ACLP
ADVANCED COMMUNICATIONS LAW & POLICY INSTITUTE
at New York Law School

NEW YORK LAW SCHOOL

THE VALUE OF CONTEXT AND RIGOR:
A REVIEW OF OTI'S *COST OF CONNECTIVITY 2020* REPORT

JULY 2020

BY MICHAEL J. SANTORELLI & ALEXANDER KARRAS

TABLE OF CONTENTS

EXECUTIVE SUMMARY iii

1. INTRODUCTION 1
1.1 *The Many Failings of OTI's Cost of Connectivity 2020 Report* 1

2. OTI IGNORES CRITICAL CONTEXT IN ITS ANALYSIS 3
2.1 *Investment* 4
2.2 *Competition* 6
2.3 *Speed* 6
2.4 *Adoption* 7

3. OTI'S SEVERELY FLAWED METHODOLOGY 12
3.1 *A Misguided Analysis of Price* 12
3.2 *Additional Methodological Shortcomings* 13

4. MUCH MORE THAN MEETS THE EYE: FILLING IN OTI'S MISSING GONS CONTEXT 16
4.1 *Ammon, Idaho* 17
4.2 *Chattanooga, Tennessee* 18
4.3 *Fort Collins, Colorado* 19
4.4 *Lafayette Louisiana* 20
4.5 *Wilson, North Carolina* 21

5. A BETTER PATH FORWARD 22
5.1 *Data Driven Policy* 22
5.2 *Importance of Oversight* 22
5.3 *Role for Targeted Subsidies* 23
5.4 *Inclusivity on the Supply Side* 24
5.5 *Inclusivity on the Demand Side* 25

6. CONCLUSION 26

ENDNOTES 27

LIST OF FIGURES

Figure 1 U.S. Broadband Investment, 2012-2018 4

Figure 2 Growth in Broadband Availability, 2010-2019 5

Figure 3 US Broadband Adoption by Household Income, 2013 & 2018 8

Figure 4 US Broadband Adoption by Race/Ethnicity, 2015 & 2018 8

Figure 5 Overall Broadband Adoption by City, 2013 & 2018 9

Figure 6 Atlanta, GA – Broadband Adoption by Household Income, 2013 & 2018 10

Figure 7 New York, NY – Broadband Adoption by Household Income, 2013 & 2018 10

Figure 8 Seattle, WA – Broadband Adoption by Household Income, 2013 & 2018 11

Figure 9 OTI Report Cities by Density 15

Figure 10 Fort Collins, CO – Broadband Adoption by Household Income, 2013 & 2018 19

EXECUTIVE SUMMARY

OTI's *Cost of Connectivity 2020* report finds a broadband "affordability crisis" in the United States. A comprehensive review of the report, however, reveals numerous methodological and analytic flaws that undermine OTI's findings and recommendations. These include:

- **OTI Ignores Essential Context.** Rather than undertake a comprehensive analysis, OTI offers merely an ahistorical snapshot of broadband prices at a single point in time. There is no effort to evaluate how the U.S. broadband market, including investment, offerings, broadband speeds, adoption trends, consumer utilization patterns, and other factors, has evolved and continues to evolve.

- **OTI Engages in Disaster Opportunism.** OTI attempts to make up for this absence of context and lack of appreciation for the dynamic nature of broadband connectivity by citing to the urgency stemming from the ongoing COVID-19 pandemic. This attempt to opportunistically leverage a crisis is unfortunate and speaks to the underlying weaknesses of OTI's analysis.

- **OTI Manifests an Anti-ISP Bias.** OTI casually dismisses efforts by private ISPs to bolster broadband connectivity, despite strong evidence that such actions have benefited millions of consumers. OTI's dismissal of responses by ISPs to the pandemic and related efforts to bring more people online via low-income-focused offerings evinces a deep anti-ISP bias that ultimately reflects poorly on its supposed objective analysis.

- **OTI's Report Reflects Many Methodological Shortcomings.** OTI's simplistic attempt at a comparative broadband pricing analysis involves numerous foundational and procedural methodological issues. Despite collecting a seemingly impressive quantity of prices and fees, the resulting analysis fails to yield any meaningful comparisons of the "cost of connectivity."

- **OTI's Support for Municipal Broadband as a "Solution" to the "Crisis" Ignores Data and Real-World Evidence of Struggle & Failure.** An examination of the cherry-picked municipal networks offered by OTI in support of its report reveals numerous shortcomings. Neither the proffered projects nor government-owned broadband networks generally should be seen as a viable means of improving broadband connectivity in a meaningful way.

OTI's *Cost of Connectivity 2020* does not offer an analytically sound foundation upon which any broadband policy should be grounded. The U.S. is not facing a broadband affordability crisis. Although discrete broadband connectivity challenges exist, the extensive policy interventions recommended by OTI would not address these challenges. A more grounded path forward includes targeted, data-driven government interventions and greater collaboration between state and local governments and broadband providers to address issues on both the supply side and demand side.

1. INTRODUCTION

There is one certainty with regard to American broadband policy – it has been and will likely continue to be animated by a steady drumbeat of criticisms from naysayers and other advocates seeking to advance their own policy agendas. For those of this ilk, broadband in the U.S. has been so bad that it threatens the nation's ability to compete with other countries said to have some greater Internet capability. The naysayers' messaging has been consistent: service in the United States is too slow; it is not universally available; it is too expensive; there is not enough competition.[1] This negative narrative has, in turn, served as a vehicle for advocates to advance expansive policy proposals for fixing these perceived problems. These prescriptions have ranged from mandating open access (aka unbundling) of broadband networks,[2] to regulating ISPs like utilities,[3] to, more recently, encouraging government provision of broadband.[4]

Time has not been kind to the prognostications of these advocates. In each case, reports of the impending death of broadband in the U.S. were greatly exaggerated. A myriad of metrics – investment; intermodal competition; availability; speed; use – all demonstrate that the broadband market in the U.S. has grown by leaps and bounds since the turn of the century.[5] In addition, many of the proposed "fixes" have turned out to be failures in and of themselves. It turns out that network unbundling actually undermines intermodal competition rather than promotes it.[6] Utility-style net neutrality rules weaken incentives to invest in broadband infrastructure.[7] And public broadband networks fail or struggle at an alarming rate.[8]

Nevertheless, the broadband skeptics persist.

It is against this backdrop that the Open Technology Institute's latest *Cost of Connectivity* report must be assessed.[9] OTI has long been among the most vociferous critics of the U.S. broadband market, having previously issued several *Cost of Connectivity* studies[10] and numerous other reports seeking to persuade policymakers and the public that broadband is failing and can only be saved by vast government intervention.[11] As discussed herein, OTI's new report, like its previous efforts, misses the mark completely.

1.1 *The Many Failings of OTI's* Cost of Connectivity 2020 *Report*

OTI's *Cost of Connectivity* reports seek to compare broadband prices and service offerings in select U.S. cities with those of handpicked cities in Europe and Asia. Inevitably, each report in the series concludes with a variation on this singular theme: "U.S. consumers in major cities tend to pay higher prices for slower speeds compared to consumers abroad."[12] OTI frames these results as dispositive of the fact that "U.S. cities lag behind cities around the world," thereby "emphasizing the need for policy reform," which, in OTI's view, should revolve around "strategies to increase competition, in turn fostering faster speeds and more affordable access."[13] Consistently across each *Cost of Connectivity* report, OTI recommends, among other things, that broadband competition in the U.S. would greatly benefit from the

entrance of public competitors in the form government-owned broadband networks (GONs).[14]

OTI's latest report, issued in July 2020, puts forward a set of "findings" that differ very little from those included in its very first report, issued in July 2012. One new addition: OTI now concludes that the U.S. faces an "affordability" crisis due to a lack of competition, resulting in an "exacerbate[d]" digital divide.[15] Based on this statement and OTI's overall report, one might reasonably assume that broadband adoption in the U.S. had retrenched in recent years – that the purported "affordability crisis" had driven people offline, thereby widening the divide. Nothing could be further from the truth. As discussed in **section 2**, broadband adoption has, in fact, continued to increase across the board in the U.S. over the last decade.

This error (one among many) speaks to a fatal flaw of OTI's report: the report is a snapshot of cherry-picked data and not a meaningful analysis of broadband markets. In terms of "data," the report only looks at broadband prices in an arbitrary selection of 28 cities spread across Asia (3 cities), Europe (9 cities), the U.S. (14 cities), Mexico (1 city), and Canada (1 city), at a single moment in time.[16] It completely eschews essential context. Indeed, the report is a steadfastly ahistorical document that fails to consider trends in how conditions in these markets have evolved. For example, the report lacks any real examination of America's digital divide – a complex set of issues that have long defied easy solutions.[17] OTI does not consider whether and how the contours of the divide have changed in recent years; instead, it simplistically concludes that "internet access in the United States remains unaffordable and therefore inaccessible for many households, especially those that are considered low-income."[18] Left undefined and unaddressed is what OTI means by "unaffordable" and for how many households broadband is "inaccessible."

OTI attempts to compensate for this absence of context and lack of understanding of the dynamic nature of broadband connectivity by citing to the urgency stemming from the ongoing COVID-19 pandemic. OTI rightly observes that broadband has proven essential as "many people rely on the internet to navigate new realities presented by the COVID-19 pandemic."[19] But this "because COVID" reasoning, in addition to being yet another example of disaster opportunism,[20] is fundamentally undermined by the report's dismissal of responses by ISPs to the pandemic and related efforts by these entities in recent years to bring more people online. ISPs have deftly handled the rapid shift to remote-everything and the accompanying data deluge on their networks, all while making free and low-cost broadband options available to millions.[21] OTI does not acknowledge these efforts. In addition, that the report writes off ISP low-income-oriented programs like Comcast's Internet Essentials (IE) makes no sense.[22] IE has helped some 8 million low-income individuals connect to broadband over the last nine years.[23] Similar offerings by AT&T, Charter, and Cox have likely helped tens of thousands more. These failings of the OTI report are examined in **Section 2**.

OTI's analysis also seems to suggest that any U.S. broadband issues would somehow evaporate if markets here were more like those in Europe and Asia. Prices certainly differ

across markets, but left unsaid by OTI is that these international counterparts and their home countries face exactly the same digital divide issues as the U.S. OTI's analysis is framed so that the reader will assume that broadband adoption issues in places like Paris and London have been resolved because cheap broadband abounds. Nothing could be further from the truth. Digital divide issues are evident within both Paris and London. Low-income neighborhoods and communities of color lag in broadband adoption in both cities – and between these cities and surrounding rural areas.[24] A similar dynamic is evident in many of the more demographically diverse cities and countries included in OTI's report. These are just some of the report's shortcomings vis-à-vis international comparisons, which are evaluated at length in **Section 3**.

To remedy what it views as alleged shortcomings in U.S. broadband prices, OTI proposes a rehash of the policy recommendations it has long put forward in previous reports. Foremost among these is an unabashed embrace of GONs as a primary solution to the country's broadband woes. As discussed in **Section 4**, OTI's GONs-related arguments ignore an array of data and key context. The five GONs chosen for inclusion in OTI's analysis would seem to be the cream of the crop – the elite 1% of municipal broadband systems. But a closer look reveals that these systems leave much to be desired. Indeed, dubious aspects of each GON call into question OTI's judgment about positioning these municipal systems as models to be replicated across country.

Targeted approaches to enhancing broadband connectivity in the U.S. abound. These are discussed in **Section 5**.

2. OTI IGNORES CRITICAL CONTEXT IN ITS ANALYSIS

Without any compelling data or analysis, OTI asserts that "the U.S. market suffers from a lack of competition."[25] Such "lack of choice directly affects the cost and quality of internet service," according to OTI.[26] This generally echoes conclusions included in previous *Cost of Connectivity* studies.[27] Based on this line of reasoning, it would be reasonable to conclude that most broadband metrics in the U.S. would have been on a downward swing over the last eight years. In such an environment, one would expect investment, for example, to decline since "monopolists" have little incentive to allocate more resources into their networks. Less investment would result in broadband speeds leveling off and adoption would suffer as prices increase to monopoly levels.

As discussed in this section, OTI's assertions are contradicted by an array of data showing that broadband in the U.S. – measured in terms of investment (***section 2.1***), competition (***section 2.2***), speed (***section 2.3***), and adoption (***section 2.4***) – has continued to improve over the last decade. OTI's ahistorical analysis disregards this essential context – *i.e.,* that the market cannot be analyzed from a snapshot of where it stands at a single moment in time. Markets generally, and those for broadband in particular, are incredibly dynamic. They change in response to a number of factors and forces – competition, consumer demand, economic conditions, etc. OTI ignores key data, rendering its analysis unavailing.

2.1 *Investment*

Investment in broadband networks by ISPs has been consistently robust over the last two decades, totaling over $1.7 trillion since 1996.[28] Figure 1 provides a summary of the last eight years.

Figure 1 – U.S. Broadband Investment, 2012-2018

Year	Investment* ($B)
2012	69.6
2013	76.0
2014	78.0
2015	77.5
2016	74.8
2017	76.9
2018	80.0

Source: U.S. Telecom[29]
**Includes investments by wireline and mobile ISPs*

The slight decrease in investment evident in 2015 and 2016 has been attributed to the imposition of stifling network neutrality rules on ISPs.[30] Since those rules were reversed, investment has recovered and topped $80 billion in 2018.

Such high levels of sustained investment have set the broadband industry apart from every other sector of the U.S. economy. Indeed, PPI has recognized firms in the broadband sector as "investment heroes" for several years in a row as companies like AT&T, Charter, and Comcast reinvest billions of dollars each year in their networks.[31]

Investment levels, even as high as those by broadband providers, only tell part of the story. Equally as important are the outcomes of these investments – how have those dollars been spent? Such perspective is completely absent in OTI's analysis. If one relied only on the OTI *Cost of Connectivity* studies to understand the U.S. broadband market, one would be left with the impression that little progress at the network level had taken place since the first report in 2012. Indeed, in its 2012 report, OTI made the following prediction: "erosion in competition is also likely to reduce incentives for cable providers to upgrade their infrastructure to offer higher speeds, despite the fact that the data show how far the U.S. lags behind other countries."[32] OTI was dead wrong. The reality is that broadband networks today are fundamentally different – and more robust – than they were in 2012. ISPs have consistently been upgrading their networks in response to evolving consumer demand and competitive pressures.

Consider the following Figure, which details how widely available broadband at a range of speeds has become over the last decade.

Figure 2 – Growth in Broadband Availability, 2010-2019

	2010	2019
HU w/access to 25 Mbps Wireline Connection	49%	94%
HU w/access to 50 Mbps Wireline Connection	45%	92%
HU w/access to 100 Mbps Wireline Connection	10%	91%
HU w/access to 1 Gbps Wireline Connection	0%	85%
HU w/access to 4G Mobile Connection	1%	99.8%

HU – Housing Units
Source: U.S. Telecom[33]

OTI simply ignores this growth in the availability of high-speed broadband. That OTI does not acknowledge that 85% of U.S. housing units can access a gig is particularly ironic given the report's intense focus on fiber and ultra-high speeds available in Europe, Asia, and some U.S. cities. Instead, this point is linked to the report's lamentable disaster opportunism: "Higher upload speeds are particularly important in the ongoing COVID-19 pandemic because users who telework or participate in distance learning require them for stable video conference connections in real time."[34]

Also left unsaid in OTI's report is how resilient U.S. networks have been during the pandemic – another outcome of ISPs' commitment to investing in their infrastructure. When lockdowns became widespread in March 2020, some expressed concern about the ability of broadband networks to handle what was expected to be a deluge of data traffic stemming from millions seeking to work, educate children, shop online, and entertain themselves during quarantine.[35] It quickly became apparent, however, that the networks could handle this surge in traffic and the fundamental shift in usage patterns triggered by millions sheltering in place.[36] It also became clear that U.S. broadband networks – both wireline and wireless – outperformed those in Europe during the pandemic, yet another critical point that OTI does not reference.[37]

Such resilience in the face of a pandemic stems from innovation within networks. In recent years, most major ISPs have deployed a range of hardware and software solutions to address network issues.[38] For example, AT&T's move toward virtualization allowed it to accommodate a 700% surge in use of its VPN during the pandemic.[39] Comcast has used artificial intelligence to manage traffic on its network, allowing it to increase upload speeds by 20% during the lockdown.[40] Going forward, such network-level enhancements are expected to be the norm for ISPs capable of investing in those services. 5G in particular is well positioned to benefit immensely from these kinds of tools.[41] Such innovation and competition between networks and platforms goes unmentioned by OTI.

For all these gains in investment, availability, and network resilience, though, small parts of the U.S remain unserved. Such is the case in every country included in OTI's report,

another key fact that is glossed over. According to the FCC, approximately 5.5% of the U.S. population lacked access to a fixed broadband connection of at least 25/2 Mbps by the end of 2018; that figure was approximately 23% in rural areas.[42] However, perspective is essential to appreciating how much progress has been made in closing this particular digital divide. In 2015, for example, some 17% of the U.S. population and 53% of the rural population was without a 25/3 Mbps fixed broadband connection.[43] Continued progress toward closing these gaps ultimately hinges on the availability of federal and state funding programs, which are key to helping make these areas more economic to serve (see section 5).

2.2 *Competition*

To support its claim that the U.S. faces a broadband "affordability crisis," OTI asserts, without compelling support, that the "U.S. market for internet service is dominated by just four companies: Comcast, AT&T, Verizon, and Charter. This lack of choice directly affects the cost and quality of internet service."[44] This echoes its finding in 2012, when it observed a "low level" of competition in the U.S. broadband market.[45] OTI, in its 2020 report, also continues to dismiss mobile broadband as an inadequate substitute for wireline broadband,[46] despite data to the contrary.

None of these assertions survive even cursory scrutiny.

Broadband competition in the U.S. continues to strengthen each year. Consider that, at the end of 2014, only 23% of Census blocks containing housing units had access to multiple options for 25/3 Mbps service.[47] By the end of 2017, that figure, according to the FCC, rose to 96%.[48] Even though these figures are inexact, they nevertheless demonstrate that significant progress has been made in bringing multiple broadband options to the vast majority of Americans.[49]

Consumers have even more choices when mobile is factored into the analysis, something OTI dismisses out of hand. Nearly 97% of the U.S. population can choose from at least three providers of 4G service.[50] Those who adamantly refuse to consider mobile broadband a substitute for a wireline connection argue that it is too slow and too expensive to serve as such. In recent years, however, average download speeds over the 4G networks of AT&T, T-Mobile, and Verizon have topped 25 Mbps.[51] In addition, most carriers now offer unlimited data packages for those who do not wish to run afoul of monthly data caps.[52] These trends reflect consumers' embrace of wireless broadband as a critical (and often preferred) on-ramp to the internet, a dynamic that will accelerate as 5G is deployed.[53]

2.3 *Speed*

For many consumers, broadband speeds are abstract: a connection, regardless of how fast it might be, either allows a person to do what they want or it doesn't. For OTI, speed is king and serves as another facet of its tenuous argument about the quality and cost of broadband in the U.S., a point that it tries to bolster by tethering to the pandemic.[54] In addition, OTI

asserts, based on its cherry-picked sample of five GONs, that "municipal networks…unlock[] faster advertised speeds."[55]

Are consumers opting for higher speeds? As noted in Figure 2, above, ultra-high-speed broadband is available to the vast majority of Americans, with 85% having ready access to a gig. But according to the FCC, a majority of subscribers still choose connections that are in the 25-100 Mbps range. That these speeds are widely available contradicts OTI's predictions in 2012 about the likely evolution of the marketplace. As previously noted, OTI assumed that ISPs generally, and cable providers in particular, would not up their speeds due to a lack of competitive pressure. In June 2012, only 8.1% of residential connections were above 25 Mbps; a majority were in the 3-25 Mbps range.[56] By December 2017, over 70% of residential fixed connections were at least 25 Mbps, with most in the 25-100 Mbps range.[57]

Notably, adoption of gigabit speeds remains tepid. According to OpenVault, by the end of 2019, "the overall percentage of subscribers provisioned for gigabit-speed service increased…to 2.81%."[58] Even in Chattanooga, the "Gig City," only about 17% of those subscribing to the city's GON opt for gig speeds.[59]

Even faster speeds are on the horizon as ISPs continue to rollout new offerings and up minimum speeds in recognition of constantly changing consumer usage patterns. For example, streaming video is rapidly overtaking traditional video in the entertainment space, and video calling is ascendant as millions work from home. Cable download speeds currently exceed 2 Gbps, and new cable standards will deliver upwards of 10 Gbps in the near future.[60] Mobile 5G networks are expected to deliver broadband speeds in the triple-digit range.[61] And alternative platforms like fixed wireless and satellite are also increasing their speeds as new hardware and standards are deployed.

In short, contrary to OTI's findings, consumers in the U.S. have a multitude of options for accessing the Internet at various speeds and prices.

2.4 *Adoption*

Another foundational crack in OTI's *Cost of Connectivity 2020* analysis is its failure to examine how broadband adoption in the U.S. has evolved over the last few years.

Central to OTI's findings and recommendations is the assertion that high broadband prices in the U.S. impede greater broadband adoption by consumers, especially those who are considered low-income and those in the "Black, Indigenous, and people of color (BIPOC) communities."[62] According to this reasoning, which relates back to OTI's original *Cost of Connectivity* report in 2012, one would expect broadband adoption to have retrenched because broadband prices have, according to OTI, remained "high."

A look at the Census Bureau's American Community Survey – the most robust set of data available – reveals the opposite: broadband adoption has continued to increase across every demographic and socioeconomic group. Overall broadband adoption in the U.S. has increased from 73.4% in 2013, the first year this data was collected, to 85.1% in 2018, the latest year for which data is available.[63] Consistent gains have been evident across every income bracket (see Figure 3) and demographic group (see Figure 4).

Figure 3 – US Broadband Adoption by Household Income, 2013 & 2018[64]

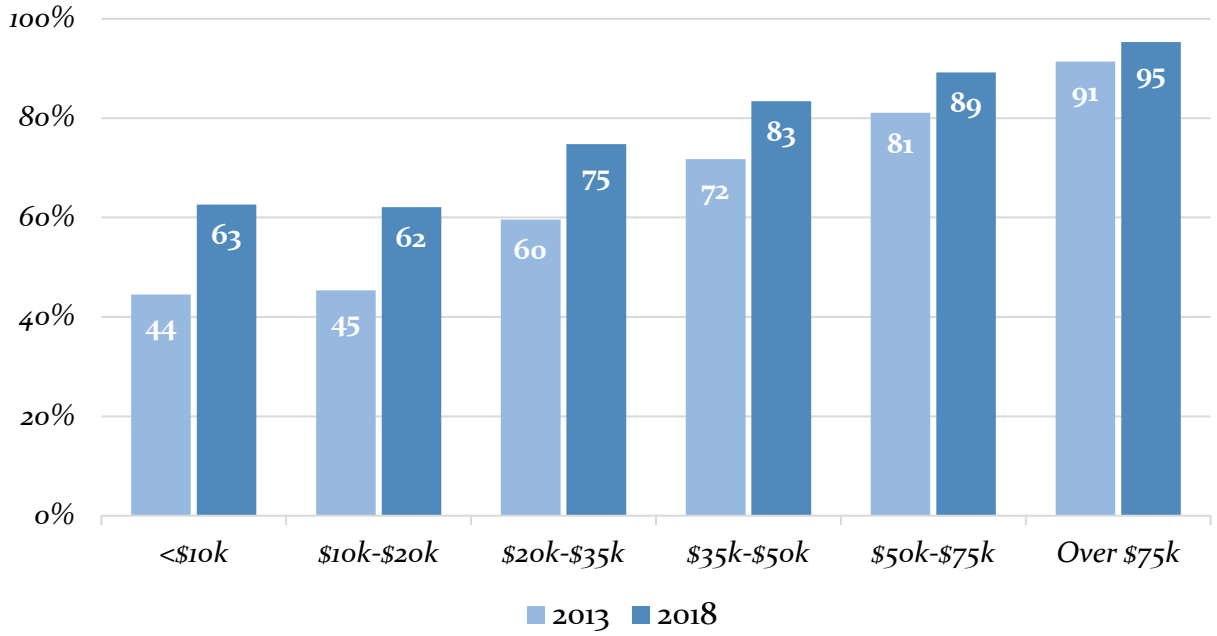
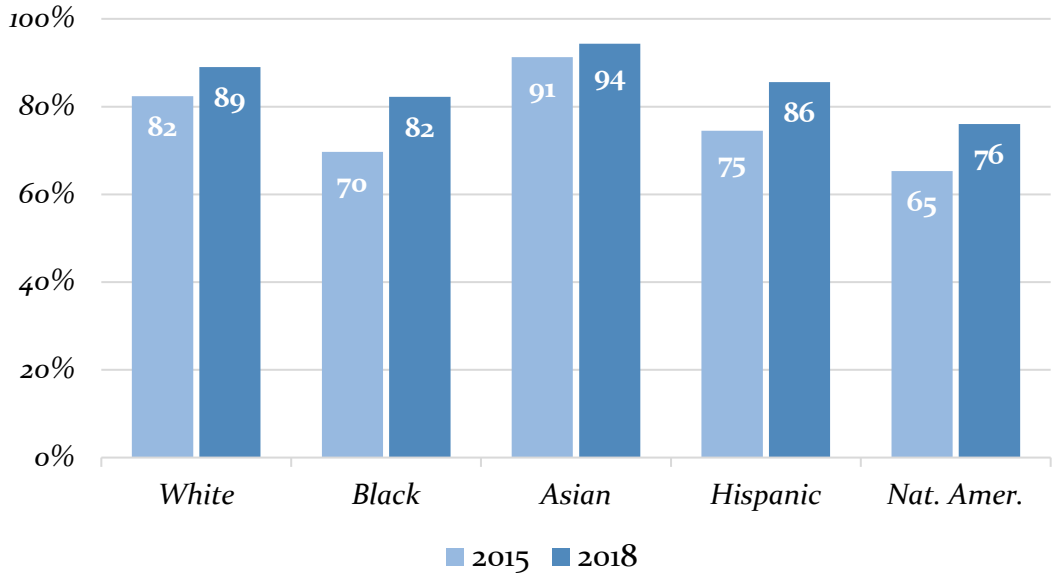
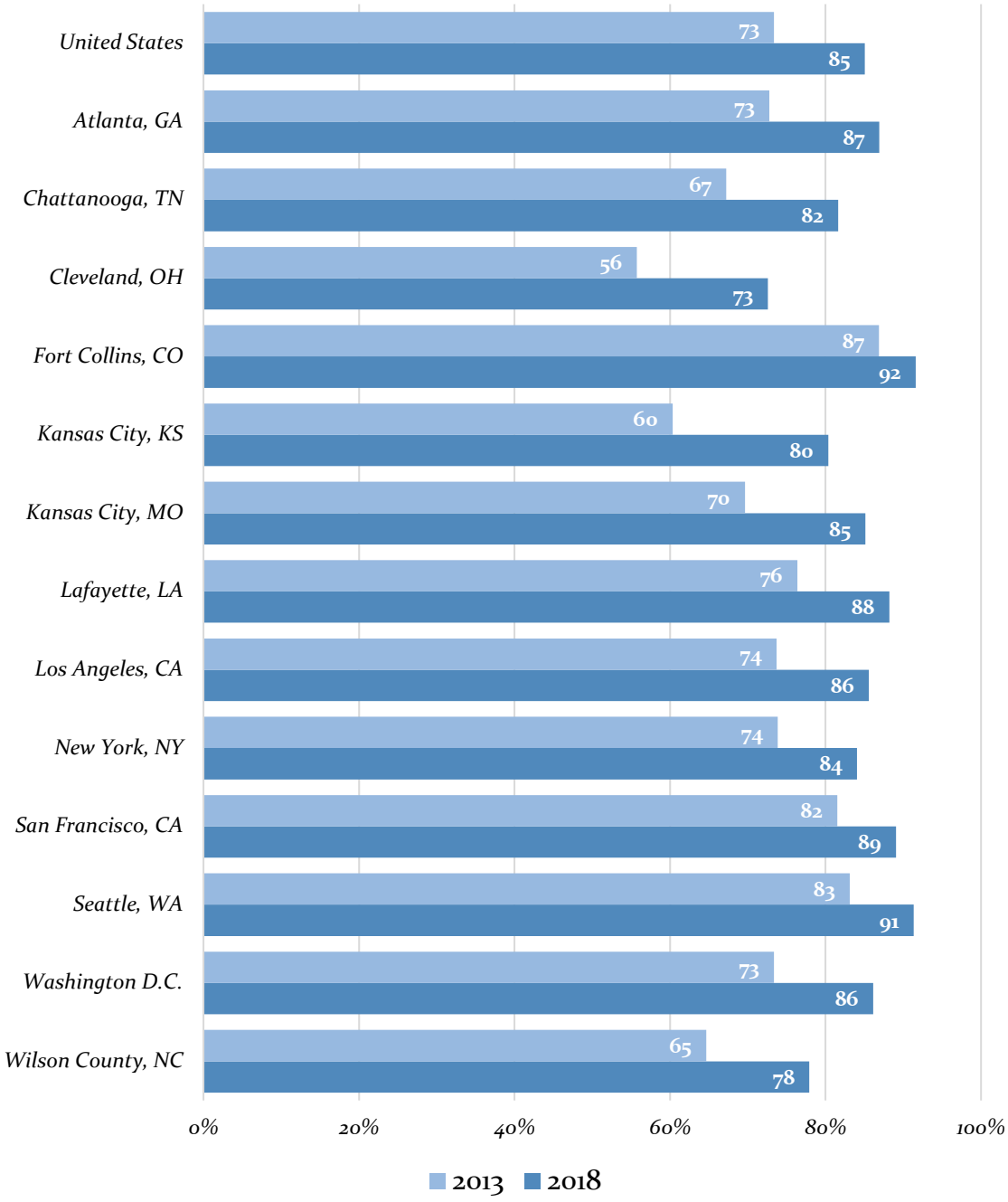


Figure 4 – US Broadband Adoption by Race/Ethnicity, 2015 & 2018[65]



These trends are also reflected in overall adoption increases within each of the cities included in OTI's 2020 report (see Figure 5).

Figure 5 – Overall Broadband Adoption by City, 2013 & 2018[66]



Some of the most impressive gains have been in low-income populations in cities with what OTI deems to be "expensive" broadband. Figures 6, 7, and 8 plot out broadband adoption gains among low-income groups in Atlanta, New York, and Seattle, respectively.

Figure 6 – Atlanta, GA – Broadband Adoption by Household Income, 2013 & 2018[67]

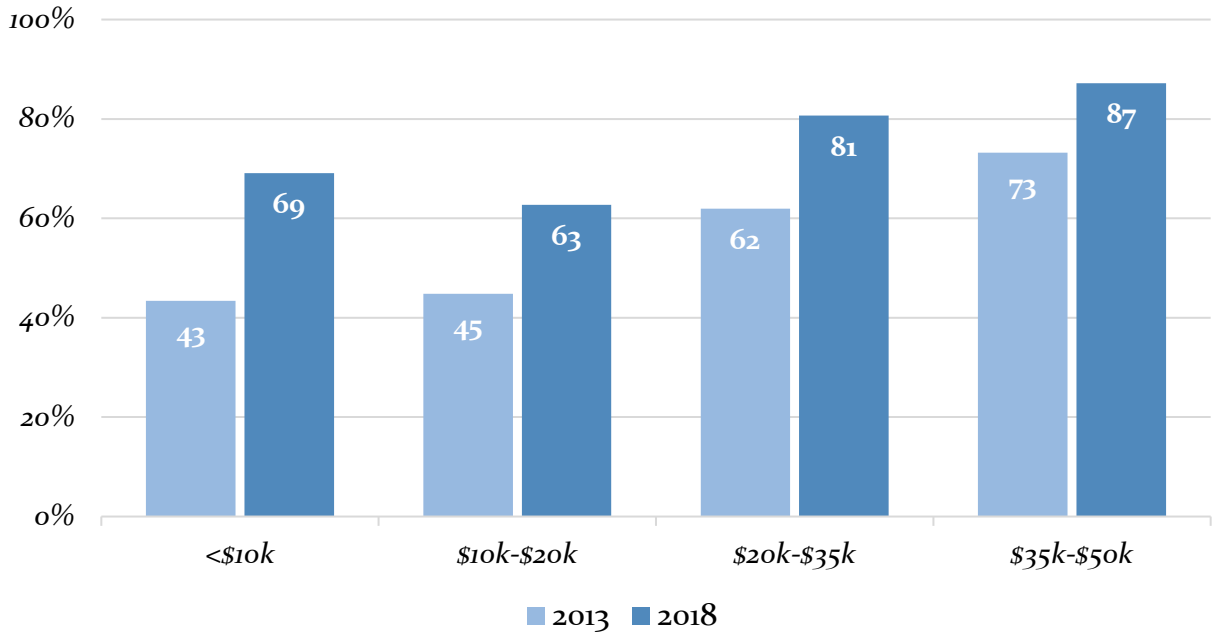


Figure 7 – New York, NY – Broadband Adoption by Household Income, 2013 & 2018[68]

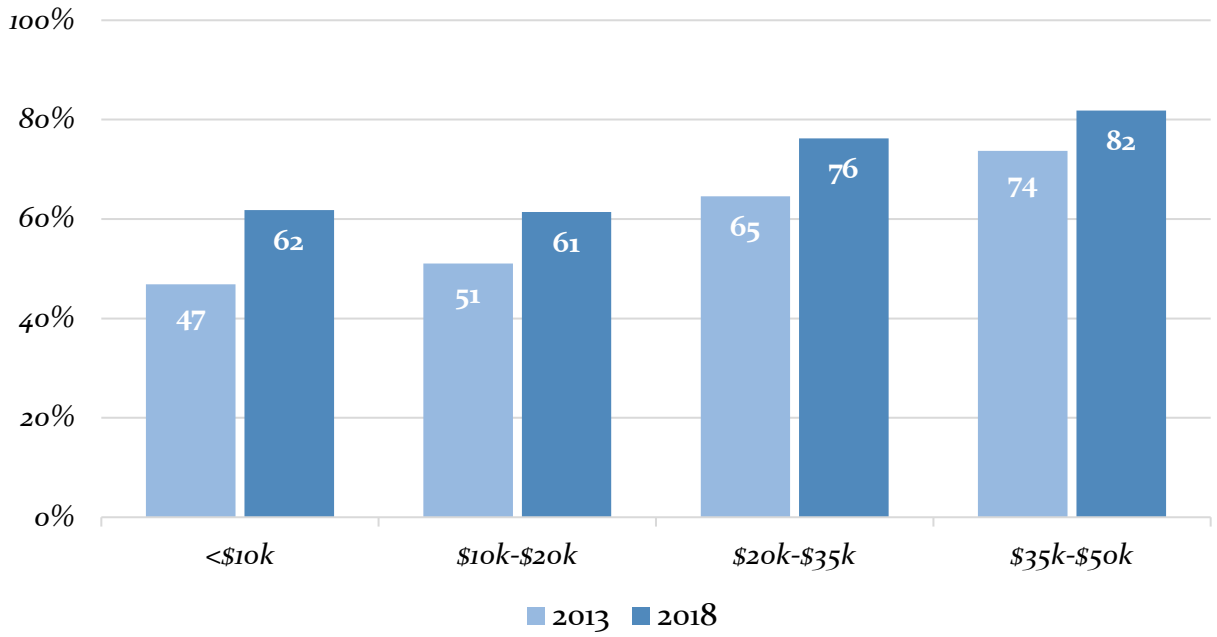
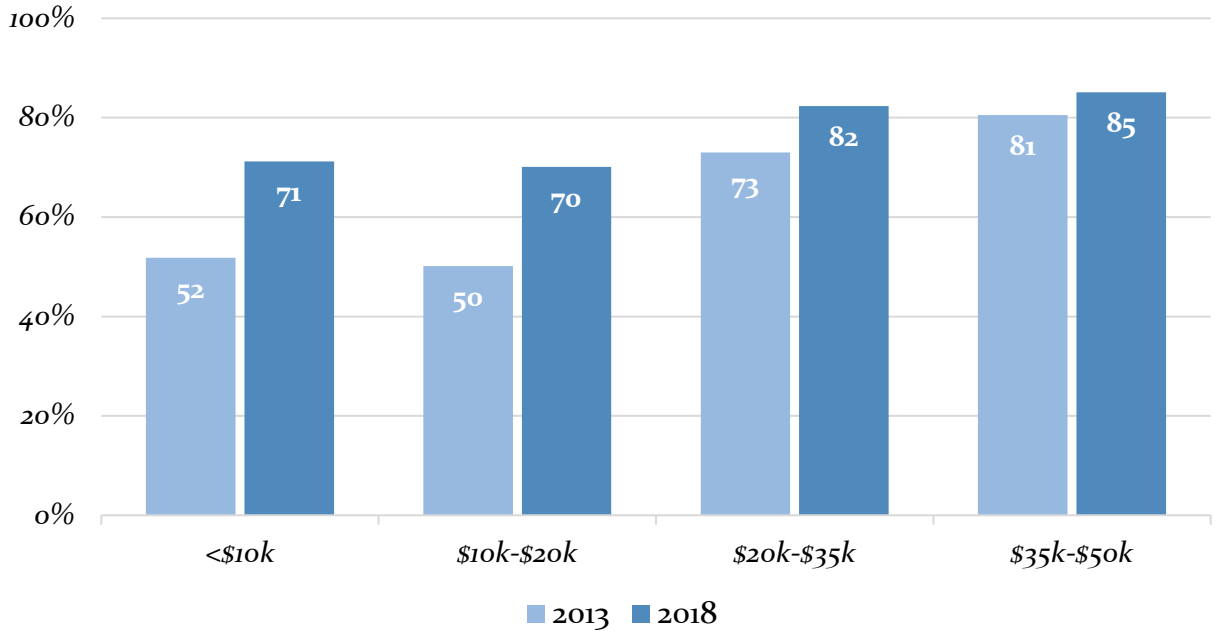


Figure 8 – Seattle, WA – Broadband Adoption by Household Income, 2013 & 2018[69]



These impressive gains, especially among low-income households and BIPOC communities, are ignored by OTI. Ultimately, as has been chronicled extensively elsewhere, broadband adoption decisions are influenced by much more than just the cost of a broadband connection.[70] Among the considerations impacting broadband adoption decisions are:

- A perception that broadband is relevant to one's life and therefore a valuable investment of resources;[71]
- The cost of a computing device to harness a broadband connection (*e.g.*, laptop, desktop, tablet, etc.);[72]
- A sense that being online is safe (*i.e.*, lack of fear about security and privacy threats);[73] and
- Being digitally literate and "ready."[74]

At least some portion of adoption gains among low-income and BIPOC communities can likely be linked to low-income offerings by ISPs like Comcast – offerings that OTI goes to great lengths to dismiss.[75] Comcast's IE in particular has been a notable success: launched in 2011, the program has connected over two million low-income households.[76] But for the program, it is reasonable to assume that many of these households would have remained offline. Indeed, according to one estimate from 2014, IE was responsible for approximately 25% of "new broadband connections among low-income families with children" between 2011 and 2013.[77]

In sum, OTI's attempt to link "expensive" broadband to lagging adoption in certain groups is simplistic and fails to account for a range of important contextual factors impacting adoption decisions. Instead, OTI treats broadband users as a monolithic group whose behavior is steered solely by the price of broadband. As discussed in this section, OTI's "crisis" framework does not hold up in the face of data showing continued adoption gains and an expansive literature underscoring how many forces other than price motivate or discourage Internet use.

3. OTI'S SEVERELY FLAWED METHODOLOGY

In addition to omitting key context and details about the evolution and state of the U.S. broadband market, the OTI report is grounded in numerous methodological shortcomings. Its analysis of pricing in the U.S. and abroad, which is central to the report's thesis, is misguided in numerous respects. These are detailed in ***section 3.1***. A number of other methodological shortcomings, discussed in ***section 3.2***, further undermine OTI's analysis.

3.1 *A Misguided Analysis of Price*

Setting aside the inaccurate conclusion that the U.S. is somehow lagging its international counterparts, OTI's approach to international and domestic comparisons utilizes an overly simplistic price analysis fraught with foundational flaws and executional issues. A comprehensive comparison of broadband prices across fifteen nations is no small undertaking. While OTI collects a seemingly impressive quantity of prices and fees, the method by which the data is aggregated and analyzed fails to yield any meaningful comparison of the "cost of connectivity."

Even making simple comparisons across national borders requires the analysis of a wide range of factors that influence the price, availability, and perceived affordability of a given country's broadband – including everything from demographics, politics, and physical geography to differences in consumer attitudes, taxation, and government policies.

OTI applies a few rudimentary techniques to attempt to adjust for these factors, the first of which is a purchasing power parity (PPP) adjustment for prices listed in foreign currencies. PPP is a deceptively simple metric, calculated by comparing the relative price of a "basket of goods" across countries, which yields the relative value of their currencies based on the price of that basket of goods.[78] As OTI slyly states, "PPP conversion rates adjust for differences in the cost of living, price levels, and other factors that affect a consumer's purchasing power."[79] It is important to note that these "other factors" do not adjust for many of the key determinants of broadband "affordability," ranging from differences in the cost of providing service to differences in income distribution, and serve only to adjust for basic differences in the value of currencies based on their ability to buy a common set of goods.

OTI's PPP adjustment, while accounting for very basic price differences between nations, neglects to account for those same factors domestically. The cost of living and price levels within the U.S. vary widely,[80] and no one would equate one income level in San Francisco to the same one in Lafayette, Louisiana. This has a peculiar effect on OTI's dataset: abroad, basic cost of living differences in countries is roughly accounted for, but in the U.S., differences between cities is entirely ignored.

Furthermore, in using simple advertised prices and fees to represent the overall "cost" of broadband, OTI fails to account for several methods by which a market's consumers might shoulder broadband costs outside of their bills. Government subsidies and tax incentives are one example, with those costs often substantially contributing to broadband deployments. Such costs are frequently borne by consumers outside of their bill.[81] One does not have to dig deep into OTI's report to find additional omissions of indirect broadband costs. In the case of Ammon, Idaho, for example, OTI excludes several key costs associated with the service, namely the approximately $3,000 fee that households must pay for their fiber connection (see section 4.1 for additional discussion).

Accounting for these myriad factors requires a much more nuanced analysis. OTI's desire for simplicity in no way justifies the report's egregious lack of analytical rigor, and in putting forth this analysis as their "most extensive to date,"[82] OTI does a disservice to the communities it purports to help.

OTI's dataset, the many issues with which are further discussed in section 3.2, falls apart when subjected to even the most standard of economic analyses. Indeed, one such analysis finds no statistically significant evidence supporting "price differences by ownership type within a market" when using OTI's own data set, and argues that OTI's "claim that municipal systems charge lower prices is unsupported by the data used in its Report once the data anomalies are eliminated."[83]

Haphazardly analyzing prices, which exist as a tempting and easily quantifiable metric, often serves to muddy, not elucidate, the desired notions of "affordability" and "value." Absent a rigorous methodology, the comparison of prices across countries speaks more to fundamental demographic and economic differences than to any actual differences in "fair pricing" or other, mostly intangible, notions of affordability.

Instead of attempting to undertake a proper econometric effort, OTI pushed forward with a flawed analysis that has yielded additional misinformation about our nation's increasingly politicized broadband marketplace.

3.2 *Additional Methodological Shortcomings*

In addition to its fundamentally misguided analysis of broadband prices, the report further sags beneath the weight of a number of egregious procedural issues.

The first of these is OTI's sampling of cities, both domestically and abroad, which ranges from the obviously cherry-picked to the downright odd. Internationally, the pool of cities paints a stunningly limited and non-representative picture of the world's broadband markets. The cities chosen are exclusively large, urban areas, with no analogues provided for the small and mid-sized domestic cities like Ammon, Chattanooga, Fort Collins, Lafayette, and Wilson.

In Asia, a region that constitutes roughly 60% of the world's population, the broadband market is summed up by a set of just three hyper-urban mega cities: Hong Kong, Seoul, and Tokyo. In Europe, the cities chosen are a mix of markets highly dissimilar to the U.S., like Dublin, Riga, Zurich, and Amsterdam, along with archetypical capitals like London and Paris.[84]

It appears that OTI's international sample was driven primarily by convenience and not by a desire for statistical representativeness. Indeed, the researchers state that in some cases "researchers' proficiency in the operative language limited [their] ability to collect…information."[85] Their actual data aggregation practices are equally varied in rigor, with the researchers encountering issues with promotional versus billed prices and undisclosed fees,[86] adding more holes to a data set that is already woefully lacking.

In terms of domestic markets, the authors openly acknowledge that their choice of cities is based not on representative demographic considerations, but instead on cherry-picking of areas with "unique local attributes."[87] Abroad, a degree of this cherry-picking is also evident: while the authors admit to the inclusion of cities like "Cleveland because of local allegations of digital redlining,"[88] their choices abroad seem to have the opposite goal of avoiding any areas with significant broadband issues.

OTI states that the report "does not examine rural towns, as [they] determined the topic of rural connectivity was best examined through a separate report."[89] The report not only omits rural towns, but restricts itself solely to populous urban cities, except for the smaller U.S. cities included specifically because of the presence of a GON. Beyond limiting the potential relevance of their international comparisons, this inclusion of primarily large metro areas does a remarkably poor job of representing global broadband markets. This is especially evident in the case of the report's primary focus, the U.S., roughly half the population of which describe their residence as being in a "suburban" area.[90]

In discussing their methodology, the authors state that they "compare internet prices across cities with similar population densities."[91] While it is true that the authors collected such information, its actual use as a factor in their analysis is relegated to a single table that groups cities by population density. That "analysis" is limited: of the nine density groupings, only four allow for a within-group comparison of costs in the U.S. and abroad, and of those four, all include either only one U.S. city, or one city abroad.[92]

OTI's mention of density also brings attention to the fact that the international markets included in the report tend to be significantly denser than their U.S. counterparts. As shown in Figure 9, the average density of the international cities is nearly three times that of the U.S. cities, and the least dense of these cities – Riga, Latvia – is still more than twice as dense as any of the six least dense U.S. cities.

Figure 9 – OTI Report Cities by Density

City	Residents per km^2
Kansas City (KS)	469
Chattanooga (TN)	479
Kansas City (MO)	590
Wilson (NC)	667
Ammon (ID)	867
Lafayette (LA)	916
Fort Collins (CO)	1,136
Atlanta (GA)	1,367
Cleveland (OH)	1,917
Riga	2,099
Prague	2,668
Seattle (WA)	3,244
Los Angeles (CA)	3,275
Amsterdam	3,752
Washington, DC	4,301
Zürich	4,654
Toronto	4,692
Dublin	4,731
London	5,175
Mexico City	6,030
Hong Kong	6,731
Copenhagen	7,114
San Francisco (CA)	7,170
Bucharest	7,612
New York (NY)	10,935
Tokyo	14,796
Seoul	16,154
Paris	21,014
Avg. Density – USA	***2,667***
Avg Density – Intl.	***7,659***

Source: OTI Report Data[93]

Indeed, density as a possible confounding factor is given only a passing consideration, and OTI makes no attempt to mathematically factor it or any other relevant demographic factor into their analysis.

OTI seeks to preempt criticisms of the sample by stating that while they "refer to metrics for Asia, Europe, North America, and the United States as a whole" they "recognize that these cities may not be fully representative of their countries or continents."[94] Briefly

mentioning these issues in the report's Methodology does little to temper actual public perception of their findings, and admitting that fact in what amounts to a footnote does not excuse OTI's overstatement of the gravity of their results. In fact, OTI proudly makes broad claims like "Europe Leads in Broadband Affordability"[95] and "Asia Leads on Cost-for-Speed Value."[96] This simultaneous self-awareness of serious methodological flaws and willingness to soldier on is antithetical to their claimed "commitment to research integrity and public transparency."[97]

Beyond deficiencies relating to the sample of cities, the method by which OTI generalizes the availability of broadband services citywide is also improper. As the authors state, the analysis includes "all available standalone internet plans…listed publicly" by each ISP, which "does not necessarily represent the available plans for each city as a whole, as certain plans may not be available in all locations."[98] This means that the inclusion of plans not actually available city-wide could drastically overstate the availability of certain price/speed tiers in each market, casting serious doubt on the report's main assertions about cost. This is especially risky given OTI's sample of cities – largely urban megacities that include pockets of under-served and under-adopting communities. OTI glosses over these issues, notwithstanding the fact that many of the international cities cited in the report, as well their home countries, struggle with the same kind of digital divide issues that continue to impact communities across the U.S. Examples of these struggles can be found in London,[99] Paris,[100] South Korea,[101] and many parts of Asia beyond the three cities deemed to represent the entire continent.[102]

OTI's report is clearly aimed at supporting a pre-determined narrative and set of policy recommendations. As such, these methodological flaws are ultimately of little import for OTI. There appears to be little interest in actually contributing to constructive dialogues regarding broadband connectivity.

4. MUCH MORE THAN MEETS THE EYE: FILLING IN OTI'S MISSING GONS CONTEXT

OTI focuses on five municipal broadband systems (and ignores costly failures in the space) to argue that "municipal networks offer faster, more affordable service" than private sector counterparts.[103] A closer look at this selection of systems – Ammon, Idaho (***section 4.1***); Chattanooga, Tennessee (***section 4.2***); Fort Collins, Colorado (***section 4.3***); Lafayette, Louisiana (***section 4.4***); and Wilson, North Carolina (***section 4.5***) – reveals important details that ultimately undermine the case for more widespread deployment of GONs, a "solution" that OTI aggressively pushes in its *Cost of Connectivity* series and in other reports.[104] Indeed, these details call into question OTI's judgment about anointing these selected systems as models that other cities might replicate.

Examining GONs closely often reveals a number of weaknesses that are usually glossed over by those advocating for more widespread public broadband. OTI's pro-GON bias reveals itself in the fact that it cherry-picked only five municipal broadband systems in the country. Such a small sample is likely to be stacked with seemingly positive examples of successful

GONs. But this is not the case. Of the systems included in OTI's report, only two – Chattanooga and Lafayette – are fully built out. GONs in Ammon and Fort Collins currently serve a tiny percentage of the local population. GON deployment in Wilson is much further along, but, as with several of the other systems reviewed by OTI, its financial health remains uncertain.

As demonstrated below, none of the GONs chosen by OTI is immune from financial and operational struggles. This speaks to the overall riskiness of municipal broadband. OTI's report is devoid of essential context vis-à-vis its chosen GONs and GONs generally, making it seem as though municipal broadband always succeeds and always delivers the lowest prices and highest speeds.

Such is not the case, as evidenced by OTI's previous embrace of the GON in Bristol, Virginia, which featured prominently in *Cost of Connectivity* studies released in 2012, 2013, and 2014. Bristol was also touted by former President Obama and by the FCC in its 2010 *National Broadband Plan*. However, by 2016, the GON had failed due to corruption within the municipal utility that operated the system and a range of other reasons.[105] After several years of complex negotiations around how to unwind the system's many financial entanglements, the Bristol GON was sold to a private company for more than $80 million less than it cost the city to build it – a staggering loss.[106] The details of Bristol's demise, a system that was once central to OTI's confidence in the ability of GONs to bolster U.S. broadband, are not included in *Cost of Connectivity 2020* save for a brief mention of the system's sale in an endnote.[107]

Similar struggles and failures litter the municipal broadband landscape.[108] Pushing municipalities to invest in deploying a GON without providing decision-makers with all of the details – good, bad, and ugly – of the systems being cited as models is irresponsible in the best of times and reckless in times such as these.

The pandemic, which OTI cites numerous times in support of its arguments, has devastated state and local economies.[109] The National League of Cities (NLC) has estimated that cities nationwide "can expect to face a $360 billion budget shortfall from 2020 through 2022."[110] Critically, cities are increasingly slashing infrastructure spending: NLC reports that "nearly 20 percent of cities indicate public works functions could be significantly affected by revenue shortfalls."[111] This is certainly not an environment within which city officials should gamble with scarce taxpayer dollars on risky GON projects.

4.1 *Ammon, Idaho*

That this partially-built GON has emerged as the go-to model for GON advocates like OTI is puzzling given the system's unique characteristics and the many unanswered questions about its replicability and long-term sustainability.

In OTI's analysis, Ammon's GON offers the lowest prices for broadband among the 14 cities in its dataset.[112] However, the OTI report excludes several key costs associated with the service, namely the approximately $3,000 fee that households must pay for a fiber connection.[113] This is a puzzling omission, especially since OTI referenced it in its *Cost of Connectivity in Ammon, Idaho* report released in January 2020.[114] Households can choose to pay this off over 20 years, with interest, an approach that adds about $20/month to a customer's bill.[115] In addition, participating households pay a utility fee of $16.50/month to offset O&M costs for the city.[116] Without explanation, OTI states in an endnote that it excludes such fees from its analysis.[117] This is a convenient methodological fudge because, taken together, these fees would almost double the average cost of service in Ammon cited in the OTI report, making it the fourth most "expensive" GON in its sample, rather than the most "affordable."

Beyond these errors, it is ironic that OTI favorably touts the Ammon GON as a model for addressing the "affordability gap" because of open questions about this model's inclusiveness. Boosters celebrate the incremental way in which the Ammon network is being built, but, in practice, such demand-driven models have resulted in concerns about the equitable deployment of broadband infrastructure. Indeed, Google Fiber, which pioneered this model, has been accused of redlining and similarly selective deployment activities in Kansas City and Atlanta, among other cities (these cities, it should be noted, are also included in OTI's analysis, but such concerns about Google Fiber's alleged redlining is not mentioned).[118] Because wireline broadband adoption tends to correlate with income (among other factors), demand for new fiber offerings might never reach critical mass in lower income areas. The Ammon model compounds this dynamic because subscribers are ultimately responsible for paying for the installation of the fiber to their home. Lower income households might be put off by the 20-year installation fee payment plan and the recurring utility fee.

In addition, the homogeneous and affluent demographics of Ammon makes this GON an outlier. In short – Ammon is a very small town (pop. 17,000) that is relatively dense (~2,250 people/sq. mile), overwhelmingly White (92%), and affluent (median household income: $65,000; poverty rate: 7%).[119] In addition, broadband adoption in Ammon is already at a very robust 89%.[120] In short, Ammon is not a city that has grappled with the kind of issues at the heart of OTI's report and thus probably shouldn't be positioned as a blueprint that other cities should follow.

4.2 *Chattanooga, Tennessee*

The Chattanooga GON is also an outlier. Although the system has captured more than half of the local broadband market; currently operates in the black; and continues to expand its offerings into surrounding towns, the perceived success of this GON stems directly from numerous factors that are likely not replicable.[121]

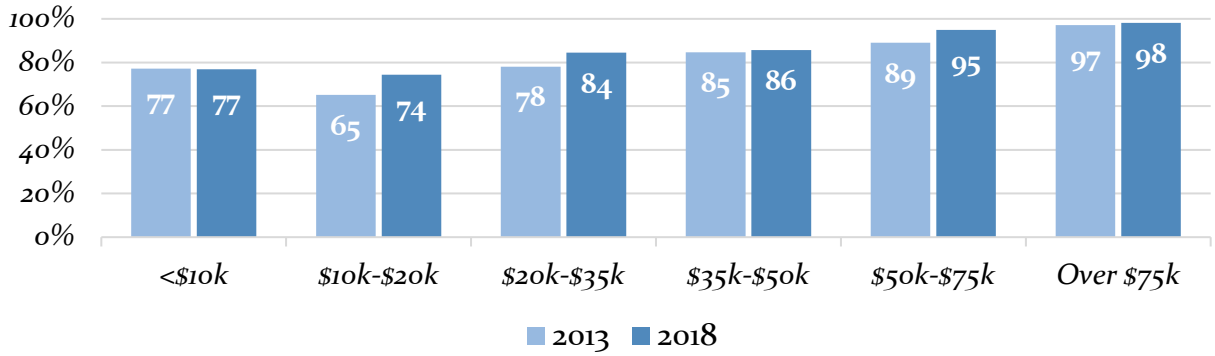
In general, GONs deployed by a municipal utility – like the systems in Chattanooga, Lafayette, and Wilson – can take advantage of numerous built-in advantages. These include the ability to: leverage a captive electric customer base (*i.e.*, customers have no other choice for electric service) to socialize broadband-related costs; cross-subsidize broadband offerings by attributing fiber-related costs to smart electric grid services; access no- or low-interest loans from deep-pocketed utility departments that might ultimately be forgiven; and access critical ROW (*e.g.*, poles) for free or at very low rates.[122]

Chattanooga certainly benefits from these utility-specific advantages. Notably, the Chattanooga GON also benefited from an infusion of $111M in federal stimulus funds, which greatly accelerated FTTH deployment.[123] Also of note is that the GON in Chattanooga has been accused of cross-subsidizing its fiber network by ascribing debt and other costs to its electric department, which uses the network for smart grid purposes.[124] None of these distinguishing facts are cited in the OTI report.

4.3 *Fort Collins, Colorado*

This GON is usually framed as a success because it overcame opposition by incumbent ISPs to win approval by voters.[125] However, this system is still in the very early stages of its development – it has not succeeded by any measure. The system has struggled financially in its early days and has been criticized for a lack of transparency. And broadband adoption in the city has long been robust, having grown significantly even without a GON (see Figure 10). In short, it is too soon to consider this system a success, making it a curious addition to the OTI analysis.

Figure 10 – Fort Collins, CO – Broadband Adoption by Household Income, 2013 & 2018[126]



Construction on the $143M system, financed with revenue bonds, began in July 2019.[127] Only a miniscule portion of the network, which promises to reach 60,000+ premises, has been built.[128]

Initial financial results, reported in April 2020, were disappointing. The system brought in only $11,000 in revenue – $375,000 less than projected.[129] As a result, the system ran at a $2+M loss.[130] Operating at a loss was expected, but the significant miss in revenues was not.

Whether the system will be able to maintain its "affordable" pricing over the long term in the face of these shortfalls and competition from other ISPs remains to be seen.

More broadly, concerns remain about the secrecy of this GON. The city has been reluctant to share details regarding "which neighborhoods have gained access to service, where construction has been completed or when specific areas of the city can expect service."[131] That OTI endorses such an opaque approach to doing business by a public entity contradicts the report's calls for greater transparency by private ISPs.[132]

4.4 *Lafayette, Louisiana*

Much like the GON in Fort Collins, the municipal broadband system in Lafayette is often held out as a "success" because it persevered in the face of opposition from ISPs. However, the Lafayette GON, after more than a decade in service, has yet to prove that it is financially sustainable. Indeed, accusations of financial wrongdoing plague the municipal utility as its broadband division treads water.

The costs of building and maintaining the GON in Lafayette have far exceeded the initial $125M bond authorized by referendum.[133] In particular, the GON has benefited from at least $27M in loans from its parent utility.[134] Such a heavy debt burden has eaten into the GON's ability to self-sustain: according to the city's most recent financial report, the GON reported a negative cash flow after factoring in over $12M in debt-related payments (principal and interest).[135] The GON's long-term debt obligations (principal and interest) stand at over $140M, which is not much less than the $150+M that it cost to build the network.[136]

These struggles were laid bare in a recent internal review of the GON's finances. According to that review, the GON "suffered more than $49 million in losses from 2008-2018, until its finances improved from 2016-18. However, if revenue from other LUS operations and Lafayette Consolidated Government are subtracted, LUS fiber suffered $83.7 million in losses in its first decade."[137] In addition, the review found significant overcharging for services by the GON to various city entities, representing an apparent backdoor to prop up the fiber division.[138] The review also revealed "about $17 million in questionable payments by LUS [the parent electric utility] to supplement the fiber division."[139]

Since these reports were made public, there have been ongoing accusations of wrongdoing on the part of those overseeing the GON.[140] Taken together, these circumstances cast a long shadow over this GON – a municipal system that has yet to establish itself as financially viable and that underscores the many downsides and risks of allowing municipal utilities to deploy broadband (as noted, corruption sunk a similarly touted GON in Bristol, Virginia).

That OTI overlooks these critical details and endorses this GON because it offers seemingly "affordable" broadband undermines the analysis and recommendations.

4.5 *Wilson, North Carolina*

The GON in Wilson appears financially viable – in recent years it has generally operated in the black. However, important details regarding the genesis and financing of this GON are usually overlooked by advocates when praising this system. These details undermine the notion that this GON has been a success that ought to be replicated.

The GON was financed by certificates of participation (COP), an alternative financing mechanism that allowed the city to avoid issuing bonds, which would have required voter approval (per the state Constitution).[141] In short, Wilson's financing model was not approved by a referendum; it was initiated by a City Council vote.[142]

The use of COP has done little to mitigate the risk for taxpayers. The COP agreement issued by Wilson states that if revenue derived from the network is not enough to make payments, the city will use taxpayer money from the city's general fund to cover those obligations.[143]

This is exactly what the city has done on several occasions. In the early years of the GON, the city transferred $3.2M from its Gas Fund to prop up the fledgling broadband division.[144] Similar "advance loans" from the Gas Fund have also been made in recent years.[145]

For all the money poured into the system – $33M in COP; millions more from inter-fund transfers by the city – more than a decade after its launch, the GON in Wilson is still not complete. Indeed, millions in funds are still necessary each year to continue expanding the network. According to BroadbandNow, the GON only serves 83% of the city, compared to over 99% by both Charter and CenturyLink.[146]

Finally, while the municipal system in Wilson has managed to stay afloat, other GONs in North Carolina have fared poorly. Indeed, two spectacular failures – in Mooresville and Davidson, and in Salisbury – offer cautionary tales about building expensive broadband networks in competitive markets. The Mooresville/Davidson system was sold at a $10M loss;[147] the GON in Salisbury, which struggled for years despite millions from the city to prop it up, was recently leased to a private entity in the hopes of reviving it.[148]

5. A BETTER PATH FORWARD

OTI's recommendations for addressing the "affordability crisis" in the U.S. range from relatively prosaic (*e.g.,* calling for more and better broadband data) to incredibly interventionist (*e.g.,* preempting state oversight of GONs; encouraging antitrust enforcement in what it deems to be an uncompetitive broadband market).[149] Ultimately, OTI views government action – by federal and local policymakers – as the only way forward.

As discussed at length in section 2, the relative *lack* of government intervention in the U.S. broadband space has supported the emergence of a robustly competitive marketplace. To the extent government intervention is needed to address lingering issues, such action

should be targeted rather than, as OTI would have it, sprawling. The following offers guiding principles for how best to structure such limited but impactful government action regarding: data (***section 5.1***); oversight of GONs (***section 5.2***); subsidies to help consumers pay for broadband and to assist ISPs in reaching unserved areas (***section 5.3***); inclusivity on the supply side (***section 5.4***); and inclusivity on the demand side (***section 5.5***).

5.1 *Data Driven Policy*

Accurate data is essential to understanding precisely which parts of the country truly remain without any broadband options. Once those areas are identified, any and all available resources – federal subsidies, state grants, local budget allocations, etc. – should be focused on seeding partnerships with private ISPs in an effort to encourage new network deployment. But for those critical resources, these areas will remain unserved. The need to prioritize resources in this manner is especially crucial now as states and cities, with declining resources and increasing burdens, navigate the profound economic turbulence caused by the pandemic. Ongoing efforts by the FCC to improve broadband mapping across all 50 states promise to equip state and local policymakers with the tools needed for these purposes.[150]

With regard to pricing data, OTI's recommendation that the FCC collect such information from ISPs is linked to its desire to see antitrust cases brought against service providers.[151] This stems from its biased (and uninformed) view of the marketplace. Like others who seize every opportunity to criticize ISPs,[152] OTI sees "monopoly" everywhere it looks across the U.S. broadband sector.[153] This is certainly not the case. As such, mandating the collection of pricing data in the absence of clear and compelling evidence of monopoly conditions across the entire United States would be a punitive and purpose-driven exercise. And even if such were required, it would ultimately be a fool's errand because whatever data was collected could only provide a snapshot of market conditions at a particular moment in time – an "analysis" very much like what OTI puts forward in its *Cost of Connectivity* report. As discussed at length in this paper, that snapshot type of "analysis" is flawed, lacking in numerous respects, and ultimately useless to the policymaking process.

5.2 *Importance of Oversight*

OTI calls on Congress to preempt state laws impacting the deployment of GONs within their borders.[154] This has been a goal of OTI's since at least 2012, when its inaugural *Cost of Connectivity* report cited these laws as "creat[ing] significant barriers" to additional broadband competition.[155]

Preempting these laws would be an incredible intrusion on the ability of states to manage the affairs of their political subdivisions. Notwithstanding potential Constitutional vulnerabilities of such action by Congress, preempting state GON laws would be poor policy and would contradict OTI's seeming embrace of greater transparency and accountability in the broadband market.

In most instances, these state laws provide an important roadmap for municipalities to follow when evaluating a GONs proposal.[156] Many oversight regimes involve public participation of some sort – public hearings, referenda, or other activities meant to fully apprise citizens of their local government's intention to invest public resources in a GON. Numerous others require substantial economic and financial analyses to ensure that a particular municipal project does not become a burden on local residents and the state. In short, these laws attempt to prevent waste, fraud, and abuse of public funds.

These are foundational concerns for state policymakers vis-à-vis their subdivisions, more so now as the country struggles to navigate the fiscal fallout of the COVID-19 pandemic. At a time when budgets are being cut, government employees are being let go, and tax revenues are in freefall, that states should continue to have wide latitude to enact laws aimed at preserving some semblance of financial health at the local level is axiomatic. GONs are incredibly expensive and risky undertakings, costing anywhere from a few million dollars to hundreds of millions (as in Chattanooga). In many cases, localities have stepped in with funding support to help steady a struggling or failing municipal system (*e.g.,* Lafayette). Other failed and failing systems negatively impacted local credit ratings, which increase borrowing costs and strain local finances even more. As these systems become more complex and ambitious, the costs associated with building and maintaining them rise inexorably, which raises the risk of costly – and potentially devastating – default by local government. Accordingly, states, now more than ever, have a compelling interest in overseeing the process by which GONs proposals are vetted and approved. That OTI wishes to strip the states of this authority is irresponsible.

5.3 *Role for Targeted Subsidies*

Overhauling the way in which the federal government subsidizes broadband deployment and adoption via the Universal Service Fund is gaining momentum. Indeed, some are calling for Congress to fund these subsidies directly rather than continue relying on consumers to pay into the USF via a "contribution factor" that has grown considerably in recent years.[157] Many states are already moving toward funding broadband programs with general revenues,[158] and other federal subsidy programs (*e.g.,* LIHEAP) are funded in the same manner. Congress should consider doing the same for broadband.

In addition to reforming how these initiatives are funded, consideration must also be given to how these funds are used. Regarding customer subsidies, OTI recommends aligning Lifeline subsidies so that they help bring the cost of broadband down to a specific price point, namely $10/month for low-income households.[159] Ironically, that figure is not far from the $15/month package for low-income households offered by ISPs like Comcast and Charter. One alternative would to encourage localities to explore partnerships with ISPs in an effort to expand these offerings and to ensure that they are widely promoted. Such local action greatly helped spread the word about Comcast's IE, which, as noted above, has been remarkably successful in bringing millions of new users to the internet.[160]

5.4 *Inclusivity on the Supply Side*

OTI accuses "some ISPs" of "purposefully neglect[ing] low-income neighborhoods" and uses that baseless accusation as a way to call for action by the federal government to "address the willful neglect" of these communities.[161] In addition to lacking credible data to support these claims, OTI fails to acknowledge that its report actually supports deployment models that could result in redlining. As discussed in section 4, the demand-driven deployment model pioneered by Google Fiber and being embraced in cities like Ammon could very well result in some neighborhoods being unserved by a new network. Indeed, Google Fiber, as noted, has been accused of redlining and selective deployment in a number of cities where it has built out its network.

Most major ISPs, on the other hand, deploy their networks under the terms of a local or state franchise agreement, which, among other things, requires universal buildout within the franchised area. Those agreements, if breached, allow a city or a state to take action against the ISP and compel it to serve everyone. Such leverage has been exerted in places like New York City, which has accused Verizon of failing to bring its FiOS service to every household in the city.[162] Although Verizon disputes those allegations, the public pressure created by the lawsuit and attendant political attention appears to have helped spur further deployment by Verizon.

Some GONs lack franchise agreements because they do not offer video service. This, along with the adoption of demand-driven models and the volatile financials of many municipal systems, raises the odds that a GON might not reach every household in a city. To bolster inclusion, states might require as part of an oversight regime that GONs demonstrate an ability – financially and technically – to serve everyone within their proposed territory.

More broadly, addressing inclusion will require fundamentally rethinking how government funds and policy are used to facilitate network deployment. Plugging gaps in broadband availability will require significantly more public funding than is currently available via the federal USF and related state grant programs. An important first step, as noted in section 5.1, is identifying, with as much precision as possible, the location of truly unserved areas and then marshaling all resources – federal, state, and local – to develop an approach that will result in broadband service being deployed to that area.

State and local government can act on numerous additional fronts in support of broadband deployment. Foremost among the areas of greatest need for government action is the modernization of policies impacting access to rights-of-way (ROW). ROW is of foundational importance to network construction as ISPs seek to thread broadband wiring across utility poles, street lamps, ducts, and other public and private structures. Too often, though, the terms and conditions for accessing these resources are onerous, leading to delays in network deployment and higher costs, which are inevitably passed onto consumers. Overdue reforms include continuing to rationalize the array of public and private ROW procedures to assure uniformity and consistency, and addressing variability

in pricing and access criteria related to utility poles. These issues are of particular importance in rural areas, where already high broadband deployment costs can grow exponentially if a pole owner (*e.g.*, a utility company) seeks to extract unreasonably high fees and related costs (*e.g.*, for make-ready work or pole replacement).[163] States that are serious about unlocking additional private investment in rural broadband deployment should address these issues immediately.

5.5 *Inclusivity on the Demand Side*

Broadband is available throughout the vast majority of the country. Networks are expanding and speeds are increasing. Policy should focus on those who have not yet adopted broadband – and the myriad reasons for that dynamic. Harnessing the transformative potential of broadband requires not just access to a high-speed connection but also hardware, software, content, digital literacy – *and relevancy* (see section 2 for additional discussion).

A critical first step in addressing these demand-side issues is acknowledging that broadband adoption is a hyperlocal issue that defies sweeping generalizations like those in the OTI report and one-size-fits-all solutions.[164] That broadband adoption varies from neighborhood to neighborhood in many cities speaks to this dynamic (as noted above, these challenges are evident in most cities – in the U.S. and abroad – included in OTI's report). In addition, numerous barriers – from lack of a computing device, to lack of digital literacy, to a fear of being online – still impede broadband adoption despite significant progress in closing digital divides evident in certain demographic and socioeconomic groups.[165]

The most impactful broadband adoption efforts tend to be those that address these myriad factors and tailor outreach and education accordingly. Comcast's IE would likely not have been as successful had it not created and leveraged relationships within the communities it serves. Equally as critical, it has continued to adjust its eligibility criteria and its target audiences – key factors that OTI neglects to mention when criticizing the program as inadequate.[166]

Another successful broadband adoption model is the one pioneered by Older Adults Technology Services (OATS), a nonprofit that helps seniors, among the lowest-adopting demographic groups, embrace new technologies. OATS has developed curricula and other resources to demonstrate the value and relevance of broadband to older adults via training classes, workshops, and hands-on demonstrations. These tailored offerings have yielded impressive results, including not only increased broadband adoption but in ensuring that its members are able to use technology in meaningful and life-enhancing ways.[167]

Effective broadband planning and policymaking is incomplete unless it focuses on ensuring that residents and businesses are actually adopting and productively using available Internet connections. Policymakers at all levels of government should work to ensure that

any discussion about broadband deployment is balanced by an equally robust inquiry into the nature of local demand (or lack of demand as the case may be). Simply relying on generalizations (*e.g.,* broadband is "unaffordable") will not result in impactful broadband policy. Digging deeper, via surveys and other data collection, is essential to precisely identifying pockets of under-adoption and learning why residents choose not to adopt. Officials should also work to identify local resources – nonprofits, ISPs, anchor institutions, philanthropies, etc. – that might be harnessed when developing tailored strategies for closing remaining digital divides. Engaging in such comprehensive efforts will ensure that a more diverse group of stakeholders, especially those with expertise in providing digital literacy training and other such services, have ample opportunities to play impactful roles.

6. CONCLUSION

As an advocacy document, OTI's *Cost of Connectivity 2020* report appears to succeed in providing its intended audience with fodder for continuing to push a false narrative about broadband in the United States. From an analytical standpoint, however, OTI's report lacks rigor. It is riddled with methodological flaws; it cherry-picks convenient data points; it eschews important developments spearheaded by private ISPs; and it embraces vast government intervention at time when targeted policy responses and collaboration with the private sector are likely to address connectivity issues in a more expedient and efficient manner.

This paper is meant to fill in the many gaps in the OTI report and provide a semblance of balance to the larger policy discussion around how to bolster broadband availability and adoption in the United States. OTI suggests that cheap, fast broadband on its own will solve these issues. This is not true. Broadband in the U.S. continues to become faster and cheaper and more widely available each year, and yet millions remain offline. The same is true in the European and Asian cities and countries profiled by OTI. These are universal struggles that defy simple solutions.

As the policy debate advances, it is essential that discussion and debate be as balanced and informed as possible. Telecommunications policy in the U.S. has always benefited from bipartisanship and collaboration. OTI's document wishes to upend that balance by pushing for policies that will likely only resonate with a small subset of policymakers. Consumers, especially those who remain in the digital dark, deserve better.

ENDNOTES

[1] *See, e.g.,* Lawrence Lessig, *The Internet Under Siege*, Foreign Policy, Nov. 1, 2001, https://foreignpolicy.com/2009/11/16/the-internet-under-siege/; Charles H. Ferguson, *The U.S. Broadband Problem,* Policy Brief #105, The Brookings Institution (2001), https://www.brookings.edu/wp-content/uploads/2016/06/pb105.pdf; Lawrence Lessig, *Why Your Broadband Sucks,* March 1, 2005, Wired, https://www.wired.com/2005/03/why-your-broadband-sucks/; *Why Broadband Service in the U.S. is So Awful,* Oct. 1, 2010, Scientific American, https://www.scientificamerican.com/article/competition-and-the-internet/; Paul Waldman, *Highway Robbery for High-Speed Internet*, June 24, 2013, American Prospect, https://prospect.org/environment/highway-robbery-high-speed-internet/.

[2] *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).

[3] *See, e.g.,* Tim Wu, *Network Neutrality, Broadband Discrimination,* 2 J. on Telecomm. & High Tec. L. 141 (2003).

[4] *See, e.g.,* Christopher Mitchell, *Publicly Owned Broadband Networks: Averting the Looming Broadband Monopoly*, Institute for Local Self-Reliance (March 2011), https://muninetworks.org/reports/publicly-owned-broadband-networks-averting-looming-broadband-monopoly.

[5] *See infra* for further discussion.

[6] *See, e.g.,* Robert W. Crandall, COMPETITION AND CHAOS: U.S. TELECOMMUNICATIONS SINCE THE 1996 TELECOM ACT (2005); Daniel F. Spulber & Christopher S. Yoo, *Rethinking Broadband Internet Access,* 22 Harv. J. Law & Tech. 1 (2008), http://jolt.law.harvard.edu/articles/pdf/v22/22HarvJLTech001.pdf.

[7] *See, e.g.,* Hal Singer, *Bad Bet by FCC Sparks Capital Flight From Broadband,* March 2, 2017, Washington Bytes blog, Forbes.com, https://www.forbes.com/sites/washingtonbytes/2017/03/02/capital-flight-from-broadband-in-the-title-ii-era/#660e1dae35cf ("*Bad Bet by FCC*").

[8] *See, e.g.,* Charles M. Davidson & Michael J. Santorelli, *Understanding the Debate over Government-Owned Broadband Networks: Context, Lessons Learned, and a Way Forward for Policy Makers,* ACLP at New York Law School (June 2014), http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Government-Owned-Broadband-Networks-FINAL-June-2014.pdf ("*Understanding the Debate*").

[9] *See* Becky Chao & Claire Park, *The Cost of Connectivity,* Open Technology Institute, New America (July 2020), https://d1y8sb8igg2f8e.cloudfront.net/documents/The_Cost_of_Connectivity_2020__XatkXnf.pdf ("*Cost of Connectivity – 2020*").

[10] *See* Hibah Hussain, Danielle Kehl, Benjamin Lennett, Chiehyu Li, and Patrick Lucey, *The Cost of Connectivity 2012,* Open Technology Institute, New America (July 2012), https://d1y8sb8igg2f8e.cloudfront.net/documents/the-cost-of-connectivity-2012.pdf ("*Cost of Connectivity – 2012*"); Hibah Hussain, Nick Russo, Danielle Kehl, and Patrick Lucey, *The Cost of Connectivity 2013,* Open Technology Institute, New America (Oct. 2013), https://www.newamerica.org/oti/policy-papers/the-cost-of-connectivity-2013/ ("*Cost of Connectivity – 2013*"); Nick Russo and Robert Morgus with Sarah Morris and Danielle Kehl, *The Cost of Connectivity – 2014,* Open Technology Institute, New America (Oct. 2014), https://d1y8sb8igg2f8e.cloudfront.net/documents/the-cost-of-connectivity-2014.pdf ("*Cost of Connectivity 2014*").

[11] New America, Open Technology Institute – Publications, https://www.newamerica.org/oti/publications/.

[12] *Cost of Connectivity – 2012* at 1.

[13] *Cost of Connectivity – 2013.*

[14] *Cost of Connectivity – 2012* at 11; *Cost of Connectivity – 2014* at 28-31; *Cost of Connectivity – 2020* at 66-67.

[15] *Cost of Connectivity – 2020* at 10.

[16] *Id.* at 12-13.

[17] For a discussion of how broadband connectivity contours have evolved over the last three decades, *see Understanding the Debate* at 28-34.

[18] *Cost of Connectivity – 2020* at 65.

[19] *Id.* at 6.

[20] *See* Michael J. Santorelli, *How to Fight COVID-Inspired Disaster Opportunism in the Broadband Space,* May 4, 2020, Washington Bytes blow, Forbes.com, https://www.forbes.com/sites/washingtonbytes/2020/05/04/how-to-fight-covid-inspired-disaster-opportunism-in-the-broadband-space/#77fcada417e0.

[21] *See, e.g., Companies Have Gone Above and Beyond the Call to Keep Americans Connected During Pandemic,* FCC, https://www.fcc.gov/companies-have-gone-above-and-beyond-call-keep-americans-connected-during-pandemic.

[22] *Cost of Connectivity – 2020* at 58-59.

[23] Internet Essentials, Our Mission, https://www.internetessentials.com/our-mission.

[24] *See infra,* section 2, for additional discussion.

[25] *Cost of Connectivity – 2020* at 7.

[26] *Id.*

[27] *See, e.g., Cost of Connectivity – 2012* at 1 (the report's findings "suggest[] that policymakers need to re-evaluate our current policy approaches to increase competition and encourage more affordable high-speed Internet service in the U.S.").

[28] *Industry Metrics and Trends 2020,* at slide 7, U.S. Telecom (April 2020) https://www.ustelecom.org/wp-content/uploads/2020/04/USTelecom-State-of-Industry-2020-Update.pptx.

[29] *Id.*

[30] *See Bad Bet by FCC; In the Matter of Restoring Internet Freedom,* Declaratory Ruling, Report and Order, and Order, 33 FCC Rcd 311, ¶¶ 87-98 (Jan. 4, 2018), https://docs.fcc.gov/public/attachments/FCC-17-166A1.pdf.

[31] *Investment Heroes 2019: Boosting U.S. Growth,* Dec. 12, 2019, PPI, https://www.progressivepolicy.org/issues/economy/investment-heroes-2019-boosting-u-s-growth/.

[32] *Cost of Connectivity – 2012* at 11.

[33] *Industry Metrics* at slide 15.

[34] *See, e.g., Cost of Connectivity – 2020* at 18.

[35] *See, e.g.,* Davey Alba & Cecilia Kang, *So We're Working from Home. Can the Internet Handle it?*, March 16, 2020, N.Y. Times, https://www.nytimes.com/2020/03/16/technology/coronavirus-working-from-home-internet.html.

[36] *See, e.g.,* John Hendel, *The Internet is Surviving the Pandemic – Let the Feuding Begin,* April 11, 2020, Politico, https://www.politico.com/news/2020/04/11/internet-surviving-pandemic-feuding-begin-179611.

[37] *See* Anna-Maria Kovacs, *U.S. Broadband Networks Rise to the Challenge of Surging Traffic During the Pandemic,* Center for Business and Public Policy at Georgetown University's McDonough School of Business (June 2020), https://georgetown.app.box.com/s/8e76udzd1icopyg42fqsc96r1yzkz1jf; Roger Entner, *A Tale of Two Continents and the Internet During COVID-19*, April 29, 2020, Fierce Telecom, https://www.fiercetelecom.com/telecom/industry-voices-entner-a-tale-two-continents-and-internet-during-covid-19.

[38] *See, e.g.,* Kyle Wiggers, *How ISPs are Using AI to Address the Coronavirus-Driven Surge in Traffic,* March 27, 2020, VentureBeat, https://venturebeat.com/2020/03/27/how-isps-are-using-ai-to-address-the-coronavirus-driven-surge-in-traffic/.

[39] *See* Mike Dano, *AT&T: SDN, NFV Helped Meet COVID-19 Traffic Demans,* April 2, 2020, Light Reading, https://www.lightreading.com/cloud-native-nfv/atandt-sdn-nfv-helped-meet-covid-19-traffic-demands/d/d-id/758661.

[40] *See* Jared Newman, *As Remote Work Exploded, Comcast Turned to AI to Keep the Internet Running,* June 24, 2020, Fast Company, https://www.fastcompany.com/90519167/as-remote-work-exploded-comcast-turned-to-ai-to-keep-the-internet-running.

[41] *See, e.g., Sustaining Continuity During COVID-19 and How Mobile Networks Can Help,* May 8, 2020, Forbes.com, https://www.forbes.com/sites/tmobile/2020/05/08/sustaining-continuity-during-covid-19-and-how-mobile-networks-can-help/#667bac2a29f6.

[42] *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion,* 2020 Broadband Deployment Report, Appendix 1, GN Docket 19-285 FCC (April 24, 2020), https://docs.fcc.gov/public/attachments/FCC-20-50A2.pdf.

[43] *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, as Amended by the Broadband Data Improvement Act,* 2015 Broadband Progress Report and Notice of Inquiry on Immediate Action to Accelerate Deployment, at Table 4, GN Docket No. 14-126, FCC (Feb. 4, 2015), https://docs.fcc.gov/public/attachments/FCC-15-10A1.pdf.

[44] *Cost of Connectivity – 2020* at 68.

[45] *Cost of Connectivity – 2012* at 9.

[46] *Id.* at 10; *Cost of Connectivity – 2020* at 69.

[47] *Internet Access Services: Status as of December 31, 2014,* at Figure 5, FCC (March 2016), https://docs.fcc.gov/public/attachments/DOC-338630A1.pdf ("*Internet Access Services: Status as of December 31, 2014*").

[48] *Internet Access Services: Status as of December 31, 2017,* at Figure 4, FCC (Aug. 2019), https://docs.fcc.gov/public/attachments/DOC-359342A1.pdf ("*Internet Access Services: Status as of December 31, 2017*").

[49] The FCC notes in its analysis that "A provider that reports offering service in a particular census block may not offer service, or service at that speed, to all locations in the census block. Accordingly, the number of providers shown in Figure 4 does not necessarily reflect the number of choices available to a particular household and does not purport to measure competition." *Id.* at p. 6.

[50] CITA, Spectrum, https://www.ctia.org/spectrum-channel.

[51] *Mobile Network Experience Report – USA,* January 2020, OpenSignal, https://www.opensignal.com/reports/2020/01/usa/mobile-network-experience.

[52] *See, e.g.,* Jeffrey Van Camp and Matt Jancer, *What's the Best Unlimited Data Plan?,* July 10, 2020, Wired, https://www.wired.com/story/best-unlimited-data-plans/.

[53] *See Internet/Broadband Fact Sheet,* June 12, 2019, Pew Research Center, https://www.pewresearch.org/internet/fact-sheet/internet-broadband/.

[54] *See, e.g., Cost of Connectivity – 2020* at 9, 10, 18.

[55] *Id.* at 54.

[56] *Internet Access Services: Status as of December 31, 2014* at Figure 9.

[57] *Internet Access Services: Status as of December 31, 2017* at Figure 8.

[58] *See Broadband Industry Report (OVBI) – 4G 2019,* at 5, OpenVault (Feb. 2020), https://openvault.com/wp-content/uploads/2020/02/Openvault_Q419_OVBI.pdf.

[59] EPB, By the Numbers, https://static.epb.com/annual-reports/2019/by-the-numbers/.

[60] *See, e.g., Tracking Cable's Top Internet Speeds,* NCTA, https://www.ncta.com/chart/tracking-cables-top-internet-speeds?share_redirect=%2Ftopics#colorbox=node-2798; *2020 Progress Report: The 10G Platform,* Jan. 3, 2020, NCTA, https://www.ncta.com/whats-new/2020-progress-update-the-10g-platform.

[61] *See, e.g.,* Roger Cheng, *5G: Everything You Need to Now About the Wireless Revolution,* June 29, 2020, CNET, https://www.cnet.com/news/5g-everything-you-need-to-know-about-the-wireless-revolution/.

[62] *Cost of Connectivity – 2020* at 6.

[63] ACLP Analysis of ACS Data, 2013-2018.

[64] *Id.*

[65] *Id.*

[66] *Id.*

[67] *Id.*

[68] *Id.*

[69] *Id.*

[70] *See, e.g.*, John B. Horrigan, *Reaching the Unconnected: Benefits for Kids and Schoolwork Drive Broadband Subscriptions, But Digital Skills Training Opens Doors to Household Internet Use for Jobs and Learning*, Technology Policy Institute (Aug. 2019), https://techpolicyinstitute.org/wp-content/uploads/2019/08/Horrigan_Reaching-the-Unconnected.pdf.

[71] *See* Rafi Goldberg, *Unplugged: NTIA Survey Finds Some Americans Still Avoid Home Internet Use,* April 15, 2019, NTIA, https://www.ntia.gov/blog/2019/unplugged-ntia-survey-finds-some-americans-still-avoid-home-internet-use

[72] Like broadband, computer ownership tends to correlate with certain demographic and socioeconomic factors. *See, e.g.,* Camille Ryan, *Computer and Internet Use in the United States: 2016,* at Table 4, U.S. Census Bureau (Aug. 2018), https://www.census.gov/content/dam/Census/library/publications/2018/acs/ACS-39.pdf.

[73] *See, e.g.,* Rafi Goldberg, *Lack of Trust in Internet Privacy and Security May Deter Economic and Other Online Activities,* May 13, 2016, NTIA, https://www.ntia.doc.gov/blog/2016/lack-trust-internet-privacy-and-security-may-deter-economic-and-other-online-activities.

[74] *Reaching the Unconnected*. *See also* John B. Horrigan, *Digital Readiness: Nearly One-Third of Americans Lack the Skills to Use Next-Generation "Internet of Things" Applications,* June 2014, https://jbhorrigan.weebly.com/uploads/3/0/8/0/30809311/digital_readiness.horrigan.june2014.pdf.

[75] *Cost of Connectivity – 2020* at 17, 68.

[76] *See Comcast Announces Largest Ever Expansion of its Internet Essentials Program,* Aug. 6, 2019, Comcast, https://corporate.comcast.com/press/releases/largest-expansion-internet-essentials-low-income-americans.

[77] *See* John B. Horrigan, *Analysis of Uptake Rates of Comcast Internet Essentials,* Sept. 18, 2014, https://ecfsapi.fcc.gov/file/7522899320.pdf.

[78] *See Adjusting for Prices Differences Across the World,* Oct. 6, 2018, The World Bank, https://datatopics.worldbank.org/world-development-indicators/stories/adjusting-for-price-differences-across-the-world.html; Michelle A. Vachris and James Thomas, *International Price Comparisons Based on*

Purchasing Power Parity, Bureau of Labor Statistics, Monthly Labor Review (Oct. 1999), https://stats.bls.gov/opub/mlr/1999/10/art1full.pdf.

[79] *Cost of Connectivity – 2020* at 17.

[80] Differences between even large metropolitan areas can reach nearly 50%. *See, e.g., Regional Price Parities by State and Metro Area,* Bureau of Economic Analysis, U.S. Dept. of Commerce, https://www.bea.gov/data/prices-inflation/regional-price-parities-state-and-metro-area.

[81] Both domestically and abroad, such subsidies are common. *See, e.g., The French Broadband Programme: A Network of Opportunities,* Oct. 3, 2017, Ashurst, https://www.ashurst.com/en/news-and-insights/insights/the-french-broadband-programme-a-network-of-opportunities/; *The Connecting Europe Broadband Fund,* Oct. 12, 2018, European Commission, https://ec.europa.eu/digital-single-market/en/news/connecting-europe-broadband-fund; OpenReach, Grants and Funding, https://www.openreach.com/fibre-broadband/community-fibre-partnerships/grants-and-funding.

[82] *Cost of Connectivity – 2020* at 6.

[83] *See* George S. Ford, *OTI's* Cost of Connectivity 2020 *Report: A Critical Review,* Perspective 20-06, The Phoenix Center (July 20, 2020), https://www.phoenix-center.org/perspectives/Perspective20-06Final.pdf.

[84] *Cost of Connectivity – 2020* at 11.

[85] *Id.* at 14.

[86] *Id.* at 16.

[87] *Id.* at 13.

[88] *Id.*

[89] *Id.*

[90] *See, e.g.,* Jed Kolko, *America Really is a Nation of Suburbs,* Nov. 14, 2018, Citylab, Bloomberg, https://www.bloomberg.com/news/articles/2018-11-14/u-s-is-majority-suburban-but-doesn-t-define-suburb.

[91] *Cost of Connectivity – 2020* at 19.

[92] *Id.* at 31.

[93] *Cost of Connectivity – 2020,* Appendices, https://www.newamerica.org/oti/reports/cost-connectivity-2020/appendices.

[94] *Cost of Connectivity – 2020* at 13.

[95] *Id.* at 38.

[96] *Id.* at 35.

[97] *Id.* at 11.

[98] *Id.* at 17.

[99] *See, e.g.,* Annie Kelly, *Digital Divide 'Isolates and Endangers' Millions of UK's Poorest,* April 28, 2020, The Guardian, https://www.theguardian.com/world/2020/apr/28/digital-divide-isolates-and-endangers-millions-of-uk-poorest.

[100] *See, e.g.,* Lara Marlowe, *Coronavirus: France's 'Lost' School Year Highlights Issues with its Education System,* July 20, 2020, The Irish Times, https://www.irishtimes.com/news/world/europe/coronavirus-france-s-lost-school-year-highlights-issues-with-its-education-system-1.4308247.

[101] *See, e.g., Digital Divide Still High in S. Korea,* March 5, 2020, Yonhap News Agency, https://en.yna.co.kr/view/AEN20200305004400320.

[102] *See, e.g., Chart of the Week: The Digital Divide in Asia,* Sept. 25, 2018, IMFBlog, The International Monetary Fund, https://blogs.imf.org/2018/09/25/chart-of-the-week-the-digital-divide-in-asia-2/; Nuurrianti Jalli, *Lack of Internet Access in Southeast Asia Poses Challenges for Students to Study Online Amid COVID-19 Pandemic,* March 17, 2020, The Conversation, https://theconversation.com/lack-of-internet-access-in-southeast-asia-poses-challenges-for-students-to-study-online-amid-covid-19-pandemic-133787.

[103] *Cost of Connectivity – 2020* at 53.

[104] *See, e.g.,* Becky Chao and Lukas Pietrzak, *The Cost of Connectivity in Ammon, Idaho,* Open Technology Institute, New America (Jan. 2020), https://www.newamerica.org/oti/reports/cost-connectivity-ammon-idaho/ ("*Cost of Connectivity in Ammon*"); Claire Park, *Community Broadband,* Open Technology Institute, New America (May 2020), https://www.newamerica.org/oti/reports/community-broadband/.

[105] *See Bristol Case Study (Updated),* ACLP at New York Law School (Dec. 2016), http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Bristol-Case-Study-Update-December-2016.pdf.

[106] *Id.*

[107] *Cost of Connectivity – 2020*, fn. 18.

[108] *See, e.g., Understanding the Debate.*

[109] *See, e.g.,* Mark Muro, *As COVID-19 Resurges, So Does the Threat to Local Budgets,* June 20, 2020, The Avenue blog, Brookings Institution, https://www.brookings.edu/blog/the-avenue/2020/06/30/as-covid-19-resurges-so-does-the-threat-to-local-budgets/.

[110] *What COVID-19 Means for City Finances,* at 4, National League of Cities (June 2020), https://covid19.nlc.org/wp-content/uploads/2020/06/What-Covid-19-Means-For-City-Finances_Report-Final.pdf.

[111] *Id.* at 15.

[112] *Cost of Connectivity – 2020* at 52.

[113] *Cost of Connectivity in Ammon* at 6.

[114] *Id.*

[115] *See Transcript: Community Broadband Bits Episode 259*, June 20, 2017, Institute for Local Self-Reliance, https://muninetworks.org/content/transcript-community-broadband-bits-episode-259. *See also* Bruce Patterson, *What is the 'Ammon Model'?,* Broadband Communities Magazine (May/June 2018), https://www.bbcmag.com/community-broadband/what-is-the-ammon-model ("*What is the Ammon Model?*").

[116] *What is the Ammon Model?*

[117] *Cost of Connectivity – 2020* at fn. 95.

[118] Regarding Atlanta, *see* Jim Burress, *The Big Disconnect: Google Fiber's Unfulfilled Promise in Atlanta,* May 14, 2018, WABE, https://www.wabe.org/googlefiber/?mc_cid=ffeba59434&mc_eid=d4bbc38d0d. Regarding Kansas City, *see* Kaleigh Rogers, *Kansas City Was First to Embrace Google Fiber, Now its Broadband Future is 'TBD,'* Aug. 30, 2017, Motherboard, Vice.com, https://www.vice.com/en_us/article/xwwmp3/kansas-city-was-first-to-embrace-google-fiber-now-its-broadband-future-is-tbd.

[119] Census Quick Facts, Ammon city, Idaho, https://www.census.gov/quickfacts/fact/table/ammoncityidaho/POP010210.

[120] ACLP Analysis of ACS 5-Year Data, 2013-2018.

[121] EPB, By the Numbers, https://static.epb.com/annual-reports/2019/by-the-numbers/.

[122] *See, e.g., Understanding the Debate; Chattanooga Case Study (Updated),* ACLP at New York Law School (Oct. 2015), http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Chattanooga-Case-Study-updated-October-2015.pdf. ("*Chattanooga Case Study*").

[123] *Chattanooga Case Study.*

[124] *See, e.g.,* George S. Ford*, Why Chattanooga is not the "Poster Child" for Municipal Broadband*, at 2, Phoenix Center Perspectives 15-01, Phoenix Center for Advanced Legal & Economic Public Policy Studies (Jan. 2015), http://www.phoenix-center.org/perspectives/Perspective15-01Final.pdf.

[125] *See, e.g.,* Nick Coltrain, *$900k Spent on Failed Fight Against Fort Collins Broadband,* Dec. 8, 2017, Coloradoan, https://www.coloradoan.com/story/news/2017/12/08/fort-collins-broadband-vote-spending/934967001/.

[126] ACLP Analysis of ACS Data, 2013 & 2018.

[127] *See, e.g.,* Jacy Marmaduke, *Fort Collins Unveils New Details About Municipal Broadband Rollout,* July 31, 2019, Coloradoan, https://www.coloradoan.com/story/news/2019/07/30/fort-collins-unveils-new-details-municipal-broadband-rollout/1873652001/.

[128] *Connexion Quarterly Report – Q1 2020,* Fort Collins, https://www.fcgov.com/connexion/files/q1-2020-quarterly-report.pdf?20200428.

[129] *Id.*

[130] *Id.*

[131] *See, e.g.,* Jacy Marmaduke, *Why Fort Collins Connexion Has Been So Quiet on the Municipal Broadband Buildout,* March 27, 2020, Coloradoan, https://www.coloradoan.com/story/news/2020/03/27/connexion-fort-collins-broadband-progress-quiet-how-many-customers-debt/5002661002/.

[132] *Cost of Connectivity – 2020* at 63-65.

[133] *Understanding the Debate* at 61.

[134] *Id.*

[135] *Comprehensive Annual Financial Report – For the Year Ended October 31, 2019,* at 29,Lafayette Consolidated Government (April 2020), http://app.lla.state.la.us/PublicReports.nsf/0/5533202A8E4B5FA286258562005C9759/$FILE/0001FE28.pdf.

[136] *Id.* at 64, 67, 70.

[137] *See* Claire Taylor, *LUS Fiber Internal Investigation Reveals $17 Million in Questionable Payments,* Dec. 17, 2019, The Acadiana Advocate, https://www.theadvocate.com/acadiana/news/article_8b04323e-20ee-11ea-boca-5b2f38b81676.html.

[138] *Id.*

[139] *Id.*

[140] *See* Claire Taylor, *Guillory Requests Investigation into LUS for Alleged Theft, Public Records Desctruction,* Feb. 6, 2020, The Acadiana Advocate, https://www.theadvocate.com/acadiana/news/article_9d6e22ea-48e4-11ea-85fb-d37946fe683a.html.

[141] *Understanding the Debate.*

[142] *Id.*

[143] *Id.*

[144] *Comprehensive Annual Financial Report – Fiscal Year Ending June 30, 2019,* at 63, City of Wilson, https://www.wilsonnc.org/home/showdocument?id=2267.

[145] *Id.*

[146] BroadbandNow, North Carolina – Wilson, https://broadbandnow.com/North-Carolina/Wilson.

[147] *See, e.g.,* Kate Stevens, *Mooresville, Davidson Boards Approve Sale of Continuum, Pending Voter Approval,* Aug. 13, 2019, Mooresville Tribune, https://mooresvilletribune.com/business/mooresville-davidson-boards-approve-sale-of-continuum-pending-voter-approval/article_39576156-be1d-11e9-a95a-2bab28100d83.html.

[148] *See, e.g.,* Jessica Coates, *An In-Depth Look at the Fibrant-Hotwire Lease,* April 3, 2018, Salisbury Post, https://www.salisburypost.com/2018/04/03/an-in-depth-look-at-the-fibrant-hotwire-lease/.

[149] *Cost of Connectivity – 2020* at 62-67.

[150] *In the Matter of Establishing the Digital Opportunity Data Collection,* Second Report and Order and Third Notice of Proposed Rulemaking, WC Docket No. 19-195 (July 17, 2020), https://docs.fcc.gov/public/attachments/FCC-20-94A1.pdf.

[151] *Cost of Connectivity – 2020* at 63.

[152] *See, e.g., Fighting Monopoly Power – Broadband Internet Access,* Institute for Local Self-Reliance (July 2020), https://ilsr.org/fighting-monopoly-power/broadband-monopolies/.

[153] *See, e.g., Cost of Connectivity – 2020* at 9-10.

[154] *Id.* at 66.

[155] *Cost of Connectivity – 2012* at 11.

[156] For further discussion, *see Understanding the Debate* at 105-108.

[157] *See, e.g.,* Joan Engebretson, *As USF Contribution Factor Hits 26%, AT&T Says Congress Should Step In,* July 22, 2020, Telecompetitor, https://www.telecompetitor.com/as-usf-contribution-factor-hits-26-att-says-congress-should-step-in/.

[158] For a general overview of state-level broadband approaches, *see State Broadband Policy Explorer,* Pew Research Center, https://www.pewtrusts.org/en/research-and-analysis/data-visualizations/2019/state-broadband-policy-explorer.

[159] *Cost of Connectivity – 2020* at 65-66.

[160] *See, e.g.,* Charles M. Davidson, Michael J. Santorelli & Thomas Kamber, *Toward an Inclusive Measure of Broadband Adoption*, 6 International Journal of Communication 2555, 2565-2566 (2012), http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/Davidson-Santorelli-Kamber-Toward-an-Inclusive-Measure-of-Broadband-Adoption-IJOC-2012.pdf.

[161] *Cost of Connectivity – 2020* at 67.

[162] *See, e.g.,* Patrick McGeehan, *New York City Sues Verizon, Claiming Broken Promises of Fios Coverage,* March 13, 2017, N.Y. Times, https://www.nytimes.com/2017/03/13/nyregion/ny-sues-verizon-fios.html.

[163] For an overview of these costs, *see Final Report of the Ad Hoc Committee on Rates and Fees,* FCC Broadband Deployment Advisory Committee (July 2018), https://www.fcc.gov/sites/default/files/bdac-07-2627-2018-rates-fees-wg-report-07242018.pdf. For additional perspective, *see The Cost of Replacing Old Wooden Poles is Slowing Down Broadband Deployment in Unserved Areas*, July 17, 2020, NCTA, https://www.ncta.com/whats-new/the-cost-of-replacing-old-wooden-poles-is-slowing-down-broadband-deployment-in-unserved-areas.

[164] *See, e.g., Understanding the Debate* at 113.

[165] *See, e.g., Barriers to Broadband Adoption – A Report to the Federal Communications Commission*, ACLP at New York Law School (2009), http://www.nyls.edu/advanced-communications-law-and-policy-institute/wp-content/uploads/sites/169/2013/08/ACLP-Report-to-the-FCC-Barriers-to-BB-Adoption.pdf.

[166] *Cost of Connectivity – 2020* at 68.

[167] *See, e.g., 2019 Program Summary,* OATS, https://oats.org/wp-content/uploads/2020/06/OATS-2020-Report_Abridged.pdf.