



## **Regionalization:**

The Key to Sustainable Broadband  
for Western Massachusetts

---

### **Part I:**

Broadband Networks:  
Stand-alone vs. Regional

### **Part II:**

The Advantage of Regionalization

May 10, 2016

# Table of Contents

<b>Section</b>	<b>Page</b>
Executive Summary .....	2-3
Part I: Broadband Networks: Stand-alone vs. Regional .....	4
Stand-alone vs. Regionalization: A Model Approach .....	5
Outsourced Regional MLP vs. Outsourced Stand-Alone Model ....	6
Cost Components .....	7
Network Operating Costs .....	7
Regional and Stand-Alone Costs .....	7
Net Income per Town .....	8
Regional Savings .....	9
Explore the MLP / Outsourced Model with an Online Tool .....	10
Part II: The Advantage of Regionalization: Why Towns Need a Regional Option ..	11
Regionalization is the Prudent Option .....	11
A Regional Option and Town Choice .....	11
Cost Savings Under the Regional Model .....	12
Regional Network Ensures Professional Management of the Enterprise ...	12
Setting Up and Administering a Stand-Alone Single Town Network .....	13
MBI Financial Modeling and the \$50,000 Per-Town “Profit” (Contingency)	15
Monthly Subscriber Rates Under the Regional Model .....	15
Advocating for Regionalization <u>Now</u> is Critical .....	16
In Conclusion .....	18
Questions and Comments .....	18
Appendix A - Town-by-Town Allocation of Last Mile Grant .....	19-20
Appendix B - MBI Last Mile Town Profiles - April, 2016 .....	21-22
Endnotes .....	23-27
Reference Documents and Links .....	28

# Regionalization: The Key to Sustainable Broadband for Western Massachusetts

## Executive Summary

With no meaningful progress made towards building a regional fiber-optic network to our region for months, a general sense of frustration has developed in the 44 western Massachusetts towns unserved by broadband. Citizens are baffled and angry. They've done their parts and now want their elected leaders to do the right thing and get the project back on track. Select boards, feeling the pressure and the need to act, are asking about other options and retreading ground WiredWest has spent the last several years investigating. Alternatives do exist. A variety of proposals from network builders and operators who want towns to commit to stand-alone networks have been shopped over the past months. But at this point, none of these alternatives has been seriously modeled by the towns. Very few towns have concrete, well developed business plans for operating their own network and are unaware of the business complexity of developing these plans and if built, managing their own network.

The Massachusetts Broadband Institute (MBI) consultant Michael Morgenstern and WiredWest agree on one point: the economics of network building and network operations do not favor small towns. One large unserved town, Leverett, which has very favorable demographics compared to other towns, did build a network that is now operational, but has not been operating long enough to prove sustainability yet. Most towns will not be able to afford the go-it-alone approach taken by Leverett. Despite this reality, the state agency, MBI, continues to encourage towns to embrace the Leverett model.

WiredWest has steadfastly advocated for a regional network with community control because towns operating together are stronger than towns operating on their own. This is true for reasons tangible and intangible.

### *Town Choice and the Regional Option*

Here are the essential questions town leaders should be asking:

- *Who is in the best position to decide which solutions are best? The Towns? The State?*
- *Should towns band together regionally or go it alone?*
- *WiredWest asserts that regionalization creates the lowest cost, most sustainable and lowest risk broadband option for towns. What is the rationale behind these assumptions?*
- *If the regional approach benefits towns compared with other options, why is formal long-term cooperation between towns being discouraged—even disincentivized—by the State agency tasked with solving the last mile problem?*

With towns putting up two thirds of the money to finance the infrastructure and being responsible for the construction cost overruns and ongoing maintenance, control of decision

making should be local. The towns, not the State, should be responsible for choosing which broadband solution best serves their residents. Beyond this fundamental principle, MBI taking WiredWest's regional plan off the table cannot be justified in light of general business and telecom industry best practices. Lack of broadband in unserved western Massachusetts towns is a regional problem that is most prudently addressed with a locally-driven, regional solution. WiredWest *has* that solution; the co-op has invested five years in planning a regional network, but MBI claims it is not sustainable. To demonstrate the lack of validity of MBI's claim, WiredWest is presenting this data-driven analysis that compares the cost to subscribers when towns participate in a regional network with the outcome of when towns operate stand-alone networks.

The analysis clearly illustrates the benefits of regionalization over towns acting alone, including:

- With a regional network, economies of scale are realized.
- Scale brings the ability to negotiate more favorable contracts with key vendors, and volume discounts on materials and equipment
- Cost sharing will eliminate duplicative services towns would otherwise have to provide—a stated goal of the Baker-Polito Administration.
- Network-wide administration will take the burden of managing a complex undertaking off the shoulders of town officials who lack telecom management expertise.
- Pooled resources allows for the hiring of technology and managerial professionals.

The essential take away: *the regional approach provides a means to affordably bring a well-managed, locally-controlled fiber-to-the-home network to sparsely populated towns at a cost to subscribers that is much lower than such towns could achieve on their own.*

Towns *do not* need to settle for fixed wireless—an admittedly inferior technology, unproven under western Massachusetts conditions—to save their way into affording a weak version of broadband that could easily be outstripped by future bandwidth requirements and cannot serve all residents. Instead, by coming together into a regional fiber network, the same towns that cannot afford fiber on their own, *can afford it as part of the WiredWest regional approach.*

As of this writing, the Baker-Polito Administration is deliberating the path forward to bring broadband to the unserved towns in western Massachusetts without benefit of input from the citizens in the affected towns, many of whom have become experts on the issue. Eventually the pause must end, and then, our towns may be able to choose among proposals for building and operating their own stand-alone network that have been presented in recent months. *What is not on the table, however, is a regional option, and it should be.*

In the face of compelling economic evidence that a regional approach results in lower costs and greater efficiency, it is difficult to comprehend the MBI's single-town strategy. Before a unilateral decision is made to ignore the will of a majority of affected towns, the Baker-Polito administration along with the western Massachusetts legislative delegation, the Massachusetts Technology Collaborative (MTC), and the MBI needs to address this issue. Public hearings on regionalization need to be held before our towns are once again locked out of the promise for a modern 21st Century communications infrastructure.

# Part I:

## Broadband Networks: Stand-alone vs. Regional

### *An analysis of cost factors for single town stand-alone networks as compared to a regionalized network in Western Massachusetts*

According to the Federal Communications Commission (FCC), just over two per cent of Americans--primarily in rural areas--still lack access to broadband internet connectivity. Residents and businesses located in 44 towns in western Massachusetts belong to this group and remain stranded on the wrong side of the digital divide. From citizens and leaders in the affected towns to the Baker-Polito Administration, all stakeholders in the Commonwealth agree--this problem must be addressed as quickly as possible.

In 2008, the Massachusetts Legislature appropriated \$40 million to bring ubiquitous broadband to the 45 western Massachusetts towns identified by the FCC as *un and underserved*, and [established the Massachusetts Broadband Institute \(MBI\) and the Broadband Incentive Fund](#). Then, in [2014, the State Legislature appropriated an additional \\$50 million to the Broadband Incentive Fund](#). The MBI and its parent organization, the Massachusetts Technology Collaborative (MTC), are charged with stewardship of these funds and crafting solutions for broadband deployment, access, and usage. Of the \$50 million, \$45 million was allocated for use in the 45 western Massachusetts towns identified by the FCC as *un and underserved*, with \$5 million set aside for towns partially served by incumbent cable providers. The MBI will receive \$5 million of the 2014 appropriation for this work.

In the Fall of 2014, the MBI developed desktop town-by-town cost estimates for building fiber-optic infrastructure throughout the unserved towns (see Appendix A, page 13-14), and committed to allocating \$40 million proportionally among those towns into two buckets: \$18 million for professional services (planning, engineering), and \$22 million for construction. The State funds represent approximately one-third of the total estimated cost for last mile fiber deployment per town. To gain access to these funds, towns needed to vote at town meeting to authorize the expenditure of the remaining two-thirds of the cost to bring fiber broadband to their towns and to demonstrate demand for broadband service.

Financing their share of the infrastructure costs represents the largest financial commitment most of these towns have ever made. While virtually everyone recognized the critical need for internet connectivity, the affordability and ongoing sustainability of such a project are priority considerations for towns, which is why arriving at the most cost effective long term solution, consistent with the selection of the best technology, was and remains absolutely critical.

During the 2015 annual town meeting season, 24 towns voted to authorize bonds to bring fiber-optic infrastructure to their towns. At that point in time, the town-operated, regional broadband cooperative, WiredWest, was presumed to be the network owner and operator once the build out of the network was completed. WiredWest and its member towns had long advocated for a regional network connecting all members. However, with town borrowing

authorizations reaching \$38 million, private sector network builders and private internet service providers were attracted to the potential financial opportunity and began offering service to selective towns if they would enter into stand-alone agreements.

As with most large regional projects with multiple stakeholders, and parties that stand to benefit financially from stand-alone solutions, differences of opinion about the best approach to achieve long term goals have cropped up. In mid-2015, as the implementation phase seemed imminent, some WiredWest towns began examining the pros and cons of working regionally versus going it alone. At the same time, the Baker/Polito administration and new state agency leaders began to wrap their arms around the proposed last mile broadband project. In early 2016, changes within the MBI senior leadership occurred.

By April 2016 it became clear that a rational, data-driven analysis comparing the financial impacts of regionalization with stand-alone networks was needed to settle the varying claims. Only with such a comparison could towns make informed decisions on how to best proceed with bringing broadband to their citizens. In addition, this data will assist our elected and appointed leaders in their efforts to assess the range of solutions available to bridge our digital divide.

Using data on the following 30 unserved WiredWest towns (those determined to be somewhat or quite likely to participate in either a stand-alone or regional last mile build between now and 2020), this report offers just such an analysis.

Ashfield	Cummington	Leyden	Plainfield	Warwick
Becket	Egremont	Monterey	Rowe	Washington
Blanford	Goshen	New Ashford	Sandisfield	Wendell
Charlemont	Hawley	New Marlborough	Shutesbury	West Stockbridge
Chesterfield	Heath	New Salem	Tolland	Windsor
Colrain	Hinsdale	Peru	Tyringham	Worthington

## ***Stand-alone vs. Regionalization: A Model Approach***

*The purpose of this paper is to compare and contrast the economic benefits of regionalization versus towns that embrace a stand-alone solution.*

Fully modeling all cost and revenue components at play in both stand-alone and regional networks is not necessary for comparative purposes. Analyzing the cost side of the equation graphically illustrates that significant differences exist between the efficiency of single town networks versus a large regional network.

## **Outsourced Regional MLP vs. Outsourced Stand-alone Model**

*An Municipal Lighting Plant (MLP), is a special entity within a town that is authorized by statute to provide telecommunications services to its customers.<sup>1</sup> WiredWest is a cooperative of MLPs, organized under M.G.L. Chapter 164, § 47c. Outsourcing refers to contracting services with third-party vendors.*

For the purposes of this analysis, assume a regional network that would provide all administrative functions for participating towns—essentially acting as a regional MLP and nothing more. These are the duties the Town of Leverett currently performs for its network. So that there can be an apples-to-apples comparison between the single town approach and a regional network, the remaining services will be outsourced, both by WiredWest and the single towns—exactly as Leverett does. This approach includes outsourcing Network Operations (including plant maintenance, break-fix work, network management), and ISP service (which includes billing, sales, marketing, customer service and technical support). It is important to understand that this does *not* represent the approach that WiredWest envisions for its real-world network. The WiredWest network would be a hybrid combination of in-house and outsourced functions, but employing that model would not allow for a valid comparison, so it is not addressed in this paper.

The numbers applied in this analysis are primarily based on the experience of the town of Leverett and the costs from Crocker Communications. Their initial modeling of operating costs was scaled for the 30 towns based on miles, poles, drops, and subscribers in each town. We expanded on their work and made numerous modifications to the assumptions in the Crocker modeling. Of note:

- The model assumes town ownership of the infrastructure;
- Seasonal and vacancy rates have been incorporated in our model;
- The depreciation formula has been modified;
- Backhaul costs have been included (*backhaul* is that portion of the network that links a regional network to the internet backbone);
- There are *no significant factors representing economies of scale* (probable savings are estimated);
- The model assumes that *all aspects of the business have been outsourced*.

By using specific town data, this exercise provides a means to *compare and rank* the relative costs and revenue for the specific towns in the study.<sup>1</sup> The modeled results are not meant to be definitive. Some of the assumptions may need to be modified resulting in variations to the estimated costs.<sup>2</sup> However, the town-to-town comparisons can be relied upon for their general accuracy. Further, using data visualization, the analysis illustrates the financial impact of regionalization on each town and compares it to the single town stand-alone model. Importantly, the data demonstrates that the advantages still apply when comparing a stand-alone model with a regional approach (whether insourced or outsourced), with respect to subscriber fees and net income per town.

## Cost Components

In the full WiredWest Financial Model, we look at three costs to the subscriber:

- The *network operating cost* (MLP Fee);
- The *cost for internet service*;
- The *cost of financing*.

However, in this presentation we focus exclusively on the *network operating cost*. This component varies substantially among towns and represents the key factor driving the differences between the regionalized and stand-alone approaches.

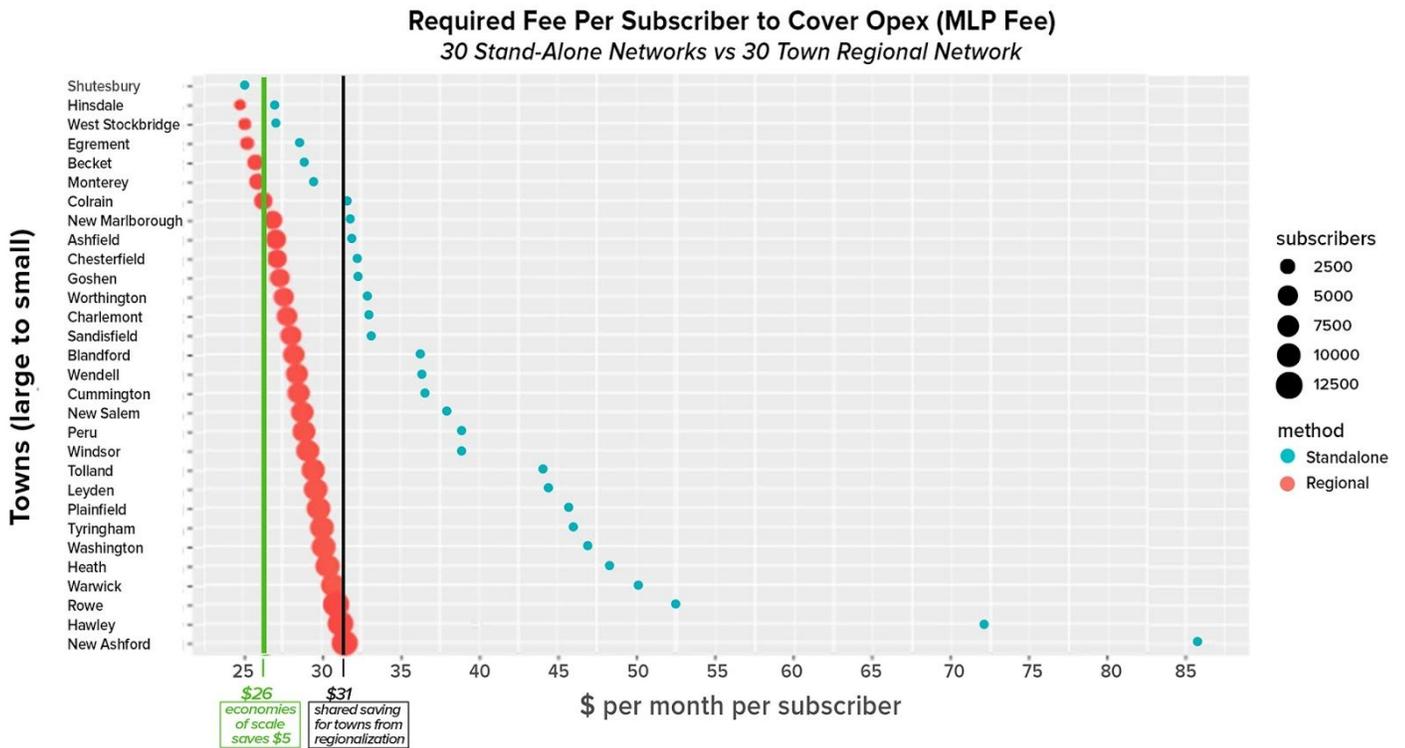
## Network Operating Costs

The plot below displays the estimated operating cost per town in terms of the MLP Fee. The MLP Fee is computed simply as the total monthly operating cost divided by the number of subscribers. Two scenarios are presented: Regional and Stand-alone.

## Regional and Stand-alone Costs

- The stand-alone cost (in **blue**) is based on each town operating an independent network.
- The regional cost (in **red**) is based on the impact of *successively adding towns* from the top to the bottom of the list. The towns are ordered by their individual per-user operational costs. Any ordering will result in the same final MLP fee, but this ordering is used to visually demonstrate the impact of regional participation to all users as smaller, sparsely populated towns are added.
- The size of the points in the plot in **red** indicate the total number of subscribers.
- The **vertical black line** (at \$31) represents the maximum cost to subscribers/month for a regional network when all 30 towns participate. The **vertical green line** (at \$26) represents the overall cost to towns net of a reasonable \$5/month savings realized through estimated economies of scale.<sup>3</sup> The cost to participate in a regional network is slightly more (about \$1/month) for the one town with a blue dot to the left of the line. Those towns to the right of the line will see operating cost savings.

Figure 1. Fee Per Subscriber to Cover Opex



The main takeaway from the plot above is that a regional approach provides a means to affordably bring fiber-to-the-home to sparsely populated towns at a cost to subscribers that is much lower than such towns could achieve on their own. Additionally, the increased cost to a few of the larger towns tends to be relatively small compared to the large savings for the smaller towns and will likely be made up through economies of scale.

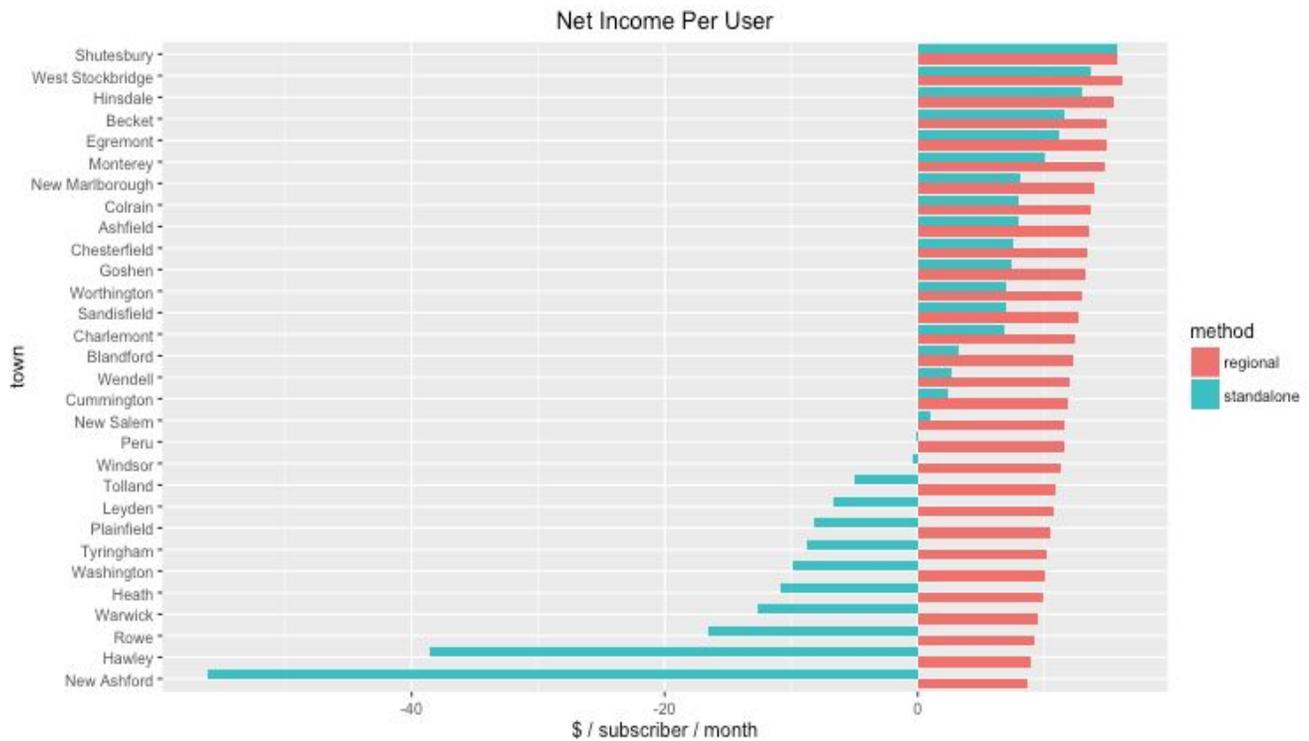
### Net Income per Town

Another way to visualize the benefit of cost sharing is to consider the net income realized per town in a stand-alone implementation versus a regional strategy. In Figure 2, below, we set an MLP fee of \$36 that results in “break even” when all WiredWest towns are participating in a regional network. Like the previous plot, this shows the impact of a regional network in which towns are added cumulatively from top to bottom.

- The **red bar** shows the positive net income realized under the expanding regional group. (For example, the regional cash flow for the bar labeled ‘Egremont’ is based on shared costs for a regional network composed of Shutesbury, West Stockbridge, Hinsdale, Becket and Egremont.)
- The **blue bar** shows the net income per town, if each operated independently, but charged the same fixed MLP fee.

Figure 2. Net Income Per User

Regional break-even MLP Fee: \$ 36.38



Obviously the MLP Fee can be adjusted to ensure positive net income for any town, but *the important point is that an MLP Fee can be set for a regional group that is much less than what most towns could achieve independently since operating costs are spread evenly across all subscribers*. The plot includes all WiredWest towns, but the trend holds regardless of the selection of towns participating. This is because the total operating costs are averaged across all subscribers. A lower MLP Fee and the management benefits of operating as a larger regional entity should result in a more sustainable operation for more towns.

## Regional Savings

In summary, there are two main economic sources of savings:

- Cost sharing
- Economies of scale

In addition, regional networks also benefit from substantial non-economic advantages. These benefits are profound for our small, rural towns. Building and operating broadband networks requires technical decisions as well as complex procurement and oversight. When towns band together, administrative efficiencies can be realized and best practices implemented. Further, in the regional implementation, these job functions would not be carried out by town staff, inexperienced in managing and making business decisions for telecommunications networks. Instead, a small group of specialists with experience in network administration would manage these tasks.

In short, an outsourced regional network will deliver internet services to our towns at a reasonable cost—one that will be less to subscribers than if towns were to go it alone, for most if not all towns.

### *Explore the MLP / Outsourced Model with an Online Tool*

Finally, WiredWest developed an *interactive model of outsourced costs* that allows for selection of towns, modification of take rate, and adjustment of operating and financing parameters. To explore the outsourced model more fully, we encourage you to visit:

[Online App \(Modeling Tool\)](#)

## Part II: The Advantage of Regionalization

### *Why towns need a regional option*

From its incorporation in 2011, and even in earlier days when it functioned informally, WiredWest has advocated for underserved western Massachusetts towns to band together to create a regional fiber-optic broadband network. Our goal was to plan, build, and operate a community controlled network that would make fiber internet service available to every premise, on every road, in every participating town. This remains our goal today. Part I of this paper, *Broadband Networks: Stand-alone vs Regional*, offers compelling evidence that development and build out of a truly regional broadband solution in western Massachusetts offers the best use of local and state taxpayer dollars and will result in the creation of a long term sustainable asset for our towns and our region.

### ***Regionalization is the Prudent Option***

WiredWest member towns are being denied the choice in creating a regional model. The state's gatekeeper of Broadband Incentive Funds, the MBI, has unilaterally and without sufficient cause or input from town officials or the public, all but eliminated the municipal broadband cooperative WiredWest from the range of available options from which towns can choose—and with it the opportunity to choose to be part of a regional solution. Yet, clear demonstrable differences exist between the WiredWest plan and all others. WiredWest proposes a network made up of member towns with the financial benefits that accrue to a regional network applying to all. Other would-be network builders, operators, and internet service providers are offering service to towns if they are prepared to enter into stand-alone agreements. None have a regional plan. Some are championing the so-called “Leverett model” which is held up by the MBI as a gold standard since it came online in March 2015. A single town network may be a good approach for a handful of our region's most populated towns as *Figure 1* of this paper illustrates. *The problem remains that most of our towns do not have the population density to effectively sustain this model and provide affordable broadband to their residents.*

### ***A Regional Option and Town Choice***

The essential questions town leaders should be asking:

- *Should the towns or the state decide what solutions are best for each town?*
- *Should towns band together regionally or go it alone?*
- *WiredWest asserts that regionalization creates the lowest cost, most sustainable, broadband option for towns. Are they right?*
- *If the regional approach benefits towns compared with other options, why is formal long term cooperation between towns being discouraged—even disincentivized—by the State agency charged with solving the last mile problem?*

The towns should be in the driver's seat of shaping our broadband solutions, not the State.

The data and graphical results presented in Part I are very clear: regionalization will save money compared to towns running their own stand-alone networks and indeed, make it possible for many towns to get broadband service who otherwise could not. *Towns working together is the path to sustainability that we should all be on. Towns must be able to participate in a regional network if they so choose.*

WiredWest has a well developed regional plan that, at the very least, can serve as the basis for a consensus approach. The conclusion of the *Case Study on WiredWest* by The Berkman Center for the Internet and Society at Harvard University puts it this way:

*"If there are objectively clear ways to improve WiredWest's plan, MBI should focus on working with WiredWest to implement those improvements. Such an approach would be more constructive than public disagreements over business plans and proposed legal structures and would make less likely the waste of years of good-faith efforts by the WiredWest communities."*

### **Cost Savings Under the Regional Model**

A regional approach provides a means to affordably bring fiber-to-the-home to sparsely populated towns at a cost that is much lower than those towns could achieve independently. The cost comparisons between stand-alone networks of the type the MBI is encouraging and a regional WiredWest network is graphically depicted in *Figures 1 and 2* (pages 7 and 8, above) and makes this point strongly. The fundamental advantages of the regional WiredWest approach can be summarized follows:

**ECONOMIES OF SCALE** - Practically speaking, the main sources of such savings will come from network operations, administration, and backhaul aggregation. These savings accrue to all of the towns and help improve the sustainability of the network.

**COST SHARING** - Averaging costs over multiple towns will result in additional savings. Operating an independent town network tends to be more expensive for less populated towns. When small towns combine with larger towns, the subscribers in the smaller towns tend to realize substantial cost savings. From the perspective of the larger towns (and the bulk of subscribers), the cost to them may rise marginally because that extra cost is spread over many subscribers.

### **Regional Network Ensures Professional Management of the Enterprise**

The value of the regional solution WiredWest proposes extends beyond quantifiable financial benefits. For member towns, the co-op will assume all the responsibilities town MLPs would otherwise have to assume. Regional network management will have a significant impact on the consolidation of administrative services (customer service, billing, maintenance, etc.), along with strengthened technical and contractual oversight.

Sharing information, knowledge, and experience are common practice in our region—and are strongly encouraged by the Baker-Polito Administration as demonstrated by their *Community*

*Compact Program.* Taking over the required administrative work, perhaps by having it done by WiredWest, is efficient and makes sense for towns that are already struggling under their current work loads. This is a clear advantage to towns of being members of the WiredWest network.

### **Setting Up and Administering a Stand-Alone Single Town Network**

We recognize that with the encouragement of MBI, a number of private sector providers have proposed building and operating stand-alone networks for towns. However, before deciding to go it alone, town leaders need to fully understand what they will be committing to. WiredWest has identified the following list of MLP responsibilities that an individual town (or a regional network) needs to fulfill *before their network becomes operational*. The question is: *does a town have the expertise to set up a telecommunications network within their borders, and if not, how will this work be accomplished in a timely and efficient manner?*

Network operators will need to solicit vendors and negotiate pricing and contracts for the following services:

Internet Service Provider (ISP)	Billing	Customer Service
Voice Over Internet Protocol (VOIP)	Accounting	Operations Service Center
Line Maintenance	Insurance	Auditing Services
Legal Services		

This work includes but is not limited to the following:

RFP writing for each outsourced area	Establishing Vendor criteria	Review vendor RFP submissions	Vendor selections for each outsourced area
Price negotiations and contracts for each vendor	Monitoring vendor performance	Set up depreciation reserve bank accounts	Establish necessary bank accounts
Approve and pay invoices	Procure and maintain spare parts	Network monitoring and testing	Negotiate IRUs for dark fiber
Prepare quarterly reports	Prepare annual reports		

Leverett has been through this process and has generously shared their experience to all interested parties in a report they made public on March 6, 2016—[The Leverett Municipal Broadband Model: An Overview of Institutional, Financial, and Contractual Arrangements.](#)

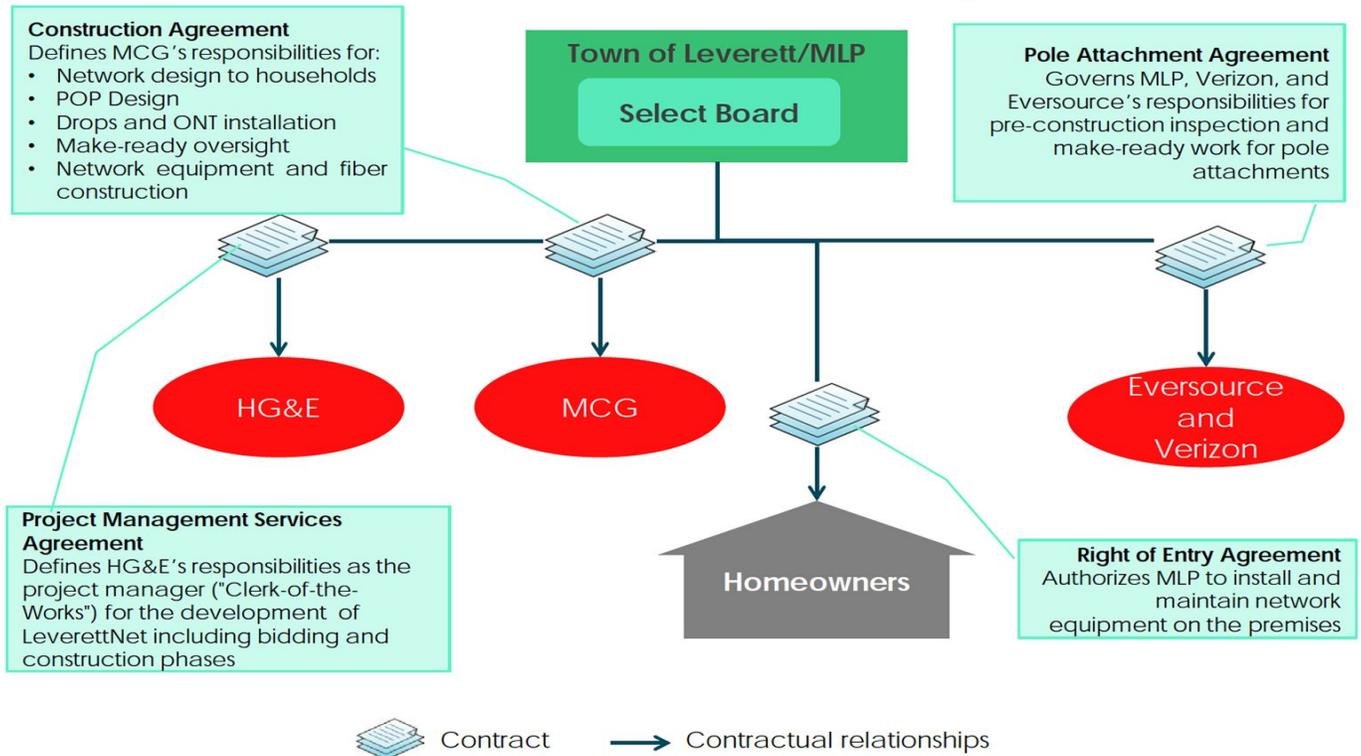
The full report should be required reading for all select boards that are considering the stand alone approach. It is important to note that with an active ten-year-old Broadband Committee,

Leverett had amassed considerable knowledge before they took on the planning for their network. The report on the Leverett Model summarizes the responsibilities involved in a series of five “Allocation of Responsibility” flowcharts, of which the first can be seen below:



# Contractual Arrangements

## Pre-construction and construction phases



Source: *The Leverett Municipal Broadband Model (March 2106)*

Once a town owned network is operational, the responsibilities are considerably reduced. However, they are ongoing for the life of the network. As the MLP, the town is directly answerable to its customers. The buck stops with the the selectboard for any unanticipated problems.

### **MBI Financial Modeling and the \$50,000 Per-Town “Profit” (Contingency)**

In April, 2016 the agency made public a 177 page document titled [MBI Last Mile Town Profiles](#),<sup>6</sup> which was forwarded to every unserved town. The overview includes the following statement:

*MBI and its consultants have made certain assumptions as part of this analysis. The modeling assumes an entirely outsourced model, whereby the towns would contract with existing industry partners for network operations, ISP services, etc. Additionally, based on*

industry practice, MBI has modeled each town under the assumption of a \$50,000 annual profit to provide cash reserves to cover unexpected costs and needs (for example for repairs due to ice storms or blizzards).

MBI states that industry practice calls for each town to *hold funds in reserve* to cover the unknown and unexpected. They call it “annual profit” but, really, it is a contingency fund, or reserve. For reasons not explained, they use \$50,000 as the annual per-town amount—regardless of town size or the number of subscribers.

### Profit & Loss (P&L) @ 60% Take Rate

Households Modeled*	1802
Subscribers Modeled	710
Entry Level Broadband Price	\$57
Average Revenue Per Unit (ARPU)**	\$79
Annual Revenue	\$677,000
Annual Operating Cost	\$627,000
→ Annual Profit <small>actually a Reserve or Contingency</small>	<u>\$50,000</u>

\* Approximate household locations from Experian

Using MBI’s numbers <sup>7</sup> and looking at the 30 WiredWest towns examined in this paper, a \$1.5 million annual contingency fund would result if taken together. With a single town, budgeting a \$50,000 contingency makes sense, but for a regional network—with the risks spread over 30 towns—it seems a \$1.5 million a year reserve is excessively conservative. The “correct” amount is arguable, but \$500,000 per year for the network seems reasonable. Aggregating the towns into a regional network, rather than each acting alone, “saves” \$1 million per year. Presumably if towns built stand-alone networks, sharing the profit/reserve would not be an option.

Source: MBI Last Mile Town Profiles

So when profit/cost/risk sharing on a regional basis is compared to single town networks, something on the order of *\$1 million less in subscriber revenue would be required every year*. That saves the average regional network subscriber \$10 per month based on \$79 average revenue per user regionally, compared to \$89 average in the stand alone model. This data appear in columns H and L of *Appendix B: Excel Spreadsheet - MBI Last Mile Town Profiles*.<sup>8</sup>

## Monthly Subscriber Rates Under the Regional Model

The [Online App \(Modeling Tool\)](#) referenced in Part I allows users to manipulate key variables that go into determining the monthly cost to subscribers (e.g., the take rate and premise count). With the App, it is simple to calculate subscriber rates under various scenarios. Here are monthly subscriber under two sets of assumptions: (1) debt service is not covered by monthly subscriber rates; and (2), debt service is build into monthly subscriber rates.

1. On the App, set the “Profit”/Contingency/Reserve at a cap of \$500,000; set the *Take Rate* at 75%; set the *Debt Covered by Subscribers* to 0%; set *Internet Service* to \$25; *Tiers* to 2 Tier with bandwidth speeds at 80%/20% - same as WiPro); and select “All WiredWest towns.” *This produces a cost of \$46 per month per subscriber, but does not include debt service.*
2. Change *Debt Covered by Subscribers* to 100%; keep *Tiers* at 2 Tiers (with bandwidth speeds at 80%/20% - same as WiPro); remove the cost of electronics (in an outsourced

model, partnering with a third party ISP that would own them). *WiredWest could charge \$76 for, say, 50 Mbps and \$101 for 1 Gbps and still be able to cover town debt payments.*

While it is difficult to precisely estimate the true costs to subscribers, the numbers presented here are a close approximation. For towns that intend to cover debt service with a tax increase (or with some other financial mechanism), the cost to subscribers for basic fiber service should be in a range of \$46 - \$60 per subscriber/ month (option 1, above). For towns that have a goal of full debt service recovery, a cost ranging between \$70 - \$100 per subscriber/month for basic service (option 2, above).

Despite objections from MBI and their consultants, the larger point of this analysis is that with WiredWest acting as the regional MLP for all participating towns, the concept of subscribers' revenue sustaining the network *and* returning the debt service to towns can be achieved.

### ***Advocating for Regionalization Now is Critical***

The Baker-Polito Administration's concerns about the ability of many towns to afford stand-alone fiber networks has created uncertainty about the future of the Broadband project, and questions about the technology choices. While we await tangible information about new policy to satisfy the governor's concerns, at the MBI Board meeting in March, *not a single word was spoken about the town-driven, regional fiber-optic network option.*

Without knowing when the state-level pause will end, it seems that the MBI intends to advocate for towns to operate their own networks, whether they want to or not, and potentially investing in inferior, band-aid technology, while completely ignoring a better and viable regional option. Were this to become policy, a great opportunity would be lost. If this paper does nothing else, it demonstrates that towns operating their own stand-alone networks will generate higher subscriber prices. (It is worth adding that in the hands of private sector operators, towns will have no voice in pricing or policy.) A return to the MBI's earlier policy, and support for a town controlled regional fiber-to-the-home network as proposed by WiredWest, would seem to be the rational solution since the analysis here demonstrates that *even the smaller towns can afford fiber when they band together with their larger neighbors.*

A case study conducted by The Berkman Center for Internet and Society at Harvard University, titled: [\*WiredWest: a Cooperative of Municipalities Forms to Build a Fiber Optic Network\*](#)<sup>9</sup> (pub. April, 2016) includes the following conclusion on the subject:

**“Give careful consideration, if not deference, to the preferences of local communities.**

Many WiredWest towns have already voted overwhelmingly to incur debt to finance approximately two-thirds of the cost of a fiber network and have indicated a preference to go forward as part of WiredWest. WiredWest's plan has been vetted by a nationally recognized municipal broadband consultancy, and WiredWest's detailed rebuttal of an MBI consultant's critique has not been publicly challenged. If there are objectively clear ways to improve WiredWest's plan, MBI should focus on working with WiredWest to implement those improvements. Such an approach would be more constructive than public disagreements over business plans and proposed legal structures and would make less likely the waste of years of good-faith efforts by the WiredWest communities. For example, the experts engaged

by MBI and WiredWest could be encouraged to work together to come to a consensus professional view or, at the very least, reduce the scope of their professional differences and agree on what differences remain. In a similar vein, if towns prefer to act collectively to share costs and risks, MBI should be cautious about advocating stand-alone single-town networks or imposing a policy of single-town ownership of network assets unless those approaches are demonstrably better at reducing overall costs and risks.”

Unfortunately, the process now underway at the state level has been Boston-based and largely internal to the MBI and its parent, the MTC, with no meaningful discourse with the affected towns. More importantly, *there has been a complete lack of outreach to and engagement with towns for input.* This is simply not acceptable. When two-thirds of the necessary funding for the project is coming from town treasuries, leaders at the local level should not be expected to accept a solution dictated by a state agency. Instead, *town representatives must be integral to the development of any plan for broadband implementation.* They should not be expected to rubber stamp and pay for a plan created without their direct involvement.

The importance town leaders place on coming together to bring broadband to their municipalities is fully consistent with the Community Compact Program the Baker-Polito Administration initiated in 2015. Last December, at a Town Hall meeting in Great Barrington, the Berkshire Edge reported:

*“Representatives from 17 Berkshire County towns and superintendents of six local school districts were assured by Gov. Charlie Baker and Lt. Gov. Karyn Polito that not only did they know how hard it is to run a town and its educational infrastructure, but that they have the town's’ collective backs as they attempt to share services to survive and prosper amid economic challenges. ‘Gone are the days, it appears, when every little rural town could afford to have its own separate everything. It’s a national problem, too,’ said Representative Smitty Pignatelli.”*

## In Conclusion

At a time when outsiders see Massachusetts as one of the most innovative states in the country, the Commonwealth's failure to take the lead on bringing broadband to western Massachusetts contributes to the region's inability to cross over the digital divide.

With each passing day, our population continues to decline as our children and neighbors leave our region for better opportunities elsewhere. More houses go unsold and construction of new homes stagnates. Economic development is stagnant if not declining as the customer base dwindles and the attractiveness for small and home based business is non-existent.

In the face of compelling economic evidence that a regional approach results in lower costs and greater efficiency, and enables participation in a long-term solution by more towns, it is difficult to comprehend the MBI's single-town strategy. Before a unilateral decision is made to ignore the will of a majority of affected towns, the Baker-Polito administration along with the western Mass. legislative delegation, the MTC and the MBI needs to address this issue. Public hearings on regionalization need to be held before our towns are once again locked out of the promise for modern 21st Century communications infrastructure.

### *Questions and Comments*

Inquiries regarding any aspect of this report should be directed to: [outreach@wiredwest.net](mailto:outreach@wiredwest.net).

# APPENDIX A

October 2014

## Last Mile Allocation

The allocations in this table are preliminary and subject to change. They assume authorized grant funds derived from state bond proceeds are in fact made available to MassTech for MBI. Further, they rely on a methodology for allocation based on estimated costs of a regional fiber network offering ubiquitous service, and within that on relative road mileage and number of residences reached. Information on costs will be further developed and the allocation methodology itself is subject to change. The allocations have not been finally approved by either the MassTech Board or the MBI board.

Town	Lower Bound after Grant	Upper Bound after Grant
Alford	\$0.6M	\$0.8M
Ashfield	\$2.2M	\$3.1M
Becket	\$2.5M	\$3.6M
Blandford	\$1.6M	\$2.2M
Charlemont	\$1.5M	\$2.2M
Chesterfield	\$1.1M	\$1.6M
Colrain	\$2.1M	\$3.0M
Cummington	\$1.3M	\$1.8M
Egremont	\$1.3M	\$1.9M
Florida	\$0.9M	\$1.3M
Goshen	\$1.2M	\$1.7M
Hancock	\$0.8M	\$1.1M
Hawley	\$1.0M	\$1.4M
Heath	\$0.9M	\$1.3M
Hinsdale	\$1.3M	\$1.9M
Lanesborough	\$2.2M	\$3.0M
Leyden	\$0.8M	\$1.2M
Middlefield	\$0.6M	\$0.8M
Monroe	\$0.5M	\$0.7M
Monterey	\$1.0M	\$1.5M
Montgomery	\$0.7M	\$0.9M
Mount Washington	\$0.6M	\$0.8M
New Ashford	\$0.4M	\$0.5M
New Braintree	\$1.5M	\$2.0M
New Marlborough	\$1.7M	\$2.5M
New Salem	\$1.2M	\$1.7M

Last Mile Allocation *continued*

Town	Lower Bound after Grant	Upper Bound after Grant
Otis	\$1.8M	\$2.5M
Peru	\$1.5M	\$2.1M
Petersham	\$1.9M	\$2.6M
Plainfield	\$0.9M	\$1.3M
Princeton	\$4.8M	\$6.4M
Rowe	\$1.1M	\$1.5M
Royalston	\$1.7M	\$2.3M
Sandisfield	\$1.6M	\$2.4M
Savoy	\$0.9M	\$1.3M
Shutesbury	\$1.2M	\$1.8M
Tolland	\$0.9M	\$1.3M
Tyringham	\$0.4M	\$0.7M
Warwick	\$1.0M	\$1.5M
Washington	\$0.7M	\$1.0M
Wendell	\$1.0M	\$1.4M
West Stockbridge	\$1.3M	\$1.8M
Windsor	\$1.2M	\$1.7M
Worthington	\$1.6M	\$2.3M

## Source: MBI Last Mile Town Profiles - April, 2016

Order	Town	Annual Operating Cost	Modeled Subscribers	Regional Total Profit	Average Revenue per Unit (ARPU)			Basic Internet			Single Town Regional ARPU *
					Single Town	Regional	Difference	Single Town	Regional	Difference	
1	Shutesbury	\$ 289,000	392	\$ 50,000	\$ 72	\$ 72	\$ -	\$ 49	\$ 49	\$ -	\$ 72
2	West Stockbridge	\$ 602,000	798	\$ 100,000	\$ 75	\$ 73	\$ 2	\$ 52	\$ 50	\$ 2	\$ 73
3	Hinsdale	\$ 970,000	1,324	\$ 150,000	\$ 66	\$ 70	\$ (4)	\$ 43	\$ 47	\$ (4)	\$ 70
4	Becket	\$ 1,597,000	2,034	\$ 200,000	\$ 79	\$ 74	\$ 5	\$ 56	\$ 51	\$ 5	\$ 74
5	Egremont	\$ 1,949,000	2,468	\$ 250,000	\$ 77	\$ 74	\$ 3	\$ 54	\$ 51	\$ 3	\$ 74
6	Monterey	\$ 2,294,000	2,846	\$ 300,000	\$ 87	\$ 76	\$ 11	\$ 64	\$ 53	\$ 11	\$ 76
7	New Marlborough	\$ 2,743,000	3,316	\$ 350,000	\$ 89	\$ 78	\$ 11	\$ 66	\$ 55	\$ 11	\$ 78
8	Colrain	\$ 3,115,000	3,744	\$ 400,000	\$ 82	\$ 78	\$ 4	\$ 59	\$ 55	\$ 4	\$ 78
9	Ashfield	\$ 3,527,000	4,230	\$ 450,000	\$ 79	\$ 78	\$ 1	\$ 56	\$ 55	\$ 1	\$ 78
10	Chesterfield	\$ 3,807,000	4,561	\$ 500,000	\$ 83	\$ 79	\$ 4	\$ 60	\$ 56	\$ 4	\$ 79
11	Goshen	\$ 4,051,000	4,850	\$ 500,000	\$ 85	\$ 78	\$ 7	\$ 62	\$ 55	\$ 7	\$ 79
12	Worthington	\$ 4,367,000	5,204	\$ 500,000	\$ 86	\$ 78	\$ 8	\$ 63	\$ 55	\$ 8	\$ 80
13	Sandisfield	\$ 4,672,000	5,476	\$ 500,000	\$ 109	\$ 79	\$ 30	\$ 86	\$ 56	\$ 30	\$ 81
14	Charlemont	\$ 4,979,000	5,858	\$ 500,000	\$ 78	\$ 78	\$ -	\$ 55	\$ 55	\$ -	\$ 81
15	Blandford	\$ 5,278,000	6,197	\$ 500,000	\$ 86	\$ 78	\$ 8	\$ 63	\$ 55	\$ 8	\$ 81
16	Wendell	\$ 5,504,000	6,438	\$ 500,000	\$ 96	\$ 78	\$ 18	\$ 73	\$ 55	\$ 18	\$ 82
17	Cumington	\$ 5,742,000	6,687	\$ 500,000	\$ 97	\$ 78	\$ 19	\$ 74	\$ 55	\$ 19	\$ 82
18	New Salem	\$ 5,969,000	6,953	\$ 500,000	\$ 87	\$ 78	\$ 9	\$ 64	\$ 55	\$ 9	\$ 82
19	Peru	\$ 6,170,000	7,180	\$ 500,000	\$ 92	\$ 77	\$ 15	\$ 69	\$ 54	\$ 15	\$ 83
20	Windsor	\$ 6,411,000	7,419	\$ 500,000	\$ 101	\$ 78	\$ 23	\$ 78	\$ 55	\$ 23	\$ 83
21	Tolland	\$ 6,601,000	7,609	\$ 500,000	\$ 105	\$ 78	\$ 27	\$ 82	\$ 55	\$ 27	\$ 84
22	Leyden	\$ 6,739,000	7,814	\$ 500,000	\$ 76	\$ 77	\$ (1)	\$ 53	\$ 54	\$ (1)	\$ 84
23	Plainfield	\$ 6,933,000	7,996	\$ 500,000	\$ 112	\$ 77	\$ 35	\$ 89	\$ 54	\$ 35	\$ 84
24	Tyringham	\$ 7,072,000	8,114	\$ 500,000	\$ 134	\$ 78	\$ 56	\$ 111	\$ 55	\$ 56	\$ 85
25	Washington	\$ 7,224,000	8,274	\$ 500,000	\$ 105	\$ 78	\$ 27	\$ 82	\$ 55	\$ 27	\$ 85
26	Heath	\$ 7,457,000	8,460	\$ 500,000	\$ 123	\$ 78	\$ 45	\$ 100	\$ 55	\$ 45	\$ 86
27	Warwick	\$ 7,684,000	8,686	\$ 500,000	\$ 102	\$ 79	\$ 23	\$ 79	\$ 56	\$ 23	\$ 87
28	Rowe	\$ 7,814,000	8,788	\$ 500,000	\$ 138	\$ 79	\$ 59	\$ 115	\$ 56	\$ 59	\$ 87
29	Hawley	\$ 7,950,000	8,882	\$ 500,000	\$ 165	\$ 79	\$ 86	\$ 142	\$ 56	\$ 86	\$ 88
30	New Ashford	\$ 8,029,000	8,954	\$ 500,000	\$ 149	\$ 79	\$ 70	\$ 126	\$ 56	\$ 70	\$ 89

\* averaging only, no savings

Model Assumptions:

- 60% take rate
- \$500,000 regional contingency budget

Using MBI's own numbers, allowing profit, cost and risk sharing across a regional network saves the average subscriber \$10/month.

# Appendix B

Source: MBI Last Mile Town Profiles - April, 2016

Town	Modeled			Capital Expenditures (CAPEX)				Financing Required			Example Tax Bill Impact			Town Status		Profit & Loss (P&L) @ 60% Take Rate							Monthly Price Required for Basic Internet to Generate Profit of \$50,000 / year		
	House holds	Fiber Miles	Poles	Est. Total Network Cost	Constr. Costs Funded by MBI	Prof. Svcs. Costs Funded by MBI	Projected Town Contribution	Year 6 Debt Service @4% over 15 Years	2016 Total Assessed Value	Year 6 Impact per mil	Annual Property Tax Increase @ \$150,000	Annual Property Tax Increase @ \$250,000	Annual Property Tax Increase @ \$500,000	Bond Authorization @ Town Meeting	Debt Exclusion @ Town Election	Households Modeled	Subscribers Modeled	Entry Level Broadband Price	Average Revenue per Unit (ARPU)	Annual Revenue	Annual Operating Cost	Annual Profit	40% Take Rate	60% Take Rate	75% Take Rate
Alford	322	25	605	\$ 1,310,000	\$ 270,000	\$ 210,000	\$ 830,000	\$ 65,000	\$ 0.24	\$ 35.70	\$ 59.40	\$ 118.90	Passed	Passed	322	151	\$ 86	\$ 109	\$ 198,000	\$ 148,000	\$ 50,000	\$ 128	\$ 86	\$ 69	
Ashfield	866	83	1,677	\$ 3,710,000	\$ 770,000	\$ 640,000	\$ 2,300,000	\$ 180,200	\$ 0.80	\$ 120.10	\$ 200.10	\$ 400.20	Passed	Passed	866	486	\$ 56	\$ 79	\$ 462,000	\$ 412,000	\$ 50,000	\$ 83	\$ 56	\$ 46	
Becket	1,802	121	2,517	\$ 5,900,000	\$ 1,290,000	\$ 860,000	\$ 3,750,000	\$ 293,800	\$ 0.59	\$ 87.80	\$ 146.30	\$ 292.60	Passed	Passed	1,802	710	\$ 57	\$ 79	\$ 677,000	\$ 627,000	\$ 50,000	\$ 83	\$ 57	\$ 46	
Blandford	605	63	1,435	\$ 2,800,000	\$ 560,000	\$ 480,000	\$ 1,760,000	\$ 137,900	\$ 0.80	\$ 120.30	\$ 200.50	\$ 401.10	Passed	No vote taken	605	339	\$ 64	\$ 86	\$ 349,000	\$ 299,000	\$ 50,000	\$ 93	\$ 63	\$ 51	
Charlmont	681	54	1,253	\$ 2,670,000	\$ 530,000	\$ 430,000	\$ 1,710,000	\$ 134,000	\$ 1.04	\$ 155.80	\$ 259.60	\$ 519.20	Passed	Passed	681	382	\$ 55	\$ 78	\$ 357,000	\$ 307,000	\$ 50,000	\$ 81	\$ 55	\$ 44	
Chesterfield	597	51	1,143	\$ 2,400,000	\$ 500,000	\$ 390,000	\$ 1,510,000	\$ 118,300	\$ 0.81	\$ 121.40	\$ 202.40	\$ 404.70	Passed	Passed	597	331	\$ 60	\$ 83	\$ 330,000	\$ 280,000	\$ 50,000	\$ 89	\$ 60	\$ 49	
Colrain	755	83	1,582	\$ 3,550,000	\$ 690,000	\$ 610,000	\$ 2,250,000	\$ 176,300	\$ 1.05	\$ 157.30	\$ 262.20	\$ 524.30	Passed	Passed	755	428	\$ 59	\$ 82	\$ 422,000	\$ 372,000	\$ 50,000	\$ 88	\$ 59	\$ 48	
Cummington	451	54	1,093	\$ 2,210,000	\$ 450,000	\$ 390,000	\$ 1,370,000	\$ 107,300	\$ 0.83	\$ 124.20	\$ 207.00	\$ 414.00	Passed	Passed	451	249	\$ 74	\$ 97	\$ 288,000	\$ 238,000	\$ 50,000	\$ 109	\$ 74	\$ 59	
Egremont	947	57	1,368	\$ 2,940,000	\$ 660,000	\$ 410,000	\$ 1,870,000	\$ 146,500	\$ 0.38	\$ 57.20	\$ 95.40	\$ 190.70	Passed	No vote taken	947	434	\$ 54	\$ 77	\$ 402,000	\$ 352,000	\$ 50,000	\$ 80	\$ 54	\$ 44	
Florida	376	33	894	\$ 1,700,000	\$ 350,000	\$ 290,000	\$ 1,060,000	\$ 83,000	\$ 0.33	\$ 49.76	\$ 82.93	\$ 165.85	No vote taken	No vote taken	376	217	\$ 71	\$ 94	\$ 245,000	\$ 195,000	\$ 50,000	\$ 106	\$ 71	\$ 58	
Goshen	584	39	1,092	\$ 2,150,000	\$ 450,000	\$ 320,000	\$ 1,380,000	\$ 108,100	\$ 0.77	\$ 115.60	\$ 192.70	\$ 385.50	Passed	Passed	584	289	\$ 62	\$ 85	\$ 294,000	\$ 244,000	\$ 50,000	\$ 92	\$ 62	\$ 50	
Hancock	606	42	904	\$ 2,200,000	\$ 480,000	\$ 330,000	\$ 1,390,000	\$ 108,900	\$ 0.36	\$ 54.70	\$ 91.20	\$ 182.50	No vote taken	No vote taken	606	269	\$ 69	\$ 92	\$ 296,000	\$ 246,000	\$ 50,000	\$ 102	\$ 69	\$ 55	
Hawley	197	35	729	\$ 1,540,000	\$ 250,000	\$ 270,000	\$ 1,020,000	\$ 79,900	\$ 1.56	\$ 233.50	\$ 389.20	\$ 778.30	No vote taken	No vote taken	197	94	\$ 142	\$ 165	\$ 186,000	\$ 136,000	\$ 50,000	\$ 212	\$ 142	\$ 114	
Heath	465	52	1,207	\$ 2,240,000	\$ 440,000	\$ 380,000	\$ 1,420,000	\$ 111,200	\$ 1.23	\$ 184.30	\$ 307.10	\$ 614.20	Passed	No vote taken	465	186	\$ 100	\$ 123	\$ 273,000	\$ 233,000	\$ 50,000	\$ 149	\$ 100	\$ 80	
Hinsdale	1,004	49	1,000	\$ 2,780,000	\$ 630,000	\$ 380,000	\$ 1,770,000	\$ 138,700	\$ 0.47	\$ 70.50	\$ 117.50	\$ 235.10	No vote taken	No vote taken	1,004	526	\$ 43	\$ 66	\$ 418,000	\$ 368,000	\$ 50,000	\$ 64	\$ 43	\$ 35	
Lanesborough	1,437	61	1,346	\$ 3,880,000	\$ 890,000	\$ 490,000	\$ 2,500,000	\$ 195,800	\$ 0.49	\$ 73.90	\$ 123.20	\$ 246.40	No vote taken	No vote taken	1,437	819	\$ 36	\$ 59	\$ 575,000	\$ 525,000	\$ 50,000	\$ 52	\$ 36	\$ 29	
Leyden	361	44	906	\$ 1,750,000	\$ 370,000	\$ 310,000	\$ 1,070,000	\$ 83,800	\$ 1.00	\$ 150.00	\$ 250.00	\$ 500.00	Passed	Passed	361	205	\$ 53	\$ 76	\$ 188,000	\$ 138,000	\$ 50,000	\$ 78	\$ 53	\$ 43	
Middlefield	292	41	803	\$ 1,590,000	\$ 310,000	\$ 270,000	\$ 1,010,000	\$ 79,100	\$ 1.21	\$ 181.20	\$ 301.90	\$ 603.90	Did not pass	No vote taken	292	155	\$ 66	\$ 89	\$ 165,000	\$ 115,000	\$ 50,000	\$ 98	\$ 66	\$ 53	
Monroe	59	8	431	\$ 1,080,000	\$ 130,000	\$ 200,000	\$ 750,000	\$ 58,800	\$ 1.48	\$ 221.84	\$ 369.74	\$ 739.48	No vote taken	No vote taken	59	31	\$ 290	\$ 313	\$ 118,000	\$ 68,000	\$ 50,000	\$ 431	\$ 290	\$ 232	
Monterey	944	66	1,505	\$ 3,100,000	\$ 680,000	\$ 460,000	\$ 1,960,000	\$ 153,500	\$ 0.30	\$ 45.70	\$ 76.10	\$ 152.20	Passed	No vote taken *	944	378	\$ 64	\$ 87	\$ 395,000	\$ 345,000	\$ 50,000	\$ 95	\$ 64	\$ 52	
Montgomery	351	27	724	\$ 1,500,000	\$ 300,000	\$ 250,000	\$ 950,000	\$ 74,400	\$ 0.70	\$ 105.40	\$ 175.60	\$ 351.30	Did not pass	Did not pass	351	208	\$ 88	\$ 111	\$ 276,000	\$ 226,000	\$ 50,000	\$ 130	\$ 88	\$ 71	
Mount Washingt	186	23	663	\$ 1,250,000	\$ 230,000	\$ 220,000	\$ 800,000	\$ 62,700	\$ 0.75	\$ 113.00	\$ 188.30	\$ 376.70	No vote taken	No vote taken	186	77	\$ 145	\$ 167	\$ 156,000	\$ 106,000	\$ 50,000	\$ 216	\$ 145	\$ 116	
New Ashford	126	11	319	\$ 700,000	\$ 150,000	\$ 130,000	\$ 420,000	\$ 32,900	\$ 0.75	\$ 112.11	\$ 186.85	\$ 373.71	Passed	Passed	126	72	\$ 126	\$ 149	\$ 129,000	\$ 79,000	\$ 50,000	\$ 188	\$ 126	\$ 102	
New Braintree	341	49	1,280	\$ 1,910,000	\$ 380,000	\$ 240,000	\$ 1,190,000	\$ 93,200	\$ 0.89	\$ 133.10	\$ 221.80	\$ 443.60	No vote taken	No vote taken	341	203	\$ 85	\$ 108	\$ 264,000	\$ 214,000	\$ 50,000	\$ 127	\$ 85	\$ 69	
New Marlborough	1,007	103	2,383	\$ 4,730,000	\$ 920,000	\$ 790,000	\$ 3,020,000	\$ 236,600	\$ 0.49	\$ 73.10	\$ 121.90	\$ 243.80	No vote taken *	Passed	1,007	470	\$ 66	\$ 89	\$ 499,000	\$ 449,000	\$ 50,000	\$ 97	\$ 66	\$ 53	
New Salem	465	41	1,009	\$ 2,140,000	\$ 400,000	\$ 350,000	\$ 1,390,000	\$ 108,900	\$ 1.01	\$ 151.29	\$ 252.16	\$ 504.32	Passed	Passed	465	266	\$ 64	\$ 87	\$ 277,000	\$ 227,000	\$ 50,000	\$ 94	\$ 64	\$ 51	
Otis	1,612	85	1,941	\$ 4,870,000	\$ 1,080,000	\$ 690,000	\$ 3,100,000	\$ 242,800	\$ 0.40	\$ 59.90	\$ 99.80	\$ 199.60	Passed	Passed	1,612	612	\$ 55	\$ 78	\$ 574,000	\$ 524,000	\$ 50,000	\$ 81	\$ 55	\$ 45	
Peru	419	39	859	\$ 1,840,000	\$ 380,000	\$ 310,000	\$ 1,150,000	\$ 90,100	\$ 1.04	\$ 156.50	\$ 260.90	\$ 521.70	Passed	Passed	419	227	\$ 69	\$ 92	\$ 251,000	\$ 201,000	\$ 50,000	\$ 102	\$ 69	\$ 56	
Petersham	493	56	1,375	\$ 2,530,000	\$ 460,000	\$ 420,000	\$ 1,650,000	\$ 129,300	\$ 0.87	\$ 130.50	\$ 217.40	\$ 434.90	No vote taken	No vote taken	493	288	\$ 68	\$ 91	\$ 313,000	\$ 263,000	\$ 50,000	\$ 100	\$ 68	\$ 55	
Plainfield	334	41	895	\$ 1,760,000	\$ 350,000	\$ 300,000	\$ 1,110,000	\$ 87,000	\$ 1.02	\$ 153.40	\$ 255.70	\$ 511.30	Passed	Passed	334	182	\$ 89	\$ 112	\$ 244,000	\$ 194,000	\$ 50,000	\$ 132	\$ 89	\$ 72	
Princeton	1,245	80	2,278	\$ 4,400,000	\$ 910,000	\$ 640,000	\$ 2,850,000	\$ 223,300	\$ 0.50	\$ 74.80	\$ 124.60	\$ 249.30	Passed	No vote taken	1,245	742	\$ 42	\$ 65	\$ 574,000	\$ 524,000	\$ 50,000	\$ 61	\$ 42	\$ 34	
Rowe	212	31	672	\$ 1,300,000	\$ 220,000	\$ 220,000	\$ 860,000	\$ 67,400	\$ 0.11	\$ 17.17	\$ 28.62	\$ 57.25	Passed	Passed	212	102	\$ 115	\$ 138	\$ 180,000	\$ 130,000	\$ 50,000	\$ 173	\$ 115	\$ 93	
Royalston	580	69	1,838	\$ 3,180,000	\$ 610,000	\$ 560,000	\$ 2,010,000	\$ 157,500	\$ 1.32	\$ 197.70	\$ 329.40	\$ 658.90	No vote taken	No vote taken	580	327	\$ 69	\$ 92	\$ 360,000	\$ 310,000	\$ 50,000	\$ 102	\$ 69	\$ 55	
Sandisfield	619	74	1,422	\$ 3,610,000	\$ 620,000	\$ 610,000	\$ 2,380,000	\$ 186,400	\$ 0.86	\$ 129.20	\$ 215.40	\$ 430.80	Passed	Passed	619	272	\$ 86	\$ 109	\$ 355,000	\$ 305,000	\$ 50,000	\$ 128	\$ 86	\$ 69	
Savoy	407	43	691	\$ 1,760,000	\$ 350,000	\$ 300,000	\$ 1,110,000	\$ 87,000	\$ 1.30	\$ 194.30	\$ 323.80	\$ 647.70	No vote taken	No vote taken	407	226	\$ 70	\$ 93	\$ 252,000	\$ 202,000	\$ 50,000	\$ 104	\$ 70	\$ 56	
Shutesbury	713	39	1,160	\$ 2,440,000	\$ 510,000	\$ 360,000	\$ 1,570,000	\$ 123,000	\$ 0.58	\$ 86.90	\$ 144.90	\$ 289.70	Passed	Passed	713	392	\$ 49	\$ 72	\$ 339,000	\$ 289,000	\$ 50,000	\$ 72	\$ 49	\$ 40	
Tolland	509	41	801	\$ 2,650,000	\$ 430,000	\$ 400,000	\$ 1,820,000	\$ 142,600	\$ 0.74	\$ 110.30	\$ 183.90	\$ 367.70	Passed	Passed	509	190	\$ 82	\$ 105	\$ 240,000	\$ 190,000	\$ 50,000	\$ 122	\$ 82	\$ 66	
Tyringham	286	24	746	\$ 1,380,000	\$ 260,000	\$ 220,000	\$ 900,000	\$ 70,500	\$ 0.37	\$ 54.80	\$ 91.40	\$ 182.80	No vote taken	No vote taken	286	118	\$ 111	\$ 134	\$ 189,000	\$ 139,000	\$ 50,000	\$ 166	\$ 111	\$ 90	
Warwick	418	52	1,392	\$ 2,480,000	\$ 450,000	\$ 420,000	\$ 1,610,000	\$ 126,100	\$ 1.73	\$ 259.80	\$ 433.00	\$ 866.00	No vote taken	No vote taken	418	226	\$ 79	\$ 102	\$ 277,000	\$ 227,000	\$ 50,000	\$ 118	\$ 79	\$ 64	
Washington	286	35	605	\$ 1,260,000	\$ 270,000	\$ 220,000	\$ 770,000	\$ 60,300	\$ 0.76	\$ 113.40	\$ 188.90	\$ 377.90	Passed	Passed	286	160	\$ 82	\$ 105	\$ 202,000	\$ 152,000	\$ 50,000	\$ 122	\$ 82	\$ 67	
Wendell	412	50	1,132	\$ 1,900,000	\$ 410,000	\$ 320,000	\$ 1,170,000	\$ 91,700	\$ 0.99	\$ 149.20	\$ 248.70	\$ 497.30	Passed	Passed	412	241	\$ 73	\$ 96	\$ 276,000	\$ 226,000	\$ 50,000	\$ 108	\$ 73	\$ 59	
West Stockbridg	809	51	1,185	\$ 2,830,000	\$ 580,000	\$ 420,000	\$ 1,830,000	\$ 143,400	\$ 0.39	\$ 57.90	\$ 96.50	\$ 193.10	Passed	Passed	809	406	\$ 52	\$ 75	\$ 363,000	\$ 313,000	\$ 50,000	\$ 76	\$ 52	\$ 42	
Windsor	464	54	1,083	\$ 2,150,000	\$ 450,000	\$ 380,000	\$ 1,320,000	\$ 103,400	\$ 0.96	\$ 143.80	\$ 239.60	\$ 479.20	Passed	Passed	464	239	\$ 79	\$ 101	\$ 291,000	\$ 241,000	\$ 50,000	\$ 117	\$ 79	\$ 64	
Worthington	642	67	1,478	\$ 2,860,000	\$ 590,000	\$ 480,000	\$ 1,790,000	\$ 140,200	\$ 0.84	\$ 126.10	\$ 210.20	\$ 420.50	No vote taken	No vote taken	642	354	\$ 63	\$ 86	\$ 366,000	\$ 316,000	\$ 50,000	\$ 94	\$ 63	\$ 51	
Totals	26,287	2,246	51,421	\$ 108,930,000	\$ 22,010,000	\$ 17,370,000	\$ 69,450,000	\$ 5,440,800	\$ 8,693,000,000						26,287	13,279			\$ 13,885,000	\$ 11,695,000	\$ 2,200,000				

# Endnotes

## 1. *Access to State Funds for Internet Infrastructure Requires MLP Status* (p. 5)

In order to qualify for a share of the \$40 million in state funds made available in 2014 by the Legislature, a town has to be considered “unserved” (as defined by the FCC as not being able to access internet download connection speeds of 25Mbps or more). [Additionally, the town must have an established \*Municipal Light Plant \(MLP\)\*.](#)

All WiredWest member towns are duly constituted MLPs pursuant to MGL 164 Section 36. WiredWest is a cooperative of 44 towns that are MLPs, and is organized under MGL 164, Section 47C. These towns qualify for funding both individually and as member of the WiredWest co-op.

The MLP legislation was written in the 1920’s to enable Massachusetts municipalities to form their own electric departments and to generate electricity. The legislation was enacted because the investor-owned utilities of that day refused to wire rural towns—much the same is happening today with broadband because Verizon and cable companies are not willing to invest in modern internet infrastructure in our rural towns since it does not meet their return on investment benchmarks. It is significant to note that the MLP legislation was amended in the 1990’s so towns could engage in the provision of telecommunications (internet) services.

Process for a town to create a Municipal Lighting Plant requires:

- Two Town Meeting votes with a two-thirds majority minimum.
- These meetings must be no less than 2 months and no more than 13 months apart.
- A second “no” vote after a first “yes” vote prohibits reconsideration for two years.
- This is referred to as the acquisition of a plant as described in MGL 164 Section 36

## 2. *Outsourcing Model Parameters* (p. 5)

The estimates shown here are based on our best assumptions to date on an MLP / Outsourced Model. There are still opportunities for clarification and improvement. Further study needs to take place to fully understand the comparative costs of outsourcing versus insourcing. We welcome input and continue to work on topics such as backhaul - including aggregation and oversubscription rate, depreciation formula, the pros and cons of providing a TV offering, and likely costs for network operations, insurance and administration costs.

## 3. *Modeling a Single Level of Internet Service Only* (p. 5)

For purposes of modeling clarity and simplicity, the model focuses exclusively on the delivery of *internet service*. In the real world, both stand-alone and the WiredWest MLP/Outsourced models would likely be implemented with tiered service levels - offering higher and lower connection speeds, at various price points to balance affordability and take rate. However, building a tiered price structure model would inordinately complicate the variables, without contributing further to our understanding of cost differences between the models. We elected the simplicity of a single service level for this reason, acknowledging that the real world network would offer multiple connection speeds.

Telephone and television offerings are not included. Telephone service is a profitable add-on in either business model. In both instances, the cost of providing telephone service is similar and can be expected to generate a profit margin of between \$2 and \$5 per subscriber per month, independent of the business model. Television service today is in a period of transition, making modeling costs impossible to predict 4 to 5 years in the future. WiredWest will continue to monitor the evolving situation and will hold off on implementation of television services until considerably closer to the time the network comes online.

#### 4. *Net Regional Savings* (p. 6)

Although this analysis does not focus primarily on the impact of scale and it is difficult to estimate the scale effects without vendor quotes, *a \$5 net regional savings is reasonable and conservative*. For example, a 10% reduction in insurance, network operations, and routine maintenance costs along with a 20% reduction in backhaul generates a savings of \$3/mo/subscriber. It is not unreasonable to expect that the ISP cost (estimated at \$25/mo) may be reduced by at least \$2/mo given a competitive bidding process and recognizing that Leverett residents realize a \$10/mo savings for double play.

#### 5. [\*Interactive Online Tool for Outsourced Cost Estimation\*](#) (p. 12)

##### Assumptions built into the App

- There are two major differences between the WiPro/MBI models and the App.
- WiPro's work is based on estimates of premises, poles and road miles from a Cartesian estimate dating back, we believe, to their 2014 desktop estimates.
- WiredWest (and Crocker) have been using the updated premise counts that MBI released in September. *There is now an option to use either data set.*
- The WiPro work models a \$50,000/yr "profit" per town, *or what everyone else calls a **contingency** or **reserve**.*
- The work reflected in the App is based on Leverett model using a fixed percentage of operating costs as a set aside. The percentage makes more sense because it varies by town size. In any case, there is an option to set a fixed dollar amount as a contingency.
- It should be noted that the \$50,000 per-town-per year "profit" number used in the MBI Town Profiles translates into \$1.5 million per year "profit", a.k.a. contingency/reserve for the 30 WiredWest towns used in this study.
- \$1.5 million per year "profit"/contingency/reserve seems excessive in the regional model. A \$500,000 is suggested as a reasonable (though admittedly arguable) cap, and is still a conservative amount. Recognizing that such a contingency accumulates year over year, even \$500,000 seems like a handsome annual set aside, but user can make their own decisions in the App.
- Last, WiPro makes some other assumptions that one can set in the App. WiPro does not include administration (those values can be set to zero). WiPro assumes 4 month seasonal use for second home owners (instead of the 7 months WiredWest suggest is more realistic); estimates a 60% take rate and don't include debt service. All these variables are controllable in the App with sliders and can be varied at will).

## Summary and Conclusions from the App

For the 30 towns using WiPro's specifications and excluding debt service, WiredWest calculates a cost for internet service at \$75/month per subscriber, while WiPro estimates \$79/month for entry level internet. Specific observations include:

- Extremes for single towns range from \$74 (Shutesbury) to \$180 (New Ashford).
- If combined and cost shared in a regional network, average cost is \$84/month per subscriber.
- However, if the “profit”/contingency/reserve is capped at \$500,000, the cost for subscribers on the regional network goes down \$8 to \$76 per month, which is just \$2 more than what Shutesbury would pay on their own.
- If one uses MBI's premise counts over Cartesian's numbers, subscriber costs go down to \$72/month.
- *If you believe a 60% take rate is too modest and that 75% is more reasonable, the cost goes down to \$64/month.*
- *Add back in the debt service and administration costs and it goes back to \$90/month.*
- *Remove the cost of electronics (if partnering with a third party ISP that would own them) and the price drops down to \$81/month.*
- *Create two tiers at 80%/20% take rates (same as WiPro) and we can charge \$76/month for 50Mbps and \$101/month for 1Gbps, which are attractive price points for service.*

In short, the outsourcing model presented here, and demonstrated by the App, is surprisingly close to WiPro's results. *By capping the total “profit”/contingency/reserve under the regional model, then the savings are substantial—even using WiPro's numbers.*

WiPro's assumptions lead to numbers that WiredWest believes are a little high. On the other hand, it's clear that the take rate (and premises counts) has a dramatic impact on price, so that's a real risk that participants need to accept.

It is challenging to estimate the true costs to subscribers. Towns choosing to proceed with fiber-to-the-home under the WiredWest regional network scenario can achieve reasonable cost to subscribers if they are comfortable with covering debt service for the life of a 20 year bond. Towns that have a goal of full debt service recovery probably need to be comfortable with a cost anywhere between \$70 and \$100 per subscriber per month for basic service.

## 6. *MBI Last Mile Town Profiles* (p. 14)

### Introduction

The pages provided in this report includes profiles for all 44 unserved towns. Each profile includes a map of the town with relevant data points such as unserved locations, connected “Community Anchor Institution” locations, MassBroadband 123 fiber optic cable infrastructure and interconnection points.

The profiles also provide a breakdown of the capital expenditures and operating expenditures for each town. The total construction costs are based on desktop modeling completed by an industry expert retained by MBI. That total cost is \$109 million for construction in the 44

unserved towns. These figures show the breakdown of the total construction cost per town, each town's projected contribution to those costs and MBI's proposed allocation to help subsidize the project.

Additionally, these profiles include the expected increased property tax burden on each homeowner (if the town chooses to borrow the funds), as well as the projected monthly subscription costs based on various take rates.

#### Assumptions of Analysis

Because there are so many variables and costs underpinning the complex financing of providing a fiber-to-the-home broadband network, *MBI and its consultants have made certain assumptions as part of this analysis. The modeling assumes an entirely outsourced model, whereby the towns would contract with existing industry partners for network operations, ISP services, etc.*

Additionally, based on industry practice, MBI has modeled each town under the assumption of a \$50,000 annual profit *to provide cash reserves to cover unexpected costs and needs* (for example for repairs due to ice storms or blizzards). These annual profit calculations also assume that the costs will not cover debt service for the town's share of the build and will not cover administrative costs inuring to the town. However, MLP costs, depreciation reserves, and customer premise equipment costs are included.

### **7. Using the MBI Last Mile Profile numbers (p. 14)**

The MBI [Last Mile Town Profiles](#) document contains maps, capital expenditures, and operating expenditures information for each of the 44 unserved towns. Included are breakdowns per-town for fiber-to-the-home networks under a standalone fully outsourced model. Each of the towns received a direct email with the Profile for their town.

On April 28, in *FiberDiary, a Weblog Tracking The Work Towards Broadband In Princeton* (by John Kowalski), the MBI Profile for Princeton is critiqued. The weblog noted a number of factual errors made by the MBI in the numbers for Princeton, and generally took the agency to task: *"MBI should ask itself whether they are delivering on their charter to help the Towns of Central and Western MA. And we should ask what have they been doing since the study this report is based on is over a year old."* You can link to it [here](#).

### **8. Appendix B - Excel Spreadsheet - MBI Last Mile Town Profiles (p. 15)**

This spreadsheet takes the numbers from the MBI Unserved Towns Profiles document and does a cumulative regionalization, in much the same way as was done for the outsourced model which started with numbers from Crocker Communications. The MBI Profiles calls for a \$50,000 "profit" per town per year. Profit, as used by MBI, is really a contingency, or reserve, for the unexpected (downed wires from ice storms, etc). According to MBI:

*"Based on industry practice, MBI has modeled each town under the assumption of a \$50,000 annual profit to provide cash reserves to cover unexpected costs and needs (for example for repairs due to ice storms or blizzards). These annual profit calculations also assume that the*

*costs will not cover debt service for the town's share of the build and will not cover administrative costs inuring to the town. However, MLP costs, depreciation reserves, and customer premise equipment costs are included."*

With a single town, specifying a \$50,000 "profit" makes sense, but if you are regionalized in the sense that you are sharing the contingency/reserve, then it still seems conservative to set a significantly lower number. In this case, \$500K per year "profit" is used for contingencies. Note that this is the budgeted profit for every year, so any unspent monies will accumulate year over year. Reasonable people could argue about the right target "profit" for 30 towns working cooperatively, but \$500,000 seems reasonable.

There are three points to be made:

- Before any savings are accounted for, regionalization raises the costs for a few towns as compared to operating their own networks, a small amount, but makes FTTH affordable for a lot more towns. However, the overall, even the largest towns benefit financially from participation in the regional network when cost savings, economies of scales, and sharing of the "profit" are taken into account.
- This is the same conclusion as the regionalization analysis above, but using MBI's numbers, not Crocker Communication's or WiredWest's.
- If you allow profit/cost/risk sharing on a regional basis, you can budget for perhaps \$1 million less in subscriber revenue every year. That saves the average subscriber (on a regionalized basis) \$10/month (\$79 regional ARPU vs. \$89, column H vs. L) as shown on the spreadsheet.

## *9. The Berkman Center for Internet and Society at Harvard University (p. 16)*

The Berkman Center was founded to explore cyberspace, share in its study, and help pioneer its development. They represent a network of faculty, students, fellows, entrepreneurs, lawyers, and virtual architects working to identify and engage with the challenges and opportunities of cyberspace.

The Berkman Center investigates the real and possible boundaries in cyberspace between open and closed systems of code, of commerce, of governance, and of education, and the relationship of law to each. They do this through active rather than passive research, believing that the best way to understand cyberspace is to actually build out into it.

Berkman Center faculty, fellows, students, and affiliates engage with a wide spectrum of Net issues, including governance, privacy, intellectual property, antitrust, content control, and electronic commerce. Their diverse research interests cohere in a common understanding of the Internet as a social and political space where constraints upon inhabitants are determined not only through the traditional application of law, but, more subtly, through technical architecture.

[Berkman Center Report on WiredWest](#)

## Reference Documents and Links

*All the documents referenced and linked to in this report are listed below.*

(Page 4)

*Chapter 231: An Act Establishing and Funding the Massachusetts Broadband Institute*

<https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter231>

(Page 4)

*Bill H.3770, 188th (2013-2014): An Act financing information technology equipment and related projects*

<https://malegislature.gov/Bills/188/House/H3770>

(Page 10)

*Online App (Modeling Tool)*

<http://prismslab.cs.umass.edu:3838/opex/>

(Page 13)

*The Leverett Municipal Broadband Model*

<http://wiredwest.net/2015s2/wp-content/uploads/2016/05/Leverettnet-Presentation-16-03-06.pdf>

(Page 14)

*MBI Unserved Town Profiles (April 2016)*

[http://wiredwest.net/2015s2/wp-content/uploads/2016/05/ww.MBI\\_mbi-unserved-town-profiles-2016-04-23.pdf](http://wiredwest.net/2015s2/wp-content/uploads/2016/05/ww.MBI_mbi-unserved-town-profiles-2016-04-23.pdf)

(Page 16)

*Case Study on WiredWest by The Berkman Center for Internet and Society at Harvard University*

[http://wiredwest.net/2015s2/wp-content/uploads/2016/05/BerkmanStudyOnWiredWestApr19\\_1.pdf](http://wiredwest.net/2015s2/wp-content/uploads/2016/05/BerkmanStudyOnWiredWestApr19_1.pdf)

(Page 24)

*FiberDiary, a Weblog Tracking The Work Towards Broadband In Princeton.*

*Critique of MBI Unserved Town Profiles.*

[http://www.kowaleski.org/public\\_html/Wordpress/?p=228#more-228](http://www.kowaleski.org/public_html/Wordpress/?p=228#more-228)