operations Manager, System Architecture
Brent Brown	System Architecture
Al Evans	Network Engineer, System Architecture
Mark Ouelette	President and Chief Operations Officer, Axiom Technologies
Alan Faraday	Executive Vice President of Operations, Windham Weaponry
	Vice President, Sebago Lakes Region Chamber of Commerce

Percy Dieppa	Information Technology Manager, Windham Weaponry
Milan Nevajda	Planning Decisions
Kevin Woodbrey	Woodbrey Consulting
Colette Tweten	Gray Economic Development Committee
Fran Monroe	Gray Economic Development Committee

2. Meeting Details

From: Tom H. Bartell [mailto:thbartell@windhammaine.us]
Sent: Thursday, April 30, 2015 9:34 AM
To: jim@camoinassociates.com; Gordon Billington (gbillington@standish.org); Willard, Don (don.willard@raymondmaine.org); danielle.loring@raymondmaine.org; Tony Plante; Ben Smith; David Nadeau; allen faraday (afaraday@windhamweaponry.com); Yvonne Berry (yberry@sjcme.edu); Aaron Hamlen (ahamlen@windhamraymondschools.org); Bill Hansen (bhansen@windhamraymondschools.org); Vincent Micale; Milan Nevajda (milan@planningdecisions.com); Lisa Fisher; Aimee Senatore; Tom J. Trautlein; Patrick.Corey@legislature.maine.gov; mark ouellette (mark.ouellette@axiom-tech.net)
Subject: Community Broadband Discussion this Friday May 1st, from 11:00am to 1:00pm, in the Hall of Fame room at Saint Joseph's College's Alfond Center

Hello All: Thank you for agreeing to participate in the Community Broadband Discussion this Friday May 1st, from 11:00am to 1:00pm, in the Hall of Fame room at Saint Joseph's College's Alfond Center. There will be signs directing you to the meeting room. Vince Micale, President SystemArchitecture.net, a Windham company, will be facilitating the meeting. We will have a broad range of interests represented so our conversation should be a lively one at least. Our agenda will be a close to the following as possible:

11:00 Introductions
11:10 Defining the issue: Bringing fully realized Fiber Connectivity to our Region, our Communities
11:20 Current experiences: Hearing from each of us.
12:00 Lunch and networking around the table: Question: Who are we missing from this conversation?
12:20 Answering the question: Do we want to pursue an initiative to bring Community Broadband to our Region?
12:40 Outlining Next Steps
12:55 Meeting Wrap Up

Thank you all again and I look forward to a great discussion and a fruitful meeting. Tom.
Thomas Bartell
Executive Director
Windham Maine Economic Development Corporation
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Windham, Maine 04062
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www.windhammaineretail.com

Lakes Region Broadband Partnership Precertification Checklist

BROADBAND WORKING GROUP
MAY 1, 2015
ST JOSEPH'S COLLEGE

Attendees:

Vince Micale – President and CEO, System Architecture
David Richard - Operations Manager, System Architecture
Al Evans – Network Engineer, System Architecture
Jim Damicis – Senior Vice President, Camoin Associates
Don Willard – Town Manager, Town of Raymond
Danielle Loring – Executive Assistant, Town of Raymond
Laurie Forbes – Technology Committee Chair, Town of Raymond
Dominic Dymond– Studio Manager, Town of Raymond
Mark Ouellette – President and Chief Operations Officer, Axiom Technologies
Patrick Corey – State Representative, District 25
Allen Faraday – Executive Vice President of Operations, Windham Weaponry and Vice President Sebago Lakes Region Chamber of Commerce
Percy Dieppa - Information Technology Manager– Windham Weaponry
Yvonne Berry – Vice President and Chief Financial Officer, St. Joseph's College
Eric Phillips – Information Technology, St. Joseph's College
Milan Nevajda – Planning Decisions
Aaron Hamlin – Technology Coordinator, RSU 14
Tony Plante – Town Manager, Town of Windham
Ben Smith – Planning Director, Town of Windham
Tom Trautlein – Systems Administrator, Town of Windham
Tom Bartell – Executive Director Windham Economic Development Corporation (WEDC)
David Nadeau – Chair, Windham Town Council
Lisa Fisher – Administrative Assistant, Planning and Economic Development Town of Windham

Goals of the Meeting:

- To determine interest in a community effort to bring fiber optics into the local service area.
- To start discussions and facilitate the process.

Some broadband service is currently available from Time Warner and Fairpoint:

- Lack of competition among providers can result in high service costs.
- Speed, up and down, is a consideration.

Benefits of a local network:

- Strong fiber would attract business and enhance capabilities of existing businesses, potentially transforming local economic communities.
- Tourism – people want to get away from it all, but they still want highest connectivity.
- Upload speeds are critical for tourism, entrepreneurs, education, and healthcare.
- Broadband capability would tear down logistical barriers related to living/commerce in Maine.
- Providing connectivity speed at a reasonable price will increase demand.
- Fiber optics offer an unlimited amount of connectivity.

What makes community broadband?

- It is community driven.

- It operates like a public utility.
- It is available for use to everyone.

The Three Ring Binder:

- The State installed the Three Ring Binder to provide rural broadband access.
    - It was installed as far as the intersection of Routes 35 and 114 in Sebago Lake Village.
    - Infrastructure is needed to connect locally to the Three Ring Binder.
    - There are subsidies available to help with fiber optic build-out.
    - Individual communities are getting into the fiber backbone business. They own the infrastructure and are leasing to provide access. Among these:
        - Rockport
        - South Portland
        - Searsport
        - Islesboro

Options for stimulating access to community broadband:

- Public
- Private
- Some mix of public and private

Cost of infrastructure:

- $25,000 per mile for fiber installation
- $1,000 to $2,500 per connection

Societal Expectations:

- People telecommute.
- Connectivity is a fundamental expectation.
- New technologies continue to increase the need both in business and at home.

Consensus:

There was an enthusiastic consensus to continue the process.

Next Steps before the next meeting:

- Formulate decision points re: public vs. private
- Develop a framework and action plan
- Research geography

Team members tasked with the next steps are:

- Laurie Forbes
- Mark Oullette
- Yvonne Berry
- Tom Trautlein

Miscellaneous Observations:

- Outreach to local/regional entities could compound support.
    - Libraries
    - Educational

    - Medical
    - Major industries
    - Major private sector businesses
    - Other area towns
    - Legislation
- Tommy George, with Cumberland County may be a good resource for county support.
- Research regional vs. municipal.
- Invite a telecom and ask them what they could do.
- There is a diverse set of needs.
- Give equal opportunity to everyone. Let them know what is going on in case they want to be involved.
- There is some value to having a prominent group and more efficiencies.
- More private sector involvement could result in less time and cost outlay.
- The public sector can be a big driver; you must gauge the need when making decisions up front.
- Get more concrete information and a narrower focus.

Future Meetings:

- The team of four…Laurie, Mark, Yvonne, and Tom will meet before the next working Group meeting.
- St. Joseph's College will continue to host meetings. Thank you!
- Vince Micale will be in touch regarding the scheduling of the next Group meeting.

Community Broadband Discussion II

Agenda

May 29th 2015 10:00 am - 1:00 pm

Location: Hall of Fame room at Saint Joseph's College's Alfond Center

Facilitator: Vincent Micale

- Appoint meeting minute taker
- Brief recap from our first discussion on May 1st, 2015 *(Vincent Micale)*
- Review agenda/schedule for Community Broadband Discussion II
- New participant introductions
- Technical overview of Fiber, Broadband Infrastructure and Fiber to the "X" *(Kevin Woodbrey)*
- Q&A and discussion on technical aspects of Fiber
- 5 minute break
- Geographical overview of existing fiber lines, "Lit" buildings, population density *(Tom Trautlein)*
- Q&A and discussion of fiber geography
- Funding model options (public, private, hybrid), advantages/disadvantages of each
- Community education strategies, outreach to local/regional entities
- Tax Increment Financing (TIF) possibilities
- Backbone capacity analysis
- Phased approach options
- Return/recovery on investment plan for investors (citizens, private/public entities)
- Business model for income/ROI recovery, metering options, goals for competition
- Lunch
- Wrap up discussion

Lakes Region Broadband Partnership Precertification Checklist

BROADBAND WORKING GROUP
MAY 29, 2015
SAINT JOSEPH'S COLLEGE

Attendees:

Tom Bartell – Executive Director, Windham Economic Development Corporation (WEDC)
Lisa Fisher – Administrative Assistant, Planning and Economic Development, Town of Windham
John Murray – Network Administrator, Saint Joseph's College
Tom Trautlein – Systems Administrator, Town of Windham
David Richardson - Operations Manager, System Architecture.Net
Brent Brown – Network Engineer, System Architecture.Net
Tory Ryden – Senior Director Marketing & Communications, Saint Joseph's College
Dominic Dymond– Studio Manager, Town of Raymond
Danielle Loring – Executive Assistant, Town of Raymond
Laurie Forbes – Technology Committee Chair, Town of Raymond
Bob Hickey – Technology Director, RSU 14
Ben Smith – Planning Director, Town of Windham
David Nadeau – Chair, Windham Town Council
Yvonne Berry – Vice President and CFO, Saint Joseph's College
Aimee Senatore – Executive Director, Sebago Lakes Region Chamber of Commerce
Don Willard – Town Manager, Town of Raymond
Kevin Woodbrey – CEO, Woodbrey Consulting
Vincent Micale – President and CEO, System Architecture.Net
Jim Damicis – Senior Vice President, Camoin Associates

Recap of the May 1, 2015 Meeting:

- It is important to establish a working group consisting of Town Mangers for the political aspect of the initiative to improve access to broadband.
- Would the best point of view for community based broadband access be public or public/private?
- Future issues to consider were:
    - Funding Models
    - Tax Increment Financing (TIF) possibilities
    - Establishment of community support through public outreach
    - Different business models
    - A plan for return on investment

Technical Aspects of Broadband:

- Bandwidth is the amount of information per second that can be transmitted. Data is divided into bits and bytes. A byte, which is a character on a page, such as a letter of the alphabet, is made up of eight bits.
- Infrastructure provides different possibilities for connection:
    - FTTC – Fiber to the curb
    - FTTB – Fiber to the building
    - FTTH – Fiber to the home - This should be targeted.
    - FTTO – Fiber to the office
    - FTTdp – Fiber to a distribution point
    - FTTM – Fiber to the mast
    - P2P – Point to point
- Fiber is more affordable and feasible than running cable.

Lakes Region Broadband Partnership Precertification Checklist

- Every device uses bandwidth. It is important to be mindful of adequate capacity so as not to be behind before you get started.
- It is possible to build infrastructure with hardware that can be adapted later.
- Providers:
    - An infrastructure provider supplies the physical means to deliver the data: fiber, switches, routers etc.; monitoring and diagnosis; design, installation and repair.
    - A data provider provides the bandwidth to access the internet: accounting and billing; monitoring and helpdesk; liaison between the infrastructure provider and the end-user.
    - The content provider provides data to the end-users.
- Income can be created by leasing space on the network to data providers.

Advantages of fiber:

- No electromagnetic/weather interference
- Greater transmission distance
- Better network adaptability

Types of fiber network:

- Passive Optical Network –Enables multiple channels to use a single fiber; there are limitations.
    - Advantages:
        - Network devices are less expensive.
        - Multiple channels can share a single fiber.
    - Disadvantages:
        - There are no redundancies; a break creates a single point of failure.
        - It is difficult to pinpoint where a break occurs.
        - There are no industry standards.
        - Less flexibility for future network connections.
- Active Optical Network – Uses intelligent switching and routing to direct and manage data flow.
    - Advantages:
        - It is easy to manage and to pinpoint problem locations.
        - New devices can be added with no network reconfiguration.
        - There is an industry standard.
        - There is market competition and rate support.
        - A ring can be established so data can be rerouted around a failure.
        - Bi-directional rates (upload and download) are equal.
    - Disadvantages:
        - The initial cost is more. (Flexibility will outweigh the cost difference.)
        - Requires the installation of additional cable to achieve redundancies.

Recommendations:

- There should be separation between the infrastructure provider and the data provider in order to foster competition.
- It is critical to retain local governing control and ownership.
- Active Optical Network provides the most flexibility and future capabilities.
- Blown in fiber provides the best opportunity for increasing bandwidth capabilities because additional fiber strands can be blown into the fiber conduit.
- Fiber represents the most important investment for the future.

Lakes Region Broadband Partnership Precertification Checklist

Geography for fiber optics:

- The Three Ring Binder is broadband infrastructure which was installed and subsidized by federal stimulus funding. Its purpose is to provide high speed internet capabilities to rural areas.
- Locally the infrastructure goes up Route 114 in Standish. The closest point to Saint Joseph's/Windham/Raymond is the intersection of Routes 35 and 114 in Sebago Lake Village.
- The density of lit buildings is evident in the Portland area but almost non-existent locally.
- Where should expansion of the ring go:
    - The need for the technology is growing, not only for business but for residential uses. It is not reasonable to expect delivery of fiber to everyone at the beginning.
    - Residential concentrations should dictate the location of service first. This shortens the window of initial expense. Fiber can be installed to go past residences even when the residences will not immediately be connected.
    - The physical layout of the region suggests installation along Whites Bridge Road and the Route 302 corridor.

Discussion points:

- Many customers will have home businesses.
- It is important to know the entire scope of demand in order to obtain an accurate estimate of costs for the build-out.
- The build-out should occur in phases.
- Community push-back should be anticipated and could be minimized through education regarding the need for the technology and a focus on public outreach. Causes of push-back:
    - Resistance to change.
    - Limited consciousness that devices are dependent on internet capacity.
    - Consideration of cost/willingness to fund.

Acceptance Strategies:

- Look more regionally than locally. Develop participation and interest.
- Access economic impact models and develop one to demonstrate a return on investment within a reasonable amount of time.
- Pursue bonding and grants. Develop the capacity to pay for improvements.
- Obtain full faith and credit of municipalities involved.
- Focus on return of services, rather than expense.
- Use examples of communities that have attracted business with fiber and the resulting benefit to those communities.
- Be clear that competitiveness relies on this technology.
- Establish what makes a community work:
    - Living
    - Working
    - Education
    - Shopping
    - Quality of life
- Gather data on independent workers and wage workers who work from home.
- Conduct a community survey to ascertain support.

Lakes Region Broadband Partnership Precertification Checklist

Funding:

- South Portland connected existing facilities to fiber network and will lease the service hoping to use revenue for future expansion.
- Look into county or state initiatives.
- TIFs are an ideal opportunity.
- Pool community resources for planning.
- Public outreach and education should begin before the push for funding.

In Conclusion:

- Smaller groups were established to focus on:
    - Coordination of Town Managers/Staff to discuss funding sources
        - Yvonne Berry
        - Don Willard
        - Tony Plante
        - Gordon Billington
        - Jim Damicis
        - Tom Bartell
    - Marketing, Outreach and Education
        - Tory Ryden
        - Amy Senatore
        - Danielle Loring
    - Architecture/Capacity on Three Ring Binder
        - Kevin Woodbrey
        - Tom Trautlein
        - John Murray
        - Vincent Micale
- July 8th – Cumberland County Broadband Forum
- July 16th – MMA Municipal Broadband Forum
- Next meeting will be in June, date and time to be determined.

Thomas Bartell
Executive Director
Windham Maine Economic Development Corporation
8 School Road
Windham, Maine 04062
Voice: (207) 892-1936
Fax: (207) 892-1910
thbartell@windhammaine.us
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From: Vincent Micale [mailto:vmicale@systemarchitecture.net]
Sent: Monday, October 19, 2015 4:13 PM
To: Tom H. Bartell
Subject: RE: Community Broadband Working Group Kickoff/Stakeholder meeting with TILSON, Tuesday October 27th 10:00am to 1:00pm, Saint Joseph's College

Tom, I am tentative with a conflict which I am trying to reschedule.

Vince

From: Tom H. Bartell [mailto:thbartell@windhammaine.us]
Sent: Monday, October 19, 2015 4:09 PM
To: jim@camoinassociates.com; Gordon Billington (gbillington@standish.org) <gbillington@standish.org>; Willard, Don (don.willard@raymondmaine.org) <don.willard@raymondmaine.org>; danielle.loring@raymondmaine.org; Tony Plante <atplante@windhammaine.us>; Ben Smith <bwsmith@windhammaine.us>; David Nadeau <davidnadeau@windhammaine.us>; allen faraday (afaraday@windhamweaponry.com) <afaraday@windhamweaponry.com>; Yvonne Berry (yberry@sjcme.edu) <yberry@sjcme.edu>; Aaron Hamlen (ahamlen@windhamraymondschools.org) <ahamlen@windhamraymondschools.org>; Bill Hansen (bhansen@windhamraymondschools.org) <bhansen@windhamraymondschools.org>; Milan Nevajda (milan@planningdecisions.com) <milan@planningdecisions.com>; Lisa Fisher <lmfisher@windhammaine.us>; Aimee Senatore <asenatore@sebagolakeschamber.com>; Tom J. Trautlein <tjtrautlein@windhammaine.us>; Vincent Micale <vmicale@systemarchitecture.net>; Patrick.Corey@legislature.maine.gov; mark ouellette (mark.ouellette@axiom-tech.net) <mark.ouellette@axiom-tech.net>; kevin.woodbrey@raymondmaine.org; laurie.forbes@raymondmaine.org; jmurray@sjcme.edu; David Richardson <drichardson@systemarchitecture.net>; Brent Brown <bbrown@systemarchitecture.net>; Al Evans <aevans@systemarchitecture.net>; tryden@sjcme.edu; dominic.dymond@raymondmaine.org; RHickey@rsu14.org; Cabana, Deb (dcabana@graymaine.org) <dcabana@graymaine.org>; Kathy Tombarelli <ktombarelli@graymaine.org>; Percy Dieppa <pdieppa@windhamweaponry.com>; Bill Diamond (diamondhollyd@aol.com) <diamondhollyd@aol.com>; Mark.Bryant@legislature.maine.gov
Cc: Elisa A. Trepanier <eatrepanier@windhammaine.us>; Liza Quinn (equinn@tilsontech.com) <equinn@tilsontech.com>; Sue Inches (sueinches@gmail.com) <sueinches@gmail.com>; Lisa Fisher <lmfisher@windhammaine.us>; mike.jenkins@me.usda.gov
Subject: RE: Community Broadband Working Group Kickoff/Stakeholder meeting with TILSON, Tuesday October 27th 10:00am to 1:00pm, Saint Joseph's College

Hello All:
I wanted to send out this reminder for the Community Broadband Working Group Kickoff meeting with TILSON. The meeting is scheduled for Tuesday October 27th from 10:00am to 1:00pm at Saint Joseph's College. I have received an RSVP from the following:

Deb Cabana, Kathy Tombarelli and 5 members of the Gray Economic Development Committee
Rep. Patrick Corey
Don Willard
Kevin Woodbrey
Nadeen Daniels, Cumberland County
Either Mike or Bob from USDA RD Maine
Travis Kennedy, Senator King's Office
Tom Trautlein
Elisa Trepanier
Dominic Dymond
Planning Decisions Inc (1)
Liza Quinn and Sue Inches (TILSON)
Ben Smith
Tom Bartell
Lisa Fisher

I apologize if you have RSVP'd and I don't have you listed, if so, please send me another note. Please let me know if you plan on attending so I can make arrangements for room set up, and more importantly lunch. Please reply as soon as possible. Thank you all for your interest in this exciting adventure! Tom.

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From: Tom H. Bartell
Sent: Monday, October 05, 2015 11:17 AM
To: Tom H. Bartell; jim@camoinassociates.com; Gordon Billington (gbillington@standish.org); Willard, Don (don.willard@raymondmaine.org); danielle.loring@raymondmaine.org; Tony Plante; Ben Smith; David Nadeau; allen faraday (afaraday@windhamweaponry.com); Yvonne Berry (yberry@sjcme.edu); Aaron Hamlen (ahamlen@windhamraymondschools.org); Bill Hansen (bhansen@windhamraymondschools.org); Milan Nevajda (milan@planningdecisions.com); Lisa Fisher; Aimee Senatore; Tom J. Trautlein; vmicale@systemarchitecture.net; Patrick.Corey@legislature.maine.gov; mark ouellette (mark.ouellette@axiom-tech.net); kevin.woodbrey@raymondmaine.org; laurie.forbes@raymondmaine.org; jmurray@sjcme.edu; David Richardson; Brent Brown; Al Evans; tryden@sjcme.edu; dominic.dymond@raymondmaine.org; RHickey@rsu14.org; Cabana, Deb (dcabana@graymaine.org); Kathy Tombarelli; Percy Dieppa; Bill Diamond (diamondhollyd@aol.com); Mark.Bryant@legislature.maine.gov
Subject: Community Broadband Working Group Kickoff/Stakeholder meeting with TILSON, Tuesday October 27th 10:00am to 1:00pm, Saint Joseph's College

Hello All:
I hope this finds you all well and ready to forge ahead in our quest for community wide access to the next generation of high speed broadband in our little corner of the world. We are ready to bring the group back together again to continue our process in moving towards our ultimate goal of fiber to the home and businesses. I have attached the notes from the two previous working group meetings for your review.

As some of you may know, the Windham Economic Development Corporation has contracted with TILSON to provide us with the information we need to get to the next decision point in our process. We will be having a Kickoff/Stakeholder meeting with TILSON at Saint Joseph's College on Tuesday October 27th from 10:00am until 1:00pm.

This email invitation is being sent to all who have participated to date, and some others who have not but might be interested or could help us along the way. If you would like to invite others please feel free to do so, the more input we have the better the outcome will be. We will need to know who is coming for a head count for the room set up and lunch. RSVP deadline is Thursday October 22nd. Thanks to all, I look forward to our continued work on this project. Tom.

Thomas Bartell
Executive Director

Lakes Region Broadband Partnership Precertification Checklist

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Working Group Meeting October, 27, 2015

Agenda:

1. Welcome and Introductions
2. Components of the Project
3. Brainstorm: How could improved internet service benefit you, your organization, the region?
4. What Is/Is Not the Problem
5. Identify Regional Broadband Goals
6. Identify Next Steps

Attendance:

NAME	TOWN/COMPANY NAME	EMAIL	
Jim Damicis	Camoin Associates	jim@camoinassociates.com	
Nadeen Daniels	Cumberland County Government	daniels@cumberlandcounty.org	
Bob Hickey	RSU 14 Windham Raymond Schools	rhickey@rsu14.org	8
John Murray	Saint Joseph's College	jmurray@sjcme.edu	8
Yvonne Berry	Saint Joseph's College	yberry@sjcme.edu	
Aimee Senatore	Sebago Lakes Region Chamber of Commerce	asenatore@sebagolakeschamber.com	8
Travis Kennedy	Senator Kings Office	travis.kennedy@king.senate.gov	
Richard Cabana	Town of Gray		
Deborah Cabana	Town of Gray	dcabana@graymaine.org	
Jean Bibber	Town of Gray - CEDC Chair	rbibber@securespeed.us	
Lacy Antonson	Town of Gray - CEDC Member	lacy@antonson.us	
Colette Tweten	Town of Gray - CEDC Member	ctweten@maine.rr.com	
Kathy Tomborelli	Town of Gray - Planner	ktomborelli@graymaine.org	
Richard Bibber	Town of Gray -Planning Board	rbibber@securespeed.us	
Don Willard	Town of Raymond	don.willard@raymondmaine.org	
Laurie Forbes	Town of Raymond	laurie.forbes@raymondmaine.org	
Gordon Billington	Town of Standish	gbillington@standsih.org	
Ben Smith	Town of Windham	bwsmith@windhammaine.us	
Thomas Trautlein	Town of Windham	tjtrautlein@windhammaine.us	
Tony Plante	Town of Windham	atplante@windhammaine.us	
Elisa Trepanier	Town of Windham	maps@windhammaine.us	
David Nadeau	Town of Windham- Town Corporation	davidnadeau@windhammaine.us	8
Bob Nadeau	USDA Rural Development	robert.nadeau@me.usda.gov	9
John McGinnis	WEDC	johnmcginnis@kaplan.edu	4

Lakes Region Broadband Partnership Precertification Checklist

Tom Bartell WEDC -Executive Director thbartell@windhammaine.us

NOTES FROM KICKOFF MEETING:
Exercise I: Full Group Brainstorm
Question: How could improved internet service benefit you, your organization or the region?
Flipcharts:
4K TV won't work, compatibility
Students can have access to info
Utube and Hulu need 4K
Broadcast technology is behind the curve
Entrepreneurs are attracted to improved internet
Small businesses are attracted to improved internet
People can work from home
People can become producers in a digital economy
Gigabit is an enabling tool
We could stream between schools
Lower costs—now costs $1200.month for streaming
Student content and assessments can be done on-line
Classes can be shared across and between districts
Online education for the region
St. Joe's online courses
18-22 year olds use internet for entertainment
Slow down occurs between 3PM and 1AM
Region is a nice place to conduct business—internet facilitates that
Extended vacation and work time for seasonal residents/visitors
Expectations of visitors can be met
Broad producer/consumer mix can be supported
Gamers could host their own services
Cloud backups could be used—too large for current system now
Job growth and economic effects could be positive
Standish current service may be OK
Need to make the business case for upgrades
Current demand versus enable the future—key question
Internet is necessary infrastructure
Need to educate the public
Need to be proactive about the speed of change
People off the main road have slow DSL
Need to know what current carriers are willing to do
Public versus private road development is a factor

Exercise II: Four breakout groups
Question: What is or isn't working for your organization? For your Community?

Is Working	**Isn't Working**
Common need is recognized	20 questions with Providers
Bandwidth sufficient now	Current business model
Hope	Future demand unknown
Collective voice	Keeping up with demand: Internet of Things
Pay to play—fair $$	Consistent transactional technology
Standish—cable to all houses per franchise agreement	Technological literacy
Maine Fiber 3-ring Binder	Cost

Lakes Region Broadband Partnership Precertification Checklist

Not a lot of complaints currently	Study from home
	Interferes with quality of life
	Hassles for customers
	Cell coverage
	Distributions—inequitable access
	OTT goes down—not reliable
	Time Warner inconsistent—slow
	Don't get value for the price
	Shared access/public staff have to buy additional storage
	Inconsistent reliability
	Cost for Town of Raymond/Windham for needed speed (Up and Down)
	Keeping up with future demand—online services and media applications
	(Lack of) support from Time Warner for Town of Raymond
	Lack of upgrades by TWC
	No central place to "bang on the door" although towns do hear some complaints

Standish—good planning, franchise agreement with five year term	Lack of Upgrades by TWC
	You don't know what you don't know.
Gray—served and has access	Lack of competition
Upgrade of broadband and wireless for schools	Lack of awareness
	Lack of density
	Lack of understanding of problems/potential
Reasonable service from TWC in Raymond municipal buildings	Level of education around problems
	Digital divide: elderly and poor left behind
	Lack of data on take rates, speed, etc Can data be found or purchased? Need way to identify bottlenecks.
	Standish—pay to play
	Gray slow up and down
	No trigger or incentive for private sector
	No competition
	Understanding of the benefits of improved service
	Education: Are we underserved?
	Gray—some dialup, OTT, TWC service is poor
	Businesses leaving Gray
	Pricing—I gig is $1200/month
	Understanding source of problem—is it hardware, computer or service?
	Some people don't see relevance or importance

	Can munis negotiate prices? Currently in a “mother may I” relationship with providers
	What are businesses paying?
	OTT goes down making it hard to conduct muni business
	School program upgrades overwhelm wireless

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From: Liza Quinn [mailto:equinn@tilsontech.com]
Sent: Monday, November 23, 2015 1:53 PM
To: Tom H. Bartell; Susan Inches
Subject: RE: Start time Dec 3

Hi Tom,

I’ve got the scheduled lined up for the 3rd for three carriers:

8:30-10:00 OTT
10:30-12:00 TWC
1:00-2:00 Oxford Networks.

FairPoint needs more time to put together their information on existing services. Apparently their territory in the three towns was cobbled together from different original phone companies, so it will take them more time to put together data. If we do want to add another ISP, I suggest we do it on the day we have FairPoint in. I will let you know as soon as I hear from them.

Have a great holiday weekend, and I will see you next week!

Thanks,
Liza

p.s. sample meeting invite to a carrier, below

_____

Discussion of OTT current internet access service offerings and coverage (residential and business), future plans, and options for working with towns to make improvements in the future.

Particularly useful data includes:

- Network and service coverage maps;
- Residential and business offerings/pricing;
- USF subsidies available to Rate of Return carriers
- The % of all internet access customers that subscribe to fastest speed offering
- Historical representation of OTT's speed offerings in Gray and perhaps elsewhere. Have they gotten faster over time to keep up with growing demand?
- OTT's plans and/or ability to increase speed offerings in the future.
- Process for improving speed and perhaps coverage of OTT offerings

Thanks Trevor. Look forward to seeing you and learning a bit more about OTT!

Liza

p.s. In addition to Gray, representatives from Windham, Raymond, and Standish will be there.

From: Tom H. Bartell [mailto:thbartell@windhammaine.us]
Sent: Wednesday, November 18, 2015 5:02 PM
To: Susan Inches <sinches@tilsontech.com>
Cc: Liza Quinn <equinn@tilsontech.com>
Subject: RE: Start time Dec 3

Hi Sue, we now have Don plus a couple from Raymond as well as Tony from Windham. Still waiting to hear from Gray. Tom.

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From: Susan Inches [mailto:sinches@tilsontech.com]
Sent: Tuesday, November 17, 2015 5:17 PM
To: Tom H. Bartell
Cc: Liza Quinn
Subject: Start time Dec 3

Hi Tom,

How is the response so far to the Dec. 3rd meeting date? We are wondering if we can start at 8:30 AM that day? Please let us know.

Thanks,

Sue

Susan B. Inches, Senior Consultant, Tilson
245 Commercial St., Portland, ME 04101
207-415-5891 (cell)
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From: Susan Inches [mailto:sinches@tilsontech.com]
Sent: Wednesday, December 02, 2015 2:04 PM
To: Tom H. Bartell; Liza Quinn
Subject: Agenda for Tomorrow

Tom,

Very simple agenda for tomorrow (attached). I've been making calls to area businesses and find that some have dedicated fiber which works well but has a high price tag, others are making do with publicly available cable service. I might mention this in the introductory remarks.

I can make copies of the agenda for participants if you like.

Looking forward to our meetings tomorrow.

Sue

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Lakes Region Broadband Partnership Precertification Checklist

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From: Susan Inches [mailto:sinches@tilsontech.com]
Sent: Friday, January 08, 2016 11:24 AM
To: Tom H. Bartell
Cc: Liza Quinn
Subject: Agenda for next week

Hi Tom,

The agenda for next week is attached, pretty much the same as the last meeting. Let me know if you want to make any changes. We can bring copies to hand out.

See you next week,

Sue

Susan B. Inches, Senior Consultant, Tilson
245 Commercial St., Portland, ME 04101
207-415-5891 (cell)
www.tilsontech.com

Windham Internet Carrier Meetings
Wednesday, January 13, 2016
Windham Town Office Council Chambers
8 School Road, Windham

Agenda:

1. Introduction to the Project (Sue and Tom)
2. Introductions of Participants and Carriers
3. Presentation from Carriers in response to the following datapoints:

    - Network and service coverage maps;
    - Residential and business offerings/pricing;
    - CAF 2 eligibility
    - The % of all internet access customers that subscribe to fastest speed offering
    - Historical representation of speed offerings. Have they gotten faster over time to keep up with growing demand?
    - Plans and/or ability to invest or increase speed offerings in the future.
    - Process for working with municipalities to improve coverage
      (Note: since GWI doesn't currently offer service in the area, their presentation will be somewhat modified from the above.)

4. Q&A/Discussion

Schedule:
8:00-9:30 Fairpoint

(Break)
10:00-11:30 GWI

LAKES REGION BROADBAND PARTNERSHIP
APRIL 1, 2016
WINDHAM VETERAN'S CENTER

Attendees:

Tom Bartell – Executive Director, Windham Economic Development Corporation (WEDC)
Lisa Fisher – Administrative Assistant, Planning and Economic Development, Town of Windham
John Murray – Network Administrator, Saint Joseph's College
Tom Trautlein – Systems Administrator, Town of Windham
Elisa Trepanier – Assessor, Town of Windham
Tina Christopherson – President, Sebago Lakes Region Chamber of Commerce & RSU 14 Adult Ed
David Nadeau – Windham Town Council
Don Willard – Town Manager, Town of Raymond
Kevin Woodbrey – CEO, Woodbrey Consulting
Jim Damicis – Senior Vice President, Camoin Associates
Kathy Tamborelli – Planner, Town of Gray
Colette Tweten – Gray Economic Development Committee
Fran Monroe - Gray Economic Development Committee
Susan Inches – Tilson Technologies

Susan Inches reviewed the work that had occurred to create the Tilson Report, High Speed Broadband in the Lakes Region.

Progress to Date:

- Asset inventory and business outreach – Two types of business had been targeted for interviews:
- Large, technically sophisticated companies who had purchased their own fiber connection for a higher level of service.
- Smaller businesses who used a "business package", not particularly high speed. They were not satisfied with speed or customer service.
- Conducted the carrier meeting – GWI, Time Warner, OTT Communications, and Fairpoint attended.
    - Time Warner and Fairpoint were not flexible in terms of decisions which were made at a corporate level.
    - GWI and OTT were small companies who wanted market share and were potential partnership opportunities.
    - Diversity needs for residences, enterprise businesses, and standard business.
    - There was coverage in the region, mostly through Time Warner – very slow speeds.
    - Fairpoint was upgrading but was working with phone lines – not a great improvement for homes.
    - Old infrastructure limited speeds.

Grant Opportunity:

- Much of the needed work was already done.
- The effort was multi-community.
- The priorities and vison had to be completed.

        - Tilson Technology would be the consultant for the grant.
        - Since much of the planning had been done the grant could focus on finding and pricing solutions:
- Partnerships
- Funding options
- Desired direction
- The next phase would be implementation; design and construction; and business modeling.

Vison Statement:

- The goal was to create a systematic design to:
    - Support small business and entrepreneurs
    - Support home based business and telecommuters
    - Encourage high tech companies
    - Grow tourism
    - Increase the capacity of homeowners
    - Support aging in place
    - Connect town facilities, schools, libraries
    - Support development of sites and corridors
- The group discussed the desired goals:
    - Speed should be one gigabit.
    - The term, “symmetrical gigabit service” should be specified.
    - The vision statement should read: “We, the Lakes Region “Broadband partnership, envision symmetrical gigabit service to every premise in the region and the establishment of service to our business corridors within two years.”
        - The precertification form requested additional information for the vision statement regarding priority areas and conformance with existing community plans and documents.
        - The basic premise would be gigabit service to everyone with an emphasis on business corridors and economic development.

Proposed Grant Management:

- Windham Economic Development Corporation would be the applicant on behalf of the Partnership.
- Town Managers or their designees would be the representative of each town.
- The Town of Windham would be the fiscal sponsor.

Developing Community Support:

- Broadband should be considered a utility.
- It would affect all demographic groups.
- A regional presentation should be made to the town councils because the area initiative crossed town boundaries.
- It took time to build community support.

Ownership and Risk Options:

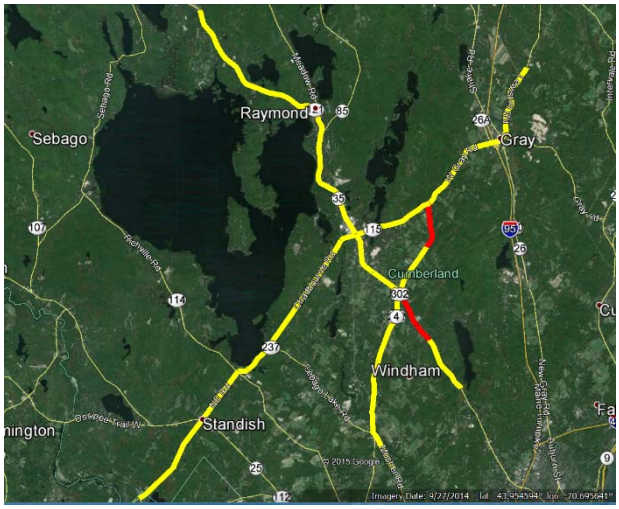
- Municipally owned network with internet services
- Primary owned network with public funding to build, with municipalities as anchor customers
- Combination network with public and privately owned portions.

Lakes Region Broadband Partnership Precertification Checklist

The Windham Economic Development Office would complete the precertification and grant application with help from Tilson Technologies.

*The Lakes Region Broadband Partnership commissioned a report by Tilson, a Portland, Maine based technology company. We have provided a copy of this report, entitled, High Speed Broadband in the Lakes Region.

Lakes Region Broadband Partnership



Community Planning Grant Application
April 13, 2016

Round One Community Planning Grant Application

Due Date: April 15, 2016

Community Broadband Planning Grant Application
Lakes Region Broadband Partnership

1. **Date: April 13, 2016**

2. **Submitting Community**: Windham Economic Development Corporation for the **Lakes Region Broadband Partnership** (Gray, Raymond, Standish, Windham)

3. **Grant Amount Requested: $79,924.00**

4. **Community Project Point of Contact:**
   Thomas Bartell
   Executive Director
   Windham Economic Development Corporation
   8 School Road
   Windham, Maine 04062
   (207) 892-1936
   thbartell@windhammaine.us

5. **Party Who Prepared Application:**
   Thomas Bartell
   Executive Director
   Windham Economic Development Corporation
   8 School Road
   Windham, Maine 04062
   (207) 892-1936
   thbartell@windhammaine.us

6. **Executive Summary of the Project:**

   Since May of 2015, four communities in the Sebago Lakes Region, Gray (pop. 7,800), Raymond (pop. 4,500), Standish (pop. 9,900), and Windham (pop. 17,500) have been meeting with stakeholders representing residents, businesses, the Sebago Lakes Region Chamber of Commerce, public schools, Saint Joseph's College, municipalities, and municipal economic development agencies and committees to better understand the current capacity of and the needs for broadband access in the four-town region.

   The four communities have come together to form the Lakes Region Broadband Partnership and are joining forces to tackle the broadband issue as a region rather than as individual municipalities. The goal of the Partnership is to realize cost efficiencies while creating broadband infrastructure which better connects all four of our communities to the worldwide economy and social networks that will make our region a more competitive and vibrant member of the Greater Portland and Southern Maine economies.

   Some of the challenges that the four town region is facing are:

   - Attracting new technology-based/dependent businesses along our Main Streets and in our villages
   - Reducing vacancy rates in existing retail/office space in the villages and along the connecting travel corridors
   - Supporting existing small and larger businesses that require increasing broadband capacity
   - Keeping up with increasing broadband demand from home occupations and telecommuters
   - Competing with urban hubs in close proximity to our region for existing and new business

- Maintaining a highly skilled digitally literate workforce to attract and sustain technology reliant businesses
- Providing high quality educational opportunities in our public and private schools and for their students needing access while at home
- Providing high quality educational opportunities in residential colleges as well as those students who utilize online/distance learning
- Sustaining tourism and improving seasonal residents' experience by increasing the quality of broadband for telecommuting
- Having access to a robust and redundant broadband network for critical services
- Future-proofing any investments made in the expansion and extension of broadband service

Maine's Three Ring Binder

Maine's Three Ring Binder, completed in 2012, is Maine's Superhighway of Broadband. In the Lakes Region Partnership, the Three Ring Binder passes through the western-most town of Standish. Like most superhighways, if communities along the route have no access to it, then life literally passes them by, and this is the case with the Three Ring Binder in the Lakes Region. Educational and economic development opportunities and the quality of life for residents are missed or suffer due to the lack of true connectivity to worldwide business and social networks. Saint Joseph's College, just a few miles from the Three Ring Binder has struggled to keep up with the broadband demands of both its residential and online students. Partner municipalities, businesses and residents are burdened with inconsistent broadband service at very high cost. Just like the transportation superhighway, the broadband superhighway needs to be accessed by communities along its path to achieve success for both the superhighway and the communities along it.

Lakes Region Broadband Partnership Vision Statement:

The Lakes Region Broadband Partnership envisions symmetrical gigabit services to every premise in the region and as a priority the establishment of services in our business corridors and downtowns within two years. Digitally aware citizens will have increased opportunities to access information and services via an enhanced broadband network as well as the opportunity to participate in digital education through a larger partnership of providers and programs. Public computer access will be broadened throughout the region, and programs will be available for citizens of limited means to access the equipment, training and broadband services necessary in the 21st Century.

The Lakes Region Broadband Partnership has developed goals for an enhanced and more robust broadband infrastructure that include:

- Increasing the reliability and redundancy of the digital infrastructure
- Connecting to the Three Ring Binder
- Meeting the growth needs of:
    - Small Businesses
    - Larger Businesses
    - Entrepreneurs
    - Home-based Businesses
    - Telecommuters

- Encouraging technology based and innovative companies (particularly media companies and data centers) to expand and/or locate in the region
- Supporting the growth of Saint Joseph's College both on campus and online
- Growing the tourism economy by providing opportunities for extended stay vacations through the use of broadband connections back to the workplace
- Supporting aging in place strategies with telemedicine and home monitoring
- Increasing the digital capacities of the municipalities to provide online services, Smart City, micro grid, and traffic control infrastructure
- Increasing digital access for residents to schools, libraries, and town halls
- Supporting the development of key sites and corridors for both increased residential densities, and business attraction and retention
- Creating downtown Wi-Fi hotspots

The Partnership has explored the current landscape of broadband options with four current providers in the region:

- FairPoint Communications
- Time Warner Cable
- OTT Communications
- GWI

The Partnership found the legacy systems of the larger communication companies are inadequate for both current and future needs for broadband services. The younger, smaller and more aggressive communication companies are willing to provide up-to-date facilities but they are lacking the resources to "go it alone".

The Lakes Region Broadband Partnership is seeking the Community Broadband Planning Grant to continue to work with our many partners including our technology partner Tilson Technologies to answer the following questions:

- What does an enhanced broadband network design look like?
- Where and how do we best connect to the Three Ring Binder?
- What technologies would be best for our "downtowns" and off-corridor businesses and residents?
- What are the planned capital and operating costs of the network?
- Which business model best works to develop and maintain the network?
- Which community anchor users would connect?
- Which private sector anchor users would connect?
- How do we expand usage along our "Main" streets beyond our anchor users?
- How do we expand usage beyond our "Main" streets?

ATTACHMENT B

Scoring Criteria

A community should provide a response to each of the items below, in the format outlined.

1. **Project Plan – 25 points**
   1.1. Provide documentation of project management plan.

Project Management Plan

The applicant for the Community Broadband Planning Grant is the Windham Economic Development Corporation on behalf of the **Lakes Region Broadband Partnership** (Gray, Raymond, Standish, and Windham)

Thomas Bartell, Executive Director, Windham Economic Development Corporation will act as Grant Manager and point person to both the ConnectME Authority and the project consultants. The Grant Manager will manage the project contracting, finances, and timeline and will coordinate committee meetings, focus groups, and public meetings.

The Windham Economic Development Corporation, a subsidiary of the Town of Windham will manage the grant funds. Through an agreement with the Town of Windham, the Town acts as Fiscal Agent for the Corporation.

The Lakes Region Partnership will be partnering with Tilson Technologies, with a subcontract to Axiom Technologies for Digital Inclusion Planning.

The Grant Oversight Committee will provide municipal oversight of grant management, contracting, finance policies, and the overall progress of the initiative. This committee has been meeting and working on broadband together since May of 2015. The Grant Oversight Committee will also act individually and together as liaison to each of the Towns' elected and appointed officials.

Grant oversight committee:
Deb Cabana, Gray Town Manager
Don Willard, Raymond Town Manager
Gordon Billington, Standish Town Manager
Tony Plante, Windham Town Manager

Support from the four communities' municipal Planning, GIS, Economic Development and Technology Departments and Committees will continue to be available to the Partnership.

The Stakeholder Group will be called upon to meet on a regular basis to review progress, to determine best methods for outreach to the broader community, and to organize and publicize public meetings, notifications and publications. The Stakeholder Group will also provide committee leadership and membership to the Technical and Digital Inclusion Committees.

The Technical Committee will be supported by Tilson Technologies and be comprised of:
Residents
Municipal IT Department personnel
School Unit IT Department personnel
Saint Joseph's College IT Department personnel
Local IT Company personnel
Local Company IT Department personnel
Municipal IT Committee members

The Digital Inclusion Committee will be supported by Axiom Technologies and be comprised of:
Residents
Municipal Social Services Department personnel
Municipal Planning Department personnel
Local IT Company personnel
Municipal IT Committee members
School Unit personnel
Adult Education personnel
Municipal Recreation Program personnel

The Stakeholder group currently has as members:

Representatives from Municipal Governments * Also a resident of a stakeholder town.

Deborah Cabana	Town Manager, Town of Gray, Maine*
Kathy Tamborelli	Planner, Town of Gray, Maine
Richard Bibber	Planning Board, Town of Gray, Maine*
Don Willard	Town Manager, Town of Raymond, Maine*
Laurie Forbes	Information Technology Committee, Town of Raymond, Maine*
Gordon Billington	Town Manager, Town of Standish, Maine*
Tony Plante	Town Manager, Town of Windham, Maine*
David Nadeau	Town Councilor, Town of Windham, Maine*
Ben Smith	Planning Director, Town of Windham, Maine
Elisa Trepannier	Assistant Assessor & GIS Technician, Town of Windham, Maine*
Tom Trautlein	Systems Administrator, Town of Windham, Maine*

Community Broadband Planning Grant Application
Lakes Region Broadband Partnership

Economic Development Entity * Also a resident of a stakeholder town.

Tom Bartell	Windham Economic Development Corporation, Executive Director*
John McInnis	Windham Economic Development Corporation, Board of Directors*
Jean Bibber	Chair, Town of Gray Community Economic Development Committee*
Lacy Antonson	Member, Town of Gray Community Economic Development Committee*
Colette Tweten	Member, Town of Gray Community Economic Development Committee*
Aimee Senatore	Executive Director, Sebago Lakes Region Chamber of Commerce
Tina Christopherson	President, Sebago Lakes Region Chamber of Commerce & RSU 14 Adult Ed

Residents, Representatives, & Local Businesses

Richard Cabana	Resident, Town of Gray, Maine
Nadeen Daniels	Cumberland County Government, Maine
Patrick Corey	State Representative, District 25, Windham
Eric Phillips	Information Technology, St. Joseph's College
John Murray	Network Administrator, St. Joseph's College, Standish, Maine
Bob Hickey	Technology Director, RSU 14 Windham Raymond Schools
Aaron Hamlin	Technology Coordinator, RSU 14
Jim Damicis	Senior Vice President, Camoin Associates
Vince Micale	President and CEO System Architecture
David Richard	Operations Manager, System Architecture
Brent Brown	System Architecture
Al Evans	Network Engineer, System Architecture
Alan Faraday	Executive Vice President of Operations, Windham Weaponry
Percy Dieppa	Information Technology Manager, Windham Weaponry
Kevin Woodbrey	Woodbrey Consulting
Colette Tweten	Gray Economic Development Committee
Fran Monroe	Gray Economic Development Committee

Previous Planning Activities

Since first gathering in May of 2015, the Lakes Region Broadband Partnership has been working to determine the current broadband needs and system capabilities within the four towns of Gray, Raymond, Standish, and Windham. In August of 2015 the Windham Economic Development Corporation, on behalf of the partnership engaged Tilson Technologies to assist the partners with determining partnership goals and objectives, inventorying broadband assets in the region, surveying area businesses, facilitating meetings with current Internet Services Providers, and providing "high level" analysis of paths forward and capital cost comparisons. These efforts resulted in the Tilson authored report "High Speed Broadband in the Lakes Region". The report highlighted inconsistencies in the broadband network, the lack of capacity in much of the network, and the difficulty that a sampling of businesses had in affording adequate broadband capacity. These findings reflected anecdotal references to inadequate internet services from many members of the business community in previous discussions. Further, the report found that while legacy broadband carriers provided service throughout the region, the quality of service was not up to recent state or national standards and that these carriers did not have plans in place to meet these standards. The younger, smaller carriers we met with were eager to "work with us" to reach the state standards, but would be unable to reach those standards on their own.

Following the release of the Tilson report, the Partnership has met and developed the following Vision statement:

> The Lakes Region Broadband Partnership envisions symmetrical gigabit services to every premise in the region and as a priority the establishment of services in our business corridors and downtowns within two years. Digitally aware citizens will have increased opportunities to access information and services via an enhanced broadband network as well as the opportunity to participate in digital education through a larger partnership of providers and programs. Public computer access will be broadened throughout the region, and programs will be available for citizens of limited means to access the equipment, training and broadband services necessary in the 21st Century.

The Lakes Region Broadband Partnership has developed goals for an enhanced and more robust broadband infrastructure that include:

- Increasing the reliability and redundancy of the digital infrastructure
- Connecting to the Three Ring Binder
- Meeting the growth needs of:
    - Small Businesses
    - Larger Businesses
    - Entrepreneurs
    - Home-based Businesses
    - Telecommuters
- Encouraging technology based and innovative companies (particularly media companies and data centers) to expand and/or locate in the region
- Supporting the growth of Saint Joseph's College both on campus and online
- Growing the tourism economy by providing opportunities for extended stay vacations through the use of broadband connections back to the workplace
- Supporting aging in place strategies with telemedicine and home monitoring

- Increasing the digital capacities of the municipalities to provide online services, Smart City, micro grid, and traffic control infrastructure
- Increasing digital access for residents to schools, libraries, and town halls
- Supporting the development of key sites and corridors for both increased residential densities and business attraction and retention
- Creating Downtown Wi-Fi hotspots

Current Planning Phase

The Partnership continues the work of fulfilling the Vision and its goals. Working with our technology partners through the Community Broadband Planning Grant will allow the Partnership to design a 21st Century broadband network, new and enhanced digital inclusion programs and services, and to meet many economic and community development goals of the communities in the region.

The outcomes of the Community Broadband Planning process will be to provide:

- One or more broadband network designs that meet the goals of the Partnership
- Capital and operating cost estimates of new networks
- Operating, ownership and business model development for new networks
- Exploration of potential partnerships with CLECs and Wireless providers
- A review of local ordinances relating to the placement and operation of broadband infrastructure with recommendations for changes if required
- Programmatic recommendations to increase digital inclusion for all residents in the Lakes Region Partnership.
- Final report, presentation and workshop for the regional community

This will be accomplished through the following planned activities. The deliverables from each of these activities are detailed in the following sections:

To better define Partnership needs and goals, and to build on the work completed to date the Stakeholder group will review existing information, conduct additional public forums and targeted focus groups to further define the region's needs and refine the Partnership's goals as necessary.

The Technical Committee along with Tilson Technologies will review existing data to define gaps in our understanding of the existing broadband infrastructure and services in the region. This review will include the physical infrastructure as well as the services provided by carriers in the Region. A specific review of access to the Three Ring Binder, which runs through Partner community Standish, for access points and routing issues will be completed, as part of the network plan. If knowledge gaps are discovered the Committee and Tilson will work to close those gaps with pertinent information.

The Stakeholder group along with Tilson Technologies will develop a gap analysis combining its work on the region's needs and goals, and the Technical Committee/Tilson Technologies' work understanding the existing broadband assets and services including the Three Ring Binder.

Tilson will provide a network design and cost estimate for fiber backbone in the village zones and business corridors in the region. Tilson will also lead an exploration with existing CLECs (Competitive Local Exchange Carriers) who may be interested in working with the towns to upgrade service. Tilson will provide baseline business modeling and operating costs for the networks designed.

The Grant Oversight Committee consisting of the Town Managers from the region's four communities will lead a review of all municipal procedures, policies, rules and ordinances which may affect the deployment of broadband infrastructure and make recommendations to the communities for changes as required.

The Digital Inclusion Committee with support from Axiom Technologies will research the affordability of existing broadband services for residents in the region as well as affordability thresholds that any new services will need to meet to provide truly accessible internet service.

The Digital Inclusion Committee with support from Axiom, working with the Region's schools, Social Services Departments, and IT companies will research programs both in and outside of Maine to discover working models that could be used in the Lakes Region to provide affordable equipment to residents of limited means.

The Digital Inclusion Committee with support from Axiom will compile and review all digital training provided by Adult Education and other programs in the region. The review will include the analysis of the utilization of existing programs as well as any gaps in programming that currently exists.

The Technical Committee, working with the Digital Inclusion Committee, with support from Tilson Technologies will integrate Public Access Computing points into any network design.

1.2. Provide the timeline to complete the proposed community plan deliverable.

The following proposed timeline is provided as a general guide to the timing of committee meetings, the presentation of reports and the delivery of designs and recommendations.

Project Implementation Schedule/Timeline									
Activity	Month 1	2	3	4	5	6	7	8	9
Grant Award									
Contracting									
Reporting									
Project Oversight Grant Oversight Committee/Refine goals and priorities/ Explore potential partnerships/Review Ordinances									
Stakeholder Group/Provide feedback									
Technical Committee/Network Design and Cost Estimate									
Digital Inclusion Committee/Axiom									
Final Report and Presentation Organize and Facilitate Community Broadband Workshop									

Deliverables

2. Plan Deliverables –20 points

2.1. Provide narrative addressing how the items A. – F. below will be addressed in the final plan delivered to the community.

A. Define local broadband needs and goals.

The Partnership has defined broadband needs and goals (See p. 7 for list of goals) through previous work as expressed in the report "High Speed Broadband in the Lakes Region", and understands that updating those findings throughout the planning process is crucial to a successful outcome. The Stakeholder group will review existing data, conduct additional public forums and targeted focus groups to further define the region's needs and refine the Partnership's goals as necessary. This effort will be coordinated with our Technical

Committee and Tilson Technologies to ensure network design is informed by the region's defined needs and goals.

B. Inventory existing broadband infrastructure assets within the municipality, municipalities or regions.

Meetings with four carriers (GWI, Time Warner, FairPoint and OTT Communications) and an engineering inspection of the region conducted by a Tilson engineer, was done as part of the previous planning process. This provides a strong foundation for understanding the current assets in the community. The Technical Committee along with Tilson Technologies will build on this work by inviting wireless providers to present their capabilities. The Three Ring Binder will also be considered as another asset on which to build. These findings will inform the network design and business modeling throughout the project.

C. Include a gap analysis defining the additional broadband infrastructure necessary to meet identified needs and goals.

The Stakeholder group along with Tilson Technologies will build on the previous gap analysis and continue to refine the region's needs and goals, and the Technical Committee/Tilson Technologies' work understanding the existing broadband assets and services. This analysis will include a specific discussion of the region's access to the Three Ring Binder. This gap analysis will be the basis for developing network designs and business models going forward. The gap analysis will also be used to measure the effectiveness of any additional network design or service proposals from third parties.

D. Include one or more potential network designs, cost estimates, operating models and potential business models based on input from broadband providers operating within the municipality, municipalities or region and any other parties that submit a network design solution in the course of developing the plan to address any broadband gaps identified in paragraph C.

Tilson will develop a high level network design, plus capital and operating cost estimates for the Lakes Region. The design will be based on meeting community goals and will include backbone fiber and some lateral build out in each of the village centers and business districts in the region, as a first phase of the project. There will be five or more fiber installations in the design, in accord with meeting community goals and priorities. A full fiber to the premises build out is not included in this design. The design will also include linking to the Three Ring Binder or other suitable internet links (backhaul). Tilson will use FiberPlanIT software for its network designs and will not include field surveys in its preliminary designs.

Tilson will also work with the communities to determine the best business strategy—do the towns prefer to own their own network or do they prefer to work with and perhaps invest in a privately owned network? Cost and risk comparisons between municipally owned and privately owned fiber will be estimated. These are important strategic questions that will be addressed with community leaders and answered in this broadband plan.

E. Include an assessment of all municipal procedures, policies, rules and ordinances that have the effect of delaying or increasing the cost of broadband infrastructure deployment.

The Grant Oversight Committee consisting of the Town Managers from the region's four communities will lead a review of all municipal procedures, policies, rules and ordinances which may affect the deployment of broadband infrastructure. The Grant Oversight Committee will produce a report detailing areas of concern and providing specific remedies if necessary.

F. Digital Inclusion

1. Affordable Internet – Cost continues to be a major barrier to broadband adoption. Applicants will need to address "ability to pay" rather than "willingness to pay." Applicants should realize the role that persistent poverty plays in shaping people's abilities to access and use computers and the Internet. www.pewinternet.org/2015/12/21/home-broadband-2015
    - Describe how community will address providing affordable internet options.

The Digital Inclusion Committee with support from Axiom Technologies will research the affordability of existing broadband services for residents in the region as well as affordability thresholds that any new services will need to meet to provide truly accessible internet service. The research will include working with the Cumberland County Community Development Program and the region's Social Services Departments to determine affordability levels as well as any Census block level areas of the region that deserve specific attention. The region's school systems will be requested to provide information as to the affordability of internet access for their students and families they serve. The Committee will provide recommendations as to programmatic solutions to affordability issues discovered.

2. Affordable Equipment – Low-cost or free computers are often just as important as having access to low-cost or free Internet options, particularly for people in low-income communities. PC's for Maine www.pcsformaine.org has embraced this reality by refurbishing older computers donated by businesses in Maine and making them available to low-income people and non-profit organizations at a free to reduced cost.
    - Describe how community will expand the availability of affordable equipment to low-income residents.

The Digital Inclusion Committee with support from Axiom, working with the regions schools, Social Services Departments, and IT companies will research programs both in and outside of Maine to discover working models that could be used in the Lakes Region to provide affordable equipment to residents of limited means. The Committee will make recommendations to the Stakeholder group for further exploration and implementation.

3. Digital Literacy Training –
    - Describe how community will teach people to use technology.

The Digital Inclusion Committee with support from Axiom will compile and review all digital training provided by Adult Education and other programs in the region. The review will include the analysis of the utilization of existing programs as well as any gaps in programming that currently exists. The towns have a specific interest in digital literacy and inclusion for senior citizens and will focus some attention on how to provide training for this group.

4. Public Computer Access – The Digital Inclusion Committee will work with Axiom to identify where there is a need for public computer access and develop a plan to address those needs.

G. Final Presentation and Community Workshop

One of the most important components of this planning project is to educate town councils and citizens about the study findings and the identified options for upgrading internet services. Tilson will prepare a final report and power point presentation, and work with the Grant Oversight committee to plan a public event. At the event, community leaders and citizens will hear from the town Broadband Committees and Consultants about the findings, recommendations and identified solutions. At the workshop, strategies for moving forward will be discussed and next steps identified.

Value Added Collaboration

3. Value Added Collaborations– 20 points

3.1. Describe how the broadband community planning grant may generate improvements to community strength through collaborating in such areas as economic development, education, employment, governmental services, health care, public safety or other regional community oriented activities.

The Lakes Region Broadband Partnership has been working together under different names and with different focuses over a number of decades. This specific planning effort provides the partners with an opportunity to further the relationships in a number of ways. Providing high speed broadband at home for students to connect with their school system and the internet to be able to complete homework assignments and collaborative projects will enhance the school experience for all students. Providing broadband connections between Saint Joseph's College and our region's public and private schools will open up opportunities for collaborative teaching and professional development. Collaborating on digital education will improve the skills and readiness of the region's workforce. Providing true broadband access to telecommuters and at-home businesses will expand employment and small business opportunities for our residents. An enhanced broadband network will provide competitive advantages to our businesses, both small and large. The use of the fiber network to enhance traffic monitoring and management throughout the region utilizing real time data and monitoring systems will advance the efficiency of the highway system. This list just touches the surface of possible system improvements and collaborations that can be achieved through an enhanced broadband network in the region. The planning process we began in the spring of 2015 has re-energized the region as we think about how we can use broadband to improve government services delivery, educational opportunities, and economic development for the residents of our region.

4. Budget – 15 points

4.1. Submit budget aligned to significant Project Plan milestones, costs and tasks.

Budget

Gap Analysis, Needs and Goals, Asset Inventory, Committees	18720
Network Cost Estimates and Design Total Premises + 9000/2 + $3600 cushion	33,203
Explore/negotiate Public Private Partnerships	6480
Final Report, Presentation and Community Workshop	7200
Mileage	1000
Subtotal	66603
Digital Inclusion Plan: Axiom	13321
Total:	$79,924

Experience, Performance, Financials

5. Overall Financial Feasibility – 15 points

5.1 Describe the applicant's experience relevant to proposed project.

Tilson is a multi-service technology firm that works with nonprofits, private enterprise and governments as they seek to improve and upgrade their communications networks. Tilson's in-house consulting team has leverages this experience to help communities throughout New England create a broadband roadmap that will help achieve their economic development goals. Over the past two years, Tilson has conducted broadband feasibility study projects for 25 municipalities, 20 of them in Maine. These feasibility projects have helped communities articulate their goals and equipped them with key information needed to gain public support for a self-directed solution.

Tilson has helped several communities take the next step by crafting public-private partnerships between municipalities, network operators, and Internet service providers. Tilson has currently has implementation projects underway in Islesboro, ME, New Shoreham, RI and Ellsworth, ME.

Tilson prides itself in offering clients objective advice on technologies, potential partners, and partnership structures. Because Tilson does not provide or resell broadband services, there is no conflict of interest that might bias the firms view as it counsels clients on the tradeoffs of various technologies, potential service providers or operating models for a network. In addition, through Tilson's work in network deployment and past consulting projects, the consulting staff has relationships with most of Maine's service providers and is well informed of the latest developments in technology and public policy.

5.1. Provide a description of financial viability by submitting pro-forma financial statements for the project and applicant financial statements. Confidential financial information may be submitted and should be so marked and submitted in a separate file.

Tilson Technology LLC, "Tilson," is a privately held company that was incorporated in the State of Maine in 1996. Tilson employs 160 people, and serves a diversified client base that includes federal, state and local governments and private customers across its network deployment and consulting practices. Tilson has submitted its confidential financial documentation demonstrating its financial viability to the ConnectME Authority directly in a folder marked "Confidential."[1]

5.2 Provide a description of team member's background and roles.

[1] The "Community Broadband Planning Grant Clarification Items" document dated March 18th, 2016 stated that the intent of section 5 was to "ascertain the community contractor's experience, financial viability, point of contact, team member bios and roles." However, the final text asks for applicant financial statements. After further clarification from ConnectME, applicant will provide supplemental financial information as necessary.

5.2.1 Principal point of contact.

Lakes Region Partnership: Tom Bartell
Tilson: Susan Inches

5.2.2 Team member bios and role in planning project.

Chris Campbell, Executive Sponsor, Tilson resource allocation and scheduling:

Chris Campbell is Tilson's Director of Broadband and Energy Consulting. He leads a team of professionals who provide strategic consulting expertise to states, communities, and firms seeking to improve telecommunications infrastructure and services and manage or develop networks.

Chris has 20 years of experience in technology, public policy and community development. Prior to joining Tilson, Chris was the Executive Director of the Vermont Telecommunications Authority (VTA) for almost five years. At the VTA, Chris led efforts to build new fiber networks and expand access to broadband and cellular service. In addition to fiber optic construction and cell site development, Chris had oversight of commercial contract development, grant making, and federal grant seeking. Prior to the VTA, Chris served as Director for Telecommunications at the Vermont Department of Public Service and Assistant Chief Information Officer for the State of Vermont.

He holds a B.A. in Economics and Environmental Studies from the University of Pennsylvania and a Master's Degree in Regional Planning from the University of Massachusetts-Amherst.

Sue Inches, Lead Consultant and Principal Point of Contact:

Susan Inches is a **Senior Consultant** at Tilson. She has over 20 years' experience in municipal planning, public policy and community outreach, with a demonstrated record of success in managing challenging political environments and developing and executing new programs. Prior to Tilson, Sue served three years as Chair of the Board of Coastal Enterprises Inc (CEI), an entity that provides financing and technical assistance to rural communities throughout Maine and the US. CEI has over $800 million in assets under management and 85 employees. Sue also served as Deputy Director of the Maine State Planning Office, a 45-person state agency that provided policy analysis, research, and municipal assistance. Prior to that she served as Director of Industry Development at the Maine Department of Marine Resources, and was on the Board of the Maine Technology Institute, an organization that granted over $20 million in R&D funds to businesses each year. She holds a BA from the College of the Atlantic and an MBA from the University of New Hampshire.

Liza Quinn, Lead Consultant:

Liza Hartmann Quinn brings her background in energy, telecommunications and town planning to her role as a **Senior Consultant** at Tilson. In the energy sector she worked with power producers and utilities to lower their cost of service and increase revenues. She also worked on teams to secure project and corporate financing, and provide analytical support to acquisitions and divestitures. Liza's telecommunications background started with cost modeling, pricing and transactional support of wholesale services, and progressed to a role a general manager of a $77 million colocation services business unit providing space, power, security, and interconnection services to large telecommunications customers. At Tilson, Liza has worked with federal, state and local clients on broadband planning, partner selection, community engagement, and business model analysis. She holds an

AB from Dartmouth College and an MBA and an MFS from Yale University. She has taught Macroeconomics at SMCC has was on the Cape Elizabeth Planning Board for several years.

David Radin, Lead Consultant ad Business Analyst:

David Radin is a **Senior Consultant** in Tilson's Energy and Broadband practice. He has over 13 years of experience across IT, strategy consulting, and renewable energy. Prior to joining Tilson, David was a Senior Research Manager for Energy & Industrials at GLG, the world's leading platform for professional learning, where he served hedge fund clients across a variety of engagements. David also has experience assisting Wildcat Venture Management, a boutique investment firm, in conducting due diligence for development of microwave low-latency networks connecting North American and European trading centers. Previously, David was a developer of energy facilities – wind farms and coal gasification plants – for Gamesa Energy USA and Process Energy Solutions. He had overall responsibility for development of the 200 MW Minonk wind farm in Minonk, IL, as well as fuel and land procurement for multiple gasification plants to convert petroleum coke to natural gas. David has significant prior consulting experience at Everest Group, a boutique strategy firm, as well as system development and IT at Ernst & Young. He has a B.S. in computer science from the University of Illinois at Urbana-Champaign and an M.B.A. from Northwestern University's Kellogg School of Management.
Nick Bournakel, Writing Support

Nick Bournakel, Additional Consulting Support:

Nick Bournakel is a **Senior Consultant** in Tilson's Energy and Broadband Group. Nick possesses a background steeped in regulatory analysis and business and has significant experience working with government agencies at both the state and federal level. At Tilson, Nick has worked with several municipalities, meeting with community leaders and residents to develop broadband plans for the towns of Bar Harbor and Mount Desert in Maine, as well as 13 Maine offshore island communities. He has previously worked as an independent consultant with a variety of clients in the cleantech sector and provided market and regulatory analysis for clients. Nick holds a BA in Philosophy from Bates College, as well as a JD from the University of Maine School of Law.

Brenden DeAndrade, Analytical Support:

Brenden DeAndrade is an **Associate Consultant** in Tilson's Energy and Broadband Group. Brenden joined Tilson after working for five years at Verizon, where he held several positions with successively increasing responsibility in network engineering and operations support as a business analyst. At Verizon, Brenden performed project management and business analysis in a fast-paced, dynamic environment that required cross-functional coordination. This work included frequent coordination with municipalities on network operational issues. Brenden has a Bachelor of Science from the University of Massachusetts and is working towards his Master of Business Administration at Northeastern University.

John Costa, Network Design:

John Costa is a **Senior Outside Plant Engineer** at Tilson. John brings expertise in field engineering, in particular, knowledge regarding siting, and radio frequency engineering. John has worked with many municipalities throughout New England, supporting the work of Tilson's broadband group in providing communities with telecom asset inventories, as well as high level fiber designs and cost estimates for these communities. Prior to Tilson, John worked as a Network Engineering Manager for the Maine Fiber Company as well as a Senior Manager of OSP planning and alternate access for FairPoint Communications.

5.2.3 Provide proof of support and endorsement from the participating local municipalities. See Management Plan, Section 1.1 Above.

5.2.4 Provide the names of local officials and community representatives that will be directly involved as members of the team. See Management Plan, Section 1.1 Above.

Past Performance, References

6.1 Past Performance – 5 points

Provide documentation demonstrating past performance in executing grant funded programs.

In addition to Tilson's extensive past performance in community-funded (as opposed to grant funded) broadband planning in Maine and other parts of New England, Tilson has worked as a contractor or sub-contractor for state and federal grant-funded recipients. Three examples for past performance on grant-funded projects are detailed below:

BTOP Grant: The Three Ring Binder, Maine Fiber Company. The three ring binder is a 1,100 mile fiber optic project designed to deliver high-speed broadband connectivity to rural communities throughout Maine. Costing roughly $32 million, the project received $25 million in BTOP funding and was supplemented by private investment. The Maine Fiber Company engaged Tilson to serve as owner's project manager of the construction. Tilson oversaw all aspects of the deployment, including managing pole licensing, construction, adds/moves/hangs, testing, and network troubleshooting. The three-ring binder was completed in 2012 on budget and ahead of schedule.

BTOP Grant: The MassBroadband Institute, MassBroadband 123 Project. The MassBroadband 123 (MBI123) Project is a 1,300 mile fiber optic project designed to bring broadband service to the rural regions of Central and Western Massachusetts. Costing nearly $90 million, the project leveraged $45 million in BTOP funds and equal matching funds from the State of Massachusetts. The project links almost 1,400 community anchor institutions through a middle mile fiber network. Tilson served as the Project Manager through the Planning, Implementation, Monitoring and Closeout of the MassBroadband 123 project, overseeing the various project vendors and subcontractors, performing the actual construction and implementation of the project. Tilson project managed all vendors throughout the process in a complex Middle Mile Fiber Optic Buildout encompassing various stakeholders, including a large variety of Community Anchor Institutions (CAI's), Points of Interconnect (POI), and various Facility Owners on the project.

State Broadband Initiative Grant: Broadband Rhode Island. Tilson was as a sub-contractor of a National Telecommunications Information Agency (NTIA) State Broadband Initiative grant in the state of Rhode Island. Tilson assessed existing broadband and telecommunications infrastructure in two communities, and compared the community's available service to the rest of the state. As part of the grant, the Tilson team surveyed existing infrastructure including 13 towers, 120 unique demographic locations and conducted analyses of a year of Internet traffic metrics. Tilson also established working groups in both communities conducting a dozen outreach events to communicate the project mission and identify requirements, constraints and concerns.

Tilson completed both projects with a final report that included detailed evaluation of the price and benefit for 10 different broadband service packages sized for project growth and demand.

6.2 Provide three client references.

Client: EA Engineering
Project Name: Broadband Planning Aquidneck Island and Block Islands, Rhode Island
Contact Name/Title: Lou Garcia
Address: 225 Schilling Cir #400 Hunt Valley, MD
Phone: (410) 329-5132
Email: lgarcia@eaest.com

Client: Town of New Shoreham, RI
Project Name: Broadband Plan and Network Designs Study
Contact Name/Title: Nancy Dodge, Town Manager
Address: 16 Old Town Road, P.O. Box 220
New Shoreham, RI 02807
Phone: (401) 466-3210
Email: townmanager1@new-shoreham.com

Client: Island Institute
Project Name: Maine Off-Shore Islands Broadband Study
Contact Name/Title: Briana Warner, Economic Development Director; Stephenie MacLagan, Economic Development Associate.
Address: 386 Main Street Rockland, ME 04841
Phone: (207) 701-1576; (207) 745-3371
Email: bwarner@islandinstitute.org; smaclagan@islandinstitute.org

High Speed Broadband

In

The Lakes Region

Submitted to:
Windham Economic Development Corporation

Prepared by:
Tilson
245 Commercial Street
Portland, ME 04101
Phone: 207-591-6427
Contact: Sue Inches
Phone: 207-415-5891
Email: sinches@tilsontech.com

Submitted:
February 3, 2016

DRAFT: Tilson Technology

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Executive Summary

The Windham Economic Development Corporation engaged Tilson, a Portland-based information technology company, in a broadband planning study. The purpose of the study was to clarify community broadband goals and identify existing internet services, so the Corporation can develop an informed strategy for improving internet services in the region. This study is intended to support the Corporation as it works to build a strong and vibrant economy in the region.

World class bandwidth and broadband infrastructure can be a significant economic development asset. A high speed network sends the message that a community has good infrastructure and services, good amenities and a positive future. This is useful in attracting and sustaining businesses, attracting younger people and attracting people who have a choice about where to live and work.

This project had five parts:

1. Broadband Goals: Assisting the working group in clarifying its broadband goals for the region.
2. Asset Inventory: An inventory of the existing internet infrastructure in the region.
3. Outreach: Interviews with up to ten local organizations to better understand their internet use and needs.
4. Service Provider Meetings: Meetings with four Internet Service Providers to fully understand their services.
5. Path Forward and Capital Cost Comparisons.

A summary report of each of these five activities is given below. Background materials on internet technologies are also included with this report.

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Key Findings:

Widely Varying Internet Needs, Great Potential

The four town region covered by this report includes residents, organizations and businesses with a wide variety of internet needs. Rural residents increasingly look to use the Internet for higher-bandwidth applications, such as streaming movies. St. Joseph's College, medical clinics and sophisticated businesses seek reliable service from 200 Mbps to 1 Gigabit or more to run their operations. A survey of users in the region could provide more detail on current and expected future demand. But even without a survey, it is easy to see the diversity of needs present in the region. Tilson believes that businesses, government and educational institutions will have the highest demand for the fastest broadband speeds, and are the most likely to have unmet broadband needs now and in the future.

The Lakes Region has many attractive assets, including a pristine environment and an active tourist and summer home community. This makes it a prime candidate for a development strategy that includes high speed broadband. A regional fiber to the premises (FTTP) network would send an important signal to would-be residents, professionals, and businesses that the Lakes Region is forward-thinking, and an attractive place to live and work. This is particularly important in attracting new businesses, which the area seeks.

The Region Has Good Internet Coverage, But Only Low Speeds Offered in Many Areas

Time Warner Cable and phone companies' digital subscriber line (DSL) service is ubiquitous in the region. Speeds vary from 3/1 to 50/5. Windham has notably low speed DSL service of only 3 Mbps in many areas, which FairPoint is working to upgrade. DSL and cable internet service are generally adequate for email, web browsing and downloading entertainment. But because of technology limitations, these services vary by the number of users served from a node at a given time, and the distance from "nodes" or transmitting equipment. Cable TV and phone carriers are planning incremental upgrades to their service offerings. We noted that subscription take rates for higher level service offered by cable and phone lines was low and that pricing may be a way of rationing services so that "take rates' of higher level services may be low. It is also unclear whether customers do not want to pay more for service or whether they are unaware that better service levels are offered.

Sophisticated businesses and medical practices, which need fast and reliable service, have privately contracted for premium fiber services ranging from 100 Mbps to 1 Gbps. We interviewed several of these businesses and found that they were happy with the service they were getting, but were paying high prices, ranging from $1500-3000 per month. These prices usually include the cost of building fiber connections to the premises.

Less sophisticated businesses rely on either consumer or non-fiber business class services. The businesses we interviewed in this group said the service was reliable most, but not all the time. They also said they thought their business would outgrow their current services in a few years. They are unanimously unhappy with the level of customer service they receive.

Internet Competition in the Lakes Region May Offer Opportunities

Meetings with four internet carriers proved to be fruitful. While all carriers are interested in gaining market share, the smaller carriers have more flexibility to meet the needs of the region. The larger

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carriers, FairPoint and Time Warner Cable, are currently working on incremental upgrades to their systems in the region. They are also competing to provide premium business services to sophisticated organizations. But they are constrained from investing broadly across the region. Because of this, we recommend the region work with the smaller carriers to see if a partnership could be developed to meet regional broadband goals. More details on this recommendation are provided in Section 5.

Present-Future Conundrum

One of the difficult things about building telecommunications infrastructure today is that while future needs are uncertain, the pace of change is fast and accelerating. Currently, it takes a community three years to plan, organize and build a fiber optic network. This presents a conundrum, where it might seem rational to wait for demand and then respond to it; doing so may mean that available services become uncompetitive, in comparison with other markets. There are a number of ways the region can address this conundrum. Section 5 describes several approaches that the towns may wish to consider.

Funding May Be Available

Even though much of the region has internet speeds below the state definition of broadband (10 down/10 up), no part of the region is currently eligible for federal Connect America Funds (CAF II). FairPoint has been awarded these funds and is obligated to allocate them to unserved areas, as defined by the FCC.

However, there are a number of other funding sources that may be available to help pay for municipal network upgrades. Here are several examples:

- Northern Border Regional Commission (grant funds)
- USDA Rural Utilities Service (grant funds)
- Economic Development Administration (available to Economic Development Districts.)
- Finance Authority of Maine (FAME), (loan funds available to non-government entities.)
- Federal E-Rate Funding which has some restrictions, but may be available

Some Maine communities have publicly funded municipal networks funded by bonding and property taxes. In order to succeed with this strategy, widespread consensus for the investment must first be established, which takes time. Other communities have used existing or created new Tax Increment Financing districts and used the proceeds to partially fund broadband infrastructure. Tilson is available to consult on financing, if that is desired.

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1. Regional Broadband Goals:

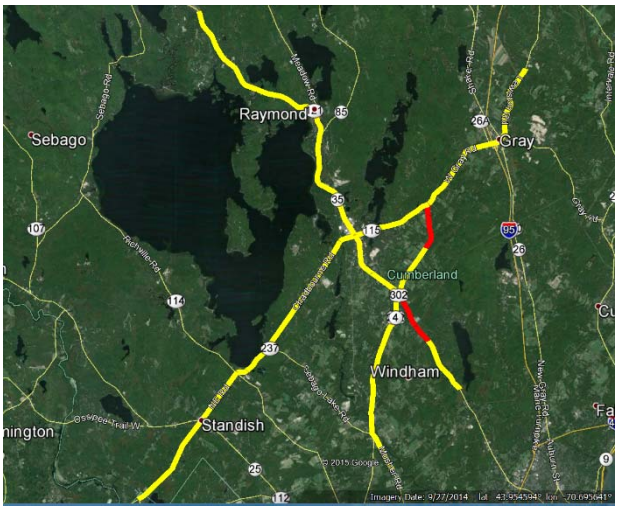
The working group, which included representatives from Gray, Raymond, Standish, Windham, Cumberland County, St. Joseph's College, WEDC, CEDC, Sen. King's office, and USDA Rural Development met, discussed and identified broadband goals for the region. The goals, ranging from the general to the specific, are as follows. High speed internet connections are needed in the Lakes Region to:

- Support small business
- Support entrepreneurs
- Support home based businesses and telecommuters, and facilitate large, timely data transfers
- Encourage tech and innovative companies to expand and locate here, media companies and data centers are of particular interest
- Grow the tourism economy (through added capacity at the Chamber and increased tourism businesses)
- Increase capacity of visitors/tourists to extend their stay and work from the region
- Support aging in place and telemedicine
- Connect schools, library, town offices
- Add digital storage for municipal offices
- Support development of key sites/corridors: Mallison Falls, RTE 302, North Windham Business Park
- Add Smart City/micro grid/traffic control infrastructure
- Create downtown WiFi hotpots
- Upgrade North Windham business district
- Increase redundancy and reliability of digital infrastructure

Although no prioritization of these goals has yet been done, the general discussion indicated that a good starting place for development would be the North Windham business corridor along Route 302. Tilson's finding that very few businesses along the corridor have fiber connections supports this view.

2. Internet Asset Inventory

A Tilson engineer conducted a physical survey to see what internet infrastructure exists in the region. For this project, we sampled roadways throughout the region, but didn't drive down every road. What we observed was a number of aging networks that appear to offer solid services. There is evidence of both older technology that appears to be in use, as well as new improvements being made. Most of the service is provided by a fiber backbone that is connected to premises by copper wire, in a "fiber to the



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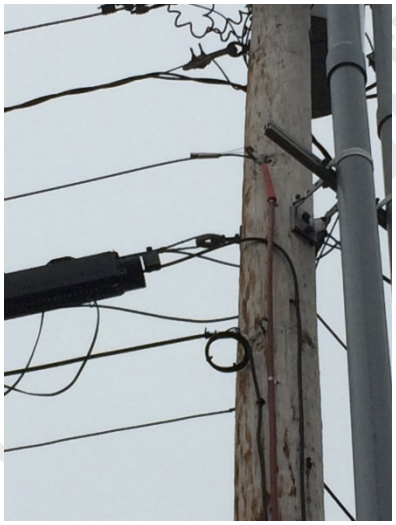
node” kind of design. Below shows our sample area with fiber (yellow) and without (red).

We expected to see more directly fiber fed facilities particularly along the Rte 302 business district in Windham, but we could only find two businesses, both banks with fiber to the premises. Shown below is a fiber connection to the Cumberland County Teachers’ Federal Credit Union on Rte 302 in Gray.



Cable TV and Maine Fiber Company have fiber in the area, but this appears to be for their own use with no services to customer premises. Telephone companies also had lines in the area, with a fiber backbone and copper wire attached, but we saw no fiber to the premises. Time Warner shared their cable TV coverage maps with us (See Appendix B). Internet packages are offered to all Time Warner customers, with internet often bundled with TV and telephone.

Maine Fiber Company has facilities in the project area which we found for the most part is being unused. There are businesses along the Three Ring Binder (3RB) route and the poles have a significant amount of fiber, but the premises are copper fed.

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3. Outreach to Businesses and Organizations

As part of this study, we reached out six organizations in the region to interview them about their current and future internet needs. From these interviews, we observed two broad categories of need:

Organizations that currently subscribe to high speed fiber service.

Of the businesses we interviewed, Orthopedic Associates, the Anania companies and St. Joseph's College are in this category. Each of these organizations use software in the cloud (meaning on remote servers), each requires consistent and reliable high speed service, and each has a need for security and confidentiality. OA and Anania have dedicated fiber provided by Time Warner, and both are satisfied with the reliability, speed and customer service, although both complained about high prices. St. Joseph's has dedicated fiber service from FairPoint and is finding it satisfactory for reliability, speed and customer service. A summary of our findings from this group is given below:

Table 1 - Sampling of Business Class Broadband Offerings

Entity	Internet Uses	Provisioned Internet Access Speed	Cost/Month
Small College with 1000 resident students	Registrar functions Student use Library Student entertainment	1 Gbps	n/a
Manufacturer with 4 Locations	Access to accounting and operations systems in the cloud for all locations.	100 Mbps	$2200
Medical Clinic affiliated with regional hospital	Share x-rays, other imaging and medical records with an affiliated hospital. Private point to point service.	NA	$1500

Businesses that are getting by.

We interviewed three businesses that fit this category: Windham Weaponry, System Architecture, and Hardypond Construction. All said they are making do with business service (but not fiber) from Time Warner. They were critical of the response time for customer service calls. All said they would be looking for more consistent, higher speed and more customer friendly service over the next several years.

Hardypond wants to attract millennials to their housing development in So. Windham, and said that high speed internet would add value to their housing offering. They have reached out to several carriers and found that service offerings of 100Mbps and up are priced at $1000 per month, a stretch for their budget. Summaries of our business outreach calls are given below.

Summaries of Business Outreach Calls:

Anania Companies, Interview with Ray Nadeau

Anania is a company of companies, with a portfolio of 8 companies (7 manufacturing and 1 software) which are mostly located in Maine, but also include a company in Minnesota and another in New Hampshire. Anania's corporate office and three of its companies are located in the Lakes Region: Lighthouse and corporate offices are located in No. Windham, Traktec and MWave operate in So. Windham. Another Anania company, Maine Cedar Log Homes in So. Windham, recently closed.

Anania uses the internet primarily for back office functions such as payroll and accounting, which are consolidated and run out of Anania's corporate headquarters in No. Windham. All of the Anania companies need to upload and download data through servers in the cloud. Some of the companies are also sharing large amounts of data with clients. To accomplish these things, the company needs reliable, high speed internet service. Anania has two dedicated fiber connections from Time Warner, with 3-year contracts. In So. Windham, service is 20x20 Mbps and in No. Windham service is 100x100 Mbps and bundled with phone service. They pay a total of $17,000 per year for their internet services in No. and So. Windham. If public fiber were available at a lower price, and they could maintain static IP addresses, then they would consider moving more businesses to the area.

HardyPond Construction, Interview with Frank Carr

Hardypond Construction is a well-respected general contractor and construction management firm in southern Maine, with over twenty years in the business. The company is headquartered in Portland and has building projects throughout southern Maine. HardyPond is currently developing a 109 unit housing project in So. Windham, which is a renovation and redevelopment of an old mill located there. The new housing consists of market rate efficiency, one and two bedroom apartments, with some affordable units. The first 45 or so units are expected to be ready by the end of 2016. The housing is intended to attract millennials—young college graduates--and also active adults in their 50s and 60s.

Currently, HardyPond has Time Warner business service with speeds of 17down/3.5 up at a cost of $150 per month. Higher speed connections are sought for the new housing project in South Windham and a fiber connection to the project is especially important for marketing the apartments to millennials. HardyPond has discussed high speed service with Time Warner and found that they can provide a fiber connection, but at a high monthly cost. Calls to FairPoint have not been returned. A public source of fiber at a lower price would be a very attractive alternative for the project.

System Architecture, Interview with Vince Micale

System Architecture is an IT consulting firm that provides network engineering, IT support, website design, software development, system integration and database administration to business clients in a variety of industries. Twenty people are employed in the company's office

in Windham and a new office was opened in Bangor in 2015. The company is using business class service from Time Warner and does not have a dedicated fiber connection. They have some data storage in the cloud and find the speeds adequate most of the time. They did report poor quality service when using the web for webinars, skype and video. This suggests that they may need to upgrade their service, but we were unable to find out exactly what service the company currently subscribes to.

Reliability and customer service were the two most important internet issues for this company. They reported that internet service occasionally goes down for a day or two, effectively shutting down their business. Customer service was cited as unfriendly and hard to work with, especially in getting service up and running in the new office in Bangor. Higher internet capability was thought to be transformational, with this company saying "Currently we make do with what internet service we have, and we probably haven't yet conceived of all the things we could do with much higher level service". Faster, more customer friendly and more reliable service would be an attractive option for this business.

Windham Weaponry, Interview with Allen Faraday

Windham Weaponry was formed in 2011 when Bushmaster, another arms manufacturer located in Windham, left the state. Now with 75 employees, Windham Weaponry assembles, distributes and directly sells firearms and related parts and accessories. The Windham facility does no machining or finishing, but is engaged in the design, quality control, assembly, and testing of the products it sells. It also runs a shooting range in Windham.

Currently the company uses the internet for on-line sales, webinars and skype, data management and increasingly, operations in the cloud. Because they are in the arms business, a security and surveillance system that incorporates 50 cameras is in continuous use. This can slow down and overtax the 35/5 internet service that they now have. They are currently "making do" with their current business class service and have researched other options. They have recently received an estimate to upgrade their service to fiber connection offering speeds of 50/50 at a price of $755 per month and are planning to upgrade to this service being offered by Time Warner. The company would strongly endorse a "community broadband" approach which would bring more options to the community as a whole and perhaps lower prices for businesses like theirs.

Orthopedic Associates, Interview with John Pineau

Orthopedic Associates (OA) is a highly specialized medical practice that offers the latest orthopedic diagnostic and treatment options available. OA has a central office, clinic and surgery center in Portland and satellite facilities in Saco, Brunswick and Windham. OA transmits large amounts of data, including X-Rays and MRI images, and needs to assure the confidentiality of this data. This makes high speed, reliable and secure internet service a necessity. Other medical establishments in the Lakes Region will have similar internet needs.

Currently, OA in Windham has a point to point private fiber connection to the Portland office with 100 Mbps speed, which was installed in 2007. This has proven to be satisfactory for speed, reliability and customer service. The service is costly, at $1500 per month. OA also has local

Time Warner service to access the internet from its Windham location. Service is adequate at present for the 12 users and 25 computers they have on site.

Going forward, OA expects to centralize more of its operations in the cloud. As this happens, more internet speed will be needed. OA would be very interested in public fiber if it were available, although it will always have a need for a secure private network for confidential materials.

St Joseph's College, Interview with Yvonne Berry and John Murray

St. Joseph's College is a Roman Catholic liberal arts college located in Standish on the shore of Sebago Lake. 1000 students are housed on campus and an additional 3-5000 students access courses on line. Some college operations (Office 365 and Learning Management System) are cloud based and are reliant on a durable internet connection. Student entertainment—games, music, video, and movies—is internet based, with campus use peaking between 5 PM and midnight. The college requires reliable and high speed internet service and is currently using a private fiber connection from FairPoint that offers speeds up to 1 gigabit. Previously, they had service from Time Warner, but said they were able to get a better price from FairPoint.

Two important points were raised in our interview. One is that the college needs redundancy (meaning more than one carrier is always available) in its internet service and cited the lack of it as a critical risk. Bowdoin College in comparison, has three internet connections available, where St. Joseph's has only one. The other important point is that the college's need for bandwidth continues to grow and they anticipate outgrowing their current internet connection over the next several years. The College is currently exploring a number of future options, which might include hosting their own fiber connection to the Three Ring Binder. A public fiber network would be an attractive alternative, also.

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4. Internet Service Provider Meetings

The Broadband Working Group, with Tilson facilitating, met with four carriers who serve the region: FairPoint, OTT, Time Warner and GWI. Discussion topics included the speed, price and coverage of their offerings, the proportion of customers that are undersubscribed (meaning the percentage of customers that don't subscribe to the fastest speeds), historical network and speed upgrades, plans for increased speed offerings, and their views on working with municipalities to improve coverage or service in the future. The summary of each meeting is provided below.

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Time Warner Cable (TWC) offers Internet service, cable TV and voice in Gray, Raymond, Standish and Windham as a franchised cable operator. In Maine, the franchises are granted by each municipality. The company's advertised service uses DOCSIS 3.0 hybrid fiber/coaxial cable network. Users across the network have access to the same speed offerings, which range from 3/1 Mbps to 50/5 Mbps. (See Appendix B for TWC street coverage and residential list pricing.) Time Warner offers high speed fiber-based services to businesses and other service providers across its footprint for negotiated rates.

TWC has spent considerable capital to upgrade its network in Maine over the past six years. These investments have yielded faster speeds. In 2008, the fastest speed available on its hybrid fiber/coaxial network was 10/1 Mbps. Today, the fastest speed is 50/1 Mbps (See Appendix B). TWC has begun to roll out faster speeds in selected markets, like Charlotte NC, of up to 300/20 Mbps. While there are currently no announced plans to upgrade the speeds in the Maine market, the TWC representative said that Maine is likely to receive upgraded speeds in the future.

According to TWC, across Maine, the majority (>50%) of TWC customers subscribe to the company's "Standard" 15/1 Mbps offering, followed by the 6/1 Mbps, 20/1 Mbps, 30/1 Mbps and either the 2/1 Mbps or 50/5 Mbps in popularity. It is unclear whether the relatively small percentage of subscribers at the faster speed tiers is due price sensitivity or lack of awareness.

TWC is willing to work with municipalities on expanding coverage to unserved streets. However, because of their centralized management structure and consistency of service offering across regional footprints, it is unlikely that they would be willing to work with the Lakes Region on a model where they would deviate from their current offerings (e.g. speeds, pricing) as part of a public-private offering.

Of note, but not discussed in the meeting is the fact that Federal law allows franchising authorities to charge a cable operator a fee of up to a five percent gross TV revenue for the right to operate in a franchise area. In Standish, TWC appears to collect a 5% franchise fee, which it remits to Standish.[1] Tilson does not know whether the Gray, Raymond and Windham franchise agreements stipulate a similar fee. Franchise fees can be a funding source for municipal networks.

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[1] Source: Unexecuted franchise agreement sent on 10/25/15 from Gordon Billington

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In western Gray, Raymond, Standish and Windham, FairPoint provides copper-based DSL service to an estimated 98% of all addresses[2]. Available DSL speeds range from .768 Mbps download to 50 Mbps download, with much slower upload speeds (typically 1 Mbps, with some exceptions). Because available speeds are a function of the type of equipment deployed in the serving DSL nodes[3], and the copper cable route distance between the DSL node and the end users, it's difficult to assess which users have access to specific speeds. FairPoint provides speeds of 12/1 Mbps or greater to 60% of its premises in Gray; 72% of residents in Raymond; 38% of the premises in Standish; and less than 18% of the premises in Windham.[4] DSL prices are not published, and FairPoint declined to share pricing, stating that most customers are on promotional contracts.[5]

FairPoint did not have data on historical upgrades, although they have recently made upgrades to their network in Raymond and Standish that give some customers access to up to 50 Mbps download (10% and 9%, respectively). In Windham, FairPoint is in the process of upgrading five of 12 total DSL nodes, which will bring 80% of the population speeds from 3 Mbps up to approximately 15 Mbps.

Data on the percentage of customers undersubscribed, meaning they do not subscribe to the fastest speed available, was difficult to assess from FairPoint's data.[6] However, the company did share that in Windham the undersubscription rate was 22%, which they consider to be relatively low and therefore an indication that the market would support a speed upgrade.

In addition to DSL, FairPoint will supply copper- or fiber-based internet access at speeds of up to 1Gbps to individual customers, but not on a neighborhood or regional basis. Prices are not published, and fiber-based services are priced and provisioned on a case-by-case basis.

FairPoint uses its fiber-based Carrier Ethernet Service to provision 100/100 Mbps connections to the Maine School and Library Network (MSLN). The MSLN network is federally funded and not generally available for private use, although there are occasional exceptions.

FairPoint expressed willingness to partner with municipalities, and cited examples of work with other towns in Maine where they upgraded a defined portion of their network via a cost-sharing structure.

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[2] DSL service is available to addresses within roughly four cable-route miles of the DSL nodes housed in its remote terminals and central offices.
[3] Windham has 12 DSL nodes, Raymond has 8, and Standish has 13. There is a heterogeneous mix of equipment in those nodes, offering a heterogeneous mix of services within each town.
[4] Meeting with FairPoint on 1/13/16.
[5] Meeting with FairPoint on 1/13/16.
[6] FairPoint shared proprietary data on the screen, but did not leave behind a presentation.

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Throughout most of Gray, OTT provides copper-based DSL service.[7] Available DSL speeds range from 4/1 Mbps to 12/1Mbps. These speeds are a function of the type of equipment deployed in the central offices and remote terminals (DSL nodes) and the copper cable route distance between the DSL node and the end users. Pricing of currently available speeds, the proportion of Gray's premises with access to those speeds, and the take rate for eligible customers at each speed tier is shown in Appendix B. It's notable that OTT provides speeds of 12/1Mbps to 54% of its premises in Gray, and of those eligible homes or businesses, only 3% subscribe to the service.[8] It is unclear whether these undersubscription rates are due to price sensitivity, lack of awareness of offerings, underlying demand, or the fact that upload speeds do not increase with the higher speed tiers.

OTT provided a timeline of internet access service investment (Appendix B) that demonstrates investments over the past 15 years that improved coverage and available speed, In the first quarter of 2016, OTT plans on offering bonded DSL service with speeds up to 50/5 Mbps that will be priced competitively with TWC's 50/5 Mbps offering. They are also planning a pilot fiber to the premise (FTTP) offering along Portland Road, and are currently soliciting customers for the offering.

In addition to serving as the incumbent phone provider in Gray, OTT offers competitive internet and voice services in Windham. It offers DSL-based services via FairPoint's copper lines in central Windham, and DSL-based services along route 302 in North Windham via its own copper lines.[9]

OTT has partnered with Lake Region municipalities in the past – in 2004 it worked with Windham to design and promote its DSL deployment; and in Gray OTT worked with the town to design and build a network to connect town buildings in 2014 and 2015. OTT is open to partnering with communities in the future, and is open to the structure of the partnership. OTT suggested that a project along route 302 in North Windham, where it has already deployed copper facilities, might be a good starting point.

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GWI currently provides DSL to residential and business customers within a four mile radius of FairPoint's central office in Windham. The company offers speed tiers of 20/1 Mbps and 7/1 Mbps, with an option to bundle with voice service.

GWI does not have plans to expand or upgrade its DSL footprint, and the company is focusing its future investments on fiber technology.

GWI has engaged in several public/private partnerships in Maine, including fiber projects with the municipalities of Islesboro, South Portland and Rockland. It is open to a partnership in the lakes region, and is flexible on the structure of the partnership.

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[7] OTT provides service to all to addresses within roughly four cable-route miles of the DSL nodes housed in its remote terminals and central offices. Almost all users (~98%) are able to access its lowest speed tiers.
[8] OTT presentation, Appendix B, for more detail.
[9] Because OTT has already deployed copper lines along 302, the incremental cost of deploying fiber along this route in the future will be much lower.

5. Paths Forward and Capital Cost Comparisons

1. Partner with Local Carriers:

Meetings with four internet carriers proved to be fruitful. While all carriers are interested in increasing their market share, the two smaller carriers (OTT and GWI) have greater flexibility in partnering with local interests, which could work in the town's favor. If local carriers are willing to meet the region's internet goals, or share the risk with the towns to meet them, this could be a less risky and lower cost solution than the towns building a network of their own.

There are several ways to think about working with local carriers. One is to provide local input into where they make their investments. OTT for example, has plans to invest regionally over the next several years, but hasn't yet committed to the location of all of their network upgrades. The towns in the region might be able to influence where these investments are made.

A second way to work with carriers is for the town to become an investment partner with one of them. If towns could provide some funding, a local carrier might be amenable to partnering on a larger network upgrade. We recommend that the WEDC and its partner towns work with the local carriers to see if there could be a strategy that would meet regional goals. Tilson is available to assist with strategy development, identifying public and private funding sources, and negotiations with a carrier, if that is desired.

2. A Publicly Funded Network:

Another option is for the region to consider building its own network. Again, there are a number of ways this could be done. A common solution is for towns to begin by developing their own fiber network to connect town offices, schools and other community anchor institutions. Because of the competitive internet market in the Lakes Region, this could be done in combination with working with carriers to upgrade internet services throughout the region.

Communities often will elect to build a fiber network incrementally, starting with the highest priority areas first. Rockport, Ellsworth and South Portland are deploying this strategy. In Rockport and Ellsworth the fiber is municipally owned with Internet Service Providers (ISPs) leasing the fiber and providing the service. This is known as an "open access" or "dark fiber" network. In South Portland, GWI owns and operates a fiber backbone with the City as an anchor tenant.

A hybrid system with fiber in some areas and fixed wireless other areas is another possible solution. Depending on the topography and availability of towers in the area, wireless can be effective in outlying areas. It is not as fast or reliable as fiber, but can be an attractive alternative to telephone DSL and cable TV.

Other communities have opted to build a public fiber to the premises (FTTP) solution throughout the town or region. The advantage this has is that it provides service to everyone, and is "future proof". Professionals working from home, summer home owners who want to live and work in Maine, students at all levels, small and large businesses, and medical patients and the elderly who need to be monitored regularly would all benefit. A fiber system sends the message to the world that the community is a desirable place to live and do business. There are many examples nationally of communities that have built fiber networks and been able to attract new employers to the region, in part because of the fiber network. The downside of this solution is that it may take several years to develop the community

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support needed to the raise public funds to build the network. Islesboro, for example, has planned for three years to build a fiber network and are just now at the point where construction is about to begin.

If a fiber or fiber/wireless hybrid solution is desired by the community, the next step would be to create a network design and provide high level cost estimates to build it. Tilson is available to assist with network designs, cost estimating and solutions for managing fiber, if that is desired.

3. High Level Cost Comparisons of Fiber Networks

Fiber network costs vary according to population, building density, subscriber "take rate" and other variables such as how much of the system is underground, the number of poles needed and the cost to lease pole space. Costs for these items vary widely from place to place, so benchmark numbers such as "fiber costs $25,000 per mile" should be taken as gross estimates that may or may not apply to a specific region.

The most important variable in building any network is the "subscriber take rate". If the number of subscribers needed to cover the fixed costs do not materialize, a project isn't viable. In fact, where projects have failed, it is usually the case that the desired take rate wasn't achieved, resulting in a default on debt. This risk is often the reason that incumbent carriers are not jumping to invest in rural areas where population is spread out, or in areas with strong competition, which may reduce the subscriber take rate for a new service. Take rate risk can be mitigated by a pre-subscription campaign where users make a financial commitment to taking the service, before a network is built.

Below is a chart that shows the capital cost estimates for FTTP networks, taken from publicly available studies that Tilson has completed in Maine. In general, estimated costs are a function of the number of route miles, number of premises, and whether construction is aerial on underground. Aerial construction and dense premise spacing yields lower costs per premise than underground construction and sparse premise spacing.[10] The chart is intended to be a benchmark to inform the Lakes Region strategy, but is not an actual estimate for the region. The cost estimates below do not include providing internet service over the network or the cost of administering the fiber.

Fiber Network Cost Estimate Comparisons (Fiber to the Premises)

Town	# of Premises	# Miles of Fiber	Estimated Capital Cost[11]
Bar Harbor Municipal Only	24	22	$2.5
Bar Harbor Universal	4,390	96	$15.1
Rockport	1,994	72	$7.9M
Rockland	3,065	50	$7.7M
Owl's Head	916	29	$3.0M

Fiber Middle Mile Only Costs:

Several towns including Rockport, Ellsworth and South Portland have opted to build short middle mile

[10] Actual costs will significantly impacted by an additional factor -- "make ready" costs, or the amount of work the utility pole owners require to be done in order to prepare the poles for an additional cable.

[11] Includes fiber to each premise (the drop), plus electronics, estimated make ready costs, and professional services, like engineering design.

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networks that connect municipal facilities and a few community anchor institutions. These are not fully built out networks, but additional drops or connections to these middle mile backbones can be made over time. The cost to build these runs from $30-45,000 per mile.

Summary and Next Steps:

The next step for the region is to prioritize the most important areas for upgrades—whether it's connecting town offices, schools and community anchor institutions; providing gigabit services to the business districts as an economic development strategy; or providing fiber to premises in the entire region. In meetings for this project, Tilson saw great interest in working with existing carriers to see what might be accomplished. We also heard references to upgrading services in the business district, and perhaps connecting anchor institutions to the Three Ring Binder in Standish as potential paths forward. From there, one of the strategies described in the "Paths Forward" section above should be actively pursued.

This report is intended to provide a foundation for action that will improve broadband services in the region. Your feedback is welcome.

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Appendix A:
Broadband Technologies Background Information

The Need for High Speed Connectivity

Fiber to the home or business opens up new worlds of possibilities. Abundant bandwidth allows people to interact as if they are in the same room. A gigabit connection can enable multiple users to share large datasets and interact seamlessly with others in remote locations. Fiber to the Premises is often cited as the "holy grail" of connectivity, and with good reason:

- Pervasive fiber networks enable the easy sharing of large data sets such as medical records, medical imaging, climate and other scientific data.
- Fiber revitalizes economies by attracting new businesses and allowing small businesses and professionals working from home to thrive.
- Fiber enhances educational offerings and increases educational attainment by allowing students to visit sites around the world digitally and interact in real time with remote teachers and student groups.
- Fiber enhances health by allowing caregivers to monitor patients and the elderly in their homes and allowing health care providers to share medical records.
- Fiber helps cities to function more smoothly by monitoring and controlling traffic, energy use and on-line interaction with constituents.

Gigabit Progress to Date

Not everyone agrees on when gigabit connections will become a necessity. Nevertheless, more and more providers and communities are implementing gigabit networks. Google introduced 1 gigabit service to Kansas City and 20 area suburbs in 2012. Since then, Google has announced its commitment to build gigabit service in 20 major cities over the next several years. In response, AT&T announced in November that it will expand gigabit to parts of 23 cities in addition to its existing gigabit service in Houston, Chicago, Miami, Nashville, Orlando and Atlanta. Comcast announced in April that 1Gbps service would be available to 18 million households in 2015, and to almost every household it serves by the end of 2016. Similar progress towards higher speed internet services is being made in countries around the world. Closer to home, cities and towns across New England are upgrading their internet services and installing fiber to the premises networks in selected areas.

At the same time, current market forces are not producing the high speed bandwidth that smaller cities and towns desire. Quite simply, this is because the financial returns to internet providers are generally below the cost of building and operating faster systems. The return on investment is much higher in densely populated regions. Most incumbent carriers will provide custom high speed internet to a business or organization that is willing to pay the high costs of installation and service, but most carriers are not motivated to assume the risk of connecting an entire town or region. In time, this reluctance could potentially create a digital divide between urban and rural areas.

In response, many communities are planning and implementing their own high speed internet systems. This is new territory, and various business and funding models being implemented in different places. The lakes region fits neatly into this latter category. The communities in the region want high-speed broadband, but more work needs to be done to find the best path for achieving this.

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FTTP Technology Comparison

Network Terminology

In comparing FTTP to other technologies, it is useful to discuss five aspects: upload bandwidth, download bandwidth, latency, resilience, and quality of service. These are defined as follows:

- Upload bandwidth "Up" is the capacity of a network connection to push data from the local network to the wide area network to which it is connected. In other words, upload bandwidth is a measurement of the capacity of the data "pipe" *from* the local network to the internet. Bandwidth is typically measured in megabits or gigabits per second, abbreviated Mbps and Gbps, respectively.
- Download bandwidth "Down" is the capacity of the local network to receive data from the wide area network. Typically, the wide area network will be the Internet. While many people focus on a connection's download bandwidth, it is important to note that all bandwidth measurements are maximums in an ideal environment. Actual *throughput,* the data transfer rate achieved in the real world, is often significantly lower than advertised bandwidth due to factors on the local network and the broader Internet.
- Latency is a measurement of the time it takes for information to travel to its destination on the network. Generally, network latency measures the round trip time – that is, the time it takes for a *packet* of information to travel from its origin to its destination and back. Latency has a significant impact on a user's perception of connection speed. High latency connections, where for example there is a significant delay between clicking on a link and the page beginning to load, will feel very slow compared to low latency connections, where the response to clicking is immediate, even if the page then takes a few seconds to load. Latency is of paramount importance for "real time" network applications like phone or video conferencing. Typically measured in milliseconds, latency below 50ms is considered normal for home cable broadband connections. An example of a high latency connection might be via satellite, where latency approaching 1000ms is not uncommon.
- Resilience or resiliency is the ability of the network to maintain an acceptable level of service despite physical faults in the network or equipment malfunction. For example, if a key fiber line is cut or broken, a resilient network would continue to function at an acceptable level until repairs could be effected. Resilience is primarily determined by how the network is designed and built, and is not an intrinsic quality to any particular network technology.
- Quality of Service, or QoS, refers to the ability of a network to prioritize different types of traffic with regard to each type's needs. For example, a phone call would require higher priority processing than sending an email since the people on the call would directly notice the adverse impacts on their call of higher latency or insufficient bandwidth, while someone sending an email would probably not notice their email took slightly longer to send. QoS is most applicable in bandwidth-constrained environments where many users, using different kinds of network applications, all share a connection that does not provide enough bandwidth for all users at once. Bandwidth might not be a concern in a FTTP network, but QoS could still be useful in minimizing latency for priority applications.

Broadband Technologies Overview

There are many competing technologies available for broadband networks. Each represents a balance between installation cost, operation cost, geographic range, and the five network characteristics

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discussed above. This section will discuss the four most common technologies: DOCSIS, DSL, LTE, and fiber.

DOCSIS

Data Over Cable Service Interface Specification, usually called DOCSIS, is the standard used by cable internet providers. There are multiple versions of DOCSIS; the current specification is version 3.0. Most US cable companies will begin to implement DOCSIS 3.1 on a wide scale in 2016.

All versions of DOCSIS use existing cable TV wiring to provide data connectivity. Each cable internet connection uses a *cable modem* to transmit and receive data, and convert between the cable company's infrastructure and a local networking interface, usually Ethernet.

Cable modems transmit and receive using the similar types of signals to those of cable TV. Cable providers can add or remove bandwidth by assigning more or fewer channels to the data network. The DOCSIS standard, among other things, defines ways for cable modems to take advantage of more channels for data. Since bandwidth on the cable companies' networks is a finite resource, as internet bandwidth needs grow, cable companies may be faced with removing less-watched TV channels from their lineups in order to free bandwidth for internet customers.

DOCSIS 3.0 is the current standard in US cable internet. While it can technically support up to 1Gbps, no cable provider offers such a service tier because it would use too many channels. In addition, gigabit speeds under DOCSIS 3.0 would require prohibitively expensive upgrades in the cable providers' head-end systems.

Instead, most operators plan to make head-end upgrades as part of the overall upgrade to DOCSIS 3.1. The newer standard is more efficient, and is designed to compete with FTTP offerings from Verizon, AT&T, Google, and others. Table 2 shows a comparison of the maximum bandwidth for each DOCSIS standard that can be typically realized. While DOCSIS 3.1 can theoretically support up to 10Gbps download, cable providers are only planning to implement a maximum of 5Gbps initially.

One important drawback to cable internet is that connection bandwidth is shared with other users in the area. If the network is not well-engineered, throughput will suffer during periods of high usage.

Table 2 – DOCSIS 3.0 vs 3.1

	DOCSIS 3.0	DOCSIS 3.1
Year Released	2006	2015
Download Bandwidth	Up to 300Mbps	Up to 5Gbps
Upload Bandwidth	Up to 100Mbps	Up to 1Gbps

DSL

Digital Subscriber Line, or DSL, is a family of technologies that allows high speed internet using old-fashioned copper phone lines. While a proven technology, DSL has significant technical limitations that drive up the cost of deploying higher-speed DSL networks.

The two main DSL technologies in use in the United States are ADSL and VDSL.

- ADSL, Asymmetric Digital Subscriber Line, is the more common technology. The "asymmetric" refers to the fact that ADSL lines have different upload and download bandwidths. When the technology was first introduced in the late 1990s, ADSL had a maximum download bandwidth of

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1.5Mbps. Nowadays, DSL networks can achieve 24Mbps download under ideal conditions using an updated version of the technology called ADSL2+.

- VDSL, Very-high-bit-rate Digital Subscriber Line, is an improved version of DSL technology that can provide bandwidth rivalling the fastest DOCSIS 3.0 connections under ideal circumstances. VDSL is generally used for DSL speeds in excess of 24Mbps. Achieving speeds comparable to fast cable connections with VDSL is very costly and technically demanding in real world conditions.

The core weakness of all DSL technologies is that speed decreases quickly as the customer moves farther from the phone company's remote terminal. While an ADSL connection might be able to attain 24Mbps, customers would have to be located within one third of a mile of the remote terminal in order to realize such speeds. Customers more than 2.5 miles from the remote terminal are limited to approximately 3Mbps, while DSL is generally not usable for customers more than about 3 miles from the remote terminal. Table 3 shows the theoretical maximum bandwidths for DSL technologies, under optimal conditions. VDSL can achieve speeds higher than below by using multiple physical pairs of wire and bonding them programmatically at the remote terminal into one connection, but this imposes a significant capital and operational cost in addition to requiring customers be in close proximity to the remote terminal.

Table 3 – DSL Technologies Comparison

	ADSL	ADSL2+	VDSL
Download Bandwidth	Up to 8Mbps	Up to 24Mbps	Up to 52Mbps
Upload Bandwidth	Up to 0.448Mbps	Up to 1.4Mbps	Up to 16Mbps

LTE

LTE, or Long Term Evolution, is a wireless technology used for data connectivity. LTE is often thought of as a cellular phenomenon. While US cellular providers have all implemented LTE in some form on their networks, the technology can also be used for fixed applications. Wireless systems have certain advantages over wired ones, chief among which is their reduced capital cost in covering sparsely populated or remote areas. This must be balanced with the need, especially in a fixed broadband network, to provide adequate service to all subscribers throughout the footprint.

LTE is a mature technology that, as noted above, is being widely used worldwide. It provides a theoretical maximum download speed of 300Mbps with uploads of up to 75Mbps. Since LTE is a wireless technology, factors such as distance from the base station and atmospheric conditions will have an effect on real-world throughput and latency. There are ISPs who provide fixed LTE connections, especially to remote communities.

Fixed LTE service providers typically provide a router that receives the LTE signal and converts it to standard Ethernet and/or Wi-Fi for use in residences and small businesses.

Fiber

Fiber optics use glass (or, in some cases, plastic) strands to carry data signals in the form of pulses of laser light. Each strand is significantly thinner than a human hair but has no theoretical maximum bandwidth. Fiber connections of 400Gbps have been demonstrated, but most FTTP networks have a bandwidth of 1Gbps per connection. As new technologies become available, FTTP networks can be upgraded by installing new equipment at each end of the fiber.

Fiber to the premises is generally considered the "gold standard" in speed, reliability, and latency. One important differentiator of FTTP networks compared to other technologies is that FTTP is symmetric.

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That is, FTTP networks offer the same upload and download bandwidth. As people use the internet more and more for applications, like video chat, that require significant upstream bandwidth, this can become an important consideration.

Broadly speaking, there are two main types of FTTP network: passive and active. In a passive network, multiple customers share the bandwidth from a common fiber strand. Conversely, customers in active networks each have their own dedicated fiber strand to the head end. Passive networks tend to have lower capital and equipment costs while active ones are generally perceived as "future-proof". Both types of networks can still provide gigabit bandwidth to end users.

Summary of Network Technologies

The below table summarizes all of the broadband technologies along the five characteristics of upload/download bandwidth, latency, resiliency, and quality of service. It is important to note that resiliency is primarily determined by how the network is engineered, and is not intrinsic to a given technology. It is possible to build highly resilient networks using any of the below technologies by building redundant connections, using higher-grade equipment, and the like.

Table 4 – Comparison of Broadband Technologies

	Max Download Bandwidth	Max Upload Bandwidth	Typical Latency	Resiliency	Quality of Service
Cable/ DOCSIS	3.0: 300Mbps 3.1: 5Gbps	3.0: 100Mbps	30-80ms	Similar to overall local cable network	Widely implemented by cable providers for phone service
DSL	52Mbps	3.1: 1Gbps	40-80ms	Similar to local phone network	Limited bandwidth can force use of QoS
LTE	300Mbps	16Mbps	60-100ms	Depends on density of base stations and backhaul engineering	Limited bandwidth in suboptimal conditions can require QoS
FTTP	10Gbps	75Mbps	<15ms	Depends on network engineering, including backbone redundancy, placement of fiber, etc.	Not generally required

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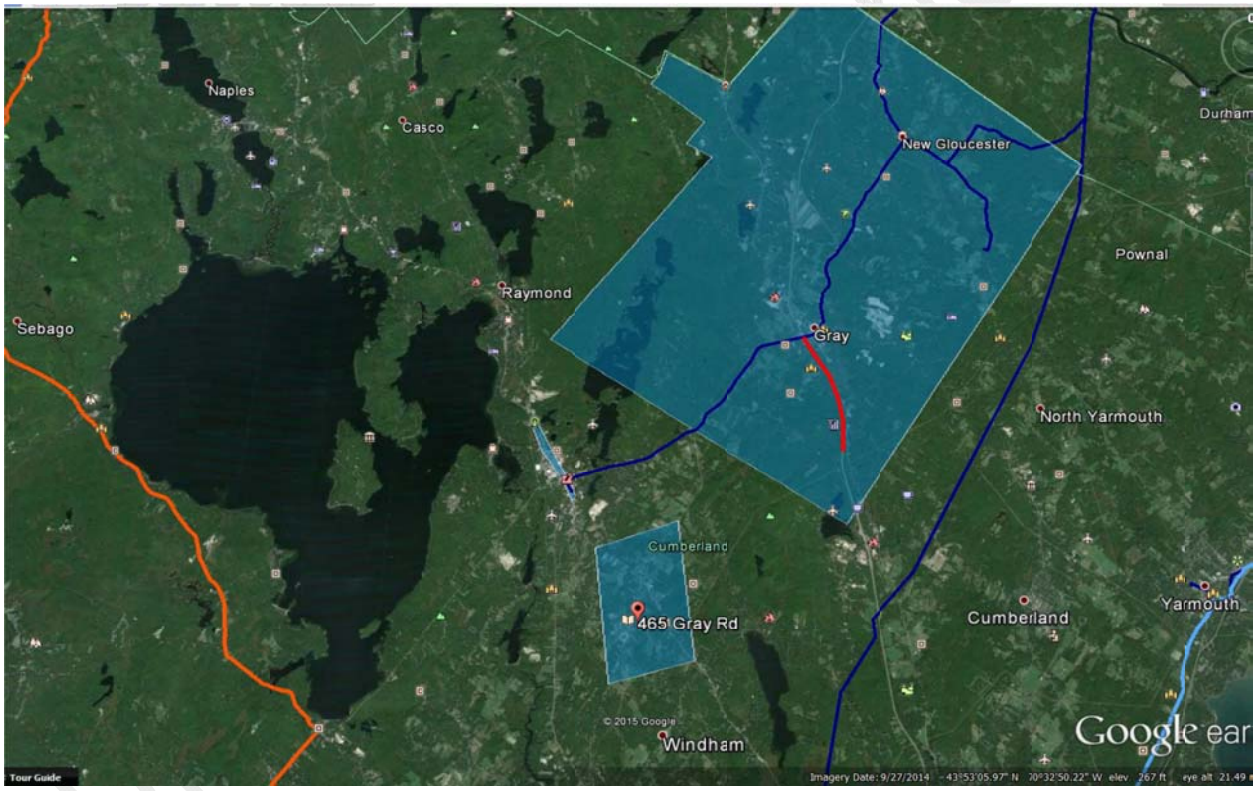
Appendix B
Additional Carrier Information for the Lakes Region

OTT Service Area



Legend

Blue polygons: Approximate DSL/phone coverage
Blue lines: OTT transport fiber
Orange line: Three Ring Binder
Red line: Fiber to the Premise pilot

OTT Speeds and Pricing

Residential

- Bonded DSL
  - 20 x 2Mbps - $43.45
  - 30 x 5Mbps - $59.45
  - 50 x 5Mbps - $69.45
  - Projected availability Q1, 2016 in all Maine ILEC's (Includes Gray)
- Fiber to the Home
  - 25 x 25Mbps - $59.99
  - 50 x 50Mbps - $79.99
  - 100 x 100Mbps - $99.99
  - Pilot project on Portland Rd in Gray in 2016
  - Gray is probable site for one of three additional FTTH projects in the 2016 budget

Business

- Bonded DSL
  - 20 x 2Mbps - $53.45
  - 30 x 5Mbps - $69.45
  - 50 x 5Mbps - $79.45
  - Projected availability Q1, 2016 in all Maine ILEC's (Includes Gray)
- Fiber to the Premise
  - 25 x 25Mbps - $159.99
  - 50 x 50Mbps - $219.99
  - 100 x 100Mbps - $339.99
  - Pilot project on Portland Rd in Gray in 2016
  - Currently soliciting beta customers

OTT DSL Speeds, Coverage and Take Rates in Gray, ME

Speeds, Coverage and Take Rates – Gray Only, Asymmetrical

Bandwdith	Coverage	Take Rate	Monthly Cost
12Mbps x 1Mbps	54%	3%	$43.45 Residential or Business
10Mbps x 1Mbps	62%	4%	$38.45 Residential or Business
6 Mbps x 1Mbps	74%	16%	$33.45 Residential or Business
4Mbps x 1Mbps	98%	33%	$28.45 Residential or Business
Less than 4Mbps	98%	4%	$28.48 Residential or Business

Most customers are not subscribed to the maximum bandwidth available.

OTT Internet Service Timeline in Gray, ME

- **1994:** Dial-up service
- **2000-2001:** First generation ADSL (Up to 8Mbps)
  - Includes Gray, Windham near high school
- **2004:** DSL deployed in North Windham
  - Worked with town leaders to roll out and promote
- **2008:** ADSL expanded to Sabbathday Lake
- **2009:** ADSL expanded in South Gray at Northern Oaks
- **2011:** ADSL expanded to North Raymond Rd.
- **2012:** Symmetrical Internet services introduced in Gray
- **2013:** Second generation ADSL (12-20 Mbps) in Gray, Windham and others
- **2014-2015:** Targeted fiber constructed for certain customers
  - Town of Gray
  - Enercon
- **2016**: Third generation bonded ADSL (up to 50 Mbps)
- **2016**: FTTP on Portland Road, Gray, another location TBD

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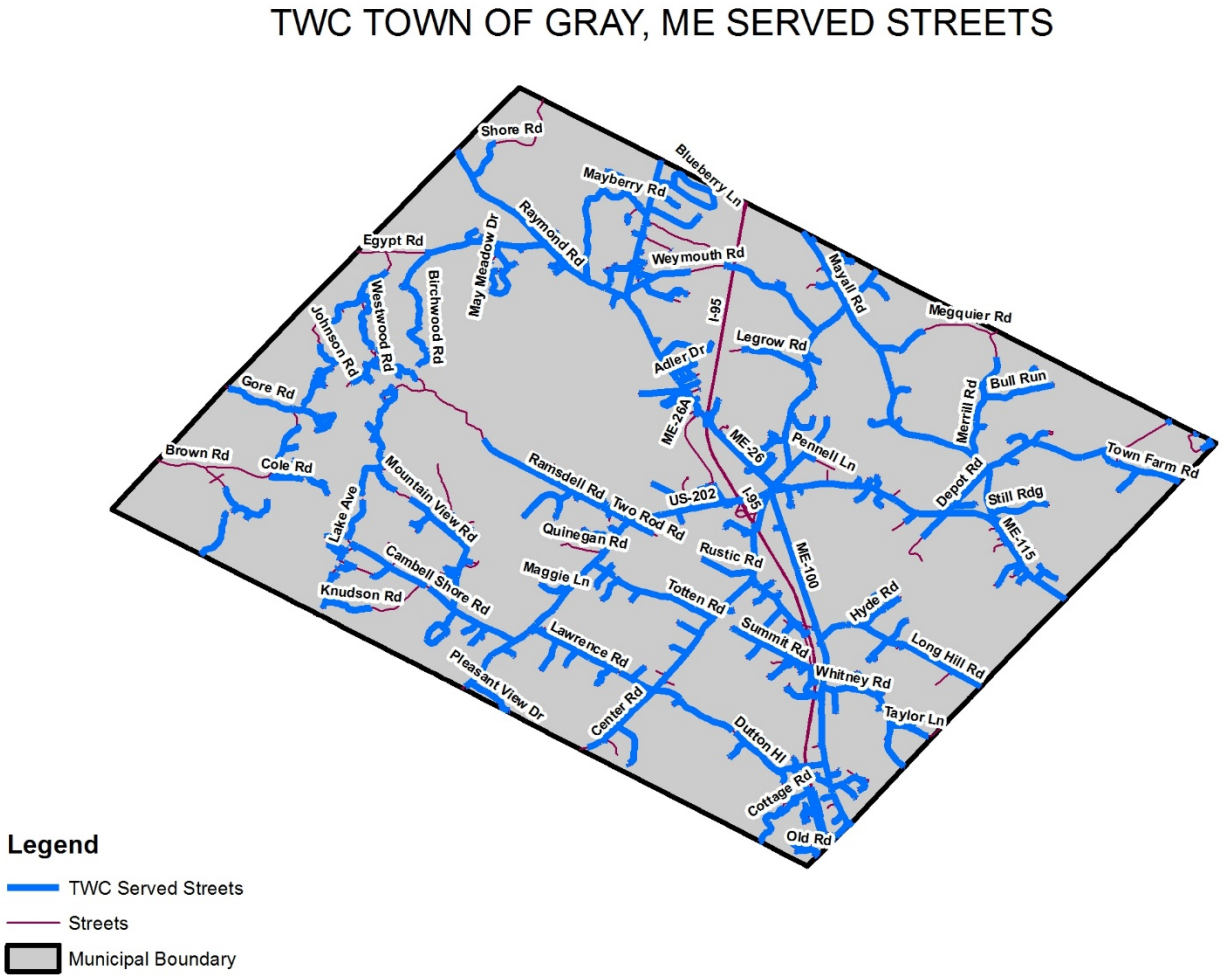
TWC Coverage Areas:



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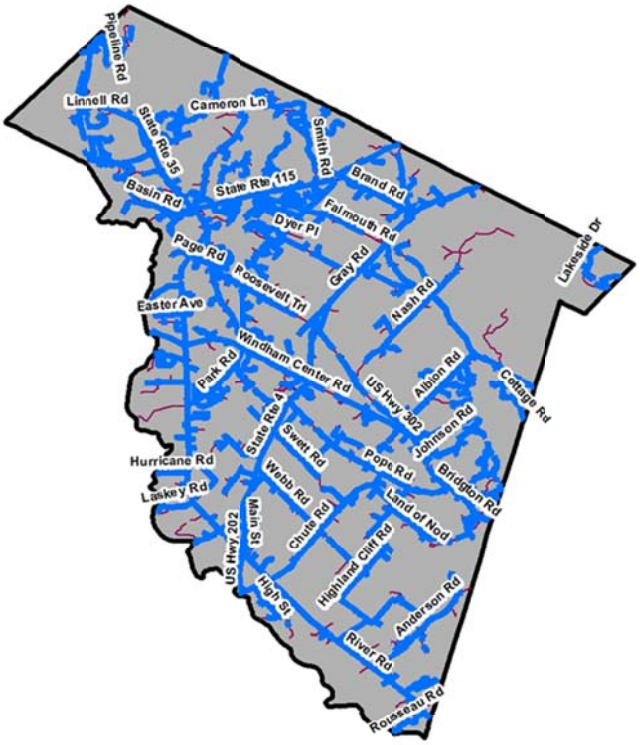
TWC TOWN OF WINDHAM, ME SERVED STREETS



Legend

- TWC Served Streets
- Streets
- Municipal Boundary

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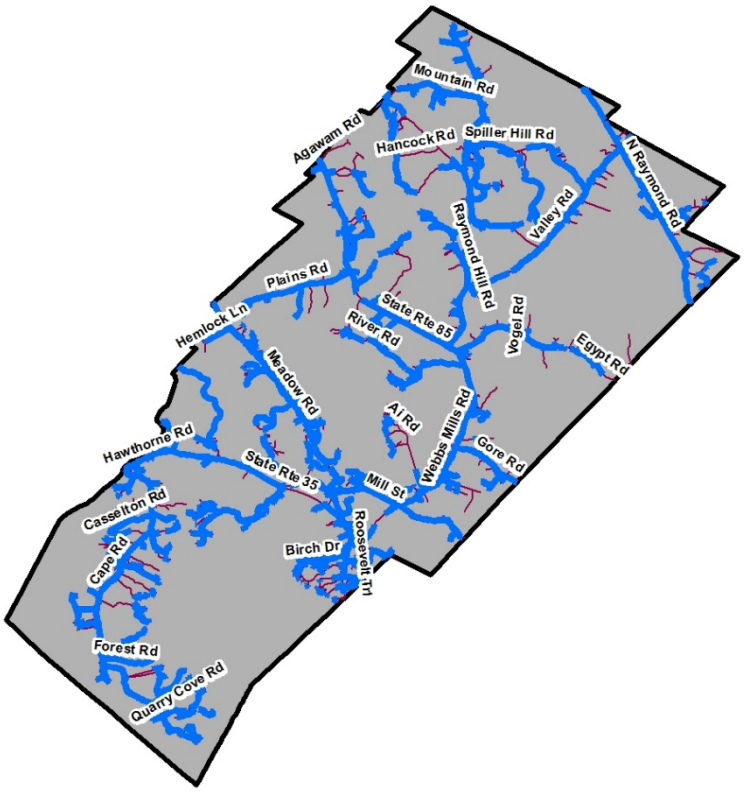
TWC TOWN OF RAYMOND, ME SERVED STREETS



Legend

- TWC Served Streets
- Streets
- Municipal Boundary

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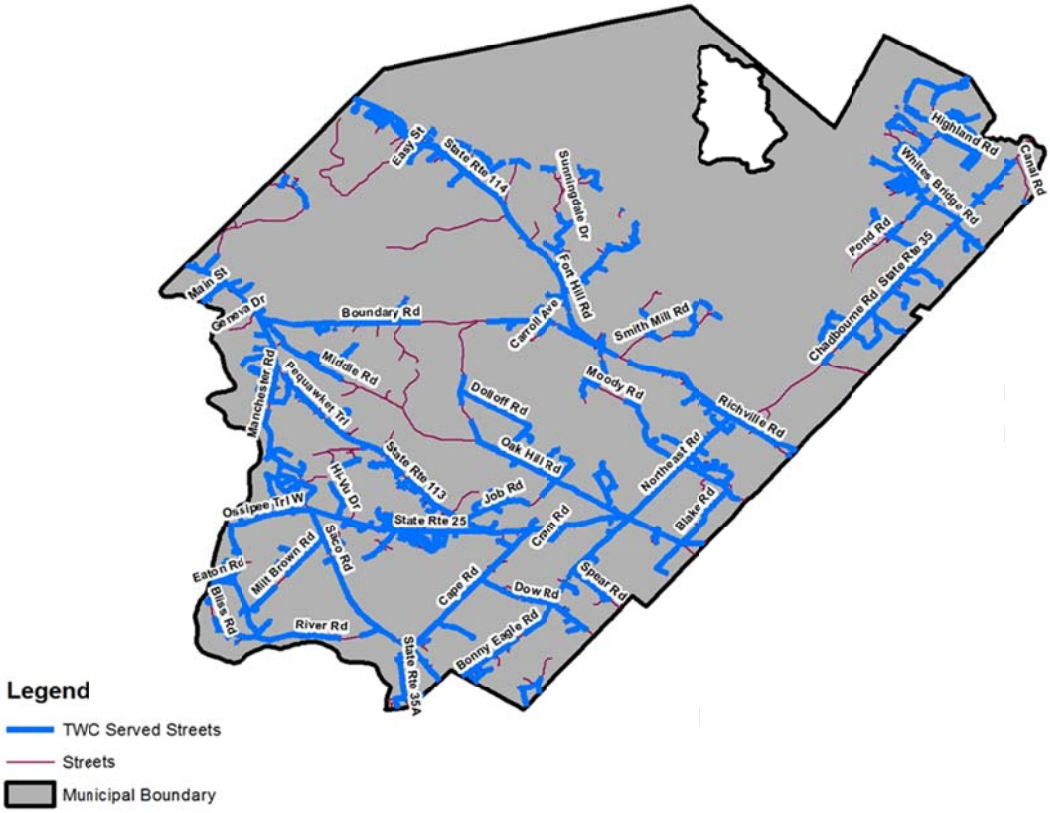
TWC TOWN OF STANDISH, ME SERVED STREETS



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TWC Speeds and Pricing (2008 and Current):

2008	Speed	Price	2015	Speed	Price
Lite	768kbps x 128kbps	$19.95	Every Day low price	2 Mbps x 1 Mbps	$14.99
Basic	1.5Mbps x 256kbps	$29.95	Basic	6 Mbps x 1 Mbps	$29.99
Standard	5Mbps x 384kbps	$44.95	Standard	15Mbps x 1 Mbps	$34.99
Turbo	10Mbps x 1Mbps	$54.90	Extreme	30 Mbps x 5 Mbps	$54.99
			Ultimate	50 Mbps x 5 Mbps	$64.99

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Appendix C:
Additional Materials Generated by This Project

Working Group Meeting October, 27, 2015

Agenda:

1. Welcome and Introductions
2. Components of the Project
3. Brainstorm: How could improved internet service benefit you, your organization, the region?
4. What Is/Is Not the Problem
5. Identify Regional Broadband Goals
6. Identify Next Steps

Attendance:

NAME	TOWN/COMPANY NAME	EMAIL	
Jim Damicis	Camoin Associates	jim@camoinassociates.com	
Nadeen Daniels	Cumberland County Government	daniels@cumberlandcounty.org	
Bob Hickey	RSU 14 Windham Raymond Schools	rhickey@rsu14.org	8
John Murray	Saint Joseph's College	jmurray@sjcme.edu	8
Yvonne Berry	Saint Joseph's College	yberry@sjcme.edu	
Aimee Senatore	Sebago Lakes Region Chamber of Commerce	asenatore@sebagolakeschamber.com	8
Travis Kennedy	Senator Kings Office	travis.kennedy@king.senate.gov	
Richard Cabana	Town of Gray		
Deborah Cabana	Town of Gray	dcabana@graymaine.org	
Jean Bibber	Town of Gray - CEDC Chair	rbibber@securespeed.us	
Lacy Antonson	Town of Gray - CEDC Member	lacy@antonson.us	
Colette Tweten	Town of Gray - CEDC Member	ctweten@maine.rr.com	
Kathy Tomborelli	Town of Gray - Planner	ktomborelli@graymaine.org	
Richard Bibber	Town of Gray -Planning Board	rbibber@securespeed.us	
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Laurie Forbes	Town of Raymond	laurie.forbes@raymondmaine.org	
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Elisa Trepanier	Town of Windham	maps@windhammaine.us	
David Nadeau	Town of Windham- Town Corporation	davidnadeau@windhammaine.us	8
Bob Nadeau	USDA Rural Development	robert.nadeau@me.usda.gov	9
John McGinnis	WEDC	johnmcginnis@kaplan.edu	4
Tom Bartell	WEDC -Executive Director	thbartell@windhammaine.us	

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NOTES FROM KICKOFF MEETING:

Exercise I: Full Group Brainstorm

Question: How could improved internet service benefit you, your organization or the region?

Flipcharts:

4K TV won't work, compatibility

Students can have access to info

Utube and Hulu need 4K

Broadcast technology is behind the curve

Entrepreneurs are attracted to improved internet

Small businesses are attracted to improved internet

People can work from home

People can become producers in a digital economy

Gigabit is an enabling tool

We could stream between schools

Lower costs—now costs $1200.month for streaming

Student content and assessments can be done on-line

Classes can be shared across and between districts

Online education for the region

St. Joe's online courses

18-22 year olds use internet for entertainment

Slow down occurs between 3PM and 1AM

Region is a nice place to conduct business—internet facilitates that

Extended vacation and work time for seasonal residents/visitors

Expectations of visitors can be met

Broad producer/consumer mix can be supported

Gamers could host their own services

Cloud backups could be used—too large for current system now

Job growth and economic effects could be positive

Standish current service may be OK

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Need to make the business case for upgrades

Current demand versus enable the future—key question

Internet is necessary infrastructure

Need to educate the public

Need to be proactive about the speed of change

People off the main road have slow DSL

Need to know what current carriers are willing to do

Public versus private road development is a factor

Exercise II: Four breakout groups

Question: What is or isn't working for your organization? For your Community?

Is Working	**Isn't Working**
Common need is recognized	20 questions with Providers
Bandwidth sufficient now	Current business model
Hope	Future demand unknown
Collective voice	Keeping up with demand: Internet of Things
Pay to play—fair $$	Consistent transactional technology
Standish—cable to all houses per franchise agreement	Technological literacy
Maine Fiber 3-ring Binder	Cost
Not a lot of complaints currently	Study from home
	Interferes with quality of life
	Hassles for customers
	Cell coverage
	Distributions—inequitable access
	OTT goes down—not reliable
	Time Warner inconsistent—slow
	Don't get value for the price
	Shared access/public staff have to buy additional storage
	Inconsistent reliability
	Cost for Town of Raymond/Windham for needed speed (Up and Down)
	Keeping up with future demand—online services and media applications
	(Lack of) support from Time Warner for Town of Raymond
	Lack of upgrades by TWC
	No central place to "bang on the door" although towns do hear some complaints

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Standish—good planning, franchise agreement with five year term	Lack of Upgrades by TWC
	You don't know what you don't know.
Gray—served and has access	Lack of competition
Upgrade of broadband and wireless for schools	Lack of awareness
	Lack of density
	Lack of understanding of problems/potential
Reasonable service from TWC in Raymond municipal buildings	Level of education around problems
	Digital divide: elderly and poor left behind
	Lack of data on take rates, speed, etc Can data be found or purchased? Need way to identify bottlenecks.
	Standish—pay to play
	Gray slow up and down
	No trigger or incentive for private sector
	No competition
	Understanding of the benefits of improved service
	Education: Are we underserved?
	Gray—some dialup, OTT, TWC service is poor
	Businesses leaving Gray
	Pricing—I gig is $1200/month
	Understanding source of problem—is it hardware, computer or service?
	Some people don't see relevance or importance
	Can munis negotiate prices? Currently in a "mother may I" relationship with providers
	What are businesses paying?
	OTT goes down making it hard to conduct muni business
	School program upgrades overwhelm wireless

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