

## 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.<sup>6</sup>

Notwithstanding this national policy framework’s success in spurring broadband access across virtually the entire country,<sup>7</sup> questions have emerged about the private sector’s ability to balance profit maximization against preserving certain core aspects of the Internet.<sup>8</sup> 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.<sup>9</sup> This dynamic was evident in debates over “open access” rules in the early 2000s,<sup>10</sup> in regulatory proceedings focused on whether to impose common carrier obligations on broadband service providers in the mid-2000s,<sup>11</sup> and in ongoing discussions about whether “network neutrality” rules are necessary to mediate interactions between network owners and content providers.<sup>12</sup>

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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,<sup>13</sup> calls for increased government involvement continue, based on various perspectives about whether market forces can guide the broadband space toward their preferred outcomes.<sup>14</sup>

## 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.<sup>15</sup> 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.<sup>16</sup> GONs proponents assert that the most expedient remedy<sup>17</sup> is for cities and towns to deploy “future-proof” networks capable of gigabit transmission speeds (equivalent to 1,000 megabits per second).<sup>18</sup>

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.<sup>19</sup> Framed in this manner, arguments in favor of GONs, which promise faster speeds at lower prices, are very attractive.<sup>20</sup>

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

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](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 10<sup>th</sup> 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](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](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](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](http://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](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<sup>21</sup> and need to repair crumbling roads, bridges, dams, and other public infrastructure.<sup>22</sup> 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.<sup>23</sup>

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.<sup>24</sup> 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.<sup>25</sup> 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](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.

Questions  
To be  
Asked

Assessing the Local Broadband Market	
Have local officials comprehensively examined the local broadband market? Such examinations should encompass both the supply side and the demand side.	<input type="checkbox"/>
<p><b>On the supply side:</b></p> <ul style="list-style-type: none"> <li>• What is the nature of local broadband competition? How many total broadband options—wireline, wireless, satellite, etc.—do consumers have access to?</li> <li>• Are there barriers to further deployment by incumbent Internet Service Providers (ISPs)? New entrants?</li> <li>• 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.</li> <li>• Has the municipality engaged ISPs in dialogues around meeting clear goals on the supply side?</li> <li>• Has the municipality clearly articulated its supply side goals for broadband via RFPs/RFIs and/or other such means of public communication?</li> <li>• Are there opportunities to use public-private partnerships (PPPs) to address supply side challenges? Pilot programs? Other experimental approaches?</li> </ul>	<input type="checkbox"/>
<p><b>On the demand side:</b></p> <ul style="list-style-type: none"> <li>• 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.)?</li> <li>• 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?</li> <li>• Has the municipality inventoried and examined existing resources on the demand side—e.g., training programs, anchor institutions, digital literacy initiatives?</li> <li>• Has the municipality attempted to work with and through local social infrastructures to address real demand side needs?</li> <li>• 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?</li> <li>• 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?</li> </ul>	<input type="checkbox"/>

### 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.	<input type="checkbox"/>
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?	<input type="checkbox"/>
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)?	<input type="checkbox"/>

### 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 <b>section 6</b> .)	<input type="checkbox"/>
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?	<input type="checkbox"/>
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?	<input type="checkbox"/>
<p><b>With regard to reviewing specific GONs proposals:</b></p> <ul style="list-style-type: none"> <li>• 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.?</li> <li>• 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?</li> <li>• Have policy makers and planners addressed the challenges associated with network construction and maintenance? Factors include population density, geographic considerations, and recurring network costs.</li> <li>• Does the network plan have one or more “end games” or exit strategies?</li> <li>• Does the plan adequately consider (and contain strategies regarding) the market strengths and possible responses of private sector providers?</li> <li>• Does the plan create competitive or regulatory advantages for the proposed municipal provider compared to non-municipal providers?</li> </ul>	<input type="checkbox"/>

## Cost, Financing & Business Model Review

<p><b>With regard to costs:</b></p> <ul style="list-style-type: none"> <li>• What is the estimated cost of the GON? Does this estimate encompass all aspects of maintenance, operation, and technology upgrades?</li> <li>• What is the expected cost of hiring experienced management and expert staff—necessary inputs for operating a network in a competitive market?</li> <li>• What is the expected cost for marketing and consumer outreach? Have these and other related costs been factored into cost projections?</li> <li>• Have policy makers contemplated the costs associated with unwinding the network in the event of failure?</li> <li>• 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?</li> </ul>	<input type="checkbox"/>
<p><b>With regard to financing:</b></p> <ul style="list-style-type: none"> <li>• 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)?</li> <li>• 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?</li> <li>• Who bears the financial risk of network failure? Bond default? Are taxpayers shielded from these obligations?</li> <li>• Does the business model use alternative funding mechanisms that would limit taxpayer exposure to the costs of failure?</li> <li>• 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)?</li> <li>• 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.</li> </ul>	<input type="checkbox"/>
<p><b>With regard to proposed business models:</b></p> <ul style="list-style-type: none"> <li>• 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?</li> <li>• 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?</li> <li>• Does the proposed business plan include contingency planning to address under-adoption, pricing adjustments by competitors, and/or outright failure?</li> <li>• Does the business model allocate any potential profits to the local government (e.g., payments in lieu of taxes)?</li> <li>• Does the business model factor in debt servicing generally? In the event that subscriber forecasts are off?</li> <li>• To what extent does the business plan include supplemental borrowing or allocation of additional funds/resources by local government?</li> </ul>	<input type="checkbox"/>
<b>Legal, Regulatory &amp; Public Policy Considerations</b>	
Are there state and/or local statutes to guide the GON review process?	<input type="checkbox"/>
Are there related utility laws that might impact core aspects of the proposal (e.g., prohibitions or limitations on utility cross-subsidies)?	<input type="checkbox"/>
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?	<input type="checkbox"/>
Is the municipality empowered under state law to engage in activities that amount to industrial planning?	<input type="checkbox"/>
In the absence of formal state or local rules regarding GONs, has the municipality considered a public referendum or other means of public engagement?	<input type="checkbox"/>

# 2

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

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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.<sup>26</sup> 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.<sup>27</sup> 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.<sup>28</sup>

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.<sup>29</sup> 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.<sup>30</sup>

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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](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.<sup>31</sup> 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.<sup>32</sup>

The rise of cable broadband Internet access in the late 1990s and early 2000s, however, presented a regulatory and technological challenge to this view.<sup>33</sup> 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.<sup>34</sup> Some viewed this approach as optimal from the standpoint of protecting the theoretical architecture of the Internet.<sup>35</sup> However, cable operators were not subject to these rules.<sup>36</sup> 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.<sup>37</sup>

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.<sup>38</sup> The major motivation was to manufacture competition among broadband service providers, which would have positioned the municipality as the primary local market facilitator.<sup>39</sup> This act was ultimately deemed unlawful by a federal appeals court, which ruled that municipalities were prohibited from regulating cable broadband service.<sup>40</sup> The immediate result was a rebuke of municipal authority to impose open access requirements on cable broadband providers.<sup>41</sup> More importantly, the case spurred the FCC to formalize and rationalize its regulatory approach to new and emerging broadband platforms.<sup>42</sup>

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.<sup>43</sup>

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,<sup>44</sup> 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.<sup>45</sup> 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.<sup>46</sup> 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.<sup>47</sup>

38 *AT&T v. City of Portland*, 216 F.3d 871 (9<sup>th</sup> 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 (9<sup>th</sup> 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](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.<sup>48</sup> 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.<sup>49</sup> 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.<sup>50</sup> 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.<sup>51</sup> 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.<sup>52</sup> 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.<sup>53</sup>

These interrelated actions provided stakeholders in the broadband space with significant clarity about the scope of possible government interventions.<sup>54</sup> The FCC framework formalized Congress's call for a mostly hands-off approach to the Internet,<sup>55</sup> 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.<sup>56</sup> 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.<sup>57</sup>

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](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](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 (8<sup>th</sup> 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.<sup>58</sup> GONs advocates proposed positioning municipal networks as a means of closing the “digital divide” and achieving universal access to the Internet.<sup>59</sup>

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.”<sup>60</sup> Between 2000 and 2005, these efforts yielded impressive improvements in the availability and adoption of broadband throughout the country.<sup>61</sup>
- 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.<sup>62</sup> 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.<sup>63</sup> 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.<sup>64</sup>

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.”<sup>65</sup>

The municipal Wi-Fi movement blossomed with Philadelphia’s announcement, in 2005, that it was planning to deploy a citywide Wi-Fi network.<sup>66</sup> 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

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](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.”<sup>67</sup> 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.<sup>68</sup> 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.”<sup>69</sup>

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.<sup>70</sup> The mesh networking technology was incapable of covering the city’s 135 square miles with reliable service.<sup>71</sup> In addition, the initial budget of \$10 million eventually tripled.<sup>72</sup> 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.<sup>73</sup>

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.”<sup>74</sup> Chicago, Houston, San Francisco, St. Louis, and Cincinnati, among many others, also opted to put their wireless plans on hold.<sup>75</sup>

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.<sup>76</sup> Broadband prices also fell during this period,<sup>77</sup> and mobile broadband, enabled by new third-generation (3G) wireless networks, emerged as a viable, affordable, and extremely popular alternative to traditional wired connections.<sup>78</sup>
- Second, no city succeeded in developing a viable business model to support its Wi-Fi efforts.<sup>79</sup> 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.<sup>80</sup> 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](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](http://www.wired.com/techbiz/it/news/2007/09/muni_wifi?currentPage=all).

80 *Rationalizing Municipal Broadband* at 72-73.

their privacy.<sup>81</sup> 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.<sup>82</sup>

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.”<sup>83</sup> There was growing evidence that the economics of GONs rarely, if ever, worked.<sup>84</sup> 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.<sup>85</sup>

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.<sup>86</sup> 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.<sup>87</sup> 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.<sup>88</sup>

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

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](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](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](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).<sup>89</sup> 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.<sup>90</sup> 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.<sup>91</sup>

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.”<sup>92</sup> 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,<sup>93</sup> 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.”<sup>94</sup>

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.<sup>95</sup> 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.<sup>96</sup>

Implicit in this reframing was a decision to place GONs far ahead of actual consumer demand<sup>97</sup> and attempt to “future-proof” advocacy by focusing on what a growing number of advocates considered the end-state

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](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/doi/supp\\_info/DEI/MunicipalBroadband.pdf](http://www.cityofchicago.org/dam/city/depts/doi/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](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](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.<sup>98</sup> The primary justification was that these networks would serve as the foundation on which new businesses and the future economy would be built.<sup>99</sup> 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.<sup>100</sup> 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.<sup>101</sup>

A fiber-based GON often cited as a success in its early days was based in Burlington, Vermont.<sup>102</sup> 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.<sup>103</sup> After securing tens of millions of dollars in financing, Burlington Telecom (BT), the operator, appeared to be on a path toward sustainability in 2007.<sup>104</sup> However, despite a positive cash flow and a slowly expanding subscriber base, by 2008 overall revenues were insufficient to cover its debt payments.<sup>105</sup> 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.”<sup>106</sup> To this day, BT remains in debt and continues to struggle to expand its user base.<sup>107</sup>

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.<sup>108</sup> 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.

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 – 2<sup>nd</sup> Edition*, Columbia University (May 2011), available at [http://www4.gsb.columbia.edu/filemgr?file\\_id=738763](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.moody.com/research/Moodys-assigns-Baa3-rating-to-the-City-of-Burlingtons-VT-PR\\_270766](http://www.moody.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

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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.<sup>109</sup> 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.<sup>110</sup> 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.<sup>111</sup> 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.<sup>112</sup>

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/](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](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,<sup>113</sup> although the first official FCC survey of broadband availability was not released until 1999.<sup>114</sup> In it, the FCC reported that, by the end of 1998, there were about 375,000 residential broadband customers.<sup>115</sup> (The FCC defined broadband as an Internet connection capable of speeds in excess of 200 Kbps.<sup>116</sup>) 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) ("1<sup>st</sup> 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.”<sup>117</sup> 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.<sup>118</sup>

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.<sup>119</sup> 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.”<sup>120</sup> 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).<sup>121</sup>

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](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.

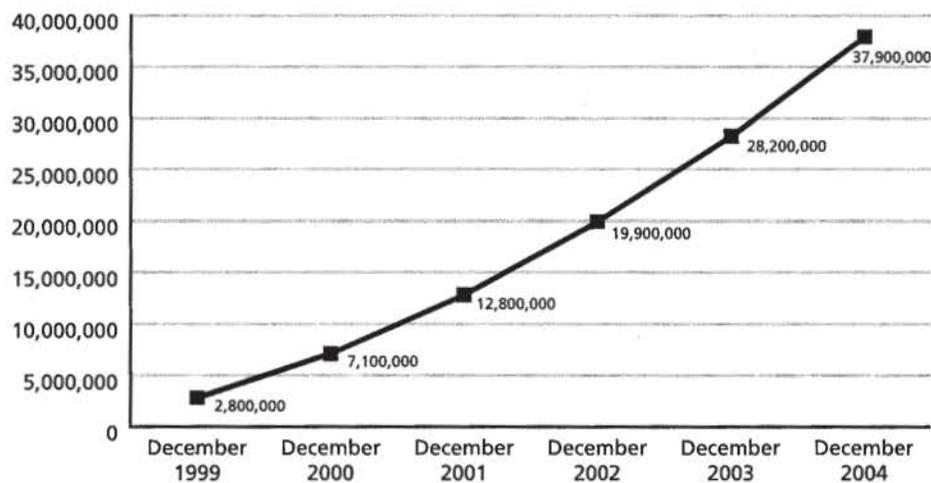
120 *Id.* at para. 48.

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).<sup>122</sup>

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.<sup>123</sup> 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.<sup>124</sup> 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.<sup>125</sup> Altogether, service providers invested in excess of \$500 billion in broadband infrastructure between 1999 and 2004.<sup>126</sup>

<sup>122</sup> *Id.* at para. 50.

<sup>123</sup> See *supra*, section 2.1, for additional discussion.

<sup>124</sup> 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](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*”).

<sup>125</sup> *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).

<sup>126</sup> *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.<sup>127</sup> 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.<sup>128</sup> 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.<sup>129</sup>

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.<sup>130</sup>

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.<sup>131</sup> 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,<sup>132</sup> as a solution.<sup>133</sup>

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,<sup>134</sup> and by 2002 consumers were using more minutes on their cellphones than on their landlines.<sup>135</sup> 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).<sup>136</sup>

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.<sup>137</sup> The rapid maturation and deployment of these services was impressive: in 2003, the FCC observed maximum mobile Internet speeds of about 144 Kbps;<sup>138</sup> by 2006, maximum download speeds had increased to over 2 Mbps, allowing users to engage in a wide array of online activities.<sup>139</sup> The FCC sought to further these gains and speed along deployment of 3G networks by auctioning off sizeable swaths of new spectrum in 2006.<sup>140</sup> Wireless carriers responded by investing over \$24 billion in their networks to support

127 See 2<sup>nd</sup> 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) (“4<sup>th</sup> 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 4<sup>th</sup> 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.R. 13350, Table 1 (2001) (“6<sup>th</sup> 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](http://www.blackberry.com/select/get_the_facts/pdfs/rim/rim_history.pdf).

137 6<sup>th</sup> 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.<sup>141</sup> 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.<sup>142</sup>

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
<b>DSL &amp; other Wireline*</b>	979,701	31,148,000
<b>Cable</b>	1,414,183	40,251,000
<b>Satellite and Fixed Wireless</b>	50,404	1,423,000
<b>FTTP</b>	312,204	2,884,000
<b>Mobile Wireless</b>	0	26,532,000
<b>Total Connections</b>	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**
<b>Cable/Cable Modem</b>	8.6 Mbps <sup>†</sup>	\$43.27 <sup>†</sup>	\$46.82	Nationwide (multiple providers)	39%
<b>Telco/DSL</b>	3.5 Mbps <sup>†</sup>	\$60 <sup>†</sup>	\$64.92	Nationwide (multiple providers)	31%***
<b>Mobile/ Wireless (3G)</b>	~1-2 Mbps	\$30 <sup>††</sup>	\$32.46	Nationwide (multiple providers)	26%
<b>Telco/FTTH</b>	20 Mbps <sup>†††</sup>	\$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](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)

<sup>†</sup> Average speed and cost<sup>143</sup>

<sup>††</sup> Cost of a wireless plan offered by a major carrier in late 2008<sup>144</sup>

<sup>†††</sup> Speed and cost of a mid-tier service option offered by Verizon in 2008<sup>145</sup>

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](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](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://gadgets.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<sup>146</sup> 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
<b>DSL</b>	30,848,000	31,142,000
<b>Other Wireline*</b>	689,000	822,000
<b>Cable</b>	41,434,000	51,649,000
<b>Satellite</b>	990,000	1,454,000
<b>Fixed Wireless</b>	488,000	771,000
<b>FTTP</b>	3,548,000	6,728,000
<b>Mobile Wireless</b>	41,436,000	169,165,000
<b>Total Connections</b>	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
<b>2009</b>	\$63 billion
<b>2010</b>	\$66 billion
<b>2011</b>	\$66 billion
<b>2012</b>	\$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

<sup>146</sup> 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.<sup>147</sup> Equally important, by December 2012 about 95 percent of U.S. households had access to at least three different mobile broadband providers.<sup>148</sup> 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.<sup>149</sup> 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
<b>Between 200 Kbps &amp; 3 Mbps</b> (% of total connections)	62,291,000 (55%)	119,869,000 (45.8%)
<b>Between 3 Mbps &amp; 6 Mbps</b> (% of total connections)	14,926,000 (13.2%)	42,052,000 (16.1%)
<b>Between 6 Mbps &amp; 10 Mbps</b> (% of total connections)	23,110,000 (20.4%)	40,016,000 (15.3%)
<b>Between 10 Mbps &amp; 25 Mbps</b> (% of total connections)	12,835,000 (11.3%)	39,177,000 (15%)
<b>Between 25 Mbps &amp; 100 Mbps</b> (% of total connections)	187,000* (0.2%)	20,418,000 (7.8%)
<b>Over 100 Mbps</b> (% 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.<sup>150</sup> 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.”<sup>151</sup> The data indicate supply is meeting demand.<sup>152</sup>

**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: 3<sup>rd</sup> 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](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](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.<sup>153</sup> 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 <sup>154</sup>
Telco/DSL	\$52/Mbps	\$18.55/Mbps	\$3.32/Mbps <sup>155</sup>
Mobile/ Wireless	N/A	\$20/Mbps (3G)	\$3.08/Mbps <sup>156</sup> (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.<sup>157</sup>

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).