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January 19, 2021

Shonda D. Green, Secretary
Department of Telecommunications & Cable
1000 Washington Street, Suite 600
Boston, MA 02118-6500

Re: MA D.T.C. 20-4; Town of Shutesbury v. Verizon New England Inc., Massachusetts Electric Company, d/b/a National Grid, and Western Massachusetts Electric Company, a/k/a Eversource

Dear Secretary Green:

Enclosed for filing in the above proceeding is the Response of Verizon New England Inc., together with the Affidavit of Terrence Toland.

Thank you for your attention to this matter.

Respectfully submitted,

Alexander Moore cs

Alexander W. Moore

cc: Service List

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND CABLE

Town of Shutesbury v. Verizon New England Inc., Massachusetts Electric Company, d/b/a National Grid, and Western Massachusetts Electric Company, a/k/a Eversource	)	D.T.C. 20-4

RESPONSE OF VERIZON NEW ENGLAND INC.

Pursuant to 220 C.M.R. §45.05, Verizon New England Inc., d/b/a Verizon Massachusetts ("Verizon MA") responds to the Petition to Remove Surety Bond Requirement for Utility License Agreements for Municipalities ("Petition") of the Town of Shutesbury and Shutesbury MLP (collectively, "Shutesbury") dated December 1, 2020.

The Petition has no merit. The bond requirement in Shutesbury's Pole Attachment Agreement with Verizon MA ("Agreement") is a common, standard and reasonable means of protecting the network and Verizon MA from the risk of loss arising when a third-party licensee attaches its facilities to Verizon MA's poles. That risk includes not only the costs Verizon MA may incur if the licensee fails to meet its contractual obligations – such as the obligations to pay annual attachment fees, to relocate its facilities on the poles to accommodate new attachments or pole replacements, and to remove its facilities if the Agreement is terminated – but also the costs, time and energy that Verizon MA would otherwise have to devote to recovering those costs. The Agreement is in the form of Verizon MA's standard form pole attachment agreement, and the bond requirement applies equally to all licensees that attach facilities to the company's poles for

commercial purposes. *See* Affidavit of Terrence Toland ("Toland Aff.") filed herewith, ¶ 2.[1] As such, it is a routine part of the licensing process and offers a just and reasonable means of protecting the pole owner without imposing more costly requirements on the licensee, such as a requirement to provide a deposit.

Shutesbury "agree[s] that the surety bond requirement is quite necessary and reasonable for other entities such as CATV corporations who routinely use space on utility poles." Petition at 2. The Petition thus rests entirely on Shutesbury's claim that it is entitled to special treatment and should not be put to the relatively minor expense of posting a bond solely because it is a municipality. That is mistaken as a matter of fact and law. Shutesbury is not merely using its fiber network for municipal purposes, such as fire or police signaling, but has established a commercial business that offers telephone and internet access services to the public. As detailed below, the risk to Verizon MA that a licensee will not or cannot pay its debts is no less, and is arguably greater, where the licensee is a municipality engaged in commerce than where it is a private company. Municipalities are generally inexperienced in the internet service provider ("ISP") business, and the new venture runs the heightened risks of failure common among start-ups. It may also be more, not less, difficult to collect debts from a municipality than from a private company.

Moreover, Shutesbury's commercial enterprise is a competitor of Verizon MA and a formidable one at that, having won over 87% of Verizon MA's former customers in the town. *See* Petition at 1. As such, Shutesbury's invocation of the "spirit of mutual benefit involved in the town/utility relationship," *id*. at 2, is inappropriate. Having elected to enter the internet service provider market, Shutesbury should be treated like any other ISP, and the Petition is

[1] Verizon MA does sometimes waive the bond requirement where the licensee attaches to a very small number of poles or uses a short stretch of conduit. *Id*.

simply an effort by a competitive ISP to reduce its operating costs by shifting risk to a competitor, and to other pole owners. That this ISP is also a government entity affords no basis for allowing such tactics. The Department should find that the bond requirement in the Agreement – which all parties agree is reasonable when applied to private commercial enterprises – is equally reasonable when applied to a municipality engaged in commercial activity and that it therefore satisfies the terms of M.G.L. c. 166, § 25A.

The Petition offers nine bullet-style arguments in support of its position that surety bonds "should be waived for the Town of Shutesbury and for all municipalities…." Petition at 2. None of these arguments has merit. Verizon MA responds to the individual arguments below, but as a general matter, they are woefully short on facts and legal authority, despite the requirement at 220 C.M.R. § 45.04(2)(c) that "in any case where it is claimed that a term or condition is unjust or unreasonable, the complaint shall specify all information and argument relied upon to justify said claim."[2] Moreover, Shutesbury has no standing or legal authority to represent other municipalities, and the issue before the Department is limited to the reasonableness of the bond provision as it applies solely to Shutesbury.

1. Shutesbury's claim that it is hard for a small town to negotiate with Verizon MA is neither true nor relevant. Verizon MA's License Administration Group ("LAG") is set up and specifically designed to manage access to the company's poles and conduit, and it regularly communicates with licensees and potentially licensees to resolve attachment and access issues, including pole surveys and management of make-ready projects. *See* Toland Aff. ¶ 3. Further, in this instance, Shutesbury did seek a change in the standard form pole attachment agreement, to

[2] In addition, 220 C.M.R. § 45.04(4) requires that "All factual allegations set forth in the complaint shall be supported by affidavit(s)." The affidavit filed with the Petition states only that the affiant is authorized to bring the Petition on behalf of Shutesbury. It does not purport to attest to the facts set forth in the Petition.

allow multiple parties (the Town of Shutesbury and the municipal light plant) to sign on as Licensees. Verizon MA agreed to the request, demonstrating its flexibility and willingness to negotiate. *Id.* ¶ 4. At no point, either at the inception of the Agreement or later, did Shutesbury ask Verizon MA to waive the bond requirement. *Id.* In any event, the degree of difficulty in making changes in the Agreement has no bearing on whether the bond requirement is reasonable.

2. Shutesbury's reliance on the petitions for grants of locations is misplaced. By their express terms, those petitions pledge to reserve space on the poles only "for the fire and police telephone signal wires belonging to the municipality and used by it exclusively for municipal purposes." Petition for Joint or Identical Pole Locations dated December 26, 2007, attached to the Petition in the Appendix: Pole Petitions. That reservation of space does not apply here, where Shutesbury has built an internet access network that is designed and intended for members of the public to use for their own purposes. In addition, the purpose of the pole petitions is to obtain grants of location for the company, not to set forth the terms and conditions on which the municipality may attach its facilities to those poles, and the petitions do not purport to state any such terms. Consequently, the absence of a bond requirement in the pole petitions does not imply that the pole owners agreed to allow access to their poles for commercial purposes without a bond. The only promise made in the pole petitions is to reserve space on the poles for the limited facilities and uses stated. And as noted above, it is a bit rich for Shutesbury to appeal to the "spirit of mutual benefit involved in the town/utility relationship" where Shutesbury is acting as a commercial enterprise and has taken most of Verizon MA's customers in town.

3. The assertion that "unlike other potential attaching entities like CATV, we build and maintain the public way at no cost to the utilities," Petition at 2, is off the mark. First, while the Town does not charge a fee specifically for use of the ways, Verizon MA and the other pole

owners do pay property taxes to the Town based on the value of their facilities in the ways. Second, the Town has no authority to charge the pole owners for use of the public ways in any event. M.G.L. c. 166, § 21 confers a statutory right on telephone companies and electric companies to place their facilities in the public ways such that they do not "incommode" the use of the ways by the public. To that end, M.G.L. c. 166, § 22 requires approval of the municipality and authorizes it to "by order grant to the petitioner a location for such line, specifying therein where the poles, piers, abutments or conduits may be placed." Nothing in § 22 or any other statute authorizes a municipality to charge a utility for placing its facilities in the public ways, and it therefore has no such power.

4. Shutesbury's argument that the bond requirement is not reciprocal fails for the same reasons. Shutesbury has no authority under M.G.L. c. 166, § 22, to require a bond from Verizon MA or the other pole owners, and the pole petitions do not evidence any promise by the pole owners to extend special, favorable terms to pole attachments by municipalities, and certainly not for commercial purposes. The fact remains that Shutesbury creates risk for Verizon MA by attaching to its poles, and it is reasonable for Verizon MA to require Shutesbury to provide security to cover that risk.

The reasonableness of that requirement is confirmed by the widespread use of bonding requirements in related contexts. Municipalities routinely require utilities to obtain bonds before performing excavation work in the public ways. And as the Department knows, M.G.L. c. 166A, § 5(k), requires a CATV operator to submit a bond to the licensing authority before commencing construction of its network in the municipality. Verizon MA has provided such bonds in more-than 100 communities in Massachusetts in which it is licensed to offer CATV service. *See* Toland Aff. ¶ 5.

5. Shutesbury seeks to differentiate itself from "CATV corporations" on the alleged grounds that "these corporations are more transient and more subject to volatile market and technology forces than towns," citing its own founding in 1735. Petition at 2. But the mere continued existence of a licensee is not the issue. Instead, the issues are the ability and willingness of the licensee to pay its debts and the ability of the pole owners to recover unpaid debts without undue expense. On that score, the fact that Shutesbury is a municipality causes at least as much concern for Verizon MA and the other pole owners than if Shutesbury were a private company.

Shutesbury offers no factual or legal support for its broad speculation that corporations are more subject to "volatile market and technology forces than towns," and the opposite may be true. When a town such as Shutesbury chooses to step into the commercial arena by offering internet service to the public, that town is just as subject to market and technology forces as any private company. Indeed, as a new entrant in a field in which it has no prior experience, in a very small market, Shutesbury is more likely to run into difficulties than are established communications service providers with substantial financial resources, such as Comcast or Charter. In recent years, many municipalities have entered the market for internet service providers but encountered lower-than-expected subscribership rates, higher-than-expected operating expenses, or both and have closed shop. For example, Burlington, Vermont, began offering fiber-based services to its residents in 2005. By 2015, however, the city wrote off as a loss a $16.9 million loan to its municipal telecom provider, BT, following years of negative cash flow. The city's credit rating was downgraded multiple times during this period, rebounding

only in 2017 when the city approved a process to sell BT.[3] Similarly, Provo, Utah, sunk $60 million into a fiber network beginning in 2003 to provide internet access to its residents. Low subscription rates, mounting debt and other issues eventually forced the city to try to sell the network. That effort spanned years and one failed transaction before the city finally sold the network to Google for one dollar ($1) in 2013.[4] As one study put it, "In short, Provo joins the growing list of municipalities that have been forced to cut their losses, abandon their GON [government operated network], and acknowledge their efforts to compete in the broadband sector did not live up to original expectations and ultimately proved costly to residents."[5] Based on a financial analysis of 20 municipal fiber projects across the country, another study warned that, "Underperforming projects have caused numerous municipalities to face defaults, bond rating reductions, and direct payments from the public coffers."[6] Clearly, a municipality entering the ISP business is just as subject to market and technology forces as any other provider, and may be less well-equipped to respond to those forces.

6. Contrary to Shutesbury's speculation, the prospect of a municipal bankruptcy and a receivership is not a panacea for pole owners. To begin with, Massachusetts law does not authorize municipalities to file for bankruptcy protection, and a municipality can likely be put into receivership only through a special act of the legislation, as in the cases of Chelsea and

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[3] *See* "Municipal Fiber in the United States: An Empirical Assessment of Financial Performance," Christopher S. Yoo and Timothy Pfenninger, University of Pennsylvania, at 21-22. Copy filed in the Appendix.

[4] *See* "Understanding the Debate Over Broadband Networks: Context, Lessons Learned, and a Way Forward for Policy Makers," Charles M. Davidson and Michael J. Santorelli, Advanced Communications Law and Policy Institute at New York Law School, 2014, at 83-88. Copy filed in the Appendix.

[5] *Id*. at 83.

[6] Yoo and Pfenninger, at 1.

Springfield.[7] The inability of creditors to force a municipality into bankruptcy or a receivership makes it more difficult, not less, to collect any debts.

Shutesbury also assumes that the only issue is whether the pole owners will ultimately be able to collect any debts that may arise.[8] A key purpose of a bond, however, is to provide a means of obtaining payment without the extraordinary expenses of litigation, special proceedings or years of wrangling with a failed or failing ISP while the pole owners carry the ISP's debt. Simply telling pole owners to wait years for a receiver to be appointed (should the Town decide to seek one) and to administer the debts while the ISP fails to pay its annual attachment fees or to move its facilities, for example, is not a reasonable remedy.

The prospect of selling Shutesbury's network offers pole owners no better recourse. Whether there would be buyers for the network in a very small town (adult population of 1,529 according to the Town's website) in which private enterprise has not built a network and the government-funded ISP has failed – and whether any such buyer would be willing to pay enough for the network to satisfy the ISP's debts – is doubtful. In any event, such a sale would be just one step in a long drawn-out process that would require substantial investment of time and resources by the pole owners. A bond is a reasonable means of providing pole owners a relatively inexpensive means of collecting their debts, not just ensuring that the debts will ultimately be paid.

Shutesbury offers no facts in support of its speculation that leaving abandoned plant on the poles might actually benefit the pole owners' networks. It might be theoretically possible for a tree or limb to fall in such a way that it rests only on a third-party strand without taking down

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[7] *See* Alston and Bird, LLP, "Managing Assets in Distress (MAD) Task Force," August, 2011, at 2, 5. Copy in the Appendix.

[8] And a receivership is no guarantee of payment. In both Chelsea and Springfield, the state-appointed receivers leveraged their authority to "coax creditors to voluntarily renegotiate contracts." *Id*. at 5.

the pole or interfering with the facilities of Verizon MA or the power company, thereby saving the company the expense of a truck roll to remove it, but it would be rare, and Verizon MA is not aware of instances in which it has actually happened. Toland Aff. ¶ 6. Any additional strength that third-party facilities provide the pole line is necessary only due to the additional strain those facilities put on the line and adds no value to Verizon MA's plant. To the contrary, abandoned plant interferes with Verizon MA's maintenance work on the poles, by adding another strand that the company's technicians have to care for in the event of an emergency pole replacement, relocation of poles due to street widening, or rearrangement of facilities to accommodate other licensees. *Id*. Abandoned plant adds unnecessary load to the poles and, with no one to maintain it, could eventually pose a safety hazard to pole workers and the public. *Id*.

As a condition for Verizon MA allowing it to install its facilities on the poles, Shutesbury agreed to remove those facilities in the event of termination of Agreement (*see* Agreement § 10.2.1), agreed that if it failed to do so, Verizon MA could do so at Shutesbury's expense (*id.*), and further agreed to provide a surety bond to back-up those promises, among others. *Id*. § 12.1. It did not protest or seek to change any of those provisions at the time.[9] Now, after installing its facilities on Verizon MA's poles and getting its business up and running, it should not be heard to claim that the bond requirement is unreasonable because, in Shutesbury's opinion, Verizon MA would be better off leaving the abandoned facilities in place.

7. There is no merit to Shutesbury's assertion that the pole owners would not be harmed by a waiver of the bond requirement because "they are never likely to have to exercise

[9] Verizon MA disputes Shutesbury's claim of duress, *i.e.* that "Our townspeople were desperate for reliable internet and we could not afford to delay the project further so we signed those standard agreements." Petition at 1. More than a year elapsed between the time Shutesbury first contacted Verizon MA regarding a potential pole attachment agreement and when it signed the Agreement. *See* Toland Aff. ¶ 4. That was more than enough time to seek changes in the standard form agreement and even to bring the issue to the Department had Shutesbury been so inclined.

their rights against such a bond." Petition at 3. Shutesbury offers no facts or analysis explaining why it thinks such an event is "supremely unlikely," and Verizon MA demonstrated above that failure of a municipal fiber project is by no means a rare occurrence. And total failure of the project is not a prerequisite to action against a bond, to recover unpaid attachment fees or the expense of relocating attachments the licensee has failed to move. Furthermore, the exact quantum of risk is beside the point. The risk exists, and it is properly borne by the party that created it, which is Shutesbury. If Shutesbury feels strongly that the level of risk is low, it should seek better pricing on its bond from the bond provider.

8. Contrary to Shutesbury's allegation, Verizon MA's pole attachment agreement with the University of Massachusetts at Amherst does include a bond requirement, and UMass has provided such a bond. Toland Aff. ¶ 7.

9. That National Grid's agreement with Shutesbury allegedly provides that the bond requirement may be waived is not relevant to Verizon MA's agreement, and the bond requirement itself is further evidence that such a provision is common, standard practice and reasonable.

WHEREFORE, Verizon MA requests that the Department: (1) find on the record before it that the bond requirement in Article XII of the Agreement is just and reasonable pursuant to M.G.L. c. 166, § 25A; and (2) deny Shutesbury's Petition.

Failing that, Verizon MA requests, pursuant to 220 C.M.R. § 45.05(3), that the Department convene an evidentiary hearing pursuant to 220 C.M.R. § 1.06.

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Respectfully submitted,

VERIZON NEW ENGLAND INC., d/b/a
VERIZON MASSACHUSETTS

By its attorney

Alexander Moore CB

_____

Alexander W. Moore
6 Bowdoin Square, 9th Floor
Boston, MA 02114
(857) 415-5130

Dated: January 19, 2021

Affidavit

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND CABLE

Town of Shutesbury v. Verizon New England Inc., Massachusetts Electric Company, d/b/a National Grid, and Western Massachusetts Electric Company, a/k/a Eversource	)	D.T.C. 20-4

AFFIDAVIT OF TERRENCE TOLAND

Terrence Toland hereby deposes and says:

1. I am a Principal Engineer in Network Engineering and Operations at Verizon. My responsibilities include managing pole and conduit license agreements in the states of Massachusetts, Rhode Island, Connecticut and New York. I work with potential new licensees to negotiate agreements as well as work to address issues that may arise under active agreements. I've been with Verizon for 25 years, including 15 years doing license-related work. I was personally involved in the communications between the company and Shutesbury officials that led to the creation of the pole attachment agreement between Verizon New England Inc. ("Verizon MA") and the Town of Shutesbury and Shutesbury MLP ("Agreement"). I offer this affidavit, based on my personal knowledge and experience except where otherwise noted, in support of the response of Verizon New England Inc. filed herewith.

2. The Agreement is in the form of Verizon's standard form pole attachment agreement, and the bond requirement in the Agreement applies to all licensees that attach facilities to the company's poles for commercial purposes. Verizon MA is sometimes willing to waive the bond requirement but only where the licensee attaches to a very small number of poles or uses a short stretch of conduit.

3. Verizon MA's License Administration Group ("LAG") is set up and designed to manage access to the company's poles and conduit by other parties, and we regularly communicate with licensees and potential licensees to resolve attachment and access issues, including pole surveys and management of make-ready projects.

4. Shutesbury initially contacted Verizon MA in or about July of 2016 to discuss the possibility of attaching a fiber network to the company's poles. Shutesbury did not, at that time or at any other time, ask Verizon MA to waive the bond requirement included in the form agreement or to remove or modify the provisions in Article X of the Agreement that require a licensee to remove its facilities in the event of termination and authorize Verizon MA to remove them if the license fails to do so. Shutesbury did, however, ask us to make a change in our standard form agreement to allow multiple parties (the Town of Shutesbury and the municipal light plant) to sign on as Licensees. Verizon MA agreed to this request. Shutesbury signed the Agreement in December of 2017.

5. I understand from others at Verizon that the company has provided bonds to over 100 communities in Massachusetts in which the company offers its Fios TV service.

6. It would be rare for a tree or a limb to fall in such a way that it rests only on a third-party strand on a Verizon MA pole without taking down the pole or interfering with the facilities of Verizon MA or the power company, thereby saving the company the expense of a truck roll to remove it. I am not aware of any instances in which that actually happened. Also, any additional strength that third-party facilities provide the pole line is necessary only due to the additional strain those facilities put on the line and adds no value to Verizon MA's plant. To the contrary, abandoned plant interferes with Verizon MA's maintenance work on the poles, by adding another strand that the company's technicians have to care for in the event of an

emergency pole replacement, relocation of poles due to street widening, or rearrangement of facilities to accommodate other licensees. Abandoned plant adds unnecessary load to the poles and, with no one to maintain it, could eventually pose a safety hazard to pole workers and the public.

7. Verizon MA's pole attachment agreement with the University of Massachusetts at Amherst does include a bond requirement, and UMass has provided such a bond.

Signed under the pains and penalties of perjury this 15th day of January, 2021.

Terrence Toland

Signed or attested before me on the
15th day of JANUARY, 20 21
by TERRENCE TOLAND

(Signature of Notarial Officer)

MUZZAMMIL M. IQBAL
MY COMMISSION EXPIRES JAN. 8, 2025
NOTARY PUBLIC
NEW HAMPSHIRE

Appendix

Municipal Fiber in the United States: An Empirical Assessment of Financial Performance

Christopher S. Yoo

John H. Chestnut Professor of Law, Communication, and Computer & Information Science at the University of Pennsylvania

Founding Director of the Center for Technology, Innovation and Competition

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CTIC
Center for Technology, Innovation and Competition

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Municipal Fiber in the United States: An Empirical Assessment of Financial Performance

Christopher S. Yoo and Timothy Pfenninger

Municipal Fiber in the United States: An Empirical Assessment of Financial Performance

Christopher S. Yoo* and Timothy Pfenninger**

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* John H. Chestnut Professor of Law, Communication, and Computer & Information Science and Founding Director of the Center for Technology, Innovation and Competition, University of Pennsylvania.

** Member of the University of Pennsylvania Law School J.D. Class of 2017 and Law Clerk Designate, Judge A. Richard Caputo, U.S. District Court for the Middle District of Pennsylvania. The authors would like to thank Timothy von Dulm and William Kirton for their assistance in this project.

EXECUTIVE SUMMARY

The current emphasis on infrastructure projects in the United States has intensified the debate over municipal broadband. Widespread news coverage of the municipally-owned electric power utility in Chattanooga, Tennessee, has led many cities to consider whether they should build their own fiber networks.

Unfortunately, city leaders who turn to existing municipal fiber analyses for guidance will discover that these studies limit their focus to the supposed success stories instead of systematically analyzing these systems' financial performance. Understanding how likely a project is to remain financially solvent is critical, because any shortfall would require a city either to inject additional taxpayer funds into the project or to default on its loan obligations. Either option would be costly and would hinder the municipality's ability to address other priorities.

This study fills this information gap by conducting a systematic analysis of every municipal fiber project in the United States based on the authoritative documentation issued by the cities, specifically the official legal disclosures filed with securities regulators when issuing municipal bonds and their audited financial statements. We identified 88 municipal fiber projects. Of these only 20 of them report the financial results of their broadband operations separately from the financial results of their electric power operations.

This report then applies the conventional tools of financial analysis to determine the likelihood that municipal fiber projects will remain solvent. Specifically, it focuses on Net Present Value (NPV), which provides a more accurate picture of the cash flowing into and out of an organization than do analyses based on a project's operating profits and losses. The report also takes a closer look at seven projects that either have been successful or have received substantial publicity: Bristol, Tennessee; Vernon, California; Chattanooga, Tennessee; UTOPIA, Utah; Burlington, Vermont; Lafayette, Louisiana; and Wilson, North Carolina.

An examination of the NPV covering the five-year period from 2010 to 2014 reveals that of the 20 municipal projects that report the financial results of their broadband operations separately, 11 generated negative cash flow. Unless these projects substantially improve their performance, they will not be able to cover the costs of current operations, let alone generate sufficient cash to retire the debt incurred to build the project.

For the nine projects that are cash-flow positive, seven would need more than sixty years to break even. Only two generated sufficient cash to be on track to pay off the debt incurred within the estimated useful life of a broadband network, which is typically projected to be 30 to 40 years. One of the two success stories is an industrial city with few residents that is unlikely to serve as a model for other cities to emulate. Regression models based on the data and the case studies of individual projects underscore the difficulty that municipal fiber projects face in becoming financially viable.

These results suggest that municipal leaders should carefully consider all of the relevant costs and risks before moving forward with a municipal fiber program. Underperforming projects have caused numerous municipalities to face defaults, bond rating reductions, and direct payments from the public coffers. In addition, troubled municipal broadband ventures take a toll on community leaders in terms of personal turmoil and distraction from other matters important to citizens. Although some claim that investing in fiber serves a necessary function of future-proofing a municipality's infrastructure, evidence shows little current need for such high broadband speeds. Sound fiscal policy favors timing capital investments so that they coincide with expected revenue, otherwise a city will be forced to pay interest on an investment that is not yet creating any benefits.

The high-level analysis presented in this study may overlook key details that can help explain the results in particular cases. In addition, the financial performance of some of these projects may improve in the future. That said, the overall results provide a useful snapshot of the nature and the size of the challenges that municipal fiber projects face. They also suggest that cities considering whether to initiate a municipal fiber project should carefully evaluate the performance of prior efforts and assess whether differences exist that would likely lead to a better outcome.

1. INTRODUCTION

Interest in government-owned telecommunications networks has waxed and waned over the years. For most of the twentieth century, nearly every country in the world except the United States relied on public ownership of telecommunications networks.[1] The results were poor service, high prices, and waiting lists for new connections that typically lasted several years. The 1984 reprivatization of the British telephone system sparked a global wave of privatization of telephone systems during the 1990s that led to significant reductions in price and improvements in service. Municipal Wi-Fi enjoyed a brief paroxysm of support during the mid-2000s, which soon faded after excessive costs and weak demand caused a number of prominent projects to fail.

More recently, the focus on advocacy for government-owned networks has centered on municipal broadband provided via fiber to the home (FTTH). Leading media outlets, such as the *New York Times* and CNN, have repeatedly pointed to Chattanooga, Tennessee, and other cities that have constructed public FTTH networks as success models worthy of emulation. In February 2015, Chattanooga joined Wilson, North Carolina, in successfully convincing the U.S. Federal Communications Commission to preempt state laws that block cities from constructing broadband networks, only to see that ruling struck down by the U.S. Court of Appeals in August 2016.

Interest in municipal fiber has not been restricted to the United States. A 2016 report prepared for the Organization for Economic Co-operation and Development (OECD) relied on case studies from a variety of countries (including Chattanooga as the U.S. example) to determine the proper role for municipal FTTH (see Mölleryd 2016). The Australian and New Zealand governments have made significant investments in FTTH with mixed results. The German and British governments are currently evaluating whether to use universal service funding to expand FTTH coverage.

To date, assessments of municipal fiber programs ... have been long on rhetoric and anecdotes and short on systematic empirical analysis.

To date, assessments of municipal fiber programs have largely consisted of advocacy pieces that have been long on rhetoric and anecdotes and short on systematic empirical analysis. Some of the reports have been in favor of municipal fiber.[2] Confidence in FTTH was buoyed by early reports about Google's efforts to build a fiber network in Kansas City and the subsequent expansion of this program into other municipalities.

Other analyses, however, have been more skeptical.[3] The fact that a number of prominent projects have exited the market by selling out to private companies at substantial losses has heightened concerns about municipal fiber's viability.[4] Some struggling projects have defaulted on the debt they issued to fund their municipal fiber networks or have faced downgrades to their bond ratings.[5] Google Fiber's recent announcement that it was reducing its staff by half and ceasing any further expansion of its fiber networks further dampened enthusiasm for FTTH.

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1. Even the United States indulged in an often overlooked one-year experiment with government ownership during World War I (Janson and Yoo 2013).
2. See Kandutch (2005); Scott and Wellings (2005); Mitchell (2007, 2011); Fiber to the Home Council (2009); O'Boyle and Mitchell (2012).
3. See Eisenach (2001); Bast (2002, 2004); McClure (2005); Fuhr (2012); Davidson and Santorelli (2014).
4. Marietta, Georgia (1996–2004), sold its system for $11.2 million at a loss of $24 million; Provo, Utah (2004–08), sold its system for $1, leaving behind $39 million in debt; Dunnellon, Florida (2011–13), sold its system for $1 million against $7.4 million in debt and substantial operating losses; Quincy, Florida (2003–14), incurred $5.1 million in debt and racked up $6 million in operating losses before transferring its operations to a private company; and Bristol, Virginia (2003–16), sold BVU Optinet for $50 million after it had invested $52.8 million in subsidies, $23.4 million in interfund transfers, and $79.6 million in bond funding and operating cash flow.
5. The cities that defaulted on their indebtedness include Burlington, Vermont, and Monticello, Minnesota. The Utah Telecommunication Open Infrastructure Agency (UTOPIA) is no longer covering the debt service on its bonds. The projects that had their bond rating cut include Burlington, Vermont; Salisbury, North Carolina; and Chattanooga.

Systematic data-based assessments of municipal fiber's financial performance have been rare. The few that exist have been helpful, but they did not attempt to analyze the entire universe of U.S. municipal fiber projects; did not apply the analytical tools that have become the established benchmark for financially evaluating projects, known as Net Present Value (NPV); and have become somewhat dated.[6] To fill this gap, we offer an empirical evaluation of municipal fiber projects in the United States, based on the official documents issued to support the bonds used to finance these projects and the audited financial statements these projects submitted during the five-year period from 2010 to 2014. These data permit an NPV analysis that provides insight into how likely municipal fiber projects are to succeed financially. Like any high-level analysis of multiple deployments, this study will no doubt may overlook some of the details and subtleties of particular projects. Analyzing data from authoritative sources in a systematic manner provides us with a methodologically valid way to draw comparisons across projects.

6. Lenard (2004) provides a helpful financial analysis of three cases studies, but covers the years 2001 to 2004 and bases its analysis on revenue and income rather than cash flow. Balhoff and Rowe (2005) provide the most sophisticated analysis in the existing literature, studying the cash flow of nine municipal broadband projects (including both fiber and non-fiber projects) and developing a pro forma cash flow model for fiber. It is based on data from 2002 to 2004, focuses on nominal operating cash flows instead of discounted cash flows, and does not take project cost into account.

2. THE RESEARCH DESIGN

As noted earlier, this study uses the conventional tools of financial analysis to assess the viability of U.S. municipal fiber projects. Some have argued that financial analysis represents the wrong basis for evaluating municipal fiber projects, claiming that broadband investments yield sufficient benefits to people to justify undertaking them even if they do not break even. Although such investments undoubtedly benefit taxpayers, the debts undertaken, and more importantly the cash needed to repay the creditors who purchase that debt, are real.

A project's failure to generate sufficient cash flow to service its debt leaves the sponsoring municipality with unattractive options. It could default on its indebtedness, which would raise the cost of every other debt-financed project that the city hopes to undertake in the future, or it could pass the indebtedness on to its taxpayers in the form of increased taxes or reduced services. Either option would impose significant costs on the city and would limit its ability to undertake other initiatives. The unattractiveness of these consequences underscores the need for decision makers to assess a project's financial viability before initiating it.

Others claim that FTTH investments are needed to future-proof a municipality's infrastructure. Although some day people may need the download speeds that FTTH makes possible, the evidence suggests little need for such speeds today. The U.S. take-up rate of gigabit service remains very low,[7] and media outlets report that consumers are questioning whether gigabit service is really necessary.[8] In addition, the recommended download speeds for leading applications,[9] empirical analyses of UK household bandwidth consumption,[10] and the lack of any appreciable demand for gigabit applications in countries that have large-scale fiber builds (such as Japan and South Korea) raise serious questions about whether the gigabit speeds associated with fiber are needed.

The U.S. take-up rate of gigabit service remains very low, and media outlets report that consumers are questioning if gigabit service is really necessary.

Wireless technologies—such as 5G—and legacy copper technologies—such as G.fast—are also exploring ways to provide gigabit speeds without incurring the cost associated with FTTH.

In any event, these arguments must confront the reality noted above that tax revenue is limited and debt financing is expensive. The fact that investments start incurring interest from the moment they are undertaken underscores the fact that there are real costs to making capital expenses before they are needed. Doing so not only increases the costs to taxpayers; it ties up funds and forecloses them from being invested in other areas that citizens need. It also runs the risk of obsolescence should a better technology come along. For these reasons, financial analysts typically recommend that any investments be timed so that they coincide with their expected benefits and associated revenue.

Municipalities should also not underestimate how much time and emotional energy a struggling municipal broadband operation can consume. The adverse impact of financial problems is reflected not only on a city's balance sheet and tax rates, but also in the initiatives that are not undertaken because of city leaders' need of to focus on addressing any problems associated with broadband operations. Decision makers must consider the risk that a struggling municipal broadband network might consume much of their time while in office.

7. FCC (2014).
8. See Dougherty (2014); Baumgartner (2016).
9. For example, Netflix recommends download speeds of 5 Mbps for HD quality video and 25 Mbps for Ultra HD, a technology that is not yet in widespread use. Skype multiparty videoconference recommends 8 Mbps. Services of providing less than 100 Mbps can easily satisfy these demands even for households downloading to multiple screens simultaneously.
10. A consultant's study commissioned by the Broadband Stakeholder Group (a consortium of equipment companies, media companies, network providers, and the UK Department for Culture and Sport) examined UK usage data and concluded that the median UK household would require 19 Mbps by 2023 and the top one percent of UK households would require 35-39 Mbps (Kenny and Broughton 2013). The modest nature of the bandwidth estimate is particularly striking given that if anything, the consortium members' interests tend to lean toward finding greater demand for bandwidth, which would facilitate members' sales revenue.

The simple fact is that financial solvency matters regardless of the presence or absence of other benefits. Even those who base their support for municipal fiber on non-financial goals should still be interested in the likelihood that the project will become insolvent and require an infusion of taxpayer funds.

2.1 The Data

As noted above, our data set is based on our best efforts to identify every municipal fiber project in the United States. Our principal source is the January 2015 report by the Executive Office of the President, called *Community-Based Broadband Solutions*. We augment this list by consulting a variety of trade and scholarly publications (see Fiber to the Home Council 2009; Montagne and Chaillou 2010). Together these sources identify 88 local governments as having deployed FTTH. The relatively small number of examples underscores one significant limitation of relying on municipal broadband to reach communities that do not currently have service: The need for access to rights of way has meant that until recently municipal broadband has deployed in areas where the city already provides electric power, which is roughly 14 percent of the U.S. population. A few cities have recently begun deploying municipal fiber in areas not served by a municipal power utility. The financial performance this approach will achieve remains to be seen.

Bloomberg's data transparency feature provides access to PDF versions of the audited financial statements for each of these projects from 2010 to 2014. Many of the providers aggregate their broadband and electric power operations into a single set of financial results instead of reporting the results of their broadband and electric power operations separately. Consequently, separate financial data is available for only 20 of the 88 U.S. fiber projects sponsored by local governments. Of these, two projects spanned multiple cities—the Electric Power Board of Chattanooga and the Utah Telecommunication Open Infrastructure Agency (UTOPIA)—and another was initiated by a county—Churchill County, Nevada.

There appears to be no reason to assume that the decision whether to report financial results of broadband operations separately biases the sample in ways that would make municipal fiber projects look artificially unattractive. If anything, municipalities with poorly performing fiber projects are more likely to obscure their poor performance by consolidating their results with other operations.[11] The fact that the 2010 to 2014 timeframe also necessarily omits municipal fiber projects that became insolvent and were sold to private companies at substantial losses prior to 2010—such as Marietta, Georgia (1996–2004), Quincy, Florida (2003–05), and Provo, Utah (2004–08)—provides further reason to believe that if anything, the sample studied in this report portrays municipal fiber in a more favorable light than would a financial assessment of the entire universe of municipal fiber builds.

Basic demographic data about the 20 projects for which separate financial data exist appear in Table I. A project's starting date and the number of households in the community provide key information about each project's size and maturity, which in turn help place its financial results in perspective. The demographic data regarding median household income and population density (taken from the U.S. Census) shed light on the economic environment in which each project operates.

The projects range in age, with the oldest being 14 years old and the youngest being four years old as of 2014. The cities in which these projects operate vary widely in terms of size, with the smallest having only 27 households and the largest spanning nearly 155,000 households; the median community consists of 10,000 households.

11. The incentives to conceal poor financial results are demonstrated eloquently by the municipal fiber project in Bristol, Virginia, known as CPC OptiNet. It launched in 2004 in partnership with Bristol Virginia Utilities (BVU) and the Cumberland Plateau Company (CPC). OptiNet's performance was obscured by the fact that BVU largely excluded OptiNet's operations from its financial reports while simultaneously failing to issue separate financial statements for OptiNet. In 2009, BVU transitioned from municipal ownership to being an independent authority owned by the state in order make borrowing easier, which removed it from the oversight of the Bristol city council. Even though OptiNet has received $22.7 million in federal subsidies, $30.1 million in state subsidies, and $23.4 million in interfund transfers from BVU's electric power operations and invested an additional $79.6 million generated through bond funding and operating cash flow, a state audit concluded that OptiNet does not have the resources to continue operating without receiving cross-subsidies from other operations that are prohibited by state law (Virginia APA 2016). OptiNet's leadership has recently come under fire for improper management and conflicts of interest. In March 2017, OptiNet's owners entered into a contract to sell its broadband operations to Sunset Digital for $50 million, which is essentially the amount of indebtedness remaining on the project without taking the subsidies into account.

Table I:

Basic Demographic Data

Municipality	Start of Project	Number of Households	Median Household Income	Population Density per Square Mile
Fayetteville, TN	2000	3,286	$29,963	1,401
UTOPIA, UT	2002	145,327	$57,778	3,704
Kutztown, PA	2002	2,066	$46,887	3,191
Windom, MN	2004	2,328	$38,764	1,117
Pulaski, TN	2005	3,960	$26,228	1,200
Burlington, VT	2006	17,012	$42,677	4,096
Lafayette, LA	2007	53,633	$46,288	2,482
Tullahoma, TN	2007	8,896	$34,829	794
Clarksville, TN	2007	56,524	$47,092	1,392
Chattanooga, TN	2008	154,746	$48,537	623
Monticello, MN	2008	5,004	$72,650	1,427
Wilson, NC	2008	21,630	$37,676	1,907
Salisbury, NC	2010	14,163	$34,959	1,488
Churchill County, NV	2004	10,756	$49,830	5
Vernon, CA	2005	27	$32,188	22
Loma Linda, CA	2005	9,624	$54,720	3,100
Bristol, TN	2005	12,515	$35,621	908
Morristown, TN	2006	12,640	$33,217	1,394
Brookings, SD	2007	8,895	$41,172	1,705
Powell, WY	2007	2,811	$45,245	1,486
High	2011	154,746	$72,650	4,096
Low	2000	27	$26,228	5
Median	2006	10,190	$41,925	1,414
Standard Deviation	2.2	43,561	$10,627	1,093

As might be expected for areas where local governments decided that public financing is required, the cities in which these projects operate appear to be slightly below the national median for household income, with the median household income of nearly $42,000 in the dataset falling below the 2014 national median of nearly $54,000. The data also suggest that high median income is no guarantee for success. The only project operating in a city with a median income substantially above the national median—Monticello, Minnesota—has already defaulted on the debt used to finance that project.

All of the projects except for two exceeded the national average population density of 92 people per square mile, as well as the benchmark for rural areas of 500 people per square mile. Churchill County, Nevada, is a thinly populated, highly rural area with a population density of five people per square mile. Vernon, California, is a largely business and industrial area with fewer than 100 residents and 30 households.

For the 20 municipal fiber projects that report the results of their broadband operations separately, we relied on the audited financial statements to provide the cash flow data necessary to calculate NPV, as described in Section 2.2. Although the financial statements contain some suggestions that some cities may have transferred in additional money to cover operating shortfalls, we took the data reported financial

statements at face value without correcting for such transfers.

The two additional facts needed to assess NPV—project cost and weighted average cost of capital (WACC)—are taken from the official documents issued to underwrite the bonds used to finance each project, as reported to the Municipal Securities Rulemaking Board (MSRB). The project costs reflected in the bond documents may underestimate the actual capital costs for some of these projects. A review of media and industry reports suggests that many of these projects were supported by transfers or loans from a municipality's electric power operations that are not reflected in the bond financing.

Table II:

Overview of Dataset

Number of Municipalities	Cash Flow	Project Cost	Cost of Capital
13 municipalities	Actual	Actual	Actual
7 municipalities	Actual	Estimated	Estimated

Seven projects did not submit their bond issuance documents to the MSRB. For these projects, we estimate project cost based on the median project cost per household (adjusted for 2010 dollars) for the 13 projects for which we have data, which is $2,215 per household. We then multiply the median adjusted project cost per household by the number of households in the city to derive a data-based estimate for adjusted project cost. For the WACC, we use the median of the 13 projects for which we have data.

Table III reports the financial data on project cost and WACC. On this table, project cost is stated in the actual amounts cited at the time the project was initiated. Those project costs are adjusted to 2010 dollars using the Bureau of Labor Statistics' average annual inflation rate from 2000 to 2010 of more than two percent. Note that project cost does not include any federal or state subsidies. In addition, the project cost includes only the cost to construct the basic fiber network and does not include the capital costs of attaching customers to the network.

The costs of the projects for which we have financial data range from more than $765 to $5,549 per household, adjusted to 2010 dollars, with a median of $2,215 per household. These numbers are higher than the project cost for Verizon's FiOS project, which were approximately $750 per home passed. They are lower than the estimated $3,000 per-household cost for Australia's attempted public fiber network that proved nonviable.

The project cost data for the two cities with substantially lower population densities than the others in the sample warrant some additional discussion. First, the fact that Churchill County has a population density of only five people per square mile suggests that its project costs may well exceed the median adjusted project cost of the sample.

Second, Vernon, California, has an estimated adjusted project cost of $59,390. With a population density of only 22 people per square mile, basing project costs on adjusted project cost per household is likely to yield estimates that are too low. Furthermore, Vernon is atypical in that it is an industrial city near Los Angeles with fewer than 30 households that caters primarily to businesses. The commercial focus of this project implies that the project cost estimate based on the number of households probably underestimates the project cost. A review of Vernon's annual financial report suggests that the cost of the project was $3 million as of 2006, which is the equivalent of $3.4 million in 2010 dollars, which is much higher than the estimated adjusted project cost reported above and equal over $125,000 per household.

[P]roject cost does not take into account any subsidies provided by state governments or the federal government.

In addition, project cost does not take into account any subsidies provided by state governments or the federal government. For example, it omits the $111.5 million in stimulus spending provided to Chattanooga or the $16.2 million promised to UTOPIA under the American Recovery and Reinvestment Act of 2009. Future projects are unlikely to benefit from such subsidies. As a result, the conclusions based on these data are probably best regarded as a best-case scenario from the standpoint of municipal fiber.

Regarding weighted average cost of capital, the median for the 13 projects for which we have data is five

Table III:

Basic Financial Data

Municipality	Project Cost	Adjusted Project Cost	Adjusted Project Cost per Household	Weighted Average Cost of Capital
Fayetteville, TN	$11,000,000	$14,039,772	$4,237	6.26%
UTOPIA, UT	$185,000,000	$224,877,300	$1,547	10.77%
Kutztown, PA	$5,800,000	$7,050,207	$3,412	6.36%
Windom, MN	$9,470,000	$10,963,025	$4,709	6.12%
Pulaski, TN	$8,500,000	$9,602,904	$2,425	3.90%
Burlington, VT	$33,000,000	$36,383,199	$2,139	7.25%
Lafayette, LA	$110,405,000	$118,789,745	$2,215	4.98%
Tullahoma, TN	$16,975,000	$18,264,172	$2,053	4.24%
Clarksville, TN	$40,200,000	$43,253,003	$765	4.65%
Chattanooga, TN	$162,000,000	$170,101,635	$1,099	4.85%
Monticello, MN	$26,445,000	$27,767,517	$5,549	6.68%
Wilson, NC	$29,190,000	$30,649,795	$1,417	4.36%
Salisbury, NC	$30,000,000	$31,500,303	$2,224	5.11%
Churchill County, NV	$20,578,667 (est.)	$24,893,781 (est.)	$2,215 (est.)	5.11% (est.)
Vernon, CA	$61,278 (est.)	$59,390 (est.)	$2,215 (est.)	5.11% (est.)
Loma Linda, CA	$18,867,693 (est.)	$22,064,618 (est.)	$2,215 (est.)	5.11% (est.)
Bristol, TN	$24,535,450 (est.)	$28,692,715 (est.)	$2,215 (est.)	5.11% (est.)
Morristown, TN	$25,392,589 (est.)	$28,779,887 (est.)	$2,215 (est.)	5.11% (est.)
Brookings, SD	$17,869,231 (est.)	$20,252,935 (est.)	$2,215 (est.)	5.11% (est.)
Powell, WY	$5,786,521 (est.)	$6,225,980 (est.)	$2,215 (est.)	5.11% (est.)
High	$185,000,000	$224,877,300	$5,549	10.77%
Low	$61,407	$59,390	$765	3.90%
Median	$22,557,059	$26,299,149	$2,215	5.11%
Standard Deviation	$50,147,004	$57,141,294	$1,143	1.45%

percent. One outlier bears mentioning: UTOPIA has a WACC of nearly 11 percent, well above the next highest WACC of seven percent. UTOPIA's WACC differs from the others' because it was the only project to base its bond on a variable interest rate. We based our estimated WACC on the maximum interest rate permitted by the three bonds used to finance the project, which varied from 10 percent to 12 percent. Admittedly, the maximum interest rate is likely higher than what UTOPIA actually paid. In fact, a review of the financial statements reveals that the interest rate for UTOPIA's bonds varied from 0.15 percent to 2.83 percent from 2010 to 2014. That said, because UTOPIA generated negative cash flow from 2010 to 2014, the use of the higher WACC actually reduces the size of the losses and thus represents a conservative assumption that places the project in the most favorable possible light. Note also that removing UTOPIA's WACC from the data would have a negligible effect on the median WACC used as an estimate for the seven projects for which we do not have complete data, only causing it to drop from 5.11 percent to 5.04 percent.

2.2 Five-Year Net Present Value (NPV)

The data from the official bond documents can be combined with the data from the audited financial statements submitted by these projects to calculate the primary financial tool used by the investment community for valuing projects: Net Present Value (NPV). NPV reflects that the fact the income statements typically provide a misleading perception of an ongoing operation's viability. Instead of basing its analysis on the accounting profits and losses reported on the income statement, NPV focuses on the cash flowing into and out of an organization. Cash flow is generally regarded as more relevant because it (and not income) determines whether an organization becomes insolvent and must either raise more capital or default. The critical importance of cash flow explains why all financial statements include statements of cash flow along with balance sheets and income statements and why creditors place the most emphasis on projected cash flows.

We then calculate cash flow for each project for the five years beginning in 2010 and ending in 2014. The standard method for calculating net cash flow in financial statements requires adding noncash operating expenses back to operating income to determine the impact of a particular year's operations on each municipality's cash position. Noncash adjustments can be significant, sometimes causing a given year's cash flow to deviate from its reported income by millions of dollars.

The most significant noncash expense is depreciation, which is the method for allocating the costs of long-lived capital investments across multiple years. Consider a project that requires an up-front investment of $30 million for equipment that is expected to last 30 years. On income statements, the cost of that investment is allocated across the expected useful life of the project, which under straight-line depreciation would be $1 million per year. The impact of this investment on the project's cash position is much different. The project would have to make the entire $30 million payment in year zero and no additional payments in any later years. This means that the income statement will overstate the project's financial performance in year zero and understate the project's financial performance in all later years.

Income statements also exclude non-operating cash expenses, such as "capital and related financing," which includes payments to cover financing obligations as well the cost to acquire any additional capital that may have become necessary. These amounts must also be taken into account when determining cash flow even though they will not appear on the income statement. Note that this analysis does not take into account interfund transfers from a municipality's electricity operations or from other forms of noncapital financing used to support either FTTH operation. Indeed, there is evidence that some municipalities may have made some transfers to balance their books in particular years. The systematic, city-specific examination that would be required to determine whether shortfalls in FTTH operations were being covered by transfers from other accounts would have caused so much deviation from the data as reported that we opted to rely on the data from the financial statements without identifying and correcting for these transfers.

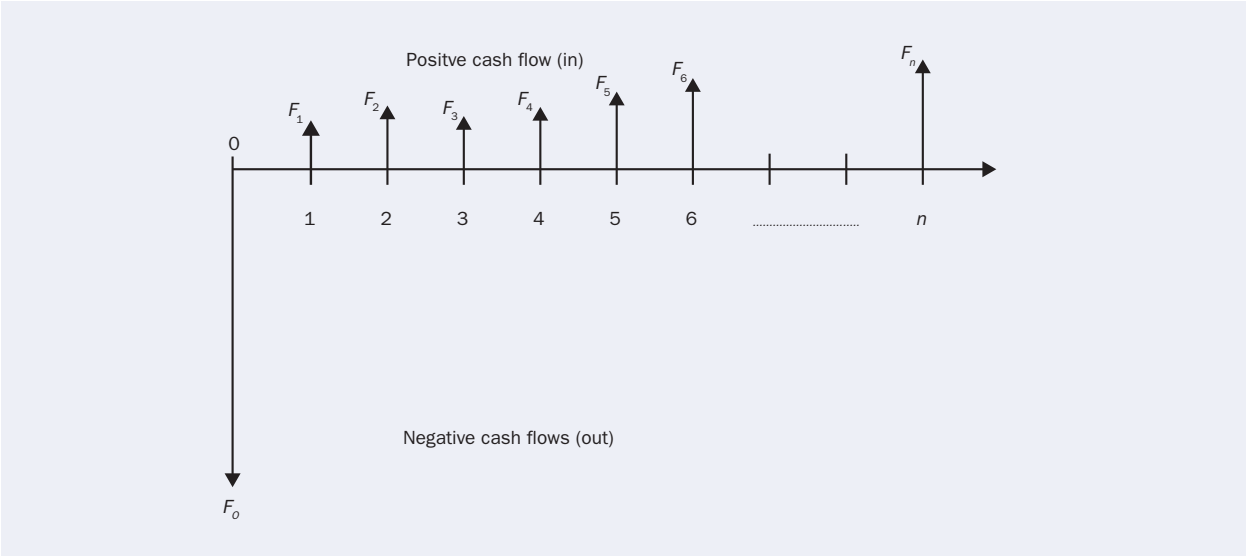
Note also that bonds are sometimes structured to require minimal capital repayments during most of their life and to make a large balloon payment towards the end of the bond period. Balloon payments are appropriate for projects with long useful lives that are likely to be refinanced by additional bonds. The fact that broadband networks are assumed to have useful lives of 30 to 40 years raises questions about using such a repayment structure for a municipal fiber project. In any event, the use of large balloon payments towards the end of the project means that the cash flow data from 2010 to 2014 do not include their fair share of capital service. As such, they arguably portray an optimistic picture of these projects' financial prospects.

The cash flow for any particular year also properly includes any increases or decreases in net working capital required by operations, which is the change in the project's current assets and current liabilities. This adjustment accounts for increases in noncash current assets, such as accounts receivable, which are reported as revenue on the income statement but are not immediately realized as cash. Similarly, this adjustment also accounts for increases in current liabilities, such as accounts payable, which are reported as an expense on the income statement but are not immediately paid out in cash. Changes in working capital can be quite significant.

Lastly, future cash flows are generally worth less than current cash flows. The real impact of a $1 million expense is less than $1 million if it can be delayed by a year, because the money can be invested during that year and earn interest or, if the organization is already in debt, can reduce the principal on which the project must pay interest during that year. Conversely, $1 million in receipts is worth less if postponed a year,

Figure 1:

Expected Cash Flow Pattern for an Investment



because the project must forego any returns it could have realized if it had received that money a year earlier. NPV accounts for these changes by discounting all cash flows, whether positive or negative, by the project's weighted average cost of capital. This can be understood either as the cost needed to finance the cash flow for a year or as the value that could have been earned if the cash were invested for a year. The resulting discounted cash flow (DCF) represents the value of any particular year's cash flow adjusted for 2010 dollars.

The expected pattern for an investment is a large negative cash flow in year zero, followed by positive cash flows in future years, as depicted in Figure 1. It is quite likely that during the early years of a project, the cash flow may be negative as the project finds its footing.

Table IV shows an example—Chattanooga—of the approach taken to value each of the 20 municipal fiber deployments. The results show how cash flow can deviate substantially from operating income. On the one hand, the presence of large expenses for depreciation and amortization causes operating income to provide too pessimistic a picture of Chattanooga's annual cash flow. On the other hand, the omission of capital and financing cash flows cuts in the other direction. Changes in working capital can apply in either direction. The net effect depends on which of these effects dominates the others. For example, Chattanooga's operating income was smaller than cash flow in 2010 but larger than cash flow in 2011 to 2014. These differences underscore the importance of looking at cash flow instead of operating income and losses.

Table IV:

Five-Year Net Present Value for Chattanooga

Year	2010	2011	2012	2013	2014
Operating Income	-$742,000	$3,729,000	$8,803,000	$11,270,000	$17,456,000
Depreciation/Amortization	$5,751,000	$8,136,000	$10,829,000	$12,343,000	$15,073,000
Other Noncash Adjustments	-$199,000	$3,759,000	-$3,190,000	$806,000	$573,000
Cash Flow from Capital and Related Financing	-$6,197,000	-$16,060,000	-$15,576,000	-$25,200,000	-$33,624,000
Change in Net Working Capital	$3,780,000	$3,147,000	-$1,025,000	-$1,675,000	-$131,000
Period Cash Flow	$2,393,000	$2,711,000	-$159,000	-$2,456,000	-$653,000
Weighted Average Cost of Capital	4.85%	4.85%	4.85%	4.85%	4.85%
Net Present Value of Period Cash Flow	$2,282,379	$2,466,150	-$137,953	-$2,032,397	-$515,393
Cumulative Net Present Value of Period Cash Flows	$2,282,379	$4,748,529	$4,610,576	$2,578,179	$2,062,787

3. THE EMPIRICAL RESULTS

We replicate the five-year NPV calculation conducted on the financial data from Chattanooga for all of the projects encompassed in our study. The results for 19 projects include the period beginning in 2010 and ending in 2014. One project (Vernon, California) did not begin reporting its fiber operations separately until 2011 and thus yields only four years of data. NPV provides the standard tool for analyzing a project's financial success.

3.1 Assessing Each Project's Potential for Success

We compare each project's five-year NPV to its project cost to evaluate the likelihood that the project will remain solvent. To correct for differences in project age, we adjust all project costs to the equivalent of 2010 dollars. As noted earlier, project cost does not include any state or federal subsidies.

If a project's five-year NPV is negative, the fact that ongoing operations are creating cash losses raises serious questions about whether the project should continue to operate. If a project's five-year NPV is positive, its likelihood of breaking even depends on whether the positive cash flow is large enough to cover the project cost. To provide some sense of the likelihood, we calculate the number of years a project would take to recover its project costs if it were to continue to generate cash at the rates generated from 2010 to 2014. We also report the age of the project and the current rate of revenue growth to provide perspective about the likelihood that a project's financial condition might sufficiently improve in future years to make the project financially viable. The growth rates for extremely young projects are expected to be very high, as the denominator for any growth calculation is likely to be quite small. Growth rates can be expected to taper off as a project matures.

Even before taking into account project cost, a key finding is that 11 of the 20 projects are cash-flow negative, many of them substantially so. The modest revenue growth rates for most of these cities offers little promise that their operations are likely to improve enough to become cash-flow positive, let alone cover project costs. Of those with the highest growth rates, one (Monticello, Minnesota) has already defaulted on its bonds and another (Salisbury, North Carolina) has had its bond rating cut out of concern that a default may be imminent.

For projects that are cash-flow positive, the key question is whether the cash flows are sufficiently large to support recovery of project costs. A rough estimate of how quickly municipal fiber projects can expect to cover their project costs is the number of years it would take the projects in our data set to recover its initial project costs if operating cash flow remained at 2010 to 2014 levels. For reference, financial statements often estimate that fiber networks will have a useful life of 30 to 40 years.

For projects that are cash-flow positive, the key question is whether the cash flows are sufficiently large to support recovery of project costs.

Of the nine projects in our dataset that are cash-flow positive, five have cash flow that is so small that recovering project costs would take more than a century (Pulaski, Tennessee; Tullahoma, Tennessee; Chattanooga, Tennessee; Powell, Wyoming; Brookings, South Dakota). Again, the relatively modest annual growth rates raise serious questions about how much these projects' financial performance is likely to improve. For two other municipalities (Fayetteville, Tennessee; Windom, Minnesota), the recovery period is 61 and 65 years, beyond the 30- to 40-year expected useful life of a fiber network.

The data identify only two potential success stories. First, at 34 years, Bristol, Tennessee, is on track to recover its project costs within a reasonable life expectancy of the fiber network.[12] Second, Vernon generated enough cash flow from 2011 to 2014 to cover its estimated adjusted project costs. As noted earlier, Vernon's municipal fiber project is atypical in ways

12. Note that Bristol, Tennessee, refers to the project in Tennessee operated by Bristol Tennessee Essential Services (BTES), not the project in Bristol, Virginia, operated by Bristol Virginia Utilities (BVU) that was recently sold to a private company.

Table V:

Discounted Cash Flow Analysis

Municipality	Age of Project as of 2010	Net Present Value 2010-14	Adjusted Project Cost	Years for Project to Turn Positive	Annual Rate of Revenue Growth
Fayetteville, TN	10	$1,141,877	$14,039,772	61	4.53%
UTOPIA, UT	8	-$7,188,982	$224,877,300	never	16.77%
Kutztown, PA	8	-$1,748,722	$7,050,207	never	3.10%
Windom, MN	6	$838,936	$10,963,025	65	9.86%
Pulaski, TN	5	$97,948	$9,602,904	490	10.30%
Burlington, VT	4	-$10,605,688	$36,383,199	never	0.68%
Lafayette, LA	3	-$36,086,333	$118,789,745	never	35.94%
Tullahoma, TN	3	$846,549	$18,264,172	108	20.13%
Clarksville, TN	3	-$7,442,513	$43,253,003	never	23.65%
Chattanooga, TN	2	$2,062,787	$170,101,635	412	41.08%
Monticello, MN	2	-$25,508,327	$27,767,517	never	34.86%
Wilson, NC	2	-$2,900,201	$30,649,795	never	10.12%
Salisbury, NC	2	-$1,702,339	$31,500,303	never	103.82%
Churchill County, NV	6	-$470,833	$24,893,781	never	-2.39%
Vernon, CA	5	$156,602*	$59,390	2	16.63%
Loma Linda, CA	5	-$2,445,825	$22,064,618	never	10.32%
Bristol, TN	5	$4,168,048	$28,692,715	34	19.22%
Morristown, TN	4	-$4,281,017	$28,779,887	never	8.28%
Brookings, SD	4	$290,521	$20,252,935	349	4.27%
Powell, WY	3	$24,847	$6,225,980	1,253	14.88%
High	10	$4,168,048	$224,877,300	1,253	103.82%
Low	2	-$36,086,333	$59,390	never	-2.39%
Median	4	-$1,086,586	$26,299,149	108	10.32%
Standard Deviation	2.2	$9,549,916	$57,141,294	375	22.06%

* Represents only four years of data

that may understate its project costs, and the city's commercially oriented nature limits its usefulness as a role model for other cities. If we use the adjusted project cost of $3.4 million derived from Vernon's 2006 financial statements, the payback period lengthens to 110 years.

3.2 Modeling the Returns for a Hypothetical Project

The data permit us to estimate how a hypothetical project might perform. We approach this in two ways. First, we use the actual returns achieved by these cities to estimate how a future project might perform during the 14-year period for which we have data. Second, we conduct regression analysis on the data to construct a model that allows us to project the financial performance of a hypothetical project into the future.

Beginning first with the model based on actual returns, the data include projects of a wide range of ages. Some of the projects were newly formed, with one starting the year after the study period began. The oldest had been operating for 10 years as of 2010 and for 14

years as of 2014. Together these data provide actual cash flows covering the first 14 years of the various municipal fiber projects' existence.

We normalized the annual cash flows to 2010 dollars. To correct for differences in project size, we reported the cash flows on a per-household basis. Because Vernon is predominantly targeted toward businesses, we conduct analyses both including Vernon and excluding Vernon as an outlier. We then took a simple average of the results that all of the projects achieved for any particular year. For example, the data set includes annual cash flows for five projects that were in their second year of operation. We averaged the normalized per-household cash flows for those five cities to obtain an estimate of how a hypothetical project might perform in year two. After repeating the analysis for years zero to 14, we added the average DCFs to estimate how a hypothetical project might perform in the first 14 years of its life. The results are reported in Table VI.

If a hypothetical project were to achieve the same results for the first 14 years of its existence as the average of the projects in our dataset, it would have an aggregate negative discounted cash flow of more than $705 per household. Taking into account the median project cost of $2,215 per household, a hypothetical project that achieved the same returns as the projects in our dataset would lose more than $2,920 per household during its first 14 years. Although the average cash flows are somewhat unstable year to year, the overall trend is positive.

To project beyond 14 years, we conduct a regression analysis to the annual data reported above. A linear regression estimates that a hypothetical project would recover the median adjusted project cost per household of $2,215 in 115 years. (Details appear in Appendix I, and the results are depicted in Figure 2.) If Vernon is omitted as an outlier case, the time to recover the adjusted project cost per household extends to 125 years. Including controls for median household income and population density extends the break even time periods to 81 years and 136 years respectively. All of these estimates far exceed the 30- to 40-year expected life of a fiber network. These results should be interpreted with considerable caution. The fact that the data set only consists of 99 observations limits the statistical significance of this model.

The regression depicted in Figure 2 assumes that cash flow would follow a pattern of linear growth. However, the economic, technological, and business literature usually assumes that adoption of new products will follow an S-curve, with adoption beginning somewhat slowly at first, accelerating as the product gains acceptance, and then slowing down as the market approaches saturation. If so, the constant and inexhaustible growth assumptions associated with linear models would be unduly optimistic.

Even if Vernon is omitted as an outlier, the model estimates that a hypothetical project would take 109 years to recover the median adjusted project cost.

Fortunately, transformations exist that can fit regressions to an S-curve. The results of this regression are depicted in Figure 3. (See Appendix II for details.) Interestingly, fitting the data to an S-curve yields an estimate that starts at a lower level than under a linear regression during the initial years of the project. The S-curve pattern calls for cash flow to reach saturation and taper off. As a result, the S-curve model estimates that a hypothetical project would take 318 years to recover the median adjusted project cost of $2,215 per household. Even if Vernon is omitted as an outlier, the model estimates that a hypothetical project would take 109 years to recover the median adjusted project cost.

As was the case with the linear model, these estimates exceed the expected 30- to 40-year expected life of a fiber network. Again, the small number of observations limits the statistical significance of these results and emphasizes the need for exercising considerable caution in placing too much weight on these conclusions.

3.3 Analysis of the Determinants of the Results

A further regression analysis sheds light on which factors contribute to viability and nonviability. Specifically, we explore whether the poor results are the result of weak revenue from attracting too few subscribers, inefficient operations, or capital expenses that are too high. (For details, see Appendix III.)

Table VI:

Discounted Cash Flow per Household by Project and Project Age

	Period Discounted Cash Flow per Household														
Years after 2010	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Salisbury, NC	$44	-$236	$106	-$60	$26										
Wilson, NC			-$2	-$83	-$113	$50	$14								
Chattanooga, TN			$15	$16	-$1	-$13	-$3								
Monticello, MN			-$2,205	-$824	-$448	$122	-$1,743								
Powell, WY				-$1	$36	-$6	-$28	$8							
Brookings, SD				$89	-$104	$100	$14	-$67							
Tullahoma, TN				-$19	$123	$14	-$11	-$11							
Clarksville, TN				-$74	-$44	-$10	$3	-$7							
Lafayette, LA				-$316	-$219	$23	-$89	-$72							
Morristown, TN					-$8	$30	-$456	$41	$55						
Burlington, VT					$14	-$963	$23	$21	$281						
Bristol, TN						$60	$245	$14	$13	$1					
Pulaski, TN						$5	-$15	$18	-$3	$20					
Loma Linda, CA						-$75	-$37	-$54	-$39	-$49					
Vernon, CA							$658	$5,473	$1,541	-$1,872					
Windom, MN							-$40	$938	-$665	$123	$5				
Churchill County, NV								-$26	$0	-$24	$1	$4			
Kutztown, PA									-$21	-$196	$8	$45	-$682		
UTOPIA, UT									-$0	$31	-$94	$15	-$1		
Fayetteville, TN											$165	$29	-$69	$126	$97
Average Per Year	$44	-$236	-$521	-$141	-$67	-$51	-$98	$483	$116	-$246	$17	$23	-$251	$126	$97

Figure 2:

Linear Regression Analysis

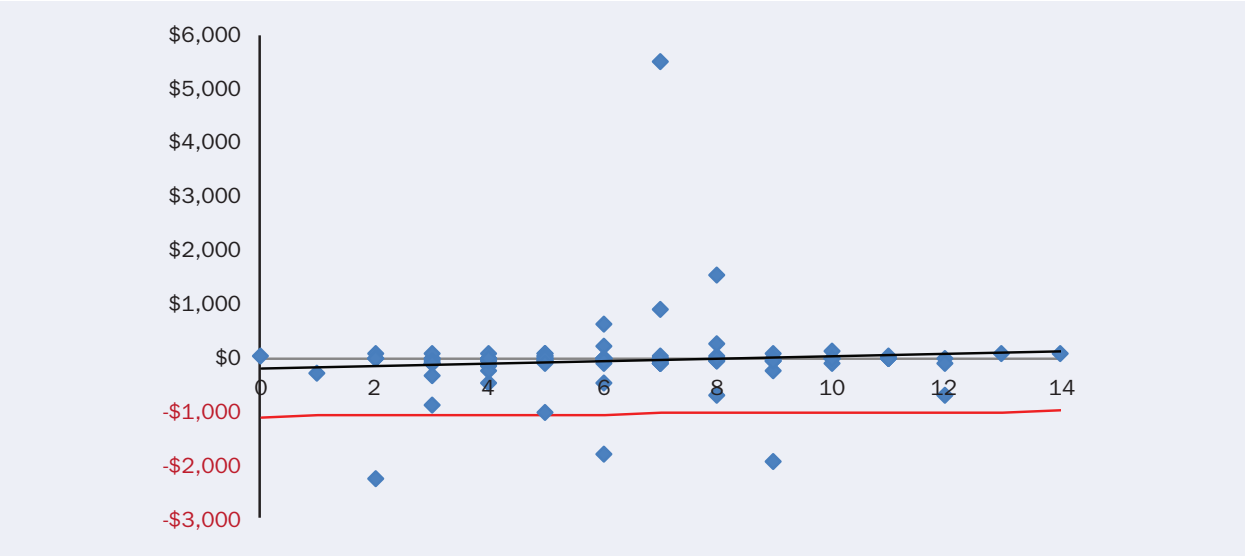
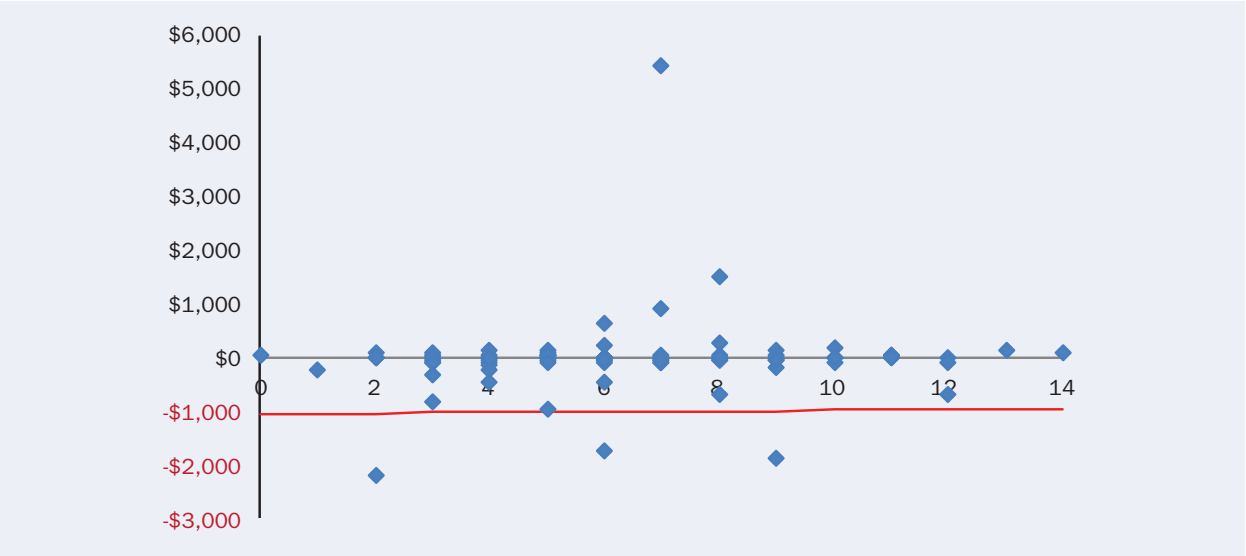


Figure 3:

S-Curve Regression Analysis



The dependent variable is constructed by dividing the adjusted project cost by NPV from 2010 to 2014. This provides a measure of what fraction of the adjusted project cost was recovered during that five-year period. Regarding the independent variables, capital expenses are measured by adjusted project cost per household in 2010 dollars. The strength of revenue generation is measured by revenue per household in 2014. Operating efficiency is measured by operating cost as a percentage of operating revenue in 2014. The data are summarized in Table VII.

Regressions on the full dataset identified revenue per household tended as statistically significant and yielded coefficients that were very similar in specifications that both omitted and included median household income and population density as controls. Specifications that omitted Vernon found operating

Table VII:

Project Cost, Operating Revenue, and Operating Cost

Municipality	Net Present Value 2010-14 per Adjusted Project Cost	Adjusted Project Cost per Household	Revenue per Household	Operating Expense per Operating Revenue
Vernon, CA	2.64	$2,215	$12,398	185%
Bristol, TN	0.15	$2,215	$1,507	85%
Fayetteville, TN	0.08	$4,237	$1,145	86%
Windom, MN	0.08	$4,709	$1,162	93%
Tullahoma, TN	0.05	$2,053	$698	86%
Brookings, SD	0.01	$2,215	$4,160	89%
Chattanooga, TN	0.01	$1,099	$645	83%
Pulaski, TN	0.01	$2,425	$797	87%
Powell, WY	0.00	$2,215	$104	86%
Churchill County, NV	-0.02	$2,215	$229	110%
UTOPIA, UT	-0.03	$1,547	$37	129%
Salisbury, NC	-0.05	$2,224	$340	78%
Wilson, NC	-0.09	$1,417	$588	95%
Loma Linda, CA	-0.11	$2,215	$43	87%
Morristown, TN	-0.15	$2,215	$707	88%
Clarksville, TN	-0.17	$765	$267	108%
Kutztown, PA	-0.25	$3,412	$581	115%
Burlington, VT	-0.29	$2,139	$426	94%
Lafayette, LA	-0.30	$2,215	$599	92%
Monticello, MN	-0.92	$5,549	$352	160%
High	2.64	$5,549	$12,398	185%
Low	-0.92	$765	$37	78%
Median	-0.03	$2,215	$484	91%
Standard Deviation	0.64	$1,143	$757	27%

efficiency to be statistically significant, although inclusion of controls for median household income and population density caused the statistical significance to disappear. The fact that these regressions yielded statistically significant results based on only 19 or 20 observations is remarkable. These results suggest that the manner in which a municipal fiber project is operated, both in terms or generating revenue and minimizing operating cost, play a more critical role in the success of a municipal fiber project than the upfront capital costs.

4. CASE STUDIES

The overall data paint a relatively pessimistic picture of municipal fiber projects' financial prospects. Of the 20 projects, more than half are cash-flow negative, and 18 were unable to generate sufficient cash between 2010 and 2014 to recover their project costs within the life expectancy of the broadband network.

That said, insight can be gained by conducting case studies of specific projects to see the causes of success and failure. This section begins by focusing on the potential success stories: Bristol, Tennessee, and Vernon, California.

This section also examines a number of other projects that have garnered significant attention from industry analysts, policy advocates, and the media, starting with Chattanooga and proceeding to the others in the order of their date of inception. Media attention is admittedly a nonobjective basis for selecting case studies, but if anything, the bias is toward those projects that are regarded as the most promising. Moreover, like the underlying data set, these case studies do not include municipal fiber projects that have already been liquidated, such as Provo, Utah, which was sold to Google for $1 and still left the city holding $39 million in debt; Dunnellon, Florida, which was sold for $1 million and left behind $7 million in debt after losing as much as $300,000 per month; and Marietta, Georgia, which sold its $30 million fiber network at a loss of $11 million.

On the other hand, the case studies omit a number of projects that have garnered little media attention but are sufficiently cash-flow positive to have an outside chance of breaking even. Specifically, these include Fayetteville, Tennessee, and Windom, Minnesota, which would recover their project costs in less than 70 years at the cash-flow rates achieved from 2010 to 2014. Unfortunately, there is insufficient secondary material to develop full case studies around these projects.

4.1 Bristol, Tennessee

Of all the projects in this study, the project operated by Bristol Tennessee Essential Services (BTES) appears to be the only one with a reasonable prospect of recovering its costs. BTES began providing telephone and Internet service via DSL in 2005 and began offering gigabit service via a fiber network in 2012.

If BTES continues to generate cash flow at the rate it achieved from 2010 to 2014, it would pay off its estimated project cost in 34 years. The pattern of the cash flows do raise some cause for concern. Although the project is cash-flow positive over the entire five-year period running from 2010 to 2014, the magnitude of the cash flows decreased during the last three years of the study, dropping from a high of $245 per household in 2011 to a mere $1 per household in 2014. This is a particular concern because BTES did not begin offering fiber until 2012. The strong 2010 and 2011 results thus reflect the success of BTES's DSL operations, although BTES undoubtedly incurred capital costs in 2010 and 2011. While BTES continued to be cash-flow positive in 2012–2014, the overall performance from 2010–2014 likely overstates its chances to break even. If the analysis is restricted to the cash-flow rates from 2012–2014, the break even period lengthens to over 200 years. The project is relatively young, and revenue grew at a robust rate of more than 19 percent from 2010 to 2014; that time period covered years five to nine of the project's overall operations. This suggests that its cash flow has some upside room to grow.

The data reveal the reasons for BTES's success. BTES's revenue of more than $1,500 per household exceeds the dataset average of nearly $450 per household reflected in the overall data set and ranks third among the projects we studied. BTES also appears to be operating efficiently, with costs amounting to 85 percent of revenue. Note that we estimated BTES's project cost at $24.5 million based on the median cost per household in our data set. BTES's financial statements reflect the more modest amount of $14.8 million in capital assets in its Advanced Broadband Services Business Unit.

Somewhat surprisingly, BTES has garnered relatively little publicity despite its strong performance. In 2010, city leaders began a drive to use fiber to attract new businesses in an attempt to capture some of the acclaim being garnered by Chattanooga.

4.2 Vernon, California

On paper, the municipal fiber project initiated by Vernon appears to possess the best financial picture in our data set. The project only began reporting its broadband operations separately in 2011, so the

data cover only four years. Between 2011 and 2014, Vernon averaged a DCF of more than $38,000 per year for a four-year total of $156,602. The fact that the estimated project cost was less than $60,000, measured in 2010 dollars, suggests that Vernon should have been able to recoup its investment in less than two years. A review of Vernon's annual financial statements suggests that the project costs were substantially higher, equalling $3 million as of 2006, in which case the payback period lengthens to over 100 years.

A closer look raises further questions about whether Vernon can serve as a model for other cities. Vernon is the smallest incorporated city in California, covering only 5.2 square miles. It is an industrial city just south of downtown Los Angeles with only 30 homes and 100 residents, compared with the 1,800 businesses and 55,000 people employed there. That explains why its population density of 22 people per square mile is so much lower than that of the other cities in this study. The fact that the network was constructed for businesses and not residents suggests why the estimate based on the number of households appears to understate the true project cost. It also explains why Vernon was able to generate revenue per household that is 24 times higher than the overall rates generated by the projects in this study.

In addition, the financial results raise some cause for concern. As an initial matter, Vernon's municipal fiber project consistently runs annual operating losses of roughly $275,000, although these paper losses are largely the product of large depreciation and other noncash adjustments that do not affect cash flow. At the same time, the cash flow in 2014 was negative after running positive from 2011 to 2013. In addition, revenue grew only at an annual rate of almost 17 percent. Such a low growth rate does not augur well for a young project.

Of even greater concern are the problems identified in a 2011 investigative report published by the *Los Angeles Times* (Becerra 2011). The paper reported that Vernon's electric utility amassed nearly half a billion dollars in debt through a series of increasingly complex and grandiose investments, as well as excessive spending on employee compensation and fees for lawyers and consultants. Although the article concluded that Vernon is unlikely to default on its obligations, its bond rating is relatively low compared with its peers. The city also raised electric power rates 16 percent in 2011 and announced plans to increase rates five percent each year for the next decade after that. Vernon's atypical nature is further underscored by the fact that Vernon pays its city leaders and outside legal counsel far more than the average city. Allegations of public corruption have also led the California State Assembly to consider legislation to force Vernon to disincorporate.

Vernon's unusual demographic characteristics make project cost difficult to estimate and make it problematic as a model for other cities to follow. In addition, the troubled state of the electric power utility raises plenty of reasons for caution.

4.3 Chattanooga, Tennessee

Of all the projects in this study, the project in Chattanooga is by far the best known. Key policymakers, such as the OECD and the Federal Communications Commission, and media thought leaders, such as the *New York Times* and the *Washington Post*, repeatedly point to Chattanooga as a model for others to emulate. Chattanooga now promotes itself as "Gig City" and claims to have attracted new businesses and jobs to the area. Chattanooga has actively advocated for expanding municipal fiber, having successfully petitioned the FCC in February 2015 to preempt state laws barring municipal broadband; that decision was appealed and overturned by the courts in August 2016.

Although associated most strongly with Chattanooga, the project also includes other nearby cities.[13] It is run by the Electric Power Board of Chattanooga (EPB), which also serves as the electric power utility for the area. The EPB board approved the plan to offer FTTH service in 2007, and Chattanooga granted EPB a franchise to do so in 2008. Initial planning was financed by a $50 million loan from EPB's electric power operations. Construction was financed by $220 million in local revenue bonds, $162 million of which were used to fund the fiber project. The project also received $111.5 million in federal stimulus funding from the U.S. Department of Energy to promote the deployment of smart grids. The project cost in this analysis considers only the $162 million of bond revenue and omits the $50 million EPB loan and $111.5 million in stimulus funding.

13. The Chattanooga project also provides service to Red Bank, East Ridge, Ridgeside, Hamilton County, Signal Mountain, Soddy Daisy, and Rossville in Tennessee and Lookout Mountain in Georgia.

EPB began offering broadband service in 2009 and has achieved strong penetration. It generated more than $1,200 per household in 2014, compared with the average of $446 generated overall by the projects in this study. Lower-speed subscriptions accumulated, although the high prices (more than $350 per month) slowed adoption of gigabit service. *The Economist* (2012) reported that EPB had only nine residents and two business that had subscribed to the $350 gigabit service two years into the project. EPB subsequently dropped prices to more competitive levels and now is enjoying more robust subscribership for gigabit service.

EPB's fiber operations were cash-flow positive by roughly $2 million from 2010 to 2014. While repaying the project cost would take 412 years at this rate, the project is relatively young, and revenue grew at a healthy 41 percent annual rate from 2010 to 2014.

A closer look at EPB's financial returns does raise some concerns about EPB's future. EPB's fiber operations did generate over $2 million in positive cash flow during the five-year period from 2010 to 2014. Unfortunately, this number is dwarfed by the $162 million in bond indebtedness that EPB undertook to finance this venture. In addition, an examination of the annual cash flows from 2010 to 2014 reveals that although cash flow was positive for 2010 and 2011 and for the entire five-year period, it was negative in 2012, 2013, and 2014. The instability of cash flows caused by major financing deadlines makes it difficult to determine whether this represents a broader trend that is likely to continue. Moreover, the Chattanooga bond requires a $71.7 million principal payment in 2033, which represents 44% of the total indebtedness. Backloading the repayment of principal is quite common. It envisions that the bond will be refinanced with another a new issuance. That said, because the cash flows from 2010 to 2014 do not include a proportionate share of the repayments of principal, if anything these data understate the difficulties that Chattanooga may face in covering its project costs.

A final note of caution comes from the fact that EPB achieved these returns with the support of $111.5 million in stimulus funding that future projects are unlikely to be able to duplicate. Including the stimulus money in the project cost would increase the time needed for the project to break even from 412 years to 683 years, assuming that cash flow remains at the rates realized during the period from 2010 to 2014.

The 2007 EPB proposal that supported the Chattanooga project was based in part on the assumption that the fiber optic network would provide sufficient benefits to the smart grid to justify the expense, even if EPB did not use it to offer broadband service. This statement should be approached with considerable caution. State laws typically prohibit the use of electric power operations to cross-subsidize telecommunications operations and vice versa. To the extent that this is true, public utility laws and sound economic and accounting principles dictate that the electric power operations should compensate the fiber operations for these benefits. That would also permit the cash-flow analysis to accurately reflect these benefits. If these benefits would be sufficient to cover the project cost, even in the absence of broadband customers, then the size of the cross-subsidy is likely to be significant.

4.4 UTOPIA, Utah

The Utah Telecommunication Open Infrastructure Agency (UTOPIA), a consortium of 16 Utah cities that joined together in 2002 to provide a public fiber network, has had an unusually troubled history. UTOPIA was initially financed by $135 million in bonds. Eleven of the cities together pledged an aggregate of $202 million of their sales tax revenue over 20 years to cover up to 39 percent of the indebtedness and interest should the venture fail. UTOPIA would serve the five cities that refused to pledge their sales tax revenue only after the buildout of the 11 pledging cities was complete.[14] The network operates on a wholesale basis, by relying on other ISPs to offer retail services using its facilities.

As of 2007, the network's financial performance trailed projections by a wide margin, offering service to less than one third of the number of projected addresses, essentially providing full service to three cities and partial service to three additional cities, and signing up only 12 percent of the number of projected subscribers. The project was further distracted by a protracted battle over a $66 million loan offered

14. The 11 pledging cities are Brigham City, Centerville, Layton, Lindon, Midvale, Murray, Orem, Payson, Perry, Tremonton, and West Valley City. Five cities are currently non-pledging members of UTOPIA: Cedar City, Cedar Hills, Riverton, Vineyard, and Washington City. Salt Lake City and South Jordan considered joining, but declined. Roy and Taylorsville initially joined, but are no longer part of UTOPIA.

by the U.S. Department of Agriculture's Rural Utility Service (RUS). RUS provided an initial $21 million in funding in 2007, but refused to release the remainder until UTOPIA "improved its financial condition and developed a new business plan." At that point, UTOPIA was insolvent, burdened by $11 million in construction costs that it had expected the RUS loan to cover, although UTOPIA eventually settled a lawsuit against RUS in 2014 for $10 million. The project replaced its management team, and 10 of the pledging UTOPIA cities backed a new $185 million bond issue to repay RUS, cover the shortfall, and retire the original loan. These cities increased their pledge from $202 million to $495 million and extended the pledge period from 20 years to 33 years. The city of Payson chose not to support the new bond issue.

The new financing failed to put UTOPIA on a sound financial footing. Heavy losses in 2009 and 2010 left the project insolvent once again. UTOPIA began to call on its cities make good on their pledges by providing between $250,000 and $3.3 million annually. West Valley City faces the largest potential burden, totaling $147 million over 30 years. In 2010, UTOPIA was awarded $16.2 million in federal stimulus funding as part of the Broadband Technology Opportunities Program (BTOP) created by the American Recovery and Reinvestment Act of 2009. UTOPIA received $7 million of the stimulus funding in 2013 and $1.6 million in 2014.

Despite these additional investments, UTOPIA has continued to perform poorly, earning $22.4 million in negative cash flow from 2010 to 2014. UTOPIA's financial statements reflect total liabilities of $333.5 million, including the $185 million in bonds issued in 2008 and notes for $56 million, for a negative net worth of $167 million. It has consistently struggled to meet its coverage targets. As a result, adoption has lagged far behind projections. With only 11,000 subscribers, UTOPIA realized less than $30 in revenue per household in 2014, well below the $446 per household benchmark achieved by the other projects in this data set. Revenue growth is sluggish at almost 17 percent.

Because UTOPIA was unable to raise any further funding through its own organization, nine of the included cities created a sister organization, known as the Utah Infrastructure Agency (UIA), to obtain new financing for building out areas not yet served. UIA raises capital to connect areas that demonstrate sufficient interest in supporting the network extension and interconnects that new network with UTOPIA. UIA was able to issue bonds for $29.5 million in 2011, followed by an additional $11.2 million in 2013 and $24.3 million in 2015, for a total of $65 million. UIA has also suffered from cash flow problems, with a negative cash flow of $18.5 million from 2010 to 2014, although its operations turned cash flow positive in 2015 and 2016.

State officials have criticized UTOPIA. A 2012 audit conducted by the Legislative Auditor General of Utah admonished UTOPIA for investing in poorly utilized and partially completed portions of the network, using debt financing to cover operating costs, engaging in poor planning and mismanagement, choosing unreliable business partners, and generating insufficient subscribers. UTOPIA has stopped covering the debt service on the $185 million bond, although UIA has covered all payments on its $65 million in bonds.

In 2014, the Australian investment firm Macquarie Capital offered to invest $30 million to complete the network, but only if all of the citizens of the 11 cities would pay a monthly utility fee of $20 regardless of whether they subscribed to the network or not. Five of the 11 cities refused to agree to the plan. At that point, those five cities began withholding their payments to UTOPIA pending a clearer outlook of the project's future.

There are some signs that UTOPIA may expand its coverage. Five additional cities have granted UTOPIA franchise agreements: Salt Lake City, Bountiful, Draper, Pleasant Grove, and South Jordan. These cities will not contribute funds to build out the network. Instead, UTOPIA now employs a practice known as demand aggregation, in which it only operates in new areas where a sufficient number of customers have already committed to subscribe. The expectation is that this expansion will be targeted at first exclusively at business customers, although UTOPIA's management expresses hope that the service would eventually be extended to residences as well.

4.5 Burlington, Vermont

Another municipal fiber project that was once held up as a positive example, but whose star has fallen precipitously, is Burlington, Vermont. Burlington Telecom (BT) began offering FTTH service in 2005 after securing $22.5 million in financing from Koch Financial. In August 2007, BT replaced this initial financing with $33.5 million in funding from CitiFinancial. When the economic crisis hit in 2008, BT surreptitiously borrowed $16.9 million from Burlington's "cash pool" and

held it for more than 60 days, in violation of the terms of the Certificate for Public Good issued by the city.

The city council appointed a blue ribbon commission to conduct an investigation, which concluded that BT had spent too much and carried too much debt for its customer base such that it could not possibly break even. BT ceased making payments to CitiFinancial in 2010, at which point ownership of BT's fiber and electronics transferred to CitiFinancial. Because of these problems, Moody's downgraded Burlington's credit rating three times in two years, although Moody's upgraded Burlington's outlook to positive in March 2017 following the city council's approval of the process to sell BT. Because the indebtedness was secured by the network equipment, CitiFinancial essentially became the network owner, although observers questioned what this actually meant. In 2014, CitiFinancial settled its dispute with BT for $10 million, which the city financed through a side deal to sell BT's assets to a local investor and then lease them back. The settlement also required that BT be sold to private interests, although the city could retain partial ownership, and gave the local investors more control the longer the sale was delayed. In 2015, the city wrote off as a loss the $16.9 million that BT owed to it. The fiber network is currently on the market.

During the five-year period from 2010 to 2014, Burlington generated a negative cash flow of $10.6 million. That is largely the result of a $19 million increase in working capital in 2011, which is most likely a one-time recognition of BT's $16.9 million debt to the city. Despite having the highest population density of any city in this study, its 2014 revenue consisted of less than $430 per household, which is below the levels achieved by the average project in our data set. From 2010 to 2014, revenue grew at a paltry 0.7 percent, owing to Burlington's decision to eliminate all funding for marketing the network. The completeness of Burlington's failure is demonstrated by the fact that municipal fiber advocates who once touted Burlington as a model for others to follow now hold it up as a lesson of how not to run a municipal fiber system.

4.6 Lafayette, Louisiana

Lafayette, Louisiana, represents another municipal fiber system often identified as a role model for other cities to follow. Although feasibility studies began in 2004, a court action forced the Lafayette Utility System (LUS) to submit the bond issue to a referendum in 2005, which passed with 62 percent support. After further court battles were resolved in LUS's favor by the Louisiana Supreme Court in 2007, LUS issued $100 million in revenue bonds. It began construction on LUS Fiber in 2008 and began offering service in 2009. LUS also issued $14.6 million in bonds in 2011 and an additional $7 million in 2012. LUS's electrical operations also loaned $16.4 million to LUS Fiber, and the Lafayette City Council approved a $5.5 million loan in 2012.

LUS Fiber operated at a negative $36.1 million in cash flow from 2010 to 2014, which is the largest loss in absolute terms of the 20 projects in this study and the third largest loss on a per-household basis (behind Monticello, MN, and Kutztown, PA). Poor operations have led management several times to push back the date that operations were projected to become self-sustaining. Like Chattanooga, Lafayette annual cash flows do not include a proportionate share of repayment of principal. Instead, the Lafayette bond calls for a principal repayment of $18.5 million in 2031, which represents roughly 23% of the total indebtedness. This suggests that Lafayette would appear even less likely to be able to cover its project cost if the cash flows from 2010 to 2014 had included a proportionate share of the principal. Despite the negative cash flow, a search of news reports failed to reveal any allegations that LUS Fiber may be struggling financially or may be about to default on any of its obligations. The fact that revenue grew at a healthy annual rate of nearly 36 percent from 2010 to 2014 suggests there may be some reason for optimism. However, Moody's has expressed concern that including broadband operations in LUS's debt ratios raised questions about its ability to cover its debts.

4.7 Wilson, North Carolina

Another project often described by advocates in glowing terms is the municipal fiber project in Wilson, North Carolina, which operates under the name Greenlight. This project has received endorsements from key opinion leaders such as President Obama and the *New York Times* and has won several national awards.

Begun in 2006, Greenlight began offering service in 2009. To raise the $29.2 million needed to construct the network, Greenlight used a novel financing mechanism known as "certificates of participation," which allows the network itself to serve as collateral rather than turn to taxpayers as guarantors. Wilson joined Chattanooga in convincing the FCC in February 2015

to preempt state laws that prohibited cities from building broadband networks, only to see that effort struck down by the courts in August 2016.

During the five-year period under study, Greenlight had a negative cash flow of $2.8 million. The pattern of cash flow growth is somewhat complicated, in that the project generated increasingly negative cash flows in 2010, 2011, and 2012, only to turn cash-flow positive in 2013. Cash flow remained positive in 2014, but to a smaller degree than in 2013. Revenue per household of nearly $590 exceeded the dataset average of $446. The fact that operational cash flow is negative raises questions about whether the project will remain solvent, particularly given that revenue grew at the somewhat modest annual rate of 10 percent from 2010 to 2014. As was the case with the Chattanooga and Lafayette bonds, Wilson's bond includes a large payment towards the end of the project. Specifically, Wilson is due to make a $6.3 million payment in 2033, which represents roughly 20% of the total indebtedness. Again, such balloon payments are common for bonds that are expected to be refinanced with new debt. Still, it suggests that the Wilson fiber build would have appeared even less likely to cover its project cost on a standalone basis had the cash flow data from 2010 to 2014 included a proportionate amount of the repayment of principal. Despite the negative cash flow, a review of news reports failed to uncover any indications that Wilson is exhibiting financial distress.

5. CONCLUSION

To date, debates over municipal fiber have been long on rhetoric and short on systematic empirical analysis. This report attempts to fill that void and provide cities weighing whether to initiate a municipal fiber project with the hard data they need to decide whether to proceed. NPV is generally recognized as the standard methodology for evaluating investments. Examining NPV and audited financial statements provides the firmest possible foundation on which to base such an analysis.

The data contained in this study are sobering. Municipal fiber is not an option for the 86 percent of the country that is not served by a municipal power utility. Of the 20 municipal fiber projects that reported the results of their municipal fiber operations separately, eleven generated negative cash flow. Unless operations improve substantially, these projects cannot continue to operate over the long haul, let alone cover the capital costs needed to establish operations. Of the others, five are projected to take more than 100 years to recover their costs, and two others are projected to take over 60 years. Only two are on track to break even, and one of those is based on a highly urban, business-oriented model that few other cities are likely to be able to replicate, and the other includes data from two years of stronger performance when it offered only DSL service.

A closer examination of specific projects reveals that the risks and consequences are quite real. Many cities managing these projects have faced defaults, reductions in bond ratings, and ongoing liability, not to mention the toll that troubled municipal broadband ventures can take on city leaders in terms of personal turmoil and distraction from other matters important to citizens. City leaders should carefully assess all of these costs and risks before permitting a municipal fiber program to go forward.

APPENDIX I

The first regression constructs a simple linear model of the DCFs from 2010 to 2014. It is based on the data set reported in Table V, which consists of the DCFs by year normalized to 2010 dollars. The data are also reported on a per-household basis to account for differences in project size. Each DCF is assigned an age based on the number of years the project had been operating at the time of a particular DCF, which ranges from zero to 14. The dependent variable is simply the DCFs, and the independent variable is the year. The analysis includes specifications that include and omit Vernon and specifications that include controls for median household income and population density. Standard errors are clustered by project.

The results yield a model that begins with a negative constant and grows slowly over time. The model predicts that the project will take 115 years to recover the median adjusted project cost of $2,215. If Vernon is omitted as an outlier, the time to recover the median adjusted project cost lengthens to 125 years. Including controls for median household income and population density shortens the time to recover median adjusted project cost to 81 years for the model including Vernon and lengthens it to 136 years in the model excluding Vernon.

Care should be placed on attributing too much weight to the results of these models. The relatively small number of observations and the simplicity of the model prevent them from achieving statistical significance.

Table A-1:

Linear Model of DCFs

Specification	Including Vernon	Excluding Vernon	Including Vernon	Excluding Vernon
Year	20.636 (19.072)	19.412 (18.058)	18.856 (13.929)	13.073 (11.230)
Median household income			-0.0165** (0.0077)	-0.0150* (0.0074)
Population density			-0.0941 (0.1112)	0.0143 (0.0559)
Constant	-144.416 (174.654)	-197.308 (161.948)	684.869 (371.567)	440.859 (242.476)
Observations	99	95	99	95
R^2	0.01	0.02	0.10	0.23

*** significant at the 99% level, ** significant at the 95% level, * significant at the 90% level

APPENDIX II

The second regression uses a transformation to fit the data to an S-curve. The independent variable is normalized to a range from [0, 1]. In the case of the DCF data at the heart of this study, this requires adding $2,500 to each DCF and then dividing the resulting sum by $8,000. This yields values ranging from [0.037, 0.997]. The resulting values are then transformed in accordance with the formula $y' = \ln\frac{y}{1-y}$. The transformed variable is regressed against the year number to produce an estimation in the form $y' = \alpha + \beta x$. Standard errors are again clustered by project. The results are then converted back into untransformed estimates using the formula $y = \frac{e^{\alpha+\beta x}}{1+e^{\alpha+\beta x}}$, which should fit an S-curve. The normalization is then reversed by multiplying by $8,000 and then subtracting $2,500. The use of a transformation precludes running specifications including controls.

The result is an estimate that is fitted to an S-curve. Under the specification including all of the data, the model estimates that the project will take 318 years to recover the median adjusted project cost in our dataset of $2,215 per household. Omitting Vernon as an outlier yields a model that estimates that the project will take 109 years to recover the median adjusted project cost.

Table A-2:

S-Curve Model of DCFs

Specification	Including Vernon	Excluding Vernon
Year	0.00844 (0.00800)	0.0129 (0.0088)
Constant	-0.397*** (0.73)	0.284*** (0.061)
Observations	99	95
R^2	0.01	0.02

*** significant at the 99% level, ** significant at the 95% level, * significant at the 90% level

APPENDIX III

The third regression attempts to measure which factors are driving municipal fiber projects' successes or failures: revenue generation, operating efficiency, or capital costs. The dependent variable is constructed by dividing the adjusted project cost by NPV from 2010 to 2014. This provides a measure of what fraction of the adjusted project cost was recovered during the five-year period running from 2010 to 2014 reported in Table VII.

Regarding the independent variables, the strength of revenue generation is measured by revenue per household in 2014, which as the last year of our study measures the project's most mature operations. Operating efficiency is measured by operating cost as a percentage of operating revenue in 2014. Capital costs are measured by project cost per household normalized to 2010 dollars.

We ran four specifications. The first includes all 20 of the projects in our data set. The second excludes Vernon as a potential outlier, given that the value for its independent variable is so discontinuous with the other projects, likely driven by the manner in which the project's commercial nature understates its adjusted project cost per household. We ran specifications that both omit and include population density and median income as controls. The results are as follows:

The results of the regression conducted on the full data set (that is, including Vernon) identify two factors as statistically significant. The regressions that omit Vernon yield statistically significant results for revenue per household, which has a *t* value of 4.15 and a statistical significance of 99.9 percent. The specification including the controls also yields weak statistical significance for adjusted project cost per household, with a coefficient that is 1.7 times smaller. Although operating efficiency has the largest coefficient and the coefficient has the wrong sign, it lacks the statistical significance to exclude the possibility that it is different from zero. The R^2 for these regressions are 0.87 and 0.90. Overall, such results are remarkable for a data set consisting of only 20 entries.

Excluding Vernon from the data set produces coefficients that are similar, but reduces the size of the coefficients for both of the variables found to be statistically significant in the first specification. Most importantly, the specification without the controls identifies operating efficiency as statistically significant. The magnitude of the coefficient is 25,000 times larger than the coefficient for the other independent variable. Interestingly, including the controls causes the statistical significance to disappear.

Table A-3:

Regression Estimation of Determinants of DCFs

Specification	Including Vernon	Excluding Vernon	Including Vernon	Excluding Vernon
Revenue per household	0.000227*** (0.000023)	0.0000309 (0.0000408)	0.000168*** (0.000041)	0.0000217 (0.0000460)
Operating cost per operating revenue	-0.160 (0.287)	-0.775*** (0.226)	0.422 (0.417)	-0.475 (0.365)
Adjusted project cost per household	-0.0000874 (0.0000525)	-0.0000310 (0.0000361)	-0.0000996* (0.0000503)	-0.0000424 (0.0000377)
Population density			-0.0000327 (0.0000550)	-0.0000277 (0.0000381)
Median household income			-0.0000145 (0.0000084)	-0.00000575 (0.00000624)
Constant	0.106 (0.263)	0.702*** (0.211)	0.298 (0.270)	0.743*** (0.217)
Observations	20	19	20	19
R^2	0.87	0.59	0.90	0.63

*** significant at the 99% level, ** significant at the 95% level, * significant at the 90% level

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Context, Lessons Learned, and a Way Forward for Policy Makers

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New York Law School Foreword

As a law school based in the heart of the largest and most dynamic city in the country, New York Law School strives to create an environment in which to train the next generation of advocates and government leaders. To do so, we foster a diverse and collaborative atmosphere that draws on the myriad strengths of our faculty, our academic programs, and our proximity to major institutions like state and federal courts, as well as New York's City Hall and its City Council. What emerges is a unique kind of thought leadership, one that is grounded in the realities of litigation, policy making, and on-the-ground advocacy. These are among the many singular traits that make NYLS New York's law school. The following paper is written very much in this spirit. It tackles head-on a controversial topic and offers a very straightforward and practical analysis that will be useful and accessible to a wide range of policy makers.

Nothing is more fundamental to effective governance than understanding the parameters of government action and knowing how to effectively work within those limits to realize core social and public policy goals. No matter what the issue under consideration, there will inevitably be debate, dialogue, and disagreement over the proper reach of government. That is certainly the case in the context of municipal broadband, and such is to be expected. The real test for officials is how they respond. In an environment of limited resources and multiple, pressing public policy priorities, this paper offers guidance for policy makers grappling with the many complex questions associated with ensuring that residents, businesses, and institutions have ready access to what has fast become the foundation of modern commerce: broadband Internet connectivity.

Having had the privilege to work in New York City government for more than two decades, including a decade as counsel to former Mayor Michael Bloomberg, I certainly appreciate the contours and challenges associated with improving broadband access at the city level. Without robust broadband access, the city's burgeoning start-up sector might have struggled to get off the ground. Similarly, without widespread opportunities for getting online—in school, at home, in our city's many parks—many residents and small businesses would have been deprived of the chance to benefit from the transformative power of high-speed Internet connectivity. For these many reasons, Mayor Bloomberg—working with key appointees in his administration like Carole Post, who, before joining NYLS as its Executive Vice President and Chief Strategy Officer, led the city's Department of Information Technology and Telecommunications and served as the city's Chief Information Officer—sought to maximize broadband coverage by engaging experts and working with them to enhance what they do best—build networks, increase capacity, support high-tech businesses, and increase digital literacy. The model that resulted was a partnership model, one that positioned city government as a vehicle for facilitating and expediting beneficial outcomes for all involved (some of these partnerships are discussed at length in **section 6**).

These types of challenges and opportunities remain in cities and states throughout the country. The following paper identifies a reasonable path forward and, perhaps most importantly, provides policy makers with an array of resources to reach the decisions that make the most sense for their municipalities. It is essential to approach these types of issues in as reasoned and forward-looking a manner as possible. This paper will help to do just that.

Anthony W. Crowell
Dean and President
New York Law School

Authors' Foreword

Over the last nine years, the Advanced Communications Law & Policy Institute at New York Law School has explored nearly every major facet of the U.S. broadband market. Through an array of articles, white papers, reports, primers, and interdisciplinary events, we have examined a wide range of policy and regulatory matters—from more esoteric topics like intercarrier compensation to the "big" issues like how to spur more robust adoption and use of broadband in key sectors (e.g., education, energy, and health care) and in major demographic groups (e.g., seniors, people with disabilities). Our wide-ranging curiosity stems in large part from previous experiences working in and around state and local government during the birth and adolescence of broadband in the United States.

This is our fifth paper on government-owned broadband networks (GONs) .Our current study holistically examines the topic of GONs in the context of statistics and data, case studies and real world experiences, and consensus-based policy objectives (e.g., spurring broadband adoption and use).

Beyond disagreements about the competitive and innovative health of the U.S. broadband space—a topic we explore at length in this report—the debate over whether or not GONs are appropriate often comes down to a fundamental disagreement over the proper role of government in private markets. This debate is not unique to the GONs space. Indeed, it is a debate that has been ongoing for decades, if not centuries, and it has spilled over into nearly every sector of the economy.

At their core, these disagreements are animated by competing worldviews that, more often than not, fail to align. The debates that such competing views stimulate, however, can be enormously productive. Throughout history, they have inspired creative solutions to profound problems. Unfortunately, in the broadband context, debates tend to unravel into unproductive shouting matches. Instead of meeting on common ground to arrive at sound policy outcomes, debates in the broadband space tend to spiral out of control, draining all of the life and productive mental energy from the room. Stakeholders often move further apart; arguments are attacked regardless of their merits; cynicism reigns supreme.

In an effort to break through what at times appears to be a manufactured stalemate, the following report is offered as a conversation starter. It has been developed first and foremost with policy makers in mind. For many at the state and local levels, the issue of GONs can be arcane, especially in light of the dozens of more pressing day-to-day priorities, like improving schools, keeping the streets paved, and fighting crime. Nevertheless, there is increasing enthusiasm around the potential for municipally owned and operated networks to serve as a means for municipalities to seize control of their economic destiny. With so many issues of foundational importance already challenging decision-makers—from rising economic inequality to structural shifts in employment that have forced millions out of the workforce, to crumbling roads, bridges, and other basic public infrastructure—calls for GONs, which typically require substantial investments of already scarce public resources, warrant increased scrutiny.

We don't purport to have the "right" answers to the many questions raised by GONs. What's right for a particular community will differ from city to city and from state to state. Nevertheless, the following report offers critical context for these discussions and proposes a possible path forward for policy makers. To the extent that someone disagrees with our analyses, observations, or recommendations, we invite constructive feedback. Our hope is that this report will spur solution-focused dialogues among a diverse array of stakeholders

and encourage creative ideas for developing and implementing rational policies that bolster broadband connectivity throughout the United States.

We would remiss if we didn't acknowledge the many sources that were influential throughout the drafting and editing of this report. Over the last few years, we have benefited immensely from conversations with stakeholders across the broadband ecosystem on the many issues discussed herein. Our dialogues with policy makers and their staffs have been immensely informative. Through conversations with state legislators, federal and state regulators, and local elected officials, as well as policy experts and members of major national policy-focused organizations like the National Conference of State Legislatures, the American Legislative Exchange Council, the National Association of Regulatory Utility Commissioners, the National Association of Counties, the National League of Cities, the National Association of Telecommunications Officers and Advisors, and Women in Government, we have learned much. Closer to home, we have appreciated our many discussions on a range of broadband issues with the New York State Broadband Program Office, the New York State Broadband Task Force, the New York State Business Council, and the Partnership for New York City, as well as a number of local elected officials, including Manhattan Borough President Gale Brewer.

We are indebted to New York Law School for supporting our work on this project. The law school is supported by a wide range of organizations—alumni, trustees, corporations, and philanthropies—that, collectively, hold a range of views on the issues discussed in and implicated by the following report. We note that everything included herein, unless otherwise noted, represents the views of the authors only and does not necessarily reflect the views of New York Law School or any of its supporters. We are incredibly thankful for the continued support of New York Law School, including the wisdom shared with us by its many resident experts. Foremost among this cadre are Dean Anthony Crowell and Executive Vice President Carole Post, two veterans of the administration of former New York City Mayor Michael Bloomberg.

We look forward to discussing these critical issues with all stakeholders going forward and hope that our report contributes to productive dialogues around harnessing the transformative power of broadband in every sector and every community across the United States.

Charles M. Davidson
Michael J. Santorelli
ACLP at New York Law School

Executive Summary

Policy makers have debated the efficacy and viability of government-owned broadband networks (GONs) in the United States for many years. At their core, these debates reflect fundamental disagreement over the broadband market's competitive and innovative health, as well as the appropriate role of government in this space. This report seeks to inform the debate by grounding it in data and relevant context. The report offers a number of resources and tools for use by policy makers when evaluating the efficacy of GONs and developing targeted and cost-effective approaches to bolster broadband connectivity from both the supply side and demand side.

Report Overview and Summary of Findings

Historical Analysis of GONs and GONs Advocacy. The report begins by tracing the historical evolution of arguments for government broadband ownership in the United States. Understanding how these arguments evolved and how they have fared in the real world is essential to understanding the contours and drivers of current GONs advocacy.

> **Key point:** Many current rationales for GONs are variations of themes and advocacy about broadband regulation in the early and mid-2000s. These themes informed much of the municipal Wi-Fi advocacy in the late 2000s and now inform the current debate over GONs.

> **Key point:** Despite a number of failed municipal Wi-Fi projects in the mid-2000s, advocacy for GONs persisted. Many blamed the failures on too little government involvement and began to embrace broadband deployment models that were exclusively public in nature and built around particular technologies (e.g., fiber) and subjective speed benchmarks. These efforts ultimately sought to "future-proof" advocacy by asserting what the "end-state" of broadband in the United States should be and then advocating for that outcome.

Contextualizing the Modern GONs Debate. The report then sets forth the relevant context in which to evaluate GONs proposals. This analysis encompasses two categories of issues.

First, the report examines the state of the U.S. broadband market. Critics argue that broadband is too expensive, too slow, and offered by too few providers, and that GONs offer viable redress. A comprehensive, data-driven and historical analysis of both the supply side (i.e., availability) and demand side (i.e., adoption and use) yields more optimistic findings regarding the broadband market's competitive and innovative health.

> **Key point:** Throughout the evolution of the GONs debate, diagnoses of failing or failed broadband have proven inaccurate. The data make clear that the U.S. broadband market is robust in terms of speed, affordability, and choice, and well-positioned to keep improving in response to evolving consumer demand.

> **Key point:** Ample data demonstrate that, by nearly every metric, broadband availability and performance have greatly improved—and continue to improve—across the entire country. Over the last 15 years, consumers have been getting increasingly more value for their money; average speeds have increased and the number of service options has multiplied.

Challenges nevertheless remain. On the supply side, some remote parts of the country remain unserved. The Federal Communications Commission (FCC) and state governments, in partnership with service providers, are helping to plug these gaps. But on the demand side, data highlight a number of important challenges that require concerted, collaborative action by public, private, and nonprofit stakeholders.

> **Key point:** Some of the most pressing public and social policy challenges remain on the demand side. Adoption rates in key user groups—senior citizens, people with disabilities, low-income households, and certain minority communities—remain below the national average. This is due in large part to an array of community-specific barriers that impede more robust adoption and use of broadband-enabled services.

The second set of issues involves the ability of municipalities, and, by implication, states, to construct and maintain these networks—and the opportunity costs of doing so. Foremost among the many factors that influence municipal action of any kind are the volatile state of public finances and the immediate need to invest more resources in shoring up basic public infrastructure like roads, bridges, dams, the electric grid, and water systems.

> **Key point:** The Great Recession exposed a number of critical weaknesses in local finances that, taken together, create an inhospitable environment for taking on the risks and making the massive new investments associated with redundant long-term construction projects like GONs.

> **Key point:** By nearly every measure, basic public infrastructure in the United States is crumbling and in need of trillions of dollars of investment. To the extent that new funding is available for investment in towns, cities, and states, data indicate that those dollars should be allocated in support of repairing existing infrastructure. Calls to prioritize public spending for the purposes of deploying a GON should be carefully examined in light of these many existing and future obligations.

Case Studies of Major GONs. To better understand the real-world issues of municipal broadband projects, the report profiles the GONs that have been built in Chattanooga, Tennessee; Bristol, Virginia; Lafayette, Louisiana; Monticello, Minnesota; Cedar Falls, Iowa; Danville, Virginia; UTOPIA, Utah (a consortium of 16 cities); Groton, Connecticut; Provo, Utah; and Wilson, North Carolina. These networks represent a broad spectrum of municipal broadband efforts undertaken across the country in recent years. While the networks share many traits—notably, volatile business models, significant debt, and uncertain financial futures—the story of each individual GON highlights why the network should be seen as a cautionary endeavor rather than a replicable model.

Findings about GONs' Efficacy in the United States. The data included in the case studies, along with analyses from other sections of the report, support an array of findings regarding GONs.

> **Finding One**: Failed and failing GONs offer much-needed perspective about the complexities and challenges associated with building and deploying advanced communications networks. Overly optimistic assumptions about costs and take-rates often doom networks before they are even launched. In addition, moderately successful municipal networks generally had their genesis in unique circumstances that are extremely difficult, if not impossible, to replicate. Oftentimes, these unique factors include the availability of one-time grant funding that offsets the significant costs associated with building a broadband network. And many "successes" offered by GONs proponents have not, in fact, endured over the long term, raising key concerns about the viability of any kind of municipal broadband network.

> **Finding Two**: GONs, especially those deployed by municipal utilities, raise fundamental concerns regarding sustainability, fair competition, and consumer welfare. As regulated monopolies, municipal utilities operate according to a distinct set of rules, regulations, and

incentives relative to private firms. These incentives are not primarily focused on spurring innovation or engaging in competitive markets.

Finding Three: Calls for achieving subjective speed benchmarks should not supplant actual consumer demand as the primary driving force shaping the broadband ecosystem. Data indicate that the vast majority of consumers are satisfied with their broadband connections and that, in general, the supply of bandwidth and the speeds of Internet connections are being shaped, in fact, by consumer demand and actual usage patterns.

Finding Four: The direct economic impact of GONs, especially in job creation, can be difficult to attribute. Data do not indicate that GONs actually serve as the nucleus of renewed economic activity in cities and towns where they have been deployed. On the contrary, they appear to be playing minor roles in creating relatively few new jobs as companies continue to respond more favorably to other, more tangible incentives (e.g., tax breaks).

Finding Five: Governments are not well-equipped to compete in dynamic markets. In general, municipal governments do not have a strong record of keeping pace with technological advances or in shaping policies that reflect rapidly evolving consumer preferences for new services. Moreover, because of the various interests represented in government policy- and decision-making, and because of other factors like institutional inertia, government is ill-equipped to act quickly or drive the type of creative destruction evident throughout the broadband ecosystem. Finally, increasing use of public-private partnerships (PPPs) and privatization of many municipal functions evince a growing recognition by government entities that there are viable alternatives to "going it alone."

Finding Six: The substantial costs of building, maintaining, and operating GONs outweigh real benefits. The asserted benefits are often attributable to other factors. And there are important opportunity costs associated with a decision to pursue a GON instead of spending money on other infrastructure (e.g., water and wastewater systems) or public policy needs (e.g., education).

Finding Seven: Pursuit of a GON often diverts scarce public resources from more pressing priorities. Many states have laws limiting the amount of debt a municipality can accrue. Cities contemplating a municipal system will have to determine whether debt assumed as a result of a GON may limit additional bond issuances in support of other projects. Pursuit of a GON often necessitates real trade-offs that may negatively impact core aspects of local governance.

Finding Eight: A GON will not spawn the next Silicon Valley. Numerous cities have successfully nurtured vibrant information sectors, high-tech clusters, and start-up communities by using public resources to create or enhance the economic and innovative conditions necessary to foster an environment conducive to these industries. But this outcome is the result of many factors and policies having nothing to do with a GON.

Finding Nine: GONs are not remedies for perceived or actual broadband connectivity challenges. Positioning a municipal network as a vehicle for spurring competition in a local broadband market could ultimately undermine market forces and harm consumers.

Finding Ten: State-level policy makers have important roles to play in the GONs context. The costs associated with building and maintaining a GON are significant, which raises the risk of financial default by local government, the diversion of resources from other priorities, or other negative outcomes (e.g., credit downgrades). States, which maintain ultimate responsibility for the financial health of the cities and towns in their borders, have strong interests in overseeing the process by which GONs proposals are vetted and

approved. Well-established legal precedent supports such a close relationship between states and their political subdivisions.

Roles for State and Local Policy Makers in Enhancing Broadband Connectivity. The final substantive section of the report examines the wide array of roles that policy makers can and should play in bolstering broadband connectivity from both the supply side and demand side.

> **Key point:** The most effective public efforts in the broadband space are well defined and narrowly tailored to address actual problems. Often, public-private partnerships, which leverage the expertise, resources, and economic incentives of stakeholders in the private and nonprofit sectors, can reduce public risk and optimize outcomes on both the supply side and demand side. Numerous examples of PPPs are provided for consideration by policy makers.
>
> **Key point:** In general, the most successful PPPs tend to be those that position government as a conduit for channeling available funding to support the efforts of expert firms in the private and nonprofit spaces, and as hubs for facilitating collaboration and frank discussions about workable, impactful solutions in a given community.

Additional Resources for Policy Makers:

The Policy Maker Toolkit presented in **section 1** provides a step-by-step guide for evaluating proposals for a government-owned broadband network. Because these networks typically require long-term commitments of limited public resources and entail the assumption of substantial risk, decision-making processes should be as informed and comprehensive as possible.

Additional Perspectives on GONs are included in **section 7** in an effort to provide further insight into the efficacy of government-owned broadband networks. These brief essays have been authored by a range of subject-matter experts who have firsthand experience with GONs or who have examined the contours of municipal broadband.

Part I

Introduction and Context

1 Introduction

This paper seeks to provide policy makers and regulators at every level of government with:

- Relevant historical and modern context to inform discussion about government-owned broadband networks (GONs);
- A data-based, fact-driven examination of ten GONs deployed in the United States over the last decade;
- Findings regarding the efficacy of GONs in the United States; and
- A list of feasible, efficient options for municipalities and states interested in increasing broadband connectivity.

1.1 Broadband Policy Making in the United States and its Critics

Policies and arguments impacting U.S. Internet access have long been driven by a desire to plan for and achieve "what's next." For example, work around the National Information Infrastructure[1] in the early 1990s gave way to the Next Generation Internet initiative a few years later. This initiative was launched to improve a congested online experience that was a result of robust consumer use and rapid growth in online services.[2] In 2010, the *National Broadband Plan*, prepared and released by the Federal Communications Commission (FCC), articulated a bold vision for high-speed Internet connectivity, including a wide availability of next-generation communication networks and more informed use of broadband-enabled services.[3]

The common thread of these initiatives is a desire to ensure U.S. consumers and businesses can access progressively better Internet connections. The nation's strategy for achieving this goal has been the implementation of a minimalist regulatory framework to encourage investment in the deployment, maintenance, and improvement of commercial broadband networks.[4] This approach can be traced back to the Telecommunications Act of 1996, in which Congress stated:

> It is the policy of the United States … to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation.[5]

1 *See, e.g., The National Information Infrastructure: Agenda for Action*, Information Infrastructure Task Force (Sept. 1993), *available at* http://www.eric.ed.gov/PDFS/ED364215.pdf. This initiative was launched to "ensure that [new] information resources [were] available to all at affordable prices." *Id*. at p. 5.

2 *See, e.g., Concept Paper*, Next Generation Internet Initiative, Networking and Information Technology Research and Development (July 1997), *available at* http://www.nitrd.gov/ngi/pubs/concept-Jul97/pdf/ngi-cp.pdf ("Today's Internet suffers from its own success. Technology designed for a network of thousands is laboring to serve millions. Fortunately, scientists and engineers believe that new technologies, protocols, and standards can be developed to meet tomorrow's demands. These advances will start to put us on track to a next generation Internet offering reliable, affordable, secure information delivery at rates thousands of times faster than today. Achieving this goal will require several years of generic, pre-competitive research and testing." *Id*. at 1).

3 *See generally Connecting America: The National Broadband Plan*, Federal Communications Commission (March 2010) ("*National Broadband Plan*").

4 *See, e.g.,* William Kennard, Chairman, FCC, *Connecting the Globe: A Regulator's Guide to Building a Global Information Community*, at p. IX-2 (1999), *available at* http://www.fcc.gov/connectglobe/regguide.pdf (observing that "Government policy can have a profound impact on Internet development; it can either foster it or hinder it. To date, the Internet has flourished in large part due to the absence of regulation. A "hands-off" approach allows the Internet to develop free from the burdens of traditional regulatory mechanisms.").

5 47 U.S.C. §230 (b) (2) (emphasis added).

What is a GON?

A government-owned broadband network (GON) is any high-speed Internet system that is built and operated by a municipality, a consortium of municipalities, or a subsidiary of state or local government (e.g., a wholly-owned municipal electric utility or a state-level authority), and that is offered on a commercial basis to residents.

The resulting "light touch" approach from this bipartisan Congressional mandate enshrined a deliberate choice to equip service providers with the latitude necessary to experiment with business models and compete in what quickly became a vibrant, interdependent broadband ecosystem.[6]

Notwithstanding this national policy framework's success in spurring broadband access across virtually the entire country,[7] questions have emerged about the private sector's ability to balance profit maximization against preserving certain core aspects of the Internet.[8] Since the commercial Internet reached a tipping point of mass appeal around the turn of the 21st century, some have argued that fundamental flaws exist in the market for Internet access and those flaws call for certain government interventions.[9] This dynamic was evident in debates over "open access" rules in the early 2000s,[10] in regulatory proceedings focused on whether to impose common carrier obligations on broadband service providers in the mid-2000s,[11] and in ongoing discussions about whether "network neutrality" rules are necessary to mediate interactions between network owners and content providers.[12]

The resulting "light touch" approach from this bipartisan Congressional mandate enshrined a deliberate choice … in what quickly became a vibrant, interdependent broadband ecosystem.

6 *See, e.g., National Broadband Plan* at p. 5 (noting that "While we must build on our strengths in innovation and inclusion, we need to recognize that government cannot predict the future. Many uncertainties will shape the evolution of broadband, including the behavior of private companies and consumers, the economic environment and technological advances. As a result, the role of government is and should remain limited.").

7 *See infra*, section 3.1, for discussion and analysis.

8 *See, e.g., Upgrading the Internet*, The Economist, Technology Quarterly, March 22, 2001 (observing that since "the Internet has gone from being an academic network populated by geeks and boffins to an artery of commerce, a disjunction is emerging between what is best from a purely engineering point of view and what makes sense commercially.").

9 *See, e.g.,* Brett Frischmann, *Privatization and Commercialization of the Internet Infrastructure*, 2 Colum. Sci. & Tech. L. Rev. 1 (2001) (highlighting several roles for the government in the provision of "Internet interconnection infrastructure").

10 *See, e.g.,* Mark A. Lemley and Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. Rev. 925 (2001) (arguing that the dynamics of the emerging market for broadband Internet access services imperiled the end-to-end principle, a nondiscrimination norm that was built into the architecture of the Internet at its founding) ("*End of End-to-End*").

11 *See, e.g.,* Barbara A. Cherry, *Maintaining Critical Rules to Enable Sustainable Communications Infrastructures*, 24 Georg. St. U. L. Rev. 947 (2007) (arguing in favor of regulating broadband as a common carrier and public utility).

12 *See, e.g.,* Tim Wu, *Network Neutrality, Broadband Discrimination,* 2 J. on Telecomm. & High Tec. L. 141 (2003) (identifying the contours, and arguing in favor, of a network neutrality regulatory regime). These conversations have taken on renewed primacy in the aftermath of Verizon v. FCC, 740 F.3d 623 (D.C. Cir. 2014), wherein the Court of Appeals for the D.C. Circuit found that, even though the FCC had overreached in adopting certain proposed "open Internet" rules, the Commission does have broad authority under the Communications Act to implement some form of regulatory framework for Internet access services. In response to the court's ruling, the FCC appears like to pursue a narrower set of network neutrality rules. *See* Tom Wheeler, FCC Chairman, *Setting the Record Straight on the FCC's Open Internet Rules,* April 24, 2014, FCC Blog, *available at* http://www.fcc.gov/blog/setting-record-straight-fcc-s-open-internet-rules (explaining that the FCC's new proposed rules will encompass the following requirements: "(1) That all ISPs must transparently disclose to their subscribers and users all relevant information as to the policies that govern their network; (2) That no legal content may be blocked; and (3) That ISPs may not act in a commercially unreasonable manner to harm the Internet, including favoring the traffic from an affiliated entity."); Guatham Nagesh, *FCC to Propose New 'Net Neutrality' Rules,* April 23, 2014, Wall St. J. (noting that "The proposal marks the FCC's third attempt at enforcing "net neutrality"—the concept that all Internet traffic should be treated equally.")

Despite substantial data,[13] calls for increased government involvement continue, based on various perspectives about whether market forces can guide the broadband space toward their preferred outcomes.[14]

1.2 The Debate over Government-Owned Broadband Networks

Advocates of government-owned broadband networks (GONs) argue that the United States lacks adequate broadband service in terms of speeds, prices, and availability.[15] This position is based on the argument that a lack of competition among service providers slows innovation at the network level and deprives consumers of ultra-high-speed access to the Internet.[16] GONs proponents assert that the most expedient remedy[17] is for cities and towns to deploy "future-proof" networks capable of gigabit transmission speeds (equivalent to 1,000 megabits per second).[18]

This approach appears to align with general policy imperatives to realize "what's next" for broadband networks, inject competition into markets, and jumpstart local economic development.[19] Framed in this manner, arguments in favor of GONs, which promise faster speeds at lower prices, are very attractive.[20]

This report will discuss these complex issues and provide a new framework in which to assess the arguments and controversy surrounding GONs. The report points out that substantial public resources to deploy GONs come at the expense of other major challenges facing many cities and states, the majority of which are already served by multiple wireline and wireless broadband providers. Many cities and states teeter on the edge of

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13 These data are discussed at length in section 3, *infra*.

14 *See, e.g.,* Lawrence Lessig, *Why Your Broadband Sucks*, Wired, March 2005 (observing that the "private market has failed the U.S. so far"); Paul Waldman, *Highway Robbery for High-Speed Internet*, June 24, 2013, American Prospect, *available at* http://prospect.org/article/highway-robbery-high-speed-internet#13721714498071&action=collapse_widget&id=1469977 (making many of the same points). *Cf.* Richard Bennett et al., *The Whole Picture: Where America's Broadband Networks Really Stand*, Information Technology & Innovation Foundation (Feb. 2013), *available at* http://www2.itif.org/2013-whole-picture-america-broadband-networks.pdf (refuting arguments that broadband in the U.S. is inferior).

15 *See, e.g.,* Blair Levin, *Global Leadership in the Broadband Economy and 10th Amendment Values,* April 4, 2013, Gig.U*, available at* http://www.gig-u.org/blog/blair-levins-remarks-to-wisconsin-broadband-summit (arguing that, for the first time in two decades, "no national carrier in the United States [has] plans to roll-out a better network than the current best network." *Id.* at p. 8); Hibah Hussain et al., *The Cost of Connectivity 2012*, New America Foundation (July 2012), *available at* http://newamerica.net/publications/policy/the_cost_of_connectivity (arguing that American consumers "tend to pay higher prices for slower [broadband] speeds compared to consumers abroad" and recommending that policy makers reevaluate our current policy approaches to increase competition and encourage more affordable high-speed Internet service in the U.S." *Id.* at 1); Hibah Hussain et al., *The Cost of Connectivity 2013*, New America Foundation (Oct. 2013), *available at* http://www.newamerica.net/publications/policy/the_cost_of_connectivity_2013 (echoing many of the observations in its 2012 report and concluding that "2013 data shows little progress, reflecting remarkably similar trends to what we observed in 2012.").

16 *See, e.g.,* Christopher Mitchell, *Publicly Owned Broadband Networks: Averting the Looming Broadband Monopoly*, Institute for Local Self-Reliance (March 2011), *available at* http://www.newrules.org/sites/newrules.org/files/cmty-bb-map.pdf ("*Averting the Looming Broadband Monopoly*").

17 Proposals to "fix" the failing broadband market abound and include an array of policy reforms that seek to, among other things, impose common carrier-like obligations on broadband service providers and mandate that all networks be open to competitors. *See, e.g.,* Lee L. Selwyn & Helen E. Golding, *Revisiting the Regulatory Status of Broadband Internet Access: A Policy Framework for Net Neutrality and an Open and Competitive Internet*, 63 Fed. Comm. L. J. 91 (2010) (calling for the reclassification of broadband Internet access service as a "telecommunications service," which would result in the application of common carrier rules); Yochai Benkler, *Next Generation Connectivity: A Review of Broadband Internet Transitions and Policy from Around the World*, The Berkman Center for Internet and Society at Harvard University (Feb. 2010), *available at* http://cyber.law.harvard.edu/sites/cyber.law.harvard.edu/files/Berkman_Center_Broadband_Final_Report_15Feb2010.pdf (supporting the adoption of open access policies for broadband networks in the U.S.).

18 On the notion of "future-proofing" and the many benefits of deploying fiber-optic networks, *see generally What Fiber Broadband Can do for Your Community,* Fiber-to-the-Home Council (summer 2012), *available at* www.ftthcouncil.org/FiberPrimer.

19 *See, e.g.,* Joanne Hovis, *The Business Case for Government Fiber Networks*, Broadband Communities (March/April 2013), *available at* http://www.bbpmag.com/MuniPortal/EditorsChoice/0313editorschoice.php ("*Business Case for Government Fiber*").

20 For past criticisms of the overly optimistic attitude of many pro-GONs advocates, *see, e.g.,* Patrick Ross, *Municipal Broadband and Net Neutrality,* Feb. 14, 2006, Progress & Freedom Foundation Blog, *available at* http://blog.pff.org/archives/2006/02/print/002560.html (comparing one advocate to the smooth-talking con man Harold Hill in "The Music Man"); John Hood, *Flashback: Monorails of the Decade,* July 3, 2008, Carolina Journal*, available at* http://www.carolinajournal.com/articles/display_story.html?id=4855 (noting comparisons of GONs to monorails, which were widely seen as overly hyped transportation systems that failed to generate expected returns on significant municipal investments).

financial insolvency[21] and need to repair crumbling roads, bridges, dams, and other public infrastructure.[22] In addition, there is considerable evidence that many GONs eventually fail. More generally, the current debate over whether GONs are a viable strategy for bolstering broadband connectivity has not adequately examined new ideas that may provide more impactful methods of using local resources to strengthen every segment of the ecosystem in more holistic and sustainable ways.

In many ways, the current debate over GONs distracts from the many policy imperatives for broadband and has the potential of driving parties apart at a time when it is essential they come together. Collaboration—among policy makers across every level of government, private firms throughout and beyond the broadband ecosystem, community leaders, consumer advocates and consumers themselves—is essential to addressing the many barriers to more robust broadband adoption and use.[23]

There are numerous examples of communities benefiting from more collaborative local leadership on these issues. Public-private partnerships (PPPs), for example, are bringing broadband networks to unserved areas, while direct engagement with service providers is yielding creative approaches to bolstering existing services.[24] Similar efforts are also proving successful on the demand side, where communities are leveraging local social infrastructures to promote adoption and more informed use of broadband services.[25] Such approaches allow local policy makers to take a more organic, data-driven assessment of broadband connectivity in their municipality and design strategies to address actual needs. As discussed here, embracing this model could yield enormous community benefits.

1.3 Report Overview

Section 2 traces the historical evolution of arguments for government broadband ownership in the United States. Understanding how these arguments evolved and how they have fared in the real world is essential to understanding the contours and drivers of current GONs advocacy.

In **section 3**, the report then sets forth the relevant context in which to evaluate GONs proposals. This analysis encompasses two categories of issues. First, in **section 3.1**, the report examines the state of U.S. broadband. Critics argue that broadband is too expensive, too slow, and offered by too few providers, and that GONs are the only answer. A comprehensive, data-driven and historical analysis of both the supply side (i.e., availability) and demand side (i.e., adoption and use) yields more optimistic findings regarding the broadband market's competitive and innovative health.

The second set of issues, which are examined in **section 3.2**, involves the ability of municipalities, and, by implication, states, to construct and maintain these networks—and the opportunity costs of doing so. Foremost among the many factors that influence municipal action of any kind are the volatile state of local finances and the immediate need to invest more resources in shoring up basic public infrastructure like roads, bridges, dams, the electric grid, and water systems.

To better understand the real-world issues of municipal broadband projects, **section 4** includes profiles of the GONs that have been built in Chattanooga, Tennessee; Bristol, Virginia; Lafayette, Louisiana; Monticello, Minnesota; Cedar Falls, Iowa; Danville, Virginia; UTOPIA, Utah (a consortium of 16 cities); Groton, Connecticut; Provo, Utah; and Wilson, North Carolina. These networks represent a broad spectrum of

21 *See, e.g.,* Mary Williams Walsh, *Cost of Public Projects is Rising, and Pain will be Felt for Years*, June 27, 2013, N.Y. Times (describing the negative impacts of volatility in the municipal bond market on cities and states). For additional discussion and analysis, *see infra,* section 3.2.1.

22 *See, e.g.,* John Schwartz, *Small Infrastructure Gains are Observed in Engineering Report*, March 19, 2013, N.Y. Times (discussing data regarding the state of U.S. infrastructure). For additional discussion and analysis, *see infra,* section 3.2.2.

23 *See, e.g.,* Charles M. Davidson & Michael J. Santorelli, *Evaluating the Rationales for Government-Owned Broadband Networks*, at p. 17-18, a Report by the ACLP at New York Law School (March 2013), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/Davidson%20&%20Santorelli%20-%20Evaluating%20the%20Rationales%20for%20GONs%20-%20March%202013.pdf ("*Evaluating the Rationales for Government-Owned Broadband Networks*"). For additional discussion, *see infra,* section 3.1.

24 For examples and discussion, *see infra,* section 5.

25 For examples and discussion, *see infra,* section 5.

municipal broadband efforts undertaken across the country in recent years. While the networks share many traits—notably, volatile business models, significant debt, and uncertain financial futures—the story of each individual GON highlights why the network should be seen as a cautionary endeavor rather than a replicable model.

The data included in the case studies, along with analyses from other sections of the report, support an array of findings regarding GONs, which are articulated in **section 5**.

The report concludes in **section 6** with an examination of the wide array of roles that policy makers can and should play in bolstering broadband connectivity from both the supply side and demand side. The most effective public efforts in the broadband space are well defined and narrowly tailored to address actual problems. Often, public-private partnerships, which leverage the expertise, resources, and economic incentives of stakeholders in the private and nonprofit sectors, can reduce public risk and optimize outcomes on both the supply side and demand side. Numerous examples of PPPs are provided for consideration by policy makers.

Policy Maker Toolkit

The following checklist of questions is offered to state and local policy makers as a resource for evaluating proposals for government-owned broadband networks. Because these networks typically require long-term commitments of limited public resources and entail the assumption of substantial risk, decision-making processes should be as informed and comprehensive as possible.

Questions to Ask When Deciding Whether to Undertake a Government-Owned Broadband Network

When considering a GON, understanding the contours and mechanics of local broadband markets is essential. The following checklist of questions identifies key issues to examine on both the supply side and demand side.

Assessing the Local Broadband Market	Questions To be Asked
Have local officials comprehensively examined the local broadband market? Such examinations should encompass both the supply side and the demand side.	☐
On the supply side: • What is the nature of local broadband competition? How many total broadband options—wireline, wireless, satellite, etc.—do consumers have access to? • Are there barriers to further deployment by incumbent Internet Service Providers (ISPs)? New entrants? • Has the municipality analyzed how it could leverage its resources to facilitate additional network deployment by private ISPs? Examples include reevaluating existing rights-of-way administration, tower siting approvals, antiquated zoning laws, and franchising processes. • Has the municipality engaged ISPs in dialogues around meeting clear goals on the supply side? • Has the municipality clearly articulated its supply side goals for broadband via RFPs/RFIs and/or other such means of public communication? • Are there opportunities to use public-private partnerships (PPPs) to address supply side challenges? Pilot programs? Other experimental approaches?	☐
On the demand side: • Are there data available on the nature of local broadband demand and use? Are there data regarding adoption rates across the municipality? Are there cost-effective ways of gathering such data (e.g., via existing survey tools, anchor institutions, etc.)? • Has the municipality engaged experts in the private and nonprofit sectors to identify barriers to more robust adoption and utilization? Has the municipality begun work to remove those barriers? • Has the municipality inventoried and examined existing resources on the demand side—e.g., training programs, anchor institutions, digital literacy initiatives? • Has the municipality attempted to work with and through local social infrastructures to address real demand side needs? • Has the municipality attempted to forge PPPs with partners in the private and nonprofit sectors? Have these partners attempted to leverage existing funding opportunities at the state and/or federal levels to support these efforts? • In unserved and underserved areas, have partners in the public, private, and nonprofit sectors engaged in sufficient demand aggregation activities to create favorable environments for new network deployment?	☐

Evaluating Related Municipal Factors	
Has the municipality evaluated basic infrastructure needs and weighed them against perceived and real broadband needs? These include developing plans to maintain roads, bridges, dams, electric grid components, water system elements, ports, and other basic public infrastructure for which state and local governments are responsible.	☐
Has the municipality identified the full range of economic, social, and infrastructural opportunity costs associated with building a GON? Are there opportunities to achieve core public goals for broadband and new technologies generally without endeavoring to build a municipal network or otherwise interfere with organic market forces?	☐
Does the municipality have a balanced budget? A surplus? A deficit? Is it financially solvent? Are there competing priorities for funding? Is the municipality assuming additional debt (e.g., under-funded pensions)?	☐

Questions to Ask When Reviewing a GONs Proposal

When evaluating whether to invest in or approve a proposal for a GON, an array of variables should guide decision-making. Numerous non-GONs options may be available to address broadband issues on both the supply and demand sides. As such, state and local policy makers should carefully consider the myriad costs, risks, and complexities associated with owning and operating a commercial broadband network. The following questions are offered as a guide for policy makers to use during these intricate undertakings.

Initial Review of GONs Proposals	
Have policy makers exhausted other options for bolstering broadband from both the supply side and demand side? (Discussed at length in **section 6**.)	☐
What is driving consideration of a GON in a particular municipality? Are there actual problems or issues that policy makers are seeking to address with a municipal network? Are policy makers looking to generate income? Spur the local economy? Make the local broadband market more competitive? Are they responding to unsolicited proposals?	☐
Have policy makers and planners consulted and involved constituents in the process? Have policy makers created opportunities and a process for informative dialogue amongst citizens and stakeholders during review and planning stages?	☐
With regard to reviewing specific GONs proposals: • Does the network plan consider and address the range of possible negative outcomes—e.g., low consumer demand, reaction by private ISPs, legal challenges, state preemption, etc.? • Are performance and outcome expectations—among policy makers, the public, etc.—for the network grounded in solid data and analysis? Are assumptions and predictions about costs, take rates, and competitive impacts supported? • Have policy makers and planners addressed the challenges associated with network construction and maintenance? Factors include population density, geographic considerations, and recurring network costs. • Does the network plan have one or more "end games" or exit strategies? • Does the plan adequately consider (and contain strategies regarding) the market strengths and possible responses of private sector providers? • Does the plan create competitive or regulatory advantages for the proposed municipal provider compared to non-municipal providers?	☐

Cost, Financing & Business Model Review	
With regard to costs: • What is the estimated cost of the GON? Does this estimate encompass all aspects of maintenance, operation, and technology upgrades? • What is the expected cost of hiring experienced management and expert staff—necessary inputs for operating a network in a competitive market? • What is the expected cost for marketing and consumer outreach? Have these and other related costs been factored into cost projections? • Have policy makers contemplated the costs associated with unwinding the network in the event of failure? • Have policy makers considered the risk and additional costs of a negative credit action (e.g., a credit downgrade) against the locality or parent utility as a result of a GON's financial or operational difficulties?	☐
With regard to financing: • How will the network be financed? Will this entail the assumption of debt by the municipality or by a quasi-public entity (e.g., a public utility)? • How much debt will planning, construction, operation, maintenance, and technology upgrades require upfront? Over the long term? How long will it take to repay these debts in the best case scenario? How long in the worst case scenario? Have policy makers quantified these scenarios? • Who bears the financial risk of network failure? Bond default? Are taxpayers shielded from these obligations? • Does the business model use alternative funding mechanisms that would limit taxpayer exposure to the costs of failure? • To what extent does the financing plan revolve around government grants or other public assistance? Are these funds guaranteed? Provided in lump-sum upfront or an installment basis? Is this aid conditional (e.g., tied to certain performance metrics)? • Has the municipality explored the feasibility of indemnification of public outlays if a network fails? This might be appropriate in instances where GONs proposals are offered unsolicited to municipalities.	☐
With regard to proposed business models: • Is the proposed business plan reasonable when measured against actual consumer demand for broadband services and when measured in light of competitive conditions in local markets? • To what extent does the business model hinge on cross-subsidies (e.g., by a parent electric utility)? Are these cross-subsidies legal? Sustainable? Do they provide the municipal network with a competitive advantage over providers? • Does the proposed business plan include contingency planning to address under-adoption, pricing adjustments by competitors, and/or outright failure? • Does the business model allocate any potential profits to the local government (e.g., payments in lieu of taxes)? • Does the business model factor in debt servicing generally? In the event that subscriber forecasts are off? • To what extent does the business plan include supplemental borrowing or allocation of additional funds/resources by local government?	☐
Legal, Regulatory & Public Policy Considerations	
Are there state and/or local statutes to guide the GON review process?	☐
Are there related utility laws that might impact core aspects of the proposal (e.g., prohibitions or limitations on utility cross-subsidies)?	☐
Are there limitations on the extent to which municipalities can leverage public resources (e.g., rights-of-way) to provide a commercial service in direct competition with private providers?	☐
Is the municipality empowered under state law to engage in activities that amount to industrial planning?	☐
In the absence of formal state or local rules regarding GONs, has the municipality considered a public referendum or other means of public engagement?	☐

2 The Evolution of the Debate over Government-Owned Broadband Networks in the United States

This section traces the historical evolution of arguments for U.S. government ownership of broadband networks. Many current rationales for GONs are variations of themes and theories in the early to mid-2000s that were at the heart of broadband regulation advocacy. These later informed much of the advocacy around municipal Wi-Fi and the current debate over GONs. Understanding how these arguments evolved and how they have fared in the real world is essential to understanding current GONs advocacy.

2.1 GONs Beta: The Ideological Origins of GONs Advocacy

There has always been a hint of revolution in GONs advocacy. Arguments for municipal entry into broadband markets reflect, to varying degrees, a desire to circumvent or replace the competitive, market-based Internet access model.[26] According to this argument, market forces cannot adequately discipline Internet service providers (ISPs), nor should they try given perceived faults in the Internet's structure and commercial nature. This necessitates government intervention to ensure widespread, unmediated Internet access.[27] Others base GONs advocacy on local self-reliance—that municipalities should be the primary providers of a service that, in their view, should be considered a public utility (like electricity and water) that serves as a basic input of local economic activity.[28]

Ultimately, rationales in favor of government-owned broadband networks revolve around a concept of the Internet as a medium that should be insulated from the marketplace.[29] This formulation views the Internet as a vast commons, something antithetical to traditional notions of private property and contrary to the economic incentives undergirding the market forces shaping the U.S. broadband space.[30]

There has always been a hint of revolution in GONs advocacy. Arguments for municipal entry into broadband markets reflect, to varying degrees, a desire to circumvent or replace the competitive, market-based Internet access model.

26 The irony, of course, is that the U.S. has long favored commercial provision of Internet access services over public provision. This was demonstrated most dramatically in the early 1990s when the federal government privatized – and thus commercialized – the Internet backbone in an effort to bolster innovation and encourage more widespread use of the service. For an overview, *see A Brief History of NSF and the Internet*, Office of Legislative and Public Affairs, National Science Foundation (Aug. 2003), *available at* http://www.nsf.gov/od/lpa/news/03/fsnsf_internet.htm.

27 *See, e.g.,* Thomas Bleha, *Down to the Wire,* Foreign Affairs (May/June 2005) (arguing that market forces, in the absence of active government involvement, steered the U.S. broadband market toward subpar results when measured against international counterparts).

28 *See, e.g.,* Sam Gustin, *Is Broadband Internet Access a Public Utility?*, Jan. 9, 2013, Time.com, *available at* http://business.time.com/2013/01/09/is-broadband-internet-access-a-public-utility/ (noting the many arguments that have been made in favor of the idea that broadband is or should be treated as a public utility).

29 For additional discussion and analysis of these various rationales, *see Evaluating the Rationales for Government-Owned Broadband Networks.*

30 *See, e.g.,* Lawrence Lessig, *The Internet Under Siege*, Foreign Policy, Nov. 1, 2001 ("…the Internet took off precisely because core resources were not "divided among private owners." Instead, the core resources of the Internet were left in a "commons." It was this commons that engendered the extraordinary innovation that the Internet has seen. It is the enclosure of this commons that will bring about the Internet's demise.").

Section 2 Highlights

This section traces the historical evolution of arguments in favor of government intervention into the U.S. broadband space. Understanding how such arguments evolved and how they have fared in the real world is essential to understanding the contours and drivers of current GONs advocacy.

- Many of the current rationales in favor of GONs are variations of themes and advocacy around related issues impacting the regulation of broadband in the early and mid-2000s. These themes later informed much of the advocacy around municipal Wi-Fi in the late 2000s and the current debate over GONs.
- Despite a number of failed municipal Wi-Fi projects in the mid-2000s, advocacy in favor of GONs persisted. Many blamed the failures on too little government involvement and began to embrace broadband deployment models that were exclusively public in nature and built around technologies (e.g., fiber) that sought to "future-proof" advocacy by asserting what the "end-state" of broadband in the United States should be and then advocating for that outcome.

For some, Internet access should occur via "dumb" networks—networks that do nothing more than passively transmit data to and from end users.[31] In this view, the commercial and operational aspects of serving as an ISP—investing risk capital in networks, maintaining the infrastructure, and experimenting with service models in response to changes in consumer preferences and to generate revenue for network expansion—ought to be subordinated to theoretical notions of "dumb" pipes built, owned, and operated outside the private sector. Governments are thus seen as natural owners of ISPs because they lack a profit motive that might distort these ideals.[32]

The rise of cable broadband Internet access in the late 1990s and early 2000s, however, presented a regulatory and technological challenge to this view.[33] The regulatory treatment of dial-up and DSL service, the other major Internet access platforms in the late 1990s, was relatively straightforward: when offered by incumbent telephone companies, these services fell under the so-called Computer Inquiry regime, which required service providers to make available the underlying basic transmission component on a nondiscriminatory basis to competitors.[34] Some viewed this approach as optimal from the standpoint of protecting the theoretical architecture of the Internet.[35] However, cable operators were not subject to these rules.[36] Because cable modems were the dominant form of broadband Internet access at the time, some worried that if cable companies were not required to facilitate competitive entry, these firms could "impose whatever conditions they desire[d] on their customers" and ultimately undermine the notion of a "dumb" network.[37]

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31 For one of the earliest descriptions of and arguments in favor of the "dumb network," *see* David Isenberg, *Rise of the Dumb Network*, Computer Telephony (Aug. 1997). *See also End of End-to-End* at 930-931 (noting that the founding principles of the Internet "counsel[] that the "intelligence" in a network should be located at the top of a layered system – its "ends," where users put information and applications onto the network. The communications protocols themselves (the "pipes" through which information flows) should be as simple and as general as possible."); Susan Crawford, *Transporting Communications*, 89 Boston Univ. L. R. 871, 937 (2009) ("We need to return to the basic notion of a non-discriminatory network underlying communications. The legal idea that companies providing transport services for general-purpose communications networks are burdened with an express obligation not to discriminate with respect to the content or source of those communications is ready for a revival."); Adam Thierer, *Are "Dumb Pipe Mandates" Smart Public Policy? Vertical Integration, Net Neutrality, and the Network Layers Model,* 3 J. on Telecomm. & High Tec. L. 275, 279-287 (2005) (providing additional background and discussion regarding the notion of a "dumb" pipe).

32 *See, e.g.,* Harold Feld, Gregory Rose, Mark Cooper & Ben Scott, *Connecting the Public: The Truth about Municipal Broadband*, A Report by Free Press et al. (April 2005) ("Private companies operate solely on the basis of profit motives. They have fiduciary obligations to stockholders to maximize their profits. While the profit motive often produces competition and innovation that benefits consumers, it provides no guarantee that private companies will fulfill vital public needs. The decisions of private companies may be economically rational in terms of the advantages accruing to the firm and its stockholders, but there are equally important economic and social needs and benefits completely absent from their calculations." *Id.* at p. 6) ("*Connecting the Public*").

33 *See, e.g., End of End-to-End.*

34 *See, e.g.,* James B. Speta, *Handicapping the Race for the Last Mile?: A Critique of Open Access Rules for Broadband Platforms*, 17 Yale J. on Reg. 40, 61-69 (2000) (discussing the regulatory treatment of these access services) ("*Handicapping the Race*").

35 *See, e.g.,* Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 Minn. L. Rev. 917 (2005).

36 *Handicapping the Race* at p. 71-75 (discussing the rationales supporting this approach).

37 *End of End-to-End* at p. 927.

This initial debate over the proper regulatory treatment of broadband platforms reached a critical turning point when the city of Portland, Oregon, attempted to impose through its local franchising authority open access requirements on a local cable broadband provider.[38] The major motivation was to manufacture competition among broadband service providers, which would have positioned the municipality as the primary local market facilitator.[39] This act was ultimately deemed unlawful by a federal appeals court, which ruled that municipalities were prohibited from regulating cable broadband service.[40] The immediate result was a rebuke of municipal authority to impose open access requirements on cable broadband providers.[41] More importantly, the case spurred the FCC to formalize and rationalize its regulatory approach to new and emerging broadband platforms.[42]

Over the next several years, the open access debate mushroomed into broader discussions about whether and to what extent regulation was needed to:

- Preserve the founding ideals of the Internet;
- Promote continued investment in network deployment; and
- Foster innovation throughout a burgeoning broadband environment.[43]

The stakes of this debate were high, as the resulting regulatory framework would embody a clear choice between two competing narratives about the nature of U.S. Internet access.

An aggressive regulatory approach would signal agreement that the marketplace was failing due to lack of competition,[44] while a deregulatory approach would explicitly endorse the principle that the broadband market's intermodal nature, combined with increasing demand for high-speed Internet access, would ensure continued consumer and social welfare gains.[45] The FCC ultimately agreed with the latter approach, and between 2002 and 2007 it developed and successfully defended in court a light-touch regulatory framework for every type of broadband Internet access service.[46] The FCC also acted to "preserve the freedom of use broadband consumers [had] come to expect" by clarifying the extent to which ISPs could manage their networks, tacitly acknowledging that broadband networks were in fact "smart," complex infrastructures, and not just "dumb" pipes.[47]

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38 *AT&T v. City of Portland*, 216 F.3d 871 (9th Cir. 2000).

39 *AT&T v. City of Portland,* 43 F.Supp.2d 1146, 1150 (U.S.D.C. Or. 1999), *rev'd AT&T v. City of Portland*, 216 F.3d 871 (9th Cir. 2000).

40 *AT&T v. City of Portland*, 216 F.3d at 881 ("We hold that subsection 541(b)(3) prohibits a franchising authority from regulating cable broadband Internet access, because the transmission of Internet service to subscribers over cable broadband facilities is a telecommunications service under the Communications Act.").

41 *Id.* at 878-879.

42 Up until that point in time, the FCC had addressed these issues only tangentially. Critical groundwork for eventual decisions regarding the regulatory treatment of broadband was developed in proceedings stretching back to the 1970s. Several other inquiries, notably a major investigation into the regulatory impacts of new communications services in the wake of the 1996 Telecommunications Act, also proved consequential to the ultimate design of the framework for broadband services. For an overview of the earlier initiatives, *see* Robert Cannon, *The Legacy of the Federal Communications Commission's Computer Inquiries*, 55 Fed. Comm. L. J. 167 (2003). *See also Federal-State Joint Board on Universal Service,* Report to Congress, 13 FCC Rcd 11501 (1998) (examining possible regulatory impacts of new and emerging communications technologies).

43 *See, e.g.,* Tim Wu, *The Broadband Debate, A User's Guide,* 3 J. on Telecomm. & High Tech. L. 63, 71-79 (2004) (providing an overview of the two sides in the debate over the proper regulatory framework for broadband networks).

44 *Id.*

45 *See, e.g.,* Daniel F. Spulber & Christopher S. Yoo, *Rethinking Broadband Internet Access*, 22 Harv. J. Law & Tech. 1 (2008) (discussing the development of the regulatory framework for broadband).

46 *See Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, 17 F.C.C.R 4798 (2002), *aff'd Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Serv*., 545 U.S. 967 (2005); *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, 20 F.C.C.R. 14,853 (2005); *Classification of Broadband Over Power Line Internet Access Service as an Information Service*, 21 F.C.C.R. 13281 (2006); *In the Matter of Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks*, 22 F.C.C.R. 5901 (2007).

47 *See* Michael Powell, Chairman, FCC, *Preserving Internet Freedom: Guiding Principles for the Industry,* at p. 5, Remarks at the Silicon Flatirons Symposium on "The Digital Broadband Migration: Toward a Regulatory Regime for the Internet Age," University of Colorado School of Law, Boulder, Colorado, Feb, 8, 2004, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243556A1.pdf. These principles were eventually adopted by the FCC in a non-binding Policy Statement issued in 2005. *See Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, Policy Statement, 20 F.C.C.R. 14986 (2005).

Those advocating government intervention did not see how such a light-touch approach could preserve their long-term vision for the Internet.[48] The open access policies at the heart of alternative regulatory schemes were considered the best way to synthesize and maintain a type of competition that would keep communications networks as passive conduits.[49] Around this time, there was also a rising sentiment that local governments were especially well-positioned to enter the market as service providers and serve as ballast against private ISPs.[50] Taken together, this line of advocacy stressed that the only metric that mattered from a consumer welfare perspective was the number of providers in a particular market.[51] But several states acted to preempt their municipalities from becoming service providers for fear that they would have an unfair competitive advantage and ultimately undermine, rather than promote, competition among providers.[52] After an array of legal challenges and FCC proceedings, the Supreme Court found that federal communications law did not preclude states from controlling their municipalities by prohibiting them from providing service.[53]

These interrelated actions provided stakeholders in the broadband space with significant clarity about the scope of possible government interventions.[54] The FCC framework formalized Congress's call for a mostly hands-off approach to the Internet,[55] while the legal cases made clear that non-federal (i.e., state and local) entities had little, if any, basis for regulating such inherently borderless services.[56] And to the extent that data regarding levels of investment, innovation, network availability and improvements in service quality are indicators, these policies succeeded in spurring broadband service competition.[57]

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48 *See, e.g., Connecting the Public* at p. 1 ("Absent federal regulation requiring network neutrality or open access, municipal systems remain the last line of defense against [allegedly anticompetitive] practices."); Rob Frieden, *Lessons from Broadband Development in Canada, Japan, Korea, and the United States*, 29 Telecommunications Policy 595 (2005) (embracing a more interventionist approach in the United States vis-à-vis broadband deployment); S. Derek Turner, *Dismantling Digital Deregulation: Toward a National Broadband Strategy,* Free Press (May 2009), *available at* http://www.freepress.net/sites/default/files/fp-legacy/Dismantling_Digital_Deregulation.pdf ("The FCC, in its blind pursuit of deregulation, abandoned line sharing and other open access policies in the hopes that this "regulatory relief" would inspire incumbents to make massive investments in broadband infrastructure. But this hope, based in part on the promises made by the incumbents to get favorable FCC treatment, turned out to be completely false." *Id.* at p. 9) ("*Dismantling Digital Deregulation*").

49 *See* Douglas H. Ginsburg, *Synthetic Competition*, 16 Media L. & Pol'y 1, 11-15 (2006) (explaining that "synthetic competition" describes "a market subject to a regulatory regime designed to assure there are multiple sellers regardless whether fewer sellers, perhaps only one, would be more efficient," and arguing that, "in synthetic competition, the preferences of regulators – not consumers – are paramount").

50 *See, e.g., In the Matter of the Missouri Municipal League, et al.,* Memorandum Opinion and Order, Separate Statement of Chairman William Kennard and Commissioner Gloria Tristani, 16 FCC Rcd. 1157, 1172 (rel. Jan. 12, 2001) ("The right policy for consumers is to have as many providers of telecommunications from which to choose-barring entry by municipally-owned utilities does not give consumers that choice.") ("*In the Matter of the Missouri Municipal League*").

51 *See generally* Barak Orbach and Grace Campbell Rebling, *The Antitrust Curse of Bigness*, 85 S. Cal. L. Rev. 605 (2012) (describing the historical evolution of this "simplistic" approach to evaluating competition).

52 The first two states to do this were Texas and Missouri. *In the Matter of the Missouri Municipal League* at 1158.

53 *Nixon v. Mo. Mun. League*, 541 U.S. 125 (2004) (rejecting municipalities' argument that the Telecom Act's prohibition on state barriers to entry applied to protect municipalities' provision of service from state superintendence).

54 *See, e.g.,* James Speta, *Deregulating Telecommunications in Internet Time,* 61 Wash. & Lee L. Rev. 1063, 1147 (2004) (assessing the pro-competitive impacts of preventing municipalities from entering communications markets); Thomas Hazlett et al., *Sending the Right Signals: Promoting Competition through Telecommunications Reform*, a Report to the U.S. Chamber of Commerce (Sept. 2004), *available at* http://www.uschamber.com/sites/default/files/reports/0410_telecommstudy.pdf (comparing and contrasting the regulatory frameworks for telephone and broadband services and finding that the exacting regulatory approach for the former would hinder, rather than advance, competition and innovation in the market for the latter).

55 Section 230(b)(2) of the Communications Act, as amended by the Telecommunications Act of 1996, states that it is "the policy of the United States…to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation."

56 In addition to the *City of Portland* and *Nixon* cases, there is a growing body of legal precedent suggesting that states lack authority over borderless services like VoIP, which travel over high-speed Internet networks. *See, e.g., Minn. Pub. Utils. Comm'n. v. FCC*, 483 F. 3d 570 (8th Cir. 2007) (upholding FCC preemption of the PUC's attempt to levy traditional telecommunications regulation on a VoIP provider, finding that it is impossible to separate interstate and intrastate elements of the service for regulatory purposes). *But see generally Verizon v. FCC,* 740 F.3d 623 (D.C. Cir. 2014) (providing a reading of the Communications Act that suggests that states, along with the FCC, might have authority to implement regulations impacting broadband networks).

57 For a comprehensive analysis, *see infra,* section 3.1.

2.2 GONs 1.0: The Rise and Fall of Municipal Wi-Fi

During development of the federal policy framework for broadband, the notion of GONs became the preferred option for those who argued against a minimalist regulatory regime.[58] GONs advocates proposed positioning municipal networks as a means of closing the "digital divide" and achieving universal access to the Internet.[59]

Disagreement over the proper role of policy in closing the digital divide existed along familiar lines.

- Some saw virtue in continuing to focus government attention on "clear[ing] away regulatory obstacles to the investment that fuels development and deployment of new technologies."[60] Between 2000 and 2005, these efforts yielded impressive improvements in the availability and adoption of broadband throughout the country.[61]
- Others saw these policies and the resulting evolution of the broadband market as major contributors to a broadening, rather than shrinking, digital divide. Evidence in support of this claim focused on two issues: low adoption rates and prices for broadband service.[62] According to this point of view, widespread deployment of GONs was an optimal solution.

Although a number of municipalities had previously experimented with providing commercial communications service, the first major wave of government-owned broadband was driven largely by the emergence of Wi-Fi.[63] This wireless technology was viewed as a game-changer for several reasons:

- It was relatively cheap to deploy;
- It was amenable to mesh networking strategies, which could, in theory, bolster coverage; and
- It was built on freely available unlicensed portions of the wireless spectrum.[64]

To some, Wi-Fi held the promise of "turn[ing] the airwaves into a commons without tragedy, and turn[ing] the economics of wireless [and broadband provision generally] on its head."[65]

The municipal Wi-Fi movement blossomed with Philadelphia's announcement, in 2005, that it was planning to deploy a citywide Wi-Fi network.[66] This initiative was hailed by proponents as a way for the GONs movement to gain credibility and underscore what they asserted as a foundational principle of Internet access: that

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58 It should be noted that municipal entry into other segments of the communications space — in particular, telephony and cable — was not a new phenomenon in the early 2000s. Indeed, some municipalities began offering local telephone service as early as the 1890s and early 1900s. *See, e.g.,* Richard R. John, Network Nation: Inventing American Telecommunications 264-267 (Belknap Press: Cambridge, MA 2010) (discussing early attempts by municipalities to offer telephone service). There is also a long history of municipal participation in the market for cable services. For an overview, *see generally* Kathryn A. Tongue, *Municipal Entry into the Cable Broadband Market: Recognizing the Inequities Inherent in Allowing Publicly Owned Cable Systems to Compete Directly Against Private Providers*, 95 Nw. U. L. Rev. 1099 (2001) ("*Municipal Entry into the Cable Broadband Market*").

59 The notion of a digital divide was not new in the mid-2000s. The term had been coined in the 1990s to describe a growing gulf between households in the U.S. that were purchasing and using new communications tools like desktop computers and dial-up Internet access, and those that were not. The emergence of broadband networks as high-speed on-ramps to the Internet, however, changed the calculus around the digital divide, shifting the policy emphasis to ensuring that as many people as possible were adopting and using this transformative technology. For a brief overview of the evolution of digital divide analysis and policy making, *see* Charles M. Davidson, Michael J. Santorelli and Thomas Kamber, *Toward a More Inclusive Definition of Broadband Adoption,* 6 Int'l. J. of Comm. 2255, 2556-2558 (2012). For additional analysis and discussion of the digital divide, *see infra*, section 3.1.2.

60 *See Networked Nation: Broadband in America 2007,* at p. 8, National Telecommunications & Information Administration, U.S. Dept. of Commerce (Jan. 2008), *available at* http://www.ntia.doc.gov/files/ntia/publications/networkednationbroadbandinamerica2007_0.pdf.

61 *See infra,* section 3.1, for discussion and analysis.

62 *See, e.g.,* Hannibal Travis, *Wi-Fi Everywhere: Universal Broadband Access as Antitrust and Telecommunications Policy*, 55 Am. U. Law. Rev. 1697, 1702 (2006) (arguing that "The provision of high-speed Internet access by private industry alone is leaving behind most of the poor, vast numbers of racial and ethnic minorities, and many residents of rural and inner-city communities.") ("*Wi-Fi Everywhere*"); Ben Scott and Frannie Wellings, *Telco Lies and the Truth about Municipal Broadband Networks*, Free Press (April 2005) ("The telecom and cable kings of the broadband industry have failed to bridge the digital divide and opted to serve the most lucrative markets at the expense of universal, affordable access." *Id.* at p. 2).

63 For examples of these early efforts, *see id.; Municipal Entry into the Cable Broadband Market.*

64 For additional discussion regarding the virtues and drawbacks of using Wi-Fi for broadband, *see* Michael J. Santorelli, *Rationalizing the Municipal Broadband Debate*, 3 ISJLP 43, 55-57 (2007) ("*Rationalizing Municipal Broadband*").

65 *See* Chris Anderson, *The Wi-Fi Revolution*, Wired, May 2003.

66 *See* Arshad Mohammed, *Philadelphia to be City of Wireless Web*, Wash. Post, Oct. 5, 2005.

it was best treated "as a basic municipal service like water, electricity, and trash collection."[67] The rapid rise in Wi-Fi's popularity coupled with the announcement in Philadelphia encouraged a number of other cities to deploy or consider deploying wireless GONs.[68] Indeed, many saw the exponential growth of municipal Wi-Fi as proof the commercial broadband market failed and GONs were the most viable means of providing all citizens with "free and low-cost … broadband."[69]

This initial wave of enthusiasm diminished almost as quickly as it began because of the many problems Philadelphia encountered in deploying its network. After several years of negotiating over rights-of-way access and experimentation with business models, the project collapsed under the weight of soaring budgets and tepid demand.[70] The mesh networking technology was incapable of covering the city's 135 square miles with reliable service.[71] In addition, the initial budget of $10 million eventually tripled.[72] As a result, project viability depended on a large number of residential subscriptions. Low quality of service, coupled with significantly better and cheaper service options offered by incumbent ISPs, resulted in fewer than 6,000 total subscriptions; fewer than 1,000 were new Internet users.[73]

The fallout from Philadelphia had consequences for other municipalities. Between 2005 and 2008, a number of large cities terminated their municipal wireless plans. Examples included Orlando, which, in 2005, "pulled the plug on its free downtown Wi-Fi service because only 27 people a day were accessing it."[74] Chicago, Houston, San Francisco, St. Louis, and Cincinnati, among many others, also opted to put their wireless plans on hold.[75]

These failures occurred for two primary reasons.

- First, there was a lack of demand for free or low-cost municipal Wi-Fi due mostly to the increasing availability of higher quality and lower-priced wired—and, eventually wireless—broadband connections. Between June 2005 and June 2007, the number of broadband subscribers in the United States more than doubled, from 42.5 million to nearly 101 million.[76] Broadband prices also fell during this period,[77] and mobile broadband, enabled by new third-generation (3G) wireless networks, emerged as a viable, affordable, and extremely popular alternative to traditional wired connections.[78]
- Second, no city succeeded in developing a viable business model to support its Wi-Fi efforts.[79] Beyond the Philadelphia failure, many other business models for large-scale municipal wireless projects proved unsuccessful. Perhaps the most notorious was an attempt to offset the costs associated with providing free or very low cost wireless Internet access with revenue derived from the sale of location-based advertising.[80] This model, initially championed by Google in San Francisco, quickly drew the ire of residents who feared for

67 *Id.*

68 *See, e.g.,* Sharon Gillett, *Municipal Wireless Broadband: Hype or Harbinger?*, 79 S. Cal. L. Rev. 561, 579-581 (2006) (providing an overview of planned deployments in 2004-2006).

69 *Wi-Fi Everywhere* at 1704.

70 *See* Dan P. Lee, *Power: Whiffing on Wi-Fi,* Sept. 24, 2008, Philadelphia Magazine*, available at* http://www.phillymag.com/articles/power_whiffing_on_wi_fi.

71 *Id.* (noting that the Wi-Fi technology "couldn't penetrate thick walls, or heights, or other obstructions.").

72 *Id.*

73 *Id.*

74 *See* Mark Williams, *Golden Gate Lark*, Technology Review, Sept. 2006 ("*Golden Gate Lark*").

75 *See* Judy Keen, *Cities Turning Off Plans for Wi-Fi*, Sept. 20, 2007, USA Today.

76 *See High-Speed Services for Internet Access: Status as of December 31, 2008*, at Table 1, FCC (Feb. 2010) ("*High-Speed Services for Internet Access: Status as of December 31, 2008*").

77 *See* John Horrigan, *Home Broadband Adoption 2009,* at p. 25, Pew Internet & American Life Project (June 2009), *available at* http://www.pewinternet.org/~/media//Files/Reports/2009/Home-Broadband-Adoption-2009.pdf ("*Home Broadband Adoption 2009*").

78 Between 2005 and 2007, the number of mobile broadband connections in the United States increased from just 380,000 to over 35 million. *High-Speed Services for Internet Access: Status as of December 31, 2008* at Table 1. For additional discussion, *see infra,* section 3.1.

79 *See, e.g.,* Bryan Gardiner, *What's Behind the Epidemic of Municipal Wi-Fi Failures?*, Sept. 4, 2007, Wired.com*, available at* http://www.wired.com/techbiz/it/news/2007/09/muni_wifi?currentPage=all.

80 *Rationalizing Municipal Broadband* at 72-73.

their privacy.[81] Even though the main reason for the unraveling of the San Francisco project was economic, privacy concerns played a major role in pushing up projected costs.[82]

A comprehensive study of failed GONs projects summed up the entire debate by stating, "Regardless of the reason given for establishing municipal networks, the results are always the same: a dangerous government market grab that fails to perform as projected."[83] There was growing evidence that the economics of GONs rarely, if ever, worked.[84] In response to these failed projects, a number of states passed laws, or considered legislation, to prohibit or restrict the use of public resources to support municipal broadband.[85]

Policy makers at every level of government sought to draw lessons from these failures and incorporate them into a clearer decision-making process in order to leverage their resources in the most efficient and cost-effective manner.[86] These responses revealed a common desire to reduce or eliminate the risk of squandering public resources.

2.3 GONs 2.0: From Wi-Fi to Fiber

By some estimates, the failed experiment with municipal Wi-Fi contributed significantly to an estimated $800 million in public spending on GONs.[87] Notwithstanding the many failures, GONs proponents continued to encourage cities and towns to deploy broadband networks. One argument was municipal Wi-Fi systems failed because of too *little* government involvement. Some faulted local governments like Philadelphia for attempting to use a public-private model in the deployment of municipal broadband networks. The crux of this argument was that these local governments would have been better off shouldering the entire burden themselves:

> The basic idea of offering Internet access as a public service is sound. The problem is that cities haven't thought of the Internet as a form of public infrastructure that—like subway lines, sewers, or roads—must be paid for. Instead, cities have labored under the illusion that, somehow, everything could be built easily and for free by private parties.[88]

To support this position, proponents framed their case around a cadre of smaller cities where government-owned Wi-Fi seemed successful in the early and mid-2000s. Examples included St. Cloud, Florida, which had

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81 *See, e.g.,* Elinor Mills, *Google in San Francisco: Wireless Overlord?*, Oct. 1, 2005, CNET News.com, *available at* http://news.cnet.com/Google-in-San-Francisco-Wireless-overlord/2100-1039_3-5886968.html (discussing initial privacy concerns regarding Google's proposal); Verne Kopytoff, *Wi-Fi Plan Stirs Big Brother Concerns*, April 8, 2006, S.F. Chronicle, *available at* http://articles.sfgate.com/2006-04-08/business/17288637_1_google-wi-fi-privacy-advocates-google-inc-s-plans (noting that "Privacy advocates are raising concerns about Google Inc.'s plans to cover San Francisco with free wireless Internet access, calling the company's proposal to track users' locations a potential gold mine of information for law enforcement and private litigators.").

82 *See* Robert Selna, *S.F. Citywide Wi-Fi Plan Fizzles as Provider Backs Off*, Aug. 30, 2007, S.F. Chronicle, *available at* http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/08/30/MNEJRRO70.DTL&hw=earthlink&sn=001&sc=1000 (noting that city approval of the plan hinged on more robust privacy safeguards that would have undermined the original business model for the network).

83 *See* Sonia Arrison, Dr. Ronald Rizzuto, and Vince Vasquez, *Wi-Fi Waste: The Disaster of Municipal Communications Networks,* at p. 5, Pacific Research Institute (Feb. 2007) ("*Wi-Fi Waste*").

84 *Id.* For an economic analysis of GONs through 2005, *see* Michael Balhoff and Bob Rowe, *Municipal Broadband: Digging Beneath the Surface*, Balhoff & Rowe LLC (Sept. 2005), *available at* http://www.balhoffrowe.com/pdf/Municipal%20Broadband--Digging%20Beneath%20the%20Surface.pdf.

85 *See, e.g., Rationalizing Municipal Broadband* at p. 68 (noting that, by 2007, about half the states in the country had "enacted, or were considering, legislation that addresses the municipal broadband debate.").

86 *See, e.g., Municipal Provision of Wireless Internet*, at p. 41-48, Staff Report, Federal Trade Commission (Sept. 2006), *available at* http://ftc.gov/os/2006/10/V060021municipalprovwirelessinternet.pdf (articulating a number of guiding principles for policy makers and capturing them in a "decision-tree" that was meant to guide decision-making processes by state and local officials).

87 *Wi-Fi Waste* at p. 3.

88 *See* Tim Wu, *Where's my Free Wi-Fi?*, Sept. 27, 2007, Salon.com, *available at* http://www.slate.com/articles/technology/technology/2007/09/wheres_my_free_wifi.single.html. The irony here, of course, is that basic public infrastructure in the U.S. – sewers and roads included – has long been considered crumbling and inferior because of chronic under-investment by the public sector. *See, e.g., Report Card for America's Infrastructure: 2005,* American Society of Civil Engineers, *available* at https://apps.asce.org/reportcard/2005/index2005.cfm (assigning an overall grade of "D" to the country's basic infrastructure, down from a "D+" in 2001). For additional discussion and analysis on this point, *see infra,* section 3.2.

successfully deployed Wi-Fi systems because, according to the argument advanced by proponents, they were delivered as public services (i.e., solely by the municipality via public funding).[89] But by 2010, many of these systems had failed. St. Cloud ended its free Wi-Fi service in 2009 because of budget concerns and low usage rates.[90] Between 2007 and 2010 the total number of cities that had deployed or were considering deploying public Wi-Fi systems decreased from over 400 to fewer than 200.[91]

GONs proponents often argued that the private sector had "persuade[d] [municipalities] either to adopt ownership models that [were] more likely to fail, or to adopt less ambitious networks that [did] not pose significant threats to incumbents."[92] This critique echoed much of the rhetoric put forward during the open access debate and subsequent discussions regarding how regulation could be used to save a "failing" broadband market. Although the market for commercial broadband services was thriving in the late 2000s,[93] some still viewed the U.S. broadband market as insufficiently competitive and looked to GONs to inject competition into stagnant markets by providing "open access network[s] … open to all service providers."[94]

By 2008, GONs proponents began to shift their focus away from wireless and toward wireline broadband. Deployment of fiber-optic GONs became the favored option for those who thought the failure of municipal Wi-Fi might spell the end of the GONs movement. This shift in advocacy was subtle and necessitated a rethinking of how to frame new calls for municipal networks in the wake of major public Wi-Fi failures. A report commissioned by the mayors of Boston, Chicago, and San Francisco in 2008 hinted at this reframing by saying continued competitiveness and economic growth at the municipal level hinged on widespread access to fast, reliable, next-generation broadband networks.[95] Others amplified these themes by arguing fiber held the most promise for GONs because it "boast[ed] nearly unlimited capacity" to support economic development, job creation, and civic participation.[96]

Implicit in this reframing was a decision to place GONs far ahead of actual consumer demand[97] and attempt to "future-proof" advocacy by focusing on what a growing number of advocates considered the end-state

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89 *Id.*

90 *See* Etan Horowitz, *St. Cloud Pulls Plug on Free Citywide Wi-Fi*, Sept. 29, 2009, Orlando Sentinel, *available at* http://articles.orlandosentinel.com/2009-09-29/news/0909290002_1_free-wi-fi-city-council-free-internet-access (noting that, at its peak, less than a quarter of the population used the network and that, by shutting down the system, the city would save $370,000 in maintenance fees each year).

91 *Compare* Bert Latamore, *What's the Future of Municipal Wi-Fi?,* Nov. 24, 2007, PCWorld.com, *available at* http://www.pcworld.com/article/139845/article.html (quoting a report that found that "400 U.S. communities were in some stage of broadband service creation" by the end of 2007), *with* Esme Vos, *Updated list of US cities and counties with large scale WiFi networks*, June 7, 2010, Muniwireless.com, *available at* http://www.muniwireless.com/2010/06/07/updated-list-of-cities-and-counties-with-wifi/ (reporting that that number had decreased to less than 200 by mid-2010).

92 *See* John Blevins, *Death of the Revolution: The Legal War on Competitive Broadband Technologies*, 12 Yale J. on Law & Tech. 87, 107 (2010) ("*Death of the Revolution*").

93 For discussion and analysis, *see infra,* section 3.1.

94 *See* Becca Vargo Daggett, *Localizing the Internet: Five Ways Public Ownership Solves the U.S. Broadband Problem*, at p. 7, Institute for Local Self-Reliance (Jan. 2007), *available at* http://www.ilsr.org/wp-content/uploads/files/5ways.pdf.

95 *See The Future of Municipal Broadband: Business, Technology and Public Policy Implications for Major U.S. Cities,* A White Paper Prepared by Civitium LLC for the Mayors of Boston, Chicago, and San Francisco (spring 2008), *available at* http://www.cityofchicago.org/dam/city/depts/doit/supp_info/DEI/MunicipalBroadband.pdf.

96 *See* Craig Aaron, *The Promise of Municipal Broadband*, Aug. 2008, The Progressive, *available at* http://progressive.org/mag/aaron0808.html ("*The Promise of Municipal Broadband*"). *See also Municipal Fiber to the Home Deployments: Next Generation Broadband as a Municipal Utility*, FTTH Council (Oct. 2009), *available at* http://www.baller.com/pdfs/MuniFiberNetsOct09.pdf.

97 In 2009, the FCC estimated that the average broadband user was consuming 9 gigabytes of data each month. Streaming video via services like YouTube accounted for a significant portion of this data. However, the rise of smartphones and faster mobile networks resulted in exponential increases in wireless data use. Overall, customers reported that they were satisfied with their broadband offerings. Indeed, an FCC survey released in 2010 found that only 9% of customers were not satisfied with the speed of their broadband connection. *See Broadband Performance*, at 6, OBI Technical Paper No. 4, FCC (2010), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2010/db0813/DOC-300902A1.pdf (estimating average data consumption); *Press Release: comScore Releases First Comprehensive Review of Pan-European Online Activity*, comScore, June 4, 2007, *available at* http://www.comscore.com/press/release.asp?press=1459 (highlighting increasing usage of online video); *Broadband Satisfaction: What Consumers Report about their Broadband Internet Provider*, at p. 3, FCC (Dec. 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-303263A1.pdf (providing results of a nationwide customer satisfaction survey) ("*Broadband Satisfaction: What Consumers Report*").

of broadband in the United States: gigabit fiber-optic networks.[98] The primary justification was that these networks would serve as the foundation on which new businesses and the future economy would be built.[99] In short, geography would no longer matter if a city had a gigabit fiber network. This reframing seemingly made GONs a *fait accompli* because very few ISPs planned to offer gigabit speeds in the near future—as there was little, if any, demand for such high-speed connectivity.[100] In addition, this position allowed advocates to dismiss the continued incremental improvements in commercial broadband service as insufficient, thus resurrecting criticisms of competition and regulation that had long been advanced by those wary of market forces.[101]

A fiber-based GON often cited as a success in its early days was based in Burlington, Vermont.[102] In 2005, Burlington began offering residents and businesses a proprietary fiber-optic broadband network that had initially been deployed for the exclusive use of city agencies.[103] After securing tens of millions of dollars in financing, Burlington Telecom (BT), the operator, appeared to be on a path toward sustainability in 2007.[104] However, despite a positive cash flow and a slowly expanding subscriber base, by 2008 overall revenues were insufficient to cover its debt payments.[105] By 2009, BT had amassed a significant debt load, leading the city council to conclude that the system was "too deeply indebted to break even given the size of its customer base."[106] To this day, BT remains in debt and continues to struggle to expand its user base.[107]

The struggling Burlington fiber network reveals the enormous stakes involved in the GON debate. As a result of its failed GON, Burlington's credit rating was downgraded on several occasions over the last few years, leaving it on the brink of junk status.[108] And almost a decade after the fiber-based, open access broadband network was deployed, few promised benefits materialized. These dynamics and resulting impacts are not unique to Burlington and, consequently, argue for extensive evaluation and study prior to committing to GONs as a strategy for improving broadband connectivity.

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98 *See, e.g.,* Susan Crawford, Captive Audience: The Telecom Industry and Monopoly Power in the New Gilded Age (Yale University Press: New Haven, CT 2013) ("Captive Audience") (calling for universal deployment of gigabit networks); Reed Hundt & Blair Levin, The Politics of Abundance: How Technology can Fix the Budget, Revive the American Dream, and Establish Obama's Legacy (Odyssey: New York, NY 2012) (calling for more widespread deployment of gigabit hubs) ("The Politics of Abundance").

99 *See, e.g., Broadband as an Economic Development Tool*, NATOA (Nov. 2008), *available at* http://www.natoa.org/policy-advocacy/documents/NATOABroadbandEconStimulus.pdf.

100 *See generally* Robert C. Atkinson et al., *Broadband in America – 2nd Edition,* Columbia University (May 2011), *available at*, http://www4.gsb.columbia.edu/filemgr?file_id=738763 (providing an overview of actual and planned broadband offerings by ISPs).

101 As made abundantly clear in section 3, *infra,* these arguments are without merit.

102 *See, e.g.,* Christopher Mitchell, *Burlington Telecom Profits from Fiber*, Broadband Properties (Oct. 2007), *available at* http://www.broadbandproperties.com/2007issues/october07/Burlington.pdf ("*Burlington Telecom Profits from Fiber*"); Christopher Mitchell, *Burlington Telecom Case Study*, Institute for Local Self-Reliance (Aug. 2007), *available at* http://www.ilsr.org/wp-content/uploads/files/bt.pdf; *The Promise of Municipal Broadband*.

103 *See* Christopher Mitchell, *Learning From Burlington Telecom*, at p. 2, Institute for Local Self-Reliance (Aug. 2011), *available at* http://www.muninetworks.org/sites/www.muninetworks.org/files/bt-lessons-learned.pdf.

104 *Id.*

105 *Id.*

106 *Id.* at p. 4.

107 *See, e.g.,* John Briggs, *Debt Takes Toll; Burlington Telecom Treads Water*, May 13, 2012, Burlington Free Press, *available at* http://www.burlingtonfreepress.com/article/20120514/NEWS02/120513019/Debt-takes-toll-Burlington-Telecom-treads-water.

108 *See Moody's Downgrades Burlington's Bond Rating*, June 21, 2012, Vermont Biz, *available at* http://www.vermontbiz.com/news/june/moodys-downgrades-burlingtons-bond-rating. *See also Rating Action: Moody's assigns Baa3 rating to the City of Burlington's (VT) $9 million Taxable General Obligation Bonds, Series 2013A*, April 12, 2013, Moody's Investor Service, *available at* http://www.moodys.com/research/Moodys-assigns-Baa3-rating-to-the-City-of-Burlingtons-VT--PR_270766 (affirming its previous downgrade and maintaining a negative outlook for the city's finances). *See also* Annie Linskey, *Burlington's Quest for Fast Internet Slows Credit Rating,* June 16, 2013, Bloomberg, *available at* http://www.bloomberg.com/news/2013-06-17/burlington-s-quest-for-fast-internet-slows-credit-rating.html (noting that ongoing legal troubles with creditors, stemming from the struggling municipal broadband network, led Moody's to warn that it might downgrade the city's debt to junk status).

3 The Modern GONs Debate in Context

This section outlines the essential context for discussions about the efficacy of government-owned broadband networks. **Section 3.1** examines the current state of the U.S. broadband market. **Section 3.2** examines the nature of state and local finances and the condition of basic public infrastructure across the country. This section recommends policy makers focus on addressing critical priorities (e.g., stabilizing budgets and shoring up infrastructure) and working with, rather than around, service providers and other stakeholders in the private and nonprofit sectors to enhance meaningful broadband connectivity.

3.1 Broadband in the United States

The U.S. broadband space has made enormous progress over the last 15 years. The market for high-speed Internet access is in no danger of failing or being controlled by a monopoly.[109] Even so, some GONs proponents believe prices are too high, speeds are too slow, and that the promise of the Internet cannot be realized because ISPs focus on maximizing profits at the expense of consumer welfare.[110] This view describes the U.S. broadband market as inadequate measured against service offerings in countries as disparate as Japan, South Korea, France, and the Netherlands.[111] At the state and local level, the focus shifts to a discussion of ultra-high-speed broadband and the risks a municipality faces in relying on the private sector to ensure residents and businesses have access to "world class" Internet connections.[112]

This section presents a data-based quantitative and qualitative analysis of broadband in the United States. **Section 3.1.1** evaluates how the U.S. broadband space evolved over the last 15 years and analyzes a range of data from both the supply side *and* the equally important demand side. Examining both aspects reveals a vibrant market for broadband services on the supply side, but also key shortcomings on the demand side. These are assessed in **section 3.1.2.**

3.1.1 The Broadband Success Story

Many of the arguments and assertions put forward by municipal broadband advocates are ripe for debate when situated in the context of the U.S. broadband market's trajectory in the past 15 years. Throughout the evolution of the GONs debate, there has been disagreement about the diagnoses of failing or failed broadband in the country. Data indicate that the U.S. broadband market is robust and well positioned to continue improving in response to evolving consumer demand.

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109 One of the more extreme (and recent) versions of this tale can be found in Captive Audience. However, as discussed *supra,* in section 2, this type of criticism has been evident ever since commercial broadband networks first emerged in the late 1990s.

110 *See, e.g.,* S. Derek Turner, *Free American Broadband!*, Oct. 18, 2005, Salon.com, *available at* http://www.salon.com/2005/10/18/broadband_4/ (providing an example of the type of argument made by pro-GONs advocates in the early 2000s).

111 For examples, *see supra*, section 2.1.

112 This kind of rhetoric is informed by notions of local self-reliance and arguments that GONs are best because they "keep[] more money circulating in the local economy." *See* Christopher Mitchell and Sascha Meinrath, *Want to Pay Less and Get More?*, Aug. 1, 2012, Slate, *available at* http://www.slate.com/articles/technology/future_tense/2012/08/community_based_projects_ make_broadband_internet_access_high_speed_and_affordable_.html.

Section 3 Highlights

Two sets of issues provide essential context for evaluating GONs proposals. The first set focuses on the state of the broadband sector. The second set focuses on the capabilities of municipalities to fund and maintain major infrastructure projects.

State of Broadband. Assertions that the market is failing or underperforming have long been at the center of calls for local government intervention into the broadband space. Data-driven analyses of both the supply (i.e., availability) and demand sides (i.e., adoption and use) yield much more optimistic findings regarding the health of this space. In particular:

- Throughout the evolution of the GONs debate, diagnoses of failing U.S. broadband have proven factually inaccurate. Data make clear the U.S. broadband market is robust and well positioned to continue improving in response to evolving consumer demand.
- Ample data demonstrate that, by nearly every metric, broadband availability and performance continue to improve across the entire country. Over the last 15 years, prices have declined, average speeds have increased, and the number of service options has multiplied.

Challenges nevertheless remain. On the supply side, some remote parts of the country remain unserved. Efforts by the FCC, the Executive Branch, and state governments are succeeding in helping to plug these gaps. On the demand side, however, data highlight critical challenges that require concerted and collaborative action by stakeholders in the public, private, and nonprofit sectors.

- Some of the most immediate challenges remain on the demand side. Adoption rates in key user groups—senior citizens, people with disabilities, low-income households, and certain minority communities—remain below the national average. This is due in large part to an array of community-specific barriers that impede more robust adoption and utilization of broadband-enabled services.

Local Government Capability. The second set of context issues focuses on the ability of municipalities (and, by implication, states) to fund the construction and ongoing maintenance of these networks—and the opportunity costs of such funding. Among the many factors that influence municipal action of any kind are the volatile state of local finances and the pressing need to invest more resources in shoring up basic public infrastructure like roads, bridges, dams, the electric grid, and water systems.

- The Great Recession exposed a number of critical weaknesses in local finances that, taken together, create an inhospitable environment for massive new investments in or assuming the many risks associated with redundant long-term construction projects like GONs.
- By nearly every measure, basic public infrastructure in this country is literally crumbling and in need of trillions of dollars of investment. To the extent that new funding is available for investment in towns, cities, and states, data indicate that those dollars should be allocated in support of repairing existing infrastructure. In this context, calls to prioritize public spending for the purposes of deploying a GON should be carefully examined in light of these many existing and future obligations.

3.1.1.1 The First Decade (1998–2008)

The federal government began studying trends in computer and Internet usage in the early 1990s,[113] although the first official FCC survey of broadband availability was not released until 1999.[114] In it, the FCC reported that, by the end of 1998, there were about 375,000 residential broadband customers.[115] (The FCC defined broadband as an Internet connection capable of speeds in excess of 200 Kbps.[116]) This represented a residential

113 *See Falling Through the Net: A Survey of "Have Nots" in Rural and Urban America,* National Information and Telecommunications Administration, U.S. Dept. of Commerce (July 1995), *available at* http://www.ntia.doc.gov/ntiahome/fallingthru.html ("*Falling Through the Net I*").

114 *See In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to all Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, First Report, 14 FCC Rcd 2398, CC Docket No. 98-146 (rel. Feb. 2, 1999) ("*1st 706 Report*").

115 *Id.* at para. 88. This number included households and small businesses.

116 *Id.* at para. 20.

penetration rate of 0.4%, a figure the FCC observed to be well ahead of the penetration level for "the telephone, color television, and cellular service at the same stage in their deployment, and approximately the same penetration percentage as that of black-and-white television."[117] Overall, the FCC reported positively on the pace of broadband deployment and was especially encouraged by significant investment in modernizing every part of the communications infrastructure in the United States:

> [W]e are encouraged that deployment of advanced telecommunications generally appears, at present, reasonable and timely. We base this conclusion, in part, on the large investments in broadband technologies that numerous companies in the communications industry are making.[118]

Among its many observations in this first report, the FCC squarely addressed the "pessimis[m]" of predicting the nascent broadband market would quickly fall prey to the forces of natural monopoly.[119] In light of the frothy nature of the early broadband market, characterized by substantial investment and innovation in the delivery of high-speed Internet access services, the FCC concluded that "the preconditions for monopoly [were] absent" from the fledgling market and found that the data did "not indicate that the consumer market [for broadband was] inherently a natural monopoly."[120] Moreover, the FCC expressed its view that the market would continue to evolve and expand to include new competition from wireless service providers (e.g., satellite and mobile).[121]

Table 3.1 provides a snapshot of the U.S. broadband market, observed by the FCC, at the end of 1998.

Table 3.1: Broadband in the U.S. Circa 1998 (Major Platforms)

Service Provider/ Platform	Avg. Speed (download)	Monthly Cost (1998 $)	Monthly Cost (2013 $*)	Availability
Cable/Cable Modem	3 Mbps	$40	$57	Limited (some major cities, suburbs and rural areas)
Telco/ADSL	1.5 Mbps	$50-60	$71-85	Limited (some major cities, suburbs and rural areas)
Telco/ISDN	128 Kbps	$30-50	$43-71	Most Major Cities (mostly for business)
Satellite	400 Kbps	$30-50	$43-71	Nationwide

Source: *1st 706 Report, FCC (February 1999)*
*Adjusted for inflation using CPI Inflation Calculator, U.S. Bureau of Labor Statistics, http://www.bls.gov/data/inflation_calculator.htm

Although many data benchmarks and analytical techniques used in 1998 and 1999 would be refined over time, the FCC in this first assessment of the U.S. broadband market set forth an approach to thinking about and measuring competition that remained a touchstone for the next 15 years:

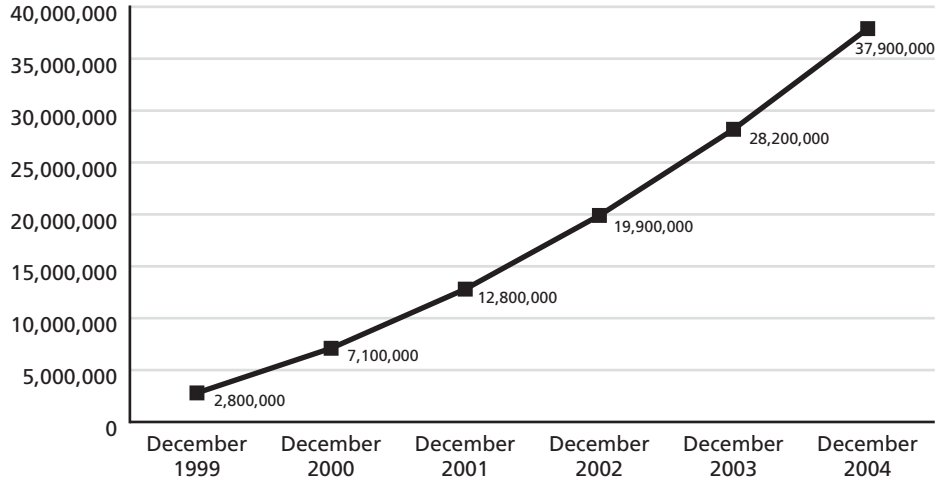
> The consumer market for broadband should be characterized by new products and services being offered and costs falling as a result of technological change. At the retail level, in addition, competition among providers of broadband service may occur on price (different

117 *Id.* at para 92.
118 *Id.* at para. 6. *See also id.* at para 36-61 (discussing investments in backbone, middle-mile and last-mile segments of broadband networks).
119 *Id.* at para 47.
120 *Id.* at para. 48.
121 *Id.* at para. 49.

prices and different rate structures (flat-rate and usage-sensitive)), quality of service (different volumes and speeds of transmission in one or both directions), warranties against outages, technical features (symmetrical and asymmetrical bandwidth, storage space), geography (one technology working best in one kind of topography), and user friendliness (some customers wanting just easy-to-use e-mail and fast web access and others wanting their own personal web pages and major multimedia applications).[122]

Over the next few years, the FCC observed continued exponential growth in the consumer market for broadband services. In the years before mobile broadband emerged as a viable competitor to wireline (in the mid-2000s), the U.S. market underwent significant change as firms sought to address growing consumer demand for faster and more ubiquitous connectivity. More specifically, during the period from 1999 to 2004, the market developed considerably in response to the minimalist, bipartisan regulatory approach that had been instituted in the late 1990s.[123] By nearly every measure, the reach and quality of broadband improved immensely during this initial phase of its evolution. For example, the total number of high-speed Internet connections grew almost 14 times larger between 1999 and 2004, increasing from 2.8 million to nearly 38 million (see Figure 3.1).

Figure 3.1: Total High-Speed Lines in Service, 1999–2004



Source: *High-Speed Services for Internet Access: Status as of Dec. 31, 2005, FCC (July 2006)*

Such robust growth stemmed from substantial investment by ISPs to improve the quality and geographic reach of their offerings. During this period, ISPs invested tens of billions of dollars in new and enhanced broadband infrastructure.[124] Thousands of miles of fiber-optic cabling was deployed in the backbone and middle-mile segments of these networks in the late 1990s and early 2000s, while ISPs continued to invest billions in the intricate, capital-intensive task of enhancing last-mile connections to these national networks.[125] Altogether, service providers invested in excess of $500 billion in broadband infrastructure between 1999 and 2004.[126]

122 *Id.* at para. 50.

123 *See supra,* section 2.1, for additional discussion.

124 *See, e.g.,* Patrick Brogan, *Updated Capital Spending Data Show Continued Significant Broadband Investment in Nation's Information Infrastructure,* at p. 2, chart 1, Research Brief, U.S. Telecom (April 2012), *available at* http://www.ustelecom.org/sites/default/files/documents/042012_Investment_2011_Research_Brief.pdf (charting ISP capital expenditures for 1996 to 2011) ("*Updated Capital Spending Data*").

125 *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to all Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Second Report, at para. 20-27, CC Docket No. 98-146 (rel. Aug. 21, 2000) ("*2nd 706 Report*") (describing investment and improvement in backbone and middle-mile segments as of 2000).

126 *Updated Capital Spending Data* at p. 2, chart 1.

The immediate result was more widespread access to multiple options for getting online. Between 1999 and 2003, the percentage of U.S. zip codes reporting at least one high-speed line increased from 59 to 93 percent.[127] During that same time period, the percentage of zip codes reporting more than one broadband service provider increased from about 33 to about 80 percent.[128] While the use of zip codes for these purposes was criticized as providing a somewhat skewed picture of broadband in the United States, the FCC noted that such data were nonetheless useful in demonstrating that "steady progress" was being made in the deployment of broadband throughout the country.[129]

Over the next few years, these positive trends in wireline broadband deployment would continue:

- Broadband networks expanded to more parts of the country;
- The variety and speed of broadband offerings increased; and
- Prices decreased.[130]

But the contours of competition in the U.S. broadband market changed dramatically when mobile broadband emerged as an alternative platform for accessing the Internet at high speeds.[131] This shift occurred around the same time that a growing number of critics were calling U.S. broadband uncompetitive, slow, and overpriced, and as advocates were looking to municipal Wi-Fi networks, which could only deliver maximum speeds of 1 Mbps to residents,[132] as a solution.[133]

The rise of mobile services was swift. By 2002, the wireless market had already reached several important milestones: in 2000, the subscriber base eclipsed 100 million,[134] and by 2002 consumers were using more minutes on their cellphones than on their landlines.[135] Between 1999 and 2002, significant progress was made in the development of mobile data offerings as a result of strong consumer demand for more advanced services (e.g., RIM released the first BlackBerry and proprietary wireless e-mail system in 1999).[136]

In an effort to satisfy growing consumer demand, most major carriers in the early 2000s announced plans to invest significant resources in deploying 3G networks, which would provide faster, more reliable Internet connections.[137] The rapid maturation and deployment of these services was impressive: in 2003, the FCC observed maximum mobile Internet speeds of about 144 Kbps;[138] by 2006, maximum download speeds had increased to over 2 Mbps, allowing users to engage in a wide array of online activities.[139] The FCC sought to further these gains and speed along deployment of 3G networks by auctioning off sizeable swaths of new spectrum in 2006.[140] Wireless carriers responded by investing over $24 billion in their networks to support

127 *See 2nd 706 Report* at para. 83; *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to all Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Fourth Report, at 30, GN Docket No. 04-54 (rel. Sept. 9, 2004) ("*4th 706 Report*"). At that point in time, broadband was defined as an Internet connection in excess of 200 Kbps.

128 *See High-Speed Services for Internet Access: Status as of June 30, 2005,* Table 5, FCC (April 2006).

129 *4th 706 Report* at p. 30.

130 *See Broadband Deployment is Extensive Throughout the United States, but it is Difficult to Assess the Extent of Deployment Gaps in Rural Areas,* U.S. Government Accountability Office, GAO-06-426 (May 2006), *available at* http://www.gao.gov/new.items/d06426.pdf.

131 For a comprehensive analysis of the evolution of the market for mobile services, *see* Charles M. Davidson & Michael J. Santorelli, *Seizing the Mobile Moment: Spectrum Allocation Policy for the Wireless Broadband Century*, 19 CommLaw Conspectus 1 (2010) ("*Seizing the Mobile Moment*").

132 *Rationalizing the Municipal Broadband Debate* at p. 70.

133 *See supra,* section 2.2., for additional discussion.

134 *See In re Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Sixth Report, 16 F.C.C.R. 13350, Table 1 (2001) ("*6th CMRS Report*").

135 *Seizing the Mobile Moment* at 34-35.

136 *See* RIM, History, http://www.blackberry.com/select/get_the_facts/pdfs/rim/rim_history.pdf.

137 *6th CMRS Report* at 13397-13398.

138 *In re Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Eighth Report,18 FCC Rcd 14783, 14793-14794 (2003).

139 *In re Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Eleventh Report, 21 FCC Rcd 10947, 10991-10992 (2006).

140 *Seizing the Mobile Moment* at 39-40.

these many new uses.[141] Other firms throughout the mobile ecosystem responded by producing new devices (e.g., smartphones) and content (e.g., apps) that leveraged these faster, more reliable connections.[142]

In short, the United States broadband services market had changed completely in just one decade. Table 3.2 compares the U.S. broadband market at the end of 2008 with the market at the end of 1999. Table 3.3 provides a snapshot of the broadband market in 2008, similar to the one provided in Table 3.1, which depicted the broadband market in 1998.

Table 3.2: U.S. High-Speed Internet Connections (Total, by Platform): 1999 and 2008

	December 1999	December 2008
DSL & other Wireline*	979,701	31,148,000
Cable	1,414,183	40,251,000
Satellite and Fixed Wireless	50,404	1,423,000
FTTP	312,204	2,884,000
Mobile Wireless	0	26,532,000
Total Connections	2,756,492	102,238,000

Sources: *FCC data reports (2000 and 2012)*

*"Other wireline" includes broadband over power lines and other such services (for the 2008 data) and "traditional telephone company high-speed services and symmetric DSL services that provide equivalent functionality" for the 1999 data.

Table 3.3: Broadband in the U.S. Circa 2008 (Major Platforms)

Service Provider/ Platform	Avg. Speed (download)	Monthly Cost (2008 $)	Monthly Cost (2013 $*)	Availability	Market share**
Cable/Cable Modem	8.6 Mbps†	$43.27†	$46.82	Nationwide (multiple providers)	39%
Telco/DSL	3.5 Mbps†	$60†	$64.92	Nationwide (multiple providers)	31%***
Mobile/ Wireless (3G)	~1-2 Mbps	$30††	$32.46	Nationwide (multiple providers)	26%
Telco/FTTH	20 Mbps†††	$53	$57.34	Select areas (expanding)	3%

Sources: *FCC reports*

*Adjusted for inflation using CPI Inflation Calculator, U.S. Bureau of Labor Statistics, http://www.bls.gov/data/inflation_calculator.htm
**Using data from Figure 3.2
***Includes "other wireline" services (e.g., traditional telephone company high-speed services and symmetric DSL services that provide equivalent functionality)
† Average speed and cost[143]
†† Cost of a wireless plan offered by a major carrier in late 2008[144]
††† Speed and cost of a mid-tier service option offered by Verizon in 2008[145]

141 *See Annual Year-End 2012 Top Line Survey Results*, at p. 2, CTIA – The Wireless Association, *available at* http://files.ctia.org/pdf/CTIA_Survey_YE_2012_Graphics-FINAL.pdf.
142 *See, e.g., Seizing the Mobile Moment* at 35-45 (analyzing innovation in the wireless space between 2002 and 2008).
143 *See* Shane Greenstein & Ryan C. McDevitt, *Evidence of a Modest Price Decline in US Broadband Services*, National Bureau of Economic Research, NBER Working Paper 16166 (July 2010), *available at* http://www.nber.org/papers/w16166.pdf?new_window=1
144 *See, e.g.*, Kelly Hodgkins, *Verizon Wireless kills Pay as You Go data plans, data plans now mandatory*, Nov. 2, 2008, BGR.com, *available at* http://bgr.com/2008/11/02/verizon-wireless-kills-pay-as-you-go-data-plans-data-plans-now-mandatory/.
145 *See, e.g.,* Tamara Chuang, *Speed up your Verizon FiOS Internet for Free; Just Ask*, June 18, 2008, Orange County Register, *available at* http://gadgetress.freedomblogging.com/2008/06/18/verizon-offers-cheaper-faster-internet/2943/ (providing pricing plan information for Verizon's FiOS FTTH service).

3.1.1.2 2009 to the Present

Since 2009, the pace of change in the U.S. broadband space has shown little sign of faltering or reversing course. When placed in the long arc of evolution described above, data indicate the market is continuously evolving in response to organic forces that stem primarily from consumer demand.

Between 2009 and the present, the long-term positive trends identified above are still evident and continue to move in the right direction.

Users. The total number of high-speed lines[146] in service throughout the United States more than doubled, growing from 119,433,000 in June 2009 to 261,731,000 in December 2012 (see Table 3.4).

Table 3.4: U.S. High-Speed Internet Connections (Total, by Platform): 2009 and 2012

	June 2009	December 2012
DSL	30,848,000	31,142,000
Other Wireline*	689,000	822,000
Cable	41,434,000	51,649,000
Satellite	990,000	1,454,000
Fixed Wireless	488,000	771,000
FTTP	3,548,000	6,728,000
Mobile Wireless	41,436,000	169,165,000
Total Connections	119,433,000	261,731,000

Sources: *FCC data report (2013)*

*"Other wireline" includes broadband over power lines and other such services

Investment. Despite a prolonged recession, ISPs continued to invest tens of billions of dollars in their networks. Table 3.5 provides a summary.

Table 3.5: Annual Broadband Capital Expenditure: 2009–2012

Year	Total Broadband Capex
2009	$63 billion
2010	$66 billion
2011	$66 billion
2012	$68 billion

Sources: *U.S. Telecom data; CTIA data; NCTA data*

Competition. These investments are bringing broadband networks to more parts of the country. Intermodal competition continues to spread, and the number of areas unserved by a terrestrial ISP continues to shrink. For example, the percentage of Census tracts with one or fewer fixed (i.e., non-mobile) broadband providers

146 These are all connections in excess of 200 Kbps. Even though the FCC increased the "benchmark" for broadband speeds in 2010 – raising it to 4 Mbps downstream and 1 Mbps upstream – for data collection purposes the Commission still considers 200 Kbps to be the threshold for broadband. *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, Amended by the Broadband Data Improvement Act, Sixth Report,* 25 FCC Rcd 9556, para. 4 (2010) (defining the new "benchmark" for broadband); *Instructions for local telephone competition and broadband reporting (FCC Form 477)*, at p. 2, FCC (2013), *available at* http://transition.fcc.gov/Forms/Form477/477inst.pdf (defining broadband as any 200 Kbps connection).

decreased from 3.5 percent in June 2009 to 1.2 percent in December 2012.[147] Equally important, by December 2012 about 95 percent of U.S. households had access to at least three different mobile broadband providers.[148] Taken together, these data indicate the vast majority of U.S. households have access to multiple broadband service providers.

Speed. In tandem with sustained investment levels and innovation at the network level, average speeds continue to increase year after year.[149] In addition, a growing number of consumers report higher speeds at home, indicating they are taking advantage of a broad range of available service options. Table 3.6 tracks this migration.

Table 3.6: Broadband Connections by Download Speed (Total, All Platforms): 2009 and 2012

	June 2009	December 2012
Between 200 Kbps & 3 Mbps (% of total connections)	62,291,000 (55%)	119,869,000 (45.8%)
Between 3 Mbps & 6 Mbps (% of total connections)	14,926,000 (13.2%)	42,052,000 (16.1%)
Between 6 Mbps & 10 Mbps (% of total connections)	23,110,000 (20.4%)	40,016,000 (15.3%)
Between 10 Mbps & 25 Mbps (% of total connections)	12,835,000 (11.3%)	39,177,000 (15%)
Between 25 Mbps & 100 Mbps (% of total connections)	187,000* (0.2%)	20,418,000 (7.8%)
Over 100 Mbps (% of total connections)	N/A	201,000 (0.01%)

Sources: *FCC data reports (2009 and 2013)*

*Data for connections with download speeds of at least 25 Mbps

These data highlight several important trends related to broadband speeds. A similar percentage of users continues to prefer speeds in the 3—10 Mbps range despite the availability of faster connections. Data also demonstrate that, though growing exponentially year after year, average data consumption remains low across the user population, which means that download speeds in the 3–10 Mbps range remain adequate.[150] Nevertheless, there has been a significant migration toward connections with download speeds in excess of 10 Mbps. The data demonstrate such a trend toward even faster speeds. To this end, the FCC recently reported that the "average subscribed speed is now 15.6 Mbps, representing an average annualized speed increase of about 20 percent."[151] The data indicate supply is meeting demand.[152]

Prices. In response to competitive pressure and consumer demand, prices for broadband service have leveled off and, in many cases, decreased over the last few years. Moreover, there is ample evidence suggesting U.S.

147 *See Internet Access Services: Status as of June 30, 2009,* at p. 30, Table 13, FCC (Sept. 2010); *Internet Access Services: Status as of December 31, 2012,* at p. 54, Table 24, FCC (Dec. 2013) ("*Internet Access Services: Status as of Dec. 31, 2012*").

148 *See* National Broadband Map, Summarize: Nationwide, http://www.broadbandmap.gov/summarize/nationwide.

149 *See, e.g., The State of the Internet: 3rd Quarter, 2013 Report*, at p. 16, Akamai (Jan. 2014), *available at* http://www.akamai.com/dl/akamai/akamai-soti-q313.pdf?WT.mc_id=soti_Q313 (noting continued strong growth in U.S. Internet connection speeds).

150 *See, e.g.,* Scott Wallsten, *The Real Benefits of Gigabit Networks Have Nothing to Do with Speed,* Technology Policy Institute (May 2013), *available at* http://www.techpolicyinstitute.org/files/wallsten_the_real_benefits_of_gigabit_networks.pdf (providing additional context about the practical value of high-speed Internet connectivity) ("*Real Benefits of Gigabit Networks Have Nothing to Do with Speed*").

151 *See Measuring Broadband America – Feb. 2013*, FCC, *available at* http://www.fcc.gov/measuring-broadband-america/2013/February (providing a detailed analysis of the steady rise in broadband speeds across the U.S.).

152 For additional discussion regarding broadband speeds and consumer demand, *see infra,* section 5.3.

consumers are getting more broadband for their dollar when compared to offerings over time.[153] Table 3.7 provides a value comparison for broadband offerings in 1998, 2008, and 2013.

Table 3.7: Broadband Value Comparison ($/Mbps): 1998, 2008, and 2013

Service Provider/ Platform	1998 $/Mbps (2013 $)	2008 $/Mbps (2013 $)	2013 $/Mbps* (2013 $)
Cable/Cable Modem	$19/Mbps	$5.4/Mbps	$1.10/Mbps[154]
Telco/DSL	$52/Mbps	$18.55/Mbps	$3.32/Mbps[155]
Mobile/ Wireless	N/A	$20/Mbps (3G)	$3.08/Mbps[156] (4G)

Sources : *Figures 3.1 and 3.2*

*Representative offerings of major ISPs

3.1.1.3 Observations

The U.S. broadband market evolved from a fragmented space in 1998 to a thriving ecosystem characterized by multiple providers across multiple platforms competing for customers by offering a menu of different service offerings. Statements about the demise of broadband have been exaggerated. Prices have declined sharply, while average speeds have increased and the number of service options has multiplied. Further, intermodal competition is now widely evident across nearly every part of the country.

In sum, evaluating the U.S. broadband market in isolation or in a static manner necessarily yields incomplete and inaccurate results. Instead, assessing the growth of the market over an extended period of time allows for a more full-bodied assessment of market growth and dynamism. While there have been ongoing assertions of market failures by some, numerous metrics reveal the broadband market has consistently improved since its nascence. While progress in U.S. communications has long been punctuated by impressive leaps and creative destruction and while some supply side challenges remain, the broadband market, by and large, was and continues to be pushed inexorably forward by consumer demand.[157]

153 *See, e.g.,* Richard Bennett, Luke A. Stewart, and Robert D. Atkinson, *The Whole Story: Where America's Broadband Networks Really Stand*, at p. 53, Info. Tech. & Innov. Foundation (Feb. 2013), *available at* http://www2.itif.org/2013-whole-picture-america-broadband-networks.pdf.

154 Based on a package — Extreme 105 — offered by Comcast consisting of a 105 Mbps standalone connection for $115/month (as of February 2014). *See* Comcast, Xfinity Internet, Deal Finder, http://www.comcast.com/.

155 Based on a package — DSL Elite — offered by AT&T consisting of a 6 Mbps connection for $19.95/month (as of February 2014). *See* http://www.attonlineoffers.com/greatoffers/dsl?fbid=Julqt-8DxSb.

156 This figure was arrived at by dividing the average download speed for Verizon Wireless's LTE 4G network, as observed by PC Magazine (13 Mbps), by the monthly cost for a smartphone data plan on Verizon Wireless ($40/month with a 1 GB data cap) as of July 2013. *See* Sascha Segan, Fastest Mobile Networks 2013, June 17, 2013, PC Mag., *available at* http://www.pcmag.com/article2/0,2817,2420333,00.asp; Verizon Wireless, Share Everything Plan, http://www.verizonwireless.com/wcms/consumer/shop/share-everything.html.

157 For a discussion of the regulatory implications of this evolution, *see* Howard Shelanski, *Adjusting Regulation to Competition: Toward a New Model for U.S. Telecommunications Policy*, 24 Yale J. on Reg. 56 (2007) (arguing that the market for advanced communications services necessitated a new type of regulatory approach in order to facilitate continued growth and innovation).

Lingering Supply Side Challenges

Broadband is nearly universal but not quite; some rural areas remain unserved. Private and public resources to bring broadband to these areas are not unlimited, and as discussed in **section 3.2,** the public resources are certainly finite. A key policy focus going forward, at least on the supply side, is for public and private entities to work together and focus efforts and resources on bringing broadband to the few remaining parts of the country that actually remain unserved.

The FCC has begun attempting to shift federal universal service funds to support network deployment to these areas. Additional experimentation is ongoing at the state and local levels, as public entities explore opportunities to partner with the private sector in an effort to figure out the economics of serving these "uneconomic" areas. These and other methods provide municipalities with a wide array of options for bringing broadband to unserved areas and working with ISPs and others to bolster connectivity in areas that are already served.

3.1.2 Demand Side Challenges: Barriers to More Robust Use of Broadband

Much of the debate over broadband in the United States has revolved around the supply of high-speed Internet connectivity. Indeed, even as broadband and intermodal competition diffused across nearly every part of the United States over the last decade, the policy focus has remained largely on notions of universal service, notwithstanding the more systemic issue of disparities in adoption rates across a range of user communities.[158] Implicit in many supply side arguments is an assumption that demand side issues will resolve themselves once there is ample supply of cheap and ultra-fast broadband.[159] Though appealing, this reductive cause-and-effect has been questioned by social scientists, researchers, practitioners, and others who have worked to identify and better understand the complex mechanics associated with broadband adoption across key demographics and in key sectors. The following discussion details the evolution of these challenges and identifies their modern contours.

3.1.2.1 Measuring and Understanding Internet Use

The contours of the digital divide(s) in the United States have been evident since the mid-1990s, when the U.S. Department of Commerce first began to track trends in computer ownership and Internet usage. These early studies identified a number of factors, including age, race, income, and educational attainment, that seemed to predict whether a particular person or household would use these technologies.[160] Table 3.8 provides an overview of Internet use data from the late 1990s and early 2000s.

158 Despite an array of universal service obligations imposed by Federal and state law, basic telephone service never reached 100% penetration. For recent data, *see* Alexander Belinfante, *Telephone Subscribership in the United States (Data Through November 1999),* p. 5, Table 1, Common Carrier Bureau, FCC (Jan. 2000), *available at* http://transition.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/subs1199.pdf (providing telephone penetration data for 1983-1999); Stephen J. Blumberg and Julian V. Luke, *Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, January-June 2013*, CDC (Dec. 2013), *available at* http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201312.pdf (providing telephone penetration data for 2003-2013).

159 *See, e.g.,* Captive Audience.

160 *See Falling Through the Net I; Falling Through the Net II: New Data on the Digital Divide.* NTIA, U.S. Dept. of Commerce (July 1998), *available at* http://www.ntia.doc.gov/report/1998/falling-through-net-ii-new-data-digital-divide; *Falling Through the Net III: Defining the Digital Divide*, NTIA, U.S. Dept. of Commerce (July 1999), *available at* http://www.ntia.doc.gov/legacy/ntiahome/fttn99/FTTN.pdf; *Falling Through the Net IV: Toward Digital Inclusion*, NTIA, U.S. Dept. of Commerce (Oct. 2000), *available at* http://www.ntia.doc.gov/files/ntia/publications/fttn00.pdf.

Table 3.8: Internet Use in the United States (Percent of Population): 1997–2001

	1997	1998	2000	2001
Total Population	22.2%	32.7	44.4	53.9
Race				
White	25.3	37.6	50.3	59.9
Black	13.2	19	29.3	39.8
Hispanic	11	16.6	23.7	31.6
Age				
18–24	31.6	44.3	56.8	65
25–49	27.1	40.0	55.4	63.9
50+	11.2	19.3	29.6	37.1
Income				
<$15,000	9.2	13.7	18.9	25
$35,000–$50,000	22.8	34.7	46.5	57.1
>$75,000	44.5	58.9	70.1	78.9
Education Level				
Less than H.S.	1.8	4.2	8.8	12.8
H.S. Diploma/GED	9.7	19.2	30.6	39.8
College Degree	41.4	58.4	72.5	80.8

Source: *A Nation Online: How Americans Are Expanding Their Use of the Internet, NTIA, U.S. Dept. of Commerce (February 2002), available at http://www.ntia.doc.gov/files/ntia/publications/anationonline2.pdf*

Contemporaneous inquiries into why individuals elected not to go online revolved almost exclusively around attitudes toward the Internet. A Pew survey from 2000, for example, found that most non-Internet users either perceived the Internet to be a "dangerous thing" or did not think they were "missing anything" by being offline.[161] The cost of Internet access and necessary hardware for going online (e.g., a computer) was also cited as an impediment for the unconnected.[162] Early analyses indicated, however, that the cost factor influenced decisions across every demographic and income group, suggesting that the issue of price sensitivity was more nuanced than initially thought.[163]

By the mid-2000s, broadband replaced dial-up as the preferred on-ramp to the Internet, a rapid shift caused by a growing appreciation among consumers and policy makers of the transformative potential of high-speed Internet connectivity.[164] To facilitate continued growth, a minimalist regulatory framework was implemented for broadband access.[165] One important result was across-the-board substantial investment in broadband delivery platforms, which, coupled with increasing consumer demand, extended next-generation networks to

161 *See* Amanda Lenhart et al., *Who's not Online: 57% of those Without Internet Access Say They do Not Plan to Log On*, at p. 3, Pew Internet & American Life Project (Sep. 2000), *available at* http://www.pewinternet.org/~/media//Files/Reports/2000/Pew_Those_Not_Online_Report.pdf.pdf.

162 *Id.*

163 *Id.* at 11. *See also A Nation Online: How Americans Are Expanding Their Use of the Internet*, at p. 75-76, NTIA, U.S. Dept. of Commerce (Feb. 2002), *available at* http://www.ntia.doc.gov/files/ntia/publications/anationonline2.pdf.

164 *See, e.g., Networked Nation: Broadband in America in 2007*, NTIA, U.S. Department of Commerce (Jan. 2008), *available at* http://www.ntia.doc.gov/files/ntia/publications/networkednationbroadbandinamerica2007_0.pdf (discussing the many ways in which broadband was expected to impact the economy and modern life).

165 *See supra,* section 2, for an overview of the regulatory response to broadband and the criticism that it received by GONs advocates.

more areas of the country, encouraged intermodal competition, and led to wider availability of better, cheaper services for households.[166]

Significant growth in adoption rates across every demographic group followed (see Table 3.9).

Table 3.9: Home Broadband Adoption (Percent of Population): 2005–2008

	2005	2006	2007	2008
Total Population	33%	42	47	55
Race				
White	31	42	48	57
Black	14	31	40	43
Hispanic (English Speaking)	28	41	47	56
Age				
18–29	38	55	63	70
30–49	36	50	59	69
50–64	27	38	40	50
65+	8	13	15	19
Income				
<$20,000	13	18	28	25
$50,000–$75,000	35	48	58	67
>$100,000	62	68	82	85
Education Level				
Less than H.S.	10	17	21	28
H.S. Diploma/GED	20	31	34	40
College+	47	62	70	79

Source: *John Horrigan, Home Broadband Adoption 2008, Pew Internet and American Life Project (July 2008), available at http://www.pewinternet.org/~/media//Files/Reports/2008/PIP_Broadband_2008.pdf*

As the market for high-speed Internet access continued to develop (on both the supply side and demand side) and as the service became increasingly integral to modern life, understanding the mechanics of broadband adoption and the reasons for non- or under-adoption became a priority. Studies from the early 2000s had confirmed the hazards associated with extending "real world" inequalities into cyberspace.[167] More generally, however, the danger of being left on the wrong side of the digital divide became increasingly palpable as consumers and businesses used their connections for a broader range of personal, civic, social, and commercial activities. Studies increasingly identified digital literacy as a vital component associated with broadband adoption; those without the skills to harness the power of broadband were more likely to view it as too costly or not worth an investment of time and money.[168] As a result, policy makers and other stakeholders slowly began to appreciate the complexities inherent in broadband adoption and focused more on the demand side of the connectivity equation.

166 *See supra,* section 3.1.1, for additional discussion.
167 *See, e.g.,* Paul DiMaggio et al., *Social Implications of the Internet,* 27 Annual Review of Sociology 307–336 (2001).
168 *See, e.g.,* Karen Mossberger et al., Virtual Inequality: Beyond the Digital Divide (Georgetown University Press: Washington, D.C. 2003).

Nevertheless, some continued to believe price was the primary reason for non-adoption in many communities. Much of the appeal of municipal Wi-Fi projects and other GONs from this era hinged on the perceived ability to use these networks to offer free or low-cost broadband Internet access to vast swaths of the population.[169] It was argued that free, readily available Internet access would be enough on its own to encourage non-adopters to go online via a high-speed connection. But, as discussed in **section 2,** many of these systems eventually did not fulfill expectations because of under-use.[170] Free, it turned out, was not enough to attract non-users.[171]

3.1.2.2 Identifying and Understanding Major Barriers to Broadband Adoption

The complex and multifaceted nature of connecting the unconnected became more apparent to policy makers and other stakeholders in the wake of federal efforts to strengthen high-speed Internet access. In conjunction with preparation of its *National Broadband Plan*, the FCC in early 2010 released a comprehensive analysis of broadband adoption in the United States.[172] The FCC would use these findings to inform dozens of recommendations included in its *Plan*, prepared at the behest of Congress to develop a strategy for using broadband to realize a number of "national purposes."[173] More generally, these findings served to sustain the momentum of a variety of other federal broadband-related efforts, including the allocation of billions of dollars in support of programs to bring broadband to unserved areas, raise adoption rates, and improve digital literacy skills.[174]

These efforts encouraged more comprehensive investigations of the myriad practical barriers to broadband adoption in specific user communities and sectors of the economy. The resulting studies, along with the *National Broadband Plan,* provided a more complete understanding of the factors that influence broadband adoption decisions.[175]

A key point that emerged was that many chose not to adopt broadband because they did not see it as relevant to them and thus not worth the investment of time and money to purchase the service (and related equipment, like a computer) and learn how to use it.[176] This outlook impacted the perceived affordability of broadband, contributing to a significant number of non-adopters who viewed the service as too expensive despite the fact

169 *See, e.g., Wi-Fi Everywhere*.

170 *See supra,* section 2.2. *See also Reality Bites*, Aug. 30, 2007, The Economist, *available at* http://www.economist.com/node/9726651 ("Worse, the networks that have been completed have attracted few users. Taipei's city-wide WiFly system, the largest such network in the world, was reckoned to need 250,000 regular subscribers by the end of 2006 in order to break even, but had attracted only 30,000 by April 2007. America's biggest network, around Tempe, Arizona, was aiming for 32,000 subscribers, but had only 600 in April 2006 and has not provided figures since.").

171 These arguments were continuously made despite data to the contrary. Indeed, several studies at the time found that the price of broadband had little effect on adoption decisions. *See* John B. Horrigan, *Why it Will be Hard to Close the Broadband Divide*, at p. 3, Pew Internet & American Life Project (Aug. 2007), *available at* http://www.pewinternet.org/~/media//Files/Reports/2007/Broadband_Commentary.pdf.pdf ("Most research on broadband adoption suggests price is not a large factor in the purchasing decision."); Kenneth Flamm & Anindya Chaudhuri, *An Analysis of the Determinants of Broadband Access*, 31 Telecom. Pol'y 312-326 (July-August 2007).

172 *See* John Horrigan, *Broadband Adoption and Use in America*, at p. 3, OBI Working Paper Series No. 1 (Feb. 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296442A1.pdf ("*Broadband Adoption and Use in America*").

173 *National Broadband Plan* at p. 3.

174 *See, e.g.,* NTIA, BTOP: About, http://www2.ntia.doc.gov/about.

175 These studies included: Charles M. Davidson and Michael J. Santorelli, *Barriers to Broadband Adoption: A Report to the FCC*, Advanced Communications Law & Policy Institute, New York Law School (Oct. 2009), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/ACLP%20Report%20to%20the%20FCC%20-%20Barriers%20to%20BB%20Adoption.pdf (identifying dozens of barriers impeding more robust broadband adoption by senior citizens and people with disabilities and across the education, healthcare, energy, and government sectors) ("*Barriers to Broadband Adoption*"); Jon Gant et al., *National Minority Broadband Adoption*, Joint Center for Political and Economic Studies (Feb. 2010), *available at* http://www.jointcenter.org/sites/default/files/upload/research/files/MTI_BROADBAND_REPORT_WEB.pdf (identifying barriers impacting African Americans and Hispanics) ("*National Minority Broadband Adoption*"); Dharma Dailey et al., *Broadband Adoption in Low Income Communities*, Social Science Research Council (March 2010), *available at* http://www.ssrc.org/workspace/images/crm/new_publication_3/%7B1eb76f62-c720-df11-9d32-001cc477ec70%7D.pdf (identifying barriers impacting low-income households) ("*Broadband Adoption in Low Income Communities*").

176 *See, e.g., Broadband Adoption and Use in America* at p. 5.

prices had been generally declining.[177] A related impediment to further adoption across most user groups was a lack of digital literacy skills.[178] The absence of these skills contributed to widely held fears among non-adopters about the security and privacy of going online and participating in activities like e-commerce.[179]

The impact of these attitudes toward broadband was heightened by numerous other barriers to adoption unique to particular user groups. Many were identified by researchers and social scientists, and used by the FCC in its *Plan*. Table 3.10 provides an overview of barriers impacting four under-adopting user groups: senior citizens, people with disabilities, minorities, and low-income households. A similar range of barriers was seen as obstacles to further use of broadband in key sectors like education, energy, and healthcare. Table 3.11 summarizes those barriers.

Table 3.10: Barriers Impacting Senior Citizens, People with Disabilities, Minorities, and Low-Income Households

Senior Citizens	People with Disabilities	Minority Communities	Low-Income Households
• Lack of awareness regarding the value of using broadband • Usability concerns • Low rate of computer ownership • Security and privacy concerns • Lack of senior-focused training programs	• Low levels of computer ownership • Negative perceptions about broadband accessibility and broadband-enabled services • Affordability concerns • Interoperability of assistive technologies • Lack of digital literacy skills	• Lack of awareness regarding the value of using broadband • Low rates of computer ownership • Affordability concerns • Underdeveloped digital literacy skills	• Perception that broadband is not a worthwhile investment of scarce funds • Lack of digital literacy skills • Low rates of computer ownership • Affordability concerns tied to billing issues

Sources: *National Broadband Plan; Barriers to Broadband Adoption; Broadband Adoption in Low Income Communities; National Minority Broadband Adoption*

Table 3.11: Barriers Impacting the Education, Energy, and Healthcare Sectors

Education	Energy	Healthcare
• Cost concerns • Outdated components of the E-rate program • Lack of a more targeted strategy for allocating federal funding • Inadequate teacher training • Demographic disparities in technology literacy • Organizational barriers among educators • Lack of adequate bandwidth within schools • Lack of national curriculum standards	• Outdated regulatory framework creates little incentive for utilities to innovate • State-by-state patchwork of regulation impedes national-scale deployment • Substantial upfront implementation costs • Lack of demand for smart home services by residential customers • Unresolved data security, cybersecurity, and privacy concerns	• Inadequate reimbursement mechanisms for most telemedicine services • Outdated privacy and security policies • State-by-state patchwork of rules regarding physician licensure and credentialing • Implementation cost concerns • Uncertainty regarding the applicability of tort law • Skepticism among healthcare providers and patients regarding the value of using these tools

Sources: *National Broadband Plan; Barriers to Broadband Adoption*

177 For additional discussion regarding the cost/affordability dynamic, *see* Charles M. Davidson, Michael J. Santorelli & Thomas Kamber, *Broadband Adoption: Why it Matters & How it Works*, 19 Media L. & Pol'y 14 (2009) ("*Broadband Adoption: Why it Matters & How it Works*").

178 *Broadband Adoption and Use in America* at p. 5.

179 *See, e.g., Barriers to Broadband Adoption* at p. 14.

3.1.2.3 Current Broadband Adoption Trends and Continued Challenges

Understanding these nuanced barriers and tailoring outreach efforts to meet unique, group-specific needs, have not translated into significant increases in national broadband adoption figures. Despite increased awareness of the benefits of broadband, hundreds of millions of dollars in funding to support community-based education and training initiatives aimed at bringing more non-users online, continued innovation and competition throughout the ecosystem, and a broader array of service options, adoption levels—across the entire population and in many user communities—have leveled off.[180] Table 3.12 summarizes this trend.

Table 3.12: Home Broadband Adoption (Percent of Population): 2009–2013

	2009*	2010**	2011†	2012††	2013†††
All Adults	65	68	69	65	70
Race					
White	69	72	74	70	74
Black	59	55	55	53	64
Hispanic	49	57	56	49	53
Age					
18–29	75	77 (16–44)	77 (16–44)	75	80
30–49	74			75	78
50–64	64	72 (45–64)	73 (45–64)	62 (50–64)	69 (50–64)
65+	35	45	49	41	43
Income					
Low-income	40 (<$20,000)	43 (<$25,000)	43 (<$25,000)	46 (<$30,000)	54 (<$30,000)
High-income	93 (>$75,000)	93 (>$100,000)	93 (>$100,000)	89 (>$75,000)	88 (>$75,000)
Education Level					
Less than H.S.	24	33	35	27	37
H.S. Diploma/GED	55	57	58	56	57
College+	86	87	88	85	89

* *Broadband Adoption and Use in America*

** *Exploring the Digital Nation: Computer and Internet Use at Home*, National Telecommunications and Information Administration, U.S. Dept. of Commerce (Nov. 2011), available at http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_computer_and_internet_use_at_home_11092011.pdf

† *Exploring the Digital Nation: America's Emerging Online Experience,* NTIA, U.S. Dept. of Commerce (June 2013), available at http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf

†† Joanna Brenner & Lee Rainie, *Pew Internet: Broadband,* Pew Internet and American Life Project (Dec. 2012), *available at* http://pewinternet.org/Commentary/2012/May/Pew-Internet-Broadband.aspx

††† Kathryn Zickuhr & Aaron Smith, *Home Broadband 2013,* Pew Internet and American Life Project (Aug. 2013), *available at* http://pewinternet.org/~/media//Files/Reports/2013/PIP_Broadband%202013_082613.pdf

180 *See, e.g.,* Edward Wyatt, *Most of U.S. is Wired, but Millions Aren't Plugged in,* Aug. 19, 2013, N.Y. Times (reporting on recent Internet use and broadband adoption data and noting that usage levels have plateaued in recent years despite significant public and private expenditures to help close the digital divide).

Bridging these divides presents a major public policy challenge. Data and research discussed above indicate that simply installing more broadband infrastructure is not the solution (whether the infrastructure is privately or publicly owned). Policy focused on optimistic assumptions vis-à-vis demand side issues, such as "more supply will equal more demand" or that the price of broadband is the most important consideration, will not address the many community-specific barriers to broadband adoption.

There are numerous viable, impactful roles that policy makers can play on the demand side. A menu of successful approaches to bolstering adoption by addressing discrete barriers and improving digital literacy has emerged over the last few years. Many of the most effective approaches are being deployed at the state and local levels. As has been discussed at length elsewhere,[181] including the *National Broadband Plan*,[182] state and local governments are uniquely positioned to partner with experts in the private and nonprofit sectors toward these ends. Such initiatives have begun to move the needle on broadband adoption in under-adopting communities.[183] (A more comprehensive discussion of these roles is provided in **section 6**.)

3.2 Public Sector Performance to Date: Volatile Economics, Fiscal Instability, and Crumbling Infrastructure

The second key contextual point in any discussion about the viability of GONs revolves around the ability of municipalities, and, by implication, states, to fund the construction, ongoing maintenance, and evolving upgrades of these networks, and the opportunity costs of such funding.

Section 3.2.1 examines the economic realities facing municipalities and states across the country. The Great Recession exposed a number of critical weaknesses in local finances that, taken together, create an inhospitable environment for massive new investments in or the many risks associated with redundant long-term construction projects. The primary purpose of this analysis is to ground GONs discussions in the economic realities facing state and local governments.

Section 3.2.2 discusses the substantial critical infrastructure challenges currently facing the United States as a whole and individual states. By nearly every measure, basic public infrastructure, including roads, bridges, dams, water systems, ports, and the electric grid, is crumbling. Its replacement or repair will require trillions of dollars. To the extent that new funding is available for investment in towns, cities, and states, the data in this subsection indicate that those dollars should be allocated in support of repairing existing infrastructure. Calls to prioritize GONs as targets of public spending must be carefully scrutinized in light of these existing and future obligations.

3.2.1 Economic Realities Facing Municipalities and States

Detroit's recent bankruptcy filing offers a relevant, albeit extreme, example of the harsh economic realities facing states and municipalities of all sizes. No single event or project led to what is the largest municipal bankruptcy filing in U.S. history.[184] Rather, it was the convergence of a host of negative economic and fiscal trends decades in the making. These included a "shrunken tax base but still a huge, 139-square-mile city to maintain; overwhelming health care and pension costs; repeated efforts to manage mounting debts with still more borrowing; annual deficits in the city's operating budget since 2008; and city services crippled by aged

181 *See, e.g.,* Charles M. Davidson, Michael J. Santorelli & Thomas Kamber, *Toward an Inclusive Measure of Broadband Adoption*, 6 Int'l J. of Comm. 2555-2575 (2012) (discussing the importance of local social infrastructures) ("*Toward an Inclusive Measure of Broadband Adoption*").

182 *National Broadband Plan* at p. 167.

183 For additional examples and best practices, *see Broadband Adoption Toolkit*, National Telecommunications & Information Administration, U.S. Dept. of Commerce (April 2013), *available at* http://www2.ntia.doc.gov/files/toolkit_042913.pdf ("*Broadband Adoption Toolkit*").

184 *See* Monica Davey and Mary William Walsh, *Billion in Debt, Detroit Tumbles into Insolvency*, July 18, 2013, N.Y. Times.

computer systems, poor record-keeping and widespread dysfunction."[185] The result was the accumulation of about $18 billion in debt, of which more than half stemmed from pension and healthcare obligations, and a third from water and sewer systems.[186]

Municipal bankruptcies remain exceedingly rare—only one in 2,710 eligible localities has filed for bankruptcy protection since 2008 (see the box to the right for recent examples)[187]—yet the fall of Detroit is symptomatic of deep financial instability across local and state governments.[188] The Great Recession and the subsequent fallout have exposed many shortcomings in public sector finances, which, for too long, had been obscured by a relatively stable economic environment.[189]

Many of the financial woes plaguing municipalities large and small stem from inability or unwillingness to appreciate the long-term consequences of short-term investments or major contractual obligations. A leading example is the looming pension crisis facing local and state governments across the country. These entitlements have become so inured in the political and social fabric that many states have strict laws guaranteeing payment of benefits accrued regardless of prevailing economic conditions.[190] Moreover, creative accounting rules and unrealistic assumptions about how pension funds would grow over time allowed policy makers to gloss over significant deficiencies in these accounts or delay actions that might plug growing gaps.[191]

As a result, and coupled with significant budget shortfalls caused by the Great Recession, state and local pensions are anywhere from 25 percent to more than 50 percent underfunded, which translates to a shortfall

Municipal Bankruptcies Since 2008

Local Government Bankruptcy Filings

- Detroit, Michigan (pending)
- San Bernardino, California
- Mammoth Lakes, California (dismissed)
- Stockton, California
- Jefferson County, Alabama
- Harrisburg, Pennsylvania (dismissed)
- Central Falls, Rhode Island
- Boise County, Idaho (dismissed)

Other Municipal Bankruptcy Filings

- Sanitary and Improvement District #512, Douglas County, Nebraska
- Lost Rivers District Hospital, Idaho
- Mendocino Coast Health Care District, California
- Lake Lotawana Community Improvement District, Missouri
- Rural Water District No. 1, Cherokee County, Oklahoma

185 *Id.*

186 *See* Mike Patton, *Detroit Files for Bankruptcy Protection: The Facts, The Figures, and The Fallout*, July 22, 2013, Forbes.com, *available at* http://www.forbes.com/sites/mikepatton/2013/07/22/detroit-files-for-bankruptcy-protection-the-facts-the-figures-and-the-fallout/.

187 *See Bankrupt Cities, Municipalities List and Map*, Updated: Dec. 3, 2013, Governing.com, *available at* http://www.governing.com/gov-data/municipal-cities-counties-bankruptcies-and-defaults.html. *See also* Mike Maciag, *How Rare are Municipal Bankruptcies?,* Jan. 24, 2013, Governing.com, *available at* http://www.governing.com/blogs/by-the-numbers/municipal-bankruptcy-rate-and-state-law-limitations.html (providing an overview of state laws governing municipal bankruptcy procedures).

188 Standard & Poor's, in a recent analysis of municipal finances, predicted that such bankruptcies would remain rare going forward. *See* Gabriel J. Petek et al., *Municipal Bankruptcy: Standard & Poor's Approach and Viewpoint*, Standard & Poor's (Oct. 4, 2012), *available at* http://www.standardandpoors.com/spf/upload/Ratings_US/Municipal_Bankruptcy.pdf.

189 There is also growing concern that the Detroit bankruptcy could set a troubling precedent for how municipalities treat bond holders during times of fiscal instability or insolvency. More specifically, Detroit is seeking to deprioritize repayment of outstanding bonds by classifying all holders of city debt as a single class of unsecured creditors. *See* Nathan Bomey, *Detroit to Battle Bondholders in Bankruptcy Court,* Feb. 19, 2014, *USA Today*, *available at* http://www.usatoday.com/story/news/nation/2014/02/19/detroit-bankruptcy-bondholders-dispute/5601609/. This has already raised bond prices for localities in Michigan. *See* Mary Williams Walsh, *Woes of Detroit Hurt Borrowing by its Neighbors*, Aug. 9, 2013, N.Y. Times. *See also* Mike Cherney, Kelly Nolan and Emily Glazer, *Detroit Rattles Muni Market*, Aug. 8, 2013, Wall St. Journal (reporting on how similar approaches to Detroit's water and sewer bonds are impacting the broader municipal bond market).

190 *See* Alicia H. Munnell and Laura Quinby, *Legal Constraints on Changes in Local and State Pensions*, Center for Retirement Research at Boston College, Issue in Brief No. 25 (Aug. 2012), *available at* http://crr.bc.edu/wp-content/uploads/2012/08/slp_25.pdf (providing an overview of these various legal protections).

191 *See, e.g., Who Pays the Bill?* July 27, 2013, The Economist ("Pension accounting is complicated. What is the cost today of a promise to pay a benefit in 2020 or 2030? The states have been allowed to discount that future liability at an annual rate of 7.5%-8% on the assumption that they can earn such returns on their investment portfolios. The higher the discount rate, the lower the liability appears to be and the less the states have to contribute upfront.").

of at least $1 trillion and possibly as much as $3 trillion.[192] At the city level in particular, Pew has observed a "widening gap" between pension commitments and funding levels in 61 major cities across the United States.[193] This divide is compounded by similarly generous and legally protected commitments to fund healthcare for retirees. Pew notes that "unfunded liabilities for retiree healthcare loom even larger than for pensions."[194]

Beyond accelerating an avalanche of legacy costs for many cities and states, the Great Recession reminded citizens of the fragility of municipal finances and the fiscal interdependencies between local and state governments. City budgets are typically funded by a diverse mixture of tax revenues derived from individuals and businesses (e.g., sales, property, and income taxes), an assortment of fees and assessments, and state (and, to a more limited extent, federal) budget dollars. The extent to which a particular city or town relies on a certain source of income varies from municipality to municipality.[195] But, in general, about half of local budget revenues are derived from two primary sources: state budgets and property taxes.[196] Of the two, "states fund on average close to a third of local budgets."[197] As a result, municipal budgets are subject to negative shocks whenever there is economic turbulence at the national, state, or local level.

Conversely, given the close economic relationship between cities and states, negative shocks at the local level can trickle up to the state level. One recent study of state budget crises that occurred in the wake of the recent recession concluded that distressed municipal finances in general are a "major threat" to the fiscal sustainability of the states.[198] In short, as much as some municipalities wish to be independent from the influence of state legislatures and governors, these entities remain closely linked economically and tend to rise and fall together. In the GONs context, this linkage is critical because, despite the attempts by some to underscore the importance of preserving some semblance of self-governance, states have significant vested interests in monitoring the economic health (along with numerous other aspects) of their political subdivisions.[199] Because a municipal broadband network represents a significant, long-term commitment of capital and assumption of debt, state governments have a major role to play when they implement GONs-related legal processes to guide the decision-making of local officials.[200]

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192 *Id.* (quoting a report by Moody's that these funds are 52% underfunded). *See also* Alicia H. Munnell et al., *The Funding of State and Local Pensions: 2012-2016*, Center for Retirement Research at Boston College, Issue in Brief No. 32 (July 2013), *available at* http://crr.bc.edu/wp-content/uploads/2013/07/slp_32.pdf (estimating that these funds are underfunded by 27 percent).

193 *See A Widening Gap in Cities: Shortfalls in Funding for Pensions and Retiree Health Care*, The Pew Charitable Trusts (Jan. 2013), *available at* http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Retirement_security/Pew_city_pensions_report.pdf.

194 *Id.* at p. 2.

195 *See, e.g.,* Gerald Prante, *Where do State and Local Government Get Their Tax Revenue?* Fiscal Fact No. 194, Tax Foundation (Oct. 2009), *available at* http://taxfoundation.org/sites/taxfoundation.org/files/docs/ff194.pdf (providing an overview of some of the primary sources of tax revenue in states across the country).

196 *See, e.g., The Local Squeeze: Falling Revenues and Growing Demand for Services Challenge Cities, Counties, and School Districts*, at 1, The Pew Charitable Trusts (June 2012), *available at* http://www.pewstates.org/uploadedFiles/PCS_Assets/2012/Pew_Cities_Local%20Squeeze_report.pdf ("*Local Squeeze*").

197 *Id.* at 5.

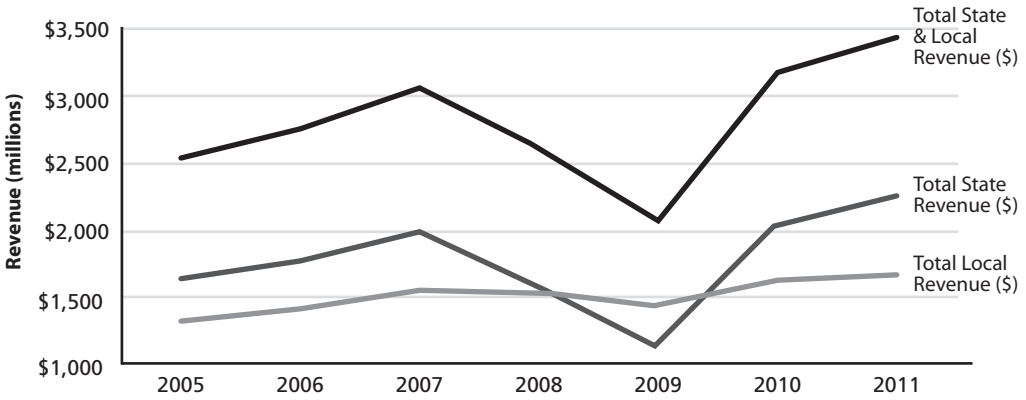
198 *See Report of the State Budget Crisis Task Force*, at p. 54-56, State Budget Crisis Task Force (July 2012), *available at* http://www.statebudgetcrisis.org/wpcms/wp-content/images/Report-of-the-State-Budget-Crisis-Task-Force-Full.pdf ("*State Budget Crisis Task Force Report*").

199 The contours of these relationships, especially in the context of monitoring the economic health of municipalities, are evident in the array of responses to local fiscal crises that have occurred in recent years. Some states, like New Jersey, have implemented relatively comprehensive oversight of local finances. Other states, like Michigan, have demonstrated a willingness to intervene in local matters when the situation becomes dire. In the case of Detroit, for example, the state governor appointed an emergency manager to oversee city government in an effort to manage what had quickly become a financial disaster. Still other states, like Pennsylvania and California, have been faulted for implementing a more hands-off approach to monitoring its municipalities. Much of this criticism stems from several major municipal bankruptcies in these states over the last few years. *See* Mark J. Magyar, *Strict Fiscal Oversight Keeps New Jersey Cities Out of Bankruptcy,* July 22, 2013, N.J. Spotlight, *available at* http://www.njspotlight.com/stories/13/07/21/strict-oversight-keeps-nj-cities-out-of-bankruptcy/?p=all; Monica Davey, *Michigan Naming Fiscal Manager to Help Detroit*, March 1, 2013, N.Y. Times, *available at* http://www.nytimes.com/2013/03/02/us/michigan-appoints-emergency-manager-for-detroit.html?_r=0; Hillary Russ, *Analysis: Pennsylvania City's Woes Fuel Debate on State Oversight*, July 15, 2012, Reuters, *available at* http://www.reuters.com/article/2012/07/15/us-usa-scranton-crisis-idUSBRE86E07C20120715.

200 To date, 19 states have enacted some type of law impacting the deployment of GONs. Many of these require municipalities to undertake comprehensive feasibility studies to ensure that the GON is economically viable. Very few have imposed outright bans on such networks.

While state and local revenues have improved (see Figure 3.2) and while progress has been made toward resolving many of the budget crises that had paralyzed state and local government in the recent past,[201] there is broad agreement that municipal finances in general remain unstable. Property and income tax collections have not grown in recent years, and growth in sales tax receipts remains tepid.[202] Any long-term drop in property tax revenues is especially critical because these receipts "make up more than two-thirds of total tax revenue for local governments as a whole and 100 percent of tax revenue for many school districts and counties."[203] Combined with other unfavorable conditions imposed on local governments by the Great Recession and its aftermath, many municipalities have been forced to slash budgets, dip into "rainy day" funds, or run deficits to continue providing core services to constituents.[204] For these reasons, there have been significantly more municipal credit *downgrades* than upgrades over the last few years.[205]

Figure 3.2: State & Local Revenues: 2005–2011



Source: *Census Bureau State & Local Government Finances Summaries: 2005–2011*

Though critically important to municipalities in the short term, fleeting dips in revenues and cuts to budgets pale in importance to the deep structural shifts remaking local economies across the country. Over the last four years, public sector employment at the state and local levels has been decimated by spending freezes and budget cuts. Indeed, between January 2009 and February 2014, state and local governments cut over 650,000 jobs.[206] The vast majority of these job losses—about 529,000—occurred at the local level.[207] Such deep and consistent cuts have been significant contributors to a national unemployment rate remaining at historically

201 *See, e.g., The Fiscal Survey of States: An Update of State Fiscal Conditions*, A Report by the National Governors Association and the National Association of State Budget Offices (spring 2013), *available at* http://www.nasbo.org/sites/default/files/Spring%202013%20Fiscal%20Survey%20of%20States.pdf (noting that "After several years of slow recovery in the national economy, fiscal distress is finally beginning to subside for most states." *Id.* at vii). *But see* Stephen Moore, *Christmas Comes Early for State Budgets*, July 6-7, 2013, Wall St. Journal (noting that recent increases in state tax revenues are likely to be fleeting and cautioning states to not overspend as a result lest they become embroiled in a "boom-and-bust" cycle of taxing and spending).

202 *See* Michael A. Pagano & Christiana McFarland, *City Fiscal Condition in 2013,* Research Brief on America's Cities, National League of Cities (Oct. 2013), *available at* http://www.nlc.org/Documents/Find%20City%20Solutions/Research%20Innovation/Finance/Final_CFC2013.pdf.

203 *State Budget Crisis Task Force Report* at p. 54.

204 *Id.*

205 *Id.* at p. 56. *See also* Priscilla Hancock, *Navigating the Municipal Market in 2013: Curb your Enthusiasm*, at p. 1, J.P. Morgan Investment Insights (March 2013), *available at* https://www.jpmorganfunds.com/blobcontent/48/731/1323356438694_II-MUNI-SPRING13.pdf ("Since the recession, credit downgrades have consistently exceeded credit upgrades by a significant margin, and no sector of the market has been spared.").

206 *See State and Local Government Employment: Monthly Data (as of March 7, 2014)*, Governing.com, *available at* http://www.governing.com/gov-data/public-workforce-salaries/monthly-government-employment-changes-totals.html.

207 *Id.*

high levels since the end of 2008.[208] Elevated levels of unemployment, coupled with a large pool of people who have given up looking for work, depress tax collections and property taxes, which in turn feeds into budget instability and creates considerable economic uncertainty.

In many instances, private sector job losses stemmed directly from the evisceration of industries that played essential roles in local economies for decades. Although some of these jobs (e.g., construction employment) reemerged in tandem with the revitalization of a particular sector (e.g., housing), there is broad agreement among economists and labor experts that many of the jobs that were lost as a result of the recession are unlikely to return.[209] The manufacturing sector, which has been shedding jobs for decades, is typically cited as the leading example of an industry that has suffered irreparable damage over the last few years.[210] Plant closings, staff reductions, and hiring and wage freezes contributed to significant turnover in this sector.[211] Such medium- and high-paying positions, which were once considered safe and reliable and thus capable of supporting families and communities for generations, have not rebounded during the recovery and have instead been replaced by mostly low-wage positions.[212] Overall, "more than half of all U.S. metro areas won't regain the jobs lost in the recession until the second half of 2015 or later."[213]

3.2.1.1 Observations

Using these dire economic conditions as an opportunity, some advocate in favor of municipal broadband networks by framing them as a critical input for jump-starting economic development.[214] The rationale offered to policy makers, local businesses, and residents typically includes the assumption that the new GON will enable a particular city, town, or region to create its own high-tech start-up community or to attract a range of new businesses.[215] The substantial upfront costs to build and maintain these networks are justified by proponents in light of the many benefits—new sectors, new jobs, and higher wages among them—that are promised to flow from the GON once fully deployed.[216]

There is disagreement among researchers as to whether a new municipal broadband network can revive or remake a local economy. While substantial empirical evidence indicates broadband and broadband-enabled

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208 *See* Bureau of Labor Statistics, Unemployment Rate, http://data.bls.gov/timeseries/LNS14000000. For additional discussion of state and local government employment losses, *see* Lucy Dadayan and Donald J. Boyd, *The Depth and Length of Cuts in State-Local Government Employment is Unprecedented*, Rockefeller Institute of Government at SUNY Albany, Issue Brief (Jan. 2013), *available at* http://www.rockinst.org/pdf/government_finance/2013-01-09-State-Local_Government_Employment.pdf.

209 *See, e.g.,* Bernard Condon and Paul Wiseman, *Recession, Tech Kill Middle-Class Jobs*, Jan. 23, 2013, Associated Press, *available at* http://news.yahoo.com/ap-impact-recession-tech-kill-middle-class-jobs-051306434--finance.html.

210 Between 1980 and 2005, this sector lost about a quarter of its overall workforce. This translates to about 4.5 million job losses. *See* Patricia Atkins et al., *Responding to Manufacturing Job Loss: What Can Economic Development Policy Do?*, Metropolitan Policy Program at Brookings (June 2011), *available at* http://www.brookings.edu/~/media/research/files/papers/2011/6/manufacturing%20job%20loss/06_manufacturing_job_loss.pdf.

211 This sector has lost well over two million jobs since the recession. For an overview of historical data, *see* Bureau of Labor Statistics, Manufacturing Employment Data, http://data.bls.gov/timeseries/CES3000000001.

212 *See* Brad Plummer, *How the Recession Turned Middle-Class Jobs into Low-Wage Jobs*, Feb. 28, 2013, Wash. Post Wonkblog, *available at* http://www.washingtonpost.com/blogs/wonkblog/wp/2013/02/28/how-the-recession-turned-middle-class-jobs-into-low-wage-jobs/ (reporting on data and analysis released by the Federal Reserve Bank of San Francisco).

213 *See* Tim Mullaney, *Many Cities Face Long Wait to Regain Lost Jobs,* June 26, 2013, USA Today, *available at* http://www.usatoday.com/story/money/business/2013/06/26/metro-areas-slow-jobs-recovery-since-recession/2453419/ (reporting on data and analysis released by the U.S. Conference of Mayors).

214 *See, e.g.,* The Politics of Abundance; *Community Broadband Creates Jobs,* Institute for Local Self-Reliance Fact Sheet, *available at* http://muninetworks.org/sites/www.muninetworks.org/files/fact-sheet-econ-dev.pdf ("*Community Broadband Creates Jobs*"); *Missing Our Gigabit Opportunity?,* Aug. 5, 2013, Gig.U Blog, *available at* http://www.gig-u.org/blog/missing-our-gigabit-opportunity.

215 *See, e.g.,* Mark Riffee, *Silicon Valley, Seattle…Chattanooga? Tennessee's 'Gig City' Woos Geeks*, Nov. 22, 2011, Wired, *available at* http://www.wired.com/business/2011/11/chattanooga-gigabit-network/; John Eligon, *Tech Start Ups Find a Home on the Prairie,* Nov. 21, 2012, N.Y. Times, *available at* http://www.nytimes.com/2012/11/22/us/silicon-prairie-takes-root-in-the-great-plains.html?_r=0 (reporting on how cities in the Midwest are attempting to rebrand themselves as part of the "Silicon Prairie").

216 *See, e.g., Business Case for Government Fiber* ("To make the case for investing in a government-owned fiber network, many communities define ROI more broadly and consider the "beyond the balance sheet" benefits that such a network would deliver.").

services create jobs and spur economic development in the United States,[217] there is little, if any, direct empirical evidence that GONs specifically have similar impacts on employment.[218] There is also robust discussion as to whether the presence of an ultra-high-speed broadband network will create new jobs and support new industries.[219] With numerous broadband options already widely available throughout the country, the introduction of a municipal supplier, even one that offers faster speeds in its locality, is unlikely on its own to transform the local economy. Indeed, a growing body of research indicates that the availability of broadband appears to be just one of many factors that impact local economic development.[220]

In the context of GONs that are positioned as essential to supporting the growth of a new high-tech sector, it must be recognized that competition for employment in the Internet ecosystem is very intense. Many of the industries that have been built online are surrounded by very high barriers to entry. To thrive, new firms require significant investment capital, as well as workers with specialized computer and digital literacy skills.[221] And unlike traditional economic hubs (e.g., the local industrial plant), start-ups and other digital firms often prefer to import talent from other states and countries rather than train new workers.[222] In addition, firms in this space tend to employ only a small number of people.[223]

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217 Numerous studies conducted over the last decade have examined the many economic and employment impacts of high-speed Internet connectivity on the U.S. economy. A representative sampling of these includes: Robert Crandall et al., *The Effect of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy*, New Millennium Research Council (Sept. 2003), *available at* http://newmillenniumresearch.org/archive/bbstudyreport_091703.pdf; William Lehr et al., Measuring Broadband's Economic Impact, Paper presented at TPRC (Jan. 2006), *available at* http://www.andrew.cmu.edu/user/sirbu/pubs/MeasuringBB_EconImpact.pdf; Robert Crandall et al., *The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data*, Brookings Institute (Nov. 2007), *available at* http://www.brookings.edu/views/papers/crandall/200706litan.pdf; *The Economic Impact of Stimulating Broadband Nationally*. Connected Nation (Feb. 2008), *available at* http://www.connectednation.org/_documents/connected_nation_eis_study_full_report_02212008.pdf; Roger Enter, *The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy*, White Paper for CTIA – The Wireless Association (May 2008), *available at* http://files.ctia.org/pdf/Final_OvumEconomicImpact_Report_5_21_08.pdf (updating a 2005, which is *available at* http://files.ctia.org/pdf/Report_OVUM_Economy.pdf); *Economic Impact of Broadband: An Empirical Study*, LECG (Feb. 2009), *available at* http://www.connectivityscorecard.org/images/uploads/media/Report_BroadbandStudy_LECG_March6.pdf; Mark Dutz et al., *The Substantial Consumer Benefits of Broadband Connectivity for U.S. Households*, Compass Lexecon/Internet Innovation Alliance (July 2009), *available at* http://internetinnovation.org/files/special-reports/CONSUMER_BENEFITS_OF_BROADBAND.pdf; Jed Kolko, *Does Broadband Boost Local Economic Development?*, Public Policy Institute of California (Jan. 2010), *available at* http://www.ppic.org/content/pubs/report/r_110jkr.PDF (finding a "positive relationship between broadband expansion and economic growth," but cautioning that the "economic benefits to residents appear to be limited."); Robert Crandall & Hal Singer, *The Economic Impact of Broadband Investment*, Broadband for America (Feb. 2010), *available at* http://www.broadbandforamerica.com/sites/default/themes/broadband/images/mail/broadbandforamerica_crandall_singer_final.docx; *The 2012 Jobs and Broadband Report*, Connected Nation (May 2012), *available at* http://www.connectednation.org/sites/default/files/cn_biz_whitepaper2012_final.pdf; Hanns Kuttner, *Broadband for Rural America: Economic Impacts and Economic Opportunities*, Hudson Institute (Oct. 2012), *available at* http://www.hudson.org/files/publications/RuralTelecom-Kuttner--1012.pdf.

218 Analyses in sections 4 and 5, *infra,* address some of the job creation claims made by GONs advocates.

219 *See, e.g.,* Julius Genachowski, *Faster, Sooner: Why the U.S. Needs 'Gigabit Communities,'* Jan. 18, 2013, Forbes.com, *available at* http://www.forbes.com/sites/ciocentral/2013/01/18/faster-sooner-why-the-u-s-needs-gigabit-communities/ (providing an example of the irrational exuberance that often surrounds talk of "gigabit communities").

220 *See, e.g.,* Jonathan Bowles and David Giles, *New Tech City*, Center for an Urban Future (May 2012), *available at* http://nycfuture.org/pdf/New_Tech_City.pdf (identifying numerous other factors impacting the creation and long-term viability of New York City's still-emerging high-tech sector) ("*New Tech City*"). For further analysis of claimed economic and employment impacts of GONs, *see infra,* sections 5.4 and 5.8.

221 *See, e.g., id.* (discussing the inputs required to sustain New York City's fledgling start-up sector).

222 The composition of Silicon Valley's high-tech workforce is often cited as an example of a high-tech cluster that does not reflect the composition of its surrounding areas. The high tech sector's recent push to reform national immigration laws also reflects a feeling that the domestic supply of qualified high tech workers is lacking. *See, e.g.,* Rebecca Greenfield, *Blacks and Hispanics Aren't Thriving in Silicon Valley's Meritocracy*, Feb. 7, 2013, The Atlantic Wire, *available at* http://www.theatlanticwire.com/technology/2013/02/blacks-and-latinos-arent-thriving-silicon-valleys-meritocracy/61890/ (reporting on minority underemployment in Silicon Valley); Eric Lipton and Somini Sengupta, *Latest Product From Tech Firms: An Immigration Bill*, May 5, 2013, N.Y. Times (reporting on the sector's recent push to reform national immigration laws to facilitate the importation of skilled tech workers).

223 Facebook employs less than 5,000 people. Google employs just over 44,000. AT&T has over 245,000 employees, while General Electric has well over 300,000. This data is *available at* www.finance.yahoo.com.

3.2.2 Infrastructure Challenges

In stark contrast to the robust U.S. broadband market, basic public infrastructure in the United States is suffering. There exist numerous examples of failing roads, bridges, dams, the electric grid, and other core public sector infrastructure across the nation. The box below provides just a few recent examples.

Examples of Major Infrastructure Failures: 2003–Present

2003 Northeast Blackout

- A sagging high-voltage line touching an overgrown tree set off a cascading failure of much of the Northeast United States' electric grid in August 2003. Fifty million people across eight states and parts of Canada were impacted, causing billions of dollars in lost economic activity and highlighting the fragile and antiquated nature of the nation's electric grid.[224]

Failure of Levees during Hurricane Katrina

- Hurricane Katrina exposed in dramatic fashion decades of neglect by local, state, and federal government entities in maintaining and updating the levee system in New Orleans to protect against more powerful storms. The storm damaged about half of all the protective structures in the city, contributing to widespread flooding that resulted in hundreds of deaths and tens of billions of dollars in property damage and lost economic activity.[225]

Major Bridge Failures in Minnesota and Washington

- In 2007, a bridge collapse in Minneapolis, Minnesota, resulted in the deaths of 13 people. The ultimate cause of the failure was an inability to adjust the design of the bridge to reflect ad hoc improvements to it over many decades. The original design of the bridge was "lighter and less expensive to build, but has gradually fallen out of favor with highway departments."[226]
- In 2013, the partial collapse of a bridge in Mount Vernon, Washington, was attributed to an outdated design. Prior to the failure, the bridge was listed as "fracture critical" and "functionally obsolete."[227]

Dam Failures and Near-Failures in the United States

- Between June 2005 and June 2013, there were 173 dam failures and 587 "episodes that, without intervention, would likely have resulted in dam failure."[228]

224 *See, e.g.,* JR Minkel, *The 2003 Northeast Blackout – Five Years Later*, Aug. 13, 2008, Scientific American, *available at* http://www.scientificamerican.com/article.cfm?id=2003-blackout-five-years-later; Charles M. Davidson & Michael J. Santorelli, *Realizing the Smart Grid Imperative: A Framework for Enhancing Collaboration Between Energy Utilities and Broadband Service Providers,* at p. 7-8, Time Warner Cable Research Program on Digital Communications (summer 2011), *available at* http://www.twcresearchprogram.com/pdf/TWC_Davidson.pdf ("*Realizing the Smart Grid Imperative*").

225 *See Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System: Draft Final Report of the Interagency Performance Evaluation Task Force*, Vol. I – Executive Summary and Overview, U.S. Army Corps of Engineers (June 2006), *available at* http://www.nytimes.com/packages/pdf/national/20060601_ARMYCORPS_SUMM.pdf; *A Failure of Initiative: Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina,* at p. 87-97, U.S. House of Representatives (Feb. 2006), *available at* http://www.c-span.org/pdf/katrinareport.pdf.

226 *See, e.g.,* Matthew L. Wald, *Faulty Design Led to Bridge Collapse, Inquiry Finds*, Jan. 15, 2008, N.Y. Times, *available at* http://www.nytimes.com/2008/01/15/washington/15bridge.html.

227 *See, e.g.,* Marisol Bello, *Bridge Collapse Shines Light on Aging Infrastructure*, May 24, 2013, USA Today, *available at* http://www.usatoday.com/story/news/nation/2013/05/24/washington-bridge-collapse-nations-bridges-deficient/2358419/.

228 *See* Association of State Dam Safety Officials, Dam Failures and Incidents, http://www.damsafety.org/news/?p=412f29c8-3fd8-4529-b5c9-8d47364c1f3e.

Appreciating the scale and scope of these particular failures, and the poor condition of U.S. infrastructure in general, should inform any discussion regarding how and where to allocate scarce public funding. In some cases, major natural disasters (e.g., historic hurricanes and floods) exposed underlying weaknesses in infrastructure that had not been updated or properly maintained for decades. In other cases, aged infrastructure failed due to neglect by public officials. Regardless of the particular circumstances that contributed to a fatal failure or near-failure, the common thread throughout is significant under-investment of public resources in shoring up what remains the foundation of modern commerce.

There is little dispute that government should invest public resources in building and maintaining basic infrastructure like roads, bridges, dams, and ports. This has been a core function of government at every level for centuries.[229] And for many decades, especially in the middle part of the 20th century, these investments were significant and typically represented several percentage points of annual GDP.[230] Beyond hastening the modernization of many aspects of American life, these investments consistently generated significant gains in productivity, economic output, and job creation.[231] But for many reasons, overall spending on public infrastructure in the U.S. has steadily decreased over the last few decades.[232] There is a widening gap between the amount spent each year on maintaining critical infrastructure and the amount needed to repair and modernize it. The result is crumbling roads, failing bridges, faulty dams, a fragile electric grid, inadequate ports, and decaying water systems.

This downward spiral has been chronicled by the American Society of Civil Engineers (ASCE). Since 1998, this group has assigned letter grades to various aspects of public infrastructure throughout the United States in an effort to draw attention to the funding gaps and public neglect that are causing such decay. Table 3.13 provides an overview of its findings from 1998 through 2013. These grades paint an ominous picture of infrastructure in the U.S., where little progress has been made in shoring up many of the key areas identified. This is made clear by a cumulative "GPA" that has barely risen in 15 years and an investment gap that has nearly tripled over the last 12 years.

The dire conditions described by these results and the many aspects of the U.S infrastructure crisis have been further fleshed out in other data released in the last few years. A 2013 analysis by *USA Today*, for example, found that only 38 percent of roads in the U.S. are in "good" condition.[233] Transportation for America recently reported that about 11 percent of U.S. bridges remain "structurally deficient" and require "significant maintenance, rehabilitation, or replacement."[234]

These data gain additional relevance and primacy when translated into economic impacts. Failure to modernize and strengthen U.S. transportation hubs, for example, has created bottlenecks and congestion that cost the country around $200 billion each year.[235] Similarly, with "42 percent of America's major urban highways … congested" due to chronic under-investment, the U.S. economy loses about $101 billion each annually in "wasted time and fuel."[236] It is also estimated that "deficient and deteriorating [mass] transit systems cost the

229 For an historical analysis, *see* John Williamson, *Federal Aid to Roads and Highways Since the 18th Century: A Legislative History*, Congressional Research Service (Jan. 6, 2012), *available at* http://www.fas.org/sgp/crs/misc/R42140.pdf.

230 *See, e.g.,* Chris Edwards, *Infrastructure Investment: A State, Local, and Private Responsibility*, Cato Institute Tax & Budget Bulletin No. 67 (Jan. 2013), *available at* http://www.cato.org/sites/cato.org/files/pubs/pdf/tbb_067.pdf (providing an historical overview of public and private investment in U.S. infrastructure) ("*Infrastructure Investment: A State, Local, and Private Responsibility*").

231 *See, e.g., A New Economic Analysis of Infrastructure Investment*, Report Prepared by the Department of Treasury with the Council of Economic Advisers (March 23, 2012), *available at* http://www.treasury.gov/resource-center/economic-policy/Documents/20120323InfrastructureReport.pdf (providing data regarding the economic impact of public infrastructure investment) ("*New Economic Analysis of Infrastructure Investment*").

232 *See, e.g., Falling Apart and Falling Behind,* Transportation Infrastructure Report 2012, Building America's Future (March 2012), *available at* http://www.bafuture.org/pdf/Building-Americas-Future-2012-Report-32013.pdf (examining recent trends in infrastructure investment and highlighting shortcomings) ("*Falling Apart and Falling Behind*").

233 *See* Gary Stoller, *U.S. Roads, Bridges are Decaying Despite Stimulus Influx*, July 29, 2013, USA Today, *available at* http://www.usatoday.com/story/news/nation/2013/07/28/roads-bridges-decaying/2594499/ ("*U.S. Roads, Bridges are Decaying*").

234 *See The Fix We're in For: The State of Our Nation's Bridges 2013*, Transportation for America, *available at* http://t4america.org/docs/bridgereport2013/2013BridgeReport.pdf.

235 *Falling Apart and Falling Behind* at p. 11.

236 *See* ASCE 2013 Infrastructure Report Card, Roads, http://www.infrastructurereportcard.org/a/#p/roads/overview.

U.S. economy $90 billion in 2010,"[237] while underinvestment in inland waterways throughout the country "cost American businesses $33 billion in 2010."[238] An increasing number of power outages and other problems with the U.S. electric grid cost the economy about $150 billion each year.[239]

Table 3.13: Summary of ASCE Infrastructure Report Cards: 1998–2013

	ASCE Grades				
	1998	**2001**	**2005**	**2009**	**2013**
Aviation	C-	D	D+	D	D
Bridges	C-	C	C	C	C+
Dams	D	D	D	D	D
Drinking Water	D	D	D-	D-	D
Energy	n/a	D+	D	D+	D+
Hazardous Waste	D-	D+	D	D	D
Mass Transit	C	C-	D+	D	D
Navigable Waterways	n/a	D+	D-	n/a	n/a
— Inland Waterways	n/a	n/a	n/a	D-	D-
— Levees	n/a	n/a	n/a	D-	D-
— Ports	n/a	n/a	n/a	n/a	C
Public Parks and Recreation	n/a	n/a	C-	C-	C-
Rail	n/a	n/a	C-	C-	C+
Roads	D-	D+	D	D-	D
Schools	F	D-	D	D	D
Solid Waste	C-	C+	C+	C+	B-
Waste Water	D+	D	D-	D-	D
Cumulative GPA	**D**	**D+**	**D**	**D**	**D+**
Investment Gap	**n/a**	**$1.3 trillion***	**$1.6 trillion***	**$2.2 trillion***	**$3.6 trillion****

Source: *ASCE Report Cards – 1998, 2001, 2005, 2009, 2013*

*Estimated five-year need

**Investment needed by 2020

Conversely, numerous positive economic impacts are expected to flow from improvements to these aspects of U.S. infrastructure. Job creation, for example, has long been tied to increases in infrastructure spending. By one estimate, a $1 billion investment in infrastructure "creates more than 25,000 jobs at construction sites and factories producing needed raw materials."[240] More broadly, McKinsey estimates that increasing infrastructure spending by one percent of GDP would "translate into … 1.5 million [direct and indirect jobs]" in the United

237 *See* ASCE 2013 Infrastructure Report Card, Transit, http://www.infrastructurereportcard.org/a/#p/transit/overview

238 *See Crying Out for Dollars*, Feb. 2, 2013, The Economist (reporting data and estimates by ASCE).

239 *See* Brad Plumer, *Bad News: The U.S. Power Grid is Getting Pricier, Less Reliable*, March 8, 2013, Wash. Post Wonkblog, *available at* http://www.washingtonpost.com/blogs/wonkblog/wp/2013/03/08/surprise-the-u-s-power-grid-is-getting-pricier-less-reliable/ (reporting on data analyses from a variety of sources). *See also Economic Benefits of Increasing Electric Grid Resilience to Weather Outages*, Executive Office of the President of the United States (Aug. 2013), *available at* http://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf (providing data and observations regarding the significant costs that stem from weather-related power outages).

240 *Falling Apart and Falling Behind* at p. 5.

States.[241] Similarly, investments aimed at increasing the capacity of transportation networks—mass transit, inland waterways, freight and rail systems, and ports—are projected to not only generate new jobs, but also contribute to increased economic activity by, for instance, allowing the U.S. to become a more attractive conduit for shipping goods.[242]

These benefits are also expected to trickle down to the consumer level. Improving roads and bridges, building new transit systems, and boosting the efficiency of air travel will alleviate congestion and help consumers increase productivity (e.g., by not being stuck in traffic for as long or having as many flights delayed) and save money on fuel.[243] Improvements to the electric grid, including the introduction of "smart grid" technologies and services, are also expected to generate significant consumer welfare gains in the form of greater efficiency, more control over consumption, fewer outages, and lower rates.[244]

Closing investment gaps, reversing the long-term trend of ambivalence toward public infrastructure, and realizing the many benefits discussed above, however, will be challenging. Increasing public funding for these purposes will be difficult in the current political and fiscal environment, especially in light of imperatives to balance budgets and cut spending in both the short term and long term.[245] Compounding these difficulties are fundamental disagreements over the proper role of public funding for infrastructure projects going forward. Recent proposals for a national infrastructure bank, for example, acknowledge the heavy burden on state and local finances that increased spending on public infrastructure would have on already strained budgets, as well as shortcomings in existing federal funding mechanisms (e.g., the Highway Trust Fund).[246] A national infrastructure bank is thus seen as one way to help plug gaps by increasing federal infrastructure funding and using those funds to leverage additional private-sector participation in this endeavor.[247]

Alternatively, there have been calls for new policies that would increase private investment and participation in improving infrastructure. In recent years, private investment has dwarfed public spending on infrastructure: "private infrastructure spending—on factories, warehouses, freight rail, pipelines, refineries, and many other items—is about four times larger than federal, state, and local government infrastructure spending combined" and about five times larger if "defense spending is excluded."[248] Some remain skeptical of relying on the private sector to continue driving infrastructure spending, but, overall, there is broad bipartisan support for tapping into the economic incentives that drive such investment and using them to forge public-private partnerships (PPPs) in this context.[249] These arrangements are seen as optimal vehicles for addressing the U.S. infrastructure crisis given their track record of success in leveraging limited public dollars, along with private incentives and

241 *See* Richard Dobbs et al., *Infrastructure Productivity: How to Save $1 trillion a Year,* at p. 4, McKinsey Global Institute (Jan. 2013), *available at* http://www.mckinsey.com/~/media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Urbanization/Infrastructure%20productivity/MGI_Infrastructure_Full_report_Jan2013.ashx.

242 *See, e.g., Falling Apart and Falling Behind.*

243 *See, e.g., New Economic Analysis of Infrastructure Investment* at p. 18-20.

244 *See, e.g., Realizing the Smart Grid Imperative* (discussing the many benefits expected to flow from the broadband-enabled smart grid).

245 *See, e.g.,* Peter Baker and John Schwartz, *Obama Pushes Plan to Build Roads and Bridges*, March 29, 2013, N.Y. Times, *available at* http://www.nytimes.com/2013/03/30/us/politics/obama-promotes-ambitious-plan-to-overhaul-nations-infrastructure.html?_r=0 (detailing recent infrastructure spending proposals by President Obama and the political response by federal policy makers).

246 *See, e.g.,* William A. Galston and Korin Davis, *Setting Priorities, Meeting Needs: The Case for a National Infrastructure Bank*, at p. 3-4, Governance Studies at Brookings, Brookings Institution (Dec. 2012), *available at* http://www.brookings.edu/~/media/Research/Files/Papers/2012/12/13%20infrastructure%20galston%20davis/1213_infrastructure_galston_davis.pdf ("*Setting Priorities, Meeting Needs*").

247 *See, e.g.,* Douglas W. Elmendorf, *Infrastructure Banks and Surface Transportation*, Congressional Budget Office (July 2012), *available at* http://www.cbo.gov/sites/default/files/cbofiles/attachments/07-12-12-InfrastructureBanks.pdf (discussing how a national infrastructure bank would work).

248 *Infrastructure Investment: A State, Local, and Private Responsibility* at p. 1.

249 *See, e.g., Setting Priorities, Meeting Needs* at p. 2 (rationalizing that increasing federal government spending will help to forge partnerships that fund projects "on the basis of economic and social benefit, not political gain.").

expertise, to realize mutually beneficial goals.[250] PPPs are already popular among municipalities seeking to bolster local infrastructure (e.g., replacing a bridge[251]) or otherwise tap into the expertise of private sector firms (and individuals) to realize efficiencies and cost savings in numerous other instances.[252] (The use of PPPs in the context of broadband deployment is discussed in **section 6**.)

3.2.2.1 Observations

When some GONs proponents address the details of how a municipality might fund deployment of the municipal network,[253] a proposed broadband system is often cast as a modern-day utility that, like any utility, will require substantial and ongoing commitments of public dollars and close regulatory oversight to ensure certain pre-determined outcomes.[254] One rationale offered in support provides that, by taking ownership of broadband, the town or city will be able to "prioritize community needs, not distant shareholder desires."[255] Much confidence is placed in municipal business dealings, a sentiment tied directly to the notion that the primary mission of government is to "maximize the general welfare."[256] Implicit in this reasoning is optimism in the ability of local government to simply increase spending on what is deemed to be essential public infrastructure.[257]

The current state of the nation's public infrastructure, as well as a history of failed and failing GONs, predicts that, over the long run, government-owned broadband systems will likely suffer the same fate of other public infrastructure—stagnation, underinvestment, and public neglect. The investment gap for public infrastructure has nearly tripled over the last 10 years, while private investment in broadband has surged, casting doubt on the notion that government is better positioned to steer this market going forward.

The enthusiastic embrace of PPPs generally and in the broadband space specifically signals recognition among public and private stakeholders that government will play increasingly redefined roles in the infrastructure context going forward. Ongoing efforts to rein in government spending, balance budgets, and restructure

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250 For examples of how to structure successful PPPs, *see, e.g.,* Eric Boyer et al., *Public-Private Partnerships and Infrastructure Resilience: How PPPs Can Influence More Durable Approaches to U.S. Infrastructure*, U.S. Chamber of Commerce, National Chamber Foundation (Jan. 2012), *available at* http://emerging.uschamber.com/sites/default/files/PPPs%20and%20Infrastructure%20-%20NCF.pdf (identifying the many efficiencies that flow from properly structured and executed PPPs); Eduardo Engel et al., *Public-Private Partnerships to Revamp U.S. Infrastructure*, Discussion Paper 2011-02, The Hamilton Project, Brookings (Feb. 2011), *available at* http://www.brookings.edu/~/media/Research/Files/Papers/2011/2/partnerships%20engel%20fischer%20galetovic/02_partnerships_engel_fischer_galetovic_paper.PDF (same); Mark Perlman and Julia Pulidindi, *Public-Private Partnerships for Transportation Projects*, Municipal Action Guide, National League of Cities (May 2012), *available at* http://www.nlc.org/File%20Library/Find%20City%20Solutions/Research%20Innovation/Infrastructure/public-private-partnerships-for-transportation-projects-mag-may12.pdf (discussing the many merits of PPPs in the context of transportation projects); Emilia Istrate and Robert Puentes, *Moving Forward on Public Private Partnerships: U.S. and International Experience with PPP Units*, Brookings-Rockefeller Project on State and Metropolitan Innovation (Dec. 2011), *available at* http://www.brookings.edu/~/media/research/files/papers/2011/12/08%20transportation%20istrate%20puentes/1208_transportation_istrate_puentes.pdf (same); *For the Good of the People: Using Public-Private Partnerships to Meet America's Essential Needs*, at 4, National Council for Public-Private Partnerships (2002), *available at* http://www.ncppp.org/presskit/ncpppwhitepaper.pdf (providing a general overview of and introduction to how PPPs might be used in a variety of contexts).

251 There are numerous examples of PPPs that have been structured around replacing or modernizing a bridge. See, e.g., Martin Z. Braun & Freeman Klopott, Kiewit, *Macquarie Picked to Lead Goethals Bridge Project,* April 25, 2013, Bloomberg, *available at* http://www.bloomberg.com/news/2013-04-24/kiewit-said-to-be-selected-to-lead-new-goethals-bridge-project.html (providing details of a $1.5 billion PPP to replace an aging bridge connecting New York and New Jersey); *A River Runs Through It*, March 2, 2013, The Economist (discussing a PPP to replace a bridge connecting Indiana and Kentucky). *See also A Question of Trust*, May 12, 2012, The Economist (providing an overview of a program in Chicago that was designed to "match public infrastructure needs to private investors on a case-by-case basis").

252 An interesting new variant of the traditional PPP at the city level is the collaboration between city agencies and individuals (or firms) to put digital data to value-enhancing uses. *See, e.g.,* Ben Kesling, *Better Living Through Hacking*, Aug. 13, 2013, Wall St. Journal (profiling a program in Chicago to engage hackers and other computer experts in an effort to "sift through volumes of unorganized [city] data and turn it into useful information").

253 *See, e.g., Business Case for Government Fiber.*

254 The public utility argument in the broadband context has been made for many years. Indeed, it was echoed in the open access debate in the early 2000s and was at the center of the debate over network neutrality. These issues were discussed in section 2, *supra*.

255 *Averting the Looming Broadband Monopoly* at p. 7.

256 *Id.*

257 *See, e.g.,* Captive Audience (calling for the creation of a broadband infrastructure bank).

entitlements, will make it difficult, if not impossible, in the near term to fund discrete projects or support a national infrastructure bank.[258] And to the extent that funding is made available for investment in public works, data from the ASCE and elsewhere support the need to use these resources to address crumbling roads and failing bridges first and foremost, either directly or via PPPs. As such, the confidence that GONs advocates have in the public sector to fix what they see as a failing broadband market is misplaced.[259]

3.3 Takeaways

The data-based analyses included in this section support several important takeaways that are relevant to the GONs debate.

First, the broadband sector in the United States is healthy. The historical data and analyses provided in **section 3.1** demonstrate that the availability of different suppliers and the overall supply of broadband in the United States continue to improve year after year. Such forward progress signifies the success of a "light touch" bipartisan regulatory model that has placed consumer demand as the primary driver of competition and innovation in the broadband market.[260]

Second, despite these gains, the U.S. broadband market remains far from perfect. On the supply side, challenges remain in developing sustainable network deployment models in unserved areas. On the demand side, key user groups, including senior citizens, people with disabilities, and low-income households, continue to have low rates of broadband adoption relative to other groups. Similarly, a number of legal and regulatory barriers impede broadband diffusion across critical sectors like energy, education, and healthcare.

In light of these challenges, the conditions are ripe for targeted government interventions, which might include—

- Supporting broadband training programs;[261]
- Targeting subsidies for under-adopting groups where affordability may be an issue;[262]
- Rolling back legacy regulations impacting the deployment of broadband to rural and unserved parts of the country;[263]
- Forging PPPs with expert firms and nonprofits to realize well-defined goals on both the supply side and demand side;[264] and
- Addressing the dozens of unique barriers impacting adoption decisions in under-adopting user communities and sectors of the economy.[265]

258 *See, e.g.,* Philip Bump, *Obama Calls for Infrastructure Funding – for Fifth Time in Five Years*, March 29, 2013, The Atlantic Wire, *available at* http://www.theatlanticwire.com/politics/2013/03/obama-calls-infrastructure-spending-fifth-time-five-years/63696/ (chronicling repeated failed attempts by the president to rally support for increases in federal infrastructure spending).

259 *Evaluating the Rationales for Government-Owned Broadband Networks* at p. 1 (noting that GONs advocates "view local government as a collective *deus ex machina* needed to revitalize a flagging broadband sector").

260 *See, e.g.,* Gerald R. Faulhaber and David J. Farber, *The Open Internet: A Customer-Centric Framework*, 4 International Journal of Communication 302-342 (2010) (discussing the customer-centric regulatory framework that has long prevailed in the broadband space and arguing against the imposition of additional rules and requirements); Jeffrey A. Eisenach, *Broadband Competition in the Internet Ecosystem,* American Enterprise Institute (Oct. 2012), *available at* http://www.aei.org/files/2012/10/17/-broadband-competition-in-the-internet-ecosystem_164734199280.pdf (discussing the interplay of regulation and competition in the Internet ecosystem).

261 Local and state governments in particular are well positioned to assist in these endeavors. *See infra,* section 6, for additional discussion.

262 The FCC is currently contemplating how to shift subsidies for telephone service to cover broadband. *See In the Matter of Lifeline and Link Up Reform and Modernization*, Report and Order and Further Notice of Proposed Rulemaking, FCC 12-11, 27 FCC Rcd 6656 (rel. Feb. 6, 2012) (adopting a variety of reforms to these ends and calling for additional comment on additional proposed changes).

263 For an overview of these efforts to date, *see* Sherry Lichtenberg, *Telecommunications Deregulation: Updating the Scorecard for 2013*, NRRI (May 2013), *available at* http://nrri.org/documents/317330/0e3a5988-6f57-492d-8ce5-70926cfe68f4 ("*Telecommunications Deregulation: Updating the Scorecard for 2013*").

264 *See infra,* section 6, for additional discussion.

265 *See supra,* section 3.1.2, for discussion of these barriers, and *infra,* section 6, for recommendations regarding local and state action vis-à-vis removing them.

Third, the economic and infrastructure analyses in sections 3.2.1 and 3.2.2 should inform discussions regarding the efficacy of and need for a GON. Too often, the debate over GONs does not adequately examine hard data regarding either the health of the broadband market or the stark economic realities facing the public sector. Nor do discussions acknowledge the opportunity costs associated with steering scarce public funding away from more critical investments like shoring up basic public infrastructure.[266]

Too often, data purporting to substantiate the efficacy of municipal broadband networks are cherry-picked and offered in isolation from other relevant data. For example, two reports issued by the U.S. Government Accountability Office (GAO) in early 2014 appeared to include favorable data regarding the impact of GONs on broadband deployment and competition. Those who advocate in favor of GONs looked to these reports as proof that municipal networks are effective in spurring competition in local markets and as evidence that state laws impacting such deployment should be preempted by the federal government. However, in offering the data and analysis to Congress, the GAO provided a number of important provisos regarding the rigor of its data; accordingly, it warned that the limited scope of its inquiries should not been seen as conclusive of the viability of GONs in any context. Several other weaknesses in the GAO's analyses, including its omission of the high costs associated with building GONs, have been highlighted by others.

Going forward, discussions about GONs should be grounded in as much data as possible and should be properly contextualized. Doing so will yield more informed and impactful policies that steer investments of scarce public resources towards areas of greatest need.

266 For further discussion of the economic and employment benefits associated with investing public resources in modernizing basic public infrastructure, *see generally* Diana G. Carew & Michael Mandel, *Infrastructure Investment and Economic Growth: Surveying New Post-Crisis Evidence,* Policy Memo, Progressive Policy Institute (March 2014), *available at* http://www.progressivepolicy.org/wp-content/uploads/2014/03/2014.03-Carew_Mandel_Infrastructure-Investment-and-Economic-Growth_Surveying-New-Post-Crisis-Evidence.pdf.

Part II

Case Studies & Findings

4 Learning from Experience: Case Studies of 10 Major GONs

Dozens of cities and towns of all sizes have deployed, are in the process of deploying, or are considering the deployment of a GON. Recent data indicate 135 municipal fiber-optic broadband networks have already been built across the country:[267]

- 38 serve only businesses and several are public-private ventures,[268]
- 89 fiber-based GONs provide residential service.[269]

In addition, 74 communities throughout the United States have deployed cable-based GONs that provide Internet access and television services to residents.[270] Dozens of others have built some infrastructure—wire-line (fiber and cable) or wireless (mostly Wi-Fi)—meant to serve at least some residents and businesses.[271]

These are small numbers in the grand scheme of U.S. local government. Over 19,000 municipal governments exist across the country, along with an additional 16,500 town or township governments.[272] Some who advocate in favor of GONs view the slow, but steady, rise in municipal broadband deployments, especially those that are fiber-based, as supporting the arguments about the state of broadband in the United States and the relative ease of building and operating such complex, dynamic networks.[273] In addition, supporters of GONs also cite the rising number of public-private partnerships (PPPs) and other hybrid approaches to bolstering connectivity as further evidence in support of the perceived inadequacies of the market for high-speed Internet access.[274]

Unlike public-private and other hybrid approaches,[275] the planning, funding, construction, maintenance, and operation of a GON is handled completely by the municipality. These municipalities allocate a significant

267 *See* Masha Zager, *Number of Municipal FTTP Networks Climbs to 135*, at p. 22, Broadband Communities (May/June 2013).
268 *Id.* at p. 24.
269 *See* Community Broadband Networks, Map, http://www.muninetworks.org/communitymap.
270 *Id.*
271 *Id.* As noted above in section 2, the number of municipal wireless networks has decreased dramatically in recent years. This is due in large part to the emergence of 3G and 4G wireless broadband adoptions, which are incredibly popular with consumers, as well as a desire by cities to forge PPPs with ISPs to deploy Wi-Fi networks in public spaces (e.g., parks). Additional discussion regarding the latter is provided in section 6, *infra*.
272 *See* U.S. Census Bureau, Lists & Structures of Government, Population of Interest—Municipalities and Townships, http://www.census.gov/govs/go/municipal_township_govs.html.
273 *See, e.g.,* Susan Crawford and Robyn Mohr, *Bringing Municipal High-Speed Internet Access to Leverett, Massachusetts*, Research Publication No. 26 (Dec. 2013), The Berkman Center for Internet & Society at Harvard University, *available at* http://cyber.law.harvard.edu/publications/2013/internet_to_leverett (profiling a "successful" GON in the "hope" that it will "be helpful to other cities that are considering launching fiber optic networks."); Press Release, *Community Broadband Networks Lead the Way on US Ignite Partnership*, June 14, 2012, New America Foundation, *available at* http://newamerica.net/pressroom/2012/community_broadband_networks_lead_the_way_on_us_ignite_partnership (arguing that community broadband networks are on the cutting-edge of innovation in this space vis-à-vis incumbent ISPs); *The Assault on Municipal Broadband,* Free Press Issue Brief (July 2012), *available at* http://www.freepress.net/sites/default/files/resources/brief_broadband.pdf (arguing that GONs should be seen as a necessary community investment because broadband is a "modern-day utility").
274 There is an array of alternative, non-GON approaches to bolstering broadband connectivity on both the supply side and the demand side. Many of these are structured as public-private partnerships, the most successful of which leverage public resources and private expertise to deploy, maintain, and operate high-speed networks. These and other effective non-GONs models for bolstering broadband connectivity are discussed in more detail in section 6.
275 For an overview of how these types of arrangements are typically structured, *see, e.g.,* Charles M. Davidson & Michael J. Santorelli, *Broadband and the Empire State: Achieving Universal Connectivity in New York*, at p. 23-31, ACLP at New York Law School (Sept. 2012), *available at* http://www.nyls.edu/user_files/1/3/4/30/83/ACLP%20Report%20-%20Broadband%20and%20the%20Empire%20State%20-%20September%202012.pdf ("*Broadband and the Empire State*"). For additional discussion *see infra,* section 6.

Table 4.1: Overview of GONs Case Studies

	Network Overview				Cost to Build				Financials (most recent annual figures)			
	Network Type	Status	Subscribers	Fiber Miles	Bonds	Loans*	Gov't Grants	Cross-Subsidies	Revenues	OpEx	Debt Service	PILOTs**
EPB Chattanooga, TN	FTTH	Built	55,000[1]	8,000[2]	$229M[3]	$74.5M[4]	$111M[5]	None	$80.7M[6]	$26.06M[7]	$2.05M[8]	$1.6M[9]
BVU Opt-Net Bristol, VA	FTTH	Built	13,400[10]	1,288[11]	$72+M[12]	$23.7M[13]	$90.4M[14]	None[15]	N/A[16]	N/A[17]	N/A[18]	N/A[19]
LUS Fiber Lafayette, LA	FTTH	Built	14,000[20]	800[21]	$132M[22]	$16.4M[23]	None	None[24]	$24M[25]	$29.3M[26]	$1.5M[27]	$0[28]
FiberNet Monticello, MN	FTTH	Built	1,270[29]	151[30]	$26.4M[31]	$4.1M[32]	None	$4.45M[33]	$1.756M[34]	$2.292M[35]	$1.8M[36]	$0[37]
CFU Fiber Cedar Falls, IA	FTTH	Partially Built	17,000[38]	750[39]	$18.45M[40]	$2.0M[41]	$880k[42]	None	$14.3M[43]	$13.2M[44]	$1.7M[45]	$0[46]
nDanville Danville, VA	FTTH	Partially Built[47]	200[48]	165[49]	None	$2.5M[50]	$1M/ year[51]	None	$1.8M[52]	$1.7M[53]	$0	$250k[54]
UTOPIA UT (multiple cities)	FTTH	Partially Built[55]	8,240[56]	1,800[57]	$185M[58]	$29.7M[59]	$37.2M[60]	None	$11.7M[61]	$12.4M[62]	$12.8M[63]	$0
TVC Groton, CT	Hybrid Fiber/ Coaxial[64]	Built & Sold	N/A[65]	N/A[66]	$34.5M[67]	N/A	None	$2.5M/ year[68]	N/A	N/A	N/A	N/A
iProvo Provo, UT	FTTH	Built & Sold	N/A[69]	N/A[70]	$39.5M[71]	$1M[72]	None	$19.3M[73]	$570k[74]	$1.89M[75]	$3.3M[76]	N/A
Greenlight Wilson, NC	FTTH	Built	6,000[77]	N/A	$33.7M[78]	$4.75M[79]	None	None	$11.42M[80]	$11.42M[81]	$3.02M[82]	$0[83]

M=million; k=thousand

*Financial transfers from a municipality or utility are often in the form a loan. While some have challenged these loans as cross-subsidization, courts often find that these transfers are not, in fact, cross-subsidies. Other networks receive loans directly from financial institutions instead of bonding. As such, this column includes loans from municipalities, utilities, and financial institutions.

**PILOTs, or payments in lieu of taxes, are payments made by utilities and GONs to compensate local governments for tax revenue lost as a result of utilities' entity status and government affiliation. A lack of PILOT payments is essentially equivalent to a lack of tax payments by a private sector entity.

Endnotes are included in Appendix I.

amount of public resources (e.g., taxpayer dollars, debt obligations) in funding these projects, frequently without finding an outlet to hedge against or otherwise spread the many associated risks.[276] In addition, the vast majority of GONs have been deployed in areas already served by multiple wireline and wireless broadband ISPs.[277] As discussed in more detail below such duplicative deployments tend to either undermine the GON or skew market forces.

To better understand the practical difficulties and financial hazards associated with municipal broadband projects, this section profiles 10 GONs. These include networks in Chattanooga, Tennessee; Bristol, Virginia; Lafayette, Louisiana; Monticello, Minnesota; Cedar Falls, Iowa; Danville, Virginia; UTOPIA, Utah (a consortium of 16 cities); Groton, Connecticut; Provo, Utah; and Wilson, North Carolina. These particular networks represent a broad spectrum of recent U.S. municipal broadband efforts. While they share many traits, including being built in areas already served by broadband ISPs, the story of each individual GON provides a series of lessons and insights that can be used by jurisdictions considering the creation of a GON. Table 4.1 provides an overview of the 10 GONs case studies and presents key information on each case.

4.1 Chattanooga, Tennessee

The city-owned gigabit broadband network in Chattanooga, Tennessee, is often cited as a prime example of how municipal networks can thrive under the right circumstances.[278] Since its 2010 launch, the city has rebranded itself as "the gig city"[279] and has begun the processes of trying to use its network to grow a high-tech sector from scratch, and streamline a number of core municipal functions.[280] Federal policy makers have taken note and have cited Chattanooga as a model that other cities might follow in meeting a "gigabit city challenge," which calls for "at least one gigabit community in all 50 states by 2015."[281] Yet a number of aspects of the Chattanooga GON render it unique and may make it difficult for other municipalities to replicate. The system in Chattanooga also has a very high price tag, which caused the city to assume a heavy debt burden and raises the possibility that, over time, the costs of this network might very well outweigh any consumer benefits.

Chattanooga, Tennessee At-A-Glance

City Population: 171,279 (2012)

Year of Network Launch: 2010

Current Status: Built

Number of subscribers: 55,000

Revenues: $80.7 million

Operating Expenses: $26.1 million

Note: Additional information on the Chattanooga network is contained in Table 1 and in Appendix I.

276 Indeed, many of the most popular means of funding these public networks involve either the assumption of significant new debt by a municipality or the reallocation of funds that could be used for other, more impactful purposes (e.g., improving local electric and water systems). *See How Municipal Networks are Financed*, Institute for Local Self-Reliance (Jan. 2014), *available at* http://www.ilsr.org/wp-content/uploads/2014/01/financing-munis-fact-sheet.pdf.

277 *Compare* Community Broadband Networks, Map, http://www.muninetworks.org/communitymap, *with* National Broadband Map, http://www.broadbandmap.gov/.

278 *See, e.g.,* Christopher Mitchell, *Broadband at the Speed of Light: How Three Communities Built Next-Generation Networks,* at p. 31-60, Institute for Local Self-Reliance (April 2012), *available at* http://www.ilsr.org/wp-content/uploads/2012/04/muni-bb-speed-light.pdf ("*Broadband at the Speed of Light*"). *See also* Edward Wyatt, *Fast Internet is Chattanooga's New Locomotive*, Feb. 3, 2014, N.Y. Times, *available at* http://www.nytimes.com/2014/02/04/technology/fast-internet-service-speeds-business-development-in-chattanooga.html ("*Chattanooga's New Locomotive*").

279 *See* The Gig City, http://www.thegigcity.com/.

280 *See, e.g.,* Steve Lohr, *Fastest Net Service in U.S. Coming to Chattanooga*, Sept. 12, 2010, N.Y. Times, *available at* http://www.nytimes.com/2010/09/13/technology/13broadband.html?pagewanted=all (reporting on the city's plans to use its gigabit network for these and other purposes); Laura Baverman, *Chattanooga's Gig City Makes Play to be 'Internet of Things' Capital*, March 15, 2013, Upstart Business Journal, *available at* http://upstart.bizjournals.com/companies/hatched/2013/03/15/need-bandwidth-come-to-gig-city-and.html?page=all (reporting on the city's Gig Tank program to encourage and incubate high-tech startups).

281 *See* Press Release, *FCC Chairman Genachowski Issues Gigabit City Challenge*, Jan. 18, 2013, FCC, *available at* http://www.fcc.gov/document/fcc-chairman-genachowski-issues-gigabit-city-challenge.

4.1.1 Background

The fiber-optic network that would eventually evolve into Chattanooga's gigabit GON first emerged in April 1996, when the board of the city's electric utility[282] —the Electric Power Board (EPB)—passed resolutions authorizing construction of a communications network to connect electrical assets (e.g., substations) and the use of $350,000 to fund the first phase of build-out.[283]

Once deployed, the network was under-utilized for a number of years, leaving the local government and EPB to consider how to put the network to more productive uses.[284] At that time, numerous legal restrictions limited the types of services and businesses in which a municipal utility could engage vis-à-vis its communications network. In the early 2000s, the state legislature began to amend its laws to allow municipal utilities like EPB to offer non-electric services (including "cable service, two-way video transmission, video programming, [and] Internet services")[285] and make loans between their divisions.[286] These amendments spurred plans to commercialize EPB's emerging broadband network. In 2007, the EPB board approved a plan to offer fiber-to-the-home (FTTH) service; in November 2008, the city of Chattanooga granted EPB a franchise for these purposes.[287]

EPB's expansion into the market for telecommunications and broadband services was met with lawsuits from incumbent ISPs and an array of other organizations. The Tennessee Cable Telecommunications Association, for example, filed suit against EPB claiming that its business plan violated Tennessee state law.[288] In particular, the group argued that EPB was illegally cross-subsidizing its communications services with revenue from its electric service.[289] The case was eventually dismissed, and EPB was free to continue with its expansion plans.[290]

4.1.2 Cost and Financing

The EPB fiber network, which supports its gigabit broadband service and a smart grid system,[291] was financed with a number of intra-utility loans, one-off federal grants, and significant debt. All told, the smart grid and broadband networks have cost approximately $390 million to deploy.[292]

At the outset, EPB Fiber, the division of the utility responsible for building the GON, received a $50 million loan from EPB Electric during the planning phase of the FTTH network.[293] In 2009, EPB was awarded $111.5 million in federal stimulus funding from the U.S. Department of Energy in support of its smart grid system.[294] To raise additional funds needed to build the fiber-optic network, EPB issued $229 million of local revenue

282 The board is comprised of five members appointed by the Mayor, each serving a staggered five-year term. Appointments must be approved by the city council. *See Pre-Filed Rebuttal Testimony and Exhibits of Harold E. DePriest, President and CEO of Electric Power Board of Chattanooga*, at p. 3, Tennessee Regulatory Authority, Docket No. 02-00562 (Dec. 22, 2003), *available at* http://www.tn.gov/tra/orders/2002/0200562ao.pdf.

283 *Broadband at the Speed of Light* at p. 32.

284 *Id.*

285 Tenn. Code Ann. § 7-52-601(a), *available at* http://www.lawserver.com/law/state/tennessee/tn-code/tennessee_code_7-52-601.

286 Tenn. Code Ann. § 7-52-603(a)(1)(B), *available at* http://www.lawserver.com/law/state/tennessee/tn-code/tennessee_code_7-52-603.

287 *Broadband at the Speed of Light* at p. 35.

288 *See Cable Group Files Suit To Try To Block EPB Fiber Optic Plan*, Sept. 21, 2007, The Chattanoogan, *available at* http://www.chattanoogan.com/2007/9/21/113785/Cable-Group-Files-Suit-To-Try-To-Block.aspx.

289 *Id.*

290 *See* Press Release, *TCTA Lawsuit Against EPB Dismissed*, April 15, 2008, EPB, *available at* https://www.epb.net/news/news-archive/tcta-lawsuit-against-epb-dismissed/.

291 For an overview of the smart grid system, *see* EPB Electric Power, Smart Grid, https://www.epb.net/power/home/products/smart-grid/.

292 *See* Kevin E. McCarthy, *Chattanooga High Speed Broadband Initiative*, Dec. 14, 2012, Research Report 2012-R-0515, Office of Legislative Research, Connecticut General Assembly, *available at* http://www.cga.ct.gov/2012/rpt/2012-R-0515.htm ("*Chattanooga High Speed Broadband Initiative*").

293 *Id.*

294 *Id. See also* Press Release, *EPB Chattanooga Awarded Federal Stimulus Grant for Smart Grid,* Oct. 28, 2009, EPB, *available at* https://www.epb.net/news/news-archive/epb-chattanooga-awarded-federal-stimulus-grant-for-smart-grid/.

bonds, which carried an interest rate of 4.5 percent and were rated as AA+ by Fitch.[295] About 70 percent of this bond issue—$162 million in all—was used to fund the fiber-optic build-out.[296]

The local revenue bonds have a 25-year maturity and are due to be paid in full in 2033.[297] The EPB communications division maintains a $5 million line of credit secured by revenues and assets, which is used for working capital needs (by mid-2012, about half of this balance was outstanding).[298] In March 2011, EPB obtained a bank loan for $19.5 million over the course of 60 months, guaranteed by the revenues and finances of its communications division.[299] The purpose of this loan was to pay off the loan provided by EPB's electric division.[300] In August of 2012, EPB obtained a $60 million revolving line of credit to pay the remaining loan balance.[301] The line of credit is secured by the assets and revenues from the video and Internet system.[302]

In the recent past, EPB has made a number of financial decisions aimed at securing lower interest rates and more favorable financing terms.[303] Many of these actions were enabled by the network's close relationship with the larger EPB utility and the city of Chattanooga (and, by extension, its residents), all of whom serve as financial backstops for the system. In 2012, there was a downgrade of the utility's bond rating.[304] The downgrade was due to an "increase in leverage to fund capex in the electric system's smart grid."[305] Fitch, the ratings agency, also expressed concern with the use of cross-subsidies (i.e., money from the Fiber division supporting the Electric division) and cost savings (from the smart grid) instead of rate increases to support future EPB investments.[306] In particular, Fitch noted that it was wary of the "variable nature" of these revenue sources.[307]

4.1.3 The Network

The EPB FTTH network is fully operational and provides broadband for schools, residences, and local businesses.[308] The service is available to 170,000 homes, schools, and businesses in the service area, covering 600 square miles and a population of several hundred thousand people.[309] As of September 2013, EPB Fiber had "over 55,000 residential and business customers."[310] Its residential services bring in roughly 65 percent of overall revenue.[311] With regard to its signature gigabit service, by the end of 2013, "only about 3,640 residents, or 7.5 percent of its Internet-service subscribers, [had] signed up" for it.[312] In addition, "roughly 55 businesses" also subscribe to the gigabit service.[313]

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295 *See, e.g., Chattanooga High Speed Broadband Initiative*.
296 *Id.*
297 *Id.*
298 *See Senior Management Report & Financial Information 2012*, at p. 43, EPB (Sept. 2012), *available at* https://www.epb.net/flash/annual-reports/2012/assets/uploads/EPB-Financials.pdf ("*Senior Management Report & Financial Information 2012*").
299 *Id.* at p. 44.
300 *Id.*
301 *See Senior Management Report & Financial Information 2013*, at p. 53, EPB (Sept. 2013), *available at* https://www.epb.net/flash/annual-reports/2013/downloads/EPB_Financials_2013.pdf ("*Senior Management Report & Financial Information 2013*").
302 *Id.*
303 *Id.* at p. 43.
304 *See, e.g.,* Bhala Mehendale, *Fitch Downgrades Chattanooga Electric Power Board, TN Electric System Revs to 'AA'*, March 7, 2012, Fitch Ratings, *available at* http://mobile.reuters.com/article/companyNewsAndPR/idUS241871+07-Mar-2012+BW20120307 ("*Fitch Downgrades Chattanooga Electric Power Board*").
305 *Id.*
306 *Id.*
307 *Id.*
308 The construction timeline was projected to extend over 30 months. *See* Karl Pfeil & Jason Clark, *Fitch Rates Chattanooga Electric Power Board's $215MM 2008 Utility Revs 'AA'*, Feb. 13, 2008, Fitch Ratings, *available at* http://www.fitchratings.com/creditdesk/press_releases/detail.cfm?pr_id=405532.
309 *See Popular Annual Financial Report for the Year Ended June 30, 2012*, at p. 8, City of Chattanooga Finance & Administration Department, *available at* http://www.chattanooga.gov/images/finance_files/FY12_PAFR_updated.pdf.
310 *See EPB Increasing Fiber Optic Speeds; Lowering Customer Prices*, Sept. 17, 2013, The Chattanoogan.com, *available at* http://www.chattanoogan.com/2013/9/17/259342/EPB-Increasing-Fiber-Optic-Speeds.aspx.
311 *Senior Management Report & Financial Information 2012* at p. 17.
312 *Chattanooga's New Locomotive.*
313 *Id.*

An array of lower-tier services is available to residential customers. EPB Fiber offers high-speed Internet, television, and phone, which can be purchased individually or as a bundle. Monthly subscription prices range from $57.99 for basic, stand-alone Internet access with speeds of 100 Mbps, to $149.22, which includes a gigabit connection (1,000 Mbps), an unlimited phone plan, and a premium television package.[314] As a stand-alone feature, a gigabit connection is available for $69.99 per month.[315]

Overall, EPB Fiber's business is profitable. Its revenues were $80 million in 2013, with expenses of $59,877,000.[316] EPB Fiber's total liabilities are $78,055,000[317] (the utility's total liabilities are $514,808,000[318]). While EPB itself is relatively stable, its bond rating was downgraded by Fitch (from AA+ to AA) as a result of the credit risk created by its cross-funding scheme.[319]

4.1.4 Community Impact

The gigabit network in Chattanooga has been the source of considerable attention regarding the merits of engaging in government-directed broadband advancement. Some see the FTTH system and the city's efforts to rebrand itself as a high-tech hub as a reasonable reaction to a long-term decline in the local industrial base.[320] As such, there is significant enthusiasm around the potential for using the GON to spur economic development and create new jobs.

The city has engaged in an aggressive campaign to support high-tech entrepreneurship and encourage more established firms to relocate to the city.[321] For example, EPB and city officials highlight that Chattanooga is home to a new Amazon.com fulfillment center, which opened in 2011 and currently supports about 2,700 jobs.[322] While some argue that the existence of the gigabit network likely had little, if any impact, on Amazon's decision to open a plant in Chattanooga.[323] The Chattanooga plant was one of a number of new distribution centers that Amazon opened in 2010 and 2011.[324] Moreover, an array of tax breaks played a pivotal role in enticing the company to the area as the city competed with other localities to bring the thousands of low-tech jobs to Chattanooga.[325] To date, no empirical evidence exists to confirm a causal relationship about the positive impact of the FTTH network on jobs in Chattanooga.[326] The number of new jobs stemming from the

314 *See* EPB Fiber Optics, Packages—Custom Bundle, https://epbfi.com/enroll/packages/.
315 *Id.*
316 *Senior Management Report & Financial Information 2013* at p. 18.
317 *Id.* at 70.
318 *Id.* at 24.
319 *See Fitch Downgrades Chattanooga Electric Power Board. But see EPB Gets Bond Rating Upgrade,* Oct. 19, 2012, The Chattanoogan*, available at* http://www.chattanoogan.com/2012/10/19/236771/EPB-Gets-Bond-Rating-Upgrade.aspx (reporting that Standards and Poor's had raised EPB's credit rating).
320 *See, e.g.,* The Gig City, About, http://www.thegigcity.com/about ("**The Gig City is a city of pioneers.** Chattanooga has a rich legacy of entrepreneurs—from startups that grew into industry game-changers to civic leaders who changed Chattanooga from the "dirtiest city in America" into Outside Magazine's "best town ever."); Tod Newcombe, *Chattanooga's Internet Rise,* Jan. 22, 2013, Governing.com, *available at* http://www.governing.com/columns/Chattanoogas-Internet-Service-Is-No-Choo-Choo.html.
321 *See, e.g.,* Sarah Rich, *Chattanooga's 'Gig Tank' Results in Real-Time Translator and Research Sharing Apps*, Sept. 11, 2012, Government Technology, *available at* http://www.govtech.com/e-government/Chattanoogas-Gig-Tank.html (reporting on the city's Gig Tank initiative, which was described by officials as "part startup accelerator, part think tank and part contest" for entrepreneurs and students to spend the summer in Chattanooga and develop ideas for applications based on the gigabit per second broadband access available in the city.").
322 *See, e.g.,* Mike Pare, *President Obama Tours Amazon in Chattanooga as Officials Prepare to Increase Workforce*, July 31, 2013, Times Free Press, *available at* http://www.timesfreepress.com/news/2013/jul/31/president-obama-tours-amazon-chattanooga-officials/.
323 Indeed, after a recent tour of the facility in July 2013, President Obama did not even mention the gigabit network in remarks to the company. For a transcript of his remarks, *see President Obama's Speech at Amazon in Chattanooga,* July 30, 2013, Times Free Press, *available at* http://www.timesfreepress.com/news/2013/jul/30/prepared-transcript-president-obamas-speech-amazon/.
324 *See, e.g.,* Mike Pare, *Chattanooga Area Amazon Sites Fir Bigger Plan*, Jan. 30, 2011, Times Free Press, *available at* http://www.timesfreepress.com/news/2011/jan/30/amazon-sites-fit-bigger-plan/.
325 *See, e.g.,* Cheri Burt, *UPDATE: Hamilton County Commission approves tax breaks for Amazon.com*, Dec. 1, 2010, WRCBTV.com, *available at* http://www.wrcbtv.com/story/13594831/hamilton-county-commission-approves-tax-breaks-for-amazoncom.
326 *See, e.g., Chattanooga High Speed Broadband Initiative*.

network appears to be small: while the city claims that the network "created 1,000 jobs in the last three years, the Department of Labor reported that Chattanooga still had a net loss of 3,000 jobs in that period."[327]

EPB officials promote its smart grid network as another positive outgrowth of the fiber GON. This system, which uses the high-speed communications network to generate, aggregate, and analyze data from an array of sources (e.g., smart meters) about the distribution and consumption of electricity in near real-time, was completed in 2013.[328] Officials have already credited it with helping to save money by preventing widespread power outages. For example, a windstorm in early 2013 brought down power lines that resulted in power outages impacting 3,500 customers; EPB officials believe that that number would have been over 8,000 if not for the smart grid.[329] EPB officials estimate that the smart grid system could generate annual cost savings of around $50 million.[330]

While these particular gains are impressive, there is debate as to whether the gigabit GON was actually necessary to achieve these service improvements. The communications requirements of even the most advanced smart grid components are significantly less than 1,000 Mbps.[331] The smart meters that were installed using the $111 million federal grant, for example, generate a relatively small amount of usage data that, even in the aggregate, do not necessitate a gigabit communications network.[332] Moreover, the intelligence of these new systems tends to be located either on the utility side or the customer side; the data generated and transmitted across communications networks feed into analytical tools that allow the utility or customer to adjust distribution or consumption patterns.[333] Even though the communications component of the Chattanooga smart grid might have resulted in cost savings in the short term, the utility will, in all likelihood, have to continue to invest in maintaining and upgrading the network, especially on the utility side, which could both drive up rates and undermine the utility's overall financial performance.[334]

4.1.5 Assessment

Using Chattanooga as a model for other municipalities to replicate in building a GON is problematic for several reasons.

First, this particular network arose out of unique circumstances. Although the roots of the system stretch back to the late 1990s, momentum around the gigabit GON was greatly bolstered by the economic responses to the Great Recession. The city received a one-time federal grant in excess of $110 million to deploy its smart grid, while actions by the Federal Reserve resulting in historically low interest rates allowed EPB to finance its network (and refinance its debt) in ways that might be difficult for other cities going forward, as interest rates are likely to rise in the future.[335]

Second, notwithstanding a creative corporate structure for the service, Chattanooga residents are not entirely shielded from liability stemming from the FTTH network. EPB is a nonprofit agency owned by the

327 *Chattanooga's New Locomotive.*
328 *Broadband at the Speed of Light* at p. 46.
329 *See EPB Says Smart Grid Paying Off Handsomely For Customers*, Jan. 18, 2013, The Chattanoogan, *available at* http://www.chattanoogan.com/2013/1/18/242501/EPB-Says-Smart-Grid-Paying-Off.aspx.
330 *Id.*
331 *See, e.g.,* Mari Silbey, *Chattanooga Powers Smart Grid with Gigabit Network*, May 1, 2012, Smart Planet, *available at* http://www.smartplanet.com/blog/thinking-tech/chattanooga-powers-smart-grid-with-a-gigabit-network/11464 (observing that "Many smart grid applications don't need the power of fiber. Meter reading, for example, doesn't require the communications network speed that streaming video does.").
332 *See, e.g., Communications Requirements of Smart Grid Technologies*, U.S. Department of Energy (Oct. 2010), *available at* http://www.gc.energy.gov/documents/Smart_Grid_Communications_Requirements_Report_10-05-2010.pdf (detailing the various kinds of technologies that will comprise the smart grid and assessing their individual communications needs).
333 *See, e.g.,* Kristen Korosec, *Using Big Data to Give the Smart Grid a Brain*, Oct. 29, 2012, Smart Planet, *available at* http://www.smartplanet.com/blog/bulletin/using-big-data-to-give-the-smart-grid-a-brain/4072.
334 *Id.*
335 *See, e.g.,* Mary Williams Walsh, *Cost of Public Projects it Rising, and Pain will be Felt for Years*, June 26, 2013, N.Y. Times, *available at* http://dealbook.nytimes.com/2013/06/26/bill-for-public-projects-is-rising-and-pain-will-be-felt-for-years/ (describing unfavorable conditions that will negatively impact the ability of municipalities to borrow in support of public projects).

city of Chattanooga. This structure allows the utility to take on liabilities without directly exposing the city government or taxpayers to these risks. In addition, the bonds issued in support of the network are structured to limit taxpayer liability. Even so, bondholders have a security interest in EPB's electrical revenues.[336] The bonds' structure is not technically a general obligation, so it has the effect of limiting the ability of creditors to access tax dollars. However, it does allow creditors to access revenues stemming from electric ratepayers. In short, if EPB was unable to pay down its debt obligations associated with the FTTH network, it might be forced to raise the rates of its 174,318 electrical customers.[337] Since EPB, like most local utilities, is a monopoly, this has the effect of exposing the entire city—FTTH subscribers and non-subscribers alike—to the substantial debts incurred in building the network.

Third, Chattanooga's long-term economic revival is likely driving many of the economic gains being attributed to the GON. Beginning in the 1980s, the city engaged public and private stakeholders in a comprehensive reassessment of its economy. The result was the creation and use of a series of public-private partnerships aimed at bolstering nearly every aspect of the city, from revitalizing the riverfront to building a world-class aquarium.[338] By the end of the 1990s, the results of these myriad efforts were impressive: there were clear—and in some cases, dramatic—increases in the number of businesses in the area, wages, jobs, and median household income.[339]

Additional Infrastructure Needs in Tennessee

The exclusively public nature of the Chattanooga GON not only contradicts the city's established preference for using PPPs to improve local economic conditions,[340] but the high upfront and recurring costs associated with running this network divert critical resources from local government priorities central to local government mission. According to the American Society of Civil Engineers (ASCE), infrastructure in Tennessee is in dismal shape—there are almost 1,200 structurally deficient bridges throughout the state; 2,700 bridges are functionally obsolete; and about 40 percent of the roads are of poor or mediocre quality.[341] In addition, ASCE estimates that the state needs to invest almost $5 billion to maintain and update its drinking and wastewater systems over the next 20 years.[342] Schools in the state also require about $3.6 billion in investment.[343] Equally important, and perhaps more pressing in the short term, a key pension fund administered by Chattanooga for retired members of the local police and fire departments is underfunded and facing a shortfall of $150 million.[344]

336 *See*, *Electric System Revenue Bonds, Series 2008A, City of Chattanooga Tennessee,* at p. 1, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2008), *available at* http://emma.msrb.org/MS270152-MS266407-MD521993.pdf ("*Electric System Revenue Bonds, Series 2008A, City of Chattanooga Tennessee*").

337 *Senior Management Report & Financial Information 2013* at p. 11.

338 For an overview of these myriad efforts, *see generally* David Eichenthal and Tracy Windeknecht, *Chattanooga, Tennessee: A Restoring Prosperity Case Study*, Metropolitan Policy Program at Brookings (Sept. 2008), *available* at http://www.brookings.edu/~/media/research/files/papers/2008/9/17%20chattanooga%20eichenthal%20windeknecht/200809_chattanooga.pdf.

339 *Id.* at p. 19.

340 *See generally id.*

341 *See* ASCE 2013 Infrastructure Report Card, States—Tennessee, http://www.infrastructurereportcard.org/a/#p/state-facts/tennessee.

342 *Id.*

343 *Id.*

344 *See, e.g.,* Joy Lukachick, *Chattanooga Mayor Andy Berke Names Task Force to Study Fire and Police Pensions*, Aug. 15, 2013, Times Free Press, *available at* http://www.timesfreepress.com/news/2013/aug/15/chattanooga-mayor-andy-berke-names-task-force-stud/. *See also* David Morton, *Primer on Chattanooga's Fire and Police Pension Fund*, Nov. 5, 2013, Nooga.com, *available at* http://www.nooga.com/164130/primer-on-chattanoogas-fire-and-police-pension-fund/ (providing a more in-depth overview of the ongoing crisis around a pension fund that is only 52 percent funded); Kimberly Barbour, *Looming Pension Fund Reform Blamed for Policy & Fire Exodus*, Dec. 17, 2013, WRCBTV.com, *available at* http://www.wrcbtv.com/story/24245101/influx-in-chattanoogas-police-fire-retirements (reporting on an influx in retirements ahead of what many expect to be significant cuts to reforms to the pension fund for retired members of the local fire and police forces).

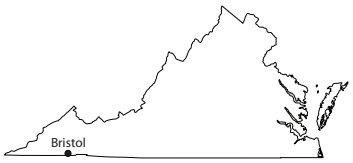
4.2 Bristol, Virginia

The GON in Bristol, Virginia, shares many similarities with the GON in Chattanooga:

- Both fiber-optic networks were built by the city-owned utility;
- Both were initially deployed for municipal purposes and later extended to compete with incumbent ISPs for residential and business customers; and
- Both offer gigabit speeds.[345]

In addition, the network in Bristol, much like the one in Chattanooga, is being lauded as an economic engine for the town and surrounding region as well as a possible template for other cities interested in building their own municipal broadband network.[346] From the standpoint of serving as a model for other municipalities, the Bristol network is also like Chattanooga in that it emerged from a very distinct set of circumstances — economic, financial, political, and otherwise. These unique attributes are discussed at length in the following case study.

Bristol, Virginia At-A-Glance



City Population: 17,662 (2012)

Year of Network Launch: 2002

Current Status: Built

Number of subscribers: 13,400

Revenues: NA

Operating Expenses: NA

Note: Additional information on the Bristol network is contained in Table 1 and in Appendix I.

4.2.1 Background

In 1999, BVU, the board of Bristol's municipal utility, and the Bristol City Council approved construction of a fiber-optic network to enhance communication between the utility's eight electric substations.[347] Later that year, the City Council voted to expand the network to connect all city offices, including City Hall, public schools, libraries, and the police and fire departments.[348] Looking beyond purely municipal functions, the council initially planned to partner with a private ISP in an effort to facilitate commercial broadband service to residents, but the city eventually elected to build that portion of the network itself.[349] To that end, the BVU board in 2001 approved an engineering study to determine the cost of providing FTTH service to all customers—public and private—throughout the utility's service territory.[350]

Efforts to expand the municipal network for commercial purposes faced numerous challenges from multiple parties, including the ISPs that were already serving the city. For example, one such incumbent argued that Virginia law barred municipalities from offering retail telecommunications services.[351] In response, Bristol sought a declaratory judgment from a federal court stating that the relevant state law was unenforceable because it was superseded by the 1996 Telecommunications Act.[352] The court agreed with the city and, in 2001,

345 *See, e.g.,* Arik Hesseldahl, *Want Gigabit Internet? You Don't Have to Move to Kansas City,* July 30, 2012, All Things D, *available at* http://allthingsd.com/20120730/want-gigabit-internet-you-dont-have-to-move-to-kansas-city/ (providing an overview of the network in Bristol).

346 *See, e.g.,* Bradley Kramer, *Pioneering Spirit: Bristol, VA, Trailblazing Muni FTTH*, at p. 22, LastMILE (Sept. 2008), *available at* http://www.metaswitch.com/sites/default/files/case-study-bvu.pdf; *Broadband at the Speed of Light* at p. 2-15.

347 *See* Wes Rosenbalm, *FTTU Broadband Network Currently Offered in Bristol Virginia and Neighboring Southwest Virginia Counties Through BVU OptiNet*, at p. 3, Report to Sheryl Bailey, Executive Director Virginia Resources Authority (Aug. 2008), *available at* http://www.wired.virginia.gov/pdf/BVU%20OptiNet_VRA%20Governor%20Report.doc ("*FTTU Broadband Network*").

348 *Id.*

349 *Id.*

350 *Id.*

351 This restriction was enacted in 1998. *See* HB 335, http://leg1.state.va.us/cgi-bin/legp504.exe?981+ful+CHAP0906.

352 *City of Bristol v. Mark L. Earley*, Case No. 1:00CV00173, (U.S. Dist. Va. Abington Dist. Ct May 26, 2001), *available at* http://www.vawd.uscourts.gov/OPINIONS/JONES/CITY.PDF.

ruled that the state law was "preempted by the Federal Telecommunications Act of 1996 … and is therefore invalid and unenforceable under the Supremacy Clause of the Constitution."[353] The law was quickly amended by the Virginia legislature, and BVU was eventually allowed to offer commercial communications services.[354]

In 2002, BVU began to deploy its network in the Bristol area.[355] During construction, the utility partnered with Cumberland Plateau Company (CPC), a nonprofit subsidiary of the Cumberland Plateau Planning District Commission, to expand the GON to industrial and business subscribers beyond Bristol in southwest Virginia.[356] This extension was funded by several state and federal grants, including a $1.6 million allocation from the U.S. Department of Commerce and a matching grant from the Virginia Tobacco Indemnification and Community Revitalization Commission.[357] The state funds stemmed from a sizable legal settlement with the tobacco industry.[358]

In 2009, the City Council asked the Virginia General Assembly to allow BVU to transition from city ownership to an independent authority owned by the state (BVU moved for independence so that it could legally expand its territory).[359] Amid some controversy,[360] the state legislature established the BVU Authority as an organization independent from the city and regulated by the state.[361] As a result, the Bristol City Council no longer approves the decisions of the BVU Authority Board.[362]

4.2.2 Cost and Financing

To date, over $100 million has been spent on this GON, with more than half coming from several rounds of municipal bond issuances. During the initial phase of construction, for example, BVU spent $13.6 million for equipment and network infrastructure.[363] To fund these and other network costs, $27.5 million in revenue bonds were issued in 2003, secured by the utility's assets.[364]

In 2010, the Authority "pledged future customer revenues, net of specified operating expenses, to repay $44,545,000 in revenue bonds issued [that] October."[365] Proceeds from this sale helped to refinance and refund previous bond issuances. These new bonds are "payable solely from BVU's net revenues and are payable through 2033."[366] By one recent estimate, the "total principal and interest remaining to be paid on the bonds is approximately $73,927,054."[367]

BVU has also received tens of millions of dollars in one-off grant funding from an array of federal and state entities. For example, deployment of the GON has been fueled by more than $24 million in federal grants

353 *Id.* at p. 18-19
354 *Broadband at the Speed of Light* at p. 4.
355 *Id.* at p. 6.
356 *Id.*
357 *Id.*
358 For additional information, *see* Virginia Tobacco Indemnification and Community Revitalization Commission, Home, http://www.tic.virginia.gov/. *See also* James Shea, *Tobacco Dollars Extend Broadband for Southwest Virginia,* Dec. 8, 2013, TriCities.com, *available at* http://www.tricities.com/news/local/article_ea52b42c-6083-11e3-8d56-0019bb30f31a.html ("*Tobacco Dollars Extend Broadband for Southwest Virginia*").
359 *See, e.g.,* David McGhee, *BVU Spinoff Motivation Questioned,* Oct. 15, 2009, News Channel 11, *available at* http://www.wjhl.com/story/20794222/bvu-spinoff-motivation-questioned.
360 *See, e.g.,* Frank Goodpasture III, *Don't Let Split Vote Take BVU from City*, Oct. 27, 2009, Tricities.com, *available at* http://www.tricities.com/news/article_4039d978-d4bd-51df-a79c-5857c180e4c9.html.
361 *See* BVU Authority Transition Agreement, *available at* http://static.mgnetwork.com/tri/media_path/-temp/BVU_Doc001.pdf.
362 *Broadband at the Speed of Light* at p. 3.
363 *Id.* at p. 2.
364 *Id.*
365 *See City of Bristol Audited Financial Statement: For the Year Ended June 30, 2012*, at p. 61, *available at* http://www.bristolva.org/DocumentCenter/View/246.
366 *Id.* These bonds limit direct taxpayer liability, but allow the network to increase revenues through raising prices and rates.
367 *Id.*

since 2003,[368] with an additional $28.4 million coming in July 2010 via the federal stimulus program.[369] These funds were allocated to BVU in support of a "388-mile fiber addition to its existing network that would bring up to 10 Gbps middle mile service to a rural, eight-county region of southwestern Appalachian Virginia."[370] With regard to state-specific grant funding, BVU has received over $30 million in "monetary grant awards" from the Virginia Tobacco Commission between 2003 and 2011.[371]

4.2.3 The Network

As of early 2012, BVU coverage exceeded 35,000 homes and businesses.[372] This number has likely grown as the network expands to other parts of Southwest Virginia. By the end of 2013, BVU had signed up about 13,400 subscribers.[373] Under its OptiNet brand, BVU offers voice, video, and data services to customers via its FTTH network. Service options range from a 20 Mbps stand-alone broadband connection for $39.95 per month to $319.95 per month for an asymmetrical 1 Gbps connection.[374] Television and telephone services are also available as stand-alone products or as part of a bundle.[375]

Despite BVU Authority and BVU OptiNet's financial viability, the GON has struggled financially. Year-over-year revenue growth remains modest, but the GON has managed to be self-sustaining based on current rates and charges.[376] In the most recent financial year, BVU reported that OptiNet had generated $2 million in profit.[377] OptiNet has yet to contribute funds directly to the city of Bristol.[378]

4.2.4 Community Impact

The Bristol GON has received praise for spurring economic development in the city and surrounding areas in southeast Virginia. One leading example: defense contractor Northrop Grumman's decision to build a new data facility in the BVU service territory.[379] Although the company highlighted the local network as one of the reasons for locating the center in the area, Northrop had already committed to building the facility somewhere in Virginia.[380] Northrup and the state of Virginia had previously entered into a 10-year, $2.4 billion contract whereby the private contractor would "overhaul the state's computer networks" and otherwise manage critical

368 *See* Susan Kendall, *Moody's Assigns A2 Issuer Rating to BVU Authority (VA),* Nov. 9, 2010, Moody's, *available at* http://www.moodys.com/research/MOODYS-ASSIGNS-A2-ISSUER-RATING-TO-BVU-AUTHORITY-VA-Rating-Update--RU_16711855 ("*Moody's Assigns A2 Issuer Rating to BVU*").

369 *Id*. For additional discussion regarding the federal stimulus program for broadband, *see infra*, section 6.1.2.

370 *See* Broadband USA, Grantees—Bristol Virginia Utilities Board, http://www2.ntia.doc.gov/grantee/bristol-virginia-utilities-board.

371 *See Funding Revitalization and Innovation in the Tobacco Region,* at p. 3, Virginia Tobacco Commission (June 2011), *available at* http://www.tic.virginia.gov/images/VA%20Business%20Magazine%20Ads/Broadband/June%202011%20Virginia%20Business%20Magazine%20Broadband.pdf. *See also Tobacco Dollars Extend Broadband for Southwest Virginia.*

372 *Broadband at the Speed of Light* at p. 2.

373 *Tobacco Dollars Extend Broadband for Southwest Virginia*.

374 *See* BVU OptiNet, Internet Packages, http://www.bvu-optinet.com/templates/default.php?purl=internet_res_hispeed&turl=inside_3col_std_template.htm.

375 For additional information, *see* BVU OptiNet, Home, http://www.bvu-optinet.com.

376 *See* Stacy Mawson, *Fitch Affirms Bristol Virginia Utilities Authority Util Sys Rev Bonds at 'A-'; Outlook Stable*, Dec. 28, 2012, Fitch Ratings, *available at* http://www.fitchratings.com/creditdesk/press_releases/detail.cfm?pr_id=778403.

377 *See* David McGee, *BVU Reports Financial Gains, Lower Expenses*, Feb. 6, 2013, Bristol Herald Courier, *available at* http://www.tricities.com/news/local/article_f4c3103a-6dab-11e2-a07c-0019bb30f31a.html.

378 *See Budget Comparison & Budget for 2013-2014*, at p. 8, City of Bristol, *available at,* http://www.bristolva.org/DocumentCenter/View/357.

379 *Broadband at the Speed of Light* at p. 3.

380 *See, e.g., Fibre in Paradise,* Feb. 18, 2010, The Economist, *available at* http://www.economist.com/node/15549324 (providing an overview of the Northrup project). *See also* Press Release, *Northrop Grumman and the Virginia Information Technologies Agency Open New High-Tech Facility in Russell County, Va.,* Dec. 12, 2007, Globe Newswire, *available at* http://globenewswire.com/news-release/2007/12/12/370405/132900/en/Northrop-Grumman-and-the-Virginia-Information-Technologies-Agency-Open-New-High-Tech-Facility-in-Russell-County-Va.html (providing additional background regarding the contractual relationship between Northrop and the state).

aspects of the newly created Virginia Information Technologies Agency.[381] (Northrop was already one of the largest employers in the state.) As such, the jobs and investment stemming from the new facility in southeast Virginia were expected and not necessarily created by the GON.

Other jobs have been created since construction of the GON. DirecTV, for example, hired 100 locals for a "virtual call center" in 2010.[382] These new employees work from home and earn $10 per hour.[383] Broadband is necessary to support these jobs, but the presence of the GON does not appear to have been essential in bringing these jobs to fruition.[384]

Alpha Natural Resources, a large coal company, built its new headquarters in Bristol, Virginia, the heart of "coal country." There is debate about the role that broadband played in the company's decision to stay in Bristol. [385] An array of multi-million dollar tax incentives offered by the city and state was also a major factor in the decision-making process.[386] Location in coal country was another consideration.[387]

For Bristol, the decision to create an independent BVU Authority has been a divisive issue.[388] There has been significant debate at the local level regarding the merits of providing broad independence to an entity that oversees a network built with taxpayer resources. Although the use of such public authorities is a standard practice in many states, some residents accused the city of shifting to an authority model in an attempt to prevent public scrutiny of a project that had amassed significant debt.[389] Creating a quasi-independent authority allowed the city to remove the GON's tens of millions of dollars of debt from its books and freed the new entity to assume even more debt and grow beyond the boundaries initially set for it.[390]

4.2.5 Assessment

In assessing the Bristol experience, it is important to understand factors that make the Bristol GON experience unique and may make it difficult for other jurisdictions to replicate. Like many other GONs across the country, the municipal broadband network in Bristol has significant debt and, though profitable, there is continued debate as to whether the benefits of the system outweigh the significant public resources that were used to build it.

The Bristol network, much like GONs in Chattanooga and elsewhere, owes its existence in large part to federal and state grant funding unlikely to be replicated over the long term. The Bristol network benefited from over $30 million in state funding that stemmed from a major legal settlement with the tobacco industry in the 1990s.[391] Even with this infusion of funding, the GON, as discussed above, remains about $70 million in debt.

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381 *See* Rosalind S. Helderman, *Virginia Revises Troublesome Northrop Contract,* April 7, 2010, Washington Post, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2010/04/06/AR2010040604178.html?hpid=sec-metro.

382 *See* Michael Owens, *DirecTV Plans to Hire 100 for Virtual Call Center*, March 31, 2010, Tricities.com, *available at* http://www.tricities.com/news/article_327f3bd5-7ecc-5399-8f19-30614268eb83.html.

383 *Id.*

384 *Id.*

385 *See, e.g., Community Broadband Creates Jobs* at p. 1.

386 *See* David McGee, *$3 million in Local Incentives for Alpha Natural Resources to Build Near Sugar Hollow Park*, Nov. 13, 2009, WJHL, *available at* http://www.wjhl.com/story/20780580/3-million-in-local-incentives-for-alpha-natural-resources-to-build-near-sugar-hollow-park (discussing the array of local and state tax incentives).

387 *See, e.g., Alpha Natural Resources Opens Headquarters in Bristol Virginia,* Nov. 29, 2011, Yes Virginia Business Blog, *available at* http://www.yesvirginia.org/BlogSpot/post/Alpha-Natural-Resources-Opens-Headquarters-in-Bristol-Virginia.aspx ("Location was a key deciding factor in Virginia's favor. According to CEO Kevin Crutchfield, "The property is in a very attractive park-like setting and has easy Interstate access. A distinct advantage of the new location is its proximity to many of the company's operations and its convenience for Alpha's current corporate office work force."").

388 *See* Dave McGee, *Bristol Council Meeting Tinged with Thorns of Criticism,* June 23, 2010, Tricities.com, *available at* http://www.tricities.com/news/article_d810e7e0-ac1e-52ad-bd1f-fee92a9c24fa.html.

389 *See* Daniel Gilbert, *BVU asks judge to throw out lawsuit that would block utility's separation bid*, Dec. 23, 2009, WJHL, *available at* http://www.wjhl.com/story/20779711/bvu-asks-judge-to-throw-out-lawsuit-that-would-block-utilitys-separation-bid.

390 *Id.*

391 The money stems from a $200 billion settlement with major tobacco companies in the 1990s. Funds are allocated annually to states. *See, e.g.,* Paige Winfield Cunningham, *Your Tobacco Settlement Funds at Work*, Dec. 5, 2010, Wash. Post Local Blog Network, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2010/12/04/AR2010120403000.html.

Additional Infrastructure Needs In Virginia

The decision to invest tens of millions of dollars of public funding in the GON resulted in resources not being allocated to shoring up failing infrastructure in the Bristol area, as well as other parts of the state. Roads, bridges, and dams throughout the state are failing and in need of billions of dollars in investment over the next decade. In particular, about a quarter of its bridges are either structurally deficient or functionally obsolete, while nearly half of the roads in the state are of poor or mediocre quality.[392] In addition, the state's drinking and wastewater facilitates require in excess of $12 billion in investment by 2020 to adequately maintain and upgrade these vital elements of the state's public infrastructure.[393]

4.3 Lafayette, Louisiana

The municipal fiber-optic system built in Lafayette, Louisiana, is cited as perhaps the most "legitimate" of the public-owned networks in the country. The local utility that built the network prevailed in legal challenges and a public referendum regarding whether it could use public funds to support construction.[394] As result of the referendum and legal challenges, Lafayette's municipal system has often been cited by GONs advocates as a model for GONs in other locations. An examination of this GON identifies a clear need for policy makers, residents, businesses, and other stakeholders, both in Lafayette and elsewhere, to keep reviewing the short- and long-term prospects of this municipal broadband system.

Lafayette, Louisiana At-A-Glance

City Population: 122,761 (2012)

Year of Network Launch: Late 1990s

Current Status: Built

Number of subscribers: 14,000

Revenues: $24 Million

Operating Expenses: $29 Million

Note: Additional information on the Lafayette network is contained in Table 1 and in Appendix I.

4.3.1 Background

Lafayette's fiber-optic GON began in the late 1990s with construction of a single fiber ring by the municipally owned local utility, Lafayette Utilities System (LUS). The purpose was to enhance communication across its electric network.[395] During the planning phase, LUS determined it could deploy a significant amount of excess capacity (i.e., eight times as many fiber strands) for only 20 percent above the original estimated cost.[396] The low cost of fiber at this time was due in large part to the glut of redundant fiber-optic networks built in cities and states across the country in the last half of the 1990s. Much of this fiber remained "dark" for years, and thousands of miles remain unlit.[397] The Lafayette City-Parish Council voted to proceed with the expanded fiber ring in 1998.[398]

392 *See* ASCE 2013 Infrastructure Report Card, States—Virginia, http://www.infrastructurereportcard.org/virginia/virginia-overview/.
393 *See* ASCE 2013 Infrastructure Report Card, States—Virginia, http://www.infrastructurereportcard.org/a/#p/state-facts/virginia.
394 *See, e.g.,* Rick Jervis, *Louisiana City Blazes High-Speed Web Trail,* Feb. 5, 2012, USA Today, *available at* http://usatoday30.usatoday.com/news/nation/story/2012-02-01/broadband-telecom-lafayette/52920278/1 (providing relevant background information regarding the construction of this GON) ("*Louisiana City Blazes High-Speed Web Trail*").
395 *See* LUS Fiber, History, http://www.lusfiber.com/index.php/historical-timeline.
396 *Broadband at the Speed of Light* at p. 17.
397 For a discussion of the conditions that led to the "glut," *see* Rebecca Blumenstein, *How the Fiber Barons Plunged the U.S. into a Telecom Glut*, June 18, 2001, Wall St. Journal.
398 *See* LUS Fiber, History, http://www.lusfiber.com/index.php/historical-timeline.

By 2002, LUS was offering wholesale data services to the city government that were faster than existing offerings but priced the same.[399] As a result, and in an effort to explore other potential uses for the network, the City Council authorized a study to examine the feasibility of using the network for non-government purposes.[400] In 2004, the city government undertook a robust market study of possible next steps for the burgeoning LUS network.[401] Also during this time, the Louisiana state legislature passed the Local Government Fair Competition Act, a bill that, among other things, set forth a process to guide municipalities interested in deploying a GON (including the completion of a feasibility study) and prohibited the use of cross-subsidies to support deployment of a communications networks.[402]

In the fall of 2004, LUS completed its feasibility report and brought the issue to the City Council.[403] The Council voted for the sale of revenue bonds to finance the project.[404] Local incumbents immediately challenged these actions in court, charging that state law required a referendum before issuing bonds.[405] The court agreed, and Lafayette held a referendum in 2005. Residents voted in favor of the $125 million bond issue by a margin of nearly two to one.[406]

Additional legal challenges followed. Citizens, incumbent ISPs, and others argued that the LUS-issued bonds were an illicit form of cross-subsidization that placed an unfair burden on taxpayers and utility customers.[407] The Supreme Court of Louisiana sided with LUS in early 2007.[408] Soon thereafter, LUS issued $110 million in revenue bonds. Network construction began in 2008; by 2009, it began to connect users.[409]

4.3.2 Cost and Financing

The original backbone and network frame were transferred from the utility to LUS Fiber, a municipally owned subsidiary of LUS, in November 2007.[410] LUS Fiber reimbursed the utility for the transfer and other startup costs. The purchase of the assets and other startup costs were funded by loans between the utility and LUS Fiber at market terms and rates.[411] Although these are loans that must be repaid, LUS Fiber does not consider such loans as debts on its balance sheet.[412]

To date, the costs of building and maintaining the GON in Lafayette have exceeded the initial $125 million bond authorized by referendum. More specifically, the city's first bond issuance—$110,405,000 in communications system revenue bonds—was in 2007, followed by a second, smaller issuance—$14,595,000—in 2011.[413] An additional $7 million in bonds was issued in 2012.[414] Furthermore, LUS Fiber took out other loans

399 *Broadband at the Speed of Light* at p. 17.
400 *Id*. at p. 18.
401 *Id*.
402 *See* Local Government Fair Competition Act, ACT No. 736, Louisiana Legislature (Reg. Session 2004), *available at* http://www.legis.la.gov/legis/ViewDocument.aspx?d=820786.
403 *Broadband at the Speed of Light* at p. 20.
404 *Id*.
405 *See generally BellSouth Telecommunications, Inc. v. City of Lafayette*, Nos. 05-1478, 05-1505 (Ct. of App. 3rd Cir., Jan. 5, 2006), *available at* http://caselaw.findlaw.com/la-court-of-appeal/1090681.html.
406 *See, e.g.,* Press Release, *Louisiana Community Fights Back at BellSouth*, Nov. 28, 2005, LUS Fiber, *available at* http://www.lus.org/site.php?pageID=295&newsID=470.
407 *See, e.g., Elizabeth W. Naquin et al. v. Lafayette City Parish Consolidated Government*, No. 2006-C-2227 (Sup. Ct. of La., Feb. 22, 2007), *available at* http://www.lasc.org/opinions/2007/06C2227.opn.pdf.
408 *Id*.
409 *Broadband at the Speed of Light* at p. v.
410 *See Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana,* at p. 42, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2010), *available at* http://emma.msrb.org/EA494408-EA384388-EA781227.pdf ("*Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana*").
411 *Id*.
412 *See Communications System Revenue Bond, Series 2012, City of Lafayette Louisiana*, at p. 39, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2011), *available at* http://emma.msrb.org/ER539796-ER417759-ER819677.pdf.
413 *Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana* at p. 42.
414 *See* Dan Aschenbach, *Moody's Assigns A1 to Lafayette, Louisiana Combined Utility Revenue Bonds; Outlook Stable*, Nov. 26, 2012, Moody's, *available at* http://www.moodys.com/research/Moodys-Assigns-A1-to-Lafayette-Louisiana-Combined-Utility-Revenue-Bonds-New-Issue--NIR_900823593 ("*Moody's Assigns A1 to Lafayette, Louisiana*").

over the years and says it will continue to do so in the future. For example, LUS Fiber borrowed $16,429,422 from the utility for "the acquisition of fiber infrastructure, startup costs, and operations."[415] In 2012, the City Council approved an additional $5.5 million loan for LUS Fiber.[416] Taken together, the total principal of LUS Fiber's debt is in excess of $150 million, exclusive of startup costs and fees.

While LUS Fiber is technically independent of the utility, "there is a relationship in that should LUS [Fiber] encounter a credit event or default on [its] bonds, LUS combined utilities revenues could be used to pay debt service."[417] Specifically, even though LUS Fiber's structure and financing are intended to limit direct taxpayer liability, like most GONs its financing mechanisms do not completely isolate the risk. While the communications system is separate from the utilities system, "if the [former] fails to generate sufficient revenues to pay debt service for its bonds, the [latter] is required to pay the debt service."[418] Thus, utilities customers are exposed to the risks associated with Lafayette's investment in municipal broadband.

4.3.3 The Network

The fiber-optic GON in Lafayette is fully operational. LUS Fiber offers television, broadband, and telephone service throughout the city. As of May 2013, the system had attracted 14,000 customers, about one-third of its total potential subscribers.[419] Its services can be purchased separately or as a bundle. The price for a 3 Mbps connection is $19.95 per month (as part of a bundle), while its gigabit service costs $999.95 per month.[420] Additional speed tiers include stand-alone symmetrical connections of 15 Mbps ($34.95/month), 40 Mbps ($49.95/month), 75 Mbps ($99.95/month), or 100 Mbps ($199.95/month).[421] Rates are regulated by the City Council.[422]

A recent audit of LUS Fiber found that, while the system is generating revenues sufficient to cover its debt payments, it has been running at an overall loss for the last few years.[423] Including depreciation, LUS Fiber "ended 2012 with a loss of $11,869,564, compared with a loss of $16,519,323 in 2011."[424] In addition, one recent analysis suggests the system, as of just a few years ago, was losing anywhere from $30,000 to $45,000 a day.[425] For these many reasons, the date by which the GON is expected to be fully self-sustaining has been pushed back several times, first to 2013,[426] then to 2014,[427] and most recently to 2015.[428]

Beyond the unique symbiotic relationship with LUS generally, there is some evidence to suggest the communications division is a drag on the overall performance of the parent utility. Moody's, for example, noted in a recent review of LUS's revenue bonds that "LUS has a high debt ratio if telecommunications system debt is included in LUS debt ratios given LUS Combined Utilities has obligation to pay if system doesn't pay."[429] Like the other GONs examined in this section, the financial stability of this GON in both the short term and long term remains uncertain and should continue to be closely monitored.

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415 *Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana* at p. 43.

416 *See, e.g.,* Richard Burgess, *Official: LUS Fiber Taking Off,* Aug. 24, 2012, The Advocate, *available at* http://theadvocate.com/home/3632694-125/official-lus-fiber-taking-off ("*LUS Fiber Taking Off*").

417 *Moody's Assigns A1 to Lafayette, Louisiana.*

418 *See Electric Revenue Bond, Series 2012, Lafayette Public Power Authority,* at p. 54, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2012), *available at* http://emma.msrb.org/ER634382-ER491088-ER893967.pdf. ("*Electric Revenue Bond, Series 2012, Lafayette Public Power Authority*").

419 *See* Richard Burgess, *LUS Announces Number of Subscribers*, May 29, 2013, The Advocate, *available at* http://theadvocate.com/news/6038657-123/lus-announces-number-of-subscribers ("*LUS Announces Number of Subscribers*").

420 *See* LUS Fiber, Pricing, http://lusfiber.com/index.php/package-price-internet.

421 *Id.*

422 *Moody's Assigns A1 to Lafayette, Louisiana*.

423 *See* Alex Labat, *LUS CPA Explains Fiber Audit,* May 20, 2013, KATC-TV.com, *available at* http://www.katc.com/news/lus-cpa-explains-fiber-audit/#_.

424 *LUS Announces Number of Subscribers.*

425 *See generally* Steven Titch, *Lessons in Municipal Broadband from Lafayette, Louisiana,* Reason Foundation (Nov. 2013), *available at* http://reason.org/files/municipal_broadband_lafayette.pdf.

426 *Moody's Assigns A1 to Lafayette, Louisiana*.

427 *LUS Fiber Taking Off.*

428 *LUS Announces Number of Subscribers.*

429 *Moody's Assigns A1 to Lafayette, Louisiana*.

4.3.4 Community Impact

NuComm International in 2006 promised to bring 1,000 new jobs to Lafayette by building an expansive call center near the city.[430] NuComm management said the presence of the GON had a major influence on its decision, along with several monetary enticements from local government (including $1 million from the state's Rapid Response economic development program and another $1 million from the Lafayette Economic Development Authority).[431] The center, which employed an average of 495 employees, suffered massive layoffs in 2009 and eventually closed.[432]

Another company that relocated is Pixel Magic, a special effects company that opened a satellite office in Lafayette in 2009.[433] The company was solicited via an aggressive campaign by state officials, which included an array of tax breaks, free office space, and other non-financial incentives (e.g., employee recruiting services).[434] According to a company official, "Pixel Magic chose Louisiana because of its variety of locations, the growth of the film industry in the state and its lucrative tax breaks for film production and digital media."[435] The firm, which typically hires on a project-to-project basis, tends to employ anywhere from 100 to 200 people.[436]

In general, the local economy remains dominated by the energy and healthcare industries, which account for about 40 percent of all economic activity.[437] Moreover, its proximity to the coast and other transportation hubs has made it an attractive destination for a range of non-high-tech trade industries, tourism, and hospitality.[438] Despite many efforts to date, very few tech-oriented companies in the area outside the thousands of workers employed by incumbent ISPs like Cox and AT&T employ more than a few dozen people.[439]

4.3.5 Assessment

A notable feature of the Lafayette GON is the significant amount of debt that accrued during the construction of the network. As discussed in **section 3,** debt of any size, especially during such volatile economic times, is of concern to municipal and state governments. In the case of Lafayette, this concern is acute given that its GON has not yet become financially self-sustaining and, after investing more than $150 million, the network has attracted only 14,000 subscribers (there are 48,800 in Lafayette, Louisiana[440]).

There is continued debate about the investment in the Lafayette GON in light of other pressing local priorities. The Lafayette budget has been in flux in recent years. Although it was able to squeeze $18 million in savings in 2012 (due in large part to a massive hiring freeze),[441] the local school system has faced a number of

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430 *See* LUS Fiber, History, a*vailable at,* http://www.lusfiber.com/index.php/historical-timeline. *Broadband at the Speed of Light* at p. 30.
431 *See Call Center at Mall Likely to Shut Down*, Jan. 17, 2012, Associated Press, *available at* http://www.goerie.com/article/20121201170999.
432 *See* Tonya LaCoste, *Only a Few Managers Lefts at Transcom*, Feb. 1, 2012, KATC.com, *available at* http://www.katc.com/news/only-a-few-managers-left-at-transcom.
433 *See, e.g., Community Broadband Creates Jobs.*
434 *See* Louisiana Economic Development, Case Study: Pixel Magic, http://www.louisianaeconomicdevelopment.com/page/pixel-magic.
435 *See Pixel Magic to Open Studio in Lafayette,* Nov. 6, 2009, NewsOK, *available at* http://newsok.com/pixel-magic-to-open-studio-in-lafayette/article/feed/103201.
436 *See, e.g.,* Letitia Walker, *More Jobs Available at Pixel Magic*, April 1, 2010, KATC.com, *available at* http://www.katc.com/news/more-jobs-availabe-at-pixel-magic/.
437 *See Leading Locations for 2013: Ranking MSAs for Economic & Job Growth*, Area Development (2013), *available at* http://www.areadevelopment.com/Leading-Locations/Q2-2013/Leading-Locations-2013-Full-Results-262716.shtml.
438 *See, e.g., Economic Profile: Lafayette, Louisiana*, Lafayette Economic Development Authority (July 2013), *available at* http://www.lafayette.org/uploads/LafayetteLAEconomicProfile71713.pdf.
439 *Id.*
440 *See* Census Bureau, State and County Quick Facts, Lafayette (city), Louisiana, http://quickfacts.census.gov/qfd/states/22/2240735.html.
441 *See* Richard Burgess, *Lafayette Sees Bigger Fund Balance*, May 29, 2013, The Advocate, *available at* http://theadvocate.com/news/6099240-123/lafayette-sees-bigger-fund-balance ("*Lafayette Sees Bigger Fund Balance*").

budget challenges in recent years, some of which have threatened the elimination of jobs.[442] In addition, recent spending cuts forced the local government to prioritize spending in ways that have led to neglect of key local infrastructure like roads and drainage.[443]

Additional Infrastructure Needs in Louisiana

In the aggregate, cuts in funding to maintain local infrastructure contribute to the overall crumbling nature of roads, bridges, dams, and other such structures throughout the state. Nearly two-thirds of the roads in Louisiana are of poor or mediocre quality.[444] Similarly, failure to address school budget gaps, along with prioritizing bond issuances in support of a GON instead of school construction, has contributed to a $7 billion shortfall in school infrastructure funding throughout the state.[445]

4.4 Monticello, Minnesota

The municipal broadband network in Monticello, Minnesota, provides a case study illustrating the volatile reality of many GONs.

4.4.1 Background

Monticello began investigating the feasibility of building a city-owned fiber-optic broadband network in 2005.[446] A task force was established and explored how the city might pay for the network without having to implement a tax levy.[447] The study concluded such a network was feasible, and the Monticello City Council approved a plan to deploy the GON in September 2006.[448] In 2007, the town held a legally mandated referendum to approve the sale of bonds that would be used to fund network deployment; the item passed by a margin of nearly three to one.[449]

Shortly thereafter, the local incumbent ISP, TDS Telecom, sued to enjoin the city from using a bond issuance to fund the GON. The case delayed construction, but was decided in favor of Monticello.[450] When the case was still before the court, the city reached

Monticello, Minnesota At-A-Glance

City Population: 12,964 (2012)

Year of Network Launch: 2010

Current Status: Built

Number of subscribers: 1,270

Revenues: $1.756 Million

Operating Expenses: $2.292 Million

Note: Additional information on the Monticello network is contained in Table 1 and in Appendix I.

442 *See* Charles Lussier, *School Board Delays Vote on Budget*, July 19, 2013, The Advocate, *available at* http://theadvocate.com/home/6527575-125/school-board-delays-vote-on.
443 *Lafayette Sees Bigger Fund Balance.*
444 *See* ASCE 2013 Infrastructure Report Card, States—Louisiana, http://www.infrastructurereportcard.org/a/#p/state-facts/louisiana.
445 *Id.*
446 *See City of Monticello, Minnesota, Telecommunications Revenue Bonds, Series 2008*, at p. 20, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (June 19, 2008), *available at* http://emma.msrb.org/MS271839-MS268494-MD531794.pdf ("*City of Monticello, Minnesota, Telecommunications Revenue Bonds, Series 2008*").
447 *Id.*
448 *Id.*
449 *Id.* at p. 21.
450 *See Bridgewater Telephone Co. v. City of Monticello*, File No. 86-CV-08-4555 (Wright Cty. Dist. Ct., June 2, 2009).

out to TDS and raised the idea of collaborating in the construction of a citywide fiber-optic network.[451] City officials reasoned that such a partnership would help to reduce costs and assure more efficient deployment.[452] TDS ultimately declined, reasoning that the proposed approach would be "anti-competitive" and might raise antitrust concerns.[453]

Construction of the GON began in earnest in 2009 after the case was decided in the city's favor, and FiberNet, the official name of the GON, began offering broadband service to customers in the spring of 2010.[454]

4.4.2 Cost and Financing

In 2008, Monticello issued two series of bonds totaling $26,445,000.[455] The bonds have interest rates of 6.5 and 6.7 percent[456] and reach full maturity in 2031.[457] These funds were secured solely by the net revenues of Monticello FiberNet.[458] In terms of allocating the funds, the city estimated that actual construction of the GON would cost $16,762,765 and take 30 months to complete.[459] Ongoing operational costs and unanticipated expenses have proven to be substantial and in excess of initial estimates.[460] Combined with tepid demand for its services, the GON encountered significant financial difficulties.

4.4.3 The Network

Monticello FiberNet is a city-owned 151-mile FTTH network that offers broadband, telephone, and television services to municipal buildings, schools, homes, and businesses.[461] Major business decisions are made by Monticello's advisory board and general manager.[462] The advisory board consists of five voting members: the mayor, a council member, and three community members; the city administrator and the general manager of FiberNet are non-voting members.[463] The general manager oversees employees, creates annual budgets, and is responsible for managing day-to-day activities.[464]

The network is fully operational. Residents can choose from an array of stand-alone and bundled offerings. Examples include a symmetrical 10 Mbps broadband connection for $29.95 per month, a symmetrical 30 Mbps connection for $52.95 per month, and a symmetrical 50 Mbps connection for $95.35.[465] These prices decrease with the addition of other services. For example, the monthly price of the 10 Mbps connection decreases to $24.95 with the addition of voice and television services.[466]

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451 *See Letter from Jeff O'Neill, City Administrator, to Tom Ollig, TDS,* July 17, 2008, *available at* http://www.muninetworks.org/sites/www.muninetworks.org/files/TDSLetter_joint%20fiber%20install_071708.pdf.
452 *Id.*
453 *See* Mike Schoemer, *TDS Turns Down City's Offer for Cooperative Installation*, Aug. 21, 2008, Monticello Times, *available at* http://www.muninetworks.org/sites/www.muninetworks.org/files/2008-TDS-Turns-Down-City.pdf.
454 *See City of Monticello, Minnesota, General Obligation Refunding Bonds, Series 2011*, at p. A-10, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Sept. 15, 2011), *available at* http://emma.msrb.org/EP571899-EP448885-EP848794.pdf.
455 *City of Monticello, Minnesota, Telecommunications Revenue Bonds, Series 2008* at p. i.
456 *Id.*
457 *Id.* at 4.
458 *Id.* at 10.
459 *Id.* at 21.
460 For a recent accounting, *see City of Monticello, Mn, Telecommunications Revenue Bonds, Series 2008*, *Quarterly Report for Period Ending March 31, 2013*, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2013), *available at* http://emma.msrb.org/EA525726-EA409489-EA806402.pdf.
461 *See City of Monticello, Minnesota, Telecommunications Revenue Bond, 2012 Annual Report*, at p. 3, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2013), *available at* http://emma.msrb.org/EA541341-EA422012-EA819011.pdf.
462 *Id.* at p. 5.
463 *Id.*
464 *Id.*
465 *See* City of Monticello, FiberNet, Residential Pricing, http://monticellofiber.com/ResidentialServices.cfm?ID=91&PID=103&siteID=1.
466 *Id.*

FiberNet has worked hard to grow its customer base since the service went live in 2010. As of March 2013, the network had 1,010 voice service customers, 1,270 Internet customers, and 970 TV customers.[467] One hundred and thirty of FiberNet's customers are businesses.[468] As a result of the lack of a strong customer base, the system appears not to be viable. In July 2012, FiberNet defaulted on its bond repayment because the city was unable to make "a monthly deposit into a debt service account as required by bond indenture."[469] The network continued to be in default and failed to make another scheduled payment in December 2012.[470] As of March 2013, total quarterly revenues were down to $439,141, which totals $1.75 million on an annualized basis.[471]

The Monticello GON was initially funded by revenue bonds that explicitly limited the city's liability, but ongoing financial difficulties have forced the city to intervene on several occasions.[472] For example, a recent audit of city financials (for fiscal year 2011) revealed several outstanding inter-fund loans to FiberNet, including a $3.1 million loan from the city's Liquor Fund and $323,000 from the General Fund.[473] In addition, "management report[ed] that inter-fund loans [grew] to $4.1 million [by September 2012], and expect[ed] additional monthly support of up to $60,000 through the end of fiscal 2012."[474] Even with city-sponsored cross-subsidization, the network continues to struggle financially. In the first quarter of 2013, FiberNet reported an operating loss of $134,278.44 and a negative cash flow of $159,644.49.[475] As a result, the city's credit rating was downgraded in September 2012.[476]

These losses and default on bond repayment obligations resulted in bondholders suing the city in late 2012.[477] In response, the city proposed a settlement that would repay bondholders 22 cents on the dollar, or $5.75 million of the over $26 million that was raised during the initial bond sales.[478] If accepted by bondholders, most of the $5.75 million would "become a general city obligation, payable from existing funds or funds generated by issuing a new bond."[479]

4.4.4 Community Impact

Evidence of FiberNet's positive impacts is limited as the city continues to address the significant financial shortcomings discussed above. GONs advocates have not attempted to frame the Monticello network as a driver of local economic development.

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467 *See City of Monticello, Mn, Telecommunications Revenue Bonds, Series 2008, (FiberNet Monticello Project), Quarterly Report for Period Ending March 31, 2013*, at p. 6, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2013), *available at* http://emma.msrb.org/EA525726-EA409489-EA806402.pdf ("*City of Monticello Quarterly Report for Period Ending March 31, 2013*").

468 *See* Tom Meersman, *Monticello's Model Broadband Effort in Peril*, June 7, 2012, Star Tribune, *available at* http://www.startribune.com/local/west/157992065.html?page=all&prepage=1&c=y#continue ("*Monticello's Model Broadband Effort in Peril*").

469 *See Comprehensive Annual Financial Report*, at p. 12, City of Monticello, Minnesota (Dec. 2012), *available at* http://www.ci.monticello.mn.us/vertical/Sites/%7B46185197-6086-4078-ADDC-0F3918715C4C%7D/uploads/2012_Monticello_CAFR_6000.pdf.

470 *Id.*

471 *See City of Monticello, Mn, Telecommunications Revenue Bonds, Series 2008, (FiberNet Monticello Project), Quarterly Report for Period Ending March 31, 2013*, at p. 3, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2013), *available at* http://emma.msrb.org/EA525726-EA409489-EA806402.pdf ("*City of Monticello Quarterly Report for Period Ending March 31, 2013*").

472 *See* Andrea Stenhoff, *Moody's downgrades to A2 from Aa3 the GOULT rating for City of Monticello (MN); concurrently downgrades lease revenue debt to A3 from A1,* Sept. 28, 2012, Moody's Investors Service, *available at* http://www.moodys.com/research/Moodys-downgrades-to-A2-from-Aa3-the-GOULT-rating-for-Rating-Update--RU_900688861 ("*Moody's downgrades City of Monticello*").

473 *Id.*

474 *Id.*

475 *City of Monticello Quarterly Report for Period Ending March 31, 2013* at p. 4.

476 *Moody's downgrades City of Monticello*

477 *See* Tim Hennigar, *Monticello Council Approves $5.75 Million Proposed FiberNet Bondholder Settlement*, June 17, 2013, Monticello Times, *available at* http://monticellotimes.com/2013/06/17/monticello-council-approves-5-75-million-proposed-fiber-net-bond-settlement/ ("*Monticello Council Approves $5.75 Million Proposed FiberNet Bondholder Settlement*").

478 *See Bondholders to Take Loss on Monticello Broadband*, Aug. 19, 2013, Associated Press, *available at* http://www.inforum.com/event/article/id/409548/.

479 *Monticello Council Approves $5.75 Million Proposed FiberNet Bondholder Settlement.*

Proponents of the GON have argued that it has sparked renewed competition among ISPs in the city.[480] One group estimated FiberNet saves Monticello $240,000 a year, and arrived at this figure by making a number of assumptions about hypothetical savings of individual households that have benefited from competing ISPs' lower prices.[481] While these service providers have adjusted their offerings in recent years, it can be argued that any perceived "savings" are outweighed by the substantial cost the city incurred for having to financially support the GON. Despite growing acceptance that FiberNet is negatively impacting city finances, some GONs advocates argue strongly that the municipal network is worthwhile because of its impacts on local competition.[482]

Proponents of this view tend to overlook the trends in broadband innovation over the last decade. Connection speeds across the country have consistently increased while prices have decreased and the diversity of offerings has multiplied.[483] Wireless broadband has further bolstered intermodal competition and provides Monticello residents with multiple options for getting online.[484] While some credit the Monticello GON with causing service improvements by local incumbents, the city could have saved millions of dollars and avoided such enormous risk by appreciating that organic forces were shaping the market as a function of the demands and actual usage patterns of residents.[485] Indeed, many citizens have expressed resentment toward the city government for getting into the business of broadband and failing.[486]

4.4.5 Assessment

The financial struggles of the GON in Monticello highlight a more general concern about the capability of municipal governments to successfully operate a GON. GON proponents argue that local government can be as nimble as the private sector when it comes to funding a new network and adjusting to competitive pressures. In light of the preceding analysis, Monticello appears to have been ill prepared to deal with market pressures and suffered as a result. The city's initial plan for the GON assumed that market conditions would not change once it entered the market.[487] When its competitors reduced prices, Monticello did not alter its plan and chose instead to adhere to the road map that had already passed muster with city officials. The result has been financial distress and support of the argument that municipalities are often ill equipped to compete in well-functioning dynamic markets.

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480 *See, e.g.,* Chris Mitchell, *A Closer Look at FiberNet Monticello,* June 8, 2012, Community Broadband Networks, Institute for Local Self-Reliance, *available at* http://www.muninetworks.org/content/closer-look-fibernet-monticello.

481 *Id.*

482 *See, e.g.,* Christopher Mitchell, *What if FiberNet Monticello Had Been Canned in 2008?*, June 29, 2012, Community Broadband Networks, Institute for Local Self-Reliance*, available at* http://www.muninetworks.org/content/what-if-fibernet-monticello-had-been-canned-2008 ("We continue to believe that Monticello made the smart choice in proceeding with its network, even in the face of all the adversity they have had. If it were possible to total up the many varied benefits to the community from the additional investment, choices, discounts, and multiplier effects, we believe it would significantly outweigh the negatives."); Christopher Mitchell, *Monticello Moves Closer to Settlement with Bondholders,* June 20, 2013, Community Broadband Networks, Institute for Local Self-Reliance*, available at* http://muninetworks.org/content/monticello-moves-closer-settlement-bondholders ("We continue to see FiberNet Monticello as benefiting the community on the whole") ("*Monticello Moves Closer to Settlement with Bondholders*").

483 For data and discussion, *see supra,* section 3.1.1.

484 The National Broadband Map reveals that every resident in Wright County, Minnesota, where Monticello is located, has access to at least three wireless broadband providers, while the vast majority has access to six. *See* National Broadband Map, Summarize: Wright County, MN, http://www.broadbandmap.gov/summarize/state/minnesota/county/wright.

485 The city was initially persuaded into exploring a municipal communications network by local business owners who were frustrated with unreliable telephone service. As discussed above, FiberNet has attracted only about 130 business customers to date. *Monticello's Model Broadband Effort in Peril.*

486 *See, e.g.,* Walt Markling, *Letter: FiberNet Remains a Costly Venture for City Residents in Monticello,* Feb. 28, 2013, Monticello Times, *available at* http://monticellotimes.com/2013/02/28/letter-fibernet-remains-a-costly-venture-for-city-residents-in-monticello.

487 *See* Nate Anderson, *Want 50Mbps Internet in Your Town? Threaten to Roll Out Your Own,* Oct. 27, 2009, Ars Technica*, available at* http://arstechnica.com/tech-policy/2009/10/want-50mbps-internet-in-your-town-threaten-to-roll-out-your-own/.

Infrastructure Needs in Minnesota

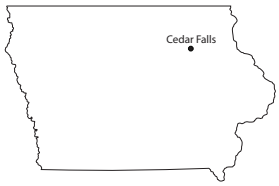
The financial difficulties facing the city and FiberNet raise the possibility that the GON will require general revenue expenditure that could be put to better and more productive uses. Infrastructure throughout the state, for example, is poorly rated and in desperate need of investment by state and local government. More than half the roads in the state are of poor or mediocre quality, while its schools have nearly $4 billion in infrastructure funding needs.[488] Billions of dollars in additional funding are needed to shore up other critical infrastructure, like the state's drinking and wastewater systems.[489]

4.5 Cedar Falls, Iowa

The municipal broadband network in Cedar Falls, Iowa, is one of the oldest in the country. First deployed in the mid-1990s, this GON evolved from a traditional cable broadband system, built atop a hybrid fiber/coaxial infrastructure, to one that is transitioning to all fiber-optic.

Though it has survived for several decades, the Cedar Falls model may be difficult for other localities to replicate. In its push to modernize and join the ranks of other "gig cities," Cedar Falls assumed a significant amount of debt with limited evidence that consumers wanted ultra-fast Internet connections. As a result, the system has experienced some financial volatility, which has led to a credit downgrade. It remains to be seen whether the benefits of this network will justify the significant costs associated with this municipality's ambitious expansion plans.

Cedar Falls, Iowa At-A-Glance



City Population: 39,993 (2012)

Year of Network Launch: Mid-1990s

Current Status: Partially Built

Number of subscribers: 17,000

Revenues: $14.3 million

Operating Expenses: $13.2 million

Note: Additional information on the Cedar Falls network is contained in Table 1 and in Appendix I.

4.5.1 Background

Cedar Falls Utilities (CFU) began to explore the feasibility of building a municipal communications network in the early 1990s.[490] After two years of study, the Cedar Falls City Council established a Municipal Communications Utility and transferred authority to the CFU Board of Trustees.[491] The project began in earnest after the issue was put before voters in 1994.[492] Seventy-one percent voted in favor of deploying a GON that would be managed and controlled by the CFU Board of Trustees.[493] Voters also approved a $3 million bond issuance to finance the project.[494]

488 *See* ASCE Infrastructure Report Card 2013, States—Minnesota, http://www.infrastructurereportcard.org/a/#p/state-facts/minnesota.
489 *Id.*
490 *See* Doris J. Kelley, *A Study of the Economic and Community Benefits of Cedar Falls, Iowa's Municipal Telecommunications Network*, 2, Oct. 2. 2003, Cedar Falls Utilities, *available at* http://www.lus.org/uploads/AStoryofTwoCities.pdf ("*Study of the Economic and Community Benefits*").
491 *Id.*
492 *See City of Cedar Falls, Iowa $3,000,000 General Obligation Bonds, Series 1995B*, at p. 6, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (June 9, 1995), *available at* http://emma.msrb.org/MS111001-MS86309-MD167913.pdf ("*Cedar Falls $3,000,000 General Obligation Bonds, Series 1995B*").
493 *Id.*
494 *Id.*

At first, the network offered only cable service,[495] but by 1997, the utility began to offer Internet service via CyberNet, a 10 Mbps citywide Ethernet network.[496] At that point, the network was composed of hybrid fiber/coaxial (HFC).[497] In 2010, CFU began to replace the coaxial portion of its network with fiber and started to extend the fiber directly to homes and businesses.[498] This upgrade eventually allowed CFU to offer 1 Gbps speeds to customers.[499]

4.5.2 Cost and Financing

Deployment of the initial HFC network was funded by a $3 million bond issued in 1995 (it matured in 2008).[500] The upgrade to fiber and expansion of the network were slated to cost $17 million.[501] In 2009, Cedar Falls began to borrow funding for these purposes by issuing a general obligation bond for $2,320,000.[502] The bond matures in 2024 and has a rising interest rate that begins at .075 percent and increases throughout the bond's life to 3.80 percent in the final year.[503]

Cedar Falls can repay this general obligation bond through any mechanism, including its taxing powers.[504] In 2010, Cedar Falls assumed additional debt to further fund the project when it borrowed $13,130,000 using communications utility revenue capital loan notes,[505] which carry an interest rate of three percent and mature in 2024.[506] This debt was secured by a first lien on revenue from the communications utility.[507] The GON also benefited from loans from the electric utility, totaling over $2 million by the end of 2011,[508] and grants from the federal government, totaling $877,433, in support of network expansion to previously unserved areas.[509] As of the end of 2012, the total annual cost of operating the GON was $13,199,726, up from $8,924,912 in 2009.[510] Maintenance and system operation cost $8,009,105 and sales, customer service, and corporate operations totaled $2,999,629.[511]

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495 *Study of the Economic and Community Benefits* at p. 2.
496 *Id*. at p. 3.
497 *Id*.
498 *See* John Molseed, *CFU Adds Fiber Optic Links to All Customers*, June 13, 2010, WCF Courier, *available at* http://wcfcourier.com/news/local/article_4cccdbd5-1341-594a-bb4c-701305cd218b.html?mode=story ("*CFU Adds Fiber Optic Links*").
499 *See, e.g.,* Jon Ericson, *Cedar Falls Joints Elite 'Gigabit City' List*, May 8, 2013, WCF Courier, *available at* http://wcfcourier.com/business/local/cedar-falls-joins-elite-gigabit-city-list/article_588684f4-4750-54c9-8c49-48fd5b891ba1.html.
500 *Cedar Falls $3,000,000 General Obligation Bonds, Series 1995B* at p. 6.
501 *CFU Adds Fiber Optic Links.*
502 *See City of Cedar Falls, Iowa, $2,320,000 General Obligation Capital Loan Notes, Series 2009B*, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Nov. 30, 2009), *available at* http://emma.msrb.org/EP357783-EP282175-EP677366.pdf.
503 *Id*. at p. 13.
504 *Id.* at p. 2.
505 *See Municipal Communications Utility of the City of Cedar Falls Iowa, $13,130,000 Communications Utility Revenue Capital Loan Notes, Series 2010*, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Sept 1, 2010), *available at* http://emma.msrb.org/EA404810-EA316792-EA712527.pdf.
506 *Id*. at p. 19.
507 *Id*. at p. 1.
508 *See Financial Statements of the Municipal Electric, Gas, Water, and Communications Utilities of the City of Cedar Falls, Iowa, For the Year Ending Dec 31, 2011*, at p. 28, Cedar Falls Utility (March 2012), *available at* http://auditor.iowa.gov/reports/1223-0046-C000.pdf ("*Financial Statements For the Year Ending Dec 31, 2011*").
509 *See Advancing Broadband: A Foundation for Strong Rural Communities*, at p. 29, Rural Utilities Service, U.S. Dept. of Agriculture (Jan. 2011), *available at* http://www.rurdev.usda.gov/supportdocuments/RBB_report_whole-v4ForWeb.pdf.
510 See *Financial Statements of the Municipal Communications Utility of the City of Cedar Falls, Iowa*, *Including Independent Auditor's Report, For the Years Ended Dec. 31, 2012 and 2011*, at p. 3, Cedar Falls Utility (April 4, 2013), *available at* http://emma.msrb.org/EP760639-EP589987-EP991542.pdf ("*CFU Auditor Report, For the Years 2011 and 2012*"). *See also Financial Statements For the Year Ending Dec 31, 2011* at p. 3.
511 *See CFU Auditor Report, For the Years 2011 and 2012* at p. 3.

4.5.3 The Network

CFU's FTTH network is 95 percent complete.[512] The new gigabit system was switched on in May 2013.[513] This GON offers only broadband Internet access and television services, not telephone. Customers also have access to CFU's wireless hotspots, which are available in parts of downtown Cedar Falls.[514] In terms of specific offerings, services include a stand-alone asymmetrical 2 Mbps connection for $29.95 a month ($34.95 for rural customers), a 30 Mbps asymmetrical connection for $64.50 per month ($69.50 for rural customers), and a 1 Gbps asymmetrical connection for $265 a month ($270 for rural customers).[515] Prices for business consumers are substantially higher (e.g., $950.00 per month for 1 Gbps in the city, $990 per month in rural areas).[516] CFU also makes available lit or dark dedicated fiber connections between customer-owned facilities, and wholesale bandwidth for other ISPs.[517]

Over the last decade, the financial viability of the GON in Cedar Falls has fluctuated. The system rarely generated revenues to cover its total costs in the years before its upgrade,[518] and over the last few years, while total operating revenues exceeded total operating expenses, operating expenses continue to grow at a fast pace.[519]

4.5.4 Community Impact

There are a number of positive impacts that have resulted from the GON in Cedar Falls which are often cited by CFU proponents and GON supporters.[520] The utility estimates its customers pay about $200 less each year for their Internet service than residents in neighboring "peer communities" in Iowa do.[521] As of May 2013, CFU accrued about 11,600 total subscribers,[522] but without knowing the types of connections these customers purchased, it is difficult to determine whether the significant costs associated with upgrading its network to all-fiber are delivering value to customers—and the city generally—in excess of these reported savings. With anecdotal evidence suggesting very few customers opt for CFU's fastest speed tiers, it can be argued that the costs of building this GON outweigh the benefits that may stem from it.[523]

Evidence that the GON spurred economic development and job creation is limited. A study from the early 2000s found that, while the presence of the GON appeared to play some role in influencing several firms to relocate to Cedar Falls, it was just one of many, arguably more important factors, making it difficult, if not impossible, to "verify that these developments [were] the direct result of the City's broadband delivery system."[524]

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512 *See* CFU, Internet, http://www.cfu.net/cybernet/default.aspx.

513 *See CFU Launches Gigabit Internet Service*, May 28, 2013, Cedar Falls Times, *available at* http://www.communitynewspapergroup.com/cedar_falls_times/news/article_09479d64-c7ca-11e2-80e2-0019bb2963f4.html ("*CFU Launches Gigabit Internet Service*").

514 *See* CFU, Free Wi-Fi Zones, http://www.cfu.net/cybernet/wifi.aspx.

515 *See* CFU, Internet—Residential Services, http://www.cfu.net/cybernet/residential-service.aspx.

516 *See* CFU, Internet—Business Services, http://www.cfu.net/cybernet/business-service.aspx.

517 *See* CFU, Internet and Fiber Services, http://www.cfu.net/customer-service/commercial-services/fiber-services.aspx.

518 *See, e.g.,* Ronald Rizzuto, *Iowa Communications Systems: The Financial Track Record,* Heartland Institute (Sept. 2005), a*vailable at* http://heartland.org/sites/all/modules/custom/heartland_migration/files/pdfs/17724.pdf.

519 *CFU Auditor Report, For the Years 2011 and 2012* at p. 6.

520 *See* CFU, Community Benefits, http://www.cfu.net/about/community-benefits.aspx.

521 *See CFU Residential Report Card for the Period of June 2012—May 2013,* CFU, *available at* http://www.cfu.net/webres/File/RPT_card.pdf.

522 *CFU Launches Gigabit Internet Service*.

523 *See, e.g., id.* (noting that these speeds will be attractive mostly to business customers in the short term). *See also* Steve Donohue, *Iowa City Charging $275 Monthly for 1-Gig Broadband Service*, May 29, 2013, Fierce Cable, *available at* http://www.fiercecable.com/story/iowa-city-charging-275-monthly-1-gig-broadband-service/2013-05-29 (noting that there is little demand for the 1 Gbps service at this point in time).

524 *See* Doris Kelley, *A Study of the Economic and Community Benefits of Cedar Falls, Iowa's Municipal Telecommunications Network*, at p. 12, Iowa Association of Municipal Utilities (July 2004), *available at* http://www.baller.com/pdfs/cedarfalls_white_paper.pdf.

CFU supporters and GONs advocates argue that the city's investment in its fiber upgrade has had positive impacts on its credit rating.[525] However, Moody's recently downgraded its bond rating from A1 to A3.[526] Moody's reasoned that CFU's debt is becoming increasingly illiquid, the network is highly leveraged (due mostly to its fiber expansion), and the network lost several major customers to competitors in recent years.[527] These challenges will be difficult to overcome as incumbents begin to leverage their nimbleness and compete more vigorously with CFU, especially on the price for higher-speed tiers.[528]

4.5.5 Assessment

The huge cost and long-term debt associated with the municipal fiber system in Cedar Falls raise questions about opportunity costs and whether such substantial resources have been invested wisely. Such uncertainty gains additional primacy when viewed in light of other priorities competing for funding at the local level.

Recent debate over the town budget for fiscal year 2014 highlighted several of these.[529] Much to the dismay of many residents, the local government approved a property tax increase for the coming year.[530] Some of these revenues might have been used to pay for a new highway interchange,[531] highlighting another important trade-off that policy makers make when they elect to deploy a GON.[532]

Infrastructure Needs in Iowa

Public infrastructure throughout the state requires significant attention—nearly half of the roads in the state are of poor or mediocre quality; more than a quarter of its bridges are structurally deficient or functionally obsolete; and nearly $15 billion is needed to meet school, drinking water, and wastewater infrastructure needs.

525 *See, e.g.,* Christopher Mitchell, *Cedar Falls Utility Gets High Bond Rating from Moody's*, March 19, 2013, Community Broadband Networks, Institute for Local Self-Reliance, *available at* http://www.muninetworks.org/content/cedar-falls-utility-gets-high-bond-rating-moodys.

526 *See* Soo Yun Chung, *A3 Rating Applies to Approximately $13 Million Senior-Lien Revenue Debt Outstanding*, March 8, 2013, Moody's Investor Services, *available at* http://www.moodys.com/research/Moodys-downgrades-to-A3-from-A1-the-rating-on-Cedar--PR_268153 ("*A3 Rating Applies to Approximately $13 Million Senior-Lien Revenue Debt Outstanding*").

527 *Id.*

528 *See, e.g.,* Jeff Baumgartner, *Mediacom Faces 1 Gig Pressure in Iowa*, May 30, 2013, Multichannel News, *available at* http://www.multichannel.com/distribution/mediacom-faces-1-gig-pressure-iowa/143570.

529 *See* Tina Hinz, *Cedar Falls Budget Hearing Set for Feb. 25*, Feb. 18, 2013, WCF Courier, *available at* http://wcfcourier.com/news/local/cedar-falls-budget-hearing-set-feb/article_7771e49b-33a6-568c-b35f-b08c11339daa.html.

530 *See* Tina Hinz, *Cedar Falls Council Oks Budget; Tax Hike Irks Residents*, Feb. 26, 2013, WCF Courier, *available at* http://wcfcourier.com/news/local/govt-and-politics/cedar-falls-council-oks-budget-tax-hike-irks-residents/article_6cd83257-6fe2-5894-8cf1-eaaa93581ff.html.

531 *Id.*

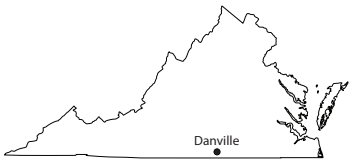
532 *See* ASCE Infrastructure Report Card 2013, States—Iowa, http://www.infrastructurereportcard.org/a/#p/state-facts/iowa.

4.6 Danville, Virginia

The government-owned broadband network in Danville, Virginia, is differentiated from other GONs in a number of ways:

- It adheres to an open access model, which means that the municipality only sells wholesale access to its network; it does not sell Internet access or other services directly to residents.
- Its financing model is extremely conservative — FTTH is being deployed on a pay-as-you-go basis, which has helped the city avoid amassing any debt associated with the GON.
- The network, called nDanville, has been consistently profitable and contributes hundreds of thousands of dollars annually to the city's general fund.

Danville, Virginia At-A-Glance



City Population: 42,996 (2012)

Year of Network Launch: Early 2000s

Current Status: Partially Built

Number of subscribers: 200

Revenues: $1.8 million

Operating Expenses: $1.7 million

Note: Additional information on the Danville network is contained in Table 1 and in Appendix I.

4.6.1 Background

The GON in Danville grew out of a fiber-optic network the local utility, the Danville Utilities Department, deployed in the early 2000s to enable more robust communications across its electric network.[533] The communications network was also built out to municipal buildings and schools.[534] In 2006, the utility studied the feasibility of turning its fiber network into an open access system that could be used by private ISPs to deliver communications services to residents and businesses.[535]

These efforts were reinforced by a parallel state-level initiative to improve rural communications capabilities. The Mid-Atlantic Broadband Cooperative (MBC) launched in 2003 to lead these efforts and spearhead the construction of an expansive broadband network in rural Virginia that could "provide unique opportunities for research/development and create opportunities for the private sector to deploy competitive broadband services."[536] The MBC network was funded by federal and state grants, the latter of which stemmed primarily from the state's tobacco settlement proceeds, some of which had also been channeled into the GON in Bristol, Virginia (see **section 4.2**). Together, these grants totaled over $40 million ($34 million of which came from the Tobacco Commission) and helped support deployment of a 700-mile middle-mile fiber network in the mid-2000s.[537] Danville eventually hooked up its fiber network to the MBC middle-mile network and began to plan for the expansion of its local infrastructure.

The network that emerged, nDanville, went live in late 2005 and was the "first municipal open access, open services network in the United States."[538] After the 2006 expansion, the utility in 2010 recommended the City Council vote to expand the fiber network to homes and businesses.[539] To that end, it offered a plan that would

533 *See, e.g.,* Andrew Michael Cohill, *Danville Transforms its Economy with Fiber*, Broadband Communities Magazine (Nov./Dec. 2011), *available at* http://www.bbpmag.com/MuniPortal/EditorsChoice/1111editorschoice.php ("*Danville Transforms its Economy*").
534 *Id.*
535 *Id.*
536 *See* Virginia Tobacco Indemnification and Community Revitalization Commission, MBC, http://www.tic.virginia.gov/mbc1.shtml.
537 *Id.*
538 *See* Danville, nDanville Fiber Optic Services Information, http://www.danville-va.gov/index.aspx?NID=668.
539 *See* Christopher Mitchell, *Danville City Council Nixes Expansion of nDanville Fiber Network*, Oct. 6, 2012, Community Broadband Networks, Institute for Local Self-Reliance, *available at* http://muninetworks.org/content/danville-city-council-nixes-expansion-ndanville-fiber-network.

expand the network to between 2,000 and 3,000 new homes funded by a $2.5 million loan.[540] The City Council voted against this proposal,[541] but a year later it approved a smaller-scale pilot program that would extend the network to 250 homes.[542]

4.6.2 Cost and Financing

The initial phase of the Danville network was constructed for $2.5 million. This stage used 70 miles of fiber-optic cable[543] and was funded by a loan from the electric utility, which has been paid back with interest.[544] Ever since, the portion of the GON that extends to homes and businesses has been built on a pay-as-you-go basis.[545] The initial 250-home pilot program approved by the city hinged on the utility's ability to fund the cost from reserves accrued from its telecommunications division.[546] As of December 2012, nDanville was debt-free and contributed over $300,000 to the city general fund each year.[547]

4.6.3 The Network

The emerging fiber-optic GON in Danville is open access, which means private ISPs can contract to use the infrastructure to deliver Internet, television, and telephone service to customers.[548] nDanville also provides free Wi-Fi access in several parks across the city.[549] In addition, during the second phase of its deployment (i.e., after initial deployment but before build-out to residents), nDanville constructed a medical network that brought fiber-optics to the local medical community.[550] The vast majority of the city's "medical offices, clinics and labs, including Danville Regional Medical Center," are connected to the network and use it to strengthen the quality and reach of their services.[551]

The last phase of deployment—bringing fiber to homes and businesses in Danville—is ongoing and is being "sized" according to the amount of reserve funding available in an effort to avoid amassing any debt.[552] Current customers have two choices of ISP—Gamewood Technology Group and Sunset Digital; the former offers several bundles of television, Internet, and telephone service, while the latter offers telephone and Internet service.[553] Gamewood's offerings range from a "bronze" package for $60 per month, which includes a 3 Mbps asymmetrical Internet connection, phone, and basic cable package, to a "platinum" package for $130 per month, which includes a 20 Mbps asymmetrical Internet connection, telephone, and an expanded cable package.[554]

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540 *Id.*
541 *Id.*
542 *See* Christopher Mitchell, *Open Access nDanville Network Goes Residential*, Aug. 11, 2011, Community Broadband Networks, Institute for Local Self-Reliance, *available at* http://muninetworks.org/content/open-access-ndanville-network-goes-residential ("*Open Access nDanville Network Goes Residential*").
543 *See City of Danville, Virginia, General Obligation Public Improvement Bonds, Series 2007*, at p. 36, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (March 31, 2007), *available at* http://emma.msrb.org/MS256957-MS232265-MD452865.pdf ("*Danville, Virginia, General Obligation Public Improvement Bonds, Series 2007*").
544 *See Editor's Choice: State-of-the-Art Broadband Builds Communities,* Broadband Communities Magazine (Dec. 2012), *available at* http://www.bbpmag.com/MuniPortal/EditorsChoice/1212editorschoice.php ("*State-of-the-Art Broadband Builds Communities*").
545 *See Comprehensive Annual Financial Report for the Fiscal Year July 1, 2001 to June 30, 2012,* at p. 14, Danville City Government, *available at* http://www.danville-va.gov/DocumentCenter/View/8624 ("*Comprehensive Annual Financial Report—Danville*").
546 *Open Access nDanville Network Goes Residential.*
547 *State-of-the-Art Broadband Builds Communities.*
548 *Danville Transforms its Economy.*
549 *See* Danville, Danville's Hot Parks, http://www.danville-va.gov/index.aspx?NID=669.
550 *Danville, Virginia, General Obligation Public Improvement Bonds, Series 2007* at p. 21.
551 *See Danville Medical Network Wins International Award*, May 19, 2011, Virginia Business, *available at* http://www.virginiabusiness.com/index.php/news/article/danville-medical-network-wins-international-award1/.
552 *Comprehensive Annual Financial Report—Danville* at p. 14.
553 For additional information, *see* nDanville, Our Service Providers, http://www.ndanville.com/our-service-providers/.
554 *See* nDanville, Packages, http://www.ndanville.com/our-service-provider/packages/.

4.6.4 Community Impact

The Danville fiber GON, though not yet fully deployed to residents, has already been credited with positive impacts. The medical network, for example, has won plaudits from a number of organizations and has been favorably received by healthcare professionals and local patients alike.[555] Danville also uses its fiber network to provide broadband access for its schools.[556] It receives about $1 million in federal E-rate funds annually for these purposes.[557]

Danville has also used the network to diversify the local economy and attract new technology-focused firms. This has been a policy imperative for the municipality, which saw its industrial base erode in the early 1990s, when Danville "lost thousands of agriculture- and textile-related jobs."[558] To date, a number of programs and initiatives have been launched in an effort to attract new firms to the area and encourage entrepreneurs and existing businesses to leverage the services provided via nDanville. These have included the Dan River Business Development Center, which is a nonprofit organization that seeks to "create an environment to enable entrepreneurs to succeed in establishing businesses and creating jobs in the Danville area."[559]

4.6.5 Assessment

The model employed by Danville to build its GON is mindful of the enormous costs associated with deploying such vast and complex infrastructure. That it has studiously avoided accruing debt and has been able to generate profits is notable. It is, however, too early to declare this GON a success or cite it as a model that other cities might adapt. The iterative nature of its deployment model runs the risk of ultimately undermining its ability to build out a citywide network, raising the possibility that its services will only be available in certain neighborhoods. Being able to pick and choose where it offers service provides it with embedded regulatory and competitive advantages over incumbent ISPs, many of whom have obligations to provide service to all households in a given area.[560]

Finally, nDanville's open access model is subject to much debate because, in the U.S. telecommunications context, many argue that this approach has repeatedly failed to generate excepted gains in competition and innovation.[561] In the broadband space in particular, there is little evidence this approach worked when open access was still required of DSL providers in the early 2000s.[562] In light of past failures, and recognizing the unique attributes of broadband service, the policy framework for broadband and other advanced communications services in the United States has been deliberately built around a preference for promoting facilities-based competition among ISPs.[563] The results to date (discussed in **section 3.1.1**) have been impressive and continue

555 *See, e.g.,* Intelligent Community, Founders Awards 2012, https://www.intelligentcommunity.org/index.php?src=gendocs&ref=Award_Founders&category=Events&link=Award_Founders.

556 *See Danville FY 2014 Adopted Budget Telecommunications Fund,* p. 17-1, (2014), *available at* http://www.danville-va.gov/documentcenter/view/9715.

557 Per a phone conversation with Jason Grey, Project Manager, nDanville.

558 *Danville Transforms its Economy.*

559 *See FY 2014 City Council Introductory Budget Summary*, at p. 4-72, Danville City Council, *available at* http://www.danville-va.gov/DocumentCenter/View/9335.

560 The practice of picking and choosing service areas is often referred to as "redlining." In the communications context, redlining is often avoided by contractual terms (e.g., franchise agreements that mandate universal service in a given territory), legislation (e.g., service obligations for telephone companies), or as a *quid pro quo* for receiving subsidies to provide service (e.g., in the case of the federal or state-level universal service funds). This issue has emerged in areas that are experimenting with hybrid approaches to bolstering broadband connectivity. Additional discussion is provided in section 6, *infra*. For a discussion of one recent example, *see* John McQuaid, *Will Poor People Get Google Fiber?*, April 13, 2013, Forbes.com, *available at* http://www.forbes.com/sites/johnmcquaid/2013/04/13/will-poor-people-get-google-fiber/.

561 For an extended discussion of how this approach failed in the market for basic telephone service, *see generally* Robert W. Crandall, Competition and Chaos: U.S. Telecommunications Since the 1996 Telecom Act (Brookings Press: Washington, D.C. 2005).

562 *Id.* at p. 127-129. *See also supra,* section 2.1, for additional discussion regarding the debate over open access policies in the early 2000s.

563 *See, e.g.,* George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *Competition After Unbundling: Entry, Industry Structure, and Convergence*, 59 Fed. Comm. L. J. 331 (2007) (providing an overview of this approach).

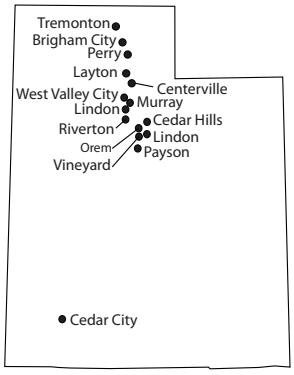
to accrue, fueling the debate over the ability of an open access approach to succeed over the long term, especially one funded in an ad hoc manner.

4.7 UTOPIA, Utah

The multi-city GON in Utah, dubbed UTOPIA, was initially seen as an ambitious attempt to marshal municipal resources in support of an open access FTTH network that would, eventually, deliver significant value to residents and business across every member city. For a number of reasons, UTOPIA has become financially problematic and has yet to deliver on many of the promises made by supporters prior to its launch.[564]

An emerging public-private partnership may eventually help to resurrect this network, but, thus far, the enormous costs of this network may overshadow any benefits that have emerged. As a result, UTOPIA offers a cautionary tale about municipal intervention into the broadband space. In April 2014, Macquarie expressed its desire to move forward with its plan to "build out the network, make it financially viable, assume the business risks and boost cash flow, ultimately retiring millions of dollars in public debt."[565] To do so, Macquarie proposed a "new utility fee on all residents of cities that opt into its plan. Estimated at $18 to $20 a month, the charge per household would apply even for residents who don't want its basic Internet service."[566]

UTOPIA, Utah At-A-Glance



Total Population of 15 Member Cities: 526,172 (2012)*

Year of Network Launch: 2008

Current Status: Partially Built

Number of subscribers: 8,240

Revenues: $11.7 million

Operating Expenses: $12.4 million

* Total Population 10 Cities Now Receiving Service: 441,334 (2012)

Note: Additional information on the UTOPIA network is contained in Table 1 and in Appendix I.

4.7.1 Background

In 2002, 16 cities in Utah agreed to jointly build a fiber-optic network, with 11 of the 16 cities pledging to finance the project through bond issuances.[567] The Utah Telecommunications Open Infrastructure Agency—UTOPIA—was formed to manage this endeavor.[568] In the following years, several of the member cities issued bonds to finance the project.[569]

564 Analyses of the failure of UTOPIA abound. *See, e.g.,* Steven Titch, *Despite Glossy Reports, Muni Broadband is Still a Net Loser*, May 6, 2013, Reason, *available at* http://reason.org/news/show/apr-2013-municipal-broadband; Andrew Moylan and Brent Mead, *Municipal Broadband: Wired to Waste*, at p. 11-12, NTU Policy Paper #129, National Taxpayers Union (April 9, 2012), *available at* http://www.ntu.org/news-and-issues/ntu-pp-128-municipal-broadband-wired-to-waste-1.pdf. Numerous other analyses are cited *infra.*

565 *See* Tony Semerad, *Australian firm proceeds with plan to take over struggling UTOPIA,* April 29, 2014, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/home3/57881464-200/network-macquarie-utopia-cities.html.csp.

566 *Id.*

567 *See* City of Orem, UTOPIA Information, http://orem.org/index.php/public-information/utopia-information.

568 UTOPIA was formed pursuant to Utah's Interlocal Cooperation Act. *See* Utah Code 11-13-101 et seq. *available at,* http://le.utah.gov/code/TITLE11/htm/11_13_010200.htm.

569 *See A Performance Audit of the Utah Telecommunication Open Infrastructure Agency*, at p. 2, Report to the Utah Legislature, No. 2012-08 (Aug. 2012), *available at* http://le.utah.gov/audit/12_08rpt.pdf ("*UTOPIA Audit*").

The initial deployment plan for UTOPIA, circa 2003, was ambitious. It consisted of a three-phase build-out that would be completed in three or four years.[570] In 2005, UTOPIA's board announced that the first phase had been a success—the network achieved "take rates high enough to meet business plan objectives."[571] Shortly thereafter, however, the GON stumbled and subsequently entered a downward trajectory.

In June 2006, the agency found out that its new network might qualify for additional financing through the Rural Utility Service (RUS), a federal agency that funds rural electric utility and telecommunications projects.[572] RUS ultimately agreed to provide UTOPIA with up to $66 million in debt financing if UTOPIA would prioritize network construction in rural cities with populations of less than 20,000 residents.[573] The agency accepted these terms and shifted its focus to bringing the network to its smaller member cities first.[574] The first installment of federal funds—$21 million in total—was released in 2007.[575] Soon thereafter, RUS suspended its support of UTOPIA until it "improved its financial condition and developed a new business plan."[576] As a result, UTOPIA spent several years attempting to resolve its dispute with RUS while also searching for additional funding to complete the network.[577] UTOPIA was able to obtain two rounds of refinancing via the creation of a sister program—the Utah Infrastructure Agency (UIA)[578]—which qualified for up to $65 million in debt financing.[579] In August 2010, UTOPIA obtained $16.2 million from the federally funded Recovery Act to help install fiber-optic lines directly to subscribing homes and businesses.[580]

UTOPIA has not met its goals for deployment and adoption. In 2007, UTOPIA made service available to 37,160 addresses, less than one-third of its original goal.[581] Moreover, the take-rate was disappointing as well. UTOPIA expected to have 49,350 subscribers in 2007, but only had 6,161.[582] By 2011, UTOPIA began to rely on payments from its newly formed affiliate, the UIA, to cover most of its annual operating deficit.[583]

4.7.2 Cost and Financing

The cost of UTOPIA has been very high: factoring in debt service and other payments, the total cost of the network approaches $500 million.[584] Of this, $185 million stems from long-term bond debt; the cost of the infrastructure itself was $110 million.[585] Construction delays and lack of consumer interest required the network to use a significant amount of its bond proceeds to service its debt ($48 million) and make up for operating deficiencies ($27 million).[586]

570 *Id*. at 6.
571 *Id*. at 7.
572 *Id.*
573 *Id*.
574 *Id*.
575 *Id*.
576 *Id*.
577 *Id.*
578 "The UIA is network is…connected to UTOPIA fiber optic network pursuant to an Indefeasible Right of Use Agreement between UIA and UTOPIA, which grants UIA access to certain facilities of and capacity in the UTOPIA network." *See Utah Infrastructure Agency Financial Statements—June 30, 2012*, at p. 2, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Dec. 13, 2012), *available at* http://emma.msrb.org/EP732731-EP568532-.pdf ("*Utah Infrastructure Agency Financial Statements—June 30, 2012*").
579 *Id*.
580 *See* Cathy McKitrick, *UTOPIA in Layton and Centerville Grows through Federal Funds*, Aug. 3, 2011, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/news/52290138-78/utopia-centerville-layton-fiber.html.csp.
581 *UTOPIA Audit* at p. 8.
582 *Id.*
583 *Utah Infrastructure Agency Financial Statements—June 30, 2012* at p. 8.
584 *See* Tony Semerad and Vince Horiuchi, *UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out?,* Dec. 3, 2012, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/news/55284692-78/utopia-network-fiber-west.html.csp ("*UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out*").
585 *UTOPIA Audit* at p. 11.
586 *Id.* at p. 13.

UTOPIA has liabilities that total at least $205 million.[587] This amount is expected to grow by $13 million each year that UTOPIA runs an operating deficit.[588] According to a state audit in 2012, UTOPIA had total net assets of negative $120 million.[589] Member cities are obligated to use taxpayer money to continue funding the network and servicing its debts until it is able to generate profits sufficient for these purposes.[590]

In December 2013, the financially troubled network announced an agreement with Macquarie Capital, a worldwide capital investment group, to work toward a public-private partnership.[591] Macquarie has invested in or advised on a number of public projects, including airports, roads, bridges, rail projects, sea ports, water and gas projects, and communications businesses in television, telephone, and radio.[592] It has a track record of bringing projects in on budget and on deadline.[593] The proposed partnership with UTOPIA hopes to complete deployment of the network infrastructure and increase its dwindling subscriber rate, while reducing costs.[594] Macquarie Capital will also assist with outside infusions of money, network design, buildout, finance and maintenance.[595]

The first stage of the partnerships entails an engineering and feasibility study to examine operational aspects of the current network and assess possible paths toward completion.[596] The ultimate goal is to develop a private-public partnership with any of the UTOPIA cities willing to participate, with Macquarie paying to build out network infrastructure and then operating it under a 30-year revenue-sharing contract.[597] The network will remain open access; Macquarie will partner with third-party service providers.[598] The member cities will continue to own the network and remain responsible for paying off the initial debt, while Macquarie Capital would be liable for any future debts.[599]

This emerging partnership is not without controversy. In the lead-up to the announcement, some 50 public officials from the network's member cities were required to sign non-disclosure agreements.[600] Many worry that this will undermine transparency, but UTOPIA's management believed that such discretion was needed to complete the deal.[601]

4.7.3 The Network

UTOPIA is owned and operated by the following member cities: West Valley City, Centerville, Murray, Lindon, Brigham City, Tremonton, Midvale, Orem, Payson, Perry, Layton, Cedar Hills, Cedar City, Vineyard, and Riverton.[602] The network is an open-access FTTH system, which means that UTOPIA "leases lines to private [ISPs] who deliver service to subscribers."[603]

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587 These encompass the $185 million in revenue bonds, nearly $16 million in notes to member cities, and $4.4 million in other liabilities. *Id*. at p. 10.
588 *Id*. at p. 12.
589 *Id.* at p. 9.
590 *Id*. at p. 11.
591 *See* Genelle Pugmire, *UTOPIA Announces Partnership with Private Capital Company*, Dec. 20, 2013, Daily Herald, *available at* http://www.heraldextra.com/news/local/central/orem/utopia-announces-partnership-with-private-capital-company/article_e364dbb4-6901-11e3-ad10-0019bb2963f4.html ("*UTOPIA Announces Partnership with Private Capital Company*").
592 *See* Vince Horiuchi & Tony Semerad, *Has Utah's UTOPIA network found a savior?*, Dec.19, 2013, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/money/57282051-79/macquarie-utopia-network-projects.html.csp.
593 *Id.*
594 *UTOPIA Announces Partnership with Private Capital Company.*
595 *Id.*
596 *Id.*
597 *Id.*
598 *Id.*
599 *Id.*
600 *See* Tim Gurrister, *UTOPIA Officials Bullish about Possible Major Partnership*, Nov. 30, 2013, Standard-Examiner, *available, at* http://www.standard.net/stories/2013/11/30/utopia-officials-bullish-about-possible-major-partnership ("*UTOPIA Officials Bullish*").
601 *See Our View: UTOPIA Dealings Must be in Open*, Nov. 18, 2013, Standard-Examiner, *available at* http://www.standard.net/stories/2013/11/15/our-view-utopia-dealings-must-be-open.
602 *See* UTOPIA, Board Members, http://www.utopianet.org/board-members.
603 *See* UTOPIA, About, http://www.utopianet.org/about-utopia/. Utah law requires public entities to offer municipally-owned broadband services on a wholesale basis. *See* Utah Code 10-18-101 et seq.

The network is partially operational and available to citizens of Brigham City, Centerville, Layton, Lindon, Midvale, Murray, Orem, Payson, Tremonton and West Valley City.[604] It intends to expand service to Cedar City, Cedar Hills, Perry, Riverton and Vineyard, but completion has been delayed by ongoing financial difficulties.[605] While the network is operating in many of its intended cities, it is still not 100 percent complete in any individual city; completion rates span from 0 percent in Perry to 96 percent in Brigham City and Tremonton.[606] Planners intended to pass through 141,000 addresses by September of 2007, but the network only passed 62,000 addresses as of June 2012, with 8,240 subscribers, or a 13 percent take rate, far below expectations.[607] UTOPIA had predicted it would have five times that amount by 2007.[608]

As an open access system, UTOPIA relies on local ISPs to provide customers with services. Some ISPs offer service only in one city, while some are systemwide. Brigham-net, for example, offers Internet, television, and telephone service only in Brigham City.[609] Customers can purchase a symmetrical 20 Mbps Internet connection for $34.95 per month and can upgrade to a 50 Mbps connection for an additional $5 per month.[610] A bundle including the 20 Mbps connection, television, and telephone costs $124.90.[611] Several other options are available depending on the city.[612] Several different ISPs offer 1 Gbps connections in select areas.[613] The cost ranges from $65 to $75 per month.[614]

UTOPIA continues to operate at a loss, as it has done since its launch over a decade ago.[615] The network's public-private partnership with Macquarie Capital may help alleviate these financial problems, but it cannot recover the system's high startup costs over the past decade.

4.7.4 Community Impact

Despite lofty aspirations about UTOPIA being a broadband utopia for residents and businesses,[616] there is broad agreement this GON has been a financial failure.[617] Criticism of this network has been sharp from residents, media outlets, and elected officials, some of whom were elected on anti-UTOPIA platforms. Brigham City Mayor Dennis Fife, who was elected in 2009 in part because of his criticism of the network, has repeatedly expressed disbelief that there is still support for the system after years of losses and hundreds of millions of dollars of debt.[618] There is a consensus that UTOPIA suffered from over-ambition, wasteful spending, poor planning, and ineffective leadership.

Citizens in particular have voiced criticism about the excessive and ongoing cost of a network that has yet to be fully built and is unable to generate enough revenue to service its debt and fund future deployments.[619] Citizens are particularly anxious about the financial state of UTOPIA because they are ultimately responsible for paying the bill. As discussed above, member cities are obligated to follow through on their pledges to provide sales tax revenue as security for their bonds.[620] This raises the possibility of tax hikes to cover these

604 *See* UTOPIA, FAQ, http://www.utopianet.org/faq/.
605 *Id.*
606 *UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out.*
607 *See Utah Telecommunication Open Infrastructure Agency, Financial Statements*, p. 2, June 20, 2012, UTOPIA, *available at* https://web.archive.org/web/20130203105656/http://utopianet.org/uploads/files/177_UTOPIA_Report_2012_-_Final.pdf.
608 *Id.*
609 *See* Brigham-net, Home, http://www.brigham.net/.
610 *See* Brigham-net, UTOPIA, http://www.brigham.net/utopia.htm.
611 *Id.*
612 *See* UTOPIA, Providers, http://www.utopianet.org/providers/.
613 *See UTOPIA Service Providers Reduce Price of Utah's Fastest Internet Connection,* Sept. 15, 2013, UTOPIA Net, *available at* http://www.utopianet.org/utopia-service-providers-reduce-price-of-utahs-fastest-internet-connection/.
614 *Id.*
615 *UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out.*
616 *See, e.g.,* Steven Cherry, *A Broadband Utopia,* April 28, 2006, IEEE Spectrum, *available at* http://spectrum.ieee.org/computing/networks/a-broadband-utopia ("*Broadband Utopia*").
617 *See, e.g., UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out* (highlighting discontent).
618 *UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out.*
619 *Utopia Audit* at p. 11.
620 *Id.*

costs or a costly default that could devastate some or all of the member cities. Another route, which Orem recently took, is to continue issuing bonds in the hope that the system can turn itself around and implement a profitable business model.[621]

Perhaps the most scathing criticism of UTOPIA was included in a 2012 audit prepared at the request of the Utah state legislature.[622] The analysis concluded that the network had not met any of its expectations, that bond proceeds were used wastefully, and that management had done a poor job of planning and executing.[623] The report stated, "We believe an underlying problem throughout UTOPIA's expansion is the lack of a carefully prepared development plan and policies to guide the construction of the network," and when the committee asked to see planning documents for UTOPIA's expansion, the "staff were unable to produce one."[624]

4.7.5 Assessment

To date, the failure of UTOPIA offers a number of important lessons for other cities now considering creating a GON. First, with regard to planning and managing expectations, the ambitious nature of the project led to a high-risk undertaking by local officials who were attracted by the promise of a FTTH network. The fanfare around this network, which was poised to be the largest of its kind when the project began, was fed by intense political pressure to deploy the network to every city at once.[625] This decision drove up costs without creating a single revenue-generating city network as a base to sustain future deployments.[626] As the network began to experience problems, this project stranded half-built infrastructure in some cities and left many others without anything to show for their investment.[627]

Second, and related, there was little effort to manage costs and adhere to a budget. Political pressure and the all-in mindset that drove UTOPIA from the start resulted in runaway costs that are now nearing a half-billion dollars. Initial concerns were countered by visions of using the new multi-city broadband network to encourage local economic development and transform these rural towns into competitive global hubs.[628] This has certainly not been the case as the network struggles to add subscribers.

In looking ahead to the future of UTOPIA, there continue to be different opinions as to the likelihood of future success. Some believe the network can be salvaged either by tweaking the business model[629] or continuing to build out in the hope more people will eventually subscribe and generate enough revenue to begin paying down debts.[630] The risk is that such determination to finish what has already been started will result in more debt, which in turn increases the likelihood of either a costly default or large tax hikes to continue servicing a mountain of debt.

UTOPIA's partnership with Macquarie Capital is a promising step toward getting the network on a more sustainable path and relieving taxpayers of future debt burdens. Nevertheless, the past, in the form of major debt loads and poor planning, weighs heavily on this network and may in due course lead to the conclusion that it failed to achieve its original ambitious objectives.

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621 *See* Emiley Morgan, *Orem Pledges $24M Bond to Fund UTOPIA Construction*, Feb. 28, 2013, Desert News, *available at* http://www.deseretnews.com/article/865574488/Orem-pledges-24M-bond-to-fund-UTOPIA-construction.html?pg=all ("*Orem Pledges*").
622 *See generally Utopia Audit.*
623 *Id.*
624 *Id.* at p. 24.
625 *Id.*
626 *Id.*
627 *Id.* at p. 16.
628 *See, e.g., Broadband Utopia; UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out.*
629 *See, e.g., Orem Pledges* (discussing a recent bond issuance by a member city and the negative response by residents).
630 *See, e.g., UTOPIA: Fiber-Optic Nirvana or a Nightmare with No Way Out* (quoting optimistic UTOPIA executives).

4.8 Groton, Connecticut

The government-owned broadband network deployed in Groton offers another example of a failed GON. Built amidst much acclaim and anticipation in the mid-2000s, the network quickly collapsed under the weight of soaring debt and tepid consumer demand. In early 2013, the city sold the system to private investors for $550,000, representing a loss of over $30 million. The city and its taxpayers remain responsible for more than $27 million in loans. This case study examines the motives that drove this GON's deployment and highlights the flawed assumptions that undergirded an unsuccessful financing plan and unrealistic business model.

Groton, Connecticut At-A-Glance

City Population: 40,115 (2010)

Year of Network Launch: 2004

Current Status: Built and Sold

Number of subscribers: NA

Revenues: NA

Operating Expenses: NA

Note: Additional information on the Groton network is contained in Table 1 and in Appendix I.

4.8.1 Background

The communications network that would eventually grow into a GON grew out of a strategic plan that the local utility, Groton Utilities, floated in 1999. As a result of declining revenues in its core business, the utility outlined a plan for constructing a 32-mile fiber-optic network, access to which would be sold on a wholesale basis to ISPs.[631] According to a company official, the initial impetus for this endeavor was to "make money" in an effort to offset sagging electricity revenues (at the time, the utility was also "developing plans to begin producing bottled water").[632] Later that year, residents approved a $6.9 million bond issue to support construction of the network.[633] The municipality prevailed in the legal challenges that followed,[634] and by the early 2000s it began to develop plans for deploying a hybrid fiber/cable network that would extend cable service to residents and thus compete directly in the market for broadband and television.[635]

Those who advocated for a municipal network in Groton were driven, in part, by local dissatisfaction with incumbent ISPs.[636] A survey commissioned by the state found that, of the 400 residents polled in the five towns that would be served by a municipal cable entity, 64 percent indicated they would be "very likely or likely" to

631 *See, e.g.,* Michael Costanza, *Groton Utilities Considering Telecommunications Service*, Oct. 22, 1999, The Day, *available at* http://news.google.com/newspapers?nid=1915&dat=19991022&id=QQchAAAAIBAJ&sjid=eXYFAAAAIBAJ&pg=5556,4321864 ("*Groton Utilities Considering Telecommunications Service*").

632 *Id.*

633 *See* Michael Costanza, *Groton City Backs Utilities' Proposal to Provide Telecommunications Service*, Nov. 2, 1999, The Day, *available at* http://news.google.com/newspapers?nid=1915&dat=19991102&id=RQohAAAAIBAJ&sjid=ynYFAAAAIBAJ&pg=4629,187783;

634 *See e.g.,* Tara Bahrampour, *Bid to Stop Groton,* June 5, 2001, N.Y. Times, *available at* http://www.nytimes.com/2001/06/05/nyregion/metro-business-briefing-bid-to-stop-groton.html (noting that "Southern New England Telecommunications has appealed an April ruling by the Department of Public Utility Control in Connecticut that would allow Groton Utilities to build a 32-mile fiber-optic network providing Internet access and other services in the Groton area.").

635 *See* Gladys Alcedo, *Hearing Planned On Proposal For New Cable Service*, March 11, 2003, The Day, *available at* http://www.theday.com/article/20030311/DAYARC/303119938/0/SEARCH ("*Hearing Planned*").

636 Competition in the U.S. video marketplace was still developing in the late 1990s and early 2000s. Satellite television service was becoming increasingly popular, but market entry by telephone companies had yet to materialize in any significant way. Of course, over the next decade, video choices would proliferate with the continued rise of satellite, the emergence of video services by telecom companies like Verizon and AT&T, and the rapid emergence of IP-enabled video. For additional discussion and analysis of this transformation, Compare *In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Eighth Annual Report, 17 FCC Rcd 1244, FCC 01-389 (rel. Jan. 14, 2002), with *In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Fifteenth Annual Report, 28 FCC Rcd 10496, FCC 13-99 (rel. July 22, 2013).

switch cable services "if a new competitor entered the market."[637] In response, incumbent firms argued against municipal entry by noting the many risks to taxpayers associated with owning and maintaining such a vast communications infrastructure.[638] The utility pressed ahead, and in 2003 the Groton City Council approved its plan. It authorized the formation of Thames Valley Communications (TVC), a city-owned taxable stock corporation, and approved a total of $6.9 million for the development of this new enterprise.[639] TVC was granted a franchise on January 1, 2004;[640] network construction began soon after, and parts of the network went live in May 2004.[641] Construction would stretch over the next few years.

4.8.2 Cost and Financing

The Groton GON was a costly venture for the city, its taxpayers, and its bondholders. Initial startup and construction costs totaled $16.9 million.[642] The city borrowed $34.5 million between 2006 and 2008 to build and expand the network.[643] This was substantially more—in terms of total dollars and total debt—than initially estimated by the city officials, who, in 2001, thought the entire network would cost "$25 million to $30 million, to be paid with operating revenue from the cable business."[644]

4.8.3 The Network

The network TVC eventually built was capable of delivering telephone, Internet, and cable service to residents and businesses in Groton, Gales Ferry, Stonington, and Pawcatuck.[645] From the beginning, some observers viewed the GON as financially unsustainable. It lost an average of $2 million a year while owing nearly $30 million in debt.[646] By 2012, the city decided to sell off the network to private investors. CTP Investors bid for, and eventually won, the right to purchase the GON for $550,000 in early 2013.[647] As a result of the sale, Groton Utilities will be required to pay off the remaining debt of $27.5 million via annual installments that began at $2.6 million and will decrease by about $100,000 each year over the next 14 years.[648]

The current, privately owned incarnation of TVC offers customers an array of standalone and bundled broadband, television, and telephone services.[649] Its broadband packages range from an asymmetrical 6.6 Mbps

637 *Hearing Planned.*
638 *See Editorial: City Utilities Goes Modern*, July 2, 2001, The Day, *available at* http://news.google.com/newspapers?id=C5tGAAAAIBAJ&sjid=7PgMAAAAIBAJ&pg=2445,251176&dq=groton+utilities+telecom+network+resident+vote+approve+1999&hl=en (endorsing the proposed GON but urging caution) ("*Editorial: City Utilities Goes Modern*").
639 *See City of Groton, Connecticut, General Obligation Bonds, Issues of 2006*, at p. 10, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Feb. 7, 2006), *available at* http://emma.msrb.org/MS244149-MS219457-MD427024.pdf ("*Groton General Obligation Bonds, Issues of 2006*").
640 *Id.*
641 *See Utilities Commission Meeting Minutes*, at p. 11, City of Groton (Nov. 23, 2004), *available at* http://www.cityofgroton.com/docs/minutes/ucommission/2004/ucommission11-23-04.pdf.
642 *Groton General Obligation Bonds, Issues of 2006* at p. 10.
643 *See, e.g.,* Deborah Straszheim, *Thames Valley Communications Transfers Ownership of Cable Company,* Feb. 2, 2013, Groton Patch, *available at* http://groton.patch.com/groups/politics-and-elections/p/thames-valley-communications-transfers-ownership-of-cbe9bb6eabc
644 *Hearing Planned.*
645 *See* Thames Valley Communications, About, http://www.tvcconnect.com/about-us.
646 *See, e.g.,* Greg Smith, *Groton Utilities' Venture Into Cable an Ambitious Idea that Didn't Pan Out,* Dec. 2, 2012, The Day, *available at* http://www.theday.com/article/20121202/NWS01/312029942/Groton-Utilities%27-venture-into-cable-an-ambitious-idea-that-didn%27t-pan-out ("*Ambitious Idea that Didn't Pan Out*").
647 *See* Greg Smith, *Original Bidder to Buy Groton Cable Company, but at Higher Price,* Jan. 15, 2013, The Day, *available at* http://www.theday.com/article/20130115/NWS01/130119838/1047.
648 *Id.*
649 *See* TVC, Rate Card, http://www.tvcconnect.com/wp-content/uploads/2013/11/RateCard.pdf.

connection for $29.99 per month, to an asymmetrical 55 Mbps connection for $59.99 per month.[650] As of 2012, TVC had 8,000 customers[651] across a service territory that covered at least 38,000 homes.[652]

4.8.4 Community Impact

Benefits that might have flowed from this GON have been overshadowed by the financial difficulties that have faced this network. It also appears that the network has not had a discernible impact on local employment. Groton's unemployment rate has been largely unchanged since deployment of the network and has generally tracked fluctuations in the national labor market.[653] Its relatively small subscriber base demonstrates the GON did not achieve one of its core goals: to compete directly with incumbent ISPs. On the contrary, the municipal system was weakened by the very competitive forces that the city thought were lacking.[654]

The large amount of debt accrued to build this system has had several negative impacts on residents. First and foremost, the town of Groton, even after selling off its failing asset, remains responsible for paying off tens of millions of dollars in debt. Due to the city's use of general obligation bonds, this onus falls directly on residents, either via increased taxes, fewer municipal services, or higher electricity rates.[655] Second and related, Groton's credit rating has been negatively impacted by the failed network. Moody's downgraded Groton's credit rating as a result of the failing municipal network,[656] and only after selling the GON to CTP was the city's credit outlook upgraded from "negative" to "stable."[657]

4.8.5 Assessment

The rise and fall of the GON in Groton highlights a number of assumptions often made by local officials and others who advocate in favor of municipal broadband deployment.

First, the size of the debt amassed by the city was driven up by the actions of city government and local utility officials, many of whom viewed the GON as a financial panacea that would be able to self-sustain and generate profits to help cross-subsidize other investments. As a result, the reasoning offered in support of the GON became a moving target. Initially, the GON was pitched as a wholesale network that would provide the utility with a new vehicle for making money to offset a decline in electricity revenues.[658] But the network eventually evolved into a commercial enterprise that would compete directly with incumbent ISPs. Such quixotic maneuvering drove up costs and greatly enhanced the risk exposure for residents, whose tax dollars were offered as collateral in exchange for the tens of millions of dollars in bond debt needed to fund deployment.

Second, expectations for the financial sustainability of the Groton GON appeared to be based on a small consumer survey undertaken in 2001, which found a majority of customers would consider switching cable providers if a competitor entered the market.[659] Such apparent pent-up demand for an alternative drove the development of a business plan largely hinged on the GON's ability to attract a substantial portion of these

650 *Id.*

651 Groton's annual report does not make clear which services these customers had purchased. *See Comprehensive Annual Financial Report, Fiscal Year Ending in 2012*, at p. iii, Dept. of Finance, City of Groton, Connecticut, *available at* http://emma.msrb.org/ER637248-ER493540-ER896400.pdf.

652 *Hearing Planned* (the 38,000 home estimate stems from a 2001 assessment by the city regarding the proposed GON).

653 *See* Groton, Connecticut Unemployment Rates, http://ycharts.com/indicators/groton_ct_unemployment_rate.

654 *See, e.g., Ambitious Idea that Didn't Pan Out.*

655 *Groton General Obligation Bonds, Issues of 2006* at p. 1.

656 *See Rating Action: Moody's Assigns Aa3 Rating to City of Groton's (CT) $23.2 million G.O. Bonds, Issue of 2013 Series A and B; Outlook Revised to Stable from Negative*, March 21, 2013, Moody's, *available at* https://www.moodys.com/research/Moodys-assigns-Aa3-rating-to-City-of-Grotons-CT-232--PR_269226 ("*Outlook Revised to Stable from Negative*"). *See also Rating Action: Moody's Downgrades the City of Groton's (CT) Long Term General Obligation Rating to Aa3 from Aa2; Negative Outlook Affirmed*, June 4, 2012, Moody's, *available at* https://www.moodys.com/research/Moodys-downgrades-the-City-of- Grotons-CT- long-term-general--PR_247614.

657 *Outlook Revised to Stable from Negative.*

658 *Groton Utilities Considering Telecommunications Service.*

659 *Hearing Planned.*

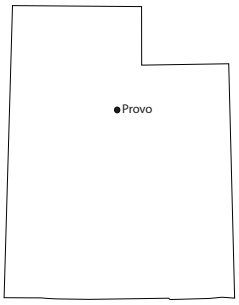
disillusioned customers and grow a subscriber base that would generate revenues sufficient to cover future deployments. Officials, however, failed to see the many risks inherent in this plan. An editorial in a local paper at the time identified these risks and called for caution: "… there is financial risk involved. Profits are not guaranteed, the business is competitive and market conditions can change dramatically in a short time."[660]

Third, the dynamism in the market proved prescient as the wider communications marketplace began to change in fundamental ways in the early and mid-2000s. Although competition in the market for video and broadband services might have been nascent in 2001, when the utility began to develop its plans for the GON, the advanced communications space began to proliferate in significant and profound ways shortly thereafter.[661] At the time, city officials and the utility were so focused on the promise of a municipal network that they failed to account for the rapid emergence of intermodal competition. Consequently, the resulting business model and the many predictions for success and viability were predicated on a static view of the market. But the marketplace and organic market forces soon addressed whatever shortcomings the city and utility were attempting to "fix" with its GON.

4.9 Provo, Utah

The GON in Provo, Utah, will forever be linked with Google, the company that purchased the municipal broadband network in 2013 for one dollar. Many now view the municipal broadband system in Provo as a failure that cost taxpayers about $60 million. After selling the system to Google, the city remains responsible for paying off nearly $40 million in debt over the next 12 years. In short, Provo joins the growing list of municipalities that have been forced to cut their losses, abandon their GON, and acknowledge their efforts to compete in the broadband sector did not live up to original expectations and ultimately proved costly to residents.

Provo, Utah At-A-Glance



City Population: 115,919 (2012)

Year of Network Launch: 2001

Current Status: Built and Sold

Number of subscribers: NA

Revenues: $570 K

Operating Expenses: $1.89 million

Note: Additional information on the Provo network is contained in Table 1 and in Appendix I.

4.9.1 Background

The roots of the FTTH municipal network that would eventually be deployed in Provo date back to 1998, when the city investigated whether and how it might construct a telecommunications system.[662] By 2001, the city successfully built a backbone network consisting of three fiber rings, which connected an array of municipal assets, including electric substations, city buildings, major traffic signals, and schools.[663] Thereafter, the city explored the feasibility of extending the network directly to residents and

660 *Editorial: City Utilities Goes Modern.*

661 For additional discussion and analysis, *see supra,* section 3.1.1.

662 *See The iProvo Timeline*, Apr. 21 2013, Daily Herald, *available at* http://www.heraldextra.com/news/local/central/provo/the-iprovo-timeline/article_92b618c2-3479-5125-bb89-96cd1e33b269.html ("*iProvo Timeline*").

663 *See City of Provo, Utah, $39,500,000 Sales Tax Revenue Bond, Series 2004 Taxable*, at p. 17, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Feb. 24, 2004), *available at* http://emma.msrb.org/MS217839-MS193147-MD374970.pdf ("*Provo $39,500,000 Sales Tax Revenue Bond, Series 2004*").

businesses.[664] Pressure from incumbent ISPs and state legislators, however, pushed city officials to shift their plan for the emerging GON to a wholesale model.[665]

In 2002, the city embarked on the second phase of building, a demonstration project that entailed the construction and operation of a wholesale FTTH network for 300 single-family houses and 30 apartment buildings.[666] The city partnered with retail providers to offer consumers television, telephone, and high-speed data services.[667] The City Council viewed this limited pilot as a success and voted to pursue the entire project in November 2003.[668] The next year, it agreed to issue $39.5 million in tax revenue bonds to finance the network, dubbed iProvo.[669] These funds would be used to build a fully fiber, open access network that would also be used for an array of internal purposes (e.g., control of traffic, electrical, and water systems; internal communication services).[670] The Council estimated that iProvo would be completed by 2006 and capable of generating a positive cash flow by 2008.[671]

The projected success of iProvo was tied directly to the ability of its primary ISP, HomeNet, to grow a robust subscriber base and generate revenues that could be used to cover the costs of building and maintaining the network. By 2005, less than a year after the network went live, HomeNet and iProvo began to run into trouble. In particular, HomeNet was only able to sign up 2,400 customers at its peak, and by 2005 it had lost one-third of them, dropping iProvo's subscribership to 1,600.[672] Consequently, HomeNet pulled out of its contract in July 2005[673] and filed for Chapter 11 bankruptcy protection.[674] This sent iProvo into a downward financial spiral where it was not gaining enough subscribers and revenues were down.[675] These troubles would only multiply over the next few years.

In 2006, low revenue and even lower subscriber rates forced iProvo to approach the city and request a loan of $1 million from its electricity reserve fund to cover costs for the next fiscal year.[676] The GON continued borrowing city funds throughout 2006 and 2007.[677] Subscriber and revenue growth, however, remained disappointing. In 2007, the network had initially expected it would be able to sign up an average of 60 subscribers per week; in reality, it was getting only 16.[678] By 2008, the year iProvo was supposed to be profitable, the network was on track to cost the city $2 million.[679]

It was becoming increasingly clear to the city that iProvo was unsustainable. The city was already investing millions of dollars annually to prop up the network[680] and was on track to lose more than $15 million in subsequent years if it continued to subsidize the GON.[681] As a result, the iProvo network was sold to a private

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664 *See* Steven Titch, *Spinning its Wheels: An Analysis of Lessons Learned from iProvo's First 18 Months of Municipal Broadband*, at p. 3, Reason Foundation (Dec. 2006), *available at* http://reason.org/files/33224c9b01e12f3b969f4257037c057e.pdf ("*Spinning its Wheels*").
665 *Id.*
666 *Id.*
667 *Id.*
668 *iProvo Timeline*.
669 *Provo $39,500,000 Sales Tax Revenue Bond, Series 2004* at p. 17.
670 *Id.*
671 *Spinning its Wheels* at p. 4.
672 *Id.* at p. 5.
673 *iProvo Timeline*.
674 *See* Tad Walch, *HomeNet Owes Provo and Other Creditors*, Feb. 3, 2006, Deseret News, *available at* http://www.deseretnews.com/article/635181385/HomeNet-owes-Provo-and-other-creditors.html?pg=all.
675 *See* John Twitchell, *Is iProvo in Trouble?*, July 12, 2005, Deseret News, *available at* http://www.deseretnews.com/article/600147949/Is-iProvo-in-trouble.html?pg=all.
676 *See* Steven Titch, *Provo Revisited: Another Year and Still Struggling*, at p. 3, Reason Foundation (April 2008), *available at* http://reason.org/files/33224c9b01e12f3b969f4257037c057e.pdf.
677 *Id.*
678 *See* Jens Dana, *Provo Eyes Ways to Fix its Network*, April 22, 2008, Deseret News, *available at* http://www.deseretnews.com/article/695272699/Provo-eyes-ways-to-fix-its-network.html?pg=all.
679 *Id.*
680 *See* Donald W. Meyers, *Veracity, OHIvey Offer Plans to Run iProvo*, May 6, 2011, Salt Lake Tribune, *available at* http://archive.sltrib.com/article.php?id=14941773&itype=storyID.
681 *See* Jens Dana, *iProvo, Broadweave Nearly Close Deal*, July 1, 2008, Desert News, *available at* http://www.deseretnews.com/article/700239528/iProvo-Broadweave-nearly-close-deal.html?pg=all.

company, Broadweave Networks, in May 2008 for $40.6 million.[682] As a condition of the sale, Broadweave agreed to pay off the $39.5 million bond that had been issued to build the GON.[683] But less than a year later, after merging with another company to form Veracity Networks,[684] the newly formed entity realized it could not build cash reserves, improve the network, or pay off lingering debt associated with the network.[685] Veracity asked the city to restructure the debt.[686] (To that point, Veracity had been drawing on a $6 million surety bond while it attempted to "save operating cash."[687]) In 2011, Veracity defaulted on its purchase agreement; control of the network reverted back to the city.[688] The city settled with Veracity and leased the network back to the company while it looked for a new buyer.[689] Also in 2011, the city "began charging $5.35 a month on residents' power bills to pay the bond payment."[690]

Like many problem GONs, Provo had a difficult time finding a buyer willing to purchase the network for the price of the assets, let alone the cost Provo paid to build the network. In April 2013, Provo finally found a buyer: the city sold the $40 million network to Google for one dollar.[691]

4.9.2 Cost and Financing

The FTTH GON in Provo was financed via a $39.5 million bond issue.[692] Beyond that, iProvo required about $2 million in subsidies from the city annually.[693] All told, additional taxpayer subsidization totaled $19.3 million.[694] The sale of the GON to Google does not remove the burden of debt from taxpayers. The city, and taxpayers by implication, are still responsible for the remaining debt on the original bond.[695] That works out to $3.3 million "in bond payments per year for the next 12 years."[696] In addition, the city of Provo will incur additional costs as a result of its deal with Google. It will have to not only retire the debt, but also "buy new equipment so it can operate city services independently from Google, and hire engineers to document the locations of all the fiber in the system."[697]

682 *See* Darren Murph, *Provo, Utah Sells iProvo Fiber-Optic Network to Broadweave,* May 9, 2008, Engadget, *available at* http://www.engadget.com/2008/05/09/provo-utah-sells-iprovo-fiber-optic-network-to-broadweave/.
683 *See Comprehensive Annual Financial Report, 2009, City of Provo, Utah*, *For the Fiscal Year Ended June 30, 2009,* at p. 9-10, Provo City, *available at* http://www.provo.org/userfiles/downloads/finance/cafrbook_2009.pdf.
684 *Id.*
685 *See* Donald W. Meyers, *Broadweave, Veracity Merge Companies, ask Provo to Restructure Payments*, Aug. 18, 2009, Salt Lake Tribune, *available at* http://archive.sltrib.com/article.php?id=13152591&itype=NGPSID.
686 *Id.*
687 *See* Donald W. Meyers, *Veracity Asks for More Time on Loan from Provo*, Sept. 2, 2009, Salt Lake Tribune, *available at* http://archive.sltrib.com/article.php?id=13255378&itype=NGPSID.
688 *See* Donald W. Meyers, *Provo Takes Back iProvo Network, Leases it to Veracity*, Apr. 18, 2012, Salt Lake Tribune, *available at* http://archive.sltrib.com/article.php?id=20654910&itype=storyID.
689 *Id.*
690 *See* Vince Horiuchi, *Provo Googled its Way out Fiber-Optic Network But Costs Live on*, June 3, 2013, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/money/56288307-79/network-iprovo-provo-google.html.csp.
691 *See* Angela Moscaritolo, *Report: Google Buying Provo Fiber Service for $1*, April 19, 2013, PC Magazine, *available at* http://www.pcmag.com/article2/0,2817,2417966,00.asp.
692 *Provo $39,500,000 Sales Tax Revenue Bond, Series 2004* at p. 17.
693 *See iProvo: A Requiem*, May 5, 2013, Utah Taxpayer's Association, *available at* http://www.utahtaxpayers.org/wp-content/uploads/2013/05/20-iProvo.pdf ("*iProvo: A Requiem*").
694 *Id.*
695 *See, e.g.,* Benjamin Wood, *Google Fiber Adds Value to Provo Network, But Taxpayer Debt Remains, Mayor Says*, April 18, 2013, Desert News, *available at* http://www.deseretnews.com/article/865578530/Google-Fiber-adds-value-to-Provo-network-but-taxpayer-debt-remains-mayor-says.html?pg=all.
696 *See* Vince Horiuchi, *Council Approves iProvo Sale to Google,* April 24, 2013, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/news/56206589-78/google-network-fiber-provo.html.csp.
697 *See Q&A With Mayor John Curtis, Provo, Utah*, at p. 40, Broadband Communities (May/June 2013), *available at* http://www.bbpmag.com/2013mags/may-june/BBC_May13_Q&AMayorCurtis.pdf.

4.9.3 The Network

The iProvo network in the city of Provo is operational but not entirely complete. The backbone has been deployed throughout the city, but only one-third of homes are connected to the network.[698] Under the city's management, subscription rates were much lower than anticipated.[699] At its peak, iProvo had about 11,000 subscribers, but churn rates were high.[700]

Prior to its sale to Google, iProvo offered triple-play packages to subscribers through contracted private ISPs. As an example of the services it offered, in 2004 HomeNet, iProvo's original retailer, offered several bundled packages of Internet access (up to 10 Mbps), cable telephone, and VoIP service, which ranged in price from $89.99 to $124.99 per month.[701] The services and pricing changed numerous times over the years as the network changed hands between public and private entities. Via Google Fiber, Google will offer subscribers free 5 Mbps service for a $30 activation fee; 1 Gbps connections will retail for $70 per month.[702] Google has no plans to offer services to businesses at this point in time.[703] But it has committed to providing "free Gigabit Internet service to 25 local public institutions like schools, hospitals, and libraries."[704]

4.9.4 Community Impact

In 2004, then-Mayor of Provo Lewis K. Billings enumerated the many benefits he foresaw for the fledgling FTTH network being in his city. These included "advanced telemedicine services," "interactive distance learning," "remote meter reading," and numerous other "things I can't even comprehend that will be enabled by the immense capacity of our network."[705] Nearly a decade later, few, if any, of these goals have been realized as the Provo GON transitions to yet another owner. Some have touted the benefits of gigabit connectivity in the city's schools, but there is little evidence that the network itself has generated tangible gains in outcomes.[706] Moreover, much of the excitement around educational technology in Provo schools seems to have stemmed more from the introduction of iPads than anything else.[707]

Over the course of its turbulent history, iProvo has been described as an example of government overreach. Residents, journalists, and elected officials alike have been critical of the GON. The Utah Taxpayers Association has characterized Provo's investment as a waste of taxpayer money. Early on, the group questioned, "Why is the city gambling with taxpayer money on a speculative venture when many private companies and cities have failed while attempting the same thing? Shouldn't we as taxpayers be able to vote before risking $40 million of OUR money?"[708]

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698 *See* Vince Horiuchi, *Provo Will be 3rd U.S. Metro Area to Get Speedy Google Fiber*, April 17, 2013, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/money/56168330-79/google-provo-network-fiber.html.csp.

699 *See, e.g.,* Jay Evenson, *Google Fiber Rescues Provo; What About UTOPIA?*, April 18, 2013, Deseret News, *available at* http://perspectivesonthenews.blogs.deseretnews.com/2013/04/18/google-fiber-rescues-provo-what-about-utopia.

700 *See* Jens Dana, *iProvo 'Surpassing Milestones'*, Sept 15, 2008, Deseret News, *available at* http://www.deseretnews.com/article/700258928/iProvo-surpassing-milestones.html?pg=all (reporting on subscription numbers); Jens Dana, *IProvo Experiencing 'Churn,'* Jan. 16, 2008, Desert News, *available at* http://www.deseretnews.com/article/695244527/IProvo-experiencing-churn.html?pg=all (reporting on customer cancellations).

701 *See* Chris Somerville, *HomeNet Launches TriplePlay on IProvo*, Dec. 10, 2004, Light Reading, *available at* http://www.lightreading.com/cable/homenet-launches-tripleplay-on-iprovo/240029971.

702 *iProvo: A Requiem*.

703 *Id*.

704 *See Google Fiber—On the Silicon Prairie, the Silicon Hills, and Now the Silicon Slopes*, April 17, 2013, Google Blog, *available at* http://googleblog.blogspot.com/2013/04/google-fiberon-silicon-prairie-silicon.html.

705 *See* Lewis K. Billings, *Benefits of a Community Broadband Network*, Oct. 11, 2004, Speech before the American Public Power Association Community Broadband Conference, *available at* http://www.provo.org/mayor.broadband.html.

706 *See, e.g.,* Mayor John Curtis, *What's the Latest on iProvo?,* July 27, 2011, Provo Insider, *available at* http://provomayor.com/2011/07/27/whats-the-latest-on-iprovo/.

707 *See* Genelle Pugmire, *Veracity Helps Provo Schools go High-Tech*, March 8, 2011, Daily Herald, *available at* http://www.heraldextra.com/news/local/central/provo/article_d38df969-a74b-5f8b-951d-9600e56fa587.html.

708 *See* Howard Stephenson, *UTOPIA Looks More and More Like a Rube Goldberg Cartoon*, Jan. 12, 2004, Utah Taxpayers Association, *available at* http://www.utahtaxpayers.org/?p=643.

Former Provo Mayor George Stewart, the mentor of the mayor who was responsible for launching iProvo, has been critical of his protégé and the network he built.[709] After a heated exchange during a City Council meeting, Stewart concluded that, "if I had been here two years ago, I would not have proposed iProvo." [710] The current mayor of Provo, John Curtis, has also been critical of the GON. He has been quoted as saying, "If I could, I would get a plot in the city cemetery and bury it. iProvo is gone, it was sold. I would never like to utter iProvo again."[711]

4.9.5 Assessment

The sale of iProvo to Google offers several insights that should inform ongoing debates over the efficacy of pursuing a municipal broadband network.

First, the sale to Google does little to erase the legacy of this municipal system. By 2013, iProvo had become a distressed asset that represented a failed foray into a competitive marketplace by the city government. The total cost of the network, estimated at around $60 million, may far outweigh any benefits that had accrued to the city up to that point.

Second, the sale of iProvo to Google is not the end of the story. Although the city and its mayor succeeded in its goal of selling the failing GON, Google was able to extract a favorable deal that might end up benefiting the company more than the residents it will serve. Google has committed to investing in upgrading the existing infrastructure to support gigabit connections and building out the network to all homes,[712] but it did not assume the nearly $40 million in debt that the city had previously tried to transfer on to its original private purchaser, Broadweave.[713]

The recent deal with Google requires Provo to spend upwards of $1.7 million on an array of items related to the transfer of ownership to Google.[714] Moreover, with much uncertainty surrounding Google's actual motivations for its small-scale gigabit fiber deployments, Provo residents could find themselves in another ambitious broadband experiment.[715]

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709 *See* Ace Stryker, *George Stewart: Man on a Mission*, Dec. 27, 2008, Daily Herald, *available at* http://www.heraldextra.com/news/local/george-stewart-man-on-a-mission/article_36913666-f18b-552d-b4f4-73a7b53056c4.html.

710 *See Off the Agenda: A Royal Rumpus: King George vs. Prince Lewis*, March 12, 2006, Salt Lake Tribune, *available at* http://archive.sltrib.com/printfriendly.php?id=3594292&itype=ngpsid.

711 *See* Genelle Pugmire, *Provo Mayor Gives Update on City's Economic Development, iProvo,* Oct. 1 2010, Herald Extra, *available at* http://www.heraldextra.com/news/local/article_e3ace13e-ea4f-51e4-a5d3-ad64adae91e6.html.

712 *See Google Fiber—On the Silicon Prairie, the Silicon Hills, and Now the Silicon Slopes*, April 17, 2013, Google Blog, *available at* http://googleblog.blogspot.com/2013/04/google-fiberon-silicon-prairie-silicon.html.

713 Cyrus Farviar, *Provo Doesn't Know Where its Fiber is, Google Makes City Spend $500,000 to Find It*, April 24, 2013, Ars Technica, *available at* http://arstechnica.com/business/2013/04/provo-doesnt-know-where-its-fiber-is-google-makes-city-spend-500000-to-find-i/.

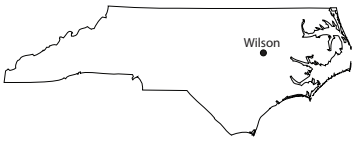
714 *Id.*

715 For an interesting analysis of possible motives, *see* Andres Cardenal, *Google Fiber: Unprofitable and Smart*, April 17, 2013, The Motley Fool, *available at* http://beta.fool.com/acardenal/2013/04/17/google-fiber-unprofitable-and-smart/31412/ (observing that "It´s essential for Google to make sure users will have access to the internet at a decent speed and a fair price, so they can actively use services like search and YouTube as much as they like, and Google gets to deliver more and better ads to that population…Not only that, every time someone uses one of Google´s services the company learns from that information and uses it to deliver better search results and more efficient advertising. Google needs us to be online as much as possible, both to make money by selling ads and to improve the quality of its services.").

4.10 Wilson, North Carolina

In April 2013, Wilson, North Carolina, became a "gig city."[716] After several years of competing with private ISPs in the market for Internet access, television, and telephone service, the city's GON was upgraded to a gigabit network in the expectation it would set a new standard for innovation and competition going forward. Today, the perceived success of the GON in Wilson is not clear-cut. Significant uncertainty surrounds many aspects of this network.

Wilson, North Carolina At-A-Glance



City Population: 49,610 (2012)

Year of Network Launch: 2008

Current Status: Built

Number of subscribers: 6,000

Revenues: $11.42 million

Operating Expenses: $11.42 million

Note: Additional information on the Wilson network is contained in Table 1 and in Appendix I.

4.10.1 Background

Beginning in the late 1980s, the city of Wilson, North Carolina, actively explored the possibility of entering the communications market as a service provider. In 1989, the city set aside $4 million to study the viability of creating or acquiring a cable company.[717] The primary motive of the city was to address what it saw as local discontent with the services offered by incumbents. In April 2001, Wilson took another step forward in its march toward a GON when it tried and failed to purchase outright the network of a local cable provider.[718] Later, Wilson sought to partner with incumbent ISPs in the construction of a FTTH network, but there was little interest in assuming the huge risks associated with building a network in the absence of any real demand.[719]

In November 2006, Wilson decided to go it alone. The City Council voted to authorize the issuance of $28 million in debt to build the FTTH network that city officials had long desired.[720] The network, dubbed Greenlight, began to connect some neighborhoods in 2008, and by 2009 the network went citywide.[721] As of January 2012, the network succeeded in passing 20,634 premises.[722] Later that year, the network began to expand into the surrounding county.

In response to concerns raised by a number of stakeholders, including incumbent ISPs, the state legislature passed a bill that sought to maintain a level playing field between public and private service providers (Wilson was exempt).[723] In particular, the bill, reflecting the enormous risk associated with such projects, required municipalities to hold hearings and a special election to approve projects, fund networks solely from revenues, and send a portion of revenues to the state's general fund.[724] The bill became law in May 2011.[725]

716 *See* Press Release, *City of Wilson to Offer Gigabit Internet Service to Customers by July*, April 19, 2013, GreenlightNC, *available at* http://www.greenlightnc.com/gigabit_press_release.php.
717 *See* Todd O'Boyle & Christopher Mitchell, *Carolina's Connected Community: Wilson Gives Greenlight to Fast Internet*, at p. 3, Common Cause and Institute of Local Self Reliance (Dec. 2012), *available at* http://www.ilsr.org/wp-content/uploads/2012/12/wilson-greenlight.pdf ("*Carolina's Connected Community*").
718 I*d*. at p. 1-2.
719 *Id*. at p. 2.
720 *Id*.
721 *Id*.
722 *See* Masha Zager, *Municipal FTTH Deployment Snapshot: Greenlight-Wilson, N.C.*, Broadband Communities Magazine (Jan. 2012), *available at* http://www.bbpmag.com/snapshot/snap0112.php.
723 *See An Act to Protect Jobs and Investment by Regulating Local Government Competition with Private Business*, H.B. 129, Feb. 21, 2011, *available at* http://www.ncga.state.nc.us/Sessions/2011/Bills/House/PDF/H129v3.pdf.
724 *Id.*
725 *See* Jim Barthold, *Governor Won't Sign Bill, So N.C. Broadband Restrictions Become Law*, May 23, 2011, Fierce Cable, *available at* http://www.fiercecable.com/story/governor-wont-sign-bill-so-nc-broadband-restrictions-become-law/2011-05-23.

4.10.2 Cost and Financing

Greenlight was largely funded through borrowing. In 2008, the City Council approved the issuance of $33,710,000 worth of certificates of participation (COPs).[726] COPs are typically used in lieu of bonds in an effort to circumvent debt limits.[727] They are akin to revenue bonds.[728] Debt from these certificates was payable from 2009 to 2033 at interest rates of between three and five percent (depending on the year).[729] The COPs are secured by a lease on the network's equipment; in the event of default, creditors can foreclose on the secured properties.[730] The city borrowed an additional $4.75 million from Wells Fargo in 2010.[731]

Operating expenses for the network are high. In 2013, Greenlight's total cost of operations was about $11,420,000.[732]

4.10.3 The Network

The Greenlight FTTH network is owned and operated by the city of Wilson, North Carolina.[733] It is operational and continues to expand.[734] The cost of continued construction is about $1,237,176 annually.[735] The network is not permitted to expand service or infrastructure beyond the Wilson county line.[736] Greenlight also offers an open Wi-Fi network in some parts of the city.[737] As of 2012, Greenlight amassed nearly 6,000 customers,[738] representing about 30 percent of the Wilson market.[739] Of these 6,000 customers, about 5,400 subscribe to some form of broadband services.[740]

Greenlight offers broadband, television, and telephone services, which can be purchased separately or in a bundle.[741] Bundled plans range in cost from $102.95 per month to $160.90 per month; all bundles come with a symmetrical 20 Mbps Internet connection.[742] As a stand-alone service, a symmetrical 20 Mbps broadband connection can be purchased for $39.95 a month, while a symmetrical 1 Gbps connection costs $154.95 per month.[743]

Greenlight's overall financial viability remains in question. While there is some evidence that the network is profitable,[744] operating revenues have not yet surpassed operating expenses.[745] Debt servicing and asset

726 *See generally Wilson, North Carolina, Certificates of Participation Series 2008*, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (May 1, 2008), *available at* http://emma.msrb.org/MS273964-MS271292-MD541860.pdf ("*Wilson Certificates of Participation Series 2008*").
727 COPs are defined as "A type of financing where an investor purchases a share of the lease revenues of a program rather than the bond being secured by those revenues." *See* Investopedia, Certificate of Participation, http://www.investopedia.com/terms/c/certificateofparticipation.asp.
728 *See, e.g.,* Christopher Mitchell & Todd O'Boyle, *Wilson Gives the Greenlight to Fast Internet*, at p. 50, Broadband Communities (Jan./Feb. 2013), *available at* http://www.bbpmag.com/2013mags/jan-feb/BBC_Jan13_Greenlight.pdf ("*Wilson Gives the Greenlight to Fast Internet*").
729 *Wilson Certificates of Participation Series 2008.*
730 *Id.* at p. 19.
731 *Carolina's Connected Community* at p. 8.
732 Per an email from Kim Hands, Director of Finance, Wilson, NC.
733 *See* Wilson Greenlight, FAQ, http://www.wilsonnc.org/living/fiberopticnetwork/greenlightfaq/.
734 *Carolina's Connected Community* at p. 16.
735 *See Comprehensive Annual Financial Report*, at p. 11, Wilson, North Carolina (June 30, 2012), *available at* http://www.wilsonnc.org/attachments/pages/597/Complete%20CAFR%20Report%202012.pdf ("*Comprehensive Annual Financial Report—Wilson*").
736 *Carolina's Connected Community* at p. 16.
737 *See, e.g.,* Wilson, Greenlight—About, http://www.wilsonnc.org/departments/greenlightITS/.
738 *Comprehensive Annual Financial Report—Wilson* at p. 253.
739 *Carolina's Connected Community* at p. 9.
740 *Id.*
741 *See* Greenlight, Packages, http://greenlightnc.com/packages/.
742 *Id.*
743 *See* Greenlight, About: Internet, http://greenlightnc.com/about/internet/.
744 *See, e.g., Carolina's Connected Community* at p. 9.
745 Email from Kim Hands, Director of Finance, Wilson, NC. Operating expenses do not include payments related to debt service, taxes, or other such expenses that arise as a result of operating a business.

depreciation, coupled with higher than expected expenses, may impact on its long-term sustainability.[746] In 2012, the network had an operating loss of $220,956.[747]

4.10.4 Community Impact

Local officials and GONs proponents assert that the primary benefit of the Greenlight network has been its ability to impose price discipline on incumbent ISPs.[748] Proponents have also asserted the city's entrance into the marketplace spurred incumbents to upgrade their networks in an effort to compete with Greenlight's speeds.[749] Additional benefits cited by supporters include using the GON to support a more robust security camera network throughout the city and serving as another community asset to lure new businesses.[750]

Claims about spurring competition should be evaluated in view of the larger dynamics at play in the broadband space. As discussed in **section 3.1,** the long-term trend in the U.S. broadband market has been toward faster speeds, lower prices, and more robust intermodal competition as consumers embrace mobile alternatives. Moreover, as has been observed in other contexts (e.g., Monticello), local governments have shown limited capability to engage in sustainable competition with private-sector firms.[751] Even if a GON does help to spur price adjustments among ISPs in the short-term, the pace and intensity of subsequent competition may tend to outstrip the ability of a local government to keep up in the long run.

The impact of Greenlight on local economic development is unclear at this point. The unemployment rate in Wilson County, for which Wilson city serves as the seat, has risen steadily in recent years (it was 9 percent in December 2013) and continues to be above statewide and national averages.[752] In addition, Wilson's leading employers tend to be manufacturing firms, which typically do not require gigabit broadband to operate.[753] If Wilson intends to use Greenlight to diversify its local economy (e.g., by attempting to shift it to become more technology-focused), it is likely to face numerous barriers on the demand side of the connectivity equation.

4.10.5 Assessment

Despite a number of perceived positive impacts, there is much uncertainty about the future of this GON. The debt structure of Greenlight is troubling. It has been asserted that Wilson's use of COPs was acknowledgment that the municipality was intentionally circumventing state law and the will of local residents. Article 5, section 4 of North Carolina's state constitution prohibits local governments from "contract[ing] debts secured by a pledge of its faith and credit unless approved by a majority of the qualified voters of the unit who vote thereon."[754] Greenlight's financing model was not approved by a referendum. It was, as discussed above, initiated by a City Council vote. In addition, the use of COPs has done little to mitigate the risk for taxpayers. The COP agreement states that if revenue derived from the network is not enough to make payments, the city will use taxpayer money from the city's general fund to cover those obligations.[755]

Perhaps more important is that this GON was built in an area with low consumer demand for and use of broadband. Deploying a broadband network in such an area not only jeopardizes the ability of the system

746 *Comprehensive Annual Financial Report* at p. 11.
747 *Id.* at 24.
748 *See, e.g., Wilson Gives Greenlight To Fast Internet* at p. 52.
749 *Id.*
750 *See, e.g.,* Lisa Gonzalez, *Wilson's Greenlight Getting the Publicity It Deserves*, July 24, 2013, Community Broadband Networks, Institute for Local Self-Reliance, *available at* http://www.muninetworks.org/content/wilsons-greenlight-getting-publicity-it-deserves.
751 *See supra,* section 4.4, for additional discussion.
752 *See Unemployment Rate in Wilson County, NC,* Federal Reserve Bank of St. Louis (July 30, 2013), *available at* http://research.stlouisfed.org/fred2/series/NCWILS0URN.
753 *See, e.g., Table 3: Major Employers*, Wilson Economic Development Council, *available at* http://www.wilsonedc.com/wp-content/uploads/2011/04/Wilson_NC_Data_Standards_Table_3.pdf.
754 *See* Art. V, § 4, North Carolina Constitution, http://www.ncga.state.nc.us/legislation/constitution/ncconstitution.html.
755 *Wilson Certificates of Participation Series 2008* at p. 15.

to become profitable and self-sustaining, it also serves as another example of the seemingly myopic focus on supply side issues in the broadband space. As noted elsewhere, North Carolina is tied with Mississippi as the least connected state in the country.[756]

Some advocates, who argue that low adoption is the result of overly expensive and uncompetitive broadband in these states, have attempted to position GONs like Greenlight as possible effective approaches capable of driving down prices and thus increasing take-rates.[757] As discussed in **section 3.1.2,** this view of broadband adoption fails to account for the many nuances associated with bolstering connectivity in under-adopting areas. There is significant evidence to suggest that efforts focused on key demand side issues are capable of closing connectivity gaps in areas that are similar to Wilson.[758] In other words, a GON is unlikely to solve the connectivity crisis in Wilson or in North Carolina.

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756 *See, e.g.,* Christopher Mitchell & Todd O'Boyle, *At the Bottom of the Broadband Barrel*, Jan. 28, 2013, News Observer, *available at* http://www.newsobserver.com/2013/01/28/2639486/at-the-bottom-of-the-broadband.html.

757 *Id*.

758 Numerous examples are provided in section 6, *infra.* However, one leading example of a successful public-private approach to bolstering broadband connectivity in rural and poorer areas is ConnectKentucky. For an overview, *see* Ann Carrns, *Faster and Stronger*, July 28, 2008, Wall St. Journal (describing the program as working "to expand the availability and use of broadband Internet connections in the state's rural areas." Moreover, "According to ConnectKentucky, [as of July 2008] 95% of the state's households can… buy high-speed Internet service, up from 60% in 2004. ConnectKentucky's efforts, funded 90% by the state and 10% by private businesses and foundations, show how public-private partnerships, as well as a willingness by local governments to work with less-established telecommunications providers, can drive increased access to high-speed Internet service and spur economic development.").

5 Conclusions About the Efficacy of GONs in the United States

The case studies in **section 4,** coupled with quantitative and qualitative analyses included in **sections 2 and 3,** support a range of conclusions about GONs in the United States. The following findings expand on these conclusions by tying together the data and observations from previous sections. Taken together, these findings make a strong case for approaching GONs proposals with skepticism.

Findings About GONs

Finding One: Failed and failing GONs offer much-needed perspective about the complexities and challenges associated with building and deploying advanced communications networks.

Finding Two: Many GONs raise fundamental concerns regarding sustainability, fair competition, and consumer welfare.

Finding Three: Calls for achieving subjective speed benchmarks should not supplant actual consumer demand as the primary driving force shaping the broadband ecosystem.

Finding Four: The direct economic impact of GONs, especially around job creation, is difficult to measure given the many other contributing factors.

Finding Five: Governments are not well-equipped to compete in dynamic markets.

Finding Six: The substantial costs of building, maintaining, and operating GONs mitigate perceived benefits.

Finding Seven: Pursuit of a GON often diverts scarce public resources from more pressing priorities.

Finding Eight: A GON will not spawn the next Silicon Valley.

Finding Nine: GONs are not remedies for perceived or actual broadband connectivity challenges.

Finding Ten: State-level policy makers have important roles to play in the GONs context.

5.1 Finding One: Failed and failing GONs offer much-needed perspective about the complexities and challenges associated with building and deploying advanced communications networks.

For policy makers considering whether to pursue a GON, the failed and failing GONs offer a more instructive perspective about the complexities and challenges of building and deploying advanced communications networks than the apparent successes do.

First, municipal networks viewed as successful generally had their genesis in unique circumstances that are extremely difficult to replicate. The gigabit network in Chattanooga, for example, benefited immensely from a

one-time $111 million federal grant that was part of a much larger policy response to the Great Recession.[759] This allocation, which was substantially larger on a per capita basis than any other smart grid-related grant made by the federal government, enabled the municipal utility to "build its [fiber-optic communications] system in three years instead of 10."[760] Similarly, the GON in Bristol, Virginia, benefited from the infusion of tens of millions of dollars in grants from the state's Tobacco Commission. In addition, historically low interest rates enabled some municipalities to either refinance outstanding GON debt or issue new bonds with even lower rates.[761] These conditions are unlikely to persist over the long term: interest rates, even on municipal bonds, are expected to begin rising soon,[762] and public funding of all kinds is likely to be cut back substantially in response to calls for deficit reduction and balancing budgets.[763]

Second, many initial successes have not endured. Thus, using a particular municipal broadband project as a model for other cities to replicate should be undertaken with caution. As discussed in **section 2,** municipal Wi-Fi advocates immediately pointed to troubled projects in cities like Philadelphia when making the case for similar projects in other cities. Many of these networks failed, though, either in the near term (e.g., as in Philadelphia and Orlando) or over the long term (e.g., a city Wi-Fi network in Seattle, Washington, was shut down in 2012; policy makers in Riverside, California, are seriously considering cancelling its municipal service[764]). Similar enthusiasm abounded during initial deployment of GONs that eventually faltered in places like Burlington, Vermont;[765] Dunnellon, Florida;[766] Monticello, Minnesota;[767] Quincy, Florida;[768] and the many cities that make up the UTOPIA consortium.[769] Some of these systems were seen as strong evidence that "communities can build a telecommunications network to provide better services at a lower cost while

759 *See supra,* section 4.1, for additional discussion. *See also* Brian Fung, *How Chattanooga Beat Google Fiber by Half a Decade*, Sept. 17, 2013, The Switch, Wash. Post, *available at* http://www.washingtonpost.com/blogs/the-switch/wp/2013/09/17/how-chattanooga-beat-google-fiber-by-half-a-decade/.

760 *See Smart Grid Grant Catapults City into Lead Position*, Nov. 30, 2009, Times Free Press, *available at* http://www.timesfreepress.com/news/2009/nov/30/smart-grid-grant-catapults-city-lead-position/.

761 For an overview of general municipal bond activity in the wake of the Great Recession, *see Understanding the Great Recession's Impact on City Bond Issuances*, Issue Brief, American Cities Project, Pew Charitable Trusts (Aug. 2013), *available at* http://www.pewstates.org/uploadedFiles/PCS_Assets/2013/Municipal_Bonds_Report_Final.PDF.

762 *See, e.g.,* Martin Feldstein, *The Rise and Rise of U.S. Interest Rates*, Sept. 9, 2013, Business Standard, *available at* http://www.business-standard.com/article/opinion/martin-feldstein-the-rise-and-rise-of-us-interest-rates-113090900893_1.html (discussing likely rises in interest rates over the short and long terms); Lisa Lambert, *Talk of Interest Rate Rise Rocks U.S. Municipal Bond Market*, June 20, 2013, Reuters, *available at* http://www.reuters.com/article/2013/06/20/us-markets-municipals-idUSBRE95J19S20130620 (reporting on the relationship between higher interest rates and declines in the municipal bond market).

763 *See supra,* section 3.2.1, for additional discussion and analysis regarding the many pressures on public funding.

764 *See, e.g.,* Brier Dudley, *Seattle Pulls Plug on its Broadband Network*, May 6, 2012, Seattle Times, *available at* http://seattletimes.com/html/businesstechnology/2018149915_brier07.html (describing the city's many failed attempts to construct and support municipally-owned broadband networks, including its Wi-Fi system); Alicia Robinson, *Riverside: Citywide Wireless Internet Service Could End*, Sept. 4, 2013, The Press-Enterprise, *available at* http://www.pe.com/local-news/riverside-county/riverside/riverside-headlines-index/20130904-riverside-citywide-wireless-internet-service-could-end.ece (noting that the city is looking to cancel the service to save money); Colin Wood, *Muni Wi-Fi: Another One Bites the Dust?,* Feb. 4, 2014, GovTech.com, *available at* http://www.govtech.com/network/Muni-Wi-Fi-Another-One-Bites-the-Dust.html (reporting on further discussions around winding down the municipal wireless network).

765 *See, e.g., The Promise of Municipal Broadband.*

766 *See, e.g.,* Lisa Gonzalez, *Dunnellon, Florida's Fiber Dreams Now a Reality,* Aug. 8, 2012, MuniNetworks.org, *available at* http://www.muninetworks.org/content/dunnellon-floridas-fiber-dreams-now-reality (noting that the city was finally moving ahead with plans to "invest in its own fiber network to spur economic development and provide the services Comcast and AT&T considered unprofitable in the rural area."). *Cf. Editorial: Dunnellon's Disastrous Deal*, Oct. 29, 2013, Ocala Star Banner, *available at* http://www.ocala.com/article/2013131029665 ("Greenlight [the name of the city's GON] has only attracted 500 customers, not the 1,700 needed for profitability. Last Wednesday night, the City Council voted to sell Greenlight for $1 million to Florida Cable Inc., a company that operates systems in 17 counties. Mayor Nathan Whitt said before the meeting, "Our goal is to get out of this as quickly as we can. It's crucial to stop the bleeding" — the bleeding being the $60,000 a month Greenlight has been costing the city…But the bleeding is far from stopped. The city must still deal with $7 million in debt, a monumental task for a city of 1,700 people with an annual municipal operating budget this year of $3.1 million.").

767 *See, e.g.,* Tom Meersman, *Monticello's Model Broadband Effort in Peril*, June 7, 2012, Star Tribune, *available at* http://www.startribune.com/local/west/157992065.html (noting that the GON in Monticello was "once seen as a national model" for other municipal broadband projects).

768 *See infra,* section 5.10, for additional discussion.

769 *See, e.g., Broadband Utopia.*

raising revenue."[770] And it appears that support for these systems as possible models for other cities interested in pursuing a GON has persisted even after it became clear these networks failed or were beginning to fail.[771]

Third, for policy making purposes, it is notable that many of the reasons for failure tend to be similar. As discussed in **section 4.1,** many GONs have been plagued with high levels of debt and low levels of consumer demand for and use of municipal broadband services. These two core factors undermine many municipal broadband networks. Such was the case in Groton, Provo, UTOPIA, Dunnellon, Quincy, Monticello, and numerous other cities. These problems were compounded by the local government's general inability to keep pace with other ISPs in the broadband market.[772]

For local and state policy makers considering a municipal network, the experiences of other GONs should be critically examined. Two fundamental questions to ask are—

- Is a success an "enduring" success that can inform future projects?
- Was the success a function of unique factors that cannot be easily replicated?

A healthy degree of skepticism is warranted because, throughout the history of GONs in the United States, proponents have argued that municipal broadband has been fruitful even though there is significant evidence pointing to problems, financial and implementation, encountered by many jurisdictions undertaking a GON.[773]

5.2 Finding Two: Many GONs raise fundamental concerns regarding sustainability, fair competition, and consumer welfare.

The prevailing narrative advanced by supporters of government-owned broadband networks is in large part based on ideas about local self-reliance and a desire to radically reformulate the traditional market-based model of providing Internet access.[774] The rationale is that municipal broadband networks are more attuned to local needs and thus able to achieve specific local goals.[775] But contrary to these assertions, the fact is that many GONs actually arise from "mission creep" of local utilities.

More specifically, many municipal broadband projects represent extensions of existing communications networks built for the exclusive use of municipal utilities. Of the 10 GONs profiled, networks in seven cities—Chattanooga, Bristol, Lafayette, Cedar Falls, Danville, Groton, and Provo—grew out of communications infrastructure (e.g., fiber rings) installed to enhance specific utility functions (e.g., connect electrical substations).[776]

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770 *Burlington Telecom Profits from Fiber* at p. 81.

771 *See, e.g., Burlington Telecom Fact Sheet*, at p. 3, Institute for Local-Self-Reliance (updated: April 2010), *available at* http://www.ilsr.org/wp-content/uploads/files/btfacts.pdf (touting meager cost savings generated by Burlington Telecom despite mounting evidence that the GON was failing due to mismanagement and low levels of consumer demand for and adoption of the service); Christopher Mitchell, *Provo's Publicly Owned Broadband Network Attracts 98 Jobs,* July 13, 2012, Community Broadband Networks, *available at* http://www.muninetworks.org/content/provos-publicly-owned-broadband-network-attracts-98-jobs (arguing that, despite clear evidence that the GON in Provo was a failure, it "Nonetheless [is] making positive contributions to the community"); *Monticello Moves Closer to Settlement with Bondholders* (expressing continued support for the GON in Monticello even after the municipality was unable to make a series of bond payments); Chris Mitchell, *Monticello Fiber Price War Offers Key Lessons for Broadband Competition,* Sept. 19, 2013, Community Broadband Networks, Institute for Local Self-Reliance, *available* http://www.muninetworks.org/content/monticello-fiber-price-war-offers-key-lessons-broadband-competition (trying to make the argument that, "…whatever [the Monticello] network may end up costing city taxpayers, it will likely be less than the savings from all of these lower prices and indirect benefits such as not losing employers that could not be competitive when only having last-generation Internet access from unreliable DSL. That doesn't help the City to make its debt payments, but it sure makes Monticello a better place to live.").

772 *See infra,* section 5.5, for additional discussion.

773 *See, e.g.,* Brian Heaton, *Local Governments Pursue Independent Broadband Despite Challenges,* Nov. 21, 2012, Governing, *available at* http://www.governing.com/blogs/view/gov-local-governments-pursue-independent-broadband.html (discussing how some who support GONs are reframing their advocacy in light of recent municipal broadband network failures) ("*Local Governments Pursue Independent Broadband Despite Challenges*").

774 *See supra,* section 2, for additional discussion. *See also Evaluating the Rationales for Government-Owned Broadband Networks* at p. 9-17 (evaluating and rebutting these and other rationales advanced by GONs supporters).

775 *See, e.g.,* Craig Settles, *Building the Gigabit City*, Ch. 3 (2013), *available at* https://www.smashwords.com/books/download/313806/1/latest/0/0/building-the-gigabit-city.pdf (discussing these and related motivations) ("*Building the Gigabit City*").

776 *See supra,* sections 4.1—4.10, for additional discussion.

Numerous others, including existing networks in Burlington, Vermont,[777] and Chanute, Kansas,[778] as well as a recently approved GON in Longmont, Colorado,[779] have followed or will follow this model. In addition to undermining several core aspects of GONs advocacy, such "mission creep" by local utilities raises a number of concerns regarding sustainability, fair competition, and consumer welfare.

With regard to sustainability, local governments and municipal utilities have poor track records vis-à-vis responding to consumer demand, which bodes poorly for the long-term prospects of any venture in such a dynamic space.[780] Equally important, utilities generally have had limited success with realizing positive returns on investment in new technologies, especially advanced communications services meant to enhance their operations. For example, over the last several decades, utilities of all sizes invested billions of dollars in deploying communications networks and services that have done little to actually drive down rates or strengthen the electric grid.[781] The fact that many utilities have sought to extend these networks for commercial purposes underscores the extent to which these tools have been underused.

Regarding competition policy generally, local utilities that extend proprietary communications networks for commercial purposes have a number of potentially unfair advantages over private service providers. Utilities in some states can explicitly cross-subsidize their communications division with revenues derived from their electric business or implicitly accomplish this via low-interest or interest free inter-divisional loans.[782] In other instances, municipally owned utilities that have deployed GONs have received generous support from local government to prop up networks that might fail on their own. Some combination of these methods has been used in numerous instances, including in Chattanooga,[783] Lafayette,[784] Cedar Falls,[785] Provo,[786] and Burlington,[787] among many others. Such practices are concerning because many operate more as a hidden tax on all residents and businesses than as one-off subsidies aimed at achieving discrete goals (e.g., encouraging economic development).

In sum, there is a wide gap between the rhetoric of many GONs advocates and the details of these networks' actual construction. In many instances, municipal utilities often see these systems as a new line of business, not as a symbol of local self-reliance. Moreover, as regulated monopolists, municipal utilities operate according to a distinct set of incentives relative to private firms in this space, which informs their behavior in ways that, over the long term, tend to result in innovative stagnation and actions that are not always consumer-focused.[788]

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777 *See supra,* section 2.3, for additional discussion.

778 *See, e.g.,* Lisa Gonzalez & Christopher Mitchell, *Chanute's Gig*, at p. 1, Institute for Local Self-Reliance (Oct. 2012), *available at* http://www.ilsr.org/wp-content/uploads/2012/10/Chanute-Muni-BB.pdf.

779 *See Ballot Question 2B: Revenue Bond Funding for Broadband Fiber Optic Network Expansion Throughout Longmont*, Ballot Brochure, Election Day, Nov. 5, 2013, City of Longmont, Colorado, *available at* http://www.ci.longmont.co.us/lpc/TC/documents/ballotbrochure_web2.pdf. This measure was approved by a two-to-one margin. *See Final Official 2013 Coordinated Election Results for Boulder County, City of Longmont Ballot Question 2B*, Nov. 5, 2013, Boulder County, CO, *available at* http://webpubapps.bouldercounty.org/clerk/voterresults2013/IssueResults.aspx?issue=V36.

780 *See infra,* section 5.5, for additional discussion.

781 *See, e.g., Realizing the Smart Grid Imperative* at p. 9-10, 14-22 (discussing some of these services and observing that these investments have done little to bolster reliability or drive down the price of electricity in the U.S.).

782 Several states prohibit this type of cross-subsidization. These include Florida and North Carolina. *See, e.g., Wi-Fi Everywhere* at p. 1768-1769 (providing examples); Jeff Stricker, *Note: Casting a Wider 'Net: How and Why State Laws Restricting Municipal Broadband Networks Must be Modified*, 81 George Wash. L. Rev. 591, 615-616 (2013) (same).

783 *See supra,* section 4.1 (discussing the use of intra-utility loans in support of this GON).

784 *See, e.g., LUS Fiber on its Way to "Self-Sufficiency"*, May 20, 2013, KATC, *available at* http://www.katc.com/news/lus-fiber-on-it-s-way-to-self-sufficiency-/#_ ("Here's how it works: LUS Fiber, because it's a public entity does not pay taxes like private business. Instead, it makes payments to the Lafayette Utilities System. LUS then loans that money back to the fiber operation. It is that loan that helped LUS to be cash positive this year.").

785 *See supra,* section 4.5 (noting a loan from the electric division of the utility in support of the GON).

786 *See supra,* section 4.9 (noting loans from the city in support of this failed GON).

787 *See supra,* section 2.3 (discussing the controversy surrounding improper loans from the city in support of this failed GON).

788 *See, e.g., Realizing the Smart Grid Imperative.*

5.3 Finding Three: Calls for achieving subjective speed benchmarks should not supplant actual consumer demand as the primary driving force shaping the broadband ecosystem.

Calls for achieving subjective speed benchmarks, like universal gigabit broadband connectivity, should be carefully evaluated in the context of actual consumer demand for high-speed Internet access.[789] As noted throughout the case studies, the number of residents and businesses subscribing to gigabit broadband service in the "gig cities"—including Chattanooga, Bristol, Wilson, some of the UTOPIA cities, and Cedar Falls—remains low. More generally, there is scant evidence that such ultra-high-speed services are actually attractive to the vast majority of users, who, as noted in **section 3,** have demonstrated a clear preference for Internet connections in the 5-20 Mbps range.[790] In fact, even though more than half of the U.S. population has access to broadband connections in excess of 100 Mbps,[791] there were only 97,000 residential connections of 100 Mbps (downstream) or more in December 2012.[792] Take-rates for gigabit connections are even lower. By one estimate, there were only about 4,000 such connections in the United States in April 2013,[793] representing a tiny fraction of the nearly 215 million residential high-speed Internet connections in service across the country.[794]

To date, the supply of bandwidth and the speeds of Internet connections have been shaped by consumer demand and actual usage patterns.[795] Surveys measuring customer satisfaction generally confirm the vast majority of users are content with their current broadband connection's reliability and speed.[796] Moreover, there is no evidence demonstrating that ultra-high-speed connections are useful to the average consumer. Conversely, there is considerable skepticism about the extent to which average Internet users can benefit from super-fast connections.[797] Some who have used gigabit connections in the U.S. for example have reported that, in practice, they are "totally unnecessary."[798] Efforts to "max out" gigabit connections have mostly come up empty; even streaming multiple high-definition movies at once leaves significant bandwidth unused.[799] Part of the reason is that most other parts of the Internet ecosystem—from computing devices to routers and other aspects of the physical infrastructure—are incapable of processing such fast speeds, further underscoring that consumer demand has yet to justify enormous investments in upgrading to gigabit speeds.[800]

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789 *See supra,* section 2.3 (noting how GONs advocacy has shifted in recent years to embrace all-fiber gigabit broadband networks and evaluating the motives behind this reframing).

790 *See supra,* section 3.1.1 (observing trends in how consumers are embracing higher-speed Internet connections).

791 *See* National Broadband Map, Summarize: Nationwide (as of Dec. 31, 2012), http://www.broadbandmap.gov/summarize/nationwide.

792 *Internet Access Services: Status as of Dec. 31, 2012* at Table 11.

793 At the time, this was likely an over-estimate. *See* Stacey Higginbotham, *How Many People Have a Gigabit Connection? Fewer Than you Think*, April 23, 2013, GigaOm, *available at* http://gigaom.com/2013/04/23/how-many-people-have-a-gigabit-connection-fewer-than-you-think/ (reporting on data from Ookla and noting that "the numbers provided by Ookla actually measure customers with speeds of above 800 Mbps, which is what it classifies as a gigabit.")

794 *Internet Access Services: Status as of Dec. 31, 2012* at Table 11.

795 *See supra,* section 3.1.1, for additional discussion and supporting data.

796 *See, e.g., Broadband Satisfaction: What Consumers Report* (finding that 91 percent of consumers in 2010 were "very" or "somewhat" satisfied with the speed of their Internet connection); Press Release, *2012 U.S. Residential Internet Service Provider Satisfaction Study,* Oct. 15, 2012, J.D. Power, *available at* http://www.jdpower.com/content/press-release/ogrbZkU/2012-u-s-residential-internet-service-provider-satisfaction-study.htm (finding that customers are generally satisfied with their connections).

797 *See, e.g.,* David Talbot, *Not so Fast: A Google Fiber One-Gigabit Mystery,* Sept. 20, 2013, Tech. Review, *available at* http://www.technologyreview.com/view/519466/not-so-fast-a-google-fiber-1-gigabit-mystery/ ("But what's still far from clear is any of us need gigabit service, how many people are actually taking it, and whether they can do anything with it (after, say, the first 100 megabits, allowing plenty of room for multiple video streams and Wi-Fi losses inside the home).").

798 *See* Farhad Manjoo, *What Do You Do with the World's Fastest Internet Service?* March 12, 2013, Slate, *available at* http://www.slate.com/articles/technology/technology/2013/03/google_fiber_review_nobody_knows_what_to_do_with_the_world_s_fastest_internet.html?fb_ref=sm_fb_share_toolbar.

799 *Id.* ("To be sure, this was pretty cool. And yet it wasn't mind-blowing. Indeed, it felt a little underwhelming. After all, who needs to play five HD videos at the same time? If that's Google's best demo of its superfast service, what does it suggest about what regular people will do with it? What's more, the demo didn't even begin to approach the limits of Google Fiber—with five HD videos playing simultaneously there were still hundreds of megabits left on the pipe. When I got back home a few days later, I replicated the same test on my home broadband line and experienced only a few hiccups."). *See also* Cyrus Farivar, *Ars Asks: Help us Max Out Google Fiber*, Nov. 28, 2012, Ars Technica, *available at* http://arstechnica.com/business/2012/11/ars-asks-help-us-max-out-google-fiber/ ("*Help us Max Out Google Fiber*").

800 *Help us Max Out Google Fiber* ("In other words, so far, it seems like a gigabit connection really only gets close to such high speeds if you have something on the other end to serve it adequately and not throttle or otherwise slow it down.").

Ultimately, calls for achieving subjective speed benchmarks should not supplant actual consumer demand as the primary driving force of innovation in the broadband ecosystem. Such an unrelenting focus on speed obscures more practical assessments made by users, many of whom are focused on whether their connection allows them to accomplish what they want or need to accomplish.[801] Those dismissing the actual needs of consumers as a barrier to realizing amorphous goals around innovation and economic development appear to be more hubristic than futuristic in their thinking, rhetoric, and advocacy.[802]

5.4 Finding Four: The direct economic impact of GONs, especially around job creation, is difficult to measure given the many other contributing factors.

A leading rationale offered in support of GONs is that these networks will have significant, measurable, sustainable impacts on local economic development.[803] In the abstract, GONs advocates assert that municipal broadband networks are uniquely positioned to "help[] local businesses, not extract[] monopoly profits," generating economic gains that can be reaped locally.[804] Projected benefits tend to focus primarily around jobs—GONs are seen as a way to retain and grow local companies, attract new firms, and serve as the foundation for creating entire new industries from scratch.[805] More broadly, some see GONs, and gigabit networks generally, as essential to the long-term economic viability of the United States.[806] To date, there is little credible evidence to support any of these claims.

In many of the case studies—and in numerous other cities across the country that have deployed a GON—the economic gains attributed to a particular municipal network were rarely the result of the type of straightforward cause-and-effect depicted by advocates, i.e., that the mere presence of the network led to specific economic benefits. On the contrary, most benefits, to the extent that any manifested, tend to be the result of numerous other, non-technological factors (e.g., traditional economic incentives to relocate or launch a new business) that, together, subordinate the role the network played in realizing these gains.

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801 *See, e.g., Real Benefits of Gigabit Networks Have Nothing to Do with Speed* at p. 1 (noting that "Speed is but one of many broadband quality attributes" and that "no evidence yet suggests that slow speeds are a barrier to innovation").

802 This analysis is focused on individual consumer demand, which is typically measured at the household level. In other contexts, calls for ultra-high-speed broadband connectivity might be more practical. For example, there is growing support for increasing bandwidth to schools and libraries across the country. To date, even though most schools in the U.S. have broadband access, bandwidth per student is low. For these and many other reasons, the President and the FCC, along with school officials and others, have called for public-private efforts focused on improving broadband connectivity, digital literacy, and professional development resources in schools across the country. For an overview of relevant proceedings and analyses, *see* Press Release, *President Obama Unveils ConnectED Initiative to Bring America's Students into Digital Age*, June 6, 2013, The White House, *available at* http://www.whitehouse.gov/the-press-office/2013/06/06/president-obama-unveils-connected-initiative-bring-america-s-students-di (detailing ConnectED, the President's initiative to bolster broadband connectivity in schools); *In the Matter of Modernizing the E-Rate Program for Schools and Libraries,* Notice of Proposed Rulemaking, FCC 13-100, WC Docket 13-184 (rel. July 23, 2013) (proposing a range of changes to the federal E-rate program in an effort to provide more funding for broadband connections in schools and libraries); *The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs,* SETDA (2012), *available at* http://www.setda.org/wp-content/uploads/2013/09/Broadband_Trifold.pdf (calling for 1 gigabit per second per 1,000 students/staff in every school by 2018); Charles M. Davidson and Michael J. Santorelli, *The Impact of Broadband on Education,* a Report to the U.S. Chamber of Commerce (Dec. 2010), *available at* http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/ sites/169/2013/08/Davidson-Santorelli-The-Impact-of-Broadband-in-Education-December-2010-FINAL.pdf.

803 *See, e.g., Evaluating the Rationales for Government-Owned Broadband Networks* at p. 13-16; *Local Governments Pursue Independent Broadband Despite Challenges.*

804 *Community Broadband Creates Jobs.*

805 *Id. See also Local Governments Pursue Independent Broadband Despite Challenges* (encouraging GONs advocates and supporters to cite to potential economic development gains when promoting a municipal network); *Building the Gigabit City* at Ch. 16 (describing expected economic gains of gigabit GONs).

806 *See, e.g.,* The Politics of Abundance; Captive Audience. For additional discussion, *see supra*, sections 2.2, 2.3, and 3.1.1.

With regard to job creation, further analysis of employment data—including official data collected by the U.S. Bureau of Labor Statistics (BLS) and unofficial anecdotal data reported by municipal officials—yields a mixed to negative picture regarding the impacts of a GON on job creation in the "information" industries.[807]

- Officials in **Chattanooga** assert the gigabit GON there "created about 1,000 jobs in the last three years."[808] The cost of building the fiber network totals about $390 million, which means it cost the city upwards of $390,000 to "create" each job. Even assuming these data are accurate, the overall trend in job growth in Chattanooga's information industry has been mixed. According to BLS data, the total number of jobs in this sector decreased by 22.2% between 2010, when the GON launched, and 2013.[809]
- In **Lafayette**, a primary goal of the GON was to attract new businesses that would benefit from ultra-high-speed connectivity.[810] BLS data, however, demonstrate the GON did not meet this goal. In particular, employment in the information sector in Lafayette decreased by 24.2 percent between 2008 and 2013.[811]
- Similarly, in **Burlington**, BLS data indicate a 21.4 percent decrease in local information sector employment since 2008.[812]
- In **Provo**, though, the information sector is blossoming despite the significant problems its GON has faced in recent years. More specifically, overall employment in this sector grew by about 20 percent since 2009.[813] This corresponds with robust economic growth across the state,[814] as well as the organic emergence of a vibrant high-tech cluster in what some have dubbed the "Silicon Slopes."[815] It appears that these developments stem primarily from the favorable business climate created by the state, as well as the presence of a major research institution (Brigham Young University).[816]

Nationally, employment in the information sector has been essentially static for the last few years (it decreased by four percent between 2009 and 2013).[817] Even so, one would expect at least some growth in information sector jobs in areas with a GON. Yet much of the sector's job growth is concentrated in areas without a GON: between 2009 and 2013, information sector jobs grew by 18.3 percent in and around Austin, Texas;[818]

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807 The U.S. Bureau of Labor Statistics defines the "information" sector as follows:
"The Information sector comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b) providing the means to transmit or distribute these products as well as data or communications, and (c) processing data.
"The main components of this sector are the publishing industries, including software publishing, and both traditional publishing and publishing exclusively on the Internet; the motion picture and sound recording industries; the broadcasting industries, including traditional broadcasting and those broadcasting exclusively over the Internet; the telecommunications industries; Web search portals, data processing industries, and the information services industries.
"The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products; (2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data."
See U.S. Bureau of Labor Statistics, Industries at a Glance: Information, http://www.bls.gov/iag/tgs/iag51.htm.

808 *Chattanooga's New Locomotive.*

809 BLS data regarding information sector jobs for Chattanooga, TN, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

810 *See supra,* section 4.3. *See also Louisiana City Blazes High-Speed Web Trail.*

811 BLS data regarding information sector jobs for Lafayette, LA, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

812 BLS data regarding information sector jobs for Burlington, VT, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

813 BLS data regarding information sector jobs for Provo-Orem, UT, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

814 *See, e.g.,* Utah Governor Gary Herbert, *Technology's new home located in 'Silicon Slopes,' Utah,* July 9, 2013, CNBC.com, *available at* http://www.cnbc.com/id/100860405 (discussing the array items—e.g., favorable taxes, streamlined regulatory approach to business, good quality of life, etc.—that has contributed to robust job growth throughout the state) ("*Technology's new home located in 'Silicon Slopes'*").

815 *Id. See also* Jasen Lee, *Salt Lake Metro Becoming Tech Hub,* Jan. 13, 2013, Deseret News, *available at* http://www.deseretnews.com/article/765620136/Salt-Lake-metro-becoming-tech-hub.html?pg=all.

816 *Technology's new home located in 'Silicon Slopes'.*

817 BLS data regarding information sector jobs for the entire U.S. for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

818 BLS data regarding information sector jobs for Austin-Round Rock-San Marcos, TX, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

6.6 percent in and around Boston, Massachusetts;[819] 8.1 percent in New York City;[820] 33.7 percent in Silicon Valley;[821] and 30.8 percent in and around San Francisco.[822] As discussed in more detail below, creating a successful and sustainable high-tech cluster—and a healthy information sector generally—is extremely difficult and involves many more factors than just the presence of an ultra-high-speed broadband network.

In sum, data do not indicate GONs serve as the nucleus of renewed economic activity in cities and towns across the country. On the contrary, they appear to be playing minor roles in creating relatively few new jobs as companies continue to respond more favorably to other more practical and prosaic enticements (e.g., tax breaks). Conversely, the debt burden resulting from many GONs is harming the short- and long-term economic prospects of cities. Indeed, in some cases—e.g., Burlington, Chattanooga, Cedar Falls, Groton, and Monticello—excessive debt generated as a result of building a GON led to credit downgrades, which serve only to increase the costs of borrowing money to finance other, arguably more pressing municipal projects.[823] It can be argued that GONs are seldom the economic panacea that many advocates assert.

5.5 Finding Five: Governments are not well-equipped to compete in dynamic markets.

Governments—and government-run utilities by extension—are ill-equipped to participate in dynamic markets or sectors characterized by constant innovation. Especially with regard to new technologies, municipal governments have a poor record of keeping pace with recent advances and otherwise shaping policies that reflect prevailing consumer preferences. Public schools, for example, remain littered with out-of-date computers and other antiquated technological gadgets that overly enthusiastic government officials purchased with the expectation that their use would improve outcomes.[824] Similarly, many public computing centers in cities across the country, launched in the late 1990s to great fanfare, are still operating with out-of-date computers and inferior Internet connections.[825] Even most voting machines in districts across the country remain analog, despite the emergence of more efficient and cost-effective digital alternatives.[826]

This dynamic is especially evident in the GONs context. Local governments in Groton and the UTOPIA cities, for instance, inaccurately construed consumer demand for new broadband services in advance of building their municipal networks. In the case of Groton, a limited consumer survey about the appeal of a possible municipal network was used to justify the construction of the GON.[827] In the case of UTOPIA, officials put

819 BLS data regarding information sector jobs for Boston-Cambridge-Quincy, MA (NECTA Div.), for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

820 BLS data regarding information sector jobs for New York, NY, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

821 BLS data regarding information sector jobs for San Jose-Sunnyvale-Santa Clara, CA, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

822 BLS data regarding information sector jobs for San Francisco-San Mateo-Redwood City, CA Metropolitan Division, for the period of 2004–2014 (not seasonally adjusted). Data on file with the authors.

823 These other imperatives, in particular the need to shore up crumbling local infrastructure, were discussed *supra,* section 3.2.

824 *See, e.g.,* Debra Donston-Miller, *Common Core Meets Aging Education Technology*, July 22, 2013, Information Week, *available at* http://www.informationweek.com/education/policy/common-core-meets-aging-education-techno/240158684 (observing the difficulty in implementing new education standards with the outdated technology that exists in many schools); *Catching on at Last*, June 29, 2013, The Economist, *available at* http://www.economist.com/news/briefing/21580136-new-technology-poised-disrupt-americas-schools-and-then-worlds-catching-last ("The idea that technology can revolutionise education is not new. In the 20th century almost every new invention was supposed to have big implications for schools. Companies promoting typewriters, moving pictures, film projectors, educational television, computers and CD-ROMS have all promised to improve student performance. A great deal of money went into computers for education in the dot.com boom of the late 1990s, to little avail, though big claims were advanced for the difference they would make.").

825 In recognition of the antiquated nature of many of these facilities, the federal stimulus program for broadband allocated about $200 million to public computing centers across the country in an effort to modernize these facilities and bolster training programs. For an overview, *see* BroadbandUSA, Grants Awarded: Public Computer Center Projects, http://www2.ntia.doc.gov/computercenters.

826 *See, e.g.,* Timothy B. Lee, *Paper Prophets: Why E-Voting is on the Decline in the United States,* Oct. 22, 2012, Ars Technica, *available at* http://arstechnica.com/features/2012/10/paper-prophets-why-e-voting-is-on-the-decline-in-the-united-states/ ("A decade ago, there was a great deal of momentum toward paperless electronic voting. Spooked by the chaos of the 2000 presidential election in Florida, Congress unleashed a torrent of money to buy new high-tech machines. Today, momentum is in the opposite direction.").

827 *See supra,* section 4.7, for additional discussion.

forward overly optimistic estimates for deployment and adoption of the new network that, when viewed in the abstract, seemed to justify the investment of tens of millions of dollars in the FTTH system.[828] In both cases, the projections proved incorrect. More generally, these and other GONs are typically plagued by some combination of poor planning, undisciplined spending, fraud, and a willingness to sacrifice long-term sustainability to realize short-term goals.[829]

In the GONs arena, government entities also face a number of challenges tied to how public services are regulated and delivered. For instance, the electricity sector's prevailing regulatory framework has created an intentionally conservative, risk-averse culture of incremental change.[830] More generally, because of the various interests always at play in government policy making and decision-making and other factors like institutional inertia, government is not well-equipped to act quickly or be a driver of the type of creative destruction evident throughout the broadband ecosystem.[831] Many governments, especially at the local level, still struggle with maintaining their websites and other basic IT infrastructure.[832] For government, even assuming abundant resources, the responsibility of building, maintaining, and upgrading a robust broadband network presents fundamental challenges. Even those that build "future-proof" fiber networks are not immune from the vagaries of the marketplace, as network deployment is only one component associated with operating and maintaining such a complex, multifaceted, and dynamic infrastructure.

Finally, the increasing use of public-private partnerships and the privatization of many municipal functions evince a growing recognition by government entities that there are viable alternatives to "going it alone." Municipalities are increasingly partnering with private entities—in the infrastructure context and elsewhere—to tap into the expertise of these firms and to spread the many risks associated with investing scarce public resources in a major project.[833] Moreover, a growing number of local governments are seeking to privatize government services that could be more efficiently delivered via the private sector. These range from the administration of parking meters to the outsourcing of back-office administrative functions.[834]

These public-private hybrid approaches to delivering core city services have been immensely successful, and, as a result, the "average American city [now] works with private partners to perform 23 out of 65 basic municipal services."[835] With the clear trend toward engaging and collaborating with the private sector on a range of activities, including the deployment of broadband networks to unserved and underserved areas,[836] cities that persist in deploying and maintaining a GON may be assuming significant, unnecessary risk. **Section 6** further discusses the trend toward public-private partnerships and presents a series of examples of such partnerships.

5.6 Finding Six: The substantial costs of building, maintaining, and operating GONs mitigate perceived benefits.

More than a decade into the GONs movement, considerable uncertainty remains regarding whether the benefits outweigh the enormous costs of building and maintaining these networks. Many of the positive economic

828 *See supra,* section 4.8, for additional discussion.

829 Unburdening sectors from these constraints and encouraging the development of a competitive private sector were core animating forces of the campaign to deregulate major industries like trucking, railroads, and the airlines in the 1970s. For an overview, *see generally* Paul A. London, The Competition Solution 78-81 (AEI Press 2005). For a discussion of the negative impacts of government intervention into competitive markets—something that deregulation attempts to correct—*see generally* Clifford Winston, Government Failure Versus Market Failure (2006).

830 *See, e.g., Realizing the Smart Grid Imperative* at p. 14-17 (discussing the framework and the risk-averse culture).

831 *Barriers to Broadband Adoption* at p. 84-99.

832 *Id.*

833 *See supra,* section 3.2.2, for additional discussion.

834 *See, e.g.,* David Segal, *A Georgia Town Takes the People's Business Private*, June 23, 2012, N.Y. Times (discussing the broad privatization efforts of Sandy Springs, Georgia); Ted Mann, *City Explores Private Deal for Meters*, May 13, 2012, Wall St. Journal (discussing how some larger cities have begun to privatize parking meters).

835 *See* Stephanie Rozsa and Caitlin Geary, *Privatizing Municipal Services*, at p. 1, Municipal Action Guide, National League of Cities (2010), *available at* http://www.nlc.org/documents/Find%20City%20Solutions/Research%20Innovation/Economic%20Development/privitizing-municipal-services-gid-10.pdf (quoting a report by the National Council of Public-Private Partnerships).

836 *See infra,* section 6.1, for additional discussion and examples.

impacts claimed by GONs supporters, especially those around job creation, remain questionable.[837] More broadly, there is a dearth of empirical evidence to demonstrate a clear causal relationship between a particular municipal network and distinct economic or social gains that would not have arisen but for the GON.

While GONs supporters offer no shortage of anecdotal evidence about the perceived benefits of municipal broadband, these tend to be easily rebuttable and attributable to other factors. The absence of empirical data raises important questions around the opportunity costs associated with a decision to pursue a GON, namely whether the money spent on the network could have been better spent elsewhere. In the context of working to improve broadband connectivity, an essential inquiry by policy makers weighing a GON proposal is whether public funding could be more wisely invested in either forging a PPP in support of bolstering local broadband infrastructure or supporting targeted demand side activities in an effort to increase adoption rates. These two alternative paths, discussed in greater detail in **section 6,** tend to yield more sustainable benefits than electing to build a municipal broadband network.

Policy makers evaluating GONs proposals should weigh the costs of building a network from scratch against the possibility of using municipal authority to facilitate the deployment of new private networks or encourage incumbent ISPs to upgrade or expand existing infrastructure, or both. Municipalities retain exclusive jurisdiction over local rights-of-way, zoning laws, and related broadband infrastructure inputs to create new incentives or enticements for private firms to enhance their offerings.[838] In addition, the simple act of consulting with ISPs, nonprofits, and other relevant organizations to develop policies that can help realize mutually shared goals vis-à-vis broadband has yielded benefits on both the supply side and demand side in a number of cities across the country.[839] With so many viable alternatives to GONs, municipal leaders—and policy makers generally—should closely examine proposals to build a municipal network by themselves.[840]

5.7 Finding Seven: Pursuit of a GON often diverts scarce public resources from more pressing priorities.

The decision to build a GON locks municipalities into a substantial long-term commitment that can divert resources—monetary and otherwise—from more pressing priorities.

In general, opting to build a GON requires a municipality to assume additional debt (only a small number of networks are built on a pay-as-you-go basis or in a manner that does not result in the accumulation of debt[841]). Many states have laws limiting the amount of debt a municipality can accrue, which means cities contemplating a municipal system will have to determine whether and to what extent debt assumed as a result of a GON will leave room for additional bond issuances in support of other projects.[842] If these limits are reached, municipalities could be forced to use alternative budget measures, including a mix of budget cuts and tax increases, to fund other undertakings. While it is difficult to identify specific trade-offs made in the context of particular GON evaluations, there is evidence that pursuing a municipal network shifted priorities in some cities.[843]

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837 *See supra,* section 5.4.

838 For a discussion of these resources, *see, e.g., Rationalizing the Municipal Broadband Debate*. Specific examples of how a municipality might use these resources for these purposes are provided *infra,* section 6.1.

839 Specific examples are provided *infra,* section 6.1.

840 For a check list to guide policy makers through this process, *see supra.*

841 Danville has used a pay-as-you-go approach to incrementally build out its GON. For additional discussion, *see supra,* section 4.6

842 Most states limit the amount of debt municipalities can accrue. *See, e.g.,* 2005 Illinois 65 ILCS 5, Sec. 8-5-1, available at http://law.justia.com/codes/illinois/2005/chapter14/43597.html ("…no municipality having a population of less than 500,000 shall become indebted in any manner or for any purpose, to an amount, including existing indebtedness in the aggregate exceeding 8.625% on the value of the taxable property therein…"). But many states also have exclusions and methods for exceeding the debt limit, oftentimes by holding a referendum. *See, e.g., id.* at Sec. 8-5-15 (setting forth the process for holding a referendum on exceeding the debt limit); Exclusion From Debt Limit; Broadband Infrastructure, NH Rev Stat § 33:6-f (2012), available at http://law.justia.com/codes/new-hampshire/2012/title-iii/chapter-33/section-33-6-f ("Municipalities may incur debt for broadband infrastructure…by the issue of bonds or notes authorized under this chapter. Any debt incurred for this purpose shall be outside the debt limit prescribed in this chapter").

843 For examples, *see supra,* sections 4.1, 4.3, and 4.5.

Pursuing a GON is not a zero-sum endeavor. Choosing to construct a municipal network by assuming millions in debt does not automatically foreclose other projects that require additional funding. But in light of the complexity inherent in building dynamic broadband infrastructure, as well as the controversy that typically attends even the mere utterance that a city is considering a GON, these particular undertakings necessitate real trade-offs that undermine core aspects of local governance.

5.8 Finding Eight: A GON will not spawn the next Silicon Valley.

Implicit in many of the arguments in favor of GONs—especially those that deliver gigabit speeds—is that these networks will serve as the foundation for new high-tech clusters. Some go further and argue that, "without [such] fast nationwide fiber infrastructure … America will not be the country that produces the next big idea, the next Google."[844] The stakes are thus very high for those communities that rationalize a gigabit GON as necessary to encourage economic development and position their cities as new hubs for high-tech innovation.[845] But despite these lofty expectations for and confidence in municipal networks' ability to realize these ambitious goals, there is much evidence to support the contrary position—that the mere presence of an ultra-fast communications network is not a factor in creating high-tech clusters.

In recent years, policy makers from across the country and around the world experimented with ways to build from scratch or synthesize from existing assets the "next Silicon Valley."[846] These ranged from multi-billion dollar investments in the construction of multiple inputs (e.g., universities and office space) thought to be necessary precursors for general high-tech innovation, to the channeling of hundreds of millions of dollars in public funding to support a particular high-tech industry (e.g., quantum computing).[847] In many cases, these efforts failed to generate expected benefits because of the unpredictable nature of innovation and the uncertainty surrounding the factors that contribute to successful high-tech clusters and startup communities. But one takeaway from these experiences garnered broad support: top-down industrial planning by government tends to impede, rather than foster, growth in this space. It has been observed that, "The problem for governments is that they often try to define where and when innovation will occur."[848] In short, there is no formula that can guarantee success in these industries.

In the United States, there are numerous examples of high-tech clusters sprouting in response to a complex alchemy of public policies, market forces, and luck. Many such clusters emerged in cities with strong research universities that produce deep pools of technical talent. The high-tech corridor in Boston and the startup sector in Austin are two leading examples of the interplay between local universities and a private sector that is eager to commercialize the research emanating from these campuses.[849] The rapidly growing startup sector in New York City—dubbed Silicon Alley—has become a hub for entrepreneurs and innovators interested in applying new technologies in "creative ways to offer new products and services," especially

844 Captive Audience at p. 264.

845 This approach to framing the need for gigabit GONs was evident in the FCC's "Gigabit City Challenge" that was issued in January 2013. *See, e.g.,* Marguerite Reardon, *FCC Pushes for Gigabit Broadband in All 50 States by 2015*, Jan. 18, 2013, CNET News, *available at* http://news.cnet.com/8301-13578_3-57564815-38/fcc-pushes-for-gigabit-broadband-in-all-50-states-by-2015/ (reporting that the goal of the challenge is to encourage cities to deploy gigabit networks in an effort to "turn themselves into innovation hubs that would create valuable jobs for its citizens.").

846 There is also a long history of failed attempts by other states to replicate Silicon Valley. For an overview, *see* Vivek Wadhwa, *Silicon Valley Can't be Copied*, July 3, 2013, Technology Review, *available at* http://www.technologyreview.com/news/516506/silicon-valley-cant-be-copied/.

847 *See* Antonio Regalado, *In Innovation Quest, Regions Seek Critical Mass*, July 1, 2013, Technology Review, *available at* http://www.technologyreview.com/news/516501/in-innovation-quest-regions-seek-critical-mass/ (providing examples of such investments in Russia and Canada) ("*In Innovation Quest, Regions Seek Critical Mass*").

848 *Id.*

849 *See, e.g.,* Paul Judge, *Boston's Route 128: Complementing Silicon Valley*, Aug. 13, 1997, Business Week, *available at* http://www.businessweek.com/1997/34/b354197.htm (discussing the early years of Boston's high-tech corridor); *In Innovation Quest, Regions Seek Critical Mass* (discussing recent startup activity in and around Boston); Pike Powers, *Building the Austin Technology Cluster: The Role of Government & Community Collaboration in the Human Capital,* p. 53-71, Proceedings—Rural Conferences (spring 2004), Federal Reserve Bank of Kansas City, *available at* http://www.kc.frb.org/PUBLICAT/newgovernance04/Powers04.pdf.

in "legacy" industries like fashion, media, and advertising.[850] This has been described as a natural evolution for the city because the startup culture "plays to New York's strengths in part because the city has always been a hub for creating content, designing new things, and marketing products and services."[851] Similar factors have also been pivotal in supporting the development of fledgling startup communities in cities like Boulder, Colorado, and Portland, Oregon.[852]

Although the reasons why these and other cities proved to be fertile ground for a startup community vary widely, they do share a common trait: none resulted from a GON.[853] More broadly, none resulted from a government plan to create a high-tech sector from scratch. Many evolved organically, and while most have benefited greatly from favorable municipal policies aimed at fostering continued growth, success never hinged on the availability of a government-owned broadband network.[854] Such top-down planning is in many ways anathema to the startup ethos that permeates these communities. In fact, the opposite approach tended to work best—having government respond to the needs of entrepreneurs as they arise. This dynamic is evident in how public funding and other resources in many startup cities have been used to support the creation of incubators, mentoring programs for entrepreneurs, shared office space facilities, tax breaks to encourage investment, and affordable housing programs.[855]

In sum, those cities that have successfully nurtured vibrant information sectors, high-tech clusters or startup communities have used public resources to create or enhance the conditions necessary to foster the type of environment that is conducive to these industries. Building a GON has never figured into this calculus.

5.9 Finding Nine: GONs are not optimal remedies for perceived or actual broadband connectivity challenges.

GONs proponents often argue municipal networks will inject competition into the local broadband market. Because existing broadband offerings are, in their view, inadequate, residents and businesses will immediately benefit from the introduction of a competing municipal network.[856] This normative perspective stems from an overly pessimistic view of U.S. broadband and an overly optimistic one about municipalities' ability to correct markets. The rationale offered is that "networks owned by local governments, nonprofit organizations, or cooperatives are structurally responsive to the community first and should own this essential infrastructure."[857] This line of thinking is questionable in a number of ways.

850 *New Tech City* at p. 16, 17.

851 *Id.* at p. 16.

852 *See, e.g.,* Dane Stangler, *Path-Dependent Startup Hubs*, Kauffman Foundation (Sept. 2013), *available at* http://www.kauffman.org/uploadedFiles/DownLoadableResources/path-dependent-startup-hubs-comparing-metropolitan-performance-high-tech-and-ict-startup-density.pdf (discussing the rise of these and other startup hubs throughout the U.S. and evaluating the factors that influenced their rise) ("*Path-Dependent Startup Hubs*").

853 Numerous surveys have sought to rank cities and regions based on metrics like startup density or using an array of factors like the number of patents filed per capita. In most instances, these surveys have yielded rankings that included cities and regions that have not built GONs, suggesting that these projects do little to improve the chances that a startup community or high-tech cluster will be spawned. For examples, *see id.* at p. 3 (ranking the top 20 large metropolitan areas by startup density, none of which is home to a GON); Richard Florida, *America's Leading High Tech Metros*, June 28, 2012, The Atlantic Cities, *available at* http://www.theatlanticcities.com/technology/2012/06/americas-leading-high-tech-metros/2244/ (ranking the top 20 U.S. metro areas using a technology index that incorporates the concentration of high-tech companies, patents per capita and average annual patent growth. Of these, only one city with a GON—Burlington, VT—makes the list. The author, however, credits the proximity of the University of Vermont as the leading factor for its inclusion.).

854 For a concise yet comprehensive examination of the various public and private sector inputs that are essential to growing these sectors in cities around the world, *see generally A Cambrian Moment*, Special Report on Tech Startups, Jan. 18, 2014, The Economist, *available at* http://www.economist.com/news/special-report/21593580-cheap-and-ubiquitous-building-blocks-digital-products-and-services-have-caused

855 *See, e.g., id.; Path-Dependent Startup Hubs* at p. 12-18 (discussing these and other efforts that have been undertaken by startup cities in recent years); *New Tech City* (recommending that New York City undertake similar initiatives in order to bolster its fledgling startup community).

856 *See supra,* section 2, for additional discussion.

857 *Averting the Looming Broadband Monopoly* at p. 7.

First and foremost, the premise of this particular argument hinges on a very basic understanding of competition, one that is largely inapplicable to the modern context. Specifically, the argument dismisses direct, data-based measures of consumer welfare and competition in favor of more rudimentary measures—e.g., the number of firms in a particular sector and their market shares—which tend to be imperfect indicators that are vulnerable to manipulation.[858] As a result, this perspective can leave out high levels of innovative dynamism throughout the entire broadband sector.[859]

Second, this rationale positions local officials as the judges of whether broadband markets are effectively competitive. The FCC has been tasked by Congress to monitor the national marketplace and undertake certain policy responses based on its analyses;[860] local governments are often ill-equipped to make such judgments.[861] Moreover, even the FCC has had issues with properly measuring and assessing broadband competition and otherwise harnessing the many new metrics for purposes that are emerging in this space.[862] Ultimately, such determinations are best made by observing consumers, who, by and large, are seeing their demands met as a result of intense competitive pressures throughout every segment of the marketplace.[863]

Finally, viewing GONs as a means of promoting competition in a local market means the proposed solution—the construction of a municipal network—risks tilting the playing field against service providers in the private sector. Introducing a "competitor" with a perceived (or actual) competitive advantage because of its affiliation with government could chill or drive away investment, slow innovation, and undermine the very market forces that have fostered a vibrantly competitive environment in this space.[864] For example, in building the infrastructure underlying their GON, some municipal utilities (e.g., EPB in Chattanooga) had the advantage of immediate (and, in some cases, free) access to key inputs like rights-of-way.[865] For private firms, gaining access to these infrastructural inputs is often a complicated and timely procedure fraught with red tape and bureaucratic inefficiency.[866]

The argument that GONs can or should be used to bolster competition in local and national broadband markets continues to be controversial and represents a policy prescription to a problem that objective data indicate does not exist.

858 *See, e.g.*, Thomas W. Hazlett, *The Federal Communications Commission's Excellent Mobile Competition Adventure*, George Mason University Mercatus Center Working Paper No. 11-46 (Nov. 2011), *available at* http://mercatus.org/sites/default/files/publication/FCC_Hazlett.pdf (discussing this in the mobile broadband context).

859 *See supra,* section 3.1, for additional discussion and analysis.

860 In the wireless space, for example, the Communications Act calls on the FCC to "review competitive market conditions with respect to commercial mobile services and shall include in its annual report an analysis of those conditions." 47 U.S.C. § 332(c)(1)(C). In the context of wireline broadband, the Act requires the Commission to determine "whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion." 47 U.S.C. § 1301 et seq.

861 *See, e.g., supra,* section 5.5 (providing examples).

862 *See, e.g.,* Larry Downes, *How the FCC Sees Broadband's 95% Success as 100% Failure*, Aug. 23, 2012, Forbes.com, *available at* http://www.forbes.com/sites/larrydownes/2012/08/23/how-the-fcc-sees-broadbands-95-success-as-100-failure/ (observing that a broad array of data support more optimistic conclusions about the U.S. broadband space than have been made in recent years by the FCC).

863 *See supra,* section 3.1.1, for additional discussion and analysis.

864 *Id.*

865 *See, e.g.,* Avrahmi Berkowitz, *If You Build It, They Will Come: Chattanooga's Broadband Leaders Speak*, July 23, 2013, Commercial Observer, *available at* http://commercialobserver.com/2013/07/if-you-build-it-they-will-come-chattanoogas-broadband-leaders-speak/ (quoting an EPB executive as saying "Since EPB already had an electric power distribution system in place, we already had the poles, the rights-of-way, the underground infrastructure…").

866 *See infra,* section 6.2, for additional discussion and examples of how these obstacles might be reduced or eliminated in an effort to encourage more robust deployment of broadband infrastructure.

5.10 Finding Ten: State-level policy makers have important roles to play in the GONs context.

Advocacy of municipal broadband networks continues as supporters increasingly frame these projects as vital to the "national interest."[867] One impact of these efforts has been a subversion of the state-local relationship in GONs advocacy. By attempting to frame GONs as essential inputs to long-term economic prosperity in the United States, proponents have often sought to marginalize the role of state-level officials, particularly state legislatures, in these discussions.[868] As a result, efforts by state legislatures to mediate the exploration of these high-risk and costly municipal projects, typically via legislation to govern the process by which these networks are approved and built, are often dismissed out of hand as intrusive encroachments of municipal authority.[869] Though this perspective attempts to position cities and metropolitan areas as primary drivers of economic development and innovation,[870] these particular arguments, variously framed around notions of local self-reliance and "cooperative localism,"[871] are unpersuasive with respect to GONs.

State-level policy makers and policy making bodies, especially legislatures, have important roles to play.[872] GONs are expensive undertakings, costing anywhere from a few million dollars, as in Groton, to several hundreds of millions of dollars, as in Chattanooga, to nearly half a billion dollars in UTOPIA.[873] In some cases when a network faltered (e.g., Monticello) local government stepped in with funding support to help steady the municipal system. Other failed and failing systems (e.g., Burlington) negatively impacted local credit ratings, which increase borrowing costs and strain local finances even more. As these systems become more complex and ambitious, the costs associated with building and maintaining them rise inexorably, which raises the risk of costly—and potentially devastating—default by local government. Accordingly, states, which maintain ultimate responsibility for the financial health of the cities and towns in their borders, have a clear and compelling interest in overseeing the process by which GONs proposals are vetted and approved.

Well-established legal precedent supports such a close relationship between municipalities and their states. In 1907, the U.S. Supreme Court succinctly summarized this relationship when it ruled that municipalities are "political subdivisions of the state, created as convenient agencies for exercising such of the governmental powers of the state as may be intrusted [sic] to them … The number, nature, and duration of the powers conferred upon these corporations and the territory over which they shall be exercised rests in the absolute discretion of the state."[874] Over the last century, the contours of these relationships have sharpened in some instances by the adoption of "home rule" statutes and other rules that, among other things, provide municipalities with a degree of autonomy to act on certain matters.[875] However, only a small number of states—including Alaska, Iowa, Massachusetts, Montana, New Jersey, New Mexico, Ohio, Oregon, South Carolina

867 These issues were discussed in detail in previous sections. *See supra,* section 2 (discussing the evolution of pro-GONs advocacy), section 3.2 (identifying many competing priorities for municipal focus and resources), and sections 2 & 4.1 (analyzing an array of failed and failing GONs).

868 *See, e.g., National Broadband Plan* at p. 153 (calling on Congress to preempt state-levels attempts to mediate GONs).

869 *See, e.g.,* Olivier Sylvain, *Broadband Localism*, 73 Ohio St. L. J. 796 (2012) (describing state GONs laws as "getting in the way" and articulating a legal and public policy strategy for bolstering local authority to enter the broadband market as service providers) ("*Broadband Localism*").

870 *See, e.g.,* Bruce Katz and Jennifer Bradley, The Metropolitan Revolution: How Cities and Metros are Fixing Our Broken Politics and Fragile Economy (Brookings Press: Washington, DC 2013) (arguing that "Cities and metropolitan areas are the engines of economic prosperity and social transformation in the United States." *Id.* at p. 1).

871 *See* Nestor M. Davidson, *Cooperative Localism: Federal-Local Collaboration in an Era of State Sovereignty*, 93 Va. L. J. 959 (2007) (defining cooperative localism as "direct relations between the federal government and local governments" and arguing that such relationships are playing increasingly "significant role[s] in areas of contemporary policy as disparate as homeland security, law enforcement, disaster response, *economic development*, social services, immigration, and environmental protection, among other areas of vital national concern." *Id.* at p. 959 (emphasis added)). For more on the self-reliance rationale, *see, e.g., supra,* section 2; *Evaluating the Rationales for Government-Owned Broadband Networks* at p. 16.

872 As set forth in section 3, *supra.*

873 *See supra,* section 4.1, for additional data and discussion regarding the cost of certain GONs.

874 *Hunter v. City of Pittsburgh*, 207 U.S. 161, 178 (1907).

875 For an historical overview of how these statutes evolved in the first half of the 20th century, *see* Kenneth E. Vanlandingham, *Municipal Home Rule in the United States,* 10 Wm. & Mary L. Rev. 269 (1968). For a more recent discussion, *see* National League of Cities, Local Government Authority, http://www.nlc.org/build-skills-and-networks/resources/cities-101/city-powers/local-government-authority.

and Utah—have "home rule" statutes, which means that in the vast majority of states in the U.S.—about 39 in all—legislatures continue to exert considerable oversight authority over municipalities and many of their functions.[876] And even in "home rule" states, municipal action is still subjected to close judicial scrutiny.[877]

In the GONs context, state legislatures have broad authority to adopt legislation impacting whether and how a municipality can or cannot offer communications services.[878] The U.S. Supreme Court confirmed this power in 2004 when it upheld a Missouri law that prohibited municipalities from offering telecommunications services.[879] In its ruling, the Court found that relevant sections of the Communications Act precluding certain actions that impeded market entry were inapplicable to a state's subdivisions (i.e., its municipalities), noting that Congress likely did not intend for the statute to support federal preemption in this particular context.[880]

To date, 19 states have adopted laws impacting the ability of municipalities to deploy a GON. Appendix II provides a summary of these statutes. Only a few states (e.g., Nebraska and Texas) imposed outright bans. In most other instances, state legislatures created a road map for municipalities to follow when evaluating a GONs proposal. Many of these involve public participation of some sort—public hearings, referenda, or other activities meant to fully apprise citizens of their local government's intention to invest public resources in a GON. Numerous others require substantial economic and financial analyses to ensure that a particular municipal project does not become a burden on local residents and the state.

Some have decried these laws as unnecessary barriers that serve only to raise the costs of a municipal network and otherwise "stifl[e]" local government experimentation with these types of systems.[881] Others argue that these laws are ultimately inapplicable in the GONs context.[882] Nevertheless, these laws remain in force and represent duly considered interventions by state-level policy makers interested in protecting citizens from waste, fraud, and abuse of public funds. Moreover, like the thousands of other laws passed each year by state legislatures, these particular laws reflect the exertion of legal authority by the legislative bodies responsible for monitoring the subdivisions they have created.

The legislative response to GONs by the Florida legislature provides a compelling case study of how a state might go about calibrating public policy responses in this context.

Florida's Legislative Approach to GONs

In the early 2000s, several municipal broadband projects were planned and deployed throughout Florida; many ultimately failed. In 2003, for example, the city of Quincy issued $3.3 million in revenue bonds to build a fiber-optic network known as NetQuincy.[883] Despite much enthusiasm and optimism about its potential to help the city "tak[e] charge of its [own] future,"[884] the network quickly faltered as expenses far outpaced revenues.[885] Similarly, the city of Orlando in the mid-2000s deployed a Wi-Fi network in parts of the city that failed due to lack of interest by consumers (despite being built to support 200 users, the system was only used by an

876 *See* National League of Cities, Local Government Authority, http://www.nlc.org/build-skills-and-networks/resources/cities-101/city-powers/local-government-authority.
877 *Id.*
878 47 U.S.C. § 253.
879 *Nixon v. Mo. Mun. League*, 541 U.S. 125 (2004).
880 *Id.* at 138.
881 *Death of the Revolution* at p. 111.
882 *See, e.g., id.* at p. 111-112 (discussing whether state statutes prohibiting the provision of "telecommunications services" apply in the GONs context); *Broadband Localism* at p. 812-837 (analyzing the *Nixon* case and evaluating alternative methods and legal justifications for deploying additional GONs).
883 *See City of Quincy, Florida*, *Utility System Improvement and Refunding Revenue Bonds, Series 2003*, p. 45, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Oct 1. 2003), *available at* http://emma.msrb.org/MS216479-MS191787-MD372435.pdf.
884 *See The Case for Municipal Broadband in Florida*, at p. 2, Florida Municipal Electric Association (2005), *available at* http://www.baller.com/pdfs/fmea_white_paper.pdf ("*Case for Municipal Broadband*").
885 *See, e.g.,* Richard Swier, *Failing Government-Owned Networks Examined*, Dec. 3, 2013, Watchdog Wire, *available at* http://watchdogwire.com/florida/2012/12/03/florida-failing-government-owned-networks-examined/.

average of 27 people per day).[886] The network was eventually shut down.[887] Several other initiatives, including a municipal fiber network in Lake County[888] and a small-scale Wi-Fi system in Tallahassee,[889] were viewed as moderately more successful, but they were also significantly less ambitious in size and scope than some of the other GONs that had been built, and they did not compete with private ISPs for residential customers.

These various projects were likely fresh in the minds of legislators who, in 2005, began to develop a legislative framework to guide these and future efforts. The result was a law that set forth a straightforward process for municipalities contemplating a GON. This process includes:

- **Ample notice of public hearings**. Municipalities are required to hold no less than two public hearings, which must be held more than 30 days apart. The municipality is required to provide notice of the hearings 30 days prior to the state's public service commission, and prominently publicize the date in a newspaper of general circulation. The municipality must also provide notice to all broadband service providers in the geographic region.[890]
- **Discussion of numerous aspects of the proposed GON at the hearings**. During the hearing, the municipality must consider whether similar services are already being provided in the area, or if service providers have proposed to offer similar services.[891] The hearing must also address the projected costs for constructing, operating, and maintaining the system, as well as realistic estimates of revenues and expenses.[892] The statute also says that the hearing should weigh the costs and benefits of opting for a municipal solution over a private one.[893]
- **Develop a business plan**. The municipality must also draft and make available to the public a business plan that details: (1) the projected number of subscribers; (2) the geographic area served; (3) the kinds of service offered; (4) a plan to ensure that the proposed network's revenues will exceed operating expenses and debt payments within four years; (5) the estimated capital and operational costs for the first four years; and (6) future network upgrade costs.[894]
- **Financing.** The statute also prohibits cities from cross-subsidizing their networks.[895] If the municipality intends to finance the project using bonds with a maturity period longer than 15 years, the government must hold a public vote.[896] And if the network is not covering operational and borrowing costs after four years, the municipality must hold a public hearing to consider whether to shutter the network, sell it, partner with a private entity, or continue operating the network.[897]

To date, this framework, coupled with a generally deregulatory approach to advanced communications services, contributed to enormous growth and innovation throughout the state's broadband ecosystem. In particular, the broadband market throughout Florida is vibrantly competitive and continues to be fueled by the interrelated forces of sustained levels of investment in network infrastructure by private ISPs and insatiable consumer demand for new services. To these ends, the state quickly emerged as a leader in broadband adoption among the southern states in the late 2000s.[898] Similarly, in the years following passage of the GONs legislation

886 *Golden Gate Lark.*

887 *See supra,* section 2.

888 This system provides broadband access to businesses and municipal institutions, not residents. One study from 2005 concluded that the system had significant positive economic impacts on the municipality. *See* George S. Ford & Thomas M. Koutsky, *Broadband and Economic Development: A Municipal Case Study from Florida,* RURDS Vol. 17, No. 3 (Nov. 2005). Some criticized this particular study as being not sufficiently thorough to account for a range of other factors that might have influenced perceived economic gains stemming from the network. *See, e.g.,* Press Release, *Heartland Statement on Municipal Broadband Studies,* April 26, 2005, *available at* http://heartland.org/press-releases/2005/04/26/heartland-statement-municipal-broadband-studies.

889 This system provides Wi-Fi access in the downtown area and in the local airport. Data from 2009 (the latest available) indicate that an average of 10 people accessed the downtown network on any given day. *See* Digital Canopy, Wi-Fi Statistics, http://wifiservices.hcs.net/.

890 Fl. Stat. § 350.81(2)(a).

891 Fl. Stat. § 350.81(b)(2)&(3).

892 Fl. Stat. § 350.81(2)(b)(4).

893 Fl. Stat. § 350.81(2)(b)(5).

894 Fl. Stat. § 350.81(2)(c).

895 Fl. Stat. § 350.81(2)(f).

896 Fl. Stat. § 350.81(2)(c)(2).

897 Fl. Stat. § 350.81(2)(l)(1)-(4).

898 *See Report on the Status of Competition in the Telecommunications Industry For 2010*, at p. 42, Florida Public Service Commission (Dec. 2010), *available at* http://www.psc.state.fl.us/publications/pdf/telecomm/20110729MasterComp.pdf.

and implementation of other forward-looking policies, increases in broadband adoption outpaced the national average.[899] As of the end of 2012, 74 percent of Florida households had a fixed broadband connection, with millions more accessing the Internet wirelessly.[900] With respect to supply side issues, 99.5 percent of the population had access to a wireline broadband connection by the end of 2012, while 96 percent had access to at least two.[901] Nearly everyone in the state—98.3 percent of the population—had access to at least three wireless broadband providers.[902]

In sum, this type of legislative approach to GONs has played a key role in encouraging the state's broadband marketplace. Equally important, the legislature augmented these policies with an array of other legislative reforms that focused primarily on advancing broadband and modernizing communications regulation.[903] These were developed in close coordination with the governor and other relevant stakeholders, reflecting the type of collaborative, holistic approach to improving broadband connectivity that has yielded positive results across the country.[904]

This dynamic is evident in numerous states that have focused resources on evaluating local broadband markets, assessing needs, and collaborating with stakeholders to craft the most efficient and effective responses possible. GONs legislation represents only one type of policy response that some states have determined best addresses their particular circumstances. Numerous other state legislatures, however, prioritized reforms aimed at recalibrating regulatory frameworks to better reflect the realities of the modern communications marketplace.[905] Regardless of the approach, the primary takeaway remains the same: state policy makers, especially legislatures, have important roles to play not only with respect to GONs but also in the larger broadband context.

899 *See, e.g., Report on the Status of Competition in the Telecommunications Industry For 2006*, p. 48-51, Florida Public Service Commissioner (May 2006), *available at* http://www.psc.state.fl.us/publications/pdf/telecomm/2006CompReportfinal.pdf.

900 *See Report on the Status of Competition in the Telecommunications Industry For 2012*, p. 31, Florida Public Service Commission (Dec. 2012), *available at* http://www.psc.state.fl.us/publications/pdf/telecomm/20130722MasterComp.pdf.

901 *See* National Broadband Map, Summarize: Florida, http://www.broadbandmap.gov/summarize/state/florida.

902 *Id.*

903 This included reform legislation in 2005 that, among other things, deregulated VoIP services and exempted broadband services from state-level regulation. *See* Section 364.01(3), Florida Statutes. Additional reforms were enacted in 2009 and 2011 in an effort to further spur broadband deployment throughout the state by reorienting regulatory policy around advanced communications services. *See* Chap. 2009-226, Laws of Florida, *available at* http://laws.flrules.org/files/Ch_2009-226.pdf; Chap. 2011-36, Laws of Florida, *available at* http://laws.flrules.org/files/Ch_2011-036.pdf.

904 *See infra,* section 6, for additional discussion and examples of the positive impacts of this type of approach to broadband connectivity.

905 For an overview of these efforts and analysis of their impacts on the broadband market, *see, e.g., Telecommunications Deregulation: Updating the Scorecard for 2013; Recalibrating Regulatory Federalism.*

Part III

A Way Forward

6 Roles for Local and State Governments in Enhancing Broadband Connectivity

With high-speed Internet connectivity transforming every aspect of modern life, many compelling motivations exist for public action in the broadband space. Attempting to harness this transformative technology for economic and social gain is a rational response by stewards of the public good, who increasingly understand that broadband connectivity is a vital ingredient to short-term economic revival and long-term prosperity.[906] Policy makers at every level of government have critical roles to play in encouraging broadband connectivity.

This section discusses the roles state and local officials can play in spurring greater broadband connectivity on both the supply and demand sides. As an overview:

- **Section 6.1** offers a general framework for policy makers when developing and implementing strategies to enhance broadband connectivity in their communities. This framework attempts to capture the best practices and lessons learned from programs that have been deployed in cities and states across the country. The section suggests 10 guiding principles to frame supply side endeavors and 10 principles to frame demand side endeavors.
- **Section 6.2** examines an array of successful and unsuccessful approaches on the supply side. The discussion compares PPPs that are "more public than private" **(section 6.2.1)**, PPPs that are "balanced" **(section 6.2.2),** and PPPs that are "more private than public **(section 6.2.3).**
- **Section 6.3** examines a number of approaches on the demand side, including "collaborative" PPPs **(section 6.3.1)** and ineffective "top-down" PPPs **(section 6.3.2).**

A key takeaway is that policy makers have meaningful opportunities to work collaboratively with local stakeholders to:

- Determine the actual state of play in the broadband space; and
- Tailor solutions that reflect and leverage the range of expertise and resources available.

6.1 A Framework for Bolstering Broadband Connectivity at the State and Local Levels

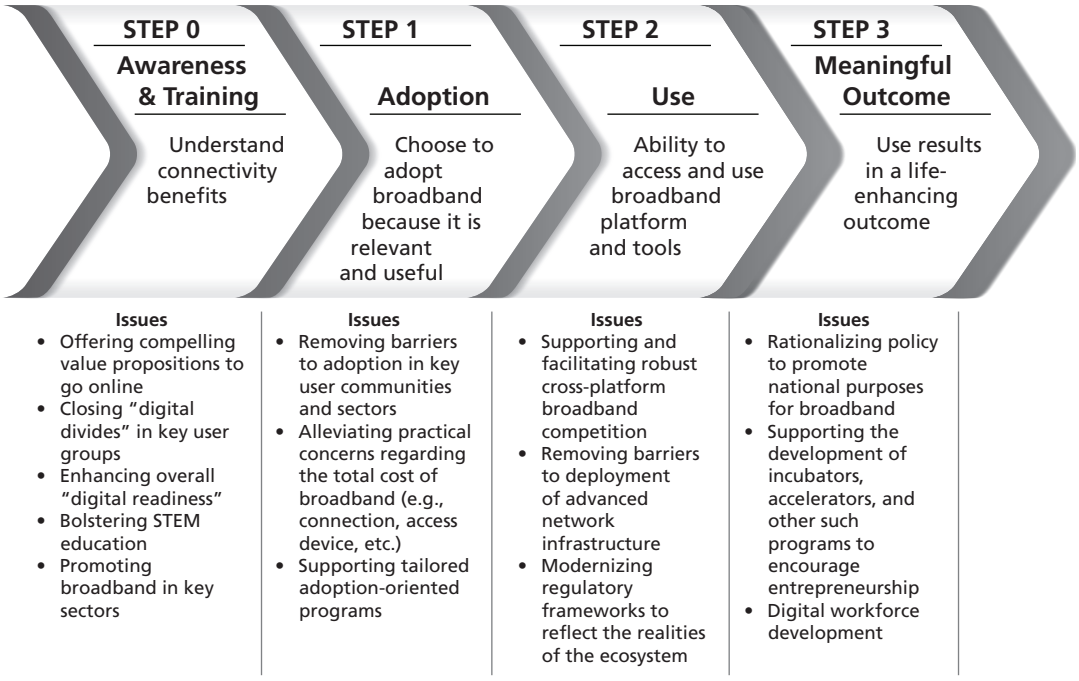
State and local governments are well-positioned to help spur broadband connectivity in a number of ways. Substantial research indicates that the most effective approaches stem from:

- Thinking broadly about broadband connectivity; and
- Appreciating that connectivity encompasses a wide range of activities impacting consumer and service provider decisions on both the supply side and demand side.

906 The clearest recent expression of these myriad public perceptions of the value of broadband to society generally can be found in the *National Broadband Plan.* However, these sentiments extend back to at least the mid-1990s, when the Clinton Administration implemented a number of policy reforms aimed squarely at unlocking the true economic and transformative power of the Internet. *See, e.g.,* Jonathan E. Nuechterlein and Philip J. Weiser, Digital Crossroads: Telecommunications Law and Policy in the Internet Age (2nd Ed.) 177-178 (MIT Press: Cambridge, MA 2013). Subsequent presidents, Congressional officials, FCC members, and other policy makers have also embraced the ability of Internet connectivity to change lives and sectors. *See Supra,* section 2.

Figure 6.1 provides a schematic of the broadband connectivity paradigm and highlights key issues implicated in each step of the process by which individuals and businesses choose to go online and the manner in which they use broadband.

Figure 6.1: Broadband Connectivity Paradigm



The approach to improving broadband connectivity highlighted throughout this paper seeks to reflect the diverse toolkit available to local and state officials and their many core competencies. The approach also encourages the use of resources in a manner reflecting communities' unique needs while respecting the still-tenuous nature of public finances.

Public-private partnerships can effectively address any aspect of the broadband connectivity paradigm depicted in Figure 6.1. Such partnerships are critical because they seek to "apply the resources of the private sector in meeting the needs of the public."[907] These partnerships have been used in an array of contexts over the last few decades, including efforts to enhance public transportation and infrastructure, education, and public safety.[908] More recently, they have become a popular means of "break[ing] the log jam" in an effort to achieve public sector goals during a period of shifting budget priorities.[909] The use of PPPs recognizes that working to improve the supply of broadband is not an all-or-nothing proposition that pits the public sector

907 *See For the Good of the People: Using Public-Private Partnerships to Meet America's Essential Needs*, at 4, National Council for Public-Private Partnerships (2002), *available at* http://www.ncppp.org/presskit/ncpppwhitepaper.pdf.

908 *See, e.g.,* Mark Perlman and Julia Pulidindi, *Public-Private Partnerships for Transportation Projects*, Municipal Action Guide, National League of Cities (May 2012), *available at* http://www.nlc.org/File%20Library/Find%20City%20Solutions/Research%20Innovation/Infrastructure/public-private-partnerships-for-transportation-projects-mag-may12.pdf ("*Public-Private Partnerships for Transportation Projects*").

909 *See* Emilia Istrate and Robert Puentes, *Moving Forward on Public Private Partnerships: U.S. and International Experience with PPP Units*, at p. 1, Brookings-Rockefeller Project on State and Metropolitan Innovation (Dec. 2011), *available at* http://www.brookings.edu/~/media/research/files/papers/2011/12/08%20transportation%20istrate%20puentes/1208_transportation_istrate_puentes.pdf ("*Moving Forward on Public Private Partnerships*").

against the private sector.[910] Rather, there is a broad range of possibilities for engagement between stakeholders throughout this space.

Structurally, PPPs vary widely, but many are forged to spread a project's risks. The amount of risk assumed by the public and by private parties differs depending on a number of variables, the most significant of which is the amount of capital invested. As an incentive for private firms to enter into PPPs and contribute resources at a high level, public entities typically reward private investment with a more tangible ownership stake and control over how the project will be realized.[911] These interests are calibrated via contracts that delineate the scope of rights and duties for public and private partners.[912] In the broadband context, there are numerous ways to structure PPPs to address issues on both the supply side and demand side. Properly implemented, these partnerships prove to be especially effective in achieving core public policy goals, including spurring new network build-out to previously unserved areas and promoting more robust broadband use in under-adopting communities, two core goals of broadband public policy.

The following principles are offered to policy makers and other stakeholders as a checklist of sorts for navigating the many options available on both the supply and demand sides.

Framework for Developing Viable Approaches to Improving Broadband Connectivity

- The most effective approaches are narrowly tailored to address specific problems evident in the locality.
- Policy makers should embrace a broad conception of broadband connectivity, one that does not position GONs as a primary or exclusive means of government action.
- Whenever possible, PPPs should be used to address supply side and demand side issues.
- Policy makers should recognize the broad range of opportunities available beyond PPPs for collaborating with relevant stakeholders.
- Every action in this context should revolve around a desire to maximize opportunities for harnessing the transformative power of broadband.

When addressing supply side issues to bolster broadband development:

1. **Have a clear vision.** Developing a clear vision and mission for new technologies in a municipality is essential to crafting focused, rational roles for local government. Cities that put forward a clear vision for broadband and technology generally have more success forging PPPs with expert firms and otherwise developing realistic strategies that efficiently marshal resources and stakeholders around common goals.
2. **Err on the side of comprehensiveness.** Comprehensive approaches that support forming diverse coalitions to work toward shared broadband goals across key sectors and communities tend to succeed.
3. **Use data to better target policy responses and calibrate partnerships.** Gathering data is an essential exercise that helps better inform policies and provides stakeholders with a clearer picture of the state of broadband connectivity in a given community. Data-centric policy making has proven an expedient means of identifying areas of unmet demand (e.g., rezoned former industrial areas).

910 A general distrust of the private sector is evident in much GONs advocacy. *See, e.g., supra,* section 2.1 (discussing the ideological origins of GONs advocacy); Eric Null, *Municipal Broadband: History's Guide,* 9 ISJLP 21, 53-55 (2013) (arguing that, since a "corporation is accountable to its shareholders," it has incentives to undermine a PPP and thus should be approached with wariness by public sector officials or, in some cases, dismissed outright in favor of a purely public solution, i.e., a GON); *Broadband at the Speed of Light* (generally pitting the interests and resources of "huge corporations" against those of municipalities in an attempt to justify GONs); David Carr, *Telecom's Big Players Hold Back the Future*, May 19, 2013, N.Y. Times (summarizing criticism of the U.S. broadband market that reflects this type of distrust).

911 *See, e.g.,* Fred Becker and Valerie Patterson, *Public-Private Partnerships: Balancing Financial Returns, Risks, and Roles of the Partners*, Public Performance & Management Review, 29 (2) (Dec., 2005) (identifying two basic parameters that should be included in any PPP: "First, a strong, positive association should exist between risks and rewards for the private partner: Higher risk assumed by the private partner deserves the promise of higher rewards, and vice versa. Second, a strong, positive association is necessary between risk and the degree of involvement of the private partner in development, operations, and ownership. A higher degree of managerial involvement by the private partner is warranted in exchange for assuming higher risk in the activity, and vice versa." *Id.* at p. 126).

912 *Public-Private Partnerships for Transportation Projects* at p. 2 (providing examples of three types of basic PPP contracts used in the transportation context).

4. **Be strategic in the use of RFIs and RFPs.** Well-written, concise, and narrowly tailored RFIs and RFPs are useful tools for municipalities to assess the scope of potential PPPs with stakeholders in the private and nonprofit sectors.
5. **Position government as a key funding conduit.** Local and state governments are important funding conduits for channeling limited public resources to private sector firms willing to work in a PPP to achieve well-defined broadband goals.
6. **Tap into government's convening power.** Local and state governments have important convening roles. They are uniquely positioned to bring stakeholders together to identify areas of need and apportion resources accordingly.
7. **Leverage municipal authority to unlock broadband deployment.** Municipalities possess enormous authority to drive broadband build-out. City officials should embrace the task of modernizing legal and policy frameworks to encourage further investment in next-generation broadband networks. Possible activities include rethinking the franchising process, streamlining the administration of local rights-of way, increasing the speed with which permits and siting requests are reviewed and approved, and modernizing zoning policies to better reflect the contours of the marketplace and the technological aspects of modern communications networks.[913]
8. **Leverage state authority to unlock broadband deployment**. Examples of successful actions undertaken in dozens of states include comprehensive regulatory modernization efforts, minimalist regulatory frameworks for advanced communications technologies (e.g., broadband, VoIP, wireless), and the allocation of limited pools of funding to seed PPPs. Together, these types of efforts are essential to unlocking additional investment in next-generation networks.[914]
9. **Maintain a level playing field.** Ensuring parity is essential to fostering continued competition in the broadband ecosystem. Conversely, tipping the playing field by granting a firm a distinct set of incentives undermines this notion. As such, it is essential that policy reforms, concessions, and incentives impacting supply side decisions be made available to all competitors.
10. **Purely public approaches rarely succeed.** The absence of expert private firms from supply side efforts deprives municipalities of innovative, cost-conscious thinking and other critical core competencies that local and state governments typically lack.

When addressing demand side issues to increase broadband adoption:

1. **Appreciate the hyper-local nature of broadband connectivity challenges.** While there are many commonalities across under-adopting groups, barriers to connectivity tend to differ in nuanced ways from state to state, from city to city, and often from neighborhood to neighborhood. Demand side responses should be calibrated accordingly.
2. **Study the relevant community to gather key data and insights.** Components of effective demand stimulation and aggregation strategies include measuring and understanding local demand, identifying and appreciating the many contours associated with barriers to broadband connectivity, and identifying existing resources and assets (e.g., elements of local social infrastructures) that can serve as the core of resulting PPPs.
3. **Effective demand side programs tend to be local in nature.** Whenever possible, outreach and training efforts should be devolved to the local level to ensure more targeted programming. National outreach campaigns can be useful in raising general awareness of the benefits of broadband connectivity, but programs that deliver hands-on training typically thrive at the hyper-local level. Local policy makers are

913 The fallout from recent natural disasters—e.g., network outages—has highlighted a fundamental dissonance between zoning laws and modern communications network requirements. For additional discussion, *see* Charles M. Davidson & Michael J. Santorelli, *Communications Network Outages—Learning from Hurricane Sandy, ACLP Briefing, New York Law School* (Dec. 2012), *available at* http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Briefing-Network-Outages-December-2012.pdf.

914 By one estimate, updating and removing requirements for ISPs to maintain legacy telecommunications networks (i.e., those that support basic telephone service over the Public Switched Telephone Network) could unlock tens of billions of dollars in additional broadband investment annually. *See* Anna-Maria Kovacs, *Telecommunications Competition: The Infrastructure-Investment Race*, Internet Innovation Alliance (Oct. 2013), *available at* http://internetinnovation.org/images/misc_content/study-telecommunications-competition-09072013.pdf.

especially well-positioned to work with private firms, nonprofit groups, and other stakeholders to spearhead these kinds of approaches.

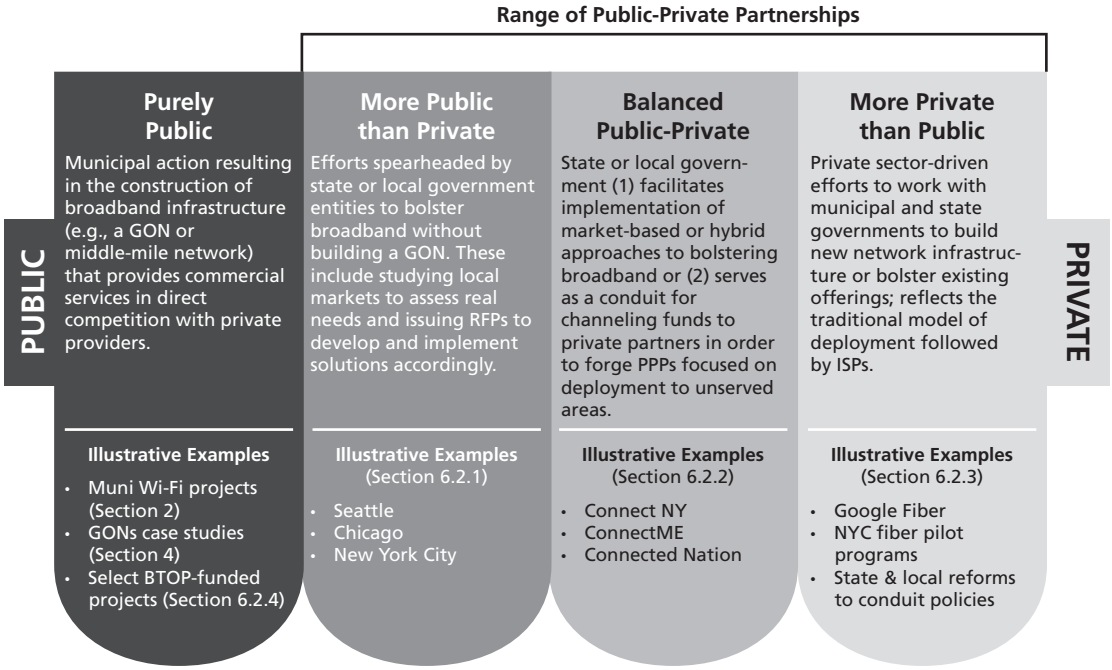
4. **Leverage local social infrastructures**. These networks of expert programs and institutions are key inputs to any demand side PPP. As such, it is essential to understand the characteristics of these local networks, including the capacities and limitations of component organizations. Developing this knowledge base is critical to effective programmatic responses.
5. **Leverage core competencies of policy makers and government institutions at the state and local levels.** Doing so will yield relationships with a broader group of stakeholders, which in turn enhances the ability to not only engage in wide-ranging awareness activities on behalf of a particular PPP (e.g., convening public forums to aid in studying local demand dynamics), but also, in many instances, assist in identifying funding mechanisms for a partnership.
6. **Pair narrowly tailored demand side programs with build-out efforts to unserved areas.** Stimulating and aggregating demand for broadband is a critical aspect of reducing the risk inherent in deploying new networks to "uneconomic" unserved areas.[915]
7. **Local and state governments are well-positioned to help coordinate demand side programs.** Core functions include serving as conduits for channeling funding and other resources to PPPs or as central hubs for facilitating partnerships among members of relevant social infrastructures (e.g., identifying opportunities for collaboration between two nonprofits; assisting interested private firms and philanthropic organizations in identifying nonprofits they can support financially).
8. **Comprehensive planning is essential.** Much like on the supply side, municipalities benefit from comprehensive strategies for addressing broadband connectivity issues. Cities that have undertaken such analyses, and worked with and through local social infrastructures to channel resources and support expert nonprofits, have seen significant progress toward closing gaps in adoption and informed use.
9. **Consider tying demand side initiatives to social service delivery.** Doing so could yield clearer, more compelling value propositions and, eventually, more meaningful uses of the technology. Equally important, PPPs that assist in social service delivery can help municipalities streamline certain administrative functions and otherwise realize a number of cost savings.
10. **Top-down approaches to demand side issues rarely work.** Often these approaches necessitate the integration of existing adoption programs to enhance efficacy. As such, it would be much more efficient and effective to work with these organizations from the start.

6.2 Supply Side PPPs to Bolster Broadband Development: Illustrative Examples

Figure 6.2 delineates the range of ways to structure supply side public-private partnerships. Subsequent subsections provide examples of each approach. The common thread is that, to succeed, each requires roughly equal participation of public and private partnerships. Those that fail tend to follow the less successful, top-down GONs approach to broadband connectivity.

915 *See, e.g., Broadband and the Empire State* (discussing this approach in the context of bringing new broadband networks to unserved parts of New York State). *See also Beyond the Divide: Progress Report*, at p. 11-20, Connected Nation (Fall 2013), *available at* http://www.connectednation.org/sites/default/files/connected-nation/files/cnctd_fall_final.pdf (detailing a similarly holistic approach to working at the community level to stimulate awareness of and demand for broadband and tailoring supply side and demand side responses accordingly).

Figure 6.2: Broadband Deployment Continuum



6.2.1 PPPs that are "More Public than Private"

PPPs that are "more public than private" describe initiatives typically spearheaded by state or local government to bolster broadband without building a GON. These include, for example, launching inquiries to study local markets and assess needs and issuing requests for information or proposals (RFIs or RFPs) to develop and implement solutions accordingly. The scope of these activities varies widely and encompasses activities like gathering data about broadband availability to better inform policy responses and developing formal plans of action that culminate in PPPs. The following examples from Seattle, Chicago, and New York provide further insight into how these types of PPPs might be structured and the various outcomes they can facilitate.

Seattle's Broadband Efforts

In the early 2000s, Seattle, like many other cities in the U.S., explored options for building a municipal network.[916] By 2005, Seattle succeeded in deploying what was eventually described as a "meager" Wi-Fi network in select parts of downtown and in public parks.[917] Also that year, the city released the results of a city-led analysis of "how the city [could] promote deployment of an advanced communications network."[918] This report identified an overarching goal for the city—"Within a decade, all of Seattle will have affordable access to an interactive, open, broadband network"—and put forward a number of recommendations for realizing this vision.[919] In response, city officials explored the feasibility of a more robust and widespread municipal wireline network.[920]

916 Many of these efforts were described *supra*, in section 2.

917 *See, e.g.,* Brier Dudley, *Seattle Pulls Plug on its Broadband Network,* May 6, 2012, Seattle Times, *available at* http://seattletimes.nwsource.com/html/businesstechnology/2018149915_brier07.html ("*Seattle Pulls Plug*").

918 *See Report of the Task Force on Telecommunications Innovation*, City of Seattle (May 2005), *available at* http://www.seattle.gov/cable/docs/SeaBTF.pdf.

919 *Id.* at p. 6-7.

920 *See, e.g.,* Matthew Halverson, *Disbanded: No Broadband Utility for Seattle*, June 20, 2012, Seattle Met, *available at* http://www.seattlemet.com/arts-and-entertainment/articles/disbanded-no-broadband-utility-for-seattle-july-2012/ (describing myriad inquiries made by the city).

By early 2012, however, local policy makers ended both municipal initiatives—the existing Wi-Fi network and fledgling plans for a GON—citing cost concerns.[921] Nevertheless, officials remained focused on encouraging broadband throughout the city and explored a number of avenues for leveraging existing municipal assets for these purposes. Soon after the Wi-Fi network was decommissioned, the city announced it would seek to lease part of its internal fiber network to the highest bidder.[922] In December 2012, the city announced an agreement with a firm to "develop and operate an ultra-high-speed fiber-to-the-home/fiber-to-the-business broadband network."[923] This deal hinged on a promise by the partner firm—a startup called Gigabit Squared—to lease the city's fiber assets and invest tens of millions of dollars in bringing fiber to the home.[924] Despite much fanfare, by the end of 2013 this partnership had unraveled.[925] This was due in large part to what city officials described as an unworkable financial plan implemented by Gigabit Squared.[926] Among other things, this resulted in unpaid bills and little progress toward actually building out the proposed network.[927]

Assessment. Even after determining a GON was not in the best interests of the city, local officials continued down a path that reflected, in many ways, the municipal broadband mindset. That the hybrid approach to bolster broadband connectivity in the city eventually failed is not surprising because it closely mirrored many of the GONs models discussed in **section 4.**

Chicago's Broadband Efforts

Since the early 2000s, Chicago has been attempting to develop and implement a diversified strategy for leveraging municipal assets to increase broadband connectivity throughout the city. Initial efforts centered on studying the feasibility of deploying a citywide Wi-Fi network.[928] By the late 2000s, however, Chicago elected to forego a municipal wireless system because of cost concerns and the general failure of the municipal Wi-Fi model.[929] Thereafter, city efforts focused primarily on studying and understanding the contours of the many demand side issues facing Chicago, especially those related to its digital divide.[930] A renewed focus on supply side issues only emerged after several years of working to boost awareness of and demand for broadband in under-adopting communities.[931]

In 2012, the city launched the "Chicago Broadband Challenge," a program aimed at conducting a holistic assessment of local broadband infrastructure, partnering with private-sector stakeholders to assist the city

921 *Seattle Pulls Plug.*
922 *Id.*
923 *See* Press Release, *City of Seattle, University of Washington, and Gigabit Squared Announce Plan to Develop Ultra-fast Broadband Network*, Dec. 13, 2012, City of Seattle, *available at* http://mayormcginn.seattle.gov/city-of-seattle-university-of-washington-and-gigabit-squared-announce-plan-to-develop-ultra-fast-broadband-network/.
924 *Id.*
925 *See* Todd Bishop, *Gigabit Squared's Legacy in Seattle: Unpaid Bill of $52,250*, Jan. 3, 2014, Geekwire.com, *available at* http://www.geekwire.com/2014/gigabit-squareds-legacy-seattle-unpaid-bill-52250/.
926 *See* Emily Parkhurst, *Seattle's Fiber-Network with Gigabit Squared is Dead*, Jan. 7, 2014, Puget Sound Business Journal, *available at* http://www.bizjournals.com/seattle/blog/techflash/2014/01/seattles-fiber-deal-with-gigabit.html?page=all.
927 *Id.*
928 *See, e.g.,* Esme Vos, *Chicago Resurrects Muni Wi-Fi Plan, Issues RFI*, Sept. 27, 2012, Muni Wireless, *available at* http://www.muniwireless.com/2012/09/27/chicago-resurrects-muni-wifi-plans/ (noting that the city began exploring a citywide wireless system in 2003).
929 *See, e.g.,* Eric Bangeman, *Chicago's Decision to Drop Muni Wi-Fi Symptomatic of a Troubled Sector*, Aug. 29, 2007, Ars Technica, *available at* http://arstechnica.com/uncategorized/2007/08/chicagos-decision-to-drop-muni-wifi-symptomatic-of-a-troubled-sector/.
930 *See, e.g., The City that Networks: Transforming Society and Economy Through Digital Excellence,* Report of the Mayor's Advisory Council on Closing the Digital Divide (May 2007), *available at* http://www.cityofchicago.org/dam/city/depts/doit/supp_info/DEI/CityThatNetworks.pdf (putting forward a number of recommendations for bolstering broadband connectivity across the city); Karen Mossberger and Caroline J. Tolbert, *Digital Excellence in Chicago: A Citywide View of Technology Use*, Report to the Chicago Department of Innovation and Technology (July 2009), *available at* http://www.cityofchicago.org/dam/city/depts/doit/supp_info/DEI/Digital_Excellence_Study_2009.pdf (evaluating technology use in the city and identifying barriers to more robust broadband adoption). For additional discussion, *see infra*, section 6.3.1.
931 In 2009, for example, Chicago receive a sizeable grant from the U.S. Department of Commerce to launch a nonprofit—the SmartChicago Sustainable Broadband Adoption program—focused on "spur[ring] economic development in five disadvantaged neighborhoods in Chicago" via "a comprehensive broadband awareness and adoption program that will include providing computers and training opportunities to more than 11,000 residents and 500 small businesses and not-for-profits." *See* BroadbandUSA, Grantees: City of Chicago, http://www2.ntia.doc.gov/grantees/CityOfChicago.

in "making the investments required to ensure that Chicago is prepared to meet the demands of the modern economy and position Chicago as one of the most connected cities in the world."[932] To meet these goals, the city in September 2012 issued an RFI to "gather ideas and recommendations for developing and expanding citywide broadband infrastructure and improve access to high-speed internet for residents across the City."[933] The city has said it will not attempt to build a GON; instead, it will look to achieve its goals for broadband and its fledgling high-tech sector in close collaboration with private firms.[934] Two dozen organizations, including numerous private firms, responded to the RFI.[935] In addition, the city forged a partnership with Gigabit Squared to deploy FTTH in select parts of the city.[936] Recent troubles in Seattle have cast doubt on the ability of this organization to deliver on its promises.[937] Indeed, in early 2014 the state of Illinois asked Gigabit Squared to return $2 million in grant money because of alleged improprieties by the group.[938]

Assessment. Chicago's many successes on the demand side have not been matched on the supply side. This is due in large part to an inability or unwillingness to engage experts in the private sector regarding their needs vis-à-vis investing more in their networks and working with stakeholders (e.g., via PPPs) to ensure more widespread access.

New York City's Public-Private Approaches on the Supply Side

New York City spearheaded a number of public-private initiatives focused on strengthening broadband infrastructure. In 2005, for example, the city enacted legislation calling for the formation of a broadband advisory committee to "review how to use municipal resources to accelerate the build-out of current, emerging, and newly developed broadband technologies and other advanced telecommunications and information services."[939] Over the next few years, the committee convened public forums to solicit feedback regarding the real needs of residents and businesses throughout the city. These and related efforts informed a number of subsequent policy responses. For instance, the city worked closely with a number of private firms to deploy Wi-Fi networks in dozens of public spaces across the city.[940] The result has been the near blanketing of parks, industrial zones, and tourist areas with privately provided wireless Internet access.

Assessment. Already one of the most robust markets for broadband in the country, New York City has further bolstered availability by successfully forging a diverse array of PPPs.

6.2.2 Balanced Public-Private Partnerships

The balanced approach to structuring PPPs positions state or local government as an intermediary working with partners to realize discrete goals for broadband. In practice, this typically results in a government

932 *See* City of Chicago, The Broadband Challenge, http://digital.cityofchicago.org/index.php/the-broadband-challenge/.

933 *See Request for Information: Broadband Infrastructure Expansion,* Dept. of Procurement Services, City of Chicago (Sept. 2012), *available at* http://www.cityofchicago.org/content/dam/city/depts/dps/ContractAdministration/Specs/2012/Spec111304.pdf.

934 *See, e.g.,* Brian Santo, *Muni Broadband with a Twist*, Nov. 1, 2012, CED Magazine, *available at* http://www.cedmagazine.com/blogs/2012/11/muni-broadband-with-a-twist.

935 *See* City of Chicago, The Broadband Challenge: RFI Respondents, http://digital.cityofchicago.org/wp-content/uploads/2012/09/RFI-Respondents-Contact-List-FINAL.pdf.

936 *See* Kevin Fitchard, *Gigabit Squared Promises Fiber Broadband for Chicago's South Side*, Oct. 16, 2012, GigaOm, *available at* http://gigaom.com/2012/10/16/gigabit-squared-plans-fiber-broadband-for-chicagos-south-side/.

937 *See, e.g.,* Stacey Higginbotham, *Gigabit Squared Co-Founder and Former President Resigns Amid Questions over Seattle Deal*, Jan. 8, 2014, GigaOm, *available at* http://gigaom.com/2014/01/08/gigabit-squared-co-founder-and-former-president-resigns-amid-questions-over-seattle-deal/.

938 *See* Sandra Guy, *State Wants Gigabit Squared to Return $2 million Grant*, March 27, 2014, Chicago Sun-Times, *available at* http://www.suntimes.com/business/26484032-420/state-wants-gigabit-squared-to-return-2-million-grant.html#.U2fC6Ve5I6I (quoting a state official as saying Gigabit Squared had "lied repeatedly" about its intentions and may have spent only $250,000 of the grant money for legitimate purposes).

939 *See* Local Law 126-2005, New York City Council (enacted), *available at* http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=444034&GUID=F0EA8014-69F5-4F7B-AB88-EEF2F394E5BE&Options=ID|Text|&Search=126.

940 *See, e.g.,* NYC Digital, Digital Road Map: Access, http://www.nyc.gov/html/digital/html/roadmap/access.shtml (describing some of these PPPs).

or quasi-government entity either working to implement market-based approaches to bolstering broadband or serving as a conduit for channeling funds to private partners to forge PPPs focused on unserved areas. The benefits associated with the balanced PPP stem primarily from maximizing the core competencies of state and local government. Both entities have the ability to serve as natural conveners and coordinators of broad activities focused on widely shared goals. In addition, the balanced PPP approach often minimizes financial outlays by public entities and seeks instead to forge partnerships that spread the risks associated with building, maintaining, and operating a complex communications infrastructure.

The following examples—of Maine, New York, and Connected Nation—highlight the permutations of this type of PPP, one that has been successful when carefully designed and implemented.

ConnectME

The ConnectME Authority in Maine was created by legislation in 2006 to "facilitate the universal availability of broadband to all Mainers and help them understand the valuable role it can play in enriching their lives and helping their communities and businesses thrive."[941] The Authority has a broad portfolio empowering it to undertake a range of initiatives focused on strengthening both the supply of and demand for broadband services throughout the state.[942]

On the supply side, the Authority possesses significant discretion with regard to awarding grants in support of deployment projects to unserved areas that would not otherwise be attempted in the absence of such funding.[943] These grants, most of which constitute only part of a project's overall cost, are flexible and can be used in support of new network deployments, as matching grants or gap funding, or for "any other necessary activities that are integral and necessary for the development, installation and use of a broadband or mobile communications system."[944] Funding for these grants stems from a "0.25 [percent] surcharge on all communications, video and Internet service bills for retail in-state service," which generates in excess of $1 million each year.[945]

By the end of 2012, 99 total grants had been made, totaling $8 million.[946] The results have been impressive: broadband is available to over 91 percent of households in the state, up from 86 percent when the Authority was first formed.[947] Equally important, the broadband adoption rate increased from 40 percent to 73 percent at the same time, which suggests there was significant demand for these services in unserved areas.[948] Future efforts are being guided by a strategic plan released in 2012.[949] The plan calls for collaboration and cooperation across state and local government, as well as with stakeholders in the private and nonprofit sectors, to bolster broadband connectivity and realize its transformative potential in key sectors like education, healthcare, and government.[950]

Assessment. Maine has struck the right balance between government involvement in the broadband space and private-sector engagement to spur network build-out. This balance hinges on the use of limited public funding to incentivize private deployment efforts in areas that would otherwise be "uneconomic."

941 *See* ConnectME Authority, About, http://www.maine.gov/connectme/about/index.shtml.
942 For an overview of its various duties, *see id.*
943 *See ConnectME Authority Final Adopted Rule*, Section 6(B), http://www.maine.gov/sos/cec/rules/90/99/639/639c101.doc.
944 *Id.* at Section 6(C).
945 *See Annual Report on the Activities of the ConnectME Authority*, at p. 8, Report to the Maine State Legislature Joint Standing Committee on Energy, Utilities, and Technology (Jan. 2013) *available at* http://www.maine.gov/connectme/about/docs/ConnectME-AnnRpt2012.pdf.
946 *Id.* at p. 2.
947 *Id.* at p. 1.
948 *Id.*
949 *See Developing Broadband in Maine: Strategic Plan*, ConnectME Authority (April 2012), *available at* http://www.maine.gov/connectme/grants/ntia/docs/ConnectMEStrategicPlanFinalDraft.pdf.
950 *Id.* at p. 2-3.

Connect NY (Contributed by David Salway, Director, New York State Broadband Program Office[951])

Since being established in 2008, the New York State Broadband Program Office has served as the single point of contact for New York State broadband development and deployment efforts. The Program Office performs a variety of functions to advance Governor Andrew Cuomo's broadband initiatives for the state, with its primary mission being to increase economic and social opportunities through universal broadband deployment. To meet this goal, the Office has worked to (1) research and implement innovative solutions to increase broadband connectivity and boost adoption in underserved and unserved, urban and rural communities throughout the state; (2) support broadband initiatives for the Governor's 10 Regional Economic Development Councils to advance broadband access and adoption; (3) manage state broadband grant programs including Connect NY and the NYS Universal Broadband Grant program; and (4) position New York to maximize available federal funding.[952]

These efforts—and broadband policies generally throughout the state—have been informed by the careful aggregation and analysis of numerous data points about broadband connectivity in New York. Baseline data, collected in 2009 and 2010, provided a detailed overview of the state of broadband availability. On the supply side, as a result of continued strong investment by an array of ISPs (wireline and wireless), broadband became available to the vast majority of residents by 2010.[953] However, pockets of unserved areas remained. More specifically, 520,000 households throughout the state, the equivalent of about 1,000,000 residents, lacked access to broadband at home.[954] Many of these households are situated in areas where it is exceedingly difficult and expensive to build out the "last mile" of broadband service. Indeed, for many unserved areas, extreme geographic conditions (e.g., dense forest or mountainous topography, as in the Adirondacks) have precluded even the deployment of cellular network infrastructure.[955]

In an effort to plug these gaps and ensure every resident in the state has equal opportunity to tap into broadband's transformative power, Governor Cuomo in 2012 launched Connect NY, a $25 million grant program "designed to spur investment by broadband service providers and expand broadband connectivity and economic development in each [of the state's] region[s]."[956] In particular, the program "funded projects which will acquire and install broadband equipment to expand last-mile services to unserved and underserved areas using existing networks, as well as deploying new infrastructure where applicable." The 18 broadband projects selected to receive Connect NY broadband grants were required to provide matching funds, bringing total statewide investment in the program to more than $32 million.[957]

The structure of the grant programs reflects a clear preference for public-private partnerships, with the majority of the grants being "awarded … to Internet service companies and in partnership with local governments and economic development organizations."[958] The virtue of this approach is that state government can use scarce public resources as an incentive for private-sector firms to share the risk in areas long considered

951 The views expressed in this Contribution are those of Mr. Salway only. However, by including the contribution in the main body of the report, the authors wish to demonstrate their support for the Connect NY program, which has emerged as a very successful public-private approach to bringing broadband to unserved parts of New York State.

952 *See The NYS 2013 Annual Broadband Report*, *available at* http://nysbroadband.ny.gov/assets/documents/Annual_Report_7.12.13_WEB.pdf ("*2013 Annual Broadband Report*").

953 *See, e.g., id.; Broadband and the Empire State* (discussing investment levels and network availability). For additional information, *see* New York State, Broadband Mapping Project, http://www.broadbandmap.ny.gov/ (incorporating deployment data as of Dec. 31, 2012).

954 *2013 Annual Broadband Report.*

955 *See, e.g.,* Michael Gormley, *Cuomo Plans $25 Million Boost to Upstate Broadband Access,* March 3, 2012, PostStar.com, *available at* http://poststar.com/news/local/article_4273422a-6577-11e1-a9ba-001871e3ce6c.html. Other factors, notably onerous review processes by entities like the Adirondack Park agency, have influenced infrastructure deployment in these areas.

956 *See* New York State Broadband Program Office, Connect NY Broadband Grant Program 2012, http://nysbroadband.ny.gov/ConnectNY2012.

957 *See Connect NY Broadband Grant Programs Guidelines* at p. 2, NYS Broadband Program Office, *available at* http://nysbroadband.ny.gov/assets/documents/connectnygrantguidelines1.pdf.

958 *See* Press Release, *Governor Cuomo Announces Applications Open for Connect NY Broadband Grants*, Aug. 27, 2012, Office of the Governor of New York, *available at* http://www.governor.ny.gov/press/082272012broadbandgrants.

"uneconomic."[959] This creates a win-win-win situation: the public sector realizes broad economic and public policy imperatives around broadband, the private sector can attract new customers in new areas, and, most important, residents finally gain access to this transformative technology.

Together, the Connect NY projects will bring broadband service to over 153,000 households, 8,000 businesses, and 400 anchor institutions—many without any means to access the Internet—across more than 6,000 square miles of New York State.[960] In addition to the vast economic benefits derived from broadband access, the projects funded by Connect NY will create 1,400 new jobs.[961] To date, the Cuomo administration awarded more than $56 million in funding for broadband projects, representing the largest statewide broadband funding commitment in the nation.[962]

In sum, Connect NY has been enormously successful and stands out as a leading model of an effective and balanced PPP, one where state government helps to create incentives for and align goals of unserved communities and private ISPs to bring much-needed broadband service to every part of the state.

Assessment. New York State's approach to addressing key supply side issues reflects a clear preference for public-private solutions. Governor Cuomo's leadership on these issues has been supported by the allocation of a substantial amount of funding to seed PPPs in an effort to support network deployment to unserved areas.

Connected Nation

The public-private model developed by *Connected Nation*, a national nonprofit organization headquartered in Washington, D.C., and dedicated to improving broadband connectivity in unserved and underserved parts of the county, has been adapted for use in over a dozen states.[963] As an overview, these programs engage in comprehensive broadband planning on behalf of states. Efforts include gathering and analyzing a range of data regarding broadband availability and adoption, the design and implementation of PPPs and other solutions to address shortcomings on both the supply side and demand side, assisting in the development of statewide broadband maps, and an assortment of other consultative services that help state and local policy makers calibrate policy responses to specific needs and resources.[964]

Assessment. Successful public-private solutions to broadband connectivity issues tend to address the unique needs of the states in which they work. Such tailor-made approaches underscore a simple truth of addressing problems on both the supply and demand sides: one size rarely fits all.

6.2.3 PPPs that are "More Private than Public"

"More private than public" PPPs are spearheaded by private-sector firms seeking to work with municipal or state government in either the construction of new broadband networks or the improvement of existing infrastructure. In many ways, this particular form of PPP reflects the prevailing model of network deployment that has been followed by ISPs for many years: companies that wish to build a broadband system

959 For additional discussion of the value of using PPPs in this way, *see generally Broadband and the Empire State.*
960 *See* New York State Broadband Program Office, Connect NY Broadband Grant Program 2013, http://nysbroadband.ny.gov/ConnectNY2013.
961 *Id.*
962 *Id.*
963 These include: Alaska, Colorado, Iowa, Kentucky, Michigan, Minnesota, Nevada, North Carolina, Ohio, Puerto Rico, South Carolina, Tennessee, Texas, and West Virginia. *See* Connected Nation, State Programs, http://www.connectednation.org/programs.
964 For additional information regarding these and other services, *see* Connected Nation, Core Services, http://www.connectednation.org/broadband-core-services.

in a municipality must work with local officials to either secure a franchise or otherwise negotiate access to the public rights-of-way that will support the physical infrastructure of the network.[965]

In general, these PPPs demonstrate there is significant room for experimentation by both the public sector and private sector vis-à-vis facilitating broadband network deployment. Many of the most successful initiatives have been based on a desire to expand upon, rather than replace, the traditional model of infrastructure build-out. Many municipalities have worked with private ISPs to either modernize or replace entirely existing deployment paradigms, all in an effort to assure ubiquitous high-speed Internet connectivity. As such, this particular type of PPP holds much potential for bringing together public and private entities in the pursuit of shared goals for broadband. Examples—from Kansas City, Kansas, and New York City—are provided below.

Google Fiber in Kansas City

In February 2010, Google announced an "experiment." Google proposed to "build and test ultra-high-speed broadband networks in a small number of trial locations across the United States."[966] The company promised to provide 1 Gbps FTTH connections "at a competitive price to at least 50,000 and potentially up to 500,000 people."[967] Previously, during preparation of the *National Broadband Plan,* Google called upon the FCC to "build [such] networks as testbeds" to "help learn how to bring faster and better broadband access to more people."[968] Less than a year later, Google thought it was "important to back up [its] policy recommendation with concrete action" and followed up with the introduction of Google Fiber.[969]

Progress toward its goal was rapid. By the end of March 2010, over 1,100 communities across the country expressed interest in being the first pilot city.[970] In July 2010, Google promised to select a city by the end of the year, but in December it announced it was pushing its decision to early 2011.[971] In March 2011, Google announced it had selected Kansas City, Kansas, as the first city where it would build out its FTTH network.[972] The company explained that its decision was based in large part on a desire to "find a location where [it] could build efficiently, make an impact on the community and develop relationships with local government and community organizations."[973]

Over the course of the next year, Google engaged in numerous activities aimed at facilitating rapid deployment of its fiber network. Immediately following the announcement, Google convened a series of town hall

965 For an overview of this process for wireline broadband networks, *see, e.g., Rationalizing Municipal Broadband* at p. 69, fn. 110 (discussing the local franchising process for cable systems). For an overview of this process for wireless broadband networks, *see, e.g., Petition for Declaratory Ruling To Clarify Provisions of Section 332(C)(7)(B) To Ensure Timely Siting Review and To Preempt Under Section 253 State and Local Ordinances That Classify All Wireless Siting Proposals as Requiring a Variance*, Declaratory Ruling, 24 FCC Rcd 13994 (2009), *recon. denied*, 25 FCC Rcd 11157 (2010), *aff'd sub nom. City of Arlington, Texas v. FCC*, 668 F.3d 229 (5th Cir. 2012), *aff'd*, 133 S.Ct. 1863 (2013) (discussing the wireless tower siting process at the municipal level and implementing a "shot clock" to streamline review and approval processes).

966 *See* Minnie Ingersoll and James Kelly, *Think Big with a Gig: Our Experimental Fiber Network*, Feb. 10, 2010, Google Blog, *available at* http://googleblog.blogspot.com/2010/02/think-big-with-gig-our-experimental.html.

967 *Id.*

968 *See* Richard Whitt, *Experimenting with New Ways to Make Broadband Better, Faster, and More Available,* Feb. 10, 2010, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2010/02/experimenting-with-new-ways-to-make.html ("*Experimenting with New Ways*"). *See also In the Matter of a National Broadband Plan for Our Future,* Comments of Google Inc., GN Docket No. 09-51 (June 8, 2009), *available at* http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/googleblogs/pdfs/google_noi060809.pdf.

969 *Experimenting with New Ways.*

970 *See* James Kelly, *Next Steps for Our Experimental Fiber Network*, March 26, 2010, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2010/03/next-steps-for-our-experimental-fiber_26.html.

971 *See* Minnie Ingersoll, *Introducing our Google Fiber for Communities Website,* July 13, 2010, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2010/07/introducing-our-google-fiber-for.html; Milo Medin, *An Update on Google Fiber*, Dec. 15, 2010, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2010/12/update-on-google-fiber.html.

972 *See* Milo Medin, *Ultra High-Speed Broadband is Coming to Kansas City, Kansas*, March 30, 2011, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2011/03/ultra-high-speed-broadband-is-coming-to.html.

973 *Id.*

meetings in Kansas City to apprise citizens of their intentions and to answer questions.[974] Construction of the network began shortly thereafter; by April 2012, Google succeeded in stringing about 100 miles of fiber from utility poles in the city.[975] Also during this time, Google conducted a market study and began to develop its service offerings, which were unveiled in July 2012.[976] Google began to connect customers to the network in November 2012.[977]

The speed with which Google was able to deploy its network and begin the process of signing up customers was aided by a unique development agreement it negotiated with Kansas City.[978] Novel terms of this agreement included—

- Free office space and power for its operations.[979]
- Free access to the city's assets and infrastructure, including waiver of fees associated with permitting and inspections processes.[980]
- A range of obligations for the city to streamline deployment of the network, including designation of a single point of contact to "address[] all issues related to the project, provid[e] coordination across City departments and serv[e] as a communications and troubleshooting resource for Google;" promises for "quick, diligent review of all applications for permits;" an "obligation to obtain Google's approval for all public statements or announcements related to the Project;" and numerous other items meant to reduce the bureaucracy typically associated with large municipal projects.[981]
- The ability to "build, operate and maintain the FTTH network, based upon demand by City residents, availability of necessary infrastructure, and appropriate cooperation of Kansas City Power & Light," the local electric utility that owns many of the poles that would support the network's fiber-optic lines.[982]
- The "right to terminate the Agreement for convenience at any time up to two (2) years after actual construction commences on the fiber network."[983]

This agreement was unique because of how fundamentally it differed from the traditional franchise agreements negotiated between municipalities and incumbent ISPs. Many of these include strict build-out requirements that obligate an ISP to provide service to all or most households in a given area.[984] In addition, local franchisees are required to pay a fee, usually a certain percentage of revenues, in exchange for access to local rights-of-way.[985] Numerous other concessions are typically extracted from ISPs during the franchising process, highlighting the enormous power that municipalities typically possess in these negotiations.[986] The Google Fiber agreement represented a significant departure from established practice and raised concerns among

974 *See* Matt Dunne, *Answers to Your Town Hall Questions—Part I*, June 10, 2011, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2011/06/answers-to-your-town-hall-questions.html; Matt Dunne, *Answers to Your Town Hall Questions—Part II*, June 15, 2011, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2011/06/answers-to-your-town-hall-questions_15.html.

975 *See* Rachel Hack, *A Construction Update,* April 4, 2012, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/201/04/construction-update.html.

976 *See* Kenneth Carter, *The State of Broadband Internet Access in Kansas City,* June 22, 2012, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2012/06/state-of-broadband-internet-access-in.html; Kevin Lo, *How Do you Want Your Internet? Your Choose*, July 26, 2012, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2012/07/how-do-you-want-your-internet-you-choose.html.

977 *See* Alana Karen, *Google Fiber Installations Kick Off Today,* Nov. 13, 2012, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2012/11/google-fiber-installations-kick-off.html.

978 *See Development Agreement, Final Execution Version*, Sept. 2012, *available at* http://www.netcompetition.org/wp-content/uploads/Google-Kansas-Agreement1.pdf.

979 *Id.* at § 2 (c).

980 *Id.* at § 3.

981 *Id.* at § 5.

982 *Id.* at § 6 (c).

983 *Id.* at § 12 (d).

984 *See generally* Thomas W. Hazlett, *Cable TV Franchises as Barriers to Video Competition,* 12 Va. J.L. & Tech 2 (2007) (discussing the contours of many local franchise agreements and arguing that they are overly burdensome to many franchisees).

985 *Id.*

986 In New York City, for example, cable franchisees during negotiations with city authorities agreed to invest millions of dollars in support of Wi-Fi deployment throughout the city. *See, e.g.,* Todd Spangler, *NYC Approves Franchises For Time Warner Cable, Cablevision*, Aug. 10, 2011, Multichannel News, *available at* http://www.multichannel.com/content/nyc-approves-franchises-time-warner-cable-cablevision.

competitors that the city, in agreeing to Google's terms, had provided the company with numerous competitive advantages in the local broadband market.[987]

Among the many notable incentives agreed to by Kansas City was the manner in which Google would build its network and sign up customers. As previously noted, the development agreement allowed Google to construct its network in response to consumer demand rather than according to municipal build-out requirements to serve an entire community. In particular, Google developed the concept of "fiberhoods" and called on households in discrete communities across the city to "rally" friends and neighbors in order to demonstrate sufficient demand for the broadband services on offer.[988] Those neighborhoods with insufficient demand, measured by the number of people who pre-registered for Google Fiber service, would be bypassed. Google rationalized this approach as follows: "Google Fiber works better when communities are connected together … We'll install only where there's enough interest, and we'll install sooner in fiberhoods where there's more interest."[989] This approach, while beneficial to Google, raised a number of concerns as to whether all neighborhoods in the city would eventually have equal access to the service.[990] These concerns persisted well after Google began to connect the first fiberhoods in Kansas City.[991]

The relatively quick deployment of Google Fiber demonstrated that many aspects of the traditional model of broadband network deployment are in need of updating. For example, since the details of the Google Fiber development agreement were made public in the fall of 2012, many stakeholders in the broadband space, ranging from ISP executives to FCC officials, have argued that cities participating in these types of "experiments" must ensure regulatory parity among service providers in order to foster sustainable competition.[992] In other words, instead of agreeing to company-specific special incentives, municipalities should strive for across-the-board parity for providers, expediting permitting and lowering entry barriers. Indeed, the speed with which Google has been able to deploy its fiber network has underscored the need for a comprehensive rethinking of how municipalities manage their rights-of-way, structure franchises, and otherwise facilitate network deployment.[993]

The need to resolve these issues and engage in comprehensive regulatory modernization efforts at the municipal and state levels gained additional immediacy in 2013 when Google announced it had begun to expand its Fiber footprint, first into cities and towns surrounding Kansas City,[994] and then into Austin, Texas, [995] and Provo, Utah. [996] In early 2014, Google announced it intended to explore deployment opportunities in dozens of other cities across the country, further heightening the need for such comprehensive reevaluations.[997]

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987 *See, e.g.,* Shalini Ramachandran, *Web Rivals Want What Google Got*, Oct. 2, 2012, Wall St. Journal (noting that local ISPs Time Warner Cable and AT&T were seeking "parity agreements" from Kansas City in order to "compete on a level playing field").

988 *See* Kevin Lo, *How to Get Google Fiber*, July 26, 2012, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2012/07/how-to-get-google-fiber.html ("*How to Get Google Fiber*").

989 *Id.*

990 *See, e.g.,* Marcus Wohlsen, *Google Fiber Splits Along Kansas City's Digital Divide,* Sept. 7, 2012, Wired, *available at* http://www.wired.com/business/2012/09/google-fiber-digital-divide/ (observing that Google's approach to building out its network and enrolling customers could "end up reinforcing the digital divide").

991 *See, e.g.,* Mary Sanchez, *Google Spreads, But Issue of Digital Divide Remains*, March 20, 2013, Kansas City Star, *available at* http://www.kansascity.com/2013/03/20/4133131/as-google-spreads-issue-of-digital.html ("The signups proved difficult in low-income areas, particularly large swaths of Kansas City's east side. It became a public reminder of haves and have-nots in regards to technology.").

992 *See, e.g.,* John Eggerton, *Pai: Rights-of-Way Issues Are Up to Date in Kansas City*, Sept. 5, 2012, Broadcasting & Cable, *available at* http://www.broadcastingcable.com/article/489147-Pai_Rights_of_Way_Issues_Are_Up_to_Date_in_Kansas_City.php (reporting on comments made by FCC Commissioner Ajit Pai to this effect).

993 *See, e.g.,* Rachelle Chong, *Google's Medin Challenges Cities to Lay the Table for Gigabit Cities*, Aug. 1, 2013, Techwire.net, *available at* http://techwire.net/googles-medin-challenges-cities-to-lay-the-table-for-gigabit-cities/ (reporting on comments made by Milo Medin of Google Fiber regarding the need for these sorts of updates).

994 *See, e.g.,* Rachel Hack, *Google Fiber is Coming to Olathe, Kansas*, March 19, 2013, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2013/03/google-fiber-is-coming-to-olathe-kansas.html.

995 *See* Milo Medin, *Google Fiber's Next Stop: Austin, Texas*, April 9, 2013, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2013/04/google-fibers-next-stop-austin-texas_9.html.

996 *See* Kevin Lo, *Google Fiber—On the Silicon Prairie, the Silicon Hills, and now the Silicon Slopes,* April 17, 2013, Google Fiber Blog, *available at* http://googlefiberblog.blogspot.com/2013/04/silicon-slopes.html. *See also supra,* section 4.9, for additional discussion regarding the failed GON in Provo and its sale by the city to Google.

997 *See* Milo Medin, *Exploring New Cities for Google Fiber*, Feb. 19, 2014, Google Blog, *available at* http://googleblog.blogspot.com/2014/02/exploring-new-cities-for-google-fiber.html.

Assessment. The deployment of Google Fiber has underscored that many aspects of the traditional local broadband franchising, permitting and regulatory models need updating. Kansas City demonstrated admirable flexibility in working with Google, a trait that should be adapted by other cities and applied evenly across the competitive landscape. More specifically, to expedite deployment and investment from all broadband players, municipalities should look for ways to expedite processes and lower entry barriers for all service providers. At the same time, municipalities should be wary of granting favors to specific players, while applying more cumbersome and expensive processes to others. Such inequity will tilt the competitive landscape, create economically damaging incentives to curry local favor, and drive away investment from non-favored players. In short, the Google Fiber model evidences admirable strides by a city to lower entry barriers and expedite deployment, but such arrangements should be made available to all comers on a non-discriminatory basis, and should provide all residents within a municipality with equal access to services.

New York City's Fiber Pilots

Over the last several years, New York City government has worked closely with incumbent ISPs to implement several initiatives aimed at supporting deployment of next-generation broadband infrastructure to households and businesses across the city.

In October 2012, former mayor Michael Bloomberg announced the launch of ConnectNYC, "an innovative City-sponsored competition to encourage growing commercial and industrial businesses in New York City to apply for free fiber cable wiring."[998] This particular program was structured to leverage existing core competencies and resources of incumbent ISPs to provide businesses with fewer than 100 employees the opportunity to jump-start growth.[999] Over two years, ConnectNYC hopes to connect over 200 businesses to fiber-optic networks. Funding will come principally from two major cable Internet service providers—Time Warner Cable Business Class and Cablevision—who, together, have pledged a combined $12 million for these purposes.[1000]

The goal of this program is twofold. First, it seeks to facilitate broadband deployment to mostly unserved industrial zones, which are increasingly used by high-tech startups.[1001] Second, and related, the program reflects an attempt by the city to assist ISPs in realizing certain obligations stemming from their franchise agreements.[1002] In particular, the city has developed a demand-driven program that will help ISPs in identifying unserved areas where new services are needed. The criteria for "winning" the competition have been developed to ensure that new broadband networks are deployed as efficiently as possible and in a manner that ensures maximum impact of new connectivity opportunities.[1003]

In April 2013, the city partnered with another local ISP, Verizon, to facilitate a more robust fiber-optic deployment. More specifically, the city launched a "micro-trenching" pilot to "speed the deployment of fiber optic cabling to businesses and residences across the five boroughs while minimizing construction time,

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998 *See* Press Release, *Mayor Bloomberg Launches Competition to Install Free Fiber Cable Wiring in Growing Businesses Across the Five Boroughs,* Oct. 19, 2012, Office of the Mayor of the City of New York, *available at* http://www.nyc.gov/portal/site/nycgov/menu-item.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2012b%2Fpr364-12.html&cc=unused1978&rc=1194&ndi=1.

999 *Id.*

1000 *Id.*

1001 *See, e.g., New Tech City.*

1002 *See, e.g.,* Press Release, *NYCEDC Launches Second Round of ConnectNYC to Construct Free Fiber Cable Wiring For Businesses Across New York City*, July 23, 2013, New York City Economic Development Corporation, *available at* http://www.nycedc.com/press-release/nycedc-launches-second-round-connectnyc-construct-free-fiber-cable-wiring-businesses.

1003 *See, e.g., id.* ("Applications for ConnectNYC Fiber Access will be evaluated based on the potential impact of fiber on the applicant's business and feasibility of fiber construction at the building's location."); ConnectNYC Fiber Challenge, FAQ: What are the Criteria for Choosing the List of Finalists?, http://nycfiberchallenge.challengepost.com/details/faq#criteria (listing three criteria: (1) "Potential Impact of Fiber on Contestant's Business (weighted at 30%). Includes factors such as the Contestant's business activities and job functions at the Location, the number of employees impacted, and the potential for increased productivity and employment at the Location." (2) "Potential to Improve Broadband Infrastructure in Underserved Areas (weighted at 40%) Includes whether the applicant is in an underserved area with limited or non-existent broadband infrastructure." (3) "Potential for Industry Clustering (weighted at 30%) Includes factors such as proximity to other Contestant Locations and the potential for scale economies in wiring a Contestant's building with fiber, and the potential to catalyze new industry clusters by wiring the business and nearby businesses.").

environmental impact and cost."[1004] To do so, the city permitted the use of micro-trenching, a technique for laying fiber-optic cable that minimizes the cost and labor intensity (e.g., digging up streets) often associated with new network construction.[1005] This approach uses "small conduits within the edges of City sidewalks to house fiber optic cabling, which can be used to deliver voice, Internet and cable television service."[1006] In addition, excess capacity—i.e., room for additional cabling—will be made available "for use by other communications industry providers, as well as by City agencies, at no cost for the duration of the pilot [which runs through November 2013].[1007] This type of approach is extremely cost-effective and "allows quick deployment of fiber optics with both minimal disruption to street and roadway traffic and minimal interference with public utility infrastructure."[1008] About a dozen locations were preapproved by the city, mostly reflecting areas where there was sufficient demand for these services.[1009]

Assessment. Together with the Wi-Fi initiatives described above and several other recent programs related to broadband (e.g., WiredNYC), New York City has developed a diverse and compelling public-private approach to boosting high-speed Internet connectivity.

6.2.4 Less Successful Models

The deployment continuum depicted in Figure 6.2 highlights one type of approach that is largely unsuccessful when it comes to addressing core supply side issues in the broadband space: "purely public" actions. In general, these encompass government action—typically at the local level, but also at the state and federal levels—that results in the construction of broadband infrastructure (e.g., a GON or a middle-mile network) that provides commercial services in direct competition with private firms. As discussed at length in **sections 2, 4, and 5,** there are many examples of failed public approaches, including many during the era of municipal Wi-Fi and more recently in cities like Provo, Groton, and Burlington. Additional examples are discussed below.

Broadband Stimulus Spending

The American Recovery and Reinvestment Act provided the National Telecommunications and Information Administration (NTIA), housed in the U.S. Department of Commerce, and the Rural Utilities Service (RUS), housed in the Department of Agriculture, with $7.2 billion to bolster broadband connectivity across the United States.[1010] The vast majority of these funds were earmarked for a range of supply side efforts, including the funding of new middle-mile and last-mile networks in unserved and underserved parts of the country.[1011] A smaller portion was used to address demand side issues, notably efforts aimed at boosting the national adoption rate and improving digital literacy skills.[1012]

1004 *See* Press Release, *New York City Launches Micro-Trenching Pilot to Enable Rapid Deployment of Fiber Optic Cabling Across the Five Boroughs*, April 2, 2013, Office of the Mayor of the City of New York, *available at* http://www.nyc.gov/portal/site/nycgov/menu-item.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2013a%2Fdoitt_04-02-13.html&cc=unused1978&rc=1194&ndi=1 ("*New York City Launches Micro-Trenching Pilot*").
1005 *See* NYC Dept. of Information Technology & Telecommunications, Innovation: Broadband, Micro-Trenching, http://www.nyc.gov/html/doitt/html/business/micro_trenching.shtml ("*About Micro-Trenching*").
1006 *New York City Launches Micro-Trenching Pilot.*
1007 *Id.*
1008 *Id.*
1009 *About Micro-Trenching.*
1010 *See* BroadbandUSA, About, http://www2.ntia.doc.gov/about.
1011 For an overview of broadband grants made via NTIA, *see* BroadbandUSA, All Grants Made, http://www2.ntia.doc.gov/all-recipients. For an overview of broadband grants made via RUS, *see* ProPublica, Recovery Tracker: Rural Utilities Service, http://projects.propublica.org/recovery/gov_entities/12e2.
1012 *Id.*

While many stimulus-funded programs and initiatives have succeeded in enhancing broadband connectivity—funding supported construction or improvement of 110,000 miles of broadband infrastructure[1013]—some have foundered and a few have failed.[1014] Certain aspects of the program have been riddled with waste, fraud, and abuse since it was launched. Over the course of the program, nearly $600 million of the broadband stimulus funds allocated by NTIA have, at some point, been temporarily or permanently halted.[1015] Much of this waste (e.g., using funding to deploy duplicative middle-mile networks) stemmed from programs administered primarily or exclusively by government or quasi-government entities at the state and local levels. The U.S. Government Accountability Office in 2010 observed that such waste might have significant unintended consequences for the broadband market going forward: "funding projects in low-density areas where there may already be existing providers could potentially discourage further private investment in the area and undermine the viability of both the incumbents' investment and the broadband stimulus project."[1016]

The following examples, which stem from the federal broadband stimulus program, illustrate some of the harm that can result from a state or local government entity using public resources to engage in supply side activities in direct competition with private sector service providers.

North Florida Broadband Authority. In 2011, the North Florida Broadband Authority (NFBA), a consortium of 14 communities in North Central Florida, was awarded over $30 million to build an open access middle-mile broadband network capable of linking a group of rural and underserved communities.[1017] The NFBA itself is a government entity that was created specifically for the purposes of overseeing the project.[1018]

By mid-2013, the project had become financially unsustainable, with monthly revenues of $11,000 and monthly expenses estimated at over $250,000.[1019] As a result, the network accumulated over $750,000 in debt.[1020] Previously, in 2011, grant funding was temporarily suspended as a result of NFBA's waste.[1021] Many of the reasons that have been cited for such poor performance by the NFBA echo criticisms typically leveled against public sector entities, including that the NFBA failed to adequately monitor its vendors, resulting in significant cost overruns.[1022] In addition, there has been significant staff turnover and claims of widespread mismanagement.[1023] Some have also argued that the middle-mile network is duplicative and unnecessary in many areas.[1024] For these and many other reasons, several of the original member cities left the consortium.[1025] In October 2013, operation of the NFBA was turned over to a private entity.[1026]

1013 *See The Economic Impact of the American Recovery and Reinvestment Act Five Years Later,* p. 41, Final Report to Congress, Council of Economic Advisors, Executive Office of the President (Feb. 2014), *available at* http://www.whitehouse.gov/sites/default/files/docs/cea_arra_report.pdf.

1014 For examples of successful stimulus-funded programs on the demand side, *see infra,* section 6.3.1.

1015 *See, e.g.,* Edward Wyatt, *Waste is Seen in Program to Give Internet Access to Rural U.S.*, Feb. 11, 2013, N.Y. Times, *available at* http://www.nytimes.com/2013/02/12/technology/waste-is-seen-in-program-to-give-internet-access-to-rural-us.html?pagewanted=all ("*Waste is Seen*").

1016 *See Further Opportunities Exist to Strengthen Oversight of Broadband Stimulus Programs*, at p. 29, GAO-10-823 (Aug. 2010), *available at* http://www.gao.gov/new.items/d10823.pdf.

1017 *See* BroadbandUSA, Grantees: North Florida Broadband Authority, http://www2.ntia.doc.gov/grantees/NorthFLA.

1018 *See* North Florida Broadband Authority, About, http://nfba.net/about.

1019 *See, e.g.,* Stew Lilker, *North Florida Broadband Authority: Stimulus Funded 800 lb. Gorilla Puts Squeeze on Financially Strapped Bradford County Schools*, May 13, 2013, Columbia County Observer, *available at* http://columbiacountyobserver.com/master_files/Florida_News_2013/13_0516_nfba_stimulus-funded-800-lb-gorillia-puts-squeeze-on-financially-strapped-school-district.html ("*North Florida Broadband Authority: Stimulus Funded 800 lb. Gorilla*").

1020 *See* Samantha Bookman, *Report: Bradford County Withdraws from North Florida Broadband Authority,* April 3, 2013, Fierce Telecom, *available at* http://www.fiercetelecom.com/story/report-bradford-county-withdraws-north-florida-broadband-authority/2012-04-03#ixzz2fkT8rbos ("*Report: Bradford County Withdraws from North Florida Broadband Authority*").

1021 *See Letter from Alan Conway, NOAA, to NFBA re Suspension of Grant*, Sept. 21, 2011, *available at* http://www2.ntia.doc.gov/files/grantees/north_florida_amendment4_suspensionletter.pdf.

1022 *Id.*

1023 *See, e.g.,* Stew Lilker, *North Florida Broadband Authority: Wracked by Gross Mismanagement From the Feds on Down, the NFBA has Become the Poster Child for Non-Disclosure*, Dec. 18, 2012, Columbia County Observer, *available at* http://columbiacountyobserver.com/master_files/Florida_News_2012/12_1218_nfba_wracked-by-gross-mismanagement-from-the-feds-on-down.html.

1024 *See, e.g.,* Joseph Fuhr, *Op-Ed: Don't Look to Government for Broadband Access,* Dec. 7, 2012, Tallahassee Democrat, *available at* http://www.theamericanconsumer.org/2012/12/10/joseph-fuhr-op-ed-dont-look-to-government-for-broadband-access/.

1025 *See, e.g., Report: Bradford County Withdraws from North Florida Broadband Authority.*

1026 *See* Karl Burkhardt, Private company takes over North Florida Broadband Authority to resume project to provide Internet, Oct. 16, 2013, Lake City Journal, *available at* http://lakecityjournal.com/main.asp?SectionID=13&SubSectionID=73&ArticleID=10457

West Virginia Statewide Broadband Infrastructure Project. The state of West Virginia was awarded over $126 million in stimulus funds to "bring high-speed Internet access to this vastly underserved region" by "adding about 2,400 miles of fiber" and connecting over 1,000 anchor institutions to the new network.[1027] The project sought to "spur affordable broadband service impacting more than 700,000 households, 110,000 businesses, and 1,500 anchor institutions, by allowing local Internet service providers to connect to the project's open network."[1028]

There are numerous examples of questionable spending practices that have riddled this project. Perhaps the most notorious is the purchase by West Virginia's Homeland Security Office of 1,064 Cisco 3945 routers at a cost of $22,600 each (the total purchase price exceeded $24 million).[1029] These routers, typically used to enable Internet service in sprawling universities or industrial complexes, were purchased by West Virginia for use in one-room public libraries and small schools, locations where a much less expensive router would have sufficed.[1030] The state also improperly inventoried these purchases, running afoul of federal guidelines for safeguarding federal assets.[1031] In addition, many of the institutions that ended up receiving Internet service via this project were never consulted about the type of services they required, an approach that replaced actual demand with a one-size-fits-all, top-down method of meeting the needs of underserved and unserved areas.[1032] An audit conducted by the state in 2013 concluded that the project wasted $14 million to date.[1033]

EAGLE-Net. The Centennial Board of Cooperative Educational Services, a Colorado state agency, received about $100 million in stimulus funds in 2009 to build the Educational Access Gateway Learning Environment Network (EAGLE-Net), a "hybrid [network] of more than 1,600 miles of terrestrial fiber and 3,000 miles of microwave wireless broadband expanding services across each of Colorado's 64 counties."[1034] An ambitious project from the start, EAGLE-Net has failed to meet many of its goals after having spent tens of millions of dollars on either duplicative and unnecessary infrastructure (e.g., a third fiber-optic line into an 11-student elementary school in Agate) or on drastically changing deployment strategies.[1035] As a result, the project quickly went over budget and, by early 2013, had "reached less than 25 percent of the more than 220 school districts and other educational institutions that are supposed to have access to its high-speed Internet network."[1036] NTIA suspended the program in December 2012, but lifted the suspension in April 2013 after numerous managerial issues were addressed.[1037] However, the much-maligned program revealed it needed "$10 million to $15 million in private financing to finish its network."[1038] Moreover, a review of the grant program by the Inspector General of the U.S. Department of Commerce determined that, overall, the grant administrators "experienced numerous challenges" in meeting the original goals of the proposed project.[1039]

1027 *See* BroadbandUSA, Program Overview: West Virginia Statewide Broadband Infrastructure Project, http://www.ntia.doc.gov/legacy/broadbandgrants/factsheets/WV_ExecOfcWestVA_FINAL.pdf.
1028 *Id.*
1029 *See Editorial: Waste: $22,600 Route*rs, May 8 2012, Charleston Gazette, *available at* http://www.wvgazette.com/Opinion/Editorials/201205080082.
1030 *Id.*
1031 *See Letter from Inspector General Todd J. Zinser, U.S. Department of Commerce, to Chairman Walden and Chairman Shimkus, U.S. House of Representatives*, at p. 4, Jan. 23, 2013, U.S. Dept. of Commerce, *available at* http://www.oig.doc.gov/recovery/Documents/OIG-13-012-I.pdf.
1032 *See, e.g.,* Nate Anderson, *Why a one-room West Virginia Library Runs a $20,000 Cisco Router*, Feb. 25, 2013, Ars Technica, *available at* http://arstechnica.com/tech-policy/2013/02/why-a-one-room-west-virginia-library-runs-a-20000-cisco-router/.
1033 *See* David Kerley, *Washington Watchdog: $14M Wasted on Broadband Effort in W.Va. Alone*, Aug. 28, 2013, The Note Blog, ABC News, *available at* http://abcnews.go.com/blogs/politics/2013/08/washington-watchdog-14m-wasted-on-broadband-effort-in-w-va-alone/.
1034 *See* BroadbandUSA, Grantees: Centennial Board of Cooperative Educational Services (CBOCES) transferred to Eagle-Net Alliance, http://www2.ntia.doc.gov/grantee/centennial-board-of-cooperative-educational-services-cboces-transferred-to-eagle-net-allianc.
1035 *Waste is Seen.*
1036 *See* Andy Vuong, *Taxpayer-Backed EAGLE-Net Project May Need More Funds for Broadband Network*, Feb. 27, 2013, Technow BytesBlog, The Denver Post, *available at* http://blogs.denverpost.com/techknowbytes/2013/02/27/ntia-eagle-net-broadband-may-need-more-funds-to-complete-network/8630/.
1037 *See* Andy Vuong, *NTIA to Lift EAGLE-Net Suspension, Broadband Project Needs More Money*, April 29, 2013, The Denver Post, *available at* http://www.denverpost.com/ci_23133964/ntia-lift-eagle-net-suspension-broadband-project-needs.
1038 *Id.*
1039 *See Letter from Todd J. Zinser, Inspector General of the U.S. Dept. of Commerce, to Rep. Greg Walden, Chairman of the Subcommittee on Communications & Technology, U.S. House of Representatives,* p. 16, Jan. 23, 2014, *available at* http://www.oig.doc.gov/OIGPublications/OIG-14-011-M.pdf.

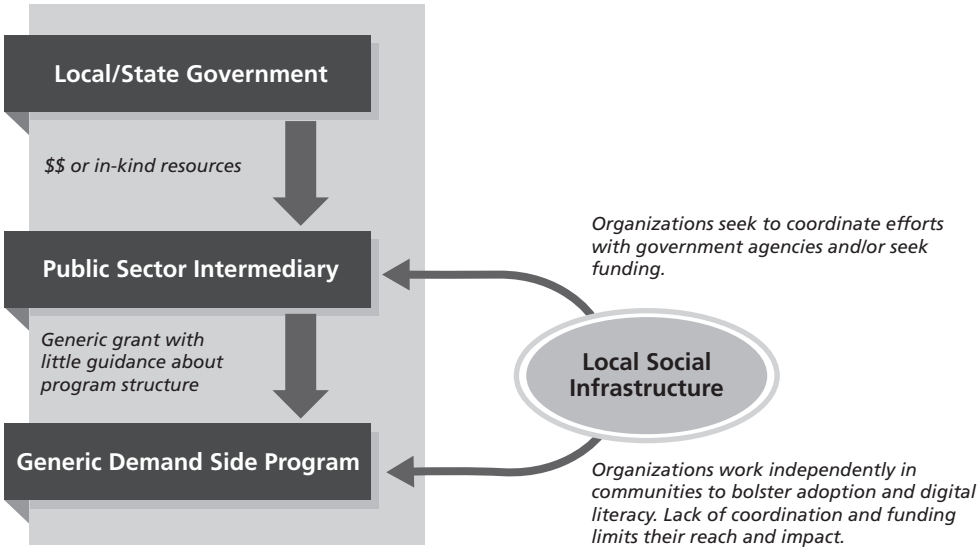
Assessment. Viewed as a whole, the many examples of ineffective government action to address supply side issues in the broadband space constitute a persuasive case that public action has the effect, intended or not, of positioning a city or town as a competitor in the broadband space.

6.3 Demand Side PPPs to Increase Broadband Adoption: Examples

Numerous adoption-related challenges exist across the nation.[1040] In response, a variety of public-private partnerships have been deployed at the state and local levels to spur increased broadband adoption and use in key demographics (e.g., senior citizens, people with disabilities, low income families, etc.) and sectors (e.g., education, energy, healthcare, etc.). While programs vary greatly, two general frameworks—a "top-down" model and a "collaborative" model—capture the broad structural components of each approach.

The top-down model, illustrated in Figure 6.3, positions local and state governments as the primary drivers of broadband connectivity on the demand side.

Figure 6.3: Top-Down Model for Addressing Demand Side Issues



This approach assumes public sector entities possess the expertise to successfully address demand side challenges hindering broadband adoption and utilization. Figure 6.3 depicts the somewhat linear, uncoordinated nature of many top-down efforts and highlights the marginalization of key partners, especially those in local social infrastructures (**Section 6.3.2** examines specific examples of how this model has been deployed). A preference for purely public action in this context tends to foreclose a broader array of PPPs.

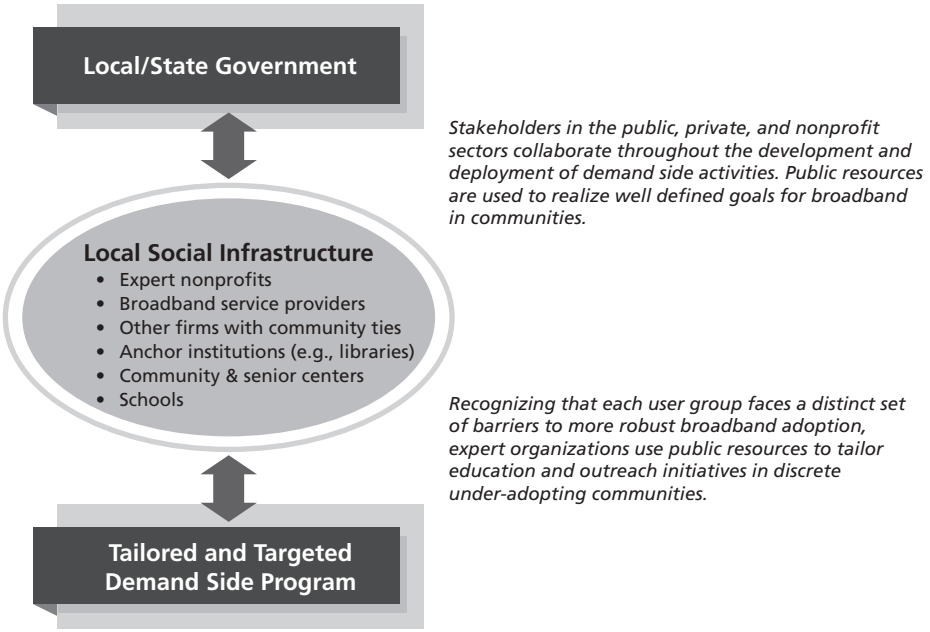
Figure 6.4 depicts an alternative collaborative model, an approach reflected in many effective demand side PPPs operating across the country. This model reveals local and state governments have important supporting roles to play in boosting broadband adoption and enhancing digital literacy.

Effective approaches to addressing lingering demand side challenges embody many of the same principles at the heart of the supply side PPPs discussed in **section 6.2** (specific examples of effective demand side programs are discussed in **section 6.3.1**). Foremost among these is recognition by public sector entities of the wide range of resources and expertise already available in the private and nonprofit sectors. PPPs developed to

1040 *See supra,* section 3.1.2, for additional discussion of these challenges and data regarding their impacts.

address broadband adoption and digital literacy issues also tend to thrive in areas where a strong social infrastructure is already in place.[1041] In the broadband context, there is wide agreement that the institutions and organizations at the heart of these social infrastructures—e.g., community centers, libraries, schools, senior centers, churches, and companies like ISPs, with roots in the municipality—are ideal conduits for channeling education, outreach, and training programs because they have succeeded in engendering high levels of trust with residents and have demonstrated an ability to deliver community-specific services.[1042]

Figure 6.4: Collaborative Model for Addressing Demand Side Issues



In sum, targeted efforts developed and implemented by an expert in the private or nonprofit sector in partnership *with* local or state government (e.g., training courses at senior centers developed specifically for older adults) are typically more effective than training services developed and implemented primarily *by* state or local government (e.g., one-size-fits-all computer training programs at a community center).

6.3.1 Examples of Effective Collaborative Demand Side PPPs

The following examples illustrate a wide range of effective demand side PPPs. These include programs that focus on:

- Education and using new technologies to ensure middle school and high school students are adequately prepared for the 21st century workplace;
- Empowering disadvantaged communities (e.g., low-income areas) with digital literacy skills; and
- Meeting the needs of a particular demographic group (e.g., older adults).

1041 Local social infrastructures include "the activities, organizations, and facilities that support a community's need to form and maintain social interactions and relationships." *See Social Infrastructure*, at p. I.4, Livable New York Resource Manual (Dec. 2011), *available at* http://www.aging.ny.gov/LivableNY/ResourceManual/DemographicAndSocialTrends/I4.pdf.
1042 *See, e.g., National Broadband Plan* at p. 171; *Toward a More Inclusive Measure of Broadband Adoption.*

An expansive menu of options exists for state and local policy makers to effectively engage with private and nonprofit organizations to address barriers to adoption and other demand side issues.[1043] Common across the examples discussed below is having local and state governments engage as conduits for strategically channeling funding or convening groups of expert firms and nonprofits to accurately calibrate outreach and training initiatives. Such approaches are especially instructive at a time when public resources are extremely scarce and the public appetite for significant investments in high-risk ventures is meager.[1044]

Education-Oriented Demand Side Programs

Many of the most effective demand side partnerships position public schools, especially those with large populations of disadvantaged youths, as the nucleus of comprehensive digital literacy programs. Curriculums and other programmatic elements typically revolve around using broadband-enabled education technologies—both in school and at home—to provide more individualized and expansive learning experiences. Some also attempt to inspire students to pursue careers in related information technology or STEM (science, technology, engineering and mathematics) fields. The following examples illustrate the diversity of approaches deployed in this particular context and highlight the key roles local and state government partners have played in their implementation.

Connected Learning. In New York City, the Connected Learning initiative was a PPP wherein the city leveraged federal stimulus funding to forge partnerships with private and nonprofit organizations in an effort to "support highly effective and technology-intensive teaching; deepen the home/school connection; strengthen in-school tech capacity; and narrow the digital divide in underserved communities."[1045] Funds were channeled through the local Department of Education and used to support the provision of free laptops and digital literacy training services to qualifying middle school students and their families.[1046] Local government served as the organizer and coordinator of this initiative, but it outsourced most programmatic duties—from curriculum development to actual training of students, teachers, and parents—to private and nonprofit partners including Time Warner Cable and Cablevision, both of which provided subsidized monthly broadband subscriptions to qualifying families; CFY, a nonprofit that provided free educational software and training to participating families and students (see below for additional information); a collection of organizations that provided in-school training and tech support; and Microsoft and Intel, which provided computing devices and related technical support.[1047]

Over the course of the program, which ran from September 2010 through June 2013, 75 middle schools participated, covering tens of thousands of students throughout the city.[1048] Over 50,000 students and parents participated in Family Learning Workshops, which were convened in order to ensure the parents of participating

1043 Examples of possible non-traditional ways in which local and state government can help direct funding to demand side programs include experimenting with social impact bonds and conditional cash transfers in the broadband context. Social impact bonds (SIBs) are a new way of approaching the financing of social programs that benefit society. In a nutshell, an SIB represents a "partnership in which philanthropic funders and impact investors—not governments—take on the financial risk of scaling up. Nonprofits deliver the program; the government pays only if the program succeeds." *See From Potential to Action: Bringing Social Impact Bonds to the US,* at p. 4, McKinsey & Co. (May 2012), *available at* http://mckinseyonsociety.com/downloads/reports/Social-Innovation/McKinsey_Social_Impact_Bonds_Report.pdf. To date, there have been only a few pilot programs to test the efficacy of SIBs (e.g., one in Britain attempting to reduce recidivism rates for recently released prisoners). Determining whether and how this particular approach might be viable in addressing demand side issues could be a worthwhile endeavor. With regard to conditional cash transfers (CCTs), these described a means of "direct[ing] funds toward qualified households or individuals based on a conditional behavior, such as children's school attendance." *See Savings-Linked Conditional Cash Transfers: Lessons Challenges & Directions*, at p. 1, New America Foundation (May 2011), http://gap.newamerica.net/sites/newamerica.net/files/program_pages/attachments/SLCCTColloquiumReport.pdf. These are more widely used than SIBs and have proven successful in numerous contexts where goals and funding mechanisms are clearly defined. Adapting CCTs for the purpose of increasing meaningful use of broadband services could also be a worthwhile experiment.

1044 *See supra,* section 3.2.1, for additional discussion and data regarding the volatile state of public finances.

1045 *See* New York City Dept. of Education, Connected Learning—About the Program, http://schools.nyc.gov/community/innovation/ConnectedLearning/about/default.htm ("*Connected Learning—About the Program*").

1046 *Id.*

1047 *Id.*

1048 *See* New York City Dept. of Education, Connected Learning—Participating Schools, http://schools.nyc.gov/community/innovation/ConnectedLearning/schools/default.htm.

students possessed the digital literacy skills needed to reinforce lessons at home.[1049] These participants also benefited from a number of related resources and educational opportunities, including targeted curriculums and software designed to seamlessly integrate new digital tools into classroom learning.[1050] Equally important, participating partners and program administrators worked together to study implementation practices and identify "promising practices" that can be used by any school—in New York City or elsewhere—interested in using new technologies to enhance educational outcomes.[1051] Many of these address key barriers to more robust use of broadband-enabled tools in school (e.g., the need for technology-focused professional development resources).[1052]

MOUSE. The nonprofit MOUSE launched in 1997 to assist in bringing Internet access to public schools across New York City.[1053] However, once most schools were wired, a need for technical support quickly emerged.[1054] MOUSE leveraged its existing apparatus and developed a training program for students to become onsite IT experts.[1055] These groups of students eventually evolved into MOUSE Squads, initially deployed in public—and then charter—schools across New York City.[1056] These Squads represent a "cost-effective solution to the problem of inadequate levels of on-site support in schools and the need to serve the 21st century educational needs of students."[1057] Moreover, participation in these groups "broadens the learning and 'life opportunities' of youth by providing authentic hands-on experiences that build skills and the motivation to succeed in school and life."[1058]

This program has had discernible impacts on both students and schools. The vast majority of MOUSE Squad members—87 percent—reported they were better prepared for college because of the program.[1059] Similarly, 87 percent said that, after participating in the programs, they were "more motivated to pursue a career in [a STEM field]."[1060] In addition, one study of MOUSE found participating students had increased academic performance.[1061] And for schools, these have been fruitful partnerships: a Citibank study found that "schools running the MOUSE program save an estimated $19,000 per year in technology support costs."[1062] As a result of its proven effectiveness, the model has been enthusiastically adopted by school administrators across the country.[1063]

The Learning about Multimedia Project (LAMP). LAMP partners with public schools to teach media and digital literacy skills to students of all ages. To do so, it asks participants to interact with digital media in unique ways (e.g., by "talking back to media" in the form of edited online videos).[1064] The wide range of programs offered by LAMP requires participants to actively engage new media to learn how they work and appreciate the many issues (e.g., privacy, online security) implicated by their use.[1065] Critically important from the standpoint of school officials is the fact that LAMP's programs align with 61 standards of the Common Core initiative.[1066] LAMP also plays a role in local workforce development: in March 2013, it joined with several

1049 *Connected Learning—About the Program. See also* CFY, What We Do—A National Opportunity, http://cfy.org/what-we-do/a-national-opportunity/ (providing a detailed discussion of how and why CFY developed its family workshop approach).
1050 *Connected Learning—About the Program.*
1051 *See* New York City Dept. of Education, Connected Learning—Promising Practices, http://schools.nyc.gov/community/innovation/ConnectedLearning/PromisingPractices/default.htm.
1052 *Id.* Barriers to broadband adoption in the education space were identified in section 3.1.2, *supra.*
1053 *See* MOUSE, About, http://mouse.org/about-mouse; MOUSE, Founders & History, http://mouse.org/about-mouse/founders-history.
1054 *Id.*
1055 *Id.*
1056 *See* MOUSE, MOUSE Squads, http://mouse.org/programs/mouse-squad-0.
1057 *See* MOUSE Squad, About, http://mousesquad.org/about.
1058 *Id.*
1059 *See* Mouse, About—Impact, http://mouse.org/about-mouse/impact.
1060 *Id.*
1061 *Id.*
1062 *Id.*
1063 *See* MOUSE, Programs, http://mouse.org/programs.
1064 *See* The LAMP, About, http://www.thelampnyc.org/about.
1065 *See* The LAMP, Programs, http://www.thelampnyc.org/programs/.
1066 *See* The LAMP, Home, http://www.thelampnyc.org/.

other nonprofits in collaborating with local policy makers in New York City to roll out a number of digital workforce training initiatives.[1067]

CFY. CFY uses new technologies to improve learning environments in school and at home in an effort to strengthen the school-home connection.[1068] Launched in New York City a decade ago, CFY developed a national network of affiliates through which it brings laptops and learning software into schools and homes in low-income areas. Its approach has four core components: (1) supporting school leaders in "driving new instructional approaches and developing deeper school-home connections;" (2) providing professional development to educators and administrators to "help them adopt blended learning strategies within the classroom, extend learning beyond the classroom, and engage families in the learning process;" (3) hosting family workshops where "families and children learn together about a wide range of digital learning activities and experience a learning partnership model that they can continue in the home;" and (4) providing home technology support for families.[1069] Like most nonprofits in this space, the success of CFY's approach hinges on PPPs with local government and private funders.

Assessment. Expert technology-focused nonprofits working in the education space are natural partners for local governments interested in harnessing broadband to improve outcomes and empower students with critical digital literacy skills. At a time when there are numerous imperatives for fostering core technology skills and piquing interest in STEM careers, local governments should engage these groups and design approaches that fit the needs of their particular school system.

Demand Side Programs Focused on Empowering Disadvantaged Communities

Millions of households in disadvantaged communities lack high-speed Internet access.[1070] The reasons for remaining offline are varied, but, as discussed in **section 3.1.2,** the primary impediment is a widespread perception that broadband is not relevant or useful to them.[1071] In response, cities and states are working more and more with private and nonprofit firms to provide the unconnected in these communities with clear and compelling value propositions for going online, as well as the skills needed to use their connections in meaningful ways. Properly designed and implemented, these programs typically succeed in raising broadband adoption rates and empowering new users with critical skills. The following examples highlight several distinct approaches to empowering disadvantaged community members in low income, mostly minority areas.

Internet Essentials. Internet Essentials is a broadband adoption and training program for qualifying low-income households that is administered by Comcast, the nation's largest broadband service provider.[1072] Comcast launched the program in 2011 throughout the company's national footprint.[1073] To qualify for the program, a family must reside in Comcast's service territory and "have at least one child eligible to participate in the National School Lunch Program."[1074] Participating families will be offered discounted Internet service and a low-cost computer.[1075] Enrollees also have access to a broad selection of support and training services, including educational resources for students, training services (in person and online) for families and workforce

1067 *See* Press Release, *Mayor Bloomberg Announces New "link" Initiative To Connect Low-income New Yorkers With Economic Opportunities*, March 25, 2013, Office of the Mayor of the City of New York, *available at* http://www1.nyc.gov/office-of-the-mayor/news/111-13/mayor-bloomberg-new-link-initiative-connect-low-income-new-yorkers-economic#/3.
1068 *See* CFY, What We Do, http://cfy.org/what-we-do/.
1069 *See* CFY, Digital Learning Program, http://cfy.org/what-we-do/the-cfy-digital-learning-program/.
1070 Recent data indicate that about a quarter of households with annual incomes below $30,000 do not use the Internet or email. Similarly, about a quarter of Hispanic adults and 15 percent of Black adults do not use the Internet or email. In addition, 41 percent of those without a high school diploma remain offline. *See* Kathryn Zickuhr, *Who's Not Online and Why*, at p. 5, Pew Internet & American Life Project (Sept. 2013), *available at* http://pewinternet.org/~/media//Files/Reports/2013/PIP_Offline%20adults_092513_PDF.pdf.
1071 *See, e.g., id.* at p. 6 (finding that the primary reason for remaining offline was "relevance," which encompassed a range of reasons and perceptions regarding the Internet, including "not interested," "waste of time," "too busy," and "don't need/want.").
1072 *See* Internet Essentials, Home, http://www.internetessentials.com/. *See also Toward a More Inclusive Measure of Broadband Adoption* at p. 2562-2566 (profiling the program).
1073 *Toward a More Inclusive Measure of Broadband Adoption* at p. 2562.
1074 *See* Internet Essentials, How it Works, http://www.internetessentials.com/how-it-works.
1075 *Id.*

tools for adults.[1076] Through its first two and a half years, Internet Essentials connected over 300,000 low-income households—or about 1.2 million people—to the Internet.[1077] In addition, 23,000 low-cost computers have been distributed, and the program provided support for free digital literacy training for more than 1.6 million people.[1078] Ninety-eight percent of participants use their discounted Internet service for homework, while 59 percent say that "the Internet helped someone in their household find a job."[1079]

Successfully deploying such a program at scale hinged on close coordination between the Internet service provider and local stakeholders in hundreds of cities and schools across the country.[1080] The "cornerstone" of this approach was "extensive partnership with a diverse array of leaders from the education, government, and nonprofit sectors," including more than 2,000 state and local officials, 1,000 community-based organizations (e.g., churches, libraries, and PTAs), and administrators and educators in over 4,000 school districts.[1081] Schools have served as the primary conduit for promoting the program; high levels of engagement (e.g., formal partnerships with Comcast) "clearly resulted in more families participating in Internet Essentials."[1082] Similarly, coordination and collaboration with local and state officials also contributed to strong results. These policy makers "create[d] an atmosphere of support and excitement around [the program] by encouraging local school districts to promote the program as a means of overcoming the achievement gap while providing a call to action for community-based organizations to utilize it as a tool to effect change in their communities."[1083] Testimonials from local policy makers in cities like Chicago, Illinois,[1084] and Aurora, Colorado,[1085] attest to the enormous power municipal officials have to publicize effective demand side programs that help to realize shared goals for technology use and broadband connectivity in disadvantaged communities and cities generally.[1086]

Chicago's Smart Communities Program. The Smart Chicago Collaborative was launched in the late 2000s to help improve the lives of residents in the city through the use of technology.[1087] A core founding principle of this initiative was the value of working with partners in the public, private, and nonprofit sectors to enhance broadband adoption by providing targeted digital literacy training courses in disadvantaged communities.[1088] These efforts were encouraged by a federal stimulus grant in 2009, which supported a program aimed at "spur[ring] economic development in five disadvantaged neighborhoods in Chicago with a comprehensive broadband awareness and adoption program that will include providing computers and training opportunities to more than 11,000 residents and 500 small businesses and not-for-profits."[1089] Programmatic elements of this initiative included plans for creating "public computer centers at six community centers for working families," as well as providing computing devices to "1,500 residents and small businesses who complete a

1076 *See* Internet Essentials, Learning Center, http://learning.internetessentials.com/.
1077 *See* David L. Cohen, *Year Three Internet Essentials Progress Report*, March 4, 2014, Comcast Voices Blog, *available at* http://corporate.comcast.com/comcast-voices/year-three-internet-essentials-progress-report.
1078 *Id.*
1079 *See* David L. Cohen, *Internet Essentials Program Reaches 1 Million Low-Income Families*, Oct. 29, 2013, Comcast Voices Blog, *available at* http://corporate.comcast.com/comcast-voices/internet-essentials-1-million-milestone-blog-post.
1080 To date, the program has been "[p]ublicized…in more than 4,000 school districts and more than 30,000 schools." *Id.*
1081 *See Internet Essentials Launch Report,* at p. 27, Comcast (Jan. 2012), *available at* http://www.internetessentials.com/sites/internetessentials.com/files/reports/launchreport.pdf.
1082 *Id.*
1083 *Id.* at p. 30.
1084 *See* Rahm Emmanuel, Mayor of Chicago, *What Internet Essentials Means to Chicago Families,* Sept. 16, 2013, Comcast Voices Blog, *available at* http://corporate.comcast.com/comcast-voices/what-internet-essentials-means-to-chicago
1085 *See* William Stuart, Deputy Superintendent of Aurora Public Schools, *Breaking Down Learning Barriers with Internet Essentials*, Aug. 28, 2013, Comcast Voices Blog, *available at* http://corporate.comcast.com/comcast-voices/breaking-down-learning-barriers-with-internet-essentials.
1086 *Toward a More Inclusive Measure of Broadband Adoption* at p. 2567 (noting that "the nature of broadband adoption—and the design of successful attempts to promote meaningful uses—is largely community-specific and tends to vary from city to city, and even from neighborhood to neighborhood. The reasons for these differences are myriad and tend to involve a complicated array of social, economic, and political forces that often muddle outreach and training efforts.").
1087 *See* Smart Chicago, What We Do, http://www.smartchicagocollaborative.org/what-we-do/.
1088 *Id. See also* Smart Chicago, Project—Sustainable Broadband Adoption, http://www.smartchicagocollaborative.org/projects/broadband-technology-opportunities-program/sustainable-broadband-adoption/.
1089 *See* Smart Chicago, Project—Sustainable Broadband Adoption, http://www.smartchicagocollaborative.org/projects/broadband-technology-opportunities-program/sustainable-broadband-adoption/ ("*Smart Chicago Broadband Adoption Project*")

multi-session training course."[1090] The structure and scope of this particular initiative was developed collaboratively by nonprofit groups and community partners in close consultation with the city of Chicago.[1091] Smart Chicago worked with the city to administer the grant, while partner nonprofits and community groups assisted in program implementation.[1092] As of the middle of 2013, this demand side program had "cause[d] 11,386 households or businesses to become new broadband subscribers"; related efforts have resulted in thousands of additional new connections across the city.[1093]

Zero Divide. A multifaceted nonprofit, Zero Divide partners with "funders, government entities and businesses … to provide mission-driven consulting services to create social change via the power of technology."[1094] More specifically, the organization works with its partners to design and implement innovative ways to use technology to "achieve three outcomes—civic engagement, economic opportunity, and health."[1095] To date, it administered an assortment of grants from private, nonprofit, and government institutions, including a stimulus grant focused on improving "broadband access for youth with limited or no access to digital and information technology in the home"[1096] and a grant from the Hewlett, Irvine and Packard Foundations to help "20 small-budget, minority-led nonprofits learn how they might better leverage technology to support their day-to-day mission-based work."[1097]

Assessment. Collaborative PPPs spearheaded by leading private and nonprofit organizations and deployed in partnership with local officials prove enormously effective in bolstering broadband use in disadvantaged communities. The most successful efforts position government as a conduit for raising awareness of these programs and facilitating broader outreach in discrete communities.

Demographic-Specific Demand Side Program

There is growing recognition among stakeholders in the broadband space that barriers to connectivity are largely unique to discrete user groups.[1098] In response, community groups and expert nonprofits are increasingly working with local policy makers and private firms to develop group-specific outreach and digital literacy training programs. To date, a number of such demand side programs have emerged and succeeded in tailoring programmatic content to meet the distinctive needs of a particular under-adopting group. This section profiles one of the most successful demographic-specific training organizations in the country: a nonprofit group that has had enormous success in bringing senior citizens online.

Older Adults Technology Services (OATS). OATS is a nonprofit organization that engages, trains, and supports older adults in using technology to improve their quality of life and enhance their social and civic engagement. Founded in 2004, OATS employs a teaching model specifically tailored to seniors. All of its classes are free and made available to older adult students in senior centers across New York City and increasingly in other cities across the country. Classes range from basic introductory courses to advanced computing and workforce development modules.[1099] To date, OATS has taught over 12,000 classes.[1100] Many participants enter the introductory classes as new Internet users; most are wary of the Internet and skeptical of its value.[1101]

1090 *Id.*

1091 *See A Platform for Participation and Innovation: Smart Communities in Chicago Master Plan*, LISC/Chicago et al. (Dec. 2009), *available at* http://www.gagdc.org/uploads/gagdc/documents/smart_communities_in_chicago_master_plan_v8.pdf.

1092 *Smart Chicago Broadband Adoption Project.*

1093 *See* City of Chicago, *Quarterly Performance Progress Report for Sustainable Broadband Adoption—Q2—2013,* at p. 2-3, U.S. Dept. of Commerce, NTIA (Aug. 2013), *available at* http://www2.ntia.doc.gov/files/grantees/17-43-b10507_city_of_chicago_ppr2013_q2.pdf.

1094 *See* Zero Divide, Our Approach, http://www.zerodivide.org/approach.

1095 *Id.*

1096 *See* Zero Divide, Clients, Case Study: National Telecommunication & Information Administration, http://www.zerodivide.org/clients/case-studies/case-study-national-telecommunications-information-administration-ntia.

1097 *See Project Announcement: Community Leadership Project*, Jan. 24, 2013, Zero Divide Blog, *available at* http://www.zerodivide.org/learning/blog/project_announcement_community_leadership_project.

1098 *See supra,* section 3.1.2, for additional discussion. *See also Toward a More Inclusive Measure of Broadband Adoption; Broadband Adoption: Why it Matters & How it Works; Barriers to Broadband Adoption.*

1099 *See* OATS, Curriculum, http://www.oats.org/curriculum.

1100 *See* OATS, Results, http://www.oats.org/results ("*OATS—Results*").

1101 *Toward a More Inclusive Measure of Broadband Adoption* at p. 2560.

The vast majority of students, however, return for additional courses, and many report continued Internet and computer use months after their OATS experience.[1102] Equally important, these classes provide seniors with unique "opportunities to establish community ties," which helps seniors overcome social isolation and "feel … part of a community."[1103] This has been found to "promote[] good mental health and overall well-being," which is "essential to active aging."[1104]

Partnerships and collaborative engagement with stakeholders in the public and private sectors have been essential to OATS's success. For example, OATS worked with and through the New York City Department for the Aging to bolster its training footprint, using city funding to increase the number of classes and trainers available in dozens of senior centers.[1105] OATS also partnered with other nonprofits and anchor institutions to deliver a broad range of social services. A partnership with the nonprofit Per Scholas, for example, allowed OATS to pair its training with free computers, which were given to students who successfully completed a multi-week training course.[1106] Similarly, OATS collaborated with Maimonides Medical Center in New York City on a "pilot project to deliver home-based technology training to a group of patients in collaboration with the Maimonides Department of Geriatrics."[1107]

These efforts were recently strengthened by a federal stimulus grant that was awarded to New York City to provide disadvantaged and under-adopting communities with "an array of new resources for digital literacy, employment support, and other critical services."[1108] From this grant, OATS received over $2 million to build the "country's first—and only—technology-focused community center for those aged 60 and older."[1109] The product of a PPP between "OATS, the federal government, the City of New York and corporate sponsors," this facility features a "state-of-the-art computer lab with 23 high-end workstations, a studio for tablet and smartphone training, video conferencing pods, a video gaming area and an open space for curated exhibitions, presentations and classes."[1110] The goal for this Exploration Center is to further expand the reach of OATS, i.e., by training an additional 10,000 seniors each year; related efforts to enlarge its footprint in New York City include the construction of "23 technology training facilities and a mobile lab."[1111] All of these efforts align with public policy imperatives—in New York City, as well as at the state and federal levels—to prepare public and government infrastructures for a senior population that is expected to almost double in size over the next few decades.[1112]

Assessment. The most effective demand side strategies are those that are tailored to meet the unique needs of under-adopting communities. This is especially true in discrete demographic groups (e.g., seniors; people with disabilities). Partnering with expert organizations with deep roots in these communities ensures better, broader, and more impactful outcomes.

1102 *Id.* at p. 2561 (providing favorable data from surveys regarding the impact of training classes on senior citizen participants). *See also OATS—Results* (same).

1103 *See* Paula Gardner et al., *Getting turned on: Using ICT training to promote active ageing in New York City*, The Journal of Community Informatics 8(1) (2012), *available at* http://ci-journal.net/index.php/ciej/article/view/809.

1104 *Id.*

1105 *See, e.g.,* New York City Department for the Aging, Seniors and the Web, http://www.nyc.gov/html/dfta/html/senior/seniors-and-web.shtml.

1106 *See, e.g., Broadband Adoption: Why it Matters & How it Works* at p. 52.

1107 *See Response to Request for Information: Broadband Initiatives Program and Broadband Technology Opportunities Program*, at p. 2, U.S. Dept. of Commerce, NTIA (Nov. 2009), *available at* http://www.ntia.doc.gov/legacy/broadbandgrants/attachments/rfi2/12C.pdf.

1108 *See, e.g., Statement of Mayor Michael R. Bloomberg on $20 Million in Federal Stimulus Awards for Broadband Adoption and Expansion,* Sept. 13, 2010, Office of the Mayor of the City of New York, *available at* http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http%3A%2F%2Fwww.nyc.gov%2Fhtml%2Fom%2Fhtml%2F2010b%2Fpr388-10.html&cc=unused1978&rc=1194&ndi=1.

1109 *See* Press Release, *OATS Launches Country's First Technology-Themed Community Center for Older Adults*, March 7, 2013, OATS, *available at* http://www.prweb.com/releases/2013/3/prweb10503817.htm.

1110 *Id.*

1111 *Id.*

1112 *See, e.g., See Toward An Age-Friendly New York City: A Findings Report*, N.Y. Academy of Medicine (fall 2008), *available at* http://www.health.state.ny.us/diseases/aids/conferences/docs/nyam_age_friendly_report.pdf (detailing findings and recommendations for making New York City a more age-friendly city); Charles M. Davidson & Michael J. Santorelli, *The Impact of Broadband on Senior Citizens*, at p. 11, Report to the U.S. Chamber of Commerce (Dec. 2008), *available at* http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/BroadbandandSeniors.pdf (discussing the impact of broadband on senior citizens within the context of a rapidly growing demographic group).

6.3.2 Examples of Ineffective "Top-Down" Demand Side PPPs

Recent examples of demand side programs that have failed are scant. In fact, many demand side programs in operation today evolved from efforts to more fully understand the dynamics of broadband adoption.[1113] As a result, these programs are typically tailored to address the unique needs of a particular user group or are framed as vehicles for removing specific barriers to broadband connectivity. Moreover, they are typically small in scale, working at the community level to engage in more hands-on education and training.[1114]

Initial attempts to address these issues, however, were not as successful and reflected a less nuanced, more homogeneous view of how broadband adoption worked in practice. Early attempts to measure and study technology use among the American public focused almost exclusively on whether and how people were using certain communications inputs (e.g., computers and the Internet).[1115] Formal responses by government to an obvious divide between the digital "haves" and "have nots" generally revolved around channeling funding to local institutions—dubbed community access centers (CACs)—that would serve as forums where the public could freely access computers and the Internet.[1116] These included public schools and libraries, which received funding via an E-rate program that was launched in 1996 and administered by the FCC,[1117] and community technology centers (CTCs), which received funding through direct allocations from the U.S. Department of Education.[1118]

From the specific vantage point of providing key populations with additional opportunities for simply accessing the Internet, these programs were largely successful. For example, in 1994 only 35 percent of public schools were connected to the Internet.[1119] After E-rate was implemented, connectivity increased significantly: the percentage of public schools connected to the Internet reached 95 percent in 1999 and 100 percent in 2003.[1120] Internet at the classroom level also increased exponentially over the same period of time, rising from just three percent of public school instructional rooms in 1994 to 94 percent in 2004.[1121] Similarly, tens of millions of dollars of federal funding supported the deployment of dozens of CTCs across the country, providing new access opportunities for thousands of residents in digitally disadvantaged communities.[1122]

These programs were less successful in addressing key demand side issues—namely, sustainable adoption and informed use—primarily because both were designed to focus primarily on the supply side. Initial successes in boosting access eventually gave way to concern that this type of approach to addressing important Internet connectivity issues—i.e., providing access without a tailored training component—would likely result in suboptimal outcomes vis-à-vis ensuring that new users would be able to fully harness these tools. The CTC

1113 These were discussed in section 3.1.2, *supra.* For additional discussion, *see generally Toward a More Inclusive Measure of Broadband Adoption; Broadband Adoption: Why it Matters & How it Works.*

1114 For example, many recipients of federal stimulus grants in the "sustainable adoption" category were cities or groups working at the city level or in a particular user community. For a listing of all grant recipients, *See* Broadband USA, Grants Awarded: Sustainable Adoption, http://www2.ntia.doc.gov/sustainableadoption.

1115 *See supra,* section 3.1.2.

1116 These were mentioned as early as 1995. *See Falling Through the Net I.*

1117 The E-rate program is financed via the Universal Service Fund. For additional information, *see* FCC, E-Rate—Schools and Libraries USF Program, http://www.fcc.gov/encyclopedia/e-rate-schools-libraries-usf-program ("The schools and libraries universal service support program, commonly known as the E-rate program, helps schools and libraries to obtain affordable telecommunications services, broadband Internet access and internal network connections."); Universal Service Administrative Company, Schools and Libraries (E-rate), http://www.usac.org/sl/default.aspx (providing comprehensive information regarding eligibility and application processes).

1118 For an overview of the CTC program, *see* U.S. Dept. of Education, Community Technology Centers, http://www2.ed.gov/programs/comtechcenters/index.html.

1119 *See Internet Access in U.S. Public Schools and Classrooms: 1994-2005,* p. 14, The National Center for Education Statistics (November 2006), *available at* http://nces.ed.gov/pubs2007/2007020.pdf.

1120 *Id.*

1121 *Id* at p. 4.

1122 *See* U.S. Dept. of Education, Community Technology Centers: Funding Status, http://www2.ed.gov/programs/comtechcenters/funding.html. *See also* CTCNet, About, http://ctcnet.org/ (noting that this organization, which was established to facilitate construction of these centers and provide a range of support services, has about 175 member programs, many of which received funding from public and private sources).

model, for example, was criticized as being monolithic in its approach to bolstering Internet connectivity.[1123] In particular, by the early 2000s, some argued the CTC approach had largely "failed to address the multifaceted aspects of the digital divide" by focusing solely on providing access.[1124] A proposed solution was to use CTCs and other such programs as forums for training new users and helping them develop digital literacy skills.[1125] In response, a number of approaches were developed to address these gaps on the demand side by, for example, tailoring curriculums and other programmatic elements to the needs and learning styles of discrete user groups.[1126] Over time, successful initial approaches yielded best practices that proved essential to impactful private and nonprofit approaches that emerged in the late 2000s.[1127]

With regard to E-rate, more widespread Internet access in schools and libraries quickly highlighted the dearth of complementary demand side programs to ensure users were able to use these connections meaningfully. For example, one recent survey found that while two-thirds of library patrons had asked library staff for assistance with using the technology services on premise, only 14 percent received formal training.[1128] Nevertheless, many agree that such informal interactions and one-on-one assistance are invaluable secondary benefits that evolved organically from the growth of Internet access in libraries.[1129] Similarly, use of broadband-enabled educational tools in schools across the country lagged in recent years, due in large part to the lack of a comprehensive demand side strategy for leveraging these tools to enhance learning opportunities and outcomes for students.[1130] Recent initiatives, like the development of a national Common Core curriculum[1131] and formal reform of the E-rate program,[1132] as well as federal stimulus funding to support a range of training programs across the country, present unique opportunities to address these issues.

Assessment. Historically, many top-down demand side programs were unsuccessful because they were designed as one-size-fits-all initiatives to address problems that ultimately defied such monolithic approaches. In light of preceding discussions about the effectiveness of ground-up approaches, the success of modern top-down efforts hinges on stakeholders' ability to engage expert organizations in local social infrastructures in an effort to tailor their outreach to meet discrete user groups' unique needs.

1123 *See, e.g.,* Craig Hayden and Sandra J. Ball-Rokeach, *Maintaining the Digital Hub: Locating the Community Technology Center in a Communication Infrastructure*, at p. 243-244 New Media & Society, 9(2) (2007) (discussing criticism of the CTC model) ("*Maintaining the Digital Hub*").

1124 *See* Josh Kirschenbaum and Radhika Kunamneni, *Bridging the Organizational Divide: Toward a Comprehensive Approach to the Digital Divide*', at p. 8, Policy Link (Fall 2001), *available at* http://www.policylink.org/atf/cf/%7B97C6D565-BB43-406D-A6D5-ECA3BBF35AF0%7D/BridgingtheOrgDivide_final.pdf.

1125 *See, e.g., Maintaining the Digital Hub. See also supra,* section 3.1.2, for additional discussion about the shift in focus in the early 2000s away from access and toward the need for improving digital literacy.

1126 *See, e.g.,* Linda Fowells and Wendy Lazarus, *Computers in Our Future: What Works in Closing the Technology Gap? Lessons from a Four Year Demonstration in 11 Low Income California Communities*, Computers in Our Future (2001), *available at* http://research.policyarchive.org/6862.pdf (describing the results of a pilot program designed to provide more individualized digital literacy training in low-income communities in California).

1127 *See supra,* section 6.231, for examples.

1128 *See* Samantha Becker et al., *Opportunity for All: How the American Public Benefits from Internet Access at U.S. Libraries,* at p. 42-45, Institute of Museum and Library Sciences (March 2010), *available at* http://impact.ischool.washington.edu/documents/OPP4ALL_FinalReport.pdf.

1129 *Id. See also National Broadband Plan* at p. 176 (recommending that additional resources be sourced to libraries and other public institutions in an effort to bolster digital literacy training opportunities).

1130 *See, e.g.,* Charles M. Davidson and Michael J. Santorelli, *The Impact of Broadband on Education,* a Report to the U.S. Chamber of Commerce (Dec. 2010), *available at* http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/Davidson-Santorelli-The-Impact-of-Broadband-in-Education-December-2010-FINAL.pdf (identifying and discussing related impediments to more robust adoption and use of broadband in the education space) ("*Broadband & Education*").

1131 *See* Amber Parks, *Understanding the Central Themes of the Common Core Standards and the Need to Develop Digital Literacy and 21st Century Skills in Today's Classrooms*, Learning.com (Aug. 2013), *available at* http://www.eschoolnews.com/files/2013/08/Digital-Literacy-Common-Core-white-paper.pdf (providing an overview of digital literacy requirements included in the Common Core).

1132 *See Modernizing the E-rate Program for Schools and Libraries,* Notice of Proposed Rulemaking, WC Docket No. 13-184, FCC 13-100 (rel. July 23, 2013), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0723/FCC-13-100A1.pdf (calling for public comment on an array of proposed reforms to the structure and administration of the program). Over the last few years, the FCC has engaged in a number of related reform activities. For an overview, *see Broadband & Education* at p. 67-69.

Part IV
Additional Perspectives

7 Additional Perspectives

The following essays are offered to provide additional perspective on the complex and multifaceted issue of government-owned broadband networks. The authors of these contributions include a diverse array of current and former policy makers, policy experts, and others with a distinct point of view on the many issues implicated by the GONs debate. The views expressed in these essays are those of their author only and do not necessarily reflect those of the authors of the main paper.

Perspectives from State Government Practitioners

7.1 What Drives Economic Development?

Chris Hart, President and CEO, CareerSource Florida; former Interim Director of the Governor's Office of Tourism, Trade and Economic Development; Senior Vice President at Enterprise Florida; member of the Florida House of Representatives, and businessman

As someone who has spent a career working to bolster economic development throughout the state of Florida, via positions in the public, private, and nonprofit sectors, I am intrigued by recent discussions regarding government-owned broadband networks (GONs). What especially piques my interest is that some see these networks as a "silver bullet" for local economic development. In my many years in this field, I can safely say that, much to my dismay, no such "silver bullet" exists. On the contrary, economic development is hard work that requires a wide variety of inputs and efforts to succeed.

While in some cases a broadband network of any kind—public or private—might serve as a catalyst for growth and job creation, the reality is that state and local policy makers work very hard and experiment with a number of different approaches to see what works in a given situation. The most successful approaches to economic development do not artificially choose which technology or platform or sector will be the driving force in a city or region. Rather, policy makers work with local counterparts in the private and nonprofit spaces to determine, in a very practical manner, what the area can reasonably sustain, foster, and grow. We ask questions like:

- What are the area's core strengths and weaknesses?
- Is the population amenable to new types of businesses?
- Do we have a talent delivery system in place to ensure we have the right skills, at the right time, available to support existing, emerging, and evolving business needs?
- How much growth can a town or city or region accommodate?
- Are core public infrastructure inputs—roads, bridges, ports, railways, etc.—reliable and able to support greater use?
- Perhaps most importantly we ask about goals—what does the area want to achieve in terms of quality of life, jobs, economic growth, etc.? Are these goals reasonable and achievable? Will the benefits ultimately outweigh the costs of realizing them?

Once these questions are answered, then it's time to begin developing a plan for achieving specific goals. Successful efforts here hinge on close collaboration with stakeholders in the public, private, and nonprofit

sectors. Whatever policies emerge stand a better chance of succeeding if they are grounded in the real needs and wants of the people they are meant to impact. Major components of the economic development plans that emerge from this type of process typically include:

- **Tax incentives.** At the heart of many economic development efforts are various kinds of tax incentives. These are structured to support growth of new businesses, facilitate continued growth of existing firms or sectors, or encourage the relocation of major new firms to serve as the center of a new sector. More often than not, these types of direct economic incentives are among the most impactful from an economic development standpoint and the most attractive to firms contemplating expansion or relocation.
- **Workforce development.** In addition to creating a hospitable economic and tax climate, it is essential that stakeholders work to ensure there is sufficient human capital to meet today's needs, fuel growth, and seed innovation. Increasingly, most firms, especially those in the manufacturing and "knowledge" industries, require workers with increasing levels of technical competency and industry-recognized credentials. As a result, many cities and regions are working with workforce boards, community colleges, and other demand-driven institutions—public as well as private—to establish in-demand and customized training programs for these very purposes.
- **Regulatory and legislative concessions.** Depending on the industry or sector, it might sometimes also be necessary to ease or remove barriers to entry and otherwise foster a supportive regulatory environment for certain new businesses. The goal is not to give a particular firm or type of firm a leg up on competitors. Rather, the goal is to create conditions that are conducive to more rapid growth across the sector. At times, this might require revisiting older rules and regulations that have resulted, intentionally or not, in insulating a segment from competition or that have created disincentives around investment and innovation.

Infrastructure is also critically important and requires similar creative responses by state and local stakeholders. A new factory, for example, might benefit from easy access to major highways, ports, or railways to transport their goods. Assuring this type of access is among the core competencies of local government—they can either build it themselves or forge a public-private partnership to accomplish the task. Similarly, a new data center or high-tech computing company might require significant electrical inputs to power processors and cooling systems. Local government could work with the appropriate utility to assure delivery of this input. For firms that need robust access to high-speed Internet connectivity, the approach is similar: government can work with existing service providers in the first instance to get where the city or region needs to be in terms of availability, connection speed, etc. In general, this type of approach—leveraging core competencies and working with expert firms to realize common goals—often yields the most productive and cost-effective solutions.

The best economic development plan, ultimately, is the one that best addresses the needs and goals of a specific area. There are no one-size-fits-all solutions when it comes to solving the riddle that is economic development. Because it is so complex and requires so much time and energy to get right, it is critical that state and local policy makers work in concert with counterparts in the private and nonprofit spaces to determine the best path forward.

7.2 Putting Government-Owned Broadband Networks in Proper Context

Ryan Palmer, Commissioner, West Virginia Public Service Commission, and
Luz Weinberg, Commissioner, Aventura, Florida; Board Member, Miami-Dade Expressway Authority

As public officials serving at the state and local levels in West Virginia and Florida, we appreciate the many nuances associated with broadband connectivity and what those nuances mean for our communities. High-speed Internet access is increasingly essential to the communities we serve. Bringing broadband to every part of the country and helping ensure that as many people as possible are using it to improve their lives are important policy priorities. However, several barriers continue to impede progress towards these goals. As a result, much of our concern in this space is focused on addressing practical issues, like promoting the benefits of Internet access to reluctant non-users (for example, older adults, rural users, and so many in minority communities), and working with stakeholders to figure out how to efficiently and effectively bring broadband to unserved and underserved areas.

In many ways, the debate over government-owned broadband networks (GONs) implicates much of our focus on these issues. Some think that local governments are best positioned to provide residents with fast, affordable Internet access. Others think that these services are best provided via a competitive private marketplace. In all truth, both views have merit because different problems often require different solutions. Regardless of who is "right" and who is "wrong," what often gets lost in the heated GONs discussions is a focus on the universe of other critically important public policy issues that compete for the attention as well as the funds of state and local policy makers.

When we think about GONs, we immediately think about infrastructure. Ultimately, that is at the heart of what we do: we work on the public's behalf to make sure that they have access to robust public infrastructure at reasonable rates. That means making sure that our streets are paved, our electricity is reliable, and water is clean and affordable, which have been challenges in both Florida and West Virginia. However, our efforts are ultimately constrained and defined by financial realities.

Budgets are not unlimited, which means public officials must prioritize. There is no getting around that basic fact. The streets will always be paved, but new public works might be delayed. Similarly, a diverse array of economic considerations influences how we manage core public assets like the electric grid and water system. Yet, a significant amount of work remains to be done across the country when it comes to our public infrastructure, much of which is aging and in need of replacement or a significant upgrade. Chronic underinvestment, a function of tight budgets and finite public resources, has resulted in far too many poor roads, unsafe bridges, and antiquated public utility systems.

In short, when considering whether to invest large amounts of public money on GONs, public officials must consider the entire universe of public infrastructure needs. Each state and community has their own unique challenges and must decide how to address all of these challenges with the resources and funds available. As a result, when we are faced with broadband expansion and adoption issues, we focus on fostering an environment and implementing policies that are most impactful given the scope of our authority, the realities of our citizenry and economy, and the needs of our basic public infrastructure. Hopefully, the result is a carefully calibrated and collaborative effort focused on creating favorable conditions to support increased broadband connectivity.

The ultimate goal is for this practical approach to enable us public officials to not just listen to our local communities but to also respond to their needs and keep focused on the undisputed fact that ensuring ubiquitous broadband for all is a legitimate priority, amongst so many that require considerable resources and leadership from both the public and private sectors.

7.3 The Truth About Municipal Broadband in Minnesota

Representative Linda Runbeck, Minnesota State Legislature

My home state of Minnesota is a battleground on the issue of municipal broadband. As a State Representative, I have witnessed a number of communities approach the issue of broadband access with various plans and policies. Some municipalities have incentivized private investment, while others have built their own networks.

As an elected official, I've come to believe that broadband service is beyond the scope of local government's core duties. I oppose municipal broadband not only because it puts government in competition with the private sector, but because local governments are not up to the task of running a municipal broadband network.

I have seen a number of municipalities put the taxpayers at risk based on the assumptions and promises of vendors and consultants. Local officials are sold a "bill of goods" and told that a city-owned broadband network will be an economic savior, will be able to pay for itself and even provide additional revenues to the city.

But local officials rarely take into consideration the fact that these businesses have financial incentives that may be in conflict with the objectives of the municipality. Policy makers rely on their promises to the detriment of constituents and taxpayers.

The decision to enter this competitive market should be made by those who have the most at stake: the taxpayers. Elected officials should acknowledge the complexity of the situation and limit their business interests in competitive markets.

Municipal Broadband Is Beyond the Scope of Government's Core Duties

From a philosophical as well as an economic perspective, I believe that using taxpayer money to further government entrance into the competitive broadband industry represents a misguided understanding of government's role vis-à-vis its citizens.

Local governments are good at a lot of things: building roads, operating utilities and managing professional law enforcement units. But local governments are ill-prepared for operating a complex business model in a highly competitive marketplace.

As a former city councilmember and wife of a current councilmember, I am familiar with the abilities, advantages, constraints and limitations of local government. And as a former small business owner and corporate executive, I am also familiar with the demands and pressures of private industry and market competition.

My time in both worlds leads me to conclude that local governments are just not up to the task of operating a business like broadband in such a competitive market. Local officials are often limited in their time. They do not have the requisite business acumen to accurately assess consumer demand and finance these projects effectively. *A lack of business acumen and experience, coupled with the restraints and limitations of public office, can lead to a high frequency of failure for investors or financial bail-outs by taxpayers.*

Municipalities Are Often Sold a "Bill of Goods"

Local governments often see municipal broadband as an economic savior or a way to boost city revenues in a poor economic climate. They believe that a municipal broadband operation will bring in new employers and generate revenues. Some broadband vendors are eager to reinforce this narrative, even if the numbers and figures demonstrate the opposite.

These vendors often present idealized expectations that omit a true assessment of the risks, the pitfalls and the substantial capital costs of owning and operating a municipal broadband system.

Minnesota has several communities that have bought into these promises, only to find themselves mired in debt with a struggling network. Monticello, a city in Wright County, embarked on building a municipal network hoping it would bolster the city's economy and generate additional revenues for the city. Monticello borrowed more than $26 million to finance the construction and operation of a government-owned network, FiberNet. While the city and the network's developers projected high subscriber rates and a quick return on investment, the outcome could not have been anymore different. FiberNet lost $2.6 million in 2011 and the city defaulted on its bond payments the following year.

Unfortunately for the city and its residents, the competitive broadband market proved difficult to penetrate, and the task of operating the business daunting. The old saying, "if it sounds too good to be true, it probably is," is rarely so applicable. *Communities must be vigilant when examining these kinds of "opportunities" and acknowledge that optimistic facts and figures may be inaccurate as a result of inherent conflicts of interests.*

Hiring an independent financial analyst to advise elected officials is a wise precaution.

Consultants, developers, suppliers, and financiers all have an interest in the sale of their goods or services. *These conflicts can and do result in too-optimistic projections and inflated figures that prevent local officials from fully appreciating the risks and difficulties of operating a broadband network.*

Municipal broadband supporters are often critical of the "bottom-line mentality" of the private sector, but rarely do they acknowledge that this mentality is equally present in the municipal broadband industry. Policy makers must be cognizant of these conflicts when deciding whether to invest in municipal broadband and should make efforts to effectively communicate these concerns to their constituents.

Constituents Must Have Input into a Community's Decision to Build a Network

Residents of municipalities throughout Minnesota can be excluded from the decision-making process when it comes to approving a municipal broadband project. This exclusion is in contravention of the spirit of Minnesota's laws and contrary to the concept of "local self-reliance" — a slogan used to frame the municipal broadband debate as a David versus Goliath struggle. The exclusion of taxpayers who directly and indirectly pay for the cost of the network does not further community involvement or self-reliance.

Minnesota law requires a municipality to hold a referendum before forming a telephone service. These requirements were put into place decades ago to ensure that the formation of a competitive business is in furtherance of the will of the people. Unfortunately the law does not extend to broadband services. Without such protections, the will of the people can be ignored by local governments, the municipality's solvency is risked, and citizens' hard-earned tax dollars at risk.

Lessons Learned

Municipal broadband is beyond the scope of government's role. Governments are intended to represent the will of the people and provide goods and services, but the parameter of that role does not cover instances where those goods and services are being adequately provided by the private sector. In short, local governments are ill-equipped to participate in a competitive market.

Perspectives from Local Government Practitioners

7.4 Beyond GONs: Appreciating the Many Roles that New Technologies Can and Should Play at the Local Level

By Carole Post, Executive Vice President & Chief Strategy and Operations Officer, New York Law School; former Chief Information Officer of New York City and Commissioner of the City's Department of Information Technology & Telecommunications

Local officials, especially those in municipalities with large, diverse populations like New York City, face a daunting array of issues that impact everyday life for thousands or millions of residents. Meeting these many needs typically requires an equally large government infrastructure that can develop and implement policies to affect real change in key communities and sectors. Fortunately, an array of new technologies, from high-speed Internet connections to social media, is helping to improve how officials engage in the day-to-day work of city government and facilitating more direct engagement with residents. While "big" issues like government-owned broadband networks (GONs) are compelling, if not ambitious, initiatives to pursue, "smaller" advances in the use of technology by government are continuing to have profound impacts on how cities serve their residents.

During my time in the administration of former New York City Mayor Michael Bloomberg, I had the privilege of being able to collaborate with an extraordinary group of forward-thinking innovators, both within city government and throughout the city's emerging high-tech ecosystem. Together, we were able to develop a number of creative and impactful solutions that sought to both streamline how government works, so as to be more responsive to citizens' needs, and to make our work more open, which in turn would help fuel further innovation and creativity in the development of citizen-focused services.

A key enabler of these efforts was data, namely the vast trove of information that every city collects in the normal course of delivering services and administering municipal programs. Mayor Bloomberg was a pioneer in harnessing this data to carefully tailor responses to discrete issues. This data-driven ethos pervaded his administration and led to the implementation of a range of incredibly successful programs across every agency, from the Police Department to Sanitation. From the perspective of using data to enhance citizen engagement, the Department of Information Technology & Telecommunications (DoITT) worked to spearhead, among other things, one of the nation's first municipal open data laws. This law facilitated the release of public data sets in an effort to increase transparency and to encourage innovators to develop new tools for our

increasingly tech-savvy population. And unlike many legislative efforts that often result in a congratulatory bill-signing, only to go silent when it comes time to implement, New York City's open data law has been the subject of active and aggressive implementation to meet its required milestones. At the time of this writing, DoITT had published thousands of data sets, a data release plan for when more data would be forthcoming, and an interactive data release progress dashboard. Moreover, the plans will be updated each year and will serve as a roadmap for the eventual publication of all publicly-available data in a single web portal.

Of course, these new tools are only useful to those citizens who are able to access them and who know how to put them to meaningful uses. The real promise of broadband, especially in the context of local government, is that it can support the delivery of critical information and important services in a number of new ways. For many residents, going online via a smartphone or a tablet, at home, in a park, or on the street, is second-hand. This is certainly the case in New York City, which is among the most hyper-connected cities in the world. As a result, our work on broadband issues revolved mostly around helping to enable continued improvements in service and promoting use of new technologies in underserved communities.

From the access side, we forged a number of partnerships with service providers in an effort to speed deployment of Wi-Fi in our city's many parks, to build technology centers in dozens of communities, and to support the continued development of the city's thriving start-up space.

From the use side, we leveraged tens of millions of dollars of federal stimulus funds to forge additional partnerships with private firms and nonprofit organizations and deploy first-in-kind outreach and digital literacy training programs in public middle-schools and workforce development centers across the city.

Together with our work around open data, these efforts constituted a comprehensive yet very practical approach to harnessing new technologies and putting them to work for city government and citizens.

From a governance perspective, it is critical that local officials embrace the many new tools and platforms that are emerging and work with, rather than compete against, the experts that are developing them and making them available. City government doesn't need to be expert in all things tech – and it is probably unwise and futile to attempt to be – but it should strive to be informed and open to new ideas and new ways of doing things.

7.5 Glenwood Springs and Municipal Broadband

David Merritt, Consulting Water Resources Engineer and former City Councilor, Glenwood Springs, Colorado

I served on Glenwood Springs City Council from 2001–2009. One of my very first votes was whether or not to go ahead with a plan to build a municipal broadband network. I was skeptical of the financial viability of the project, but the majority of the city staff and council were in favor of it. We ended up going through with it and building a small fiber network that provides services to municipal buildings and businesses in the core of the city.

At the time, Glenwood Springs was served by Qwest and Comcast, although market penetration was relatively weak. Qwest and Comcast had made statements that they intended to develop the Glenwood Springs market, but they were slow to build out new infrastructure. The city government's dissatisfaction with the pace of broadband development led to a push for a municipal network.

The city borrowed $3.5 million under Glenwood Spring's electrical utility. The network was launched in 2002 and initially provided fiber access to municipal buildings and local businesses, but not consumers. It has only been through third-party contracting that "point to point wireless" was established for residential users and business users outside the central core. The infrastructure has also been used to provide VoIP to businesses located within the central core that is physically connected to the fiber-optic cable.

From an operational standpoint, the network can be construed as successful—the city does have more internet access. But from a financial standpoint, it's not been the success that was anticipated for the city. In the

early years, the network hemorrhaged tax dollars and ratepayer money. The city had used annual cash infusions from the electric utility to keep the network operational, but has now managed to keep operational costs nearly within revenues. However, there will be capital upgrades required which will again stress finances.

My experience as a councilmember at the formation of the network should provide other elected officials with some perspective and insight. There are a number of concerns and unknowns that we in Glenwood Springs faced. I hope that sharing these concerns and experiences with others will help cities decide whether or not to build a municipal network.

Set Realistic Expectations

The City Council and staff believed that the fiber network would provide additional revenue for the electrical utility and the city. Despite optimistic projections, the reality was that the network did not produce a profit during the entirety of my tenure on the City Council. Municipal broadband is too risky to expect profitability, but when necessary should be viewed as providing an essential service

After the network began running on a deficit, the city government reset expectations. Glenwood Spring's City Council realized that the network would not generate the revenue that was initially forecast. The city was forced to accept the fact that the network would require revolving subsidization.

When examining a municipal broadband project, city governments must set realistic expectations. Proper planning requires a careful and measured analysis of all factors. Conservative planning will ensure that a city will lose $10,000 rather than $50,000.

Do Not Invest Good Money after Bad

Cities and towns tend to invest good money after bad when it comes to broadband networks. The logic is based on using sunk costs to justify further spending—if the network is failing, the answer to the problem should not be further investment.

The Glenwood Springs government was tempted to expand into the retail space in 2007, offering cable television and residential telephone service. The thought was that if the network offered more services they could make more money and possibly generate a profit. Supporters of the expansion sought to put good money after bad in an attempt to make the network turn a profit, but this would come at a substantial risk.

The City Council voted against the plan. I think we saved the city from being in the hole for millions. Residential expansion is costly and even more risky. We in the City Council voted to maintain the network's focus on high-value concentrated businesses in the city's core areas rather than building out expansive and expensive infrastructure into the surrounding community.

Involve All Interested Parties in the Process

Taxpayers, elected officials, community organizations and businesses all have a stake in conversations regarding broadband. Accordingly, these individuals and groups should have a hand in the decision-making process.

The city kept the network relatively under the radar. We chose to extend the discussion to the local Chamber of Commerce, but not to citizens and community organizations. In hindsight, this was not the best approach.

It does not matter that the network was not conceived to be a retail broadband provider—it still put taxpayer dollars at risk and the community should have had a say in pursuing the project.

Be Mindful of Those Pushing for a Municipal Network

Cities often rely on consultants to plan and design municipal networks because governments lack the requisite expertise to do so in-house. Though they possess expertise on these issues, these folks are also self-interested because they generally have a stake in an outcome that involves the construction of a government-owned broadband network. Such self-interest can have negative consequences for municipalities.

The consultants arrived into Glenwood Springs like "The Music Man." They overpromised the networks, and many in the city felt like we were over-sold. Many members of the City Council wanted to believe that the consultants' estimates and projections were a guarantee, but they were not.

Elected officials should temper their optimism and recognize that consultants and counterparties have a vested interest in cities and town going ahead with municipal broadband projects.

Investment Invites Competition

While Glenwood Springs's network does not provide direct retail service to citizens, it has facilitated the entry of two ISPs who do provide the connection between the retail consumers and the system. Market competition is a good thing for consumers, but municipalities are often ill-equipped to effectively compete with private firms.

Incumbent providers have continued to build out their networks in Glenwood Springs. Private investment in the area has led to an increase in competition, which in turn has resulted in better services and lower prices. These low prices force Glenwood Springs to keep their own prices low despite the network's need for additional revenue to make the network profitable.

Elected officials should recognize that investment invites competition, and the private sector is in the business of competition. Any municipal plan should take into account that it will likely be in competition with national providers who have numerous advantages over public sector entities, from expertise to economies of scale.

Conclusion

Glenwood Spring's fiber network has had mixed results. It was promised as a business, but functions as a utility. The city has made the best of the situation and minimized the risk by limiting investment. Elected officials should be conservative in their investment, careful with their planning, and tempered in their optimism. Competition, bad investments, and poor planning can easily turn a municipal network into a million dollar loss.

7.6 Lessons Learned from Marietta's Fibernet Failure

Bill Dunaway, former Mayor, Marietta, Georgia

Marietta, Georgia, operates its own utilities and has done so for the past 100 years. When utility companies saw deregulation looming, they wanted to get into the broadband business to make up for what they expected to be a loss of revenues from their core energy business.

The city itself was well served from an Internet perspective. We had incumbent providers offering high-speed service to individuals, businesses, and the city government. The underlying drive for a municipal network was not a lack of service. Rather, Marietta was concerned that their electric utility, which provides a bulk of the city's revenues, would be diminished by deregulation.

The municipal network was originally laid out all over Cobb County and extended into Atlanta. The Cobb County school system was one of the network's biggest customers, along with the county government. The network was exclusively wholesale—we did not provide fiber to the home. We spent about $35 million on building and maintaining the network. But the network was never able to generate sufficient revenues.

I was elected in 2002 on the platform of selling the network. The town had been subsidizing the network with taxpayer money since its inception to the tune of $1 million a year, an amount that was simply unsustainable. In 2004, we were finally able to sell the network at a loss of $11 million. Selling at a loss was necessary to prevent future losses.

Upgrading and Maintaining Municipal Networks are Often Unforeseen and Hugely Expensive

The cost of upgrading and maintaining a network is extensive. When cities discuss broadband, they tend to leave out the future costs created by the network. Technology moves quickly, and cities must keep pace. Elected officials have to realize that a commitment to building a broadband network is ongoing, and upgrades and maintenance will need to be made regardless of the network's profitability.

Marietta was ill-equipped to handle the speed of broadband technology and the rapid degradation of the infrastructure. Year after year, we were forced to divert money to the network for upkeep, despite low subscriber rates and poor performance.

Marietta was not prepared to spend $1 million annually to subsidize the network and keep it maintained. Elected officials have to take into account the extent of their commitment. Infrastructure costs are not a one-time thing; they are ongoing and sometimes unpredictable.

The Risk of Selling at A Loss

We sold the network at an $11 million loss, and that is fortunate. When a network is unprofitable, it becomes a tremendous burden for the city government and taxpayers. In the case of Marietta, the network was such a burden that selling at such a staggering loss was still considered a positive conclusion to the boondoggle. It is not uncommon for a failed network to be worth less than the obsolete infrastructure that it is made of.

The rapid pace of technological advancement not only makes it difficult and costly to keep up with innovation, but it also leads a network to be almost worthless if it fails. Why would a prospective buyer want to purchase equipment and infrastructure that is already outdated? This is the problem I faced as mayor of Marietta.

We ultimately decided that a loss of $11 million was a better option than subsidizing the network with $1 million every year—it was the best and only option we had. No one wanted to buy an outdated network in a saturated market.

Selling a Network Can Be Extraordinarily Difficult

Selling Marietta's Fibernet created a number of obstacles and challenges that I did not anticipate. Handling customer and taxpayer concerns, addressing the media, and dealing with competitive incumbents and prospective buyers makes the process of selling a failed network very difficult.

Prospective purchasers will try to get the lowest price they can, and in order to do so they will gather as much information on the network as possible. The local media was also interested in getting as much information about any impending sale as well. When parties are negotiating a sale, you do not lay all your cards on the table, but Georgia law required that I provide access to any city council discussion of the sale. This made it extraordinarily difficult to find common ground and agreement on a plan. We did not want to give too much information to prospective buyers that would harm our ability to negotiate, but government structure provides that we must be transparent and upfront with our citizens. Elected officials should recognize that the government restrictions may make a potential sale even more difficult.

Even if I was able to convince some of the council members that a sale was necessary, many still resisted the plan. Marietta has a weak-mayor form of government, which limited my ability to unload the network. Some members of the City Council viewed the network as their "baby" and would rather the city continue to prop the network up. Government structure can make getting out from under the network even more difficult than some elected officials realize.

Selling an unprofitable network presents a number of issues and obstacles that make it extraordinarily difficult. Elected officials should take these troubles into account when thinking about investing in a network—it may be easy to get in, but it's very difficult to get out.

7.7 Perspectives on the Davidson, North Carolina Experience

7.7a Lessons from MI-Connection, a GON in Davidson, North Carolina

Laurie Venzon, former Commissioner, Davidson, N.C.

For a long time, the town of Davidson, North Carolina, was a small, sparsely populated community with limited demand for broadband. But as the city began to change and grow, so, too, did its demand for connectivity. Davidson has a long history of poor communications service providers. Lakeside Communications, the original provider, was bought out by Prestige, and Prestige was bought out by Adelphia. During this time, Davidson's population and the population of the surrounding area began to skyrocket. There are currently over 11,000 people in Davidson and over 100,000 people in the Lake Norman region.

When Adelphia took over Prestige, Davidson's government negotiated with Adelphia for a right of first refusal to purchase the network's local assets in the event of failure or bankruptcy. The agreement allowed the town to exercise some control over broadband providers and the town's service. When Adelphia went bankrupt, Time Warner put in a bid for the system. Before the deal was approved, Davidson approached Time Warner and asked if they would honor certain provisions of the current contract with Adelphia. Time Warner Cable declined and indicated they had no intention of upgrading the system or providing the level of service in the Adelphia contract. This fueled Davidson's decision to pursue its right to purchase the system from Adelphia, cutting Time Warner out of the deal. Davidson formed a partnership with four other surrounding communities and began a due diligence process to analyze the viability of the towns running their own broadband network. Unfortunately, this reaction by local government set the stage for a costly investment that is still being paid for to this day.

Poor Planning and Erroneous Assumptions

The communities involved in the municipal broadband project hired consultants to analyze the feasibility of a government-owned network. The consultants found that a municipal network supported by Davidson and four other nearby towns would be successful. This projection was based on a number of assumptions that proved to be inaccurate.

The consultants' assumptions did not consider any competition that might arise in the market, believing that the area's subscriber base would not have any additional options, given the previous lack of interest from any company to invest in the area (not considered dense enough to be profitable). The consultants also included a modest 3–5% customer growth rate in their financial models which proved to be unattainable when the recession hit two years later. Yet, even with its optimistic assumptions, and a five-year payback period, three of the five member-cities backed out of the plan, which dramatically reduced the potential subscriber base.

Davidson should have backed out at that point as well. On paper, the plan worked for five towns, but it would be difficult to succeed with only two. Unfortunately, elected officials in Davidson felt they had come too far to turn back. With Mooresville and Davidson the only remaining towns left, they decided to proceed under the assumption that the network would still grow at a 3 to 5 percent clip annually and they could make up the subscriber base that the other towns represented. Thus, in August of 2007, MI-Connection was born. Eighteen months later, by January 2009, the reality was the network's subscriber base had fallen from 15,000 to 10,000 due to a variety of issues discovered after the purchase was made.

The Risks of Partnerships with Other Municipalities

Municipal networks represent risk. Competitive industries, such as broadband, carry an inherent potential for failure. Davidson believed that a partnership with other nearby communities would reduce the risk and provide a broader subscriber base. While these assumptions may be true in the abstract, they ignore the risks created by community-partnerships. *Every approach to a municipal broadband network comes with its own risks and benefits and needs to be objectively evaluated.*

A municipal network owned by one community provides the government more direct oversight of the network and more insight into the network's operations and subscriber demands. The network infrastructure is also likely to be substantially smaller because the geographic footprint is narrower. There are, however, a number of downsides. The financial risk is solely on the taxpayers of a single community; the network rises and falls with that one community. If the network fails, the debt load is not spread out among several communities; rather, it is placed solely on the backs of a single community.

Multi-town partnerships like MI-Connection, on the other hand, offer the benefits of diversifying risk and reducing overall debt loads. However, they also create a number of risks in the form of information asymmetries, potential conflicts of interest, different priorities between the municipalities, as well as, being susceptible to changing "political winds."

When I was elected Commissioner in November, 2007, I began to examine the network's contracts and our inter-local agreement with Mooresville to better understand the arrangement. The two towns had basically outsourced the operation of the network to Bristol Virginia Utilities while they maintained oversight through a MI-Connection board of directors. By January 2009, when MI-Connection was losing customers and money every month, I began to take a closer look at the situation. I discovered while the infrastructure had been upgraded to a state of the art fiber-optic network, the operations were functioning very poorly. In addition, the business arrangements they had made with other parties were very costly.

Furthermore, when I contacted several commissioners from Mooresville (Davidson's partner in the network), they stated that they were unaware of the network's struggles. Even though we were "partners" in the MI-Connection endeavor, we never discussed the network as a group. Mooresville was receiving information that we did not receive and vice versa. And there was some information that neither of the town boards received. Such an information asymmetry makes it difficult to effectively oversee a network. Once we realized that we had been kept in the dark about several challenges facing the network, the Davidson & Mooresville commissioners set up monthly meetings to address all the issues that had presented themselves and began the years-long process of digging ourselves out of the hole.

Another issue with multi-town partnerships is the likelihood that political differences can lessen the effectiveness of oversight. As the number of individuals tasked with network oversight is increased, the potential for conflict increases which may cause poor management and policy decisions. Add to that the factor of political elections every two years and a government owned network can quickly find itself in the middle of a political crossfire. This does not create the best type of environment in which to run a business.

Market Demand

Municipal broadband networks do not operate in a continuum separate from market forces. Most, if not all, of the problems that municipal broadband providers encounter are the result of local officials' inability or inexperience to examine the market effectively. Typically, when an area is underserved, the market is indicating that the population density is too low for a high-speed broadband network to be profitable. Many elected officials focus on their constituents' request or demand for a network, but don't want to acknowledge that financial infeasibility is the major reason that broadband has not been deployed in a given area. Policymakers must understand that municipally owned networks will often require a large amount of subsidization especially in the early years or whenever infrastructure upgrades require capital infusion.

Concerns and Risks

A municipally owned network failure does not just harm the local government; it harms the taxpayers along with the surrounding communities and the state. *The potential political and economic fallout of a government-owned system's failure must be taken into account by elected officials.*

The political fallout that resulted from MI-Connection's troubles was telling: only one person who authorized the network purchase in 2007 is left either of the Davidson or Mooresville town boards. In the ensuing years after the towns bought the Adelphia system, at every turn, citizens would continue to bring up the failing

network and would often refuse to support current projects as a result of their aversion to the wasteful spending on the MI-Connection endeavor. The damage that was done in terms of the public's trust was immense.

Additionally, in Davidson, the unexpected need to subsidize the network created financial difficulties. The subsidy amounted to 20% of our budget so we had to cut programs, cut staff, reorganize and charge residents a solid waste fee that equaled a 4 cent property tax increase. Needless to say, people were not happy.

The local economy can also be at risk when cities and towns invest in risky broadband networks. Davidson could have easily defaulted on their payments had the network failed. If Davidson was unable to pay its portion of the MI-Connection debt, the State of North Carolina may have been forced (via the Local Government Commission) to take over the town's finances and raise taxes (in the range of 10–12 cents per hundred—a 30% increase in the town's property tax rate). Communities run the risk of losing their autonomy if the town-owned broadband network fails.

Furthermore, the state's bond rating is at risk. If Davidson or any other municipality defaults on a loan or bond, the default could spill over into other cities in the state. Increased rates for other cities that did not invest in such risky endeavors would make it more costly for those governments to borrow money to fund other core needs such as public infrastructure—roads, bridges, sidewalks and water systems.

Solutions and Best Practices

There are a number of mechanisms that elected officials can put into place to minimize risks and costs associated with broadband planning if they believe it is in the best interest of their constituents for their local government to own a broadband network. Referendums and public-private partnerships are options that should be considered versus simply having a board vote to take on the endeavor itself. Both the referendum and a public-private partnership provide municipalities with political capital, expertise, and cost-savings.

Referendums and voter approval should be a requirement for any municipal network. The voters' money is at risk, and they are the network's potential customers. Allowing voters to have a say in the network limits the political risk of building a network. In Davidson and Mooresville, the network's lack of voter support led to a number of elected officials being removed from their positions. If voters are given the opportunity to provide input in the planning stage of the network, they are more likely to "buy-into" the network and assume some of the responsibility to make it successful. With a majority providing front-end support, it is less likely for retaliation against elected officials to occur.

Referendums ensure that there will be an adequate customer base for the network. Cities can use the number of votes as a preliminary indicator of how many subscribers the network has the potential to begin with at inception. While a vote does not necessarily translate into a paying customer, it is an effective means of determining if there is adequate support in the community.

Finally, referendums are an issue of fairness. The municipal governments use taxpayer money and put it at risk. Municipal broadband networks are unlike other government infrastructure in that they are not universally used and they are subject to competition by the private sector. These factors increase the risk of failure and loss of taxpayer money. When elected officials are taking risks above and beyond the risks of what governments typically do, they should be required to seek out the approval of their constituents.

Governments should seek out partnerships with private industry to minimize risk, diversify funding, and provide the network with the expertise that is not usually available to municipal networks. A public-private partnership could create a win-win situation. The private sector is an efficient market that specializes in precisely what the municipality intends to do and will provide the expertise needed for the network to be successful. The public sector/municipality has access to very inexpensive borrowing rates for capital that could ensure financial feasibility of the network that might otherwise be lacking if capital had to be funded at market rates.

Public-private partnerships must mitigate the public information requirements via their partnership arrangement. A government's business is the public's business which creates a huge disadvantage for municipal networks. The requirement to allow public access to a municipality's documents, emails and other information

allows competitors to freely access information regarding the network. This includes operational performance, pricing data, strategic plans and marketing campaigns. Governments and private industry should structure partnerships in such a way as to limit these drawbacks while maximizing the benefits of the partnership.

Conclusion

Municipal broadband networks are risky. Davidson and Mooresville put their towns, their taxpayers, and the state of North Carolina at risk when they devised a network according to a number of faulty assumptions and continued to move forward without the necessary base of subscribers that the financial models required for success. For other communities considering such an endeavor, the best course of action would be to first explore whether a public-private approach is possible. If not, then the municipality should seek a referendum to assure that the will of the people is being acted upon and to gauge market interest in such a service. Otherwise, the potential risks far outweigh any of the benefits.

7.7b Resuscitating a Failed Network

John N. Venzon, Chairman, MI-Connection

As Chairman of MI-Connection, I have seen a municipal network at its lowest point, but I've also been a part of turning the network around. Being part of the network's management team has given me unique insight into the trials and tribulations of running a government-owned broadband network. I believe that these unique experiences will aid others in determining whether or not such a system makes sense in their community.

My first experience with MI-Connection came when my wife, Laurie, was elected a town Commissioner in Davidson, North Carolina. The network had already been bonded by the time of her election. Shortly thereafter, she began to ask questions about MI-Connection's financials. The responses she received from the management were shallow and obscured its financial condition. The evasive nature of these answers only encouraged us to dig deeper.

What we uncovered was shocking. The city had overpaid and over-borrowed, and the network was under-subscribed. The system, in short, was being mismanaged into the ground. The towns worked to revamp the board of directors and when I first joined I became the treasurer and then took over as chairman.

MI-Connection's Problems Began During Planning

The planning stage of a network is vital to long-term success. Our investigation into the planning that went into MI-Connection revealed a number of fundamental problems.

We first determined that Davidson and Mooresville—the two partner cities—had significantly overpaid for the network. The overpayment was a result of events surrounding the previous owner's failure and bankruptcy. During the sale, the network appeared to have significantly more active customers than it actually did. As a result of these inflated subscriber numbers, the cities paid between $5 and $10 million more than the network was worth.

MI-Connection's original management team also outsourced a number of responsibilities that resulted in increased costs. And elected officials and managers were not providing the necessary oversight. We were essentially writing a blank check.

The network was in trouble. We ended up with $92 million in debt, two different financing vehicles, and a network that essentially had $15 million in revenue. When I began to attempt to revitalize the network, I approached both town boards and informed them that the current structure was not a viable business model and that it could not sustain the debt because it had no growth potential. My biggest fear was that we would default on the bond and the state would service the debt for us. If that happened, the state might also take over Davidson's government.

How We Turned MI-Connection Around

Turning MI-Connection around was a herculean task. First, we had to find a way to stem the outflow of cash. To do so, we immediately sought to renegotiate our contracts. This step was extraordinarily difficult because the network had no charter that discussed how we should proceed. What's more, we were very limited in how we could renegotiate because MI-Connection is a government agency. As such, we were required to abide by a number of restrictions. For instance, there were strict limits to how we could borrow funding. Essentially, MI-Connection was barred from every traditional method that the private sector uses to turn a company around.

Second, we had to make sure we had the right people working to solve these complex problems. A strong team is essential in any turnaround. We were fortunate to have a phenomenal staff of hard-working, intelligent people running the network. When I began my tenure at MI-Connection, I focused on recruiting all of the top talent in the area.

We also had to make sure that MI-Connection had a specific objective or goal. Early on, MI-Connection did not have a focus. There was no common set of objectives from a business standpoint. Some officials wanted to get into the broadband business to provide better services to constituents regardless of the system's economic viability. Another group saw broadband as a way for the communities to generate additional revenue. A third group saw the network as a solution to their dissatisfaction with existing service options. And still others believed the municipal system would be good for economic development and would help attract businesses and employers.

While a broadband network has the potential to accomplish many of these objectives, business models must be properly structured and deployed. And local government must buy in and support the objective.

Finally, we had to make sure that there was a clear end game for the network. MI-Connection had no clear exit strategy. As such, one of my top priorities as Chairman was to develop an end game strategy for the network. After careful consideration, we determined that the best course of action would be to stem the bleeding of the network and make the network more appealing for prospective buyers. Once we were able to develop a clear objective and devise an exit strategy, we were able to take the necessary steps to turn the network around and accomplish our goals.

We have made substantial progress towards self-sufficiency, but MI-Connection is not yet out of the woods. We have reduced the network's debt, lowered expenses, and streamlined the network's management structure. These changes have made the network more viable, but they are not lasting solutions. Our policies are designed to make the network more attractive to prospective private buyers, not to foster long-term sustainability as a municipally owned and operated broadband network. Our management's stated goal has always been to turn the network around and divest Davidson and Mooresville of MI-Connection as soon as it is financially prudent to do so. We intend to accomplish this goal in the next five years.

Advice and Best Practices

In light of my experience with MI-Connection, I respectfully offer policy makers the following advice about how best to approach the issue of municipal broadband.

1. **Municipal networks should be community networks.** Make sure proposals pass the broad community consensus test. I went back and interviewed everybody involved in MI-Connection. For the first few months, the towns were meeting clandestinely. These kinds of decisions must be vetted in the light of day. They must be scrutinized to make sure you have support going in beforehand.
2. **Don't just believe the consultants.** When the elected officials were engaged in the planning phase, they hired outside counsel and lawyers who had fairly large fee structures, which generated thousands in income for their services. More importantly, those individuals had a vested interest in running up fees and making this go through. Their financial models had so many assumptions in them that no one stopped to say, "Is this really the right thing to do?" You can plug in an assumption to any business model

and make it work. The real question is what will happen in the real world, and do you have the skill set and discernment to determine whether this is the right thing and whether it will be successful.

3. **"Stick to your knitting."** In the Carolinas we have a saying that originates from the states' textile companies: "Stick to your knitting." If you don't have the expertise, you better find people who are capable of doing it or don't do it at all. Municipalities should stick to what they can do effectively and leave to the experts that which they do expertly.
4. **Identify clear objectives and always have an exit strategy.** If you're going to enter the broadband space, know why you're getting into it and how you're getting out.

Perspectives from Subject Matter Experts

7.8 Municipal Broadband: A Financial Perspective

Anna-Maria Kovacs, Ph.D., CFA, Visiting Senior Policy Scholar at Georgetown University's Center for Business and Public Policy[1133]

Any broadband network has to be well-funded and well-run. That takes deep pockets, scale economies, and experience in network construction and operations as well as in marketing. While municipalities can obtain funding via taxes, tax dollars are limited. Municipalities are unlikely to have either scale in purchasing telecommunications equipment or experience in constructing and running broadband networks. Thus, when a municipality considers building out a broadband network with tax dollars, the first question has to be: "Is there an alternative way to get a private company to do this?"

That is a vital question, because if there is no business case for a private company, it is even less likely that there is a business case for the municipality to build out. If the town decides to proceed anyway, its taxpayers need to understand that they will be paying indefinitely for a project whose benefits are intangible. Were the benefits tangible, they could be incorporated into a viable business case that would attract private investment.

If the community already has at least one broadband provider and is considering funding a competitor, the equation becomes even more complex. Not only must the business case be realistic about the likelihood of winning customers away from the incumbent, it must be realistic about the impact on the incumbent and the incumbent's reactions. Will the incumbent respond by upgrading its existing network and improving service? That's good for the community, but makes it even more likely that the municipal network will be unprofitable and a drain on tax dollars. Conversely, will the incumbent lose market share and leave the community? That may help the municipal network's profitability, but is not necessarily helpful to the community as a whole.

As the ACLP report shows, there are all too many examples of municipalities who have spent taxpayer funds only to discover that the job is more complex or the financials more precarious than they expected. No town wants to see its credit rating damaged, as was Burlington, Vermont's. Nor is it ideal for a city to find itself selling a network in which it invested $39,000,000 for one dollar, as did Provo, Utah.

Fortunately, there are other options for communities that are creative and flexible. Kansas City attracted Google's gigabit network via concessions that include speeding permitting, providing rights of way, and being flexible about build-out requirements. Austin, Texas, has extended flexibility to incumbents as well as to Google. As a result, Austin has persuaded three privately capitalized companies—AT&T, Google, and Grande Communications—to either build or upgrade networks to gigabit speed. Such private solutions allow the community to enjoy the benefits of broadband without saddling the taxpayers with the cost and risk.

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Questions That Communities Should Ask

A community that wants a new or upgraded broadband network needs to ask a series of questions, including:

- What network(s) does the community already have? What does it need today? What will it need over time?
- What will it take to make a broadband network—either private or public—a viable business in this community?
- What is the business case under at least three scenarios: realistic, best-case, and worst-case?
  - What will the capital costs be upfront?
  - What will ongoing operating costs be?
  - Where are revenues coming from? Is the incremental revenue from this project enough to cover costs of operations and capital, or will it require continued taxpayer funding?
- Is this a viable business case for private capital?
- If there is no business case for private investment, why is there a business case for the municipality?
- What can the community do to make this project more attractive to private capital? What can the town do to facilitate the build-out? To lower cost and risk for the provider? To ensure a baseline of revenues?
- If there is a private-public partnership, how are the costs, the risks, and the benefits divided?
- How much is the community willing to lose on this network and for how long? How long will taxpayers be willing to support the network?
- What alternative uses of the taxes being raised for the network is the community forgoing?
- What will the impact of additional debt be on cost of the community's other debt under best-case and worst-case scenarios?
- What is the exit strategy?
- If there is an incumbent, how will this new competition impact the incumbent—best case and worst case? Is the incumbent likely to exit the market, thus eliminating hoped-for competition?

In the vast majority of communities in the U.S., private capital has already built at least one broadband network, and in most of the U.S. it has built several, wired and wireless. For those communities, the Austin, Texas, solution of working with the private entities is both practical and greatly preferable.

Even those communities that still lack a broadband network are best served by finding a private provider. If there is one thing that the examples in ACLP's study show, it is that operating a broadband network is not an amateur sport. It requires capital, experience in operations and marketing, and scale. Only as a last resort should a community build its own network, and even then only if community leaders are certain that the taxpayers are willing to support the municipal network long-term. Far preferable is a flexible and creative approach that makes the project appealing for an experienced, privately capitalized provider.

7.9 Government-Owned Broadband Networks: The View from Utah

Royce Van Tassell, Vice President, Utah Taxpayers Association

Until recently, I hadn't seen the show *Sports Night* since ABC broadcast it from 1998 to 2000. Styled as a half-hour comedy, it broke with many conventions, chiefly by dealing in serious and personal ways with the war on drugs, sexual harassment, doping, and the inherent conflicts between quality programming and attracting an audience.

The characters are warm and engaging, the dialog quick and witty, but many of the props seem remarkably dated. The jeans have that late 1990' "baggy with a belt" look (think Girbaud). My wife hates the hairstyle of every woman on the show (though I'm guessing she sported something similar in the late 1990s).

And then there's the technology. Set on a fictional sports news studio, hundreds of videocassettes are lying around. Cathode ray tube monitors (CRTs) take up half of ever desk. They use fax machines, but cell phones are almost nonexistent. Only the resident nerd uses e-mail (think "You've got mail!").

No newsroom, or office of any kind today, could survive using such outdated technology. But in the late 1990s, our collective expectations for communications made all these tools the norm.

Technology Has Changed Our Expectations

Even as ABC was broadcasting *Sports Night,* Global Crossing, Comcast, AT&T, Nokia and Blackberry (among others) were developing and deploying the technology that makes "Sports Night's" props look quaint today. Now the United States has more smartphones than people. Debates over disposing of CRTs mostly ended about five years ago. DVRs, Roku, Apple TV and Chromecast have already replaced the DVDs that replaced video cassettes.

Technology breakthroughs changed our expectations. In one form or another, all of today's widespread technologies were available in 1998, if you were willing and able to pay for it. Recall that in the 1980s some superstars flaunted their wealth by casually pressing bricklike cell phones to their ear. But the average American, even the average American business, couldn't afford the luxuries in 1998 that we take for granted today, so they didn't expect them.

Cities Get Impatient

Not everyone has been so patient. In scores of cities across the country, mayors and city councils have decided that their cities, their constituents, "need" even faster communications technology now. To meet these "needs," they have built, or are considering building, their own municipal telecom systems.

These cities want to change the expectations of the customers in their area; they sincerely believe that the adage, "if you build it, they will come," applies to telecommunications. Hence, the current trend is to build municipal telecom systems with "fiber to the home" (FTTH).

FTTH allows for blazing fast speeds. Municipal networks in Tennessee, Virginia and Utah now offer speeds of 1 gigabyte per second (gig), and Google Fiber offers a similar gig product in Kansas City, Provo, and Austin. A gig connection allows the user to stream five HD movies simultaneously, and still be able to check e-mail and surf the web without waiting. No doubt, a gig is cool.

Cool as that speed is, municipal telecom systems are also expensive and risky. Quite a few cities have built their own system, only to find large consistent financial losses forcing them to sell the network for pennies on the dollar. And many of the municipal systems touted as "successful" would be financial failures in the private sector. Barely breaking even on the operations side does not lure many investors.

Why Do Municipal Telecom Systems Struggle?

Why is it so difficult to make these systems work? Every analyst offers a different opinion. Some blame elected officials unwilling to spend enough. Others blame Luddite state policy makers who don't recognize that municipal telecom is the only way for their cities to grow. Still others blame competitive responses from incumbent telecom and cable providers.

Undoubtedly all of these factors play some part. For my part, I think two factors are decisive. First, the governance structure of municipal telecom systems virtually guarantees that their boards of directors will know little if anything about how to succeed in the telecom sphere. Second, government of any kind has a very difficult time managing the risks of a highly competitive business.

Who Governs Municipal Telecom Systems?

When a city builds its own telecom system, they need to establish a governing board, and politics nearly always trumps business acumen in selecting those board members. They choose the mayor, members of the city council, the city manager, the city's finance director and other prominent political figures.

These people are all good at what they do, but none of them was selected because they know how to succeed in the telecom business. The ability to win an election signifies nothing about that person's ability to effectively govern or manage a telecom system. In nearly every case, these elected officials are successful in what they do, be that a local activist, philanthropist, small business owner, etc.

But just as it's unrealistic to assume a successful accountant will succeed as a school principal, it's unrealistic to assume that an elected official will succeed at managing a telecom venture. Accountants aren't principals. Mayors aren't heads of telecom companies.

Governments Have Trouble Managing Risk

Another big reason municipal telecom systems struggle is that governments have trouble managing risks. The transparent plodding nature of government combines with the lack of market feedback to give elected officials precious little meaningful feedback about the risks of various options.

Evaluating whether to repave a street, extend a sewer line, or build a new water tower relies almost exclusively on variables City Hall has readily at hand. They know how many building permits they have approved, and the number of cars and water and sewer usage per home are quite stable. The technologies and costs for building, maintaining and operating this infrastructure are similarly predictable.

By contrast, telecommunications absorbs multiple tectonic shifts every decade. Going back to my experience watching *Sports Night* recently, recall that cell phones were unusual, while faxes remained standard. Since ABC pulled *Sports Night,* not only have cell phones become ubiquitous, but several cell phone manufacturers have come and gone as "kings" of cell phones. Nokia gave way to Motorola, which Blackberry crushed, only to be outdone by Apple. While Apple maintains a substantial part of the cell phone market, HTC and LG knocked Apple off its perch, and Samsung is now ascendant.

And that's just in the handset market. Advances in compression technology allow DSL, coax and wireless to carry volumes of data analysts once thought only fiber could carry. Finding a balance in the midst of these technological and consumer preference changes requires a degree of risk-taking to which politics simply isn't well suited.

What Direction Next?

In the ongoing debate over municipal telecom, proponents and opponents of municipal telecom relate competing anecdotes of successful or failing municipal telecom systems. Proponents point to Chattanooga, Tennessee, and Danville, Virginia, while opponents (myself included) point to Groton, Connecticut, Utah's UTOPIA (the Utah Telecommunications Open Infrastructure Agency), or Alameda, California.

Proponents note the benefits of speed, while opponents emphasize that the private sector is more than willing to provide all the speed anyone is willing to pay for. Just like 1980s superstars paid a hefty price to carry their brick-like cell phones, anyone who wants the speed of a fiber optic cable into their home or business can have it, if they're willing to pay the price. No matter who builds these telecom systems, they are expensive.

Building and operating these systems means tearing up roads, digging trenches, laying conduit, pulling fiber, installing and maintaining electronics at the ends of the fibers, providing adequate heating and cooling for the electronics, selling connections to individual homeowners and businesses, dropping and installing lines and electronics from the street to homes and businesses, managing network traffic, etc. If the system offers video, a head-end is necessary, plus purchasing the rights to sell bundles of channels. And public or private systems need a lot of employees to do all of this. When cities build these systems, the real effect is for some taxpayers to subsidize other taxpayers' telecom "needs."

Despite all these risks, dozens of private telecom companies have invested hundreds of billions of dollars into discovering, even creating, consumer preferences, and then meeting them. When cities build and operate municipal telecom systems, political considerations inevitably influence sound business decisions. And only happenstance will align political considerations with the business decisions necessary to succeed amidst the constant changes of communications technology.

Recall that in its infancy, cell phone technology was incredibly expensive. That bricklike cell phone, which was more status symbol than phone, cost thousands of dollars. As private companies have invested billions of dollars, the cost of cell phones has plummeted. The same will continue with telecom technology.

7.10 Crafting Effective Strategies for Effectively Allocating Municipal Resources

By Joseph S. Miller, President and CEO, Washington Technology Project, LLC

Cities across the country are facing increasing inequality on a number of fronts—income, housing, education, healthcare, etc.—and those inequalities should inform policy makers' decisions regarding their allocation of surplus resources, including in the technology arena.

Minorities comprise an ever-increasing majority of the U.S. population, yet Blacks and Latinos continue to struggle for inclusion in the technology sector, both as entrepreneurs and as employees of companies on the leading edge of innovation. These disparities are, to some extent, caused by active, deliberate discrimination by venture capitalists and employers. Achievement gaps in science, technology, engineering and mathematics (STEM) fields also contribute to these trends. While some local governments have made significant investments to alleviate them, additional allocations are desperately needed to improve STEM achievement rates to address the array of out-of-school factors that contribute to STEM disparities.[1134]

All cities have limited resources. In the context of calls for technology expenditures, public officials have to holistically assess such calls in view of other social priorities. Are poverty rates increasing or decreasing? Is healthcare spending sufficient? Is affordable housing available? Is education adequately funded? The answers to these questions matter. Cities like my native hometown of New York have already invested hundreds of millions of dollars to attract technology-based businesses and top tech talent from other regions. New York City has invested heavily over the past five years to build its profile as a world-class technology hub. Notable among these initiatives is the Applied Sciences NYC initiative—a network of "top tier applied sciences and engineering campuses."[1135]

Paradoxically, New York City remains among the top 10 cities in income inequality nationwide. In 2012, according to its analysis of U.S. Census data, Brookings found New York City households just cracking the top 5% in income ($226,675) earn 13.2 times as much as households earning income in the 20th percentile ($17,119).[1136]

If academic achievement gaps are any guide, income inequality in New York City will continue to persist, as many blacks and Latinos in particular will not have the skills to compete for high paying jobs in the city. New York City's black or Hispanic students currently in grades 3 through 8 continue to underperform academically, compared to their Asian or White counterparts.[1137] In 2013, 61.4% of New York City Asian students and 50.1% of White students in grades 3 through 8 performed at or above proficiency on Common Core tests in

1134 *See* David C. Berliner, *Poverty and Potential: Out-of-School Factors and School Success* (Education Public Interest Center: 2009) *available at* http://nepc.colorado.edu/publication/poverty-and-potential.

1135 Applied Sciences NYC website *available at* http://www.nycedc.com/project/applied-sciences-nyc.

1136 http://www.brookings.edu/research/papers/2014/02/cities-unequal-berube

1137 *See* New York City Department of Education, *2013 New York State Common Core Test Results: New York City Grades 3 – 8* (New York City Department of Education: 2013) available athttp://schools.nyc.gov/NR/rdonlyres/8F6125CE-0AF1-4F6F-A109-34F7C27006CA/0/2013MathELAResultsSummary.pdf.

math in New York City, compared to 15.3% of Black students and 18.6% of Hispanic students in the same grades.[1138]

In addition to these pressing social problems, pervasive broadband adoption and usage disparities persist. While access to high speed networks continues to pose a problem in certain remote and rural areas, numerous factors not related to a lack of broadband infrastructure contribute to low broadband adoption rates.[1139] According to a 2013 National Telecommunications and Information Administration report, just 55% of African American and 56% of Hispanic households have adopted broadband, compared to 74% of their White and 81% of their Asian American counterparts.[1140] Forty-three percent of households with incomes of $25,000 or less have adopted broadband, compared to 84% of households with incomes between $50,000 and $74,999.[1141]

Those who have not adopted broadband cite a variety of reasons. The top three reasons include "lack of interest/perceived relevance" (48%), "too expensive" (28%), and "no computer or computer inadequate" (13%).[1142] Notably, none of these factors are related to a lack of broadband infrastructure. In fact, just one percent cited a lack of access to broadband as their primary reason for not adopting broadband (although 2% of rural households stated they have not adopted broadband because it is not available in their areas).[1143]

Conclusion

Municipalities across the nation are grappling with the question of how to allocate scarce resources to address the myriad pressing economic and social issues facing their residents. Many cities are also grappling with the question of how to allocate scarce resources to reduce the socioeconomic disparities affecting large swaths their citizens. Other jurisdictions, such as New York City, boast a surplus of resources and have the luxury of being able to focus on growing their local economies. However, even many of these jurisdictions tend to focus too heavily on making investments to assist those who have already done well, rather than funding programs to alleviate barriers to African Americans, Latinos and other under-adopting demographics being full participants in the technology sector.

1138 *Id.*

1139 National Telecommunications and Information Administration, *Exploring the Digital Nation: America's Emerging Online Experience* (Department of Commerce, June 2013) *available* at http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf

1140 *Id.* at 26.

1141 *Id.*

1142 *Id.* at 36.

1143 *Id.*

Appendix I: Notes to Table 4.1

1 *See EPB Increasing Fiber Optic Speeds; Lowering Customer Prices*, Sept. 17, 2013, Chattanoogan.com, *available at* http://www.chattanoogan.com/2013/9/17/259342/EPB-Increasing-Fiber-Optic-Speeds.aspx.
2 *See* Brian Fung, *How Chattanooga beat Google Fiber by half a decade*, Sept. 17, 2013, Washington Post Switch Blog, *available at* http://www.washingtonpost.com/blogs/the-switch/wp/2013/09/17/how-chattanooga-beat-google-fiber-by-half-a-decade/.
3 *See* Kevin E. McCarthy, *Chattanooga High Speed Broadband Initiative*, Dec. 14, 2012, Research Report 2012-R-0515, Office of Legislative Research, Connecticut General Assembly, *available at* http://www.cga.ct.gov/2012/rpt/2012-R-0515.htm ("*Chattanooga High Speed Broadband Initiative*").
4 This figure includes three separate loans: (1) a $50 million loan from the municipality's electric division of the municipal utility to establish the utility's fiber optic division, *Id*. (2) a $19.5 million loan to pay off these electrical division loans. *See Senior Management Report & Financial Information 2012*, at p. 45, EPB (Sept. 2012), *available at* https://www.epb.net/flash/annual-reports/2012/assets/uploads/EPB-Financials.pdf ("*Senior Management Report & Financial Information 2012*"). (3) A $5 million line of credit secured by revenues and assets, *Id.*
5 *Broadband at the Speed of Light* at p. 38.
6 *See EPB Senior Management & Financial Information 2013*, Annual Report 2013, at p. 17, *available at* https://www.epb.net/flash/annual-reports/2013/downloads/EPB_Financials_2013.pdf ("*EPB Senior Management & Financial Information 2013*").
7 *Id.* at p. 20.
8 *Id.*
9 *Id.*
10 *See* James Shea, *Tobacco Dollars Extend Broadband for Southwest Virginia,* Dec. 8, 2013, TriCities.com, *available at* http://www.tricities.com/news/local/article_ea52b42c-6083-11e3-8d56-0019bb30f31a.html ("*Tobacco Dollars Extend Broadband for Southwest Virginia*").
11 *See* Press Release, *BVU Awarded More than 28 Million Dollars in Grant*, July 2, 2013, BVU, *available at* http://www.bvu-optinet.com/data_elements/press_release_DMME_Grant_2010.pdf
12 *Broadband at the Speed of Light* at p. 3. *See also City of Bristol Audited Financial Statement*, at p. 61, June 30, 2012, *available at* http://www.bristolva.org/DocumentCenter/View/246.
13 OptiNet originally borrowed this amount from BVU's electric division. The amount was eventually reconstituted as an investment. *Broadband at the Speed of Light* at p. 7.
14 This figure includes: $50.4 million in federal grant, including a federal stimulus award, and about $40 million in state grants. *Broadband at the Speed of Light* p. 6. *See also* Susan Kendall, *Moody's Assigns A2 Issuer Rating to BVU Authority (VA),* Nov. 9, 2010, Moody's, *available at* http://www.moodys.com/research/MOODYS-ASSIGNS-A2-ISSUER-RATING-TO-BVU-AUTHORITY-VA-Rating-Update--RU_16711855 ("*Moody's Assigns A2 Issuer Rating to BVU*"); *Funding Revitalization and Innovation in the Tobacco Region,* at p. 3, Virginia Tobacco Commission (June 2011), *available at* http://www.tic.virginia.gov/images/VA%20Business%20Magazine%20Ads/Broadband/June%202011%20Virginia%20Business%20Magazine%20Broadband.pdf; *Tobacco Dollars Extend Broadband for Southwest Virginia.*
15 There was no direct cross-subsidization, but certain transactions were dubious. For example, while Virginia's state Corporation Commission was examining the network's cost allocation model, OptiNet booked $23.7 million in funds from the Electric division as debt. Once the model was approved, OptiNet re-characterized the funds as an investment. *Broadband at the Speed of Light* p. 7.

16 Information was not made publically available; attempts to contact BVU Authority's CFO, Stacey Pomrenke, did not receive a response.
17 *Id.*
18 *Id.*
19 *Id.*
20 *See* Richard Burgess, *LUS Announces Number of Subscribers*, May 29, 2013, The Advocate, *available at* http://theadvocate.com/news/6038657-123/lus-announces-number-of-subscribers.
21 *See* Ricky Jervis, *Louisiana City Blazes High-Speed Web Trail*, Feb. 5, 2012, USA Today, *available at* http://usatoday30.usatoday.com/news/nation/story/2012-02-01/broadband-telecom-lafayette/52920278/1.
22 *See Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana,* at p. 42, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2010), *available at* http://emma.msrb.org/EA494408-EA384388-EA781227.pdf ("*Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana*"). *See also* Dan Aschenbach, *Moody's Assigns A1 to Lafayette, Louisiana Combined Utility Revenue Bonds; Outlook Stable*, Nov. 26, 2012, Moody's, *available at* http://www.moodys.com/research/Moodys-Assigns-A1-to-Lafayette-Louisiana-Combined-Utility-Revenue-Bonds-New-Issue--NIR_900823593 ("*Moody's Assigns A1 to Lafayette, Louisiana*").
23 *Utilities Revenue Refunding Bond, Series 2012, City of Lafayette Louisiana* at p. 45.
24 *Broadband at the Speed of Light* at p. 23.
25 *See* Alex Labat, *LUS CPA Explains Fiber* Audit, May 16, 2013, KATC.com, *available at* http://www.katc.com/news/lus-cpa-explains-fiber-audit.
26 *Lafayette City-Parish Consolidated Government Financial Audit* at p. 26.
27 *Id.* at p. 24.
28 *See* Alex Labat, *Video: LUS CPA Explains Fiber Audit*, at 1:50, May 16, 2013, KATC.com, *available at* http://www.katc.com/news/lus-cpa-explains-fiber-audit.
29 *See City of Monticello, Mn, Telecommunications Revenue Bonds, Series 2008 (FiberNet Monticello Project), Quarterly Report for Period Ending March 31, 2013*, at p. 6, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (2013), *available at* http://emma.msrb.org/EA525726-EA409489-EA806402.pdf ("*City of Monticello Quarterly Report for Period Ending March 31, 2013*").
30 *See City of Monticello, Minnesota, Telecommunications Revenue Bonds, Series 2008*, at p. 3, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (June 19, 2008), *available at* http://emma.msrb.org/MS271839-MS268494-MD531794.pdf ("*City of Monticello, Minnesota, Telecommunications Revenue Bonds, Series 2008*").
31 *Id.* at p. i.
32 Roughly $3.4 million in interfund loans were made in 2011. In addition, "management report[ed] that inter-fund loans [grew] to $4.1 million [by September 2012], and expect[ed] additional monthly support of up to $60,000 through the end of fiscal 2012." *See* Tim Hennigar, *FiberNet operating transfers pass Monticello City Council vote*, Dec. 6, 2012, Monticello Times, *available at* http://monticellotimes.com/2012/12/06/fiber-net-operating-transfers-pass-monticello-city-council-vote/. *See also* Andrea Stenhoff, *Moody's downgrades to A2 from Aa3 the GOULT rating for City of Monticello (MN); concurrently downgrades lease revenue debt to A3 from A1,* Sept. 28, 2012, Moody's Investors Service, *available at* http://www.moodys.com/research/Moodys-downgrades-to-A2-from-Aa3-the-GOULT-rating-for-Rating-Update--RU_900688861 ("*Moody's downgrades City of Monticello*").
33 This aid was provided by the municipality to shore up the flagging network. Transfers included: an interfund transfer of $322,527 from the general fund to FiberNet; a $3.12 million interfund transfer from the liquor fund; a $377,473 transfer from the city's street reconstruction fund; a $300,000 transfer from the DMV fund; a $200,000 transfer from the street light improvement fund; and another $125,789 transfer from the liquor fund. *Id.*
34 Annualized based on most recent quarterly data. *City of Monticello Quarterly Report for Period Ending March 31, 2013* at p. 3.
35 Annualized based on most recent quarterly data. *Id.* at p. 4.
36 *Id.*
37 Phone conversation with Monticello Assistant Finance Director, Angie McIntire. Monticello does not make any payments in lieu of taxes to the city of Monticello.

38 *See CFU launches gigabit Internet service*, May 28, 2013, Cedar Falls Times, *available at* http://www.communitynewspapergroup.com/cedar_falls_times/news/article_09479d64-c7ca-11e2-80e2-0019bb2963f4.html.

39 *See Fiber Marks a Year of Progress,* at p. 1, Cedar Falls Utilities Online (Oct. 2011), *available at*http://www.pageturnpro.com/Publications/201110/963/31612/pdf/129623134074261250_October2011web.pdf.

40 This figure encompasses both initial build-out costs (i.e., a $3 million bond issued in 1995, which came to maturity in 2008) and recent upgrades to fiber. With regard to the upgrade to fiber and expansion of the network, this was slated to cost $17 million. Cedar Falls began to borrow additional funding in 2009 for deployment purposes, borrowing $2,320,000. The city then borrowed $13,130,000 using communications utility revenue capital loan notes. *See Municipal Communications Utility of the City of Cedar Falls Iowa, $13,130,000 Communications Utility Revenue Capital Loan Notes, Series 2010*, at p. 1, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Sept. 1, 2010), *available at* http://emma.msrb.org/EA404810-EA316792-EA712527.pdf ("*Municipal Communications Utility of the City of Cedar Falls Iowa $13,130,000 Communications Utility Revenue Capital Loan Notes , Series 1995B*").

41 *See Financial Statements of the Municipal Electric, Gas, Water, and Communications Utilities of the City of Cedar Falls, Iowa, For the Year Ending Dec 31, 2011*, at p. 28, Cedar Falls Utility (March 2012), *available at* http://auditor.iowa.gov/reports/1223-0046-C000.pdf ("*Financial Statements For the Year Ending Dec 31, 2011*").

42 *See Advancing Broadband: A Foundation for Strong Rural Communities*, at p. 29, Rural Utilities Service, U.S. Dept. of Agriculture (Jan. 2011), *available at* http://www.rurdev.usda.gov/supportdocuments/RBB_report_whole-v4ForWeb.pdf.

43 See *Financial Statements of the Municipal Communications Utility of the City of Cedar Falls, Iowa*, *Including Independent Auditor's Report, For the Years Ended Dec. 31, 2012 and 2011*, at p. 10, Cedar Falls Utility (April 4, 2013), *available at* http://emma.msrb.org/EP760639-EP589987-EP991542.pdf.

44 *Id.* at p. 10.

45 *Id.* at p. 21.

46 *See generally id.*

47 *See* Andrew Michael Cohill, *Danville Transforms its Economy with Fiber*, Broadband Communities Online Magazine, *available at* http://www.bbpmag.com/MuniPortal/EditorsChoice/1111editorschoice.php.

48 *Id.*

49 *Id.*

50 *See State of the Art Broadband Builds Communities*, p. 69, Broadband Communities Magazine (Nov./Dec. 2012), *available at* http://bbcmag.epubxp.com/i/100321/66

51 From the federal E-rate program. Phone conversation with Jason Grey, Project Manager, nDanville.

52 *See Danville FY 2014 Adopted Budget, Telecommunications Fund*, p. 17-1, City of Danville, VA, *available at* http://www.danville-va.gov/DocumentCenter/View/9715.

53 *Id.* at p. 17-1.

54 *Id.* at p. 17-2.

55 *See* Natalie Crofts, *UTOPIA Courts Potential Investor,* Dec. 23, 2013, KSLNews.com, *available at* http://www.ksl.com/?sid=28129914.

56 Data as of June 2012. *See Utah Telecommunication Open Infrastructure Agency, Financial Statements*, p. 2, June 20, 2012, UTOPIA, *available at* https://web.archive.org/web/20130203105656/http://utopianet.org/uploads/files/177_UTOPIA_Report_2012_-_Final.pdf ("*Utah Telecommunication Open Infrastructure Agency, Financial Statements – June 2012*"). More recent numbers are difficult to come by, but the Salt Lake Tribune puts the number below 10,000. *See* Tony Semerad, *UTOPIA: Fiber-optic Nirvana or a Nightmare with No Way Out?*, Dec. 3, 2012, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/news/55284692-78/utopia-network-fiber-west.html.csp.

57 *Utah Telecommunication Open Infrastructure Agency, Financial Statements – June 2012* at p. 16.

58 *See A Performance Audit of the Utah Telecommunication Open Infrastructure Agency*, at p. i, Report to the Utah Legislature, No. 2012-08 (Aug. 2012), *available at* http://le.utah.gov/audit/12_08rpt.pdf ("*UTOPIA Audit*").

59 This figure reflects amounts owed to pledging members. *See Utah Telecommunication Open Infrastructure Agency, Financial Statements – June 2012* at p. 19.

60 This figure includes: (1) $21 million from the U.S. Rural Utility Services and (2) $16.2 million in federal stimulus funds. *See UTOPIA Audit*, at p. 7. *See also* Cathy McKitrick, *UTOPIA in Layton and Centerville Grows through Federal Funds*, Aug. 3, 2011, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/news/52290138-78/utopia-centerville-layton-fiber.html.csp.

61 It should be noted that $6.5 million of UTOPIA's revenues stem directly from federal stimulus grants. *Utah Telecommunication Open Infrastructure Agency, Financial Statements – June 2012* at pp. 4, 9.

62 *Id.* at p. 9.

63 *Id.* at p. 22.

64 *See Utilities Commission Meeting Minutes*, at p. 11, Nov. 23, 2004, City of Groton, *available at* http://www.cityofgroton.com/docs/minutes/ucommission/2004/ucommission11-23-04.pdf.

65 When contacted by phone, a representative of TVC stated that this information is confidential.

66 *Id.*

67 *See* Deborah Straszheim, *How A Promising Idea Went Terribly Wrong In Groton,* Jan. 6, 2013, Groton Patch, *available at* http://groton.patch.com/groups/politics-and-elections/p/how-a-promising-idea-went-horribly-wrong-in-groton

68 *Id.*

69 The number has not been disclosed by city officials. *See* Vince Horiuchi, *Provo Will be 3rd U.S. Metro Area to Get Speedy Google Fiber*, April 17, 2013, Salt Lake Tribune, *available at* http://www.sltrib.com/sltrib/money/56168330-79/google-provo-network-fiber.html.csp ("Although the backbone of the network is built out to the entire city, wiring from the curb to homes and apartments is completed only in about a third of the city's 35,000 homes, [Provo Mayor John] Curtis said. He would not say how many paying subscribers iProvo has.").

70 The location – and presumably the amount – of fiber used to build the network are currently unknown. The city hired an engineering firm to determine exactly where the fiber-optic cables are buried – a condition of the sale of the system to Google. *See* Vince Horiuchi, *Council Approves iProvo Sale to Google,* April 24, 2013, Salt Lake Tribune, *available at* http://archive.sltrib.com/article.php?id-26443832&itype=storyID.

71 *See City of Provo, Utah, $39,500,000 Sales Tax Revenue Bond, Series 2004 Taxable*, at p. 17, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Feb. 24, 2004), *available at* http://emma.msrb.org/MS217839-MS193147-MD374970.pdf ("*Provo $39,500,000 Sales Tax Revenue Bond, Series 2004*").

72 *See* Tad Walch, *IProvo Debt to Require City Help,* Feb. 22, 2006, Deseret News, *available at,* http://www.deseretnews.com/article/635186518/IProvo-debt-to-require-city-help.html?pg=all.

73 *See iProvo: A Requiem*, May 5, 2013, Utah Taxpayer's Association, *available at* http://www.utahtaxpayers.org/wp-content/uploads/2013/05/20-iProvo.pdf.

74 *See Continuing Disclosure Memorandum, Summary of Debt Structure and Financial Information, SEC Rule 15c2-12, For the City of Provo, Utah*, p. 122, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (Dec. 19, 2012), *available at* http://Emma.msrb.org/EA492788-EA382935-EA779784.pdf.

75 *Id.*

76 *Id.* at p. 82.

77 *See* Press Release, *City of Wilson to Offer Gigabit Internet Service to Customers by July*, April 19, 2013, Greenlight NC, *available at* http://www.greenlightnc.com/gigabit_press_release.php.

78 *See Wilson, North Carolina, Certificates of Participation Series 2008*, Electronic Municipal Market Access, Municipal Securities Rulemaking Board (May 1, 2008), *available at* http://emma.msrb.org/MS273964-MS271292-MD541860.pdf ("*Wilson Certificates of Participation Series 2008*").

79 *See* Todd O'Boyle & Christopher Mitchell, *Carolina's Connected Community: Wilson Gives Greenlight to Fast Internet*, at p. 8, Common Cause and Institute for Local Self Reliance (Dec. 2012), *available at* http://www.ilsr.org/wp-content/uploads/2012/12/wilson-greenlight.pdf.

80 Email from Kim Hands, Wilson, NC, Director of Finance.

81 *Id.*

82 *Id.*

83 *Id.*

Appendix II: State Laws Impacting GONs

State	Overview
Alabama	Alabama requires a municipality to hold a public hearing and referendum (Ala. Code § 11-50B-1 et seq.)
Arkansas	A municipal government cannot offer broadband services unless the municipality already has an electricity or television service. If the municipal government offers either service, a public hearing must be held. (Ark. Code § 23-17-409)
Colorado	Municipalities must hold a referendum unless the area is unserved and incumbent ISPs have refused to provide the requested service. (Colo. Rev. Stat. Ann. § 29-27-201 et seq.)
Florida	Florida requires two public hearings, a feasibility plan, and a requirement that the network be self-sustaining within four years. (Fl. Stat. § 350.81)
Louisiana	The municipality must hold a public hearing. If the proposal is approved, the city must undertake a feasibility study in an effort to determine whether annual revenues will exceed annual costs by the amount necessary to cover debt payments. (Rev. Stat. Ann. § 45:884.41 et seq.)
Michigan	The municipal government must request a bid from private ISPs. The public entity then must submit a sealed bid to provide services. The public entity cannot go outside the municipality's boundaries. (Mich. Comp. Laws Ann. § 484.2252)
Minnesota	A municipality may only operate a telephone exchange or other facilities in support of communications services if they receive a 65% referendum vote. (Minn. Stat. Ann. § 237.19)
Missouri	A municipality cannot sell telecommunications service, but it can offer cable service after a referendum. (Mo. Rev. Stat. § 392.410(7))
Nebraska	A municipal government cannot offer broadband services, but it can sell/lease dark fiber. (Neb. Rev. Stat. Ann. §§ 86-594; 86-575)
Nevada	Municipalities with populations over 25,000 or counties with more than 50,000 people may not offer broadband services. (Nev. Stat. §§ 268.086; 710.147)
North Carolina	The city must create a separate enterprise fund, publish independent annual reports, only operate within the city, and provide nondiscriminatory access to private ISPs. The network cannot be cross-subsidized and services cannot be sold below cost. (N.C. Stat. Ch. 160A, Article 16A)
Pennsylvania	A municipality cannot offer communications services unless the incumbent refuses. (66 Pa. Cons. Stat. Ann. § 3014(h))
South Carolina	A GON may not receive any benefit that is not provided to non-government networks. GONs cannot be cross-subsidized and must be audited. (S.C. Code Ann. § 58-9-2600 et seq.)
Tennessee	Any utility that seeks to provide broadband must receive a resolution from the county's legislative body. The Comptroller must then report to the General Assembly and recommend whether to move forward. (Tenn. Code Ann. § 7-52-601 et seq.)
Texas	Municipalities are prohibited from offering broadband service. (TX Util. Code § 54.201 et seq.)
Utah	Municipalities can provide wholesale services, but in order to retail directly to consumers the network must undergo a feasibility study. (Utah Code Ann. § 10-18-201 et seq.)
Virginia	A municipality with a population of more than 30,000 may offer telecommunications services if the plan is approved by a governing board. The network must also abide by reporting requirements. (VA Code §§ 15.2-2108.6; 56-265.4:4;56-484.7:1)
Washington	Public utilities can only provide telecommunications on a wholesale basis. (Wash. Rev. Code Ann. § 54.16.330)
Wisconsin	Municipalities must hold a public hearing and draft a report on a proposed GON prior to a public hearing. This process does not apply if the private ISPs do not intend to provide services in the area. (Wis. Stat. Ann. § 66.0422)

About the Authors

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The ACLP's mission is to promote robust and solution-focused dialogues among state and federal policy makers, academe, service providers, the financial community, and consumers concerning changes to the state and federal legal, policy, and regulatory regimes. To do so, the ACLP has published papers and hosted an array of interdisciplinary public policy events on key public policy issues impacting stakeholders throughout the advanced communications space.

Davidson previously served as a Commissioner on the Florida Public Service Commission (PSC), the regulatory agency that oversees the state's telecommunications, energy, and water industries. His government work included serving as the Executive Director of Florida's Information Technology Task Force and as the Staff Director of the state's Committee on Information Technology. He previously served as a Special Professor at Hofstra University School of Law. His research interests include studying the antitrust implications of changing communications and utilities marketplaces, identifying necessary policy reforms to spur broadband connectivity across key demographics and sectors of the economy, and developing regulatory and policy reforms in the energy and water spaces. Davidson holds a Masters of Law in Trade Regulation from New York University, a Masters in International Business from Columbia University, and his B.A. and J.D. degrees from the University of Florida, where he served as a fellowship instructor at the College of Law.

Santorelli previously served as the lead staffer for the New York City Council's Committee on Technology. In this capacity, he was responsible for organizing hearings and preparing policy papers on a diverse array of topics. Other duties included drafting legislation and consulting with local stakeholders in the private and nonprofit sectors to develop strategies for spurring use of emerging technologies among underserved populations. His research interests include examining the impacts of new services on existing policy frameworks in the advanced communications and regulated utilities spaces, and considering how to recalibrate regulatory models to accommodate innovation, disruptive technologies, and new business models. Santorelli received his B.A., *cum laude*, from Tufts University, and his J.D., *cum laude*, from New York Law School.

Municipal Assets in Distress (MAD) Task Force

August 2011

Options for Dealing with Municipal Assets in Distress

In recent months, there has been much discussion on the financial markets' concern over the ability of municipalities to avoid defaults on their debt and other obligations, and increasing speculation that many municipalities may need to seek help to restructure their debts, either through a federal Chapter 9 bankruptcy proceeding or other available state law remedy. We have attempted to set forth for the reader a summary of the available remedies as made available by the various states. Because of the vastly different remedies established by the states, it is critical that municipalities and those with claims against municipalities seek legal counsel at the first hint of distress.

Federal law provides the legal framework for municipal bankruptcy. 11 U.S.C. § 903. However, access to Chapter 9 is regulated by state law: a municipality may only file for bankruptcy if it is expressly authorized by state statute or by a statutorily designated government officer or organization. § 109(c)(2). Moreover, the filing must be voluntary, as a creditor cannot force a municipality into bankruptcy. § 109(c)(4). Other Code requirements include the following: (1) the debtor must be a municipality (defined in § 101(40) as "a political subdivision or public agency or instrumentality of a State"); (2) the municipality must be insolvent; and (3) the municipality must have negotiated in good faith with its creditors or been excused from doing so. § 109(c)(1) *et seq*.

Fourteen states allow municipalities to file Chapter 9 without restriction. Thirteen states conditionally allow municipalities to file Chapter 9. One state prohibits Chapter 9 filings. Twenty-two states lack authorization statutes, thus preventing municipalities from filing Chapter 9. However, financially distressed municipalities barred from Chapter 9 might find relief through (1) increasing taxes and decreasing expenses; (2) a state bailout; (3) judicial receivership; (4) special authorization from a government official to file Chapter 9; and (5) special legislation authorizing state receivership of the municipality.

States Authorizing Chapter 9 Bankruptcy Without Restriction

The following 14 states have authorized municipalities to file Chapter 9 without restriction:

- **Alabama**
- **Arizona**
- **Arkansas**
- **California**
- **Florida**
- **Kentucky**
- **Minnesota**
- **Missouri**
- **Montana**
- **Nebraska**
- **Oklahoma**
- **South Carolina**
- **Texas**
- **Washington**

For a list of state statutes authorizing Chapter 9 filings, see the Appendix.

States Conditionally Authorizing Chapter 9 Bankruptcy

Thirteen states have conditionally authorized municipalities to file Chapter 9. Most often, these conditions include prior approval from either a government official or a state appointed financial review board. Rhode Island goes one step further and requires that a state appointed receiver attempt to resolve a municipality's financial problems prior to a Chapter 9 filing. R.I.G.L § 45-9-1 *et seq*. States that have conditionally authorized Chapter 9 filings include:

- **Colorado**
- **Connecticut**
- **Idaho**
- **Illinois**
- **Iowa**
- **Louisiana**
- **Michigan**
- **New Jersey**
- **New York**
- **North Carolina**
- **Ohio**
- **Pennsylvania**
- **Rhode Island***

** As of May 2011, legislation regarding municipal bankruptcy is being debated in the state senate.*

For descriptions of the conditions municipalities must fulfill before filing Chapter 9, see the Appendix.

States Not Authorizing Chapter 9 Bankruptcy

Georgia is the only state that expressly prohibits municipalities from filing Chapter 9. O.C.G.A. § 36-80-5. However, a municipality may not file Chapter 9 unless it is specifically authorized by state statute. 11 U.S.C. § 109(c)(2). The following states lack authorization statutes:

- **Alaska**
- **Delaware**
- **District of Columbia**
- **Hawaii**
- **Indiana***
- **Kansas**
- **Maine**
- **Maryland**
- **Massachusetts**
- **Mississippi**
- **Nevada**
- **New Hampshire**
- **New Mexico**
- **North Dakota**
- **Oregon**
- **South Dakota**
- **Tennessee**
- **Utah**
- **Vermont**
- **Virginia**
- **West Virginia**
- **Wisconsin**
- **Wyoming**

** As of April 2011, legislation regarding municipal bankruptcy is being debated in the state house.*

Options for Municipalities Barred from Chapter 9

Municipalities located in states that have not authorized Chapter 9 filings have other options available to help rectify financial insolvency.

Increase Taxes and Decrease Expenses

Financially unstable municipalities often seek stability from increased taxes and decreased expenses. This solution is easier in theory than in practice: citizens often lack fiscal capacity to pay increased taxes and leaders may lack the political clout or legal ability to reduce expenditures. Further, raising taxes and cutting services could inhibit stabilization by deterring investment and curbing growth.

It should be noted that this step is often taken by municipalities authorized to file bankruptcy. Chapter 9 requires that a municipality be "insolvent." 11 U.S.C. § 109(c)(3). In reviewing this requirement, courts analyze a municipalities' taxing capacity. Courts do not require a municipality to use its taxing authority to the fullest extent possible before being deemed insolvent. *See In re Sullivan County Reg'l. Refuse Disposal Dist.*, 165 B.R. 60, 66 (Bankr. D. N.H. 1994). However, a failure to consider reasonable tax increases can effect the good faith requirement of § 109(c)(5). *Id.*

Debt Limits

Many states strictly limit the amount of debt that a municipality may hold. This policy helps to insulate municipalities from bankruptcy due to structural operational deficiencies. However, these municipalities are still susceptible to bankruptcy resulting from a one-time liability (e.g., a large lawsuit or a natural disaster). In short, while a debt limit does not prevent a municipality from going bankrupt, it reduces the likelihood of municipal insolvency. States that do not allow Chapter 9 filings but have debt limits include Delaware, Mississippi, New Hampshire, Oregon, Wisconsin and Wyoming.

Similarly, Kansas requires all municipalities to operate on a "cash-only" basis. Again, these municipalities are protected from bankruptcy resulting from operational deficiencies, but remain vulnerable to bankruptcy resulting from one-time liabilities.

State Bailout

The most popular solution to municipal insolvency appears to be a state bailout. Two highly publicized state bailouts of municipalities occurred in Harrisburg, Pennsylvania, and Hamtramck, Michigan. Pennsylvania advanced Harrisburg $3.3 million in aid to prevent the city from defaulting on bond payments.[1] The governor of Michigan denied Hamtramck's request to file Chapter 9 and instead offered three options: (1) a low interest loan from the state; (2) a tax anticipation loan; and (3) a fiscal stabilization bond allowing the city to borrow an amount equal to three percent of its assets.[2] Interestingly, both Pennsylvania and Michigan allowed Chapter 9 filings at the time of the bailouts. As of June 2011, Hamtramck is still analyzing the three options.

Judicial Receivership

Insolvent municipalities could file for judicial receivership. In May 2010, Central Falls, Rhode Island, owed over $10 million on outstanding municipal bonds and was insolvent. At that time, Rhode Island had not authorized Chapter 9 filings, so the municipality petitioned the superior court for judicial receivership. The court granted the petition and issued an order enjoining the commencement, prosecution or continuance of actions or proceedings against the city or any of its property—protection typically afforded under Chapter 9. *Pfeiffer v. Moreau et al.*, C.A. No. PB 10-5615 (R.I. Super. Ct. 2010).[3] The court appointed a

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[1] Nicole Gelinas, *A Reckless Bailout for Harrisburg*, PHILADELPHIA INQUIRER (Sept. 16, 2010), http://articles.philly.com/2010-09-16/news/24976552_1_municipal-borrowers-debt-service-general-obligation-pledges.

[2] Kelly Nolan, *Michigan Forbids City To Seek Municipal Bankruptcy*, DOW JONES NEWS (Nov. 16, 2010), http://www.advfn.com/news_UPDATE-Michigan-Forbids-City-To-Seek-Municipal-Bankruptcy_45309 449.html.

[3] This cite is to a lawsuit over the enactment of R.I.G.L. § 45-9-1 et seq. that discusses the original order. The appointment of the judicial receiver and the enactment of R.I.G.L. § 45-9-1 have been mired in ongoing litigation. The case still serves as solid anecdotal evidence.

receiver with the authority to supervise municipal business and engage consultants. *Id.* Financial institutions and bond ratings agencies were alarmed. Within three weeks, the Rhode Island legislature passed a new law that prohibited municipalities from entering judicial receivership. R.I.G.L. § 45-9-1 *et seq*. This new law requires municipalities to follow a three-step process that includes appointing a financial overseer, appointing a budget and review commission, and possibly appointing a non-judicial receiver who has the authority to approve Chapter 9 filings. *Id*.

While helpful, remedies offered by judicial receivership are limited. Unlike in Chapter 9, a judicial receiver cannot force a creditor to compromise a claim, since the states are prohibited from passing laws impairing the obligation of contracts. *See* U.S. Const. art. I, § 10. However, judicial receivership can help stay proceedings against the municipality, giving it time to create a plan of action. Even though it doesn't provide the same protections as Chapter 9, judicial receivership can be a lifeboat for municipalities barred from Chapter 9.

State Receivership

Several states have passed statutes authorizing state receivership of financially distressed municipalities. These states include Nevada, Massachusetts, Maine and Pennsylvania. These statutes have rarely been used, and therefore, there is little track record detailing the process by which a municipality would go into receivership.

Special Legislation

Massachusetts, which does not have legislation authorizing Chapter 9 filings, has passed special legislation authorizing temporary state receivership of a specific municipality.[4]

In 1991, Massachusetts passed special legislation that authorized state receivership of the city of Chelsea. Mass. Gen. Laws ch. 200 (repealed). Prior to the legislation, the state attempted to intervene financially, but a fight over the city's budget and a burdensome financial crisis required more drastic measures. The governor, acting under authority of the special legislation, appointed a receiver who held the powers of the mayor, city council and school committee. The city emerged from receivership in 1995, and has remained prosperous and self-sustaining.

In 2004, Massachusetts passed special legislation authorizing state receivership of the City of Springfield.[5] The receiver renegotiated union contracts, collected uncollected taxes and fines, and overhauled the city's budget. Within five years, Springfield was operating at a budget surplus and was able to repay over $52 million in state loans. Unlike Chelsea, Springfield had publicly held long-term debt.[6] However, Springfield was able to avoid default thanks to the state's Qualified Bond Program, which authorizes the state treasurer to make debt service payments on the city's behalf to prevent default. *See* Mass. Gen. Laws ch. 44A, § 7.

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[4] Pennsylvania also authorizes state receivership of municipalities through an "Act 47" plan. The state also conditionally authorizes municipalities to file Chapter 9. See the Appendix for further information.

[5] Sarah Schweitzer, *Springfield's overseers leave a city in the black*, THE BOSTON GLOBE (July 1, 2009), http://www.boston.com/news/local/massachusetts/articles/2009/07/01/springfield8217s_state_over seers_leave_city_in_the_black/?page=2.

[6] William Cox, *Lessons of receivership: the legacy of Chelsea*, Gov't Fin. Rev. (Aug. 1993), *available at* http://www.allbusiness.com/finance-insurance/391457-1.html.

This manner of addressing financially distressed municipalities seems clumsy, time consuming and highly controversial. Yet, the process can be beneficial. First, it draws state-wide attention to the problem, increasing the likelihood that it will be addressed. Second, while a state cannot force any creditor to compromise a claim (*see* U.S. Const. art. I, § 10), in both Chelsea and Springfield, the state's receiver was able to fix fundamental financial problems and coax creditors to voluntarily renegotiate contracts. This allowed each city to stabilize its budget and formulate a plan to pay off creditors.

Authorization from a Government Official

With implicit authorization from the state legislature, an executive order authorizing a Chapter 9 filing likely fulfills the requirements of § 109(c)(2).

To file Chapter 9, a municipality must be "specifically authorized . . . to be a debtor under . . . State law, or by a governmental officer or organization empowered by State law to authorize such entity to be a debtor under [Chapter 9]." 11 U.S.C. § 109(c)(2). "Specific authorization" requires that a statute "expressly authorize" a filing with language that is "exact, plain, and direct with well-defined limits so that nothing is left to inference or implication." *In re County of Orange*, 183 B.R. 594, 604 (Bankr. C.D. Cal 1995). While a statute must "expressly authorize" a municipality to file Chapter 9, a statute need not "expressly authorize" a "governmental officer or organization" to authorize a Chapter 9 filing. *In re New York City Off-Track Betting Corp.*, 427 B.R. 256 (Bankr. S.D. N.Y. 2010).[7] However, a government officer likely needs implicit authorization from the legislature for an order authorizing Chapter 9 to be valid. *Id*.

The case of *In re New York City Off-Track Betting* involved a Chapter 9 filing by New York City Off-Track Betting Corporation (NYC OTB), a public benefit corporation.[8] *Id*. NYC OTB was originally under control of New York City. However, once NYC OTB became insolvent, the New York legislature transferred control of the entity from the city to the state. *Id*. at 269. Shortly thereafter, Governor David Patterson issued an executive order authorizing NYC OTB to file Chapter 9. *Id.* Objectors contended that the governor had not been "specifically authorized" by state statute to allow NYC OTB to file for bankruptcy, and therefore, his executive order did not fulfill the requirements of § 109(c). *Id.* The court disagreed.

The court noted that the legislature's failure to delegate a "specific action" did not prevent the governor "from taking that action pursuant to executive order." *Id*. at 271. In its order delegating control of the entity to the state, the legislature noted that "the continued operation of NYC OTB corporation is of paramount importance to the public interest." *Id*. Therefore, the governor was implicitly authorized to allow a Chapter 9 filing because he was merely fulfilling the legislature's stated policy. *Id.*

Case law surrounding this particular issue is sparse. Whether or not a government official is "empowered by State law to authorize" a Chapter 9 filing in the absence of a state statute requires an individual assessment of state law and the facts surrounding the case. It is likely that a government officer needs to have implicit authorization from the legislature before he can authorize a Chapter 9 filing.

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[7] The case was eventually dismissed because no reorganization of the company was deemed possible. Due to constitutional limits on Chapter 9 filings, if a municipality cannot reorganize, the court's recourse is to dismiss.

[8] Public benefit corporations (PBC) "are created by the State for the general purpose of performing functions essentially governmental in nature." *In re New York City Off-Track Betting Corp.*, 427 BR 256, 265 (Bankr. S.D. N.Y. 2010). Though PBCs "are not the same as the State of New York or its subdivisions, they may be treated as such in certain circumstances." *Id*.

APPENDIX:

STATE	CHAPTER 9 ALLOWED?	ALTERNATIVES	RELEVANT STATUE	NOTES OR CONDITIONS
Alabama	Yes	N/A	Ala. Code § 11-81-3	Applies to "the governing body of any county, city or town, or municipal authority organized under Article 9, Chapter 47 of this title . . . ."
Alaska	No		N/A	N/A
Arizona	Yes	N/A	Ariz. Rev. Stat. Ann. § 35-601 - 35-605	Applies to "any taxing district." This language refers to language from the 1898 Bankruptcy Act.
Arkansas	Yes	N/A	Ark. Code Ann. § 14-74-103	Applies to "taxing agencies or instrumentalities." Section 101(40) of the Code provides that the term "municipality" means a "political subdivision or public agency or instrumentality of a State."
California	Yes	N/A	Cal. Gov't Code § 53760	None
Colorado	Conditional	N/A	Colo. Rev. Stat. § 32-1-1402	Applies to "insolvent taxing district." An "insolvent taxing district" is defined as "a special district which is organized or acting under the provisions" of the state's Special Districts Act.
Connecticut	Conditional	N/A	Conn. Gen. Stat. § 7-566	Requires "express prior written consent of the governor." Establishes a Municipal Finance Advisory Commission that creates policies and regulates municipal finances. *See* Conn. Gen. Stat. § 7-394b.
Delaware	No	State regulated debt limits	Del. Code Ann. tit. 22, § 106, § 830.	State enacted strict debt limits to lessen the likelihood of state default. Del. Code Ann. tit. 22, § 106, § 830.
Dist. of Columbia	No	N/A	N/A	N/A

Florida	Yes	N/A	Fla. Stat. § 218.01	None
Georgia	No	State aid available	O.C.G.A. § 36-80-5.	Chapter 9 filing is prohibited by statute. However, the state provides for grants of state funds to municipalities for any "public purpose." O.C.G.A. § 36-40-23. Ostensibly, a grant could be used to assist financially distressed municipalities.
Hawaii	No	N/A	N/A	N/A
Idaho	Conditional	N/A	Idaho Code Ann. § 67-3903	A "taxing district," defined as "any entity or unit with the statutory authority to levy a property tax" must adopt a resolution authorizing the bankruptcy petition. *See* § 63-201; § 67-3904.
Illinois	Conditional	N/A	50 Ill. Comp. Stat. § 320/1 *et seq.*	The Financial Planning and Supervision Commission may recommend that a unit of the local government file bankruptcy. A "unit of local government" is limited to municipalities with populations of less than 25,000 people. The Local Government Financial Planning and Supervision Act details the multitude of requirements for a "unit of local government" to file bankruptcy. 50 Ill. Comp. Stat. § 320/1 *et seq.* Municipalities with more than 25,000 citizens may seek debt restructuring though the Financially Distressed City Law.
Indiana	No*	N/A	N/A	As of 4/19/2011, the "bankruptcy bill," which would allow municipalities to file Chapter 9, is in debate in the state senate.
Iowa	Conditional	N/A	Iowa Code § 76.16A	A "city, county, or other political subdivision" may file Chapter 9 only if it is insolvent due to involuntarily incurred debt.

Kansas	No	Cash only basis	*See* Kan. Stat. Ann. § 10-1102.	State requires municipalities to operate on a cash-only basis, making a bankruptcy filing highly unlikely and very difficult. *See* Kan. Stat. Ann. § 10-1102.
Kentucky	Yes	N/A	Ky. Rev. Stat. Ann. § 66.4	None
Louisiana	Conditional	N/A	La. Rev. Stat. Ann. § 39:619 and § 13:4741	- Section 39:619 requires "consent, approval and authority of the state through the governor and the Attorney General" before filing. - Section 13:4741 requires written approval of State Bond and Tax Board before filing.
Maine	No	State receivership	Me. Rev. Stat. tit. 30-A § 6102 *et seq.*	State law contains provisions for the creation of a Board of Emergency Municipal Finance that would "enable municipalities that have fallen into financial difficulties to receive assistance from the state and to be reestablished on a sound financial basis and to assure the state of the collection of the taxes due from those municipalities to the state." The statute allows for a type of state receivership. Me. Rev. Stat. tit. 30-A § 6102 *et seq.*
Maryland	No	Treasurer must approve debt limits	N/A	Municipalities must adopt "local debt policies" that are approved by the state treasurer. Md. Code Ann. Article 95 § 22F. To remain eligible for state aid, a municipality must submit annual financial reports using the state's uniform system of financial reporting. Md. Code Ann. Article 15 § 38.

Massachusetts	No	Special legislation for state receivership	Mass. Gen. Laws ch. 44A, § 7	If a municipality is going to default on bond payments, it can receive financial assistance from the state to prevent default. Mass. Gen. Laws ch. 44A, § 7. Some municipalities have sought special state legislation allowing for state receivership.
Michigan	Conditional	Emergency Assistance Loan Board	Mich. Comp. Laws Ann. § 141.1512-1519	Requires notice to the "emergency financial assistance loan board" and authorization from the "emergency financial manager." Michigan has the most complex process for a municipality to file for bankruptcy. *See* Mich. Comp. Laws Ann. § 141.1512 *et seq.*
Minnesota	Yes	N/A	Minn. Stat. § 471.831	"'Municipality' means a municipality as defined in United States Code, title 11, section 101, as amended through December 31, 1996, but limited to a county, statutory or home rule charter city, or town; or a housing and redevelopment authority, economic development authority, or rural development financing authority established under chapter 469, a home rule charter, or special law."
Mississippi	No	State regulated debt limits	N/A	The state limits the amount of debt that a municipality may incur. Miss. Code Ann. § 17-21-51. Special annual taxes must be levied if a municipality is unable to service its debt. *Id.* The state also offers financial assistance to municipalities from the "municipal revolving fund," though its disbursements are based on population and not fiscal requirements. Miss. Code Ann. § 21-33-401.
Missouri	Yes	N/A	Mo. Ann. Stat. § 427.100	None

Montana	Yes/ Conditional	N/A	Mont. Code Ann. § 7-7-132	Applies to "local entities" and requires that a "local entity's" legislative body passes an ordinance saying that it meets all eligibility requirements found in § 109 of the Federal Bankruptcy Code.
Nebraska	Yes	N/A	Neb. Rev. Stat. § 13-402	None
Nevada	No	State Receivership	Nev. Rev. Stat. § 354.685	If certain conditions are met, a hearing will be held with the Nevada Tax Commission. "If, after the hearing, the Nevada Tax Commission determines that a severe financial emergency exists, it shall require by order that the Department take over the management of the local government as soon as practicable." Nev. Rev. Stat. § 354.685
New Hampshire	No	State regulated debt limits	N/A	The state limits the amount of debt that a municipality may incur. N.H. Rev. Stat. Ann. § 33:4-a. If an entity whose taxes make up five percent of the municipalities revenue files for bankruptcy, thus causing financial distress for the municipality, the municipality may borrow money in excess of the state mandated debt limit. N.H. Rev. Stat. Ann. § 33:7-c.
New Jersey	Conditional	N/A	N.J. Stat. Ann. § 52:27-40	Any county, municipality, school district or political subdivision must get approval from the "municipal finance commission" before filing the plan. § 52:27-41. The "municipal finance commission" must also approve, in writing, each payment to attorneys, agents, committees, or other representatives of creditors. § 52:27-42, 43.

New Mexico	No	State Board of Finance may provide technical assistance and emergency loans	N.M. Stat. Ann. § 6-1-1 *et seq.*	State government, through the State Board of Finance, provides technical assistance and may make "emergency loans" to municipalities in a wide range of circumstances.
New York	Conditional	N/A	N.Y. Local Fin. Law § 85.80	No municipality with outstanding ARRA bonds (as defined in Public Authorities Law Title 18 § 2432) may file for Chapter 9.
North Carolina	Conditional	N/A	N.C. Gen. Stat. § 23-48	Requires approval of "Local Government Commission of North Carolina." Note that the statute uses the term "taxing district," which is in reference to language of the 1939 version of the Bankruptcy Code.
North Dakota	No	N/A	N/A	N/A
Ohio	Conditional	Oversight commission assists municipality in "fiscal emergency"	Ohio Rev. Code Ann. § 118, § 133.36.	Filing must be approved by the tax commissioner. A "fiscal emergency" may be declared by state auditor. An oversight commission of seven members is appointed and the city is required to create a plan to overcome the emergency. The state provides fiscal supervision and advice and prepares a "90-day accounting report" within 90 days of declaring an emergency. Even after municipality is out of emergency, state continues to monitor annual financial reports and audits.
Oklahoma	Yes	N/A	Okla. Stat. tit. 62, § 283	None
Oregon	No	State regulated debt limits	N/A	State mandated debt limits. Org. Const. art. XI, § 10. The Municipal Debt Advisory Commission offers assistance and oversight of municipalities issuing bonds. Or. Rev. Stat. § 287A.630.

Pennsylvania	Conditional	State receivership - *"Act 47 Plan"*	53 Pa. Cons. Stat § 5510.11 and 11701.261	The municipality must submit its bankruptcy petition to the State Department of Internal Affairs and receive written approval before filing. Requirements for approval are detailed in 53 Pa. Cons. Stat. § 11701.201. The municipality may elect to follow an Act 47 plan—a form of state receivership. Municipalities are incentivized to participate in Act 47 because of access to state loans.
Rhode Island	Conditional	Non-judicial receivership	R.I. Gen. Laws § 45-9-1 *et seq.*	Municipalities are prevented from entering judicial receivership and must proceed through a three-step process including appointment of a financial overseer, a budget and review commission, and possibly a non-judicial receiver.
South Carolina	Yes	N/A	S.C. Code Ann. § 6-1-10	None
South Dakota	No	N/A	N/A	N/A
Tennessee	No	Assistance from state comptroller with options to restructure debt service	Tenn. Code Ann. § 6-56-101 *et seq.*; § 8-4; § 9-21.	State comptroller's office has statutory authority to assist in municipal fiscal crisis. State could allow county to lengthen its debt service (restructure debt). The state could also make a direct loan to a county or guarantee a loan if a county petitions for it. The comptroller's office would perform an audit and give assistance and advice.
Texas	Yes	N/A	Tex. Loc. Gov't Code Ann. § 140.001	None
Utah	No	N/A	Utah Code Ann. § 10-6-110	State government strictly regulates municipal budgets and requires annual review of each municipality's budget to ensure that revenues equal expenses in any given year. *See* Utah Code Ann. § 10-6-110 *et seq.* Municipal bankruptcy is highly unlikely.

Vermont	No	Possibility of judicial receiver in some municipal bond defaults	N/A	Possibility of an appointment of a judicial receiver in the "event of default" of municipal bond obligations of public utility systems. Vt. Stat. Ann. tit. 24 § 1827. Other statutes deal with bond holders' rights in the event of default of certain types of municipal bonds. Vt. Stat. Ann. tit. 10 § 635, tit. 16 § 3860, tit. 29 § 811, tit. 30 § 5034, § 8067.
Virginia	No	State aid for municipal bond default	Va. Code Ann. § 15.2-2659	State comptroller will withhold state funds from municipality and make principal/interest payments on behalf of a municipality in the event of municipal bond default. Va. Code Ann. § 15.2-2659.
Washington	Yes	N/A	Wash. Rev. Code § 39.64.040	A taxing district must adopt a resolution before it files for bankruptcy. § 39.64.050.
West Virginia	No	State aid for municipal bond defaults	W. Va. Code § 13-3-1	State has a Credit Enhancement Program (consisting of legislative appropriations to prevent municipal bond defaults—the sinking fund deficiencies statute—and the West Virginia Municipal Bond Commission) that reduces risks associated with bond default. W. Va. Code § 13-3-1.
Wisconsin	No	State regulated debt limits	Wis. Stat. § 67.03	State mandated debt limits established to prevent municipal insolvency. Wis. Stat. § 67.03.
Wyoming	No	State mandated debt limits for bond issuers	Wyo. Stat. Ann. § 16-5-107.	State mandated "maximum allowable indebtedness." Wyo. Stat. Ann. § 16-5-107. Any debt created that exceeds the limit is void and any officer who helps create the debt in violation of the state statute and constitution is personally liable. Wyo. Stat. Ann. § 16-5-301.

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If you have questions regarding the above information, please contact a member of the **Municipal Assets in Distress (MAD) Task Force**.

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