

# Breaking the Broadband Monopoly



How Communities Are  
Building the Networks  
They Need

Christopher Mitchell  
*christopher@newrules.org*

May 2010

A publication of



---

**New Rules Project**  
1313 5th St. SE, Suite 303  
Minneapolis, MN 55414

612-379-3815  
[www.newrules.org](http://www.newrules.org)  
[www.muninetworks.org](http://www.muninetworks.org)

## Acknowledgments

---

This report would not have been possible without the help of my colleagues at ILSR, especially David Morris. Thanks also to Eric Lampland, Jim Baller, Joanne Hovis, Craig Settles, Patrick Lucey, and Michelle. Any errors are my responsibility. This report was made possible in part with funding from the Media Democracy Fund.

## Recent Publications

---

### **Electric Vehicle Policy for the Midwest - A Scoping Document**

By John Bailey and David Morris, December 2009

### **A New Deal for Local Economies**

By Stacy Mitchell, October 2009

### **Energy Self-Reliant States: Second and Expanded Edition**

By John Farrell and David Morris, October 2009

### **Feed-in Tariffs in America: Driving the Economy with Renewable Energy Policy that Works**

By John Farrell, April 2009

### **The Benefits of North Dakota's Pharmacy Ownership Law**

By Justin Dahlheimer and Stacy Mitchell, January 2009

### **Meeting Minnesota's Renewable Energy Standard Using the Existing Transmission System**

By John Bailey, George Crocker (NAWO), John Farrell, Michael Michaud (Matrix Energy Solution), David Morris, November 2008

### **Rural Power: Community-Scaled Renewable Energy and Rural Economic Development**

By John Farrell and David Morris, August 2008

### **Balancing Budgets by Raising Depletion Taxes**

By Justin Dahlheimer, June 2008

### **Driving Our Way to Energy Independence**

By David Morris, April 2008

### **Broadening Wind Energy Ownership by Changing Federal Incentives**

By John Farrell, April 2008

### **Municipal Broadband: Demystifying Wireless and Fiber-Optic Options**

By Christopher Mitchell, January 2008

---

Since 1974, the Institute for Local Self-Reliance (ILSR) has worked with citizen groups, governments and private businesses to extract the maximum value from local resources.

A program of ILSR, the New Rules Project helps policy makers to design rules as if community matters.



2010 by the Institute for Local Self-Reliance. Permission is granted under a Creative Commons license to reproduce and distribute this report freely for noncommercial purposes. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-nd/3.0/>.

# Table of Contents

---

Executive Summary .....	I
Introduction .....	2
Why Public Ownership? .....	3
Better Technology, Lower Prices.....	4
Stimulate Economic Development.....	5
Meet Community Needs and Wants .....	6
Encourage Competition .....	7
Evaluating Publicly Owned Networks.....	10
Full-Cost Accounting.....	10
Public Ownership is the Best Solution for Rural Areas .....	11
Public Ownership in Big Cities .....	13
Publicly Owned Networks: A Growing List of Success Stories .....	14
Institutional Networks .....	14
Montgomery County, Maryland	
Santa Monica, California	
Washington, DC	
Scott County, Minnesota	
And Many Others	
Wireless Networks .....	18
Oklahoma City, Oklahoma	
Ponca City, Oklahoma	
City-wide Fiber Networks .....	19
Powell, Wyoming	
Kutztown, Pennsylvania	
Lafayette, Louisiana	
Obstacles to Community Ownership.....	23
Internally Created Obstacles .....	23
Existing Institutional Networks	
Transparency	
Elections	
Obstacles Erected by Incumbent Providers .....	24
Scale	
Access to Apartment Buildings	

Lawsuits .....	26
State Legislative Obstacles.....	27
Outright Prohibitions on Services	
Retail Service Prohibition	
Restrictions on Business Plans and Structuring Debt	
Requirements That Prioritize Private Companies	
Referenda	
Other Procedural Obstacles	
Federal Obstacles .....	31
E-Rate	
Broadband Stimulus Program	
Open Access and Public Ownership .....	34
Open Access: Paying the Bills .....	34
Aligning Incentives for Open Access.....	35
Combining Open Access and the Sale of Retail Services.....	37
The Future of Open Access.....	37
Open Access Experiences.....	38
Utah Telecommunication Open Infrastructure Agency (UTOPIA)	
Jackson, Tennessee	
Lessons Learned From Publicly Owned Networks.....	40
Network Planning.....	40
Launching the Network .....	42
Packages and Pricing.....	43
Auditing and Oversight.....	44
Content Decisions .....	45
Geography and Authority .....	46
Middle Mile.....	47
Case Studies .....	48
Chattanooga, Tennessee.....	48
Brigham City, Utah.....	49
Conclusion .....	52
References.....	53

## Executive Summary

Across the country, hundreds of local governments, public power utilities, non-profits, and cooperatives have built successful and sometimes pioneering telecommunication networks that put community needs first.

These communities are following in the footsteps of the publicly owned power networks put in place a century before. We watch history repeating itself as these new networks are built for the same reasons: Incumbents refusing to provide service or charging high rates for poor service.

Cities like Lafayette, Louisiana, and Monticello, Minnesota, offer the fastest speeds at the lowest rates in the entire country. Kutztown's network in Pennsylvania has saved the community millions of dollars. Oklahoma City's massive wireless mesh has helped modernize its municipal agencies. Cities in Utah have created a true broadband market with many independent service providers competing for subscribers. From DC to Santa Monica, communities have connected schools and municipal facilities, radically increasing broadband capacity without increasing telecom budgets.

These pioneering cities have had to struggle against many obstacles, often created by incumbents seeking to prevent the only real threat of competition they face. Eighteen states have passed laws that discourage publicly owned networks. When lawsuits by entrenched incumbents don't thwart a publicly owned system, they cross-subsidize from non-competitive markets to temporarily reduce rates in an attempt to starve the infant public network of subscribers.

Despite these obstacles, more and more cities are building these networks and learning how to operate in the challenging new era in which all media is online and a high speed tele-communications network is as much a part of the essential infrastructure of a modern economy as electricity was 100 years ago.

Communities that have invested in these networks have seen tremendous benefits. Even small communities have generated millions of dollars in cumulative savings from reduced rates – caused by competition. Major employers have cited broadband

networks as a deciding factor in choosing a new site and existing businesses have prospered in a more competitive environment.

Residents who subscribe to the network see the benefits of a network that puts service first; they talk to a neighbor when something goes wrong, not an offshore call center. At the municipal fiber network in Wilson, North Carolina, they talk of the “strangle effect.” If you have problems with their network, you can find someone locally to strangle. Because public entities are directly accountable to citizens, they have a stronger interest in providing good services, upgrading infrastructure, etc., than private companies who are structured to maximize profits, not community benefits. Residents who remain with private providers still get the benefits of competition, including reduced rates and increased incumbent investment.

Some publicly owned networks have decided to greatly increase competition by adopting an “open access” approach where independent service providers can use the network on equal terms. Public ownership and open access give residents and businesses the option of choosing among many providers, forcing providers to compete on the basis of service quality and price rather than simply on a historic monopoly boundary.

Perhaps the greatest benefit communities have gained from owning their telecommunications networks is self-determination. Recent court rulings enable private network owners to set their own rules, including increased charges for accessing some sites – much like a cable bill charges more for some programming. The rules are made far from where the customer resides and the criteria used to design such rules maximizes benefit to the private firm, not the community.

There is no one model for community broadband. Communities vary greatly in their needs, assets, desires, and culture, not to mention a regulatory environment that varies from state to state. This report presents case studies, evaluates existing networks, offers lessons learned, and highlights the most important issues facing both communities and policy makers at all levels. Public ownership offers the best prospect for building the networks we need to succeed in the 21st century.

## Introduction

Most communities get “high speed” broadband from only two sources: the privately owned cable company or the privately owned telephone company (i.e. incumbent providers). Even though Americans pay more than international peers for broadband, they get far slower speeds. Over the past decade, a number of Asian and European countries have surpassed the U.S. in various broadband metrics by implementing policies that recognize the important role of regulation and public sector investment in broadband networks. In contrast, the U.S. has embraced a policy of de-regulation, increasing the power of incumbents who have slackened investment in networks while increasing prices.

In response to the private sector’s general refusal to build affordable, next-generation broadband networks, as well as a desire to control their own future in an increasingly information-intensive economy, hundreds of communities across the country have built their own networks. They have done so in the face of great odds, confronting obstacles both inherent (e.g. the amortized assets and large cash reserves of massive corporations) and human made (e.g. state laws that impose significant hurdles for public networks; lawsuits by incumbent providers). The vast majority of these publicly owned networks have proven successful.

Though we explain how these networks have succeeded in a variety of ways, perhaps the most obvious sign of success for community networks is that so few communities have decided to sell their assets. Any community that regrets its

decision to build a network can sell it – but the only community to do so in recent years is Provo, Utah. And Provo chose to sell it because state law prevented the City from using the business model they preferred from the start. This is just one of the many barriers incumbent interests have pushed through state legislatures to protect themselves from competition.

Broadband has become critical infrastructure but the largest entities that own it do not operate in the public interest. Private companies are not allowed to dictate which communities get modern roads and bridges; they cannot increase electrical rates every year for no good reason. Roads are available to all on equal terms, allowing trucking companies to compete fairly with each other. In contrast, broadband networks operate with very little public oversight.

There is no reason to believe this trend will change. States are over-burdened with a variety of problems and generally sympathetic to telecom lobbyists. If there is a single lesson for communities from the Federal Communication Commission’s (FCC) recent National Broadband Plan, it is that the Federal Government is not going to solve this problem either. This plan will take years to work its way through Congress and the Courts. Local voices are all but shut out of DC and no one knows what deals will be struck along the way.

Fortunately, communities can take action to solve their own problems. With smart investments, communities can call all the shots on their own broadband network.

No matter the size of the community, everyone needs a network that looks to Main Street rather than Wall Street...

## Why Public Ownership?

Public broadband networks come in many forms of ownership and operations.

The most widespread model is municipal ownership. Most communities with citywide publicly owned broadband already had a public power utility distributing electricity.

Cities like Lafayette, Louisiana; Chattanooga, Tennessee; Wilson, North Carolina; Chelan, Washington; Bristol, Virginia; Reedsburg, Wisconsin; Spencer, Iowa; and Windom, Minnesota all used their public power company's expertise in building their broadband network.

Other communities have contracted with a company to operate a network that is both built and owned by the community. Powell, Wyoming, and Monticello, Minnesota, both invested in a network and contracted with an experienced company to provide triple-play (phone, TV, internet) services to subscribers.

Still other communities receive services from either a non-profit organization or cooperative – because these structures put the public before profit, we classify them as publicly owned. The non-profit OneCommunity<sup>1</sup> in Northeastern Ohio has expanded services throughout many communities with a series of innovative partnerships. The Mountain Area Information Network, a non-profit in North Carolina, has brought wireless broadband to people abandoned by absentee-owned telecom companies. Telephone cooperatives in rural America have long been offering broadband to members and many have invested in fiber-optic networks.

The business structures may differ but the motivation and result is the same: a telecommunications network that becomes part of the essential infrastructure of the community, like roads and water pipes, that is directly responsible to its community/customers and puts the needs of the community first.

Many people have become convinced that government can do nothing right. The 100-year

record of the 2,100 community-owned electricity networks alone should dispel that myth. In the telecommunications area the success rate is similarly impressive. This achievement is particularly noteworthy because overbuilding (i.e. building a second or third telecommunications network in a community) is costly and because states and incumbent companies have placed numerous obstacles in the path of success.

*In Tennessee, Chattanooga is building the largest municipally owned fiber to the home network in the country. Harold DePriest, head of Chattanooga's Electric Power Board, noted: "The issue is, does our community control our own fate, or does someone else control it?"*

Community networks are not liberal or conservative. Burlington, Vermont, has a liberal reputation and Lafayette, Louisiana, has been ranked one of the ten most conservative cities in the country. These networks are a matter of essential infrastructure, not politics.

At the local level, these communities understand that their interests are quite different from massive corporations. Companies have a fiduciary responsibility to do what is best for their shareholders, which may mean putting off network upgrades in rural communities and charging as much as the market will bear. However, unreliable networks and high prices hurt all citizens and businesses, which is why "public v. private" mischaracterizes the decision. The decision is between the needs of a whole community and one or two absentee companies.

Many communities have found that public ownership is the only way they can achieve a truly competitive information economy. A community with no power to create competition by requiring the private cable company to share its lines with competitors may choose to build its own network and allow independent service providers to compete fairly – creating a true market for broadband services. Rather than having to beg for upgrades to remain competitive, the community has the power to choose how quickly to invest in new technologies. Owning the network means an end to paying monopoly prices – and keeping that money in the community rather than exporting profits to distant shareholders. Given the supreme importance of broadband for modern commerce, owning the network is a key element of self-determination.



The community-first motivation of publicly owned networks translates into many benefits for communities. The most obvious is that communities are no longer stuck with whatever technology offers the greatest monetary profit. Community networks often offer superior technology, faster speeds, greater reliability, and lower prices than incumbent networks.

### Better Technology, Lower Prices

Any new network built by an incumbent today would be entirely fiber-optic. However, cable and telephone companies are unwilling to invest in modern networks because they can save money by continuing to use existing copper lines. When communities build their own networks, they invest in modern technology, not last generation DSL or cable networks. Therefore, communities tend to have an advantage technologically and can offer superior services. See Table 1 and Figure 1 for impressive community network offerings.

In fact, publicly owned fiber networks offer some of the fastest and most affordable broadband speeds in the nation. We have calculated the value of services from some of the most impressive municipally owned networks to compare against Comcast and Verizon, who offer some of the fastest speeds in the private sector.

Publicly owned networks tend to offer lower prices for access to the Internet, forcing competitors to actually compete for customers, a result that creates benefits for the whole community. In deciding prices and marketing speeds locally, communities have to consider a variety of factors – including local rates for backhaul (i.e. the costs of connecting to the Internet backbone). Some communities may price more conservatively in order to repay debt more quickly while others focus on building a world-class network as part of an economic development strategy.

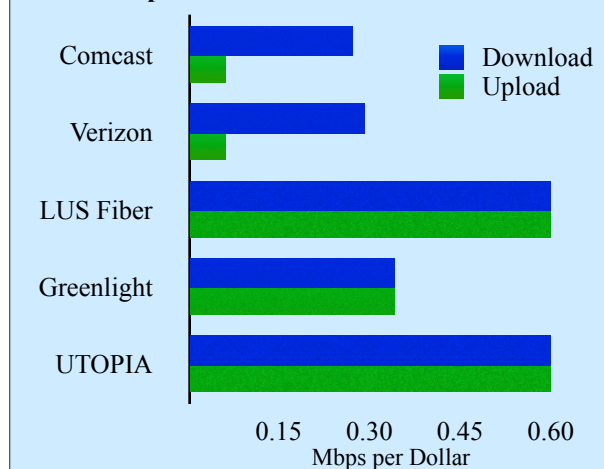
Investing in better technology is not simply about faster speeds and lower prices. For example, some have mistakenly claimed Verizon’s fiber-optic FiOS was technically superior to Burlington Telecom’s (BT) network in Vermont merely because FiOS markets faster speeds. In reality, BT’s architecture is more versatile and future-proof than Verizon’s. Burlington spent more on its fiber plant (i.e. the layout of the physical network in the

**Table 1: Network Speeds / Prices Comparison**

Network	Mbps	Monthly Cost
Lafayette, LA	10	\$28.95
	50	\$57.95
Loma Linda, CA	5	\$29.95
Monticello, MN	20	\$34.95
	50	\$95.35
Reedsburg, WI	10	\$49.95
UTOPIA, UT	15	\$39.95
	50	\$59.95
	100	\$147.00
Wilson, NC	10	\$34.95
	20	\$54.95
Comcast*	“up to” 50/10	\$99.95
	“up to” 15/3	\$42.95
Verizon	15/5	\$54.99
	50/20	\$144.99
Free (France)**	100	\$33.00
Japan ***	100	\$44.00-48.00

Table reflects regular rates absent promotional/bundled discounts. All speeds are symmetrical except Verizon and Comcast, who do not offer symmetrical tiers.  
 \* Cable architecture, as well as Comcast’s “PowerBoost” technology, makes subscribers less likely to achieve these speeds regularly.  
 \*\* This cost reflects a bundle offering telephone and video services, total package is \$33.00  
 \*\*\* Price depends on provider, Yahoo or Nifty

**Figure 1: Community Networks Offer More Broadband per Dollar**



Mbps per dollar, averaged across residential service tiers of networks representing the best of public networks and national private networks.



field) than Verizon would have because they are investing for a longer term than Verizon, which requires a rapid return on its investment.

Publicly owned networks have focused on greater reliability because of their community focus; redundant connections and equipment are important for low-probability, high-impact events (e.g. natural disasters) but do little to boost profitability. Profit-maximizing companies are more willing to gamble with potential outages following a catastrophe. First responders may be just another client to Comcast or AT&T but they represent a community-wide priority for publicly

owned networks. The examples below on Institutional Networks offers several examples to this effect.

## Stimulate Economic Development

Many communities cite economic development as the primary reason for building a publicly owned network. Table 2 documents some of the businesses that have located in a community because of connectivity from the publicly owned network. Networks are even more successful at nurturing and nourishing existing businesses. Businesses have increasingly focused on locating where they can ensure a future of affordable and reliable broadband at the speeds they need, which is one reason many communities have quietly built networks to business parks. Some offer services directly whereas others merely provide dark fiber (fiber already in the ground that is not currently being used, or “lit”), but these are good first steps that may later be expanded into a citywide network if necessary.

Chief Information Officer of Santa Monica’s publicly owned fiber network, Jory Wolf noted:

*When I talk to prospective post-production and tech businesses seeking to relocate to Santa Monica, they tell me it is no longer the cost of real estate, but the cost of IP [transport] driving the decision. Municipalities that fail to offer an infrastructure where businesses have all components essential for operations – space, power, water, broadband, etc. risk losing the most stable industries in the current economy.<sup>2</sup>*

As more and more businesses experiment with telecommuting and working-at-home projects, they have recognized the benefits of allowing, even encouraging, employees to stay home. In Minnesota, a major employer in the suburbs of the Twin Cities has been the primary driver for improving residential broadband options in its community. Another Minnesota company, Best Buy, has received a lot of attention for its “Results Oriented Work” that encourages employees to work wherever they choose. These companies need employees to have full remote access to office network resources – requiring speeds greater than DSL can offer and symmetrical

**Table 2: Economic Development Examples**

Location	Company
Auburn, IN	Cooper-Standard Automotive
Bristol, TN	Media General
Bristol, VA	Northrup Grumman, CGI-AMS
Chelan County, WA	Yahoo
Douglas County, WA	CSabey Corporation
Grant County, WA	Microsoft, Ask Jeeves, Intuit
Independence, OR	Various metal fabrication companies
Jackson, TN	Portfolio Recovery Associates, Jarvis Caster
Kutztown, PA	Various film production companies
Lake County, FL	Munn’s Air Conditioning and Heating
Lafayette, LA	Nucomm International
Mason County, WA	Louisville Slugger, Sims, various high technology and online engineering firms
Morristown, TN	Colgate Palmolive
Powell, WY	ReSource Inc.
Princeton, IL	Ingersoll Rand
Scottsburg, IN	Chrysler
Tacoma, WA	More than 100 high-tech companies
The Dalles, OR	Google
Windom, MN	Various trucking companies

### WindomNet Kept Jobs in Community

A local employer just outside of Windom, MN, attempted to upgrade its IT capabilities and ordered a better broadband connection from the absentee-owned incumbent phone company. After ordering equipment to take advantage of the new connectivity, the incumbent realized it could not provide the service it promised. The company had no choice but to move the related jobs to a different site across the country where they knew the connectivity was available. But before they could, local WindomNet ran a fiber cable out to them, offered the needed services, and kept those jobs in the region.

connections (uploads at the same speed as downloads) that cable cannot offer. Businesses are very sensitive to locating in areas with a high quality of life to ensure employees will want to work and live in the community. When officials from Anoka County, just outside Minneapolis, spoke with residents about broadband access, several said they would not have bought or built houses where they did if they knew access to the Internet was so limited.

Businesses also want to know they can depend on the network. As a Utah businessperson noted when explaining his support of the publicly owned UTOPIA network, in the event of problems, he can get someone on the phone as opposed to calling some international tech support center of the incumbent provider.<sup>3</sup> Down at the municipal fiber network in Wilson, North Carolina, they have termed this the “strangle effect.” If you have problems with their network, you can find someone locally to strangle.

In fact, for some publicly owned networks, everyone is a stakeholder, even if they are customers of the private competition. In Windom, a small community in rural Minnesota, network engineers of the publicly owned WindomNet responded to a request for help from a company that leased lines from the incumbent. The business lost broadband connectivity and the incumbent said it would take several days before a technician could respond. WindomNet put the community first and helped them solve the problem before they lost days of productivity.

## Meet Community Needs and Wants

Public access, educational, and governmental programming has long been a mainstay of civic life in most communities. These local channels broadcast public meetings, helping citizens to stay informed on community matters. In line with our free speech values, public access channels have offered a platform to anyone with the desire to create content.

Online video hosts like YouTube have made sharing some kinds of video easier but the content is no longer controlled by the creator. Hosting sites often claim rights over uploaded video. The model is based on sharing silly keyboard cat videos (and the like) around the world rather than developing serious content for a local audience.

In recent years, creating video for a local audience has come under serious attack. Cable companies like Comcast have used state-wide franchising laws to de-fund community access channels in many states – including Michigan, Indiana, and Vermont. Though community access studios are seeing increased demand for assistance in creating, editing, and sharing content, cable companies see local content as a distraction from selling expensive packages of profitable channels.

Publicly owned networks use the same technology to encourage local content. Rather than focusing on subscriber revenue, communities may want to encourage programming about local cultural or sporting events to create a larger sense of community. The network may collaborate with local schools to run a studio creating local news or entertainment programming. Rather than simply using video-on-demand to sell Hollywood movies, the community may index all local government and school board meetings to increase civic participation.

For communities with large immigrant populations, public access and video-on-demand both offer many possibilities to help both assimilation and preservation of their culture. Modern networks can offer an unlimited number of channels, abolishing the scarcity paradigm that has defined television up to now. In the past, the number of channels was constrained by the transmission technology. Everything has changed

### Community Networks Meet Community Media

Several publicly owned networks have gone beyond minimum franchise requirements to support local media. Salisbury, NC, is soliciting ideas from citizens to put more local content on their television lineup. Jackson, TN, built a studio for the community and has used it to cover local sporting events, court trials, and a weekly interview show. Burlington, Vermont, not only offers live coverage of public meetings, but archives and indexes meetings on video-on-demand. During a time when privately owned cable and telephone companies are marginalizing public access, communities have realized they can use this technology to ensure those who have left the community can stay in touch with local events. Many communities with publicly owned networks are developing partnerships with local schools to produce video content, offering a valuable learning experience.

with modern networks that can offer hundreds of thousands of channels. Rather than simply having a few channels for the whole community, the town can create as many channels as it wants, creating a renaissance of local programming. Some of these channels may be commercial in nature, allowing for hyper-local advertising for local businesses that could not afford an ad across the incumbent cable company's footprint.

In overcoming the digital divide, communities may enlist the help of high school students to produce tutorials in a variety of languages to explain basic computer tips and troubleshooting. Though these may be easier to distribute over the computer, it is the familiarity and ease of use from the television that enables one to overcome the barriers of learning to use a computer. Several communities have partnered with non-profits to refurbish computers for those in poverty, offering free or subsidized access on the community network. A publicly owned network could partner with community foundations to ensure all school children have a home Internet connection with access to a homework help line. The capital costs to create such a program are significant, but the ongoing costs would be minor once the connections are established because bandwidth is cheap and growing less expensive every day.

These are but a few ideas that illustrate the many possibilities of modern networks – and how many possibilities are foreclosed when the network

owner is only interested in maximizing profits. As the rate of technological change quickens, communities that own networks will find even more opportunities to encourage innovation and ensure all citizens can participate.

Just as technological advances have lowered the cost of high quality video content, community networks create avenues to share that content. In Burlington, Vermont, the municipal network already gives channels away to those who want to offer civic-based programming. They sell channels for \$65/month to anyone else, creating a space for entrepreneurs and local business advertising that simply does not exist on privately owned cable networks. This is the cutting edge of the television/computer/Internet convergence and the biggest question is who will own it – the public or some absentee private company. The owner will surely shape it – will it mirror the roads that are available to everyone on an equal basis or the cable television model with hundreds of channels but nothing on?

### Encourage Competition

Joe Franell, who runs the Ashland Fiber Network in Oregon, has noted:

*Where there is a high rate of return on investment with old technology without any threat of competition, monopolistic incumbents have little reason to improve their networks and/or product offerings.<sup>4</sup>*

### Myth - The U.S. Broadband Gap is Caused by its Large Size

Though the United States is certainly more difficult to wire as a whole than Japan or South Korea, our population distribution is similar to many countries, particularly in Europe, who have surpassed us. Our most dense areas, where one might expect the fastest networks are often quite lacking in available broadband. As this report notes, some of the fastest speeds at the most affordable prices are delivered by publicly owned networks and these networks have succeeded in all manner of geography and densities. The broadband gap results from public policies that allows private companies to decide the terms on which communities receive broadband.

### Glasgow, Kentucky, Saved Millions with Its Community Network

Glasgow's electric board invested in 4Mbps speeds long before many towns had even 1Mbps access. Accumulated savings from the low cable rates of Glasgow total \$30 million dollars – and a much larger portion of the spent money stayed in the community rather than going to the shareholders of some absentee national firm.

Absent government intervention, broadband networks tend toward monopoly. For more than a decade, federal government intervention has spectacularly failed to deliver broadband competition to most Americans. Communities, on the other hand, have the power to create a competitive environment in their towns. Incumbents have many advantages (detailed below in the Obstacles to Community Ownership Section), making it difficult for new competitors – or “overbuilders” – to gain sufficient market share to pay off the debts incurred by building a new network. However, by building modern full fiber-to-the-home (FTTH) networks, communities can leapfrog incumbent offerings and ensure they determine their own futures rather than a corporate boardroom in Philadelphia, Atlanta, or Denver.

In the early days of the world-wide web, subscribers could pick from any number of providers – subscribers decided to whom to connect the dial-up modem over the phone lines without interference from the phone company. Since then, much has changed in both policy and technology. Wired broadband connections are seldom available from anyone but the incumbent telephone and/or cable company. From the point of view of the network owner, the reason is obvious: one can make greater profits by monopolizing the connection than allowing competitors access to subscribers via one's network.

Community networks present the best, possibly only, opportunity of restoring robust competition among service providers. Due to the high costs of building a network, private providers very rarely “overbuild” or take on an established incumbent provider. Most Americans can only choose between a cable company and a telephone company for broadband access – a prospect unlikely to change absent a public initiative. Though some wireless companies have attempted to compete against wired networks, they have

captured very little market share because the technology cannot compete with fiber-optics on speed or reliability.

In the late 1990's and early 2000's, many communities created the first broadband provider in their town because the private sector was dawdling. These public networks spurred investment by the incumbents, a trend that is replayed in every community that builds its own network. For example, the small town of Muscatine, Iowa, was the first to deploy broadband for residents, spurring broadband investments from both the private cable company and the telephone company. In Colorado, Qwest and Comcast only built broadband in Longmont after the city announced a partnership with another company that would use public fiber to deliver broadband services. After Lafayette began building its fiber network, incumbent cable company Cox upgraded its offerings, noting “the people in this area have made it very clear they want faster speeds.”<sup>5</sup>

The very fact of building a community network creates an additional competitor. A publicly owned network changes the entire dynamic – as noted by a Tacoma, Washington, resident who benefits from Click!, the municipal cable network.

*I have Comcast in Tacoma and all I know is since there is competition down here Comcast is about half the cost as it is in Seattle. They give you a rate good for a year. When your year is up you call up and just say Click! and bam back down you go. A friend in Seattle once called Comcast with both of our bills with similar service and mentioned my price and they said I must live in Tacoma and they wouldn't match the price.<sup>6</sup>*

**CLICK! NETWORK**  
TACOMA POWER

Such is the power of competition. In economic terms, FTTH networks are almost a perfect natural monopoly due to the large up front expense but decreasing costs to add subscribers. An established network can underprice any new competitors. However, there is no technical reason multiple competitors cannot offer services on the same fiber infrastructure. In fact, as is discussed below, several networks already allow



**Myth: Cable Companies Have Exclusive Franchises**

Both cable and telephone companies previously had exclusive monopolies but the 1996 Telecommunications Act outlawed many barriers to competition, and requires cities to offer competitive franchises. Incumbent lobbyists have since prevented or neutered policies that would actually encourage competition.

independent service providers on the network in an arrangement generally termed “open access.”

Publicly owned networks, freed from a singular focus on profits, have a different calculus than private companies. Regardless of whether they offer retail services themselves, they may allow competitors to use the network because the community derives greater benefits from that arrangement. Niche providers may be better able to serve local businesses. Greater competition may speed innovation and keep prices low. In the long term, some public network owners would rather be in the business of supplying the pipe than the more complicated world of delivering services.

The open access approach solves what the vast majority of Americans want: true competition in telephone, television, and broadband services. In some open access arrangements, the network owner offers retail services directly while also allowing competitors fair and equal access to the network. In other cases, the network owner offers wholesale access without offering any retail services directly, in effect operating their new network like the road system – just as FedEx, UPS, and DHL can all compete for customers in the physical world, multiple service providers can compete for subscribers on the same network.

The citywide wholesale-only approach has proved difficult to finance as it has tended to generate less revenue for the network owner, making debt repayment more difficult (see Open Access and Community Ownership below). However, some communities have created a hybrid. Powell, Wyoming, built a FTTH network and is allowing a single service provider to use it currently but will open it to others after six years.

## Evaluating Publicly Owned Networks

Direct comparisons between publicly owned networks and privately owned networks are difficult because the motivations and history of each differ greatly. Private companies thrived under a government-guaranteed monopoly and networks in rural areas receive Universal Service funds (a federal program overseen by the FCC). To the extent that private companies succeed in providing services absent public subsidization, they operate in lucrative areas. Even then, they go bankrupt at a surprising rate (cable company Charter and telco FairPoint are two recent examples). Publicly owned networks do not have the luxury of only operating in optimal circumstances – they exist where communities need them.

Local governments build broadband networks for a variety of reasons, some of which are quantifiable: lowering costs for services or increasing the available speeds in a community. Some reasons are more difficult to put a dollar figure on: community savings from reduced rates on telecom services and television, enhanced services from increased broadband competition, economic development, or the benefits of local ownership. Other reasons are impractical to quantify: better educational opportunities, increased local media production, and improved customer service.

### Full-Cost Accounting

The idea that one could understand whether a publicly owned network is successful or not based on its cash flow after three or five years is naïve because the benefits go significantly beyond the spreadsheet. Yet, this is the basis for nearly all negative critiques of public ownership – often by telecom-funded think tanks who have not bothered to interview anyone from the community they are bashing.

Let's assume that a new network offers a faster broadband connection at prices 20% below the incumbent network. If a private company owns the new network, its success will be judged by whether it makes a profit. However, if the new network is publicly owned, its success should be

### Community Savings

One of the biggest financial impacts of a publicly owned networks results from incumbents cutting their prices or skipping rate hikes in communities with community networks (as Time Warner did in Wilson, NC last year). If an incumbent has 10,000 subscribers and cuts prices by \$10/month on average, the community **cumulatively saves \$1.2 million a year** – real money that continues to circulate locally.

However, lower rates cause fewer people to switch to the new community network, which may then take longer to break even. Even if a community falls behind on its business plan, the benefits to the community will far outweigh the extra time in breaking even. Opponents of community networks fail to account for these and other important benefits when they calculate the value of a network.

judged by a variety of outcomes, including: the community savings (both lower prices, and keeping a larger percentage of the money in the community), increased economic development, and general resulting improvements in the quality of life. Properly evaluating publicly owned networks demonstrates success:

*In terms of fiber-enabled cost savings, 120 businesses in Bristol [VA] reported an average of \$2,951 in savings per year, while, in Reedsburg [WI], 33 cited annual cost savings averaging \$20,682. Twenty Jackson [TN] businesses reported cost impacts due to fiber, with one large organization reporting a total of \$3 million in savings.<sup>7</sup>*

Much of these savings result from the lower prices community networks offer subscribers because they charge a rate sufficient to repay the debt from building the network and to cover costs for future upgrades rather than simply charging what the market will bear. A private network owner secures no benefits by keeping prices low enough to encourage economic development. But when the community network lowers prices, the community benefits in many ways (e.g. community savings that will likely be spent or invested locally, economic development that increases the tax base).



## Public Ownership is the Best Solution for Rural Areas

The importance and necessity of public ownership is most obvious in rural areas, where private absentee-owners greatly overcharge for poor services. The low population density makes building networks much more expensive on a per-user basis, which is why private companies are slow to invest. However, the benefits of fast and affordable networks in rural areas are tremendous – long distance education and health care can greatly improve the quality of life for residents and ensure the next generation has equal opportunity to succeed. Without broadband networks, today’s communities are just as doomed as those in the past that were bypassed by the railroad or did not have access to an electrical grid.

Historically, the Universal Service Fund has subsidized rural telecommunications carriers, but many of these companies have poor track records on reliability. The FCC’s proposed National Broadband Plan looks to continue this trend, proposing to subsidize these companies forever.

Private companies, even with subsidization, have failed to maintain this essential infrastructure in rural communities. Verizon offloaded its crumbling New England lines on FairPoint (which promptly filed for bankruptcy and failed to live up to its agreements to expand broadband access) and is now attempting to sell even more rural lines to Frontier (who perennially ranks at the bottom of subscriber satisfaction polls). At the same time, Qwest, the dominant provider in many rural areas, has argued it cannot expand broadband access (slow DSL lines) absent government subsidization:

*Virtually all areas in the U.S. that lack broadband today are unserved because it is uneconomic to build broadband infrastructure without substantial subsidization. Significant additional broadband deployment to unserved areas in Qwest’s service territory is not economically feasible at this time without grant funding.<sup>8</sup>*

Remarkably, Qwest further argued that it would be unfair to fund a second provider in these rural areas because even a single provider has difficulty

### Infrastructure and Full Benefit Accounting

The FCC’s National Broadband Plan notes: “[A]s with electricity and telephony, ubiquitous connections are means, not ends. It is what those connections enable that matters.”

Understanding this principle is key to understanding why privately owned networks hinder communities. Privately owned companies will maximize their profits from the connection, a practice that restricts who has access to networks and how the connections are used.

Consider a scenario where Ford owned the streets and desired a healthy profit margin. Using the streets would be more expensive for everyone. The higher costs of using the roads would hurt the many businesses that depend on equal and low-cost access to transportation, creating ripple effects that would put a significant drag on the economy. Owning the streets would allow Ford to control any industry that depends upon transportation by deciding how much to charge them for access. If roads were measured by how quickly each paid for itself, most roads would be “failures.”

We have long understood that infrastructure best serves society when it is available to all at affordable prices. Access to fast and affordable broadband radically increases educational opportunities, expands markets for innovative companies, provides economic development opportunities, and increases access to health care for many in rural areas. These are just some of the benefits left off the calculus of private companies when determining where to invest. On the other hand, communities examine all of these impacts when deciding whether to build a network and, if so, how to run it.

profiting. This logic is stunningly self-serving – Qwest should be subsidized and it alone should serve those rural communities. Continuing to use taxpayer dollars to subsidize profitable carriers like Qwest is a poor use of public money.

The very thought of using tax dollars to subsidize Qwest, for last-generation DSL rather than modern fiber networks insults the memory of what might be one of the most successful rural public policies in history. The Rural Electrification Administration (REA) extended wires to farms throughout the country using loans that were repaid with a default rate of less than 1%. Public ownership in rural areas – especially cooperatives that want to expand FTTH services –

### **Rural Electrification's Broadband Ramifications**

Because the challenge of ensuring all Americans have access to fast and affordable broadband is so significant, we should look back at an even larger challenge: wiring rural America for electricity.

Private utility companies were wiring wealthy neighborhoods and industry for electricity in the 1890's. Hundreds of cities began creating their own public power company to ensure the whole community gained from the technological change. Thousands of communities built their own grid in the face of private company campaigns to derail them, claiming the new technology was just too complicated for local governments to handle.

Despite the successes of public power, some 90% of farms still had no access to electricity in 1935, more than 40 years after urban areas started getting wired. Roosevelt's Administration responded with the Rural Electrification Administration (REA), tasked with financing long term, low interest loans to rural cooperatives to build electrical networks.

Up from 10% in 1935, 50% of farms had access to electricity at the end of World War II and some 90% of farms had access by the early 1950's. Despite the Great Depression, the Great War, and intense opposition from private utilities, cooperatives and the federal government ran wires throughout many of the most rural areas in the nation. The significance of this achievement must be contrasted with today, when many policymakers do not believe it possible to wire rural areas with broadband, despite all the advantages we currently have over those who electrified the nation (including available poles).

For decades, the federal government has continued providing ongoing subsidies to private telecom companies to offer services in rural areas, even as they have offered poor service and refused to upgrade connections. In contrast, public power companies and rural cooperatives get higher satisfaction ratings from customers on value and reliability.

Though many are aware that the REA was responsible for expanding access to electricity, fewer recall its role in dramatically lowering electricity prices. Private utilities greatly

overcharged the few rural customers who could afford the upfront costs of connecting to the grid. Cooperatives and public power agencies showed that electricity could be offered at much lower costs, effectively forcing private utilities to bring their prices down.

Experts estimate cable companies have as much as an 80% margin on broadband services - meaning they would still be greatly profiting if they cut prices in half. Without effective competition, they have no reason to reduce those margins. Studies of the digital divide suggest that one of the most common reasons for a family not subscribing to broadband is the monthly cost.

The longer we wait to ensure everyone has true access, the more expensive the final networks could be. In electrical jargon, the term "snake" line referred to an electrical network that snaked from wealthy customer to customer. The more equitable approach was to build networks with "area coverage," where the costs of serving low-revenue customers was balanced by the few high-revenue customers. If a snake line already served the high-revenue customers, the costs of serving the neighbors increases.

The REA did not just "happen." The Federal Government used its authority to help finance networks, but it was neighborhoods and communities that organized themselves to take advantage of the new technology. They formed cooperatives; in many cases, they helped build the infrastructure, just as a number of rural communities in Europe have lowered the costs of fiber-to-the-farm by digging their own trenches.

U.S. policymakers should recall the true lessons of electrification rather than just noting the grandiose accomplishment in sound bites. Throughout history, the public sector has been essential in ensuring all Americans have access to the infrastructure necessary for success.

Communities that want broadband have to organize for it, no one else is going to do it, least of all the private companies who claim rural areas have insufficient demand. These companies echo the same false sentiments from the Edison Electric Institute in 1935: "only in the imagination... does there exist any widespread demand for electricity on the farm or any general willingness, or ability, to pay for it."

is vastly preferable to a never-ending plan to subsidize private companies who have failed to upgrade their networks. So long as a network requires indefinite subsidization to exist, policy should prioritize public and nonprofit entities that are directly accountable to their subscribers.

Further, open access networks can create true competition in rural areas among many independent service providers.

Despite all the billions of dollars the Universal Service Fund has poured into rural networks, few rural residents have a choice in providers today or hope for a choice tomorrow.

Communities of all sizes need networks that look to Main Street rather than Wall Street in deciding how to invest and price services.

### Public Ownership in Big Cities

Cities like Boston, Seattle, and Portland, Oregon have seen Verizon build FiOS throughout the affluent suburbs while ignoring the city. These cities are responding; Portland has been studying public ownership and may move forward. Seattle's new Mayor campaigned on a publicly owned fiber network and has been meeting with leaders from community networks around the country.

Even though national cable and phone companies tend to prioritize urban networks with upgrades, these communities still lack the robust competition, fast speeds, and competitive prices urban areas around the developed world have. While major cities in Japan, France, Sweden, Denmark, South Korea, and still others are building ubiquitous high-capacity fiber networks, the few network owners in U.S. cities have made modest DSL and cable upgrades. U.S. cities wanting to remain globally competitive in the 21st century should build their own network, lest AT&T or Comcast decide 20th century broadband infrastructure is sufficient.

Historically, technological shifts rearrange population centers. St. Louis thrived on canals and river traffic but Chicago quickly surpassed it in the locomotive age. Cities that cannot offer fast, affordable, and reliable connectivity will continue losing businesses and residents to communities that do. Already, communities in Vermont and around midwestern lakes frequently hear people saying they could permanently move to the lake house if broadband was available.

Able to work remotely, they can keep their job while enjoying life far away from the city.

In another America, people crowd into libraries to search and apply for jobs online, unable to afford a connection at home. Computer prices have fallen steadily; the monthly subscription for broadband is now a larger barrier than the one-time cost for a refurbished computer. Though libraries and computer technology centers remain essential, they have waiting lines and limited open hours, a serious barrier for people working multiple jobs and single parents. Publicly owned networks are proving important partners in several communities, where non-profits refurbish computers and offer digital training in combination with a discounted broadband subscription plan.

No matter the size of the community, everyone needs a network that looks to Main Street rather than Wall Street in deciding how to invest and price services. When the network owner is a committed community partner, broadband can help mitigate many modern problems.

## Publicly Owned Networks: A Growing List of Success Stories

Publicly owned networks have proved enormously valuable in a variety of contexts, technologies, and purposes. Success stories ran the gamut, from small networks used solely by public entities to wireless networks to cutting-edge citywide FTTH networks.

### Institutional Networks

Many communities begin to build their fiber networks by meeting the telecommunications demand from public agencies first. Governments are some of the largest telecom consumers in the country and often have greater requirements for security and reliability than businesses. Even modestly sized municipal governments typically have facilities scattered throughout the community requiring connectivity. Many communities have an I-Net, an Institutional Network connecting government facilities that is run by the incumbent cable company as part of its video franchise obligations.

Communities without I-Nets, as well as those communities that need to supplement an inadequate I-Net, typically lease connections from telephone companies. Leased connections (e.g. T.1s) tend to be pricey, reflecting monopoly power more than the costs of providing the service. As applications have demanded greater bandwidth, local governments have struggled to keep pace without killing their budgets. Consultant Rita Stull noted:

*Public sector agencies are the nation's largest telecom customers. A community with a population of 40,000 purchases an estimated \$1.1 million dollars annually in telecom services.<sup>9</sup>*

Larger businesses have faced similar constraints, leading many of them to build their own networks by laying fiber-optic cables or leasing dark fiber. Though the costs of bandwidth are constantly diminishing, the prices for leased lines remain dependent on the level of competition locally. Those depending on leased lines have little

control over their future telecom budgets whereas those operating networks are often able to enhance their networks without increasing costs as technology improves.

Local governments that rely on leased lines pay too much for too little. The result is budgetary stress *and* too little bandwidth for applications crucial to modern governance, such as Geographic Information Systems (GIS). Local governments generally operate more efficiently, and at greatly reduced costs, when they own their own telecommunications network. Further, local governments can ensure greater security on the network (protecting important personal data) when they control access to every aspect of the network.

### Montgomery County, Maryland

Fifteen years ago, Montgomery County, Maryland, realized it would save money and improve County services by building its own network rather than leasing lines.<sup>10</sup>

Though all the high schools have been connected, many elementary schools remain dependent on leased lines (they are extending the FiberNet to these schools as the budget allows). Those dependent on leased lines pay far more on a per-Mbps (million bits per second) basis but are limited to 1.5Mbps (see E-Rate discussion in section on federal obstacles to community ownership). Not only do schools connected with the FiberNet pay considerably less, they have access to 100Mbps, upgradeable to 1Gbps.

	Max Speed	\$ / Mbps / Year
<b>Leased Line</b>	1.544 Mbps	\$3,652
<b>FiberNet</b>	100 Mbps	\$71.11

But do elementary schools really need so much bandwidth? They think so:

*Over 100 of our elementary schools have insufficient bandwidth to open recommended reading programs that provide individualized pacing and visual and audio interaction to better address individual learning styles and support students' mastery of the curriculum content.<sup>11</sup>*



Over time, more applications will take advantage of this bandwidth because developers will expect schools to have this level of connectivity. Until now, so few schools have had fast connections, there was little reason to design a program that required high bandwidth.

### Santa Monica, California



In 1998, the City of Santa Monica created a Telecommunications Master Plan to ensure the city would thrive in a time of rapidly changing technology. After several years, the City, the school district, and Santa Monica College

partnered and began leasing an I-Net from Adelphia as part of the cable franchise. As a result of the agreement, the three public partners paid Adelphia to construct the network to connect forty-nine facilities, using money from the city's General Fund.

The City's Information Systems Department (ISD) runs the network and has expanded it over time as opportunities arose. Using an innovative program called "Know Before You Go," the City has expanded the network's reach by placing conduit in the ground whenever Public Works or another department opens the street. All departments have learned to coordinate with ISD, a process that took some time to catch on. Over the years, city has overbuilt the "conditioned" I-Net (because it was built by the franchise, the cable company restricts network traffic to government entities) with its own fiber that has no limitations on how it can be used. The City offers companies the option to lease fiber, ensuring local businesses can get the connectivity they need to compete.

To fund network expansion, the City incrementally cancelled leased lines over a period of several years and used those freed funds to pay for the new equipment. As it improved services with better capabilities, it also produced dramatic savings – some \$550,000/year. Rather than cutting the ISD budget after creating those savings, the City has reinvested the funds to expand network access and available applications. They have real-time parking information for garages, irrigation controls using Wi-Fi, and a variety of public safety applications like security cameras.

Police cruisers take advantage of video streaming. The City also offers free Wi-Fi connections at libraries, community centers, the homeless shelter, and variety of other locations to benefit residents. Additionally, the network leases dark fiber and allows service providers to use the network, a boon to local post-production media companies that need vast amounts of bandwidth.

The network now connects over 55 public facilities as well as local hospitals and a few businesses. Santa Monica applied for stimulus funds in 2009 to further expand the network, but did not receive an award. Nonetheless, with their careful planning, the network is self-perpetuating with funds ready when opportunities arise.

### Washington, DC



Despite its reputation as a poorly governed city (attributed to several factors), the municipality of Washington D.C., has built an

impressive network to meet the unique needs of the U.S. capital. In 2007, DC-NET began with service to 135 sites, a number that has more than doubled to 280, including 140 school buildings alone. The network also provides connectivity for libraries, public hospitals, community centers, and some Wi-Fi networks.<sup>12</sup>

DC-NET staff designed, installed, and have maintained the overwhelming majority of the network. As is common with all these networks, some operations are contracted out (e.g. fiber-optic construction and some aspects of maintenance, such as fixing fiber cuts).

DC-Net controls the locks and determines who has access to any part of its network, including key electronics on site in the buildings and elsewhere in the network, providing a high level of security.

On the critical issue of reliability, DC-NET has proven impressive. The network has more layers of redundancy than one typically finds with a commercial carrier and the uptime shows it. In the first year of operation, it tallied an impressive record – with only four buildings briefly losing their network connection in three events – an average of 15 minutes of interruption per site for the year. This is far better than the industry standard – in DC-NET's first year of operation.

DC-Net is also more responsive to the needs of its subscribers. Though private companies like Verizon may require a month or even two to connect a new subscriber, DC-NET can do it in as quickly as a week to as long as twenty days. As for the services available, DC-NET will provide service from 2 Mbps -1000 Mbps, allowing subscribers far greater freedom to select the speeds they need than commercial providers offer.

This publicly owned network saves DC some \$5 million/year compared to the costs of duplicating functionality using leased circuits. Even then, it would not be nearly as reliable due to limits in redundancy from leased lines. However, this impressive network can only be used for public agencies. Because DC-NET has used fiber conduit and pole attachment agreements from agreements with Comcast, RCN, and Verizon, DC-NET is currently limited to providing services to public, educational, and government entities only.

### Scott County, Minnesota

Scott County, a mostly rural county southwest of Minneapolis, was dissatisfied with its options



and costs of existing broadband networks. They were averaging costs of \$58/Megabit (Mb) across the schools and ever-increasing telecom needs suggested ever-increasing costs. Because the county crossed several telephone company territories, it had to manage leased lines from several companies, increasing costs and overhead.

After mapping the existing publicly owned fiber, they found virtually no usable assets. The county decided to build a fiber-optic network that it would own in order to connect all the county facilities, including libraries, 800MHz towers, public safety buildings, schools, and some additional assets. They also leased fiber to connect to the Minneapolis “511” Building (a “meet point” where many carriers interconnect) where they could get a lower price on the connectivity they needed. Once connected to the 511 Building, Scott County could choose between hundreds of providers of bandwidth rather than the local providers who used monopoly power to justify their high rates.

The project cost \$4 million but immediately started allowing the county to save by terminating its leased connections (which were significantly more expensive despite offering far lower speeds than the new connection). They partnered with a private company by allowing the partner to lay a conduit next to the county’s fiber in return for the partner paying for the maintenance costs of the paths (saving the County some \$150,000/year). The County paid \$3.5 million for the upfront costs to save on future operating costs.

When the County wanted a connection out of the region to the south for redundancy, it found the bids so expensive they had to lay fiber themselves. Not only was it cheaper to build the connection themselves, they now have full control over the fiber; if they leased it, they would have had restrictions on who they could partner with in sharing the connection.

The County has connected the fiber to a number of towers to feed the 800 MHz towers for public safety as well as working with nearby counties to offer redundancy in the event of a disaster. Buildings on the ring have incoming connections from different directions to improve reliability in the event of disaster.

To save costs, the County partnered with the State to manage transport on the network. In return for leasing some of the fiber, the State’s Office of Enterprise Technology manages portions of the network on a 24/7 basis, saving itself some \$65,000-70,000/year. Because the County owns the fiber, it can more easily create mutually beneficial partnerships with other levels of government, as well as companies in the private sector.

The schools are now paying \$7/Mb (1/8 the cost paid previously), allowing them to cut the telecom budget even as they increased their available bandwidth. The County also works with potential last mile providers by offering attractive middle mile rates. Scott County does not want to offer those retail services, hoping its middle mile investment will encourage others to invest in the needed networks. But in the meantime, it is expanding its network by working with the local municipalities and other entities in the area. When key roads are torn up, they are sure to lay conduit, recognizing that the need for these networks will only increase.



## And Many Others

Hundreds of communities have similar success stories – especially from connecting schools to publicly owned networks. In Wisconsin, Reedsburg schools transitioned from a T.1 (1.5 Mbps) at \$650-\$750/month to 100Mbps for under \$500/month from the publicly owned network.<sup>13</sup> Down in Palm Beach County, Florida, a publicly owned network connects some 300 buildings, including schools, libraries, and other key community sites. They even provide Wi-Fi access for dozens of low-income families that have received refurbished computers.

Among large cities, San Francisco has extended its network to serve low-income housing units and community technology centers. Seattle has elected a new Mayor who campaigned on using their extensive fiber assets to form the base of a FTTH network. Across the country, communities of all sizes are recognizing the advantages of owning the network infrastructure.

Though most of the above examples emphasized cost savings and operating efficiencies, publicly owned networks have been recognized as being more reliable when they are most needed. The events of 9/11 demonstrated the importance of publicly owned networks in New York. The terrorist attack and subsequent building collapse greatly damaged Verizon's network. Some customers in the City did not regain phone services for weeks. The City's I-NET was built with greater redundancy in mind and they only lost connectivity to the World Trade Center, allowing the City Government to continue functioning.

The FCC has been debating how to build a nationwide network that will allow all first-responders to communicate across jurisdictions. It has not decided who will own and build the network, which will allow commercial operators to use it when the network is unused by public safety departments. The deputy chief of the New York Police Department argues for the public to build it: "Commercial networks simply aren't built to the standards we need."<sup>14</sup> The point is not to bash commercial networks, but to note that they have a different set of motivations than the public sector, resulting in networks that are less resilient in extreme situations.

When local jurisdictions around Washington DC realized they needed a resilient network for first responders and public safety applications after 9/11, they built it on I-Nets:

*I-Nets are well suited to public safety communications. Their independence from commercial carrier lines assures a survivable network when commercial options are saturated. In addition, local government control allows flexible network design, and end-to-end risk and security management.<sup>15</sup>*

Given the various liabilities and higher costs from leasing circuits, communities must at least evaluate the costs and benefits of building their own network, even if it only carries official municipal traffic. The Lessons Learned section below offers some insights when planning these networks.

## Wireless Networks



Communities have found that while they need reliable and fast networks to their buildings, they also have a substantial need for mobile access – for everyone from building inspectors to first responders. Many communities have invested in these networks, yet most people are only aware of several high-profile “MuniWireless” disasters.

The entire MuniWireless label is problematic. It became popular after a few large companies entered the market to build and own Wi-Fi networks in major cities –Philadelphia, Houston, and San Francisco. These networks became the face of MuniWireless despite the fact that each of these networks was to be owned by a private company. The “MuniWireless” moniker hid the fact that many of these networks had little connection to the public sector.

Naming aside, MuniWireless was an exciting proposition, especially capturing the attention of the tech news media. Companies like Earthlink created the “free lunch” model, offering to build networks at no cost to the City, significantly altering the entire atmosphere of such endeavors. Community leaders suddenly appeared foolish to their citizens if they proposed building and owning something that a private company would do for free. The many benefits of owning such a network paled in comparison to a free lunch. In the end, Robert Heinlein’s There-Ain’t-No-Such-Thing-As-A-Free-Lunch maxim proved true once again. The free lunch business model proved an abysmal failure and the companies walked away from the communities they agreed to serve.

The main technical problem with the networks was the equipment – vendors had oversold technical capabilities, resulting in slower speeds and far less reliability than necessary, which meant fewer people subscribed. These technical problems hurt all Wi-Fi networks but a number of communities have still achieved significant savings and efficiency gains through smart investments in Wi-Fi.

## Oklahoma City, Oklahoma



Like so many other communities, Oklahoma City turned first to Earthlink, hoping the company would build the network they needed. But when Earthlink walked away, the City stepped up, building the largest Wi-Fi mesh municipal network in the world, covering some 555 square miles in a city with a population of over 500,000. The network does not offer services to residences or businesses, focusing only on meeting official municipal needs.

And meet municipal needs it has. Some 200 applications run on the network for the 1200 people who use it network every day. Using 1200 fixed wireless nodes (antennas) in addition to 900 mobile nodes attached to vehicles like police cruisers and fire trucks, wireless access offers at least 512kbps in 95% of the urban areas (though speeds of several megabits/second are common). In a city averaging 15,000 inspections per month, the efficiency gains by replacing data entry with immediate update from handheld devices in the field are immense.

At major outdoor events, the City can use the network to allow street vendors to process credit cards from their stands. On the public safety side, the network supports some 300 surveillance cameras, any of which can be streamed into police cars – while traveling up to 40mph.

In 2008, the International Association of Chiefs of Police awarded their Excellence in Technology award to Oklahoma City for the network. Launched originally in 2006, it was financed out of the proceeds from a public safety sales tax and capital improvement funds. The City estimates the wireless network has generated over \$10 million in value, not a bad return on an investment of \$5 million. First responders still have cellular data cards as a backup to the network but they are rarely used.

Among its many achievements, this network is providing an important tool for both weather and Homeland Security research. Having this network spread over such a large land-mass allows researchers to monitor air currents and weather patterns constantly at a micro level – useful in understanding how a terrorist chemical weapon attack would spread through a city. In return, the

City gets weather data that can help in responding more quickly to ice storms or determining where heat waves will be the strongest.<sup>16</sup>

### Ponca City, Oklahoma

Ponca City, with a smaller population of 25,000, took a different approach to their wireless network than Oklahoma City. With some 75% of their staff having at least one responsibility outside the office, building a wireless network was an obvious decision. The network provides additional safety to police officers – who have cameras that may be monitored from the station in real time in case of problems. City employees can now use VOIP phones instead of the cellular network, which has significant gaps in coverage throughout the city. Like Oklahoma City, reducing cellular charges has created considerable savings.

They also chose a Wi-Fi mesh system because it provides durability even if some of the nodes fail – the network routes around the problem. They started with some 500 wireless nodes to cover thirty square miles but have since decided to expand the network across a larger footprint.

Ponca City is somewhat unique in its decision to open spare capacity on the network to the public for no charge, in an effort to help those who could not afford Internet access on their own. Like Oklahoma City, they too received an award for their network – the 2009 Municipal Innovations Award from the Oklahoma Municipal League.

Though the “MuniWireless” fad has faded, communities often still have a strong need for mobile access to broadband. Communities that own an I-Net can leverage that asset, as did Oklahoma City, to provide backhaul on a wireless network. Even as wireless will not replace reliable fiber networks, neither will police cruisers move around town attached to a fiber-optic link. As mobile broadband access becomes more important, cellular solutions will remain too limited and expensive for local governments, suggesting they may benefit from building their own wireless network. Having a robust fiber infrastructure facilitates a wireless network by providing a robust backbone for wireless access points.

## City-wide Fiber Networks

Hundreds of cities have built citywide networks for their communities. Most are cable networks, most often built in rural communities in the 1980’s and 1990’s when private companies refused to invest in those areas. In the early 2000’s, communities seeking to build a network increasingly turned toward a FTTH solution as the deployment costs decreased. Communities with a public power utility have been more likely to build their own networks.

### Powell, Wyoming



The city of Powell started talking about a fiber network in 1996 but did not make progress for almost ten years. They developed a plan to build a FTTH network and lease it to an outside operator. The incumbents declined to partner with the City and later spent

considerable effort to derail the City’s efforts. However, the City found a local cooperative, TriCounty Telephone (TCT), willing to offer triple-play services on the City’s network.

Financing the deal took more time than expected because the City was unwilling to commit public money directly or even as a backstop if the network fell behind on debt payments. While the City worked on the financing, cable incumbent Bresnan and telephone incumbent Qwest tried to convince the state legislature to abolish Powell’s authority in this arena. The legislature did create new obstacles for cities building such systems but Powell was grandfathered in.

In late 2007, the City agreed to an arrangement where TCT would exclusively lease the network and make up shortfalls in debt payments if required for a period of six years. After that period, the network would be open to other service providers as well and it would be the City’s responsibility to cover any shortfalls if needed. If the City chose not to appropriate in that situation, the investors could take the network. Estimates suggested a 33% take rate would allow the network to break



even by the fifth year but most expected a higher take rate.

In early 2008, Powell completed the \$6.5 million bond financing. As is more common in small builds, they immediately connected a line to the home rather than waiting for the subscriber to sign up. They trenched a fiber to the side of every house regardless of whether they were taking service, putting the fiber in a box on the side of the house. If the occupant signs up, a crew only has to install electronics rather than bringing a line down from the pole. This approach increases the capital cost slightly but can significantly decrease operating expenses as residents subscribe.

TCT began offering services in early 2009, creating a price war. Bresnan and Qwest significantly lowered their promotional prices in response to the network, ensuring that even residents who do not subscribe to the new city-owned network will benefit from it. Bresnan has lowered its prices considerably, offering deals to Powell customers that are unavailable in nearby communities without competition. Incumbent providers often engage in what appears to be predatory pricing – a matter we discuss below in *Obstacles to Community Ownership*.



Powellink, built with the slogan “Our Fiber, Our Future,” offers much faster speeds than Qwest and Bresnan, both of whom are limited to asymmetrical connections that leave upload speeds at 1Mbps or less. TCT, whose network can offer 100Mbps symmetrical connections,

does not fool around with promotional rates and long-term contracts.

Responding to critics of the City’s investment, Powell’s mayor noted that small communities like Powell always have to wait for companies to get around to them:

*"It was 10 years ago when people at Qwest said they would be bringing us a fiber-to-the-home system," he said. "I found a letter from 1997 saying, 'It's coming soon.' Obviously, 'soon' for us is different for them."<sup>17</sup>*

The network has attracted jobs that require these high speeds – teaching English to students around the world using tele-presence applications. The company intends to hire 100 people, a major economic development win in a community of 5,000.



Powell’s City Administrator, Zane Logan, argues that building a modern network offers much more bang for the buck on the matter of economic development. Some communities work out tax breaks and other advantages for a company that announces it will create a certain

number of jobs. In Powell, they instead focused on providing great infrastructure. They started by upgrading the public power system to ensure the highest reliability. Then they built an impressive network, offering speeds rarely available in even the densest urban areas of the U.S. and at prices below existing packages. Now, as Powell expands, developers will pay the majority of costs to expand the network in newly built neighborhoods in the same way they connect sewer systems. *Powellink Photos, courtesy Ernie Bray.*

### Kutztown, Pennsylvania



Kutztown’s Hometown Utilicom network may be the smallest publicly owned FTTH network in the country. The borough of Kutztown has 6,000 residents and 8,000 students. Due to the large student population, rental properties comprise some 35% of

the town. Their public power utility built the fiber network in 2002.

Like most networks, Kutztown first approached their incumbents to partner in improving broadband access locally. Service Electric, the regional cable incumbent provider, turned them down and has become a fierce competitor for subscribers. Despite its aggressive pricing and marketing, Kutztown has achieved a stronger take rate where they compete head to head.

Service Electric began offering discounts in Kutztown after they built the FTTH network, cutting bills by \$25/month. Further, Service Electric offers DVR and set-top boxes at no



charge in Kutztown. The company's 228 channel package runs \$68 outside of town and \$45 in town; Service Electric is almost certainly losing money in its bid to prevent customers from subscribing to the publicly owned network. Though the apparent predatory pricing from the incumbent has disrupted the community network's business plan, the community savings are tremendous, totaling some \$2 million since the network started. Subscribers to Service Electric save over \$300/year from what they would pay absent competition – this money stays in the community. Subscribers to Hometown Utilicom get better customer service and support a network that offers free Internet in some parks and the community pool.

Hometown Utilicom has been providing Internet services to the borough government at no charge, creating a savings of \$80,000/year from leasing lines. However, the utility wants to begin charging City Departments for telecommunications, just as it does for electricity usage.

Perhaps the most illuminating and distressing part of Hometown Utilicom history came immediately after the Borough was presented with the "Governor's Award for Local Government Excellence" due to their network. Bowing to the power of incumbent lobbyists, the Governor then signed one of the most restrictive state laws against publicly owned networks, preventing other communities from following Kutztown's lead in taking responsibility for essential infrastructure. *Photo, courtesy A. Velik.*

### Lafayette, Louisiana

Lafayette, a proud Cajun-Country community in Louisiana, had to overcome many obstacles in its determination to build a modern FTTH network. For years, the network was delayed by incumbent lawsuits and attempts at the State Legislature to hamstring community ownership. Being not from the area, the incumbents apparently did not realize that Cajuns do not back down from a fight.

Lafayette's Mayor, Joey Durel, was the former head of the Lafayette Chamber of Commerce and



**Table 4: Lafayette Residential Services**

Broadband		Bundles*		
Mbps	Price	# Channels	Mbps	Price
10	\$28.95	80+	10	\$84.95
30	\$44.95			
50	\$57.95	250+	30	\$137.21

\* Bundles also come with phone services, not noted here for space constraints. Additionally, LUS offers a mega-bundle with access to every service they offer and 50Mbps Internet for \$199.99 month.

understood that incumbent under-investment hurt the community. Though they had broadband available, they wanted a state-of-the-art network to ensure the next generation would have a reason to stay in town. Table 4 shows the impressive offerings of the community network.

The more incumbents fought Lafayette's desire for self-determination, the more community support formed around the network. In an interview, Durel noted that the years-long fight helped educate the community:

*Durel said the cable and telecom incumbents "were their own worst enemy. The more controversy they made out of this, the more they educated people." The local newspaper covered the legal battle fairly, Durel said, and most people understood what they'd get from the new network by the time it launched.<sup>18</sup>*

In that interview, he also noted that incumbents have started to care more about their image in town now that they have competition, resulting in millions for the community in educational and sponsorship donations. Additionally, Lafayette has seen fewer rate increases than nearby communities who do not have competition.

The years of delay actually saved the community millions because technological advances allowed the city to build a faster network at a cheaper price in the end. However, one has to wonder what the cost was in terms of missed opportunities over those years. They have already seen one massive employer bringing hundreds of jobs to town, citing the network as a main motivation; they could have had many more

economic development wins if the network had been completed years ago.

Lafayette's network will undoubtedly spur more economic development due to its unique approach. The network has to pay for bandwidth outside its network (when a user downloads a song from iTunes, for example), whereas additional communication entirely within the network has a negligible cost. Recognizing an opportunity for a new approach in broadband, the utility decided against limiting local in-network bandwidth. Everyone using the Lafayette Utilities System (LUS) Fiber network connects to each other at 100Mbps speeds – speeds comparable to those across most wired internal home networks. Thus, while a user may only subscribe to LUS Fiber at the 10 Mbps symmetrical level, they will still access in-network connections at 100Mbps (see Figure 2).

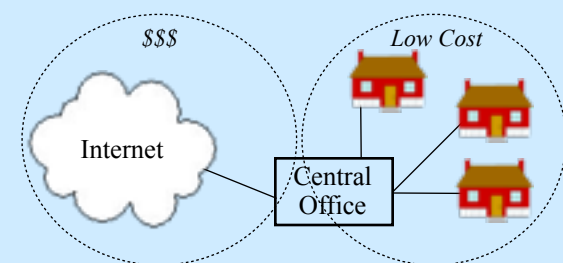
This innovative approach creates a dynamic where subscribers will encourage others to subscribe to enable these faster transfers. Businesses could lease expensive lines from the incumbent provider to connect local offices or merely subscribe to LUS Fiber's least expensive tier, a tremendous cost savings. The 100Mbps connections will even allow local coffee shops to broadcast cultural performances to any subscriber in town – something many Lafayette folks are excited about.

In testifying to the U.S. Congress about broadband, Durel noted the advantages Lafayette has from the unique network:

*Our customers, when communicating with each other will get not 1 or 2mbs, but we will open up the pipe to them and they will have 100mbs at their disposal. Actually, I often say with tongue firmly planted in cheek that I hope that the other 49 states do outlaw what we are doing. Then I will ask them to send their technology companies to Lafayette where we will welcome them with open arms and a big pot of gumbo.*

The network is ahead of schedule for both its rollout and take rate. It has set a new bar nationally for fast prices at affordable speeds with the 10 Mbps symmetrical connection for \$28.95 a month.

**Figure 2: Effective Cost of Moving Bits**



Communication between the houses and central office (CO) does not incur Internet access charges and is essentially free on the network; communication between the CO and Internet is more expensive. In planning the network, Lafayette took advantage of this situation and allows all subscribers to connect to each other at 100Mbps.



## Obstacles to Community Ownership

Why aren't there thousands of community owned fiber networks? Because of the many obstacles each community faces. Some are inherent to the building of a new network in the face of competition from incumbents. Some are internally created by the cities themselves. Others are barriers imposed by state legislatures or the federal government. The biggest hurdles to community owned fiber networks are political, not technological or even financial.

### Internally Created Obstacles

Some private companies portray government as a hostile monolith, but local governments are actually comprised of competing interests that can get in the way of each other, creating conflicts.

For instance, Burlington Telecom, a part of the Burlington municipal government, has had frosty relations with the Burlington Electrical Department (BED), culminating in delays to build the network when BED took longer than expected in preparing the poles for the fiber-optic cables.

The actions of one city department can impact the network – as when Hometown Utilicom in Kutztown lost a number of subscribers after a landlord lost a zoning dispute. In his anger at the city, the landlord decided to prevent his tenants from subscribing to the publicly owned network.

### Existing Institutional Networks

Existing I-Nets can be a barrier to a better network. To gain access to the community's right-of-way, cable companies have often offered "free" services via an Institutional Network (I-Net). Of course, these services are not "free" to the city as a whole. Their costs are recovered in the prices they charge residential and business subscribers.

This arrangement has created incentive problems. Philosophically, it was not fair because cable subscribers paid for some costs of local government that should be shared by all citizens. It was not efficient because cable companies often did not live up their responsibilities and networks frequently failed to meet the needs of local

government. Neither entity had an incentive to build the kind of network local governments need to do their jobs effectively.

For example, Saint Paul, Minnesota, finds it difficult to follow the Santa Monica model of building a network by transferring leased line costs because Saint Paul has no significant budget for telecom expenses, relying for years on an aging cable network provided by Comcast as part of the franchise at no cost to the city.

In some cases, communities negotiated access to conduit or fiber as part of the franchise and operated the network themselves. However, they had to agree to certain terms of use in operating the network – a term called "conditioning." So long as they used conduit from the franchise, any traffic on the network was restricted to only government entities. Cities that want to expand their networks to under-served business parks or neighborhoods may have to build an entirely new network depending on the terms of the I-Net operating agreement. The takeaway lesson: saving money in the short term can increase costs over the long term.

### Transparency

Most communities have open meeting requirements that ensure transparency for public decisions. These are good requirements and publicly owned networks should operate transparently, but this policy enables incumbent providers to know far more about the public network than the public network will know about the private network.

During the early stages of planning and development, public networks often must release their strategies, marketing and product plans to incumbent competitors even before they are finalized. Not only does this give competitors a future advantage, but this early process information can be used to derail efforts before full public discussion can take place. Further, publicly owned networks are unable to surprise their competitors with new products or pricing plans, a significant disadvantage. Many have noted that if incumbents truly desire a level playing field, they should open themselves to the same level of scrutiny in public. Unsurprisingly, they have demurred.

The point of transparency is to ensure the network remains accountable to the community. However, some aspects of the network operations should be withheld from the public, the most obvious example being the channel contracts for television. With this information, incumbents would know exactly how to price their services competitively. Additionally, the network must withhold customer records to ensure their privacy. Different communities draw different lines in what to make public, but they all operate more publicly than the incumbents they challenge.

### Elections

The very structure of local government elections can be an impediment to building networks. Network plans may represent years of work but can be stopped in a single election cycle. When communities were investigating citywide wireless networks, some suggested the motivation for wireless instead of fiber-optic had less to do with the higher upfront costs of the fiber project and more with the deployment time. Wireless networks can be completed within a single election cycle and elected officials prefer to make investments they can showcase during their reelection campaigns.

Champions of fiber networks took the greater risk of committing the city to a significant investment that would not be done before the next election – it may have been the smart choice, but it can also complicate campaigning. Consider that incumbent companies (who are often powerful members of the local Chamber of Commerce) may aid opponents to unseat network supporters.

### Obstacles Erected by Incumbent Providers

Most communities have at least one provider offering services cable or DSL broadband services in at least part of the city. One of the most significant obstacles for any network to overcome is gaining market share against entrenched competitors. This is the main reason wired networks rarely have real competition – incumbents have nearly all the advantages.

When the telephone and cable networks were built, they were regulated monopolies that have

### Incumbent Predatory Pricing

Scottsboro, Alabama overbuilt an incumbent cable company, eventually serving almost everyone taking cable in the community. After Charter bought the incumbent, it cross-subsidized from other markets to engage in predatory pricing against the City. Scottsboro customers were offered a video package with 150 channels for less than \$20/month, charging nearby communities over \$70 for the same package. Additionally, they offered \$200 cash for those who made the switch to Charter Cable and another \$200 for switching to Charter Internet. In a proceeding at the FCC, experts estimated Charter was losing at least \$100-\$200 year on these deals and even more when factoring in the cost of six major door-to-door marketing campaigns.

long since amortized the costs of building the network (at that time, cable companies and telephone companies did not offer competing products). When a new competitor enters the market, it must build an entirely new network and therefore has higher costs in providing services to its subscribers. The incumbent provider, having long ago paid off the fixed costs of the network only has to pay for incremental network upgrades, often allowing it to offer discounts the new competitor cannot match.

Private companies, generally desiring a rapid return on investment, have recognized the futility of successfully overbuilding incumbent cable and telephone companies.

### Scale

Incumbent advantages differ based on the company – the very scale of some incumbents (e.g. AT&T, Comcast, Verizon, Qwest, Time Warner) offer tremendous advantages over a new network. Comcast has tens of millions of subscribers. Large networks can cross-subsidize across the network, allowing them to dramatically cut prices in competitive markets. Though municipalities are typically prohibited from cross subsidizing (from public power revenues, for instance) companies like AT&T and Verizon can use profits from their wireless divisions or from other parts of their network to finance wired network investments. Cable companies can use the large profits from areas they monopolize to subsidize lowered prices in competitive markets.

### Large Incumbents Determine Content

Comcast held out against carrying the Big Ten channel despite its large footprint across Big Ten schools, in part because it claimed the Big Ten network wanted to charge too much for carriage. Long after the final deal was worked out, when Comcast was asking regulator approval to merge with NBC, it revealed that it had a 4.99% stake in ownership of the network – likely a part of the bargain it drove to carry the channel. This scale threatens small and new channels, who must take the terms Comcast offers them or they will not be available to most cable subscribers.

In another example of how large companies like Comcast exert strong control over channels, consider the dispute between the Tennis Channel and Comcast at the beginning of 2010. Though sports channels Golf and Versus charge more for retransmission, they are on the basic tier and available to millions more subscribers than the Tennis Channel, which Comcast puts on a sports tier for which subscribers must pay extra. The difference between the Tennis Channel compared to Versus and Golf? Comcast owns Versus and Golf, so it has an interest in promoting these channels. In television, just as in broadband, communities should be aware who is making programming choices than impact the content they want.

Though communities build networks to expand broadband access, they have found it necessary to also offer cable television services in order to raise the necessary revenues to pay the debt of building the network. Despite stories of families “cutting the cord” of cable TV and switching entirely to broadband for entertainment, enough people want triple-play to require community networks to engage in the endlessly frustrating world of negotiating channel contracts to offer cable television. Providers consider television channels “sticky” services because they induce and retain customers.

Large incumbents have much more power in negotiating channel contracts because channel owners need massive companies like Comcast to carry their channels. Unless a community network can join a cooperative such as the National Cable Television Cooperative (NCTC) that aggregates members to create purchasing power, putting together a channel lineup is a long, expensive process because the channel owners play hardball with small operators. And unfortunately, NCTC has recently been closed to community networks. This is certainly not a level playing field.

### Putting Together a Channel Lineup

Some channels may charge nothing because their business model is based on advertising and the more people with that channel will increase their ad rates. A few channels will pay the network to be in the lineup (e.g. home shopping channel). However, most require a payment per viewer from less than a dollar to perhaps five dollars (premium channels like HBO may be more expensive). Larger, national cable companies have more negotiating power due to their size and will pay less for channels than a new network serving a single community. Though the exact amount of each contract is held in great confidence as a trade secret, the differences add up to small providers paying perhaps 25% - 50% more for their channels than larger companies. The result is that community networks may be unable to win a price war with large incumbent providers (though communities can compensate by offering better broadband speeds, better HD television quality, and more channels – particularly local channels).

But price is not the only hassle – if a new network wants ESPN, its parent company will require the network to take ESPN2 as well as other channels owned by the same company as well as having requirements where they are in the lineup. Ever wonder why ESPN2 is almost always right next to ESPN on the dial? This is why. Putting together lineups is a tricky, expensive, and frustrating process. Burlington Telecom hired a full time person just to manage the process.

### Access to Apartment Buildings

Serving apartment buildings, or MDUs (multiple dwelling units) in industry-speak, is complicated. Though the FCC has outlawed the practice of exclusive contracts in these buildings, incumbent providers still have tremendous advantages in this segment of the market. Most of the difficulty comes from negotiating with the building owners to get access to the building, to install service.

Building owners may be disinterested in allowing a new provider access or may set high terms – such as an upfront \$20,000 fee to offer services to residents. These “fees” may be requested either above or below the table before the owner/manager will facilitate access to the building. Incumbent providers already have these deals in place.

In some places, such as condos, the complex owner or association may require the network to install fiber cables underground rather than

aerially – a significant added expense. These requirements may greatly expand the costs of connecting those users, but the MDU owner will likely oppose contributing to the excess costs. Because residents likely already have access to a triple-play provider, the new network will be in a more difficult position for negotiations over who pays the added expense.

## Lawsuits

When communities have started to build their own network, many have found themselves in court. Despite losing case after case, incumbent providers have continued to file suits, many of them quite frivolous, against publicly owned networks. Very few communities lose court cases, but some communities choose to stop fighting – another reason incumbents have used lawsuits as a tactic. Communities should prepare themselves for potential lawsuits because no matter how secure they are in law, incumbents use lawsuits to delay and punish communities that challenge their monopoly.

Lawsuits are particularly damaging because of the precarious balancing between startup costs and when the network begins generating revenues. To construct a scenario: Muni Telecom may borrow \$30 million over 20 years. For the first 3 years, it makes interest-only payments on the debt because it is connecting customers and is not generating sufficient revenue to start paying the principle. If the first year is instead spent in court, it will still have to start making principle payments after year three – but it will be one year behind in the revenues it forecast, throwing off the whole business plan. Further, the lawyer fees can be a substantial and unexpected cost that add to network expense.



The example of Monticello, Minnesota, is illustrative. Immediately after they secured investor financing for the network using revenue bonds, the incumbent telephone company, TDS, filed suit, claiming the city did not have authority to use revenue bonds to finance the broadband network.

Though few thought TDS' argument held merit, Monticello put the investor money into escrow and delayed starting the network until the lawsuit was resolved. Under the terms of the bond, they had one year to start using the funds or would have to return them to the investors. This is the first way in which incumbents win just by filing the lawsuit – Monticello was forced to delay the project.

Monticello had planned to break ground in the spring of 2008 but the lawsuit ensured they would miss an entire year; the case would certainly last until after construction season in Minnesota had ended. In the meantime, TDS upgraded its network in Monticello to offer the FTTH services it previously maintained were not necessary.

The City initially filed a motion to dismiss that the judge finally granted some six months later, with prejudice. TDS waited until the last moment of its thirty days to appeal the decision, buying them more time to expand their network and lock customers into long term contracts. Many residents were confused, some erroneously believing that the TDS FTTH network was the new publicly owned network.

Throughout this time, the City Council and others in the City considered whether they should just drop plans for the public network. After serious consideration, they decided to continue because the community not only wanted a FTTH network, but a network that created competition and put community needs first (future investment, community support, keeping rates low, keeping money in the community).

Several months later, the Appeals Court upheld the lower court decision. Unfortunately, TDS once again had thirty days to appeal to the Minnesota Supreme Court. Monticello's deadline to use the bonds would come before TDS was required to act on its right to appeal. Should this happen, Monticello would have had to bond again, almost certainly under far less favorable conditions because of the 2008 economic collapse.

To most, it seemed that TDS would effectively win the war after losing every battle. The City asked the Supreme Court to expedite a review due to the looming deadline but few expected the Court, busy handling the Franken – Coleman Senate dispute, to respond. Days before the bond deadline, the Supreme Court agreed with the lower courts and



Monticello immediately set to work building the network, after losing a year and more than \$170,000 in legal fees (not including additional fees paid by League of Minnesota Cities).

TDS responded by lamenting the decision and ironically claiming that municipal initiatives reduce incumbent incentives to invest – ignoring that they had invested more in Monticello than their other communities precisely because of the Monticello FiberNet. Monticello now has better broadband competition than perhaps anywhere else in the state. The Internet speeds are faster and more affordable than those available in the state’s largest cities, Minneapolis and Saint Paul.

Monticello’s legal delay was relatively short compared to some of the earlier ones. Bristol Virginia Utilities had to endure several court proceedings over three years while spending some \$2.5 million to defend its right to be the first city-owned, full FTTH triple-play network in the nation. It has since won several awards for its services and the benefits to the community. Lafayette, Louisiana spent many years in a string of legal battles that cost millions before hooking up its first customers in 2009. They now offer some of the fastest and more affordable broadband in the nation.

Chattanooga, Tennessee, had to defend itself from concurrent lawsuits when cable companies filed overlapping complaints in different courts. Fitting the pattern, Chattanooga won its court cases and has begun deploying what will be the largest community-owned fiber network in the country (see end of report for a short case study on Chattanooga).

Some have suggested that by building open access networks where the public owns the network but does not directly offer services, a community may avoid raising the ire of incumbents as it is not directly competing for subscribers. Unfortunately, the UTOPIA project followed that model and has weathered significant opposition from Qwest and

Comcast, the former having sued UTOPIA to block access to utility poles. Qwest and Comcast lobbyists pushed for restrictions in the Utah Legislature to hassle UTOPIA. However, other communities have found some incumbents – typically not absentee private companies – willing to partner on an open network.

## State Legislative Obstacles

Eighteen states have enacted barriers specifically to discourage communities from building their own networks. In many of these states, some communities have persevered and overcome those barriers in order to build their network. Barriers range from restricting how publicly owned networks can operate to prescribing specific steps in creating the network. Many of these laws are recent, creating an odd dynamic where privately owned networks are deregulated while networks that are structurally accountable to the public are subject to increasing regulation.



Despite being some of the most hated corporations in America (cellular companies generate the most complaints to the BBB, cable companies the second most), national cable and telephone companies have many allies in Congress and state legislatures. Massive companies like Comcast, Verizon, and AT&T hire lobbyists throughout the country and make campaign contributions to ensure politicians are ready to protect them. When Nebraska was considering a law to preempt community broadband ownership, one state senator noted: “I’ve never been so lobbied so hard in my life.”<sup>19</sup>

Many of these barriers have been proposed in state legislatures by large companies like AT&T,

Verizon, Comcast, and Qwest, who have claimed they are necessary to preserve a “level playing field” between themselves and local governments. The very idea that AT&T, the 10<sup>th</sup> largest company in the United States, needs legislative protection against competition from a municipal or county government is absurd.

*I therefore lay down the following principle: That where a community—a city or county or a district—is not satisfied with the service rendered or the rates charged by the private utility, it has the undeniable basic right, as one of its functions of Government, one of its functions of home rule, to set up, after a fair referendum to its voters has been had, its own governmentally owned and operated service.*

-FDR



When Congress set the telecommunications policy of the U.S. with the 1996 Telecom Act, it stated: “No State or local government may prohibit any entity from providing interstate or intrastate tele-communications services.” But the Supreme Court later ruled that states could prevent cities and counties from building networks. Though many have argued that the Supreme Court supremely erred, the FCC’s proposed National Broadband Plan recognizes an important role for communities: “Congress should make clear that Tribal, state, regional and local governments can build broadband networks.”

Authorized by the Supreme Court and motivated by corporate lobbyists, states have imposed a variety of barriers to discourage community networks (see Figure 3 for a map of states with barriers).

*Photo, courtesy Shannon Lewis.*

### Outright Prohibitions on Services

The most disruptive barrier is when states like Nebraska and Texas prohibit cities from providing services to the public, all but ensuring a few private providers will maintain their monopoly indefinitely. Arkansas and Missouri prohibit cities from offering exchange services to the public, which prevents them from offering telephone service as part of a modern triple-play networks.

Imagine being the Mayor of a small town where only a portion of the community has access to DSL and businesses are charged excessively high rates for the broadband connections they need to survive in the modern era. If the state prohibits you from building your own network, you have the sole option of begging companies to invest in your town. This is incompatible with the American tradition – where people and communities are empowered to succeed, not reduced to begging for essential infrastructure.

In Tennessee, Chattanooga is building the largest municipally owned FTTH network in the country. Harold DePriest, head of Chattanooga’s Electric Power Board, noted: “The issue is, does

our community control our own fate, or does someone else control it?”<sup>20</sup> Chattanooga no longer depends on Comcast headquarters in Philadelphia to determine what infrastructure is available to local businesses and residents. If Chattanooga were in Nebraska, or one of several other states, it would not have that choice.

### Retail Service Prohibition

Utah prohibits community networks from offering retail services (Washington has the same restriction on public utility districts) – requiring publicly owned networks to operate on a purely wholesale basis. Such networks are quite difficult to finance solely on revenues from

subscribers. Barring an extremely high take rate (e.g. 85%), the revenues from wholesale-only networks are typically insufficient to pay the debt incurred in building a citywide network (see Open Access and Community Ownership section). Provo, Utah, is often

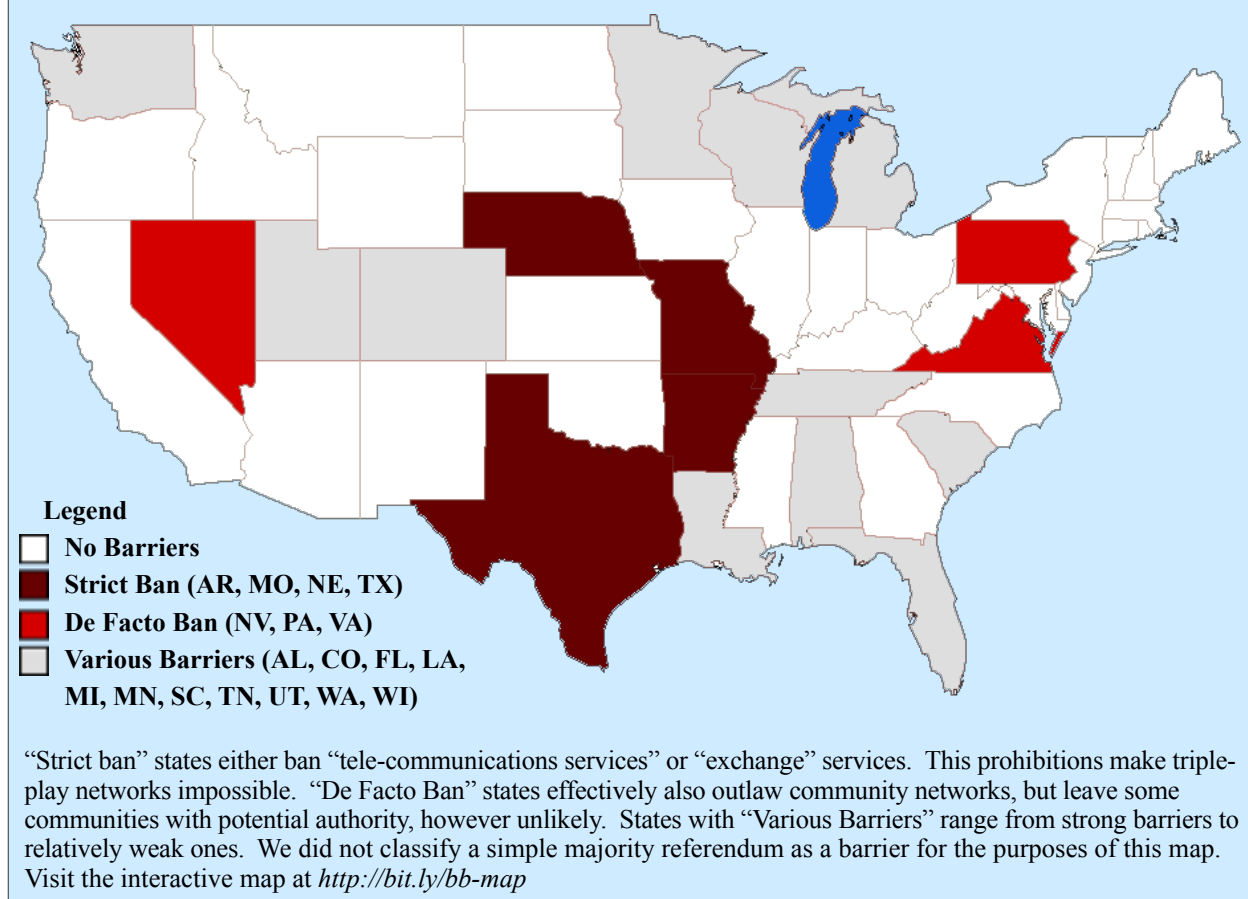
cited by opponents of public ownership because they sold the network to a private company. However, Provo’s problems derived largely from the state preemption against retail services. They sold it to the private sector specifically because only a private operator could change the business model to one more likely to succeed.

### Restrictions on Business Plans and Structuring Debt

Several states have stopped short of a ban on services, merely imposing burdensome requirements on publicly owned networks. These restrictions remove any benefits a public entity would have, making any potential network even more difficult to justify financially. Communities in these states have the worst of both worlds: all the disadvantages of being a private company

*Imagine if Borders and Barnes & Noble, claiming it was killing their book sales, asked lawmakers to ban cities from building libraries. The legislators would laugh them out of the State House. Yet the same thing is happening right now with respect to Wi-Fi and other municipal broadband plans, and it is being taken all too seriously. In fact, although it is almost universally acknowledged that broadband access is essential to economic growth and education, phone and cable companies are lobbying furiously to prohibit municipalities from providing free or discounted broadband to their residents.*

*- FTC Commissioner Jon Leibowitz*

**Figure 3: Community Broadband Preemption Map**

without any of the advantages (advantages include cross subsidization from other markets, depreciation) while also having the drawbacks of being a public entity (e.g. procurement regulations, greater public scrutiny). These restrictions increase the risks of building a network, protecting incumbent interests rather than citizens.

Virginia has a de facto ban on publicly owned networks from offering video services due to restrictions that require it to cash-flow in the first year<sup>21</sup> while also requiring the network to impute costs that would be incurred by a private sector company (e.g. paying certain taxes and fees that would not otherwise be incurred by the public sector).<sup>22</sup> In addition to the wholesale-only regulations noted above, Utah also imposes unique bonding requirements on community telecommunications projects, greatly restricting the power of communities to finance such networks.<sup>23</sup>

Florida and South Carolina require publicly owned networks to impute costs that could be incurred by the private sector when setting rates.<sup>24</sup> Restrictions on how a community sets its rates render it unable to respond to predatory pricing from incumbents. Financing a network with twenty-year bonds requires a referendum in Florida.

As with many other states, communities have ceased building fiber-optic networks following these restrictions.

### Requirements That Prioritize Private Companies

In some states, the community must first ask the private sector to build a network and may only proceed with a publicly owned network if the private sector fails to respond. In Pennsylvania, a community must request the speeds it needs and can only proceed if the incumbent has not provided the speeds within fourteen months; there

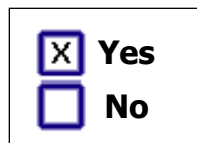
is no provision for affordability, theoretically allowing the incumbent to make the speed only available at outrageous prices.

Before building a publicly owned network in Michigan, communities must issue an RFP for a network and may only proceed with their own project if they receive fewer than three qualified bids. Communities that are able to proceed are limited to the terms of the RFP, greatly limiting the community's ability to adapt to changing circumstances in the dynamic environment of providing services.

### Referenda

In Minnesota, communities must pass a referendum with 65% support in order to build a triple-play broadband network.

The high barrier invites cable and telephone companies to engage in campaigns promoting FUD (fear, uncertainty, and doubt), knowing they only need to confuse or discourage a minority of voters in order to prevent competition in the community. To add to a community's difficulty in surpassing this barrier, those who vote in the election without choosing to cast a "no" or "yes" on the network question are counted as having voted no.



In a referendum, cable and telephone companies (often joined by the think tanks they fund) have frequently misrepresented facts in expensive campaigns to frighten voters. Those supporting the project typically have access to considerably less funding and the main proponent – often the local government – is prohibited from encouraging voters to support the measure because they must remain neutral in the process. Large incumbents will think nothing of spending hundreds of thousands in a campaign because preserving their monopoly is far more valuable. Prior to Monticello's referendum, citizens received glossy mailings and phone calls from a firm in Nebraska that made inaccurate claims regarding the City's broadband plan.

Proponents of referenda requirements will note that a community unable to show majority support for a network probably should not build it. Indeed, if referenda did not suffer from the problems noted above, that observation would be

### State-wide Franchising has Preempted Local Authority Without Dropping Prices or Encouraging Competition

Communities have become dependent on broadband networks even as they have little power to compel the telephone or cable companies to act in the public interest. State and federal governments have ostensibly been promoting competition since 1996 but the result has been far fewer service providers and greater market power among the biggest ones left.

Cable and telephone companies need access to community rights-of-way (ROW) in order to build their networks. Without access to the ROW, the company would have to individually negotiate with each landowner to install a pole – an impractical approach. Thus, local governments manage the ROW and have historically required companies to compensate the public for access. In return for a video franchise and ROW access, cable companies would have to offer every neighborhood services, ensuring low-income neighborhoods would not be red-lined. Additionally, the cable company frequently had to set aside a certain number of channels of public, educational, and government access (PEG channels). Without these franchise agreements requiring universal service within the community, the number of Americans with access to broadband would be far lower as private companies would have focused investment in areas offering the highest returns (i.e. wealthy neighborhoods).

Over the past decade, cable and telephone companies have claimed local requirements are too much of a burden and slowed their ability to build networks so they lobbied state governments to modify the franchising process, allowing a company to get a state-wide franchise. Though these state-wide franchise laws have lowered the compensation private companies must pay for access to a community's ROW, the vast majority of communities have not seen lower prices or greater competition. The glaring exceptions – Verizon's FiOS rollout and AT&T's U-Verse – were planned regardless of state-wide franchising changes. Both companies have expanded in states that required local franchises as well as states with a state-wide approach. Statewide franchise reforms have only succeeded in consolidating power in the hands of a few powerful cable and telephone companies.

Cable and telephone companies pushed state-wide franchising bills to reduce their costs and boost profits, knowing that the real impediment to competition in cable and broadband is the extreme cost of building a network and the many advantages of incumbents, as detailed in the Obstacles to Community Ownership section.

### The Flip-Side of Referenda

Paradoxically, referenda can have an upside. Though it certainly intimidates communities and discourages them from moving forward on a project, those that have successfully passed a referendum have documented public support for their project. Having passed a referendum makes it more difficult for incumbents to claim the process goes against the public desire (though they will likely make the claim, nonetheless). Passage of a referendum can more fully commit a local government to fighting for the network because it becomes a mandate from the citizens.

true. However, under modern campaign laws, referenda are a deeply flawed means of measuring public support for a complicated decision. In reality, this barrier allows a few deep-pocketed companies to effectively veto infrastructure for an entire community, while countless other communities do not even consider planning a network due to the barrier.

### Other Procedural Obstacles

Some states have a specific prescription for how many public meetings the local government must conduct, how it must advertise those meetings, and what will be discussed. Regulations like these pre-suppose that communities are likely to build network without public knowledge or approval. In our experience, the opposite is true – communities spend years examining their options and conducting due diligence before making a decision.

These regulations are intended to provide a forum for opponents to attack the network plans. Many communities have found incumbent employees who do not even live in town coming to such meetings to dominate the discussion. The fact that communities are responsible for incorporating citizen input, unlike private providers who operate in secrecy, is another example of the way the playing field tilts toward private interests.

### Federal Obstacles

Many of the federal obstacles are a result of spending programs that either undermine the incentive for communities to own their telecommunications networks or which discriminate against publicly owned networks.

Two examples are highlighted below: E-Rate and the broadband stimulus program.

#### E-Rate

E-Rate is a means for the federal government to aid local schools and libraries in affording broadband. Unfortunately, the rules encourage monopolistic service providers (telephone incumbents) to overcharge for T.1 lines while prohibiting communities from using the funds to purchase or build their own network. As noted on E-Rate's Wide Area Network Fact Sheet:

*Leasing a Wide Area Network (WAN) is eligible for Schools and Libraries support but building or purchasing a WAN is not eligible.*<sup>25</sup>

In comments to the FCC, comments by the City of Chicago (whose Board of Education has received over \$300 million in E-Rate funds since 1998) suggested the FCC should revisit that decision: "Funding for WANs would allow for more frequent and less expensive broadband deployments."<sup>26</sup>



Several benefits result from local ownership of networks rather than leased lines. The most obvious is that schools will have much faster connections than they currently do, many schools served by publicly owned networks have transitioned from private T.1 lines at 1.5 Mbps to 100Mbps or even 1Gbps connections. However, the school also benefits from centralizing its network management – by routing the connections through a central point rather than directly connecting each school to the Internet, the network can greatly improve security, administration, and cut costs by purchasing bandwidth in greater volume.

Communities that already have a publicly owned fiber network can bid for contracts to serve the school because E-Rate funds are available to telecommunications carriers as recognized by the FCC. A rural Virginia community, Danville, has extended its fiber-optic, open access "nDanville" network to serve schools after successfully bidding for E-Rate funds. Thus, the rules do allow established community networks to bid for providing services, but private providers have proved willing to greatly underbid (operating at a



loss) publicly owned networks in other scenarios merely to deny subscribers to the public network.

On a different level, the E-Rate program's practice of providing indefinite subsidization of services reduces the motivation for communities to develop sustainable models of delivering bandwidth to libraries and schools. If a school or library is only paying 20% of the cost of a slow and overpriced line, it has considerably less motivation to seek a better connection – especially as the only alternative to an existing connection may be to build a new network. Local governments have frequently found that faster connections from private providers may not be available because the incumbent telephone company simply has no additional capacity and is unwilling to invest the necessary funds to expand.

E-Rate should be reformed to encourage communities to build their own, self-sustaining networks to reduce their reliance on Universal Service funds while dramatically improving access to key institutional anchors. Since 1998, E-Rate has expended some \$25 billion. Recall that the Montgomery schools noted above transitioned from leasing low-capacity lines at \$3600/Megabit to much higher capacity fiber connections from the publicly owned network at \$71/Megabit.

A smarter E-Rate program would push communities in the direction of local self-reliance rather than encouraging endless, expensive dependence on companies that have little incentive to improve connectivity. Federal policy should assist communities with the upfront costs of a network if they need it (preferably with loans, reserving grants for extreme need scenarios) but communities should be able to budget for their operating costs, which will be significantly less than the exorbitant lease rates. With some smart reforms, the need for E-Rate subsidies should decrease over time rather than perpetually increasing.



### Broadband Stimulus Program

After winning the 2008 election, the Obama Administration announced that broadband networks would be a priority. True to its word, the stimulus package included \$7.2 billion to expand

networks throughout the United States.

When Congress began considering a broadband program for the 2009 stimulus bill, the House version intended to allow all entities to apply (businesses and public entities) whereas the Senate limited eligibility to public sector and nonprofit entities.<sup>27</sup> The final language, adopted by the Conference Committee and passed by both houses in February was a compromise that still favored a public and non-profit corporations.

A private company could be eligible, but only if “the Assistant Secretary finds by rule (the for-profit private company) to be in the public interest.” (Section 6001(e)(1))

On July 2, 2009, the National Telecommunications & Information Administration (NTIA) released the rules for the broadband stimulus program (called the Broadband Technology Opportunities Program or BTOP). While a plain reading of the statute language suggests that NTIA should decide on an individual basis whether a private profit making entity is in the public interest, NTIA simply declared all private companies in the public interest. Adding insult to injury, the NTIA did not explain what it meant by “public interest.” Under its rules, even companies that have blatantly violated the public trust would be eligible.

Some have argued that the NTIA is simply offering a level playing field. But it is absurd to think that a city facing an incumbent global company with resources thousands of times greater would be on a level playing field. For-profit companies have the resources to push their way to the front of the line – an observation confirmed in an article quoting Vice President Winogradoff of Gartner, one of the leading analysts of the telecommunication industry

*With time and resources scarce and applications to review from nearly 2,200 entities, favoring vendors was less complicated because they wrote savvy*



### Myth – Incumbents Want a Level Playing Field

Incumbents facing the prospect of a community network frequently demand a “level playing field,” as though the public had all the advantages. The idea is appealing – who is not for a level playing field? Unfortunately a “level playing field” is easier demanded than created. The Georgia Public Service Commission explained why when considering a question about the publicly owned network in Marietta:

*Preventing anticompetitive practices, unfair competition, and abuse of market position does not mean that the Commission must impose conditions on every applicant which has some advantage not shared by every other applicant. The Commission is required to treat all LEC's [Local Exchange Providers – i.e. phone companies] equally, not make all LEC's equal. BellSouth and the large cable companies certainly enjoy better capital costs than a typical small business owner. Does this put the small company at a competitive disadvantage? Of course. Should the Commission determine which LEC has the highest capital costs and require that all other companies impute that amount into their rates to level the playing field"? Certainly not. If Marietta has to comply with expensive open records requirements or expensive municipal bidding requirements, should those costs be imputed into the rates of all private companies? Again, no. Similarly, if BellSouth has a large tax write-off one year, it would be ridiculous to require that they impute into their tax rates the taxes they did not have to pay merely because some other company may not have had a tax write-off that year.*

As documented above, a level playing field would greatly benefit public networks who otherwise have to overcome far greater hurdles than massive incumbent corporations. Policy should favor structures that are directly accountable to the public and result in greater competition for the community. Current policies favor incumbents, limiting competition.

*proposals and required less follow-up, in Winogradoff's view.*

*...  
Winogradoff said he empathized with government applicants, given the complicated list of eligibility requirements they faced at a time when agencies were laying off staff. Vendors couldn't help but have an upper hand.<sup>28</sup>*

The rules for rural broadband funding overtly discriminated against communities by requiring applicants to collect census-block level data on broadband access. This precise level of detail is difficult to find because incumbent providers are typically the only ones with access to it and they claim it is a proprietary trade secret. Though private companies can quickly hire a consultant or contract with others to gather this data, the public sector has more constraints and is less nimble (often a necessary tradeoff to accountability).

If an applicant were able to collect that data, NTIA decided to “verify” that data by asking the existing providers if they want to challenge the application. Though NTIA later noted that incumbents could not “veto” applications by challenging them, it is not clear to what extent these challenges affected applications.

One would think the public sector would be favored for federal programs like the stimulus precisely because they are already accountable to the public and therefore agencies can expend less in overseeing how the funds are spent (NTIA does not yet have the budget to ensure grants to private companies are spent properly). Additionally, the public sector will use funding to further expand services rather than hiring lobbyists and distributing dividends to shareholders. The Federal Government should return to its successful electrification strategies of prioritizing public and local ownership of infrastructure.

## Open Access and Public Ownership

Whereas private network owners seek to maximize profit, publicly owned networks typically seek to maximize public benefit. This focus on the public interest allows community networks to treat the network as a common carrier, like public roads. Like road networks, service providers would compete for customers on the basis of service quality and price; similar to package delivery from Fedex, DHL or UPS. Not only would subscribers have greater choice in providers, small businesses can compete and innovate against massive incumbent service providers. With open access, the network owner forgoes the greater monopoly revenues that would come from operating the network on a closed basis.

Though open access has great promise for resolving one of the most vexing problems in cable and telephone services, states must not dictate this model to publicly owned networks. Utah effectively prohibits communities from offering retail services and Washington does the same for public utility districts. Communities must be free to choose the model that best solves their unique problem. To the extent policymakers choose to force structural separation, the requirement should apply equally to private and publicly owned networks.

If one were to start a network entirely from scratch today, without incumbent lobbyist pressures or the history of how networks have been funded, it would almost definitely be an open access network. Just as with roads, the public would own the infrastructure to ensure access would be available to all on equal terms. The network may or may not offer retail services directly, but would encourage a variety of independent service providers to market their services to potential customers (an arrangement termed “structural separation”).

This arrangement understands that services should be the focus of competition, not infrastructure – especially as modern technology has separated the services from the infrastructure. Competition often leads to innovation – if a “services” company has to build its entire network (at a cost ranging from \$20 to \$200 million depending on the community) simply to offer services to

customers, the high costs and difficulty will push a more conservative business approach and innovation will slow. However, if a company can invest less than \$1 million to access a network of potential customers, it will be more willing to try different approaches and concentrate on niche markets. It is the old owners of networks that have limited competition today because they understand that power lies in ownership – thus controlling the rules for that infrastructure. It is time to move beyond that paradigm.

Communities have little power in encouraging the federal policies necessary to create the scenario envisioned above. But communities can, and should, act locally. Just by building a triple-play network, the community often expands competition significantly. An open access network can add considerably more competition.

The Wired Road, a wholesale-only open access network in Virginia, illustrates one of the benefits of open access competition. A large institutional customer had been paying \$2300/month for a leased line before subscribing to the Wired Road; the new services cut costs to \$1200/month while tripling speed. When a second provider began offering services over the network, the subscriber saw its monthly bill drop to \$500/month.

Networks like the Wired Road solve the potential network neutrality problem by removing any incentive for the network owner to influence the bits or restrict competitive services. The owner only cares about transmitting bits, it has no interest in whether it is transmitting video from Fox or NBC, for instance. Equal access to everyone is what allowed Google to rise from nothing to dominating search and online advertising. Google can easily afford to create deals with present service providers to solidify its power by slowing traffic to rival sites; subscribers of those service providers would simply have to accept such limitations. However, in an open access environment, subscribers can easily switch away from those who abuse their trust.

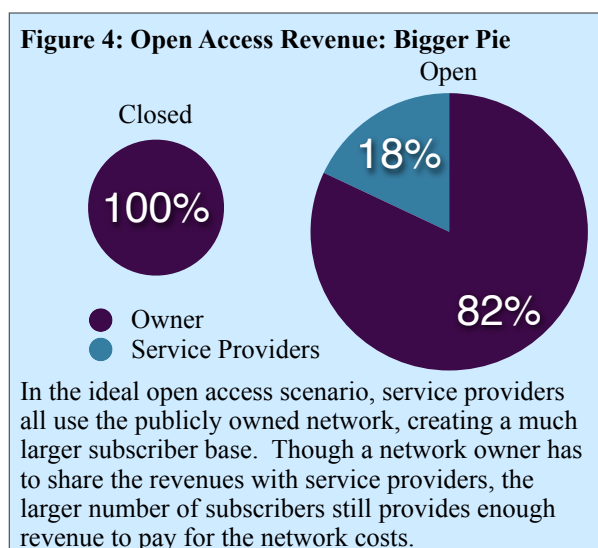
### Open Access: Paying the Bills

Despite the many benefits of the open access approach, few communities have embraced it. The main reason is the greater variability in how much revenue is generated compared when the

owner controls all aspects of the network. U.S. citywide open access networks have not matched the success of those in Europe. Even as they have generated substantial community benefits, they have failed to generate sufficient revenue to meet debt payments.

Open access networks should generate enough revenue to pay for themselves when they attract high take-rates – and they should because they are technologically superior to incumbent networks. Though the network owner receives a smaller slice of revenue than under a closed-access scenario, a smaller slice of a bigger pie (i.e. many more subscribers than in the closed scenario) will yield enough to make the needed debt payments (see Figure 4).

If incumbents agree to use the open access networks, communities across the country would almost certainly embark on campaigns to build this needed infrastructure. But incumbents, particularly massive multi-state companies, benefit too much from the status quo. In Utah, they have actively fought and successfully disrupted UTOPIA. Smaller open access networks in other states have largely escaped the wrath of the industry. In the incumbents' defense, open access is a significant change in the business model of companies familiar only with monopolistic or duopolistic environments. The prospect of losing their ownership advantage and having to compete entirely on services is undoubtedly daunting.



Most incumbents have proved unwilling to use open access networks, falsely claiming their services would be less reliable. Such claims are a smokescreen – publicly owned fiber networks have proven more reliable than the privately owned copper networks.

Communities in favor of a modern open access network may take a page from many of our international peers and consider tapping into tax revenues for debt repayment. The use of tax revenues has been a subject of much controversy and comment. Incumbents have attempted to delegitimize the use of tax revenues for this critical infrastructure, but we should remember that user fees (e.g. gas taxes, vehicle registrations, license fees) pay for only about half of the cost of our roads. Property and other taxes make up the difference. Roads are considered essential public infrastructure and are operated as common carriers. Steadfastly requiring broadband networks to pay for themselves entirely via subscriber revenues is a boon to incumbents, but can hurt communities.

Communities should be free to choose how they want to finance the infrastructure they need; doing so could free them to embrace an open access model. Cook County, the most rural county in Minnesota, has dedicated part of a local-option sales tax for capital improvement to a fiber network they want to build, having tired of dial-up only services on the incumbent phone company's aging infrastructure.

## Aligning Incentives for Open Access

Communities that solve the financing problems will quickly find open access has more potential pitfalls. In a wholesale-only open access network, both the network owner and the independent service providers must trust and work together to ensure the network succeeds. They do, however, have different pressures and motivations that can lead to complications. The following discussion of incentives highlights worst-case scenarios, but is not intended to blemish the open access model because these problems will fade as the model matures.

Consider that a public network owner may have invested tens of millions of dollars, or more, into building an open access network and must make regular payments on the debt. A service provider

may only have invested hundreds of thousands to provide services. The network owner will have much more motivation to get enough subscribers on the network to meet revenue targets.

The very act of luring service providers to the network can prove a chicken-and-egg problem. Open access networks with more subscribers attract stronger service providers. A service provider is motivated more by the potential of 100,000 subscribers than 10,000. Unfortunately, an open access network will start with few subscribers – requiring good service providers with able marketing skills to attract customers (assuming incumbents refuse to use the network). Both UTOPIA and iProvo suffered from unreliable service providers in the early years, hurting the networks' reputations.

Network reputation plays a significant role in how rapidly it will grow, so a network owner must vet service providers to ensure they will be capable of offering a reliable experience to subscribers. If subscribers are dissatisfied with the service providers, they may not know how to differentiate between the network and service provider, thus giving the network an undeserved bad reputation.

Service providers may be tempted to take risks to increase profits (e.g. skimping on customer support) because they have less to lose if the customers are alienated. Open access networks iProvo in Utah and Jackson Energy Authority in Tennessee both had to expend more resources than expected to help service providers troubleshoot and solve problems for end users. Though the service provider was technically responsible for this work, the network owner had to be involved because it had more to lose from problems than any other stakeholder.

Between the electronics and labor, a network owner may expend \$750-\$1000 to connect a new customer. Few networks have tried to recapture the cost with a connection fee out of fear of discouraging new subscribers; just as with cell phones, the network owner recovers the equipment cost over the life of the subscription. Jackson and iProvo quickly discovered an incentive imbalance in this arrangement – service providers immediately profited from a new customer whereas the network owner required several years just to recover the initial outlay.

#### **Myth - The Public Sector Should Not Compete with the Private Sector**

Governments “compete” with the private sector in many ways on a daily basis. Libraries compete with book stores, schools with private schools, public transit with taxis, police with security firms, even lumber yards, liquor stores, municipal golf courses and swimming pools with privately owned counterparts. Without public competition in the form of the Rural Electrification Authority, much of the country would still not be wired for electricity or phones. The focus on whether local governments, who have a wholly different motivation than private companies, are “competing” with the private sector is a red herring to distract the public from incumbent providers' failures to build modern networks. On matters of infrastructure, a community should always have the option to build the network it needs, just as it can build roads, bridges, water systems, and other modern necessities.

When a subscriber has a problem on the weekend, or after business hours, the service provider may be unavailable (just as with a retail network, staffing a 24/7 call center is trivial for a company with one million customers but impossible for one with only one thousand). For a network to be successful, the network owner must ensure someone is picking up the phone on Saturday afternoon, a responsibility that *should* fall to the providers.

When a service provider fails to meet its obligations, the network owner is in a difficult position because it has fundamentally opposed responsibilities – promoting the network while also policing the service providers. In the event that a service provider has poor customer service, reliability, or does not make necessary payments to the owner, the provider may be removed from the network. Yet the fallout from removing a service provider will damage the networks' reputation. Customers will be upset – they may lose data, email addresses, and will have to find a new provider immediately. The network owner has to consider these possibilities when making the rules and contracts for service providers.

Having independent service providers can provide annoying complications to everyday activities like installing new customers. In iProvo, the network owner installed the equipment while the service provider also had to make an onsite visit (e.g. to verify internal wiring would support network services). Cable and telephone companies already



have problems hitting targets to get a single technician to an appointment within a four hour window – now the network may require coordinating two technicians or asking a person to take multiple days off work to be available for technicians to make the network connection. The frustration of installs is a significant source of current animosity against incumbent networks, meaning the new network must do better.

The issues that have arisen for early open networks like iProvo represent transitional factors as this new model gains traction. The open access approach is a fundamental break with the history of monopoly in telecommunications; there will inevitably be speed bumps. However, these problems are fairly small when compared to the problems posed by the present incumbent providers.

## Combining Open Access and the Sale of Retail Services

The difficulties of a wholesale-only approach to open access has led to some communities committing to open access principles even as they offer their own services. The first General Manager of Burlington Telecom, Tim Nulty, noted that they offered retail services while also maintaining a commitment to open access because in the long run, they would want to exit the retail services side and focus only on providing transport. In the meantime, they have bills to pay and need the revenues from offering services as well as control over the user experience to ensure the network maintained a good reputation.

However, offering open access that competes with the network owners' services can create a problem. Consider the following hypothetical example: Muni Telecom (MT) offers a \$100 triple-play plan and the competing Incumbent Cable offers a \$110 plan. If MT invites more service providers on the network, it will want to ensure the providers target Incumbent Cable rather than engaging in a price war with MT by offering a new triple-play service at \$95. If MT is forced to lower its prices by others on its network, it will have less revenue for needed expenses. Ideally, new providers will offer innovative approaches and/or focus on niche markets.

Network owners must ensure service providers succeed by attracting new customers to the network rather than cannibalizing existing ones. One method is to ensure that access fees, paid to our hypothetical MT provider by new competitive providers, exceeds the base cost of building network access. At that point competition by price is welcome and desirable. Again, this is facilitated by the longer capital spreads allowed in public sector investments, which reduces the necessary monetization of access cost fees.

## The Future of Open Access

Though open access is no panacea, it offers the best solution for creating a true market for broadband services. Most of the above problems may be remedied with forethought, smart policies, and a recognition that every approach to building a network has its own set of difficulties.

As the open access model matures, communities must ensure providers are invested in the success of the network as a whole. They should share in the upfront costs of subscribing customers to motivate good customer service and effective customer retention policies. If the network must aid in troubleshooting problems not attributable to network infrastructure, service providers should be billed an appropriate amount for their time to encourage proper investment in equipment and staff training. Creating contracts that address these problems can be difficult in the early years when the network has fewer subscribers and thus less power over potential service providers.

Communities should consider innovative approaches that lead eventually to open access even if the network must be closed at first. As open access networks grow from tens of thousands of users to millions, they will prove the benefits of competition. Google's announcement of gigabit FTTH networks may prove more interesting for their stated commitment to open access than the high speeds. Google, however, will not bring these networks to most communities – that is something most will have to do for themselves.

Fortunately, communities already have a wealth of knowledge to draw upon, standing on the shoulders of the open access networks that came before. Unlike when UTOPIA started, several



companies now have experience on an open access network and are looking for opportunities to offer services on new networks. Providers from UTOPIA can even offer services on other open access networks around the country – while the new networks also encourage local businesses to offer services. For instance, when Brigham City created a special assessment to finish the UTOPIA build-out in their community (the case study is discussed below), local provider Brigham.net was able to continue offering services to its customers over the faster UTOPIA network rather than remaining reliant on reselling Qwest's slow DSL. Brigham.net can now offer services to anyone on UTOPIA, expanding its opportunities for new customers.

With a publicly owned open access network, communities can ensure they will have a competitive broadband market offering fast and reliable service well into the future regardless of how state and federal policymakers choose to (de) regulate private companies.

## Open Access Experiences

### Utah Telecommunication Open Infrastructure Agency (UTOPIA)

UTOPIA is probably the most well known example of an open access network in the U.S. It offers some of the fastest speeds in the country at the most affordable prices and has been cited by local business owners as a major competitive advantage. Those with access to UTOPIA can choose between ten service providers already; more service providers are in a queue to join the network in the near future.

UTOPIA, as well as its sister project in Provo, are frequently labeled as failures by large carriers and anti-government groups because they have missed revenue targets and are taking considerably longer to build out than expected. In the case of iProvo, the city wanted to start offering retail services but Utah law essentially forces publicly owned networks to offer only wholesale access, thereby dramatically reducing its revenues. As a result, the city sold the network to a private company.



When UTOPIA was formed, many of the communities had little access to broadband, though incumbents increased investment after the network announcement. Even today, many of the communities have pockets without broadband. UTOPIA is comprised of sixteen cities, with an aggregate population of 500,000, that will share an extremely fast, open access network. Most of those cities pledged to back the debt of UTOPIA with sales tax proceeds (cities that did not pledge are prioritized lower on the build-out list).

UTOPIA has encountered many problems, both externally and internally that are unrelated to the open access model. Externally, the incumbent providers (Qwest and Comcast), as well as anti-government groups like the Utah Taxpayers Association, have strongly fought UTOPIA in the courts, legislature, city halls, and newspapers. Additionally, federal Rural Utilities Service funding fell through, setting the project back considerably. Internally, the original management team made many costly mistakes and have been entirely replaced with a new team that has a plan for recovery.

Cities will soon have to make good on their sales-tax pledge to aid in debt payments, though this will be a loan to UTOPIA that the network will have to repay after breaking even. Some cities have seen tremendous savings from the network: Orem, a city near Salt Lake City, reports savings of \$600,000/year, presumably from cutting overpriced and slow leased lines from the telephone incumbent.

UTOPIA provides an important anecdote illustrating the divide between the motivations of the network owner and service providers. Early in the network, one of the service providers was adding many customers over the summer months with an effective advertising strategy. In September, the number of new customers fell dramatically, leading UTOPIA to contact the service provider and inquire into the decline. The service provider's business model was to hire college students over the summer months to add subscribers and then largely coast until the next year – an approach that worked for the service provider but left UTOPIA with far fewer subscribers than needed for revenue targets.

Despite its many problems, UTOPIA has created many benefits for its communities. In late

September 2007, the Utah Legislature's "Government Competition and Privatization Subcommittee" heard testimony relating to the UTOPIA network where one local businessman discussed the benefits of the network. When their business considered moving outside the UTOPIA territory, they compared prices and realized they would have to pay thousands rather than hundreds on telecom to maintain the bandwidth on which they depended. "We're here to stay" was his conclusion. To those who claimed government was interfering with the "free market," he responded:

*Where we can have a free market, we should have a free market. That is one of the main reasons I support UTOPIA, because it allows competitive access on those lines... I would rather it be my local government owning it – it is a lot easier to get a hold of the mayor of Murray than it is the CEO of Qwest when I have a problem.<sup>29</sup>*

One of UTOPIA's problems is expanding the network to a greater number of potential subscribers. One of its members, Brigham City pioneered a new financial approach (see case study at end of report). Brigham City is the first to enact a special assessment area, allowing residents to aid in the costs of building the network in return for lower monthly bills. UTOPIA is working with other communities to gauge interest in this approach.

UTOPIA has added many service providers to the network and has a much brighter future now than many assumed possible a few years ago.

### Jackson, Tennessee

Jackson, a community of some 60,000 in a larger metro area in western Tennessee, is one of the many publicly owned FTTH networks in the state boasting the largest number of them. Thanks to President Franklin Roosevelt, the publicly owned Tennessee Valley Authority (TVA) helped electrify the state and create a strong tradition of public utilities

Despite this tradition, when it began building the network, Jackson faced a suit from a local telephone company. Whereas Lafayette and Bristol fought lawsuits against them, Jackson

### The Wired Road and nDanville

The Wired Road and nDanville are wholesale-only open access networks in rural Virginia. Both have embarked on an incremental approach rather than immediately embarking on a citywide network. Each has seen success, improving broadband access and lowering prices where it is available. This gradual approach to a wholesale-only network may prove more sustainable and practical than the high-cost build-at-once approach that has faltered in previous open access networks.

chose to negotiate with the company in an effort to avoid the legal fees and the years it would take to win in court (which they likely would have done as community after community has shown). Though the Jackson Electricity Authority (JEA) originally intended to offer retail services, it agreed to start with a network selling wholesale access only. They created a set of metrics the providers would have to meet in year 3 and year 5 to ensure JEA's ability to meet its debt obligations from funding the network; if the providers fell short, JEA could begin selling retail services.

Long before year 3, JEA recognized the providers would fall well short of targets, even as the costs to JEA from running the network were greater than expected (e.g. JEA staff had to help service providers resolve more problems than expected). Though JEA's open access network had lowered prices because incumbents responded to the new network with lower prices (saving money for everyone in the community), it has not generated sufficient revenue to pay the debt. In time, Jackson bought one of the providers to facilitate its entry into offering services directly. JEA is now adding retail customers to increase revenues and meet its debt obligations. The other service provider continues to offer services on the network.

Despite the challenges from the original open access approach, Jackson's network has produced many community benefits, including 100Mbps connections to local schools and cumulatively creating an estimated \$5 million in consumer savings through reduced phone, broadband, and cable rates as a result of competition. Finally, the JEA network has enabled six radiology clinics to pioneer telemedicine approaches.

## Lessons Learned From Publicly Owned Networks

Years of experience have offered many lessons from community networks. Given their complicated nature, there is no way to avoid problems when building a network. However, by proactively addressing common issues, these problems may be minimized. One of the benefits of community networks is the public can evaluate the tradeoffs of different approaches and weigh in on challenges.

### Network Planning

The network planning stage is incredibly important. The decisions made about the physical design of the network will define its strengths and weaknesses. A cost-cutting decision in the short term may greatly increase costs over the life of the network. For a variety of technological reasons, the actual location of fiber in the ground may foreclose some network designs.

The trade-offs of building and operating networks are well known to technically savvy network architects. For example, placing aerial fiber on poles is usually less than a third of the capital expense of buried fiber, but requires yearly rental fees to the pole owner. Further, the cost of annual maintenance is significantly greater. Equipment to support television (e.g. video head ends, transponders, etc) comes in a vast array of capabilities and costs. Less knowledgeable consultants may encourage specific solutions without fully considering future service offerings or the impact of coming trends in Internet provided video. Communities should require consultants to provide understandable explanations of those trade-offs, rather than offering a single approach.

Many communities have started their network with a modest foray into an I-Net or providing some manner of broadband services to a few businesses or technology center. Not all such networks will result in citywide FTTH, but they still should be built to support future growth to ensure maximum flexibility. Though the costs of planning for future expansion do add upfront costs to a project, they will reduce future costs when expansion is necessary. As an added

**Figure 5: Planning An Institutional Network**

Figure 5.1: Star

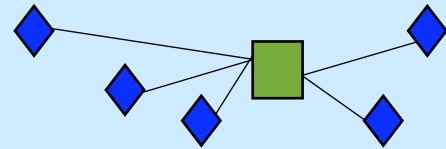


Figure 5.2: Compound Star and Cut

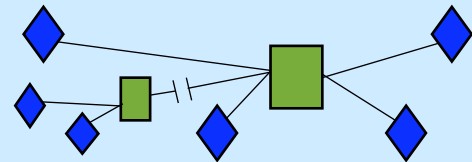
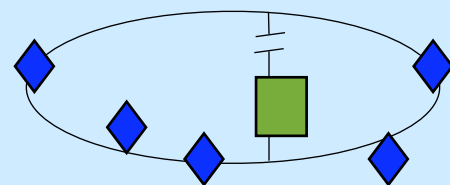


Figure 5.3: Ring and Cut



The easiest method of connecting multiple buildings with fiber is to simply run fiber from building to building in what is called a “star” topology (Figure 5.1). Unfortunately, this approach offers poor redundancy, and can decrease reliability as it expands over time. In the star topology, a single fiber cut will isolate one location. In 5.2, network growth means a single cut can isolate 2 locations.

A better alternative is to create a ring (5.3), or system of rings that connect to buildings and offer multiple paths for data in the event of failure (e.g. back-hoe, earthquake, end of the Mayan Calendar). The ring adds cost up front but offers redundancy and great expansion options. Each location has two fiber paths, so no single cut can isolate a location. Future expansion will cost less with a ring because most buildings will already have fiber near them.

benefit, networks ready for future expansion often offer greater redundancy from the start. See Figure 5 for an explanation.

Community networks often grow as needs change and the community gains confidence in offering services. Even if a community decides not to offer retail services, it will improve its negotiating position with incumbent providers by reserving the capability of adding that capacity in the future. Service providers will approach franchise negotiations differently, having to respect the additional options available to the community.

When a community realizes it needs better broadband, most will first approach the incumbent providers (if any) to ask for improvements. A variety of responses are possible, but none are binding. Some communities are strung along for years by providers who continually promise needed upgrades RSN (real soon now). For instance, in Windom, Minnesota, the small community voted down a referendum to build a publicly owned fiber-optic network in 2000. Qwest had said it would invest in DSL imminently. The following year, after Qwest invested in DSL elsewhere, Windom wised up and voted to build their own network so they would no longer be stuck with dial-up. They learned quickly, others have waited longer.

Communities that decide to offer retail services directly will often start with a community survey to find the public attitude toward a publicly owned network (often completed by a consultant or survey specialist). However, communities should take care in the questions posed. Consider this question: “Would you take services from MuniNet if you could save 20%?” The answers to this question may reveal what percentage want lower bills, not necessarily how many will support a publicly owned network. However, it does plant an important seed in the community: *what if* the community built a network and lowered prices?

A larger potential problem with this question is that no one can predict what prices will be when the network is completed, though a smart prediction is that incumbents will lower their prices.

Communities should not make specific pledges to keep prices  $x\%$  below competitor rates. If incumbents drop their prices sufficiently low, the community network will have to either forego its pledge to be  $x\%$  below or sell services below cost (which may violate laws and make debt payments harder to reach). Be prepared for price wars.

A simple rule: do not let politics dictate pricing. Before launching services in Bristol, Virginia, the City Council asked the utility to slightly lower the prices so they would be even farther below incumbent rates. Unfortunately, with the new prices, BVU had less revenue than expected under the plan and had to raise the prices back to the original level – a move that may be interpreted poorly by citizens. Communities are better advised to start with conservative pricing and

either lower them if possible or simply use the extra revenue to avoid the next rate increase (cable companies are hated for raising rates nearly every year).

Because misinformation is the predominate tool of those fighting community networks, network planners should have clear lines of communication with citizens. Those citizens who strongly support the network should have a place to stay informed on what is happening. Creating a blog to track progress or a “frequently asked questions” web page can stop rumors from spreading by creating a place where people can obtain answers. Many will never visit or read it, but it will inform the network champions who will be talking to their neighbors and allow them to authoritatively rebut the inevitable misunderstandings.

Once a community commits to a network, it should encourage people to sign non-binding pre-subscription cards. Some networks have announced that the neighborhoods with the most pre-subscription cards will be the first to receive services (building the network takes time, some neighborhoods will receive access before others). This strategy creates a dynamic where supporters for the network are reward for spreading the word about the new network. Documenting support for the network will also help in arranging financing and responding to critics. Alternatively, the community may want to prioritize historically neglected neighborhoods in an attempt to mitigate the digital divide.

A number of communities have set up a mobile home or truck to take to neighborhood gatherings, fairs, and other events to show people how a faster connection can change how they use the Internet. Many may not realize how easy it is to set up a video chat between grandparents and their far-flung families. Others may be stunned to see the better quality from a faster connection (e.g. better syncing between video and audio). Community networks succeed by being a part of the community, and this means being available to demonstrate the technology and answer questions. Rural cooperatives once had demonstrations to show the benefits of electrical appliances in the kitchen; once again, history repeats itself.

Communities have often created a slogan to reinforce the concept of investing for the future of the community – as in Powell, Wyoming, where



they used: “Building a Stronger Future” or in Lafayette, Louisiana, they simply said “Fiber for the Future.” In both of these communities, they recognized the power of broadband and were tired of seeing their kids leave the community to take full advantage of modern technologies.

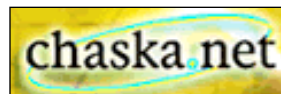
Depending on the local circumstances, such a message reminds people they need to invest for the next generation’s benefit, which should resonate strongly.

## Launching the Network

The early years of a network are difficult due to technical challenges, responses from incumbents, and the many steps that go into the learning curve. By putting community needs first, some problems can be turned into opportunities. For instance, Burlington Telecom initially planned to only improve the internal wiring on a subscriber home if it was clearly necessary. However, many of the service calls they received proved related to the internal wiring, leading them to spend more time on internal wiring at the install rather than risk additional service calls later (“truck rolls” are expensive). They later found their rapid response to the problems greatly helped their reputation.

Communities should focus on providing a good technical support experience. Having local and friendly responses to problems is one of the key differentiators a publicly owned network can use against incumbent providers. This means going the extra mile when subscribers call in with problems that may not be caused by the network (perhaps a problem with the computer operating system or browser). In the early years of Burlington Telecom, the technical support staff could use their judgment in making a quick trip to the subscriber to resolve problems they could not resolve over the phone.

Unfortunately, providing support services can be difficult for smaller networks. Some networks have elected to outsource help to other companies. Though this approach moves the subscriber experience beyond local control, Chaska.Net in Minnesota has reported good experiences with Siemens, and Hiawatha Broadband Communications has gained the trust of several small community-owned networks.



The first 10%-20% of subscribers are fairly easy to attract for a new network. Whether early adopters prefer local service or are filled with rage at an incumbent provider, a significant minority will immediately switch to the new network and they may not require anything more than word of mouth. Beyond the low-hanging fruit, the network will need an advertising strategy. All things being equal, many people are just going stick with what they have. If prices are sufficiently lower, they may switch, but there are switching costs – hassle of switching, loss of an old email address, or uncertainty about the new service.

Even though the new network may have far better, more technologically advanced services, many people are simply interested in the lowest priced offering that allows them to surf the Internet. Thus, if the network offers a modestly priced 1Mbps symmetrical connection and a 10Mbps symmetrical connection for ten dollars more, many will continue to subscribe to the slower offering. Bear in mind that high-capacity fiber networks are not necessary because everyone needs them today, but because some (e.g. businesses, tech-savvy folks) need them today. Others will increasingly need the capacity as technologies evolve. A smart advertising campaign will explain the benefits of the new network, helping people overcome both inertia and annoyance to subscribe. Additionally, it should note that while everyone benefits from lower prices in the community due to the competition of the new network, joining the new network will create the most benefits for everyone.

Sales staff should target small businesses. Small businesses are reliable customers that sign long-term contracts (which is one reason they may not immediately be interested in new services – they have to wait for existing contracts to expire). Small businesses generate considerably more revenue than residential customers on a per user basis, in part because they pay more for a higher level of service. Just as small businesses provide more revenue, they also have higher expectations. They will be wooed by the incumbents, and may have relationships with an incumbent salesperson. If they have problems, they expect to be prioritized in repairs. Fortunately, publicly owned networks should be able to offer faster speeds (especially upstream) at lower prices, and with better technical support. Further, networks should offer data backup and recovery services by default because high upstream speeds facilitate off-site



backup in ways not possible with cable and slow DSL connections.

Incumbents have often claimed they will have less incentive to invest in a community when competing against a municipal network. In practice, however, incumbents have increased investment and cut prices in communities that have built networks, as TDS did in Monticello. This response is great for the community because everyone benefits from the lower bills, but it can hurt the publicly owned network by starving it for subscribers. In this case, local leaders must remind the community that the lower prices are a direct result of the new network and even if the lower take rate means extra years before breaking even, the community is benefiting greatly from it. The municipal cable network in Scottsboro, Tennessee, had to deal with such severe predatory pricing from Charter Cable that it wrote to its customers, explaining that if they switched to Charter, the municipal network would fold and Charter would resume its high prices in the absence of competition.



## Packages and Pricing

Responding to a price war is difficult because the incumbents will undercut prices from the new network with their pricing advantages in obtaining television content (scale), ability to cross-subsidize from non-competitive areas, and their already amortized network. However, by emphasizing the local nature of the network and greater quality (e.g. higher broadband speeds, faster response to technical problems), the publicly owned network should be poised to compete even if its price, in the short term, is slightly higher than the incumbent's.

Pricing can be tricky, both for residential services and for municipalities and schools. Though consultants and other specialists should be consulted in determining pricing, the discussion below offers some starting points.

First of all, understand the pricing of the incumbents. To the extent the incumbents lower their rates after a community builds a network, the community should receive credit for those savings. Keep a record of how prices change over time,

preferably by collecting some bills from the incumbents. Some incumbents offer special deals only on the phone; the rates in advertisements may not reflect the actual costs paid by subscribers.

When deciding what broadband speeds to offer, take advantage of the advanced fiber network. A number of muni FTTH networks offer the same slow speeds as DSL or cable competitors – such an approach does not differentiate the public network from the incumbent. FTTH networks should offer fast speeds to attract subscribers – a lesson many recent networks have taken seriously (e.g. Monticello, MN; Lafayette, LA; and Wilson, NC).

In residential services, some networks have found themselves in difficulty after crafting packages because the lower end of the offering created too little revenue. Connecting a customer to a fiber network can cost some \$750-\$1000 just from the electronics equipment and labor. Many customers will choose the lowest tier of offering to save money – thus if a network offers an extremely low-priced triple-play with limited options at \$44/month, the slim margins after operating costs could take more than five years to pay off the upfront costs. Similarly, a customer that takes only phone service from the new network at \$25/month will be a fiscal drain on the network for many years.

One of the key metrics for the financial success of a network is ARPU (average revenue per user). This creates a tension between the goals of succeeding financially and lower costs for the community. Communities have dealt with this pricing paradox in a variety of ways – some offer discounts to senior citizens and those living below the poverty line. Others keep the individual prices of services low but require a minimum contract per month, as in Lafayette, where the lowest cost Internet service is a speedy 10 Mbps symmetrical at \$28.95. However, one has to pair that with either a telephone option or television plan (increasing their monthly bill to at least \$44/month) to ensure the utility generates enough revenue to make debt payments and continue connecting other customers.

Burlington Telecom found itself a victim of its own success. Some people were so excited at the prospect of a local alternative to the cable and telephone companies they immediately switched their home phone to it but did not take other

services. Perversely, their subscriptions actually hurt the network financially due to their low monthly bills and the high cost of connecting them. This is a reality that few understand, but educating the community on the basic economics of a community network may help spread understanding of why they take so many years to pay off – especially if they are offering extremely low prices.

One important offset to these pricing issues is new revenue sources. When thinking of total revenue, consider new services such as home security, healthcare visits over the network, work-at-home options and a host of new services yet to come. Each of these new services have value either to the customer or the service provider. What is the ability to “check in” on your home through a video and security connection while on vacation or business travel worth? What is the value to rural healthcare providers of being able to “check in” with their patients via high definition video rather than dispatch a nurse to do the same? Community owned fiber networks will bring services not thought of today – but others can be seen and included in revenue plans.

Beyond the difficulties of residential pricing comes a bureaucratic question: how much to charge city departments, agencies, and schools for broadband. In Provo, the City bragged that iProvo created tremendous savings because City Departments had faster connections at no charge. However, critics focused solely on the financial performance of the network, which was not generating sufficient revenues to pay operating costs and debt.

Even when a city owns the network, it should charge itself for connections. The question is how much they should pay. Consider a 100 Mbps connection to a city department from a publicly owned network that replaces several leased T1 lines at a cost of \$3000/month. If the cost of provisioning the 100 Mbps circuit is \$1000/month to the network, how much should the city department pay for it?

In Burlington, City departments pay the cost of the connection and no more, creating significant direct savings for budgets while greatly increasing bandwidth. In our hypothetical example, this department would still be saving some \$2000/month while greatly increasing its broadband

capacity. The network would just break even on providing services.

Another option would be to charge more than the cost of simply providing the service – say \$1500/month. The department would cut its costs in half and the network would generate a margin on the service, better enabling it to make debt payments – important goals in the early years of any network. Prices in telecom are typically set based on market conditions (often monopoly power) and bear little relationship to the cost of provisioning services. If the network were to be sold, departments would have to go back to leasing lines so these costs should be considered when deciding on pricing.

Pricing strategies will also change based on the network model. If the network is independent of the City, the city may have to RFP for its connectivity (depending on local and state laws), which changes the dynamic of how prices may be set, because incumbents may engage in predatory practices just to prevent the new network from growing. In Ashland,



Oregon, and Kutztown, Pennsylvania, the publicly owned network lost bids to serve local University dorms to a private incumbent who bid well below the cost of providing the service. These companies would rather lose money than allow the public competitor to gain a new customer. There is little to be done in this situation but document and note the community savings that arise from competition.

## Auditing and Oversight

Most citywide community networks have been built by public power utilities that already have structures in place for auditing and accountability. But communities are increasingly investing in networks without a convenient entity to run them. In Burlington, Vermont, the network was created as a project of the City’s Clerk-Treasurer office and has proved too independent from City Council oversight, causing problems of transparency that have come to light in late 2009. The Mayor’s administration hid the unexpectedly high debt from the City Council and public, resulting in a bigger scandal than if the Mayor had been upfront about the problems – in a time when the entire economy was collapsing.

### Burlington Telecom

Burlington Telecom (BT) has become the poster child for why networks must be structured carefully. After starting with a strong tradition of transparency, a new Mayor's Administration effectively cut off oversight of the network from both citizens and the City Council. After two years of secrecy, the City Council found the network in deeper debt than anyone realized, leading to discussions of how to proceed.

Even as Burlington Telecom is experiencing significant problems from the Mayor's handling of the network, public meetings have shown citizens more concerned they would lose their network rather than anger at the City for investing in it originally. Though the debt has cast the future of the network in doubt, the network has saved millions for the city, which no longer had to lease overpriced lines from the incumbent. It has generated jobs as businesses moved into town to take advantage of a faster and more reliable network than any nearby. The important lesson: ensure networks have proper auditing procedures and are truly accountable to the public.

Publicly owned networks have to balance oversight and transparency without revealing key details to competitors. For instance, with detailed knowledge of how much a publicly owned network pays for its channel contracts agreements, competitors can price their services just below the cost of the public network (forcing them to match the prices and lose money or price their services above competition).

When planning and later running a network, depending on the network model, publicly owned networks may be required to have open meetings – subjecting them to greater scrutiny. Different communities have struck different balances – Burlington alone has experimented with different approaches from open transparency to extreme secrecy following personnel changes. In Wilson, North Carolina, the utility decided to abandon attempts at secrecy following repeated document requests from Time Warner and others. They put a copy of their business plan on the website and told everyone where to find it, trusting in their high quality of service and localness to balance the incumbent's strategic edge in information.

Communities should be as open as possible because secrecy often breeds confusion and distrust by citizens. Aside from the most important proprietary information, they use

openness as a differentiator from the incumbents. In the court of public opinion, secrecy from government is treated as though it must be actively hiding something whereas secrecy is accepted from the private incumbent providers. It is not a level playing field, but community networks have thrived in this environment nonetheless. In the wake of the problems in Burlington, communities are structuring their networks to ensure proper oversight.

### Content Decisions

Burlington is actually at the forefront of another important issue – having built an IPTV network that allows it virtually unlimited television channel capacity, it created an open carriage policy that resulted in making many channels available not commonly found on televisions throughout the U.S. One of these channels caused an uproar in 2008 – Al-Jazeera English – which is closely akin to the BBC. Some citizens demanded the channel be removed from the network, which raises an interesting problem for community networks – who determines what is available on the television?

Interestingly, Burlington Telecom had dealt with a similar problem previously – when some objected to the names of adult movies that were available on their television. Though children were unable to view such programs, many of the titles were themselves explicit and parents were unable to hide them from prying eyes. Burlington came up with a solution to empower subscribers to block even the titles if they chose. And after the Al-Jazeera English controversy, the network chose to continue distributing the channel, allowing subscribers to choose what they watched rather than presuming to choose for them.

Depending on the community, the authority over creating the television lineup may fall on the network or a public board that is insulated from the politics of City Council. Though this issue could create some controversy over the next few years, it will become moot before too long.

As television increasingly converges with the Internet, modern fiber-optic networks will remove the problem of scarcity and channel lineups will lose importance. As the number of available channels dramatically increases, numbers will

cease to be a convenient means of remembering them, suggesting future channels will have a designation closer to [www.abc.com](http://www.abc.com) than channel “4-1.” Thus, many communities may be able to avoid these content fights entirely. Building a network accountable to the public can create responsibilities that are difficult to accept. When Comcast or Time Warner chooses the lineup, there is little the City Council can do and few would expect them to try. But when the network is accountable to the community, unexpected issues may arise.

## Geography and Authority

Another potentially problematic issue of design is whether networks are constrained by political boundaries. Most municipal networks have remained within their boundaries – for a variety of political, regulatory, and practical reasons. As more communities recognize the need for a network, this approach will likely change. Already, a number of publicly owned networks operate outside their municipal footprint. Chattanooga’s network will be available to the footprint served by the electrical utility, beyond city boundaries. Windom’s network in Minnesota will soon serve nearby rural communities as a result of stimulus broadband funding.

In rural areas, a county seat may build a network but those living outside the city are unlikely to find a good option absent a nearby cooperative telephone company. However, the question of how to expand a municipal network – particularly in unorganized rural areas – is tricky. Who bears the risk if the costs are greater than expected or revenues less than predicted? If the community bears the risk, should the network be as accountable to the desires of subscribers outside the community or is a tiered approach better? Incumbent providers, who already oppose the rights of communities to build their own networks, are likely to press hard for restrictions on publicly owned networks expanding beyond their boundaries.

As rural telephone cooperatives have built FTTH networks and overbuilt nearby privately owned telephone companies, they have had to wrestle with these questions and have come to different conclusions based on the circumstances. When Federated Telephone expands to a new community

(who tend to welcome them with open arms), the cooperative board decides whether new customers can become members of the coop. Typically, new subscribers may become members after they have paid off the costs of the connection (this can take many years depending on the particulars). Other cooperatives, including TCT in Wyoming, do not invite new customers to join the cooperative though they have continued providing the same high level of service to all customers.

Some communities may prefer not to expand their networks, recognizing a competitive advantage from their investment. In late 2009, during discussions of whether Burlington Telecom should expand outside city limits into the county, some preferred not to share the next generation network to encourage businesses and people to move into the City.

The most economical method of expanding broadband to rural areas is to incorporate more dense areas into the network. The higher revenues from the dense areas balances the higher costs of rural areas. Further, many of the fixed costs for a modern FTTH network have economies of scale, suggesting that communities can significantly reduce the costs of needed networks by partnering to avoid unnecessarily redundant investments. However, though the economics become easier as networks grow, the political difficulties increase as the number of participants grows. There is no easy solution; if there was, someone would undoubtedly have already solved the problems of expanding broadband to rural areas.

Depending on the geography and demographics, these networks may not require ongoing subsidization for operating expenses via programs like Universal Service. Because fiber-optic networks have lower operating costs than the current copper networks, more networks in rural areas will be entirely self-sustaining after converting to fiber. When subsidies are required, they should be lower than present levels. However, if these publicly owned networks are permitted to overbuild higher density areas, they could be even more self-sufficient as higher revenues from greater density areas will balance the higher costs of rural areas. Unfortunately, both states and federal programs have discouraged public networks from offering services in areas already



served by existing providers. Several states only allow the public to offer services in areas entirely unserved by providers. This represents an important tradeoff; to the extent policymakers want to protect the interests of incumbents, they commit to ongoing subsidies for neglected areas because the private sector has already targeted the areas easiest to serve.

## Middle Mile

Perhaps after realizing the difficulties of challenging entrenched interests with last-mile networks, the broadband stimulus programs began to focus on “middle mile” investment. These are the networks that provide backhaul from a service provider to the Internet. Many areas of the country have extremely limited options for these connections, driving the prices up dramatically. When the backhaul prices are extremely high, providers have to charge much more for slower connections than would otherwise be the case. Theoretically, as middle mile connections become more affordable, providers will increase their investment in last-mile networks.

Unfortunately, the cost of the last-mile networks is still sufficiently high that a robust middle mile throughout the country will not naturally stimulate many last-mile deployments. Alberta, a western province in Canada, provided an excellent experiment in solving the middle mile problem when they built a massive fiber network to connect every community. They made cheap backhaul available to everyone on equal terms. Even after many years, they have found that private providers remain unwilling to build out in rural areas, leaving many communities without residential broadband opportunities.

The opposite proposition, that last-mile networks will attract better middle-mile options seems more likely. When a rural area has few last-mile networks, no carrier will see a value in extending middle-mile access. However, as rural areas aggregate users and build networks, private providers are more likely to see a business case for connecting them. For this reason, the federal government should focus first on aiding the more expensive last-mile networks rather than the politically expedient middle mile connections in the hopes it will obviate the need for further government involvement.

## Case Studies

We could have developed case studies of dozens of cities, but decided to focus on two that provide good examples of the experience of publicly owned networks.

### Chattanooga, Tennessee

In September, 2009, EPB, the public power utility serving Chattanooga and nearby communities in Tennessee, rolled out fully fiber-powered triple-play services to 17,000, a number expected to grow by July 2010, when services will be available to some 100,000 people and businesses. It will take three years before all 160,000 potential subscribers are passed.



Chattanooga's quest faced numerous lawsuits.

The Tennessee Cable and Telecommunications Association sued in 2007 and Comcast chimed in a year later. As has been done in other communities, the private companies alleged the power utility was cross-subsidizing its triple-play telecom offering with revenues from the electric side. Aside from this just being a poor business practice, the companies say such cross-subsidization would be unfair to them even though major carriers routinely cross-subsidize from community to community - overcharging in non-competitive markets to make up for keeping prices low in competitive markets.

Nonetheless, public power companies and other public agencies have learned to keep meticulous books to show they are not cross-subsidizing, something courts recognize each time their time is wasted by lawsuit-happy incumbent providers.

EPB has long offered some telecom services. Starting nearly 10 years ago, the power utility stepped up to ensure businesses had access to the telephone and broadband networks they needed. Those services clearly scratched an itch as they had more than 2,300 customers before beginning to expand the network to everyone. One of EPB's subscribers is a radiology clinic located in a strip mall, where ten radiologists help rural hospitals, who may lack such specialists, to diagnose

problems. The burgeoning area of tele-medicine requires next-generation networks to transmit very large data files quickly.

EPB's footprint includes over 168,000 electrical customers scattered over 600 square miles that reach into northern Georgia. As the fiber network expands to cover the full territory, it will quickly become the largest publicly owned fiber network in the country, making Chattanooga the envy of larger cities.

Josiah Roe of Medium, formerly Coptix, a Web graphic design company, cited the ability to upload and transfer large files with the "comprehensibly better product" as an advantage for his company. "When I go to Chicago or larger cities and they hear we have [FTTH], they're just amazed to see a city of our size doing something like that," Roe says. He adds that, "Chattanooga is very progressive and forward-thinking" in its fiber initiative.<sup>30</sup>

One of the reasons publicly owned fiber networks are commonly built by public power companies is because power companies already need fiber to reliably transmit data in real-time to monitor areas of the grid. This fiber network will be used extensively for electrical uses, which is why the electricity side of EPB is paying for \$160 million of the \$220 million expected expense. EPB has received a \$111 million from a Department of Energy's smart-grid stimulus grant. The grant allowed them to cut the expected completion time for the project down to three years from ten.

Though many utilities are turning to wireless for smart-grid data transmittal, EPB fears its topology will interfere with long-range wireless solutions. Fiber is considerably more reliable, but the upfront costs are indeed higher. EPB is not actually running fiber to every home for smart-grid applications, just those who are taking telecommunications services. Those who do not take telecom services will have an electric meter wirelessly connect to a mesh network that uses a nearby fiber-connected home to send and receive usage data.

Some critics have claimed the electrical side of EPB should pay less for the fiber network but the Electric Power Research Institute (EPRI - a trusted source in these matters) has validated the

EPB numbers. Additionally, people in the smart-grid pilot project are already seeing benefits:

*EPB hopes to recoup its investment primarily from not having to continue to manually read its 160,000 meters, cutting the theft of power from altered older-design meters and generating extra revenues from new video and telecommunications services made possible by the fiber-optic network.<sup>31</sup>*

Over the next 3 years, EPB expects to sign up at least 35% of its footprint for its telephone, Internet, or television services. Comcast has now made Chattanooga a priority for investment, offering its "up to" 50Mbps down cable network (often paired with a paltry 5Mbps upstream connection). As usual Comcast will advertise its "introductory" rates that increase dramatically after a set period of time; publicly owned networks typically resist using such gimmicks.

Katie Espeseth, vice President of EPB Fiber Optics, explained why:

*We're entering the market with a consistent and clear price — it is not a temporary, promotional price ... Because of our fiber-optic infrastructure, our picture quality is clearer and more consistent and our 'Fi-speed' Internet service is consistent and more reliable.<sup>32</sup>*

EPB's strategy is to promote local content and faster services rather than engaging in a price war. They are actively looking for local content to put on the television, including youth sports that they will put on video-on-demand.

Note the slowest broadband connection is 15Mbps/15Mbps - speeds faster than those available in most communities around the country (see Table 5 for available services). EPB is offering services that will ensure any subscriber can use multiple modern applications simultaneously - an increasingly common need as households continue getting more bandwidth-hungry devices.

Espeseth has estimated 2,600 new jobs will be created in the greater Chattanooga area from the fiber network and resulting economic development. EPB has hired 70 full-time installers and more

**Table 5: Chattanooga EPB Fi Prices and Options**

Option	Price
15 Mbps	\$57.99
15 Mbps / Basic Phone	\$68.83
15 Mbps / Basic Phone / Basic Cable	\$92.97
15 Mbps / Basic Phone / (120 Long Distance Min) / 77 Channel Cable Pkg	\$117.24
20 Mbps	\$69.99
50 Mbps	\$174.99
All broadband speeds are symmetrical; prices by month. Caveats: an extra \$5.99 a month for HD Capability on the TV, but even the basic phone package comes with caller ID and 3-way calling.	

temporary workers in order to add 100 subscribers a day to the network. Another article puts a number on the projected economic development, expecting "almost \$850 million in value from both communications and smart grid services, including things like jobs and energy savings."<sup>33</sup>

## Brigham City, Utah

The UTOPIA project, an ambitious FTTH network developed by a consortium of 16 Utah cities, has encountered difficulties that delayed its original build-out schedule. However, it is now building out fiber in Brigham City, one of the original cities in the consortium. Brigham City found a local solution to UTOPIA's slow deployment schedule and created a model to speed build-out in willing communities.

Brigham City, a city of 18,000 in northern Utah, decided to form a voluntary assessment area – sometimes called a special assessment area – to finance the network build-out that will pass all homes and connect residents looking to subscribe. As with all wired networks, upfront costs are steep and typically require a heavy debt load. Brigham City's unique approach may catch the interest of deployers unwilling or unable to shoulder that debt.

For several months, a group of canvassers organized by UTOPIA went door to door in Brigham City to talk to residents about UTOPIA

and ask if they were interested in subscribing to the network. Supporters organized some 30 block parties and invited UTOPIA to attend with a mobile home to demonstrate the superiority of full fiber optic networks. Residents who wanted service asked the city to create a voluntary assessment area. Creating this special district would allow participants to finance their connections themselves.

Residents who wanted to subscribe could either pay the connection cost up front or agree to pay up to \$25 per month (the exact amount would depend on how many joined the program) over the course of 20 years. This amount does not include the cost of services; rather, it is the cost of connecting to the network and having the option of subscribing to UTOPIA-based services (see Table 6 for some available options). Those uninterested are not levied.

In other UTOPIA cities, when residents subscribe to services on the UTOPIA network the connection costs are included in the service fees. Those connection costs will be deducted for Brigham City residents who have paid the full cost of their connections, meaning that the assessment cost will be balanced by ongoing savings on services.

Perhaps the biggest long-term benefit of this approach is having a built-in take rate. UTOPIA knows it will have almost 30 percent of the Brigham City community from the day it starts offering services – and that those subscribers are sufficiently interested in the services to place a levy on themselves. Having bought in, they are unlikely to switch away if incumbent providers engage in predatory pricing. Furthermore, if they do decide to switch, UTOPIA has not lost the cost of the connection.

Before UTOPIA began building its fiber network in Brigham City, many residents already had access to last-generation broadband services delivered over copper networks. Both Comcast and Qwest offer some broadband in the city, although not everyone has access. In some neighborhoods, Qwest offers “up to” 7 Mbps and Comcast offers “up to” 20 Mbps. As is common with DSL and cable providers, these connections are asymmetrical, offering slow upstream speeds. UTOPIA, by contrast, offers 100 Mbps symmetrical service.

**Table 6: UTOPIA Residential Price Examples**

**Prime Time Communications**

Option	Price
10 Mbps	\$39.95
20 Mbps	\$49.95
50 Mbps	\$69.95

**Xmission**

Option	Price
15 Mbps	\$50.00
50 Mbps	\$80.00

Different service providers offer different services at different prices. Some offer triple-play bundles and others focus on niche services. UTOPIA has ten service providers and plans to add more soon.

Qwest sent some of its Salt Lake City lawyers to the city council meeting that created the assessment area. The lawyers complained they did not know enough about what the city was doing and noted that Qwest planned to upgrade its infrastructure in Salt Lake City and might invest in some areas of Brigham City in 2010. Qwest also claimed that, if Brigham City supported the network, it was essentially telling private industry it was creating a public monopoly – a stunning statement as UTOPIA encourages private-sector companies, including Qwest, to offer services on its network.

Brigham City does have a local, independent provider, Brigham.net, that offers dial-up and DSL services. To provide DSL services, Brigham.net leases and resells Qwest circuits. Incumbent telcos such as Qwest have long fought federal regulations that required them to open their networks to competition, and they have largely won. The number of competitive Internet service providers in the United States has fallen precipitously. Despite customer poaching and other hassles from Qwest, Brigham.net had cultivated a very loyal customer base. Many customers said they would only join UTOPIA if Brigham.net offered services over the network. When the company learned how it could offer services on UTOPIA – on equal terms as other carriers rather than the disadvantaged terms on Qwest’s network – it agreed to join. Since then, Brigham.net has greatly increased its customer base and hired an extra person.<sup>34</sup>



The City put up \$300,000 to connect municipal buildings and facilities – a one-time cost that will result in thousands of dollars in savings in operating costs per month while also generating new operational efficiencies from increased network capacity.

Some 400 households paid \$3,000 up front for a connection, while 1,200 other households opted for the 20-year assessment (Brigham City has some 5,600 households in total). Residents opting for 20-year assessments will pay \$22.50 per month for 20 years (\$5,400 over the full term) for their connections. The city creates a lien on each of their properties as security against a \$3.66 million tax-exempt bond at 5.5 percent interest. Monthly payments from the 1,200 households will repay the bond.

Those who choose not to take services from UTOPIA will not be assessed, but will still benefit from the network; they are likely to pay lower rates for their triple-play services due to the competition offered by UTOPIA.

The City Council allocated an additional \$371,000 to ensure the network would be able to accommodate residents and businesses who later choose to join. The city believes that if only 207 subscribers join in the future, it will recover this investment.

UTOPIA has long been dogged by a group called the Utah Taxpayers Association (UTA). UTA, working with Comcast and Qwest, has pushed laws through the state government to hinder UTOPIA and regularly attacks it in the press. Prior to Brigham City's decision to enact the voluntary assessment area, UTA mailed out postcards to residents criticizing the plan. The city quickly responded to each of the points on the postcard, and those who came to the city council meeting to establish the assessment area (other than the Qwest lawyers) were overwhelmingly in favor of the proposal.

However, the UTA's opposition reveals dangers for other municipalities contemplating this path.<sup>35</sup> UTA's postcards threatened that people would lose their homes if they did not pay the assessments they agreed to. Due to these scare tactics and the anxieties of a few people who did not realize they were agreeing to liens on their properties because they did not read the contracts

they signed, UTA was able to manufacture a controversy. Groups like UTA can stoke the fears invoked by words such as "assessment" and "lien" despite the fact that unpaid assessments rarely lead to foreclosure – in the case of Brigham City, city officials note they have "*never exercised its option to foreclose*" under liens for street infrastructure projects.

Though this assessment model solves the financing problem, the costs and difficulty of canvassing neighborhoods are fairly significant. Additionally, the citizens of Brigham City were already committed to UTOPIA, having supported the sales tax pledge and waiting many years for their connection. Thus, they were likely more receptive to the idea than other communities may be. Still, other communities may find they can finance portions of a FTTH network with similar assessments rather than attempting to finance the entire network by borrowing against the liens.

This approach is not for everyone, but it may be appropriate for communities in the right circumstances – other communities in the UTOPIA footprint are already investigating it to finish their build out. Because Brigham City already had almost 50% of the conduit and infrastructure necessary (UTOPIA came to a hard stop when expected funding fell through), the costs for other communities to duplicate this model may be greater.

## Conclusion

In the 1990's, the United States had few peers in the infrastructure of the 21st century - broadband networks. Over the past decade, several peer nations have surpassed the U.S. by instituting government regulations and policies that recognized the important role of the public sector.

Many communities have realized the benefits of publicly owned broadband networks, from lower prices and faster speeds to creating a meaningful choice between providers. These communities do not have to worry when Comcast arbitrarily blocks content and the Courts prevent the FCC from protecting the public. Communities can protect themselves by building and owning the infrastructure they depend on for education, economic development, and even entertainment. Ownership is about setting the rules, not about operation – a number of communities have built networks that are leased to one or more companies that offer the services.

As with all infrastructure, building a network requires significant up-front investment and planning. Powerful incumbents will certainly fight the prospect of competition. However, as we've shown in this report, the difficulties have proven well worthwhile for the vast majority of communities who have built their own networks.

Building a publicly owned Institutional Network offers a good starting point for many communities. Connecting the schools and public facilities with a next-generation network will greatly increase available bandwidth, creating more opportunities and often lowering telecom budgets. Communities can leverage this asset to create Wi-Fi hotspots and begin expanding access to others in

the community who are under-served (whether the speed is too slow or just over-priced).

States should remove barriers that discourage communities from solving their own problems. Such policies benefit only incumbent providers, who are left with even fewer incentives to upgrade last-generation networks.

At the national level, Congress should clarify that states cannot bar publicly owned networks. National broadband programs should prioritize those networks that are structurally accountable to communities. Policies that use public funds to subsidize absentee-owned private companies should be restructured to encourage local self-reliance, resulting in fewer future federal outlays rather than more.

Every generation likes to imagine its burden is bigger than those who came before. Expanding fast and affordable broadband access to everyone is a daunting task, but surely not harder than electrifying farms during the Great Depression and Great War. The Rural Electrification Administration ran a wire to nearly every rural home, creating an infrastructure essential to the many boom years that followed.

By recognizing the power of public ownership, we can run a new wire to every home that will deliver high quality, affordable, and competitive broadband services. Acting now, during the transition from copper to fiber-optics, public ownership offers the best opportunity for building the infrastructure of the next century. The alternative is spending another decade trying to force private providers to upgrade *their* networks. Smart communities can, and will, preserve their self-determination in the digital age.

## References

1 For more information, see <http://fjallfoss.fcc.gov/ecfs2/document/view?id=7020347712>

2 <http://4g-wirelessevolution.tmcnet.com/broadband-stimulus/topics/broadband-stimulus/articles/69765-santa-monica-seeks-expand-wifi-through-broadband-stimulus.htm>

3 Audio recording available here: <http://www.le.state.ut.us/asp/interim/Minutes.asp?Meeting=6431#Audio>

4 “Open Access Saves a Municipal Broadband System”  
Broadband Properties Magazine - August 2007

5 <http://www.2theadvocate.com/news/42567107.html?showAll=y&c=y>

6 [http://blogs.seattleweekly.com/dailyweekly/2009/12/mike\\_mcginn\\_scopes\\_tacomas\\_bro.php](http://blogs.seattleweekly.com/dailyweekly/2009/12/mike_mcginn_scopes_tacomas_bro.php)

7 “Municipal & Utility Guidebook to Bringing Broadband Fiber Optics to Your Community” by David Chaffee and Mitchell Shapiro. Available at <http://www.pti.org/index.php/ptiec1/more/406/>

8 <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020247005>

9 Rita Stull, 2008 Spring NATOA Journal Article

10 [http://broadband.gov/ws\\_future\\_fiber.html](http://broadband.gov/ws_future_fiber.html) and [http://www.apprising.com/2009/11/fcc\\_gets\\_down\\_to\\_brass\\_tacks\\_o.html](http://www.apprising.com/2009/11/fcc_gets_down_to_brass_tacks_o.html)

11 [http://www.montgomerycountymd.gov/content/council/pdf/agenda/cm/2009/090921/20090921\\_EDMFPI.pdf](http://www.montgomerycountymd.gov/content/council/pdf/agenda/cm/2009/090921/20090921_EDMFPI.pdf)

12 Thanks to Tegene Baharu, who wrote a case study of DC-NET for NATOA that provided much of the information for this discussion.

13 “Municipal & Utility Guidebook to Bringing Broadband Fiber Optics to Your Community” by David Chaffee and Mitchell Shapiro. Available at <http://www.pti.org/index.php/ptiec1/more/406/>

14 Quoted in <http://thehill.com/business-a-lobbying/88425-police-fire-chiefs-say-plan-will-not-improve-communications-system>

15 [http://www.broadband.gov/docs/ws\\_pshs/pshs\\_afflerbach\\_reference.pdf](http://www.broadband.gov/docs/ws_pshs/pshs_afflerbach_reference.pdf)

16 <http://govpro.com/technology/wireless/city-broadband-weather-network-20091223/>

17 [http://www.trib.com/news/state-and-regional/article\\_5b8787f4-47a2-53dc-95b4-f94184cab69b.html](http://www.trib.com/news/state-and-regional/article_5b8787f4-47a2-53dc-95b4-f94184cab69b.html)

18 <http://www.publicola.net/2010/03/01/lessons-for-seattle-from-lafayette/>

19 Ciara Torres-Spelliscy, Esq. “The Need to Permit Broadband from Public Entities.” Brennan Center for Justice at NYU School of Law - May 22, 2006

20 Christopher Rhoads in Wall Street Journal, “Cities Start Own Efforts to Speed Up Broadband” on May 19, 2008.

21 VA Code §15.2-2108.6

22 VA Code § 15.2-2108.11

23 UT Code § 10-18-302

24 FL Code § 350.81; SC Code § 58-9-2600 et seq.

25 <http://www.universalservice.org/sl/applicants/step06/wide-area-network-fact-sheet.aspx>

26 <http://fjallfoss.fcc.gov/ecfs/document/view?id=7020349665>

27 For the full discussion with the House and Senate language, see <http://www.muninetworks.org/content/how-ntia-dismantled-public-interest-provisions-broadband-stimulus-package>

28 [http://www.govtech.com/gt/articles/746565?id=746565&full=1&story\\_pg=1](http://www.govtech.com/gt/articles/746565?id=746565&full=1&story_pg=1)

29 Audio recording available here: <http://www.le.state.ut.us/asp/interim/Minutes.asp?Meeting=6431#Audio>

30 <http://businessstn.com/content/200909/optic-nerve>

31 <http://smartgrid.testing-blog.com/2009/07/21/electricity-meets-the-internet-with-smart-meters-chattanooga-times-free-press/>

32 <http://www.timesfreepress.com/news/2009/sep/16/fiber-takes-cable/>

33 <http://earth2tech.com/2009/09/14/does-fiber-have-a-role-in-the-smart-grid-a-tennessee-utility-thinks-so/>

34 Interview on FreeUTOPIA podcast: <http://www.freeutopia.org/2010/03/12/podcast-for-march-2010/>

35 For more thoughts on this, see <http://www.freeutopia.org/2009/12/14/some-thoughts-on-the-future-of-the-saa>

*For More Information, see*

[www.MuniNetworks.org](http://www.MuniNetworks.org)

*for news and reports discussing communities that have built networks. Also, visit*

[www.newrules.org/information](http://www.newrules.org/information)

*for specific laws, ordinances, and other rules communities have used in building networks.*

*Contact Christopher:*

[christopher@newrules.org](mailto:christopher@newrules.org)

Feel free to distribute this report. We appreciate being informed of its use so we can be most effective in our work.