

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
Inquiry Concerning Deployment of Advanced) GN Docket No. 17-199
Telecommunications Capability to All Americans)
in a Reasonable and Timely Fashion)
)

COMMENTS OF USTELECOM ASSOCIATION

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SUMMARY

The ultimate goal of this inquiry is simple: to ensure that all Americans have access to high-speed broadband that will enable them to use any technology to send and receive high-quality voice, data, graphics, and video telecommunications. USTelecom and its member companies have been focused on broadband deployment for decades, leading the charge to expand and upgrade networks with fiber and internet protocol (IP) technology to deliver the best advanced telecommunications capability available in the world.

A full and honest assessment of broadband deployment efforts requires an assessment of the progress that has been made since the last inquiry. Although a speed benchmark can provide a useful snapshot view of the state of broadband deployment, the 25 Megabits per second (Mbps) download, 3 Mbps upload (25/3) benchmark was arbitrarily selected based on a hypothetical family's hypothetical bandwidth requirements for simultaneous use of multiple devices engaged in bandwidth-intense activities. At the same time, it would be disruptive for the Commission to change or eliminate the current benchmark without evidence that broadband at those speeds does not meet the need of consumers as they typically use broadband services today. The Commission should also consider whether a single benchmark can appropriately take into account the differences in broadband service technologies or variations in consumers' perspectives about what is adequate deployment.

Basing section 706 determinations solely on what percentage of the U.S. population has access to broadband that meets a particular speed benchmark ignores whether progress is being made in our efforts to deploy broadband to all Americans. Considerable weight must therefore be given to the actual overall deployment progress made from year to year, including consideration of real world conditions and a verifiable assessment of whether consumers' broadband needs are being met, taking into account the strides the Commission is making in high-cost areas by continuing and increasing investments through the Connect America Fund program.

Finally, if the Commission finds that broadband is not being deployed in a reasonable and timely fashion, the best way to remedy that finding is to adopt policies and, where necessary, regulations to promote continued broadband deployment by removing barriers to investment. We continue to firmly believe that any effort to promote competition that does not focus on facilitating and removing barriers to infrastructure investment will likely fail.

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The USTelecom Association (USTelecom) respectfully submits these comments in response to the Federal Communications Commission’s (FCC or Commission) request for input on the current state of advanced telecommunications capability, or broadband, deployment and availability.¹

I. INTRODUCTION

We welcome this opportunity to take a fresh look at how the section 706 inquiry has been undertaken in recent years, and to propose a more effective approach that objectively – without ulterior motives or prebaked outcomes – conducts this process as Congress intended, for the purpose of determining whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion, and if not, determining what actions are necessary to bring about such deployment. As noted in our comments to the 2016 Notice of Inquiry,²

¹ *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199, Thirteenth Section 706 Report Notice of Inquiry, FCC 17-109 (rel. Aug. 8, 2017) (*Thirteenth Broadband Progress NOI*).

² Comments of the United States Telecom Association, GN Docket No. 16-245 (Sep. 6, 2016) (USTelecom 2016 NOI Comments).

which we incorporate herein by reference, USTelecom and its members strongly support policies that promote continued broadband deployment by removing barriers to infrastructure investment.

II. EVIDENCE SUGGESTS THAT BROADBAND IS BEING DEPLOYED IN A REASONABLE AND TIMELY MANNER.

A. Broadband Speed and Availability Have Steadily Increased.

According to an analysis of the Commission's most current broadband availability data by USTelecom and CensusNBM, U.S. broadband providers continue to deploy and upgrade networks rapidly, bringing consumers across the nation ever-faster service and choice.³ The full report of this research is attached to these comments. The vast majority of Americans have available broadband services that allow them access to information, entertainment, employment options, and other services and products that they have come to expect and rely on. As of mid-2016, 96 percent of Americans had at least one wired broadband service offering available to them – 98 percent, if terrestrial fixed wireless service is included in the analysis.⁴ Nearly all Americans could get broadband service via mobile wireless, with 99.5 percent able to get mobile broadband via fourth generation (4G) LTE (Long Term Evolution) technology as of mid-2016.⁵ All of the country could get service via satellite broadband.⁶

Services at higher speeds are also widely available. As of mid-2016, wired broadband service at 10 Megabits per second (Mbps) download and 1 Mbps upload (10/1) was available to

³ Patrick Brogan, USTelecom, *U.S. Broadband Availability Mid-2016* (August 25, 2017), available at <https://www.ustelecom.org/sites/default/files/US%20Broadband%20Availability%20Mid-2016%20formatted.pdf> (visited Sep. 5, 2017) (USTelecom Mid-2016 Broadband Availability Report).

⁴ USTelecom Mid-2016 Broadband Availability Report at 3-4.

⁵ *Id.* at 4.

⁶ *Id.* at Appendix A.

93 percent of Americans – 95 percent if terrestrial fixed wireless is included. Wired broadband service at 25 Mbps download and 3 Mbps upload (25/3) was available to 89 percent of Americans – 90 percent if terrestrial fixed wireless is included. Wired broadband service at 50 Mbps download and 5 Mbps upload was available to 88 percent of Americans – 89 percent if terrestrial fixed wireless is included.⁷ Wired broadband service at 100 Mbps download and 10 Mbps upload was available to 68 percent of Americans – 76 percent with download speeds less than 10 Mbps.⁸

Moreover, broadband deployment at higher speeds has been growing rapidly. Availability of broadband at 25 Mbps download grew from 49 percent in 2010 to 90 percent in 2016, while broadband at 50 Mbps download showed similar growth. Availability of broadband at 100 Mbps download grew from 10 percent in 2010 to 76 percent in 2016. Gigabit broadband did not exist as a practical matter in 2010, but by mid-2016, it had grown to 9 percent of households, and it continues to grow.⁹ Indeed, that percentage may have as much as doubled in the past year, with recent reports suggesting that as many as 57.5 million Americans now have access to Gigabit connectivity.¹⁰

⁷ *Id.* at 6-7.

⁸ *Id.* at 7-8. Including fixed wireless does not alter the result at 100 Mbps download. *See also* FCC, *Internet Access Services: Status as of June 30, 2016*, at 15 (Apr. 2017) (June 2016 Internet Access Status Report), available at https://apps.fcc.gov/edocs_public/attachmatch/DOC-344499A1.pdf (indicating that almost all residential connections with download speeds of 100 Mbps or greater have upload speeds of 3 Mbps or greater).

⁹ *Id.* at 8. 2010 data in the USTelecom Mid-2016 Broadband Availability Report are from the National Telecommunications and Information Administration (NTIA) National Broadband Map at broadbandmap.gov (visited Sep. 5, 2017). For comparison to 2010, data are available only for wired broadband and download speeds.

¹⁰ *See* Carl Weinschenk, telecompetitor, *Gigabit Report: 57.5 Million Americans Now in Gigabit Reach, Chicago and California Lead* (Sep. 7, 2017), available at <http://www.telecompetitor.com/gigabit-report-57-5-million-americans-now-in-gigabit-reach-chicago-and-california-lead/>.

Additionally, the vast majority of Americans benefit from competitive choice in broadband providers. In mid-2016, there were competing wired broadband services available in 84 percent of the country – 89 percent if terrestrial fixed wireless is included in the analysis. Competitive availability of wired broadband (*i.e.*, at least two wired options) at higher speeds is growing rapidly as providers upgrade their widely deployed broadband networks. For example, competitive availability at 10/1 to households was 65 percent, up from 55 percent in 2010; and competitive availability of broadband at 25/3 was 49 percent, up from 23 percent in 2010.¹¹ Terrestrial fixed wireless was available to 37 percent of Americans as of mid-2016; and when we include fixed wireless, 41 percent of Americans had three or more fixed broadband options as of mid-2016. 4G LTE broadband was available from three or more providers to 95 percent of Americans.¹²

Despite some regulatory decisions that have lessened incentives for broadband investment,¹³ there are ample market incentives for providers to deploy better and faster broadband in most of the country, and certainly no systemic market failure when it comes to deploying broadband in the U.S. Broadband providers have invested more than \$1.5 trillion over the last two decades and more than \$70 billion per year to deploy and upgrade their networks.¹⁴ And to the extent the market incentives are not sufficient to attract broadband investment in

¹¹ USTelecom Mid-2016 Broadband Availability Report at 2.

¹² *Id.* at 4.

¹³ See, e.g., *Restoring Internet Freedom*, Notice of Proposed Rulemaking, WC Docket No. 17-108, FCC 17-60, ¶ 4 (rel. May 23, 2017) (acknowledgement by the Commission that Title II regulation of broadband internet access service “has put at risk online investment and innovation,” resulting in a decline in broadband network investment and a “pull [] back on plans to deploy new and upgraded infrastructure and services to consumers”).

¹⁴ USTelecom, Broadband Industry Stats, Historical Broadband Provider Capex, available at <https://www.ustelecom.org/broadband-industry-stats/investment/historical-broadband-provider-capex> (visited Sep. 2, 2016).

certain high-cost portions of the country, the Commission is actively identifying these areas and promoting broadband through the Connect America Fund (CAF) program. These significant ongoing investments, in combination with the broadband deployment data, highlight that U.S. broadband providers continue to deploy and upgrade networks, bringing the vast majority of consumers across the nation ever-faster service and choice in a reasonable and timely fashion.

B. The Section 706 Inquiry Should Include Both Fixed and Mobile Services.

USTelecom supports the Commission’s proposal to incorporate both fixed and mobile services into this section 706 inquiry.¹⁵ We agree this is the most consistent reading of the statute’s definition of “advanced telecommunications capability,” which refers to high-speed capability “without regard to any transmission media or technology.”¹⁶ Today, it is evident that mobile communications are among the technologies providing capability that enables a large majority of Americans to utilize high-speed broadband.

Consistent with our comments to the last two section 706 inquiries, USTelecom supports evaluating reasonableness and timeliness of deployment based on availability of either fixed broadband *or* mobile broadband, not both fixed *and* mobile broadband. The statute calls for some form of advanced telecommunications capability to be deployed and available, not a particular form or multiple forms. Given the advances in mobile technology, including LTE and emerging fifth generation (5G) services that enable speeds matching or exceeding some wired technologies, it no longer makes sense to exclude mobile services from this inquiry.

To the extent the Commission or other commenters believe that mobile broadband must be declared a substitute for fixed broadband to merit inclusion, we dispute that notion. The two

¹⁵ *Thirteenth Broadband Progress NOI*, ¶ 5.

¹⁶ 47 U.S.C. §1302(d)(1).

need not be perfect or complete economic substitutes; if the Commission confirms that both meet the definition of “advanced telecommunications capability,” the Commission must evaluate both in this inquiry. To be clear, it is appropriate for the Commission to recognize relevant differences between fixed and mobile broadband, but it need not exclude mobile broadband – in particular as an option for providing service in some remote areas because it may be the most economically viable way of serving such areas.

We also do not find compelling arguments that mobile broadband should be excluded because fixed and mobile broadband are complements not substitutes.¹⁷ From real-life observations, we know that consumers increasingly use mobile devices and services, including usage in fixed locations, interchangeably for many voice, data, graphics, and video applications. There is also evidence that some consumers are cutting the cord, choosing not to subscribe to fixed services at all and instead using mobile broadband exclusively. Pew Research Center reported that 12 percent of adults surveyed in 2016 had smartphones but no fixed home broadband.¹⁸ According to Pew, some portion of consumers who have chosen only smart phones report having available to them adequate fixed broadband alternatives.¹⁹ Deployment of high-quality mobile broadband, such as LTE networks and emerging 5G networks, has encouraged consumers to shift more usage to mobile devices and services where possible. The wide

¹⁷ See, e.g., Letter from United States Senators Al Franken, Sherrod Brown, Tammy Baldwin, Richard Blumenthal, Heidi Heitkamp, Amy Klobuchar, Elizabeth Warren, Brian Schatz, Edward J. Markey, Tom Udall, Kirsten Gillibrand, and Ron Wyden to Chairman Pai and Commissioners Clyburn, O’Rielly, Carr and Rosenworcel (Aug. 31, 2017) (filed in GN Docket No. 17-199).

¹⁸ Pew Research Center, Internet & Technology, *Mobile Fact Sheet* (Jan. 12, 2017), available at <http://www.pewinternet.org/fact-sheet/mobile/> (visited Sep. 6, 2017).

¹⁹ Aaron Smith, Pew Research Center, Internet & Technology, *U.S. Smart Phone Use in 2015* (Apr. 1, 2015), available at <http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/> (visited Sep. 6, 2017).

availability of unlimited data plans has further encouraged this shift. This all strongly suggests that fixed and mobile broadband are, in fact, treated by many consumers for many purposes as substitutes.

The Commission should evaluate the extent to which mobile broadband serves the goals of section 706 by monitoring usage trends and marketplace developments, and encouraging more empirical analysis. Voice telephony provides an example of how consumers are embracing mobile technologies and how consumer preferences change over time; the portion of U.S. households that rely on wireless-only telephone service grew from 3 percent in 2003 to more than 50 percent as of 2016.²⁰ The Commission therefore should not dismiss emerging evidence that mobile may already be functioning as a substitute for fixed broadband, and should evaluate mobile broadband based on whether it provides the functional capabilities that consumers need and use.

C. The Commission May Retain the 25/3 Benchmark for Fixed Service as a Goal, but Should Also Consider Other Metrics for Measuring Broadband Deployment Success.

The Commission adopted the 25/3 benchmark without demonstrating that a single threshold was the best approach to measuring the success of broadband deployment, or that this particular threshold was an adequate measure of what Congress had in mind as “advanced telecommunications capabilities” (despite claims that its decision was “[b]ased on the record”).²¹ For example, in considering what broadband speeds consumers need to enjoy advanced

²⁰ USTelecom Mid-2016 Broadband Availability Report at 5.

²¹ *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*, Broadband Progress Report and Notice of Inquiry on Immediate Action to Accelerate Deployment, 30 FCC Rcd 1375, 1403-04, ¶ 47 (2015) (2015 Broadband Progress Report and NOI).

capabilities, the Commission described a hypothetical household of two or more people using multiple devices simultaneously, and concluded that 25 Mbps downstream is necessary to provide “all households” high-quality voice, data, graphics, and video.²² This conclusion, of course, was speculative and never was borne out, considering that nearly two years after Chairman Wheeler declared a 25 Mbps connection to be “table stakes,”²³ 90 percent of consumers had 25/3 or better broadband service available, but just under half of them had chosen to subscribe to it.²⁴ Moreover, the Commission uses different (and lower) standards in the context of its Universal Service programs, under which it supports the deployment of fixed broadband at 10/1, sending a mixed message as to what the Commission really believes constitutes adequate advanced telecommunications capability.

Discrete speed thresholds viewed at a single point in time do not, by themselves, reflect the dynamic process of broadband deployment and upgrades, nor do they provide insight on the progress being made toward meeting the goals of section 706. Nevertheless, USTelecom conditionally supports the Commission’s proposal to maintain speed thresholds as one factor in its section 706 evaluation, taking into account consumer needs and demand based on actual

²² *See id.* (justifying its selection based on the need for 5 to 8 Mbps per HD video stream, and approximately 25 Mbps for more advanced video services).

²³ *2015 Broadband Progress Report and NOI*, Statement of Chairman Tom Wheeler.

²⁴ *See* USTelecom Mid-2016 Broadband Availability Report at 7. *See also* June 2016 Internet Access Status Report at 15 (indicating that 38.5 million residential broadband connections were between 25 Mbps and 100 Mbps download, and 17.7 million were at least 100 Mbps download, for a total of 56.2 million at 25 Mbps or greater). Based on census data indicating that there were 125.8 million U.S. households in 2016, approximately 113.2 million households could get broadband at speeds of 25 Mbps download or greater (125.8 million households x 90 percent) and 49.6 percent of these households (56.2 million connections out of 113.2 million households) had chosen to subscribe. *See* U.S. Census, Historical Household Tables, Table HH-1, available at <https://www.census.gov/data/tables/time-series/demo/families/households.html> (visited Sep. 5, 2016).

current usage patterns and reasonably projected demand. A key challenge for the Commission is to develop a process that is sufficiently flexible to keep up with technology and demand shifts, while maintaining objectivity and not interfering with rational economic decisions where markets are functioning properly.

At the same time, it is not necessary to establish a hard and fast rule for what benchmarks should be established and when they should be adjusted. A consistent and objective framework is important to the Commission's ability to rationally determine when the objectives of section 706 are being met. Ideally, the Commission would weigh factors and evidence regarding consumer use and perception about the adequacy of their broadband choices in meeting their broadband needs in addition to whether established speed and other benchmarks are being met. It is likely that competition will do more to ensure that providers' broadband offerings meet consumers' ultimate test, perhaps even more than mandated speed benchmarks.

1. Fixed and mobile services need not be measured by the same benchmarks.

Fixed Benchmark. At this time, lowering the current fixed service benchmark would be unduly disruptive. Raising the benchmark would also be disruptive and unwarranted, absent record evidence that providers are not meeting consumer broadband needs. USTelecom therefore supports the Commission's proposal to maintain the 25/3 benchmark for fixed services adopted in 2015 until an updated framework is in place.²⁵

Although 90 percent of Americans already had access to at least 25/3 fixed broadband in mid-2016,²⁶ according to the Commission's broadband connections data, 40.5 percent of residential broadband connections subscribed to service between 25 Mbps and 100 Mbps

²⁵ See *Thirteenth Broadband Progress NOI*, ¶ 12.

²⁶ See *supra* note 7.

download (and the vast majority of these, 40.1 percent of residential connections, got at least 3 Mbps per second upload).²⁷ The share of fixed residential connections in the 25/3 speed tier was greater than any other residential tier. The next largest group was the 22.5 percent that received service between 10 Mbps and 25 Mbps download (19.7 percent with upload speeds of 1 Mbps or more, and 2.9 percent with upload speeds less than 1 Mbps). At that time, 18.6 percent of connections were at download speeds of 100 Mbps or greater (practically all with upload speeds greater than 3 Mbps).²⁸ In other words, not only was the largest group of connection in the 25 Mbps tier, there were more connections at the next lower tier than at the next higher tier. Therefore, the data do not support increasing the benchmark beyond the current 25/3 threshold. This is particularly true with regard to services at 100 Mbps or greater download speeds, the next speed tier after 25/3 for which the Commission publishes data. According to USTelecom's Mid-2016 Broadband Availability Report, 76 percent of Americans already have access to broadband service at 100 Mbps broadband.²⁹ Yet just less than 19 percent of broadband connections were 100 Mbps download or greater.³⁰

Mobile Benchmark. USTelecom supports a mobile broadband benchmark based on deployment of LTE technology. The most readily available data for mobile broadband services collected by the Commission is currently based on that technology, which makes it well-suited for the Section 706 deployment analysis. LTE is capable of providing average speeds between

²⁷ June 2016 Internet Access Status Report at 15.

²⁸ *See id.* at 15. At lower speeds, 14.3 percent received service at download speeds between 3 Mbps and 10 Mbps download, and 4.1 percent received service as speeds lower than 3 Mbps.

²⁹ USTelecom Mid-2016 Broadband Availability Report at 8.

³⁰ June 2016 Internet Access Status Report at 15.

10 Mbps download and 20 Mbps download,³¹ and consumers are clearly using LTE services to access advanced voice, data, graphics, and video communications.

USTelecom does not recommend that the Commission adopt a speed benchmark for mobile broadband in the current inquiry. The many challenges associated with measuring mobile broadband speeds and footprints, including, for example, determining the appropriate geographic level for measuring mobile availability, weigh in favor of collecting more data before settling on a mobile benchmark. Should the Commission decide to proceed now, we recommend setting a mobile benchmark consistent with existing availability data for LTE.

The Commission should not apply the current fixed broadband benchmark of 25/3 to mobile broadband. Because it is well understood that LTE does not currently offer speeds that typically would meet that threshold,³² adopting a 25/3 threshold might be aspirational, but as a practical matter would be self-defeating. Moreover, just as the Commission rationally set a lower threshold for mobile broadband services to be supported by Universal Service,³³ it should likewise set a more realistic threshold for mobile broadband in the section 706 context.

³¹ OpenSignal, State of Mobile Networks: USA (Feb. 2017), available at <https://opensignal.com/reports/2017/02/usa/state-of-the-mobile-network> (visited Sep. 6, 2017) (stating that average 4G download speeds during the fourth quarter of 2016 for the top four providers were: 16.9 Mbps for Verizon; 16.7 Mbps for T-Mobile; 13.9 Mbps for AT&T; and 9.0 Mbps for Sprint).

³² *Id.*

³³ See, e.g., *Connect America Fund, Universal Service Reform - Mobility Fund*, 32 FCC Rcd 2152, 2173, n.129 and accompanying text (2017) (adopting a minimum download speed of 5 Mbps for Mobility Fund-II eligibility).

2. The Commission should consider other benchmarks only as appropriate to measure the progress of broadband deployment.

The Commission asks whether it should establish other benchmarks, such as data allowances or other limitations on services, in evaluating broadband deployment.³⁴ USTelecom opposes considering data allowances at this time in determining benchmarks for advanced telecommunications capability for either fixed or mobile services. Data allowances generally address pricing and network management practices, not deployment, and section 706 does not call for an analysis of pricing or network management. Similarly, other characteristics of mobile service such as reliability of service and latency³⁵ do not directly or meaningfully affect mobile deployment, and seem far removed from the core section 706 inquiry. The Commission therefore should not expand the inquiry to include benchmarks for such criteria.

3. The Commission’s framework for the section 706 inquiry should be based on factors that directly impact broadband deployment.

We agree with the Commission that the proper framework for conducting the annual section 706 inquiry should be consistent and objective, “using predictable, reliable, and regularly-released public data from [reliable] sources.”³⁶ Whether deployment is being accomplished in a reasonable and timely manner can be influenced by many factors, perhaps most importantly consumer experience. The statute compels such a finding by defining “advanced telecommunications capability” based on whether users are able “to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology.”³⁷ For many consumers, broadband at speeds lower than the 25/3 benchmark will

³⁴ *Thirteenth Broadband Progress NOI*, ¶16.

³⁵ *See id.*, ¶ 22.

³⁶ *Id.*, ¶ 23.

³⁷ 47 U.S.C. §1302(d)(1).

provide the requisite capability much of the time. Although the Commission should not aim just for adequacy, the need to update benchmarks should not serve as a license for overreaching in order to secure the perpetual ability of the Commission to avail itself of the regulatory authorities granted *conditionally* in section 706(b).³⁸

The impacts of industrial and technological change are important to consider,³⁹ but should not be employed to influence a particular outcome. For example, attempting to capture the impact of emerging uses such as the so-called “Internet of Things” (IoT) would lead to speculation, at best. What would such a criterion measure, and how would it factor into evaluating the reasonableness and timeliness of deployment? While USTelecom acknowledges the potential social and economic benefits of the IoT, section 706 does not address connected “things” or Internet-based applications. There is also scant evidence on the extent to which the various devices and sensors that comprise the IoT will place demand on broadband networks or affect consumers’ access to high-quality connectivity. Therefore, USTelecom believes that the Commission should not expand its inquiry to include a benchmark that attempts to capture the impact of the IoT at this time.

D. The Commission Should Measure Comparative Progress in Determining Whether Broadband is Being Deployed to All Americans in a Reasonable and Timely Manner.

No American should be left out of the digital revolution. Therefore, it is important that the Commission look at deployment in all areas of the country. At the same time, the

³⁸ 47 U.S.C. §1302(b) (directing that if the Commission does not find adequate deployment, “it shall take immediate action to accelerate deployment [] by removing barriers to infrastructure investment and by promoting competition in the telecommunications market.” *See also* 47 U.S.C. §1302(a) (specifying regulatory authorities including price cap regulation and regulatory forbearance).

³⁹ *See Thirteenth Broadband Progress NOI*, ¶ 28.

Commission must acknowledge – as it has through implementation of the CAF in high-cost areas – that deployment in some areas will progress at a significantly faster pace than others, in particular where competition is robust because of dense population. Whereas, it may take years to achieve deployment of the highest speed broadband in other areas due to rough terrain or other environmental conditions, or a lack of demand. As such, under the current methodology for measuring deployment by taking a snapshot view of the entire country, our broadband deployment efforts may never be deemed successful.

In comments to the *2015 Broadband Progress NOI*, USTelecom proposed that the Commission focus on the progress of actual deployment from year-to-year rather than on the percentage of broadband adopters at a particular speed.⁴⁰ We continue to believe that such an assessment is most consistent with how Congress apparently intended to have the Commission measure deployment success. The statute seeks a finding that broadband *is being deployed* on a reasonable and timely basis, so 100 percent deployment, while the aspirational goal, cannot be the right test.

For this reason, USTelecom supports the Commission’s proposal to evaluate reasonableness and timeliness of deployment on the basis of progress rather than a snapshot of a single benchmark at a point in time.⁴¹ That is, the Commission should employ a comparative approach that assesses progress rather than only results.

1. Any deployment analysis must start with an understanding of where underlying infrastructure has already been deployed.

Deployment of faster, higher-quality broadband is typically a matter of upgrading infrastructure, *e.g.*, by deploying new terminal equipment or extending faster access media, such

⁴⁰ USTelecom 2016 NOI Comments at 2-3.

⁴¹ *Thirteenth Broadband Progress NOI*, ¶¶ 30, 36.

as fiber, closer to customer premises. And, as we noted earlier, access to higher speed services has grown rapidly over time.⁴²

The Commission collects data that can track progress over time. If the Commission does adopt an analysis that measures the ongoing progress of deployment, the analysis should take into account the economics of extending and upgrading networks, including the demand and cost characteristics of incremental build-outs and upgrades. The Commission might look to past deployment and upgrade cycles, accounting for any differences in cost and complexity between new and old technologies. The Commission might also look to past competitive responses. The Commission would want to account for differences in adoption, competition, and growth potential compared to the past, as well as how those factors affect the average cost of deploying new technology. Finally, the Commission might account for differences among various broadband access technologies in terms of demand, costs, and upgrade cycles.

The Commission might also look at factors such as revenue spent on broadband deployment, new fiber routes and other infrastructure, and even proposed deployments. It could look at where broadband deployment supported by Universal Service dollars are taking place and planned. This would aid in helping to identify areas where broadband is not likely to be deployed in the near future, and help focus money and facilities to such areas, where measures that promote competition and remove barriers to investment will do the most good.

2. A finding that broadband is being deployed in a reasonable and timely fashion need not deprive the Commission of authority to take remedial action where needed.

Apart from the mandate to “take immediate action to accelerate deployment,” if it finds that advanced telecommunications capability is not being deployed in a reasonable and timely

⁴² See *supra* note 9 and accompanying text.

fashion, the Commission also is directed to “encourage” such deployment using “price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.”⁴³ Notwithstanding any lingering debate about the extent of authority granted to the Commission under section 706,⁴⁴ we note that the Commission’s directive to *encourage* deployment is not conditioned on a finding that broadband is not being deployed on a reasonable and timely basis.

We therefore encourage the Commission to adopt a realistic and holistic approach that goes beyond merely assessing whether consumers have access to broadband at a certain speed. Although it may have been convenient (or even necessary) to use speed as a proxy for “capability that enables users to originate and receive high-quality voice data, graphics, and video telecommunications using any technology”⁴⁵ for the first few years of the section 706 inquiry, there is no excuse for not moving beyond that limited framework for future inquiries.

a. The Commission should measure reasonable and timely deployment based on multiple factors.

A full assessment of deployment success requires a review of the progress being made by those investing in and building infrastructure, as well as the improvements in quality and availability of advanced telecommunications capability from the perspective of broadband consumers.

⁴³ 47 U.S.C. §1302(a), (b).

⁴⁴ *But see USTelecom v. FCC*, 825 F.3d 674, 733 (D.C. Cir. 2016) (“As to section 706, this court concluded in *Verizon* that it grants the Commission independent rulemaking authority.”) (citing *Verizon v. FCC*, 740 F.3d 623, 635-42 (D.C. Cir. 2014)).

⁴⁵ 47 U.S.C. §1302(d)(1).

Is broadband investment steady or increasing? Robust investment and infrastructure building are key indicators that broadband is being timely and reasonably deployed. Therefore, the Commission should incorporate into its section 706 inquiry an assessment of year-to-year expenditures on broadband infrastructure, taking into account external factors (in particular, those within the Commission’s control such as regulations) that may affect investments and buildout. Specifically, the Commission should compare expenditures it directs for broadband deployment from the Universal Service Fund, as well as private investment in broadband infrastructure. If expenditures are increasing or remaining steady, the Commission should deem this to be evidence of reasonable and timely deployment.

Is broadband coverage steady or increasing? As noted earlier, the ultimate goal of the section 706 inquiry is to ensure that all Americans have access to high-quality, broadband-enabled telecommunications. This inquiry therefore should make a year-to-year assessment of whether more Americans are gaining access to broadband coverage by assessing deployment in all areas of the United States. For example, the Commission could determine progress with each inquiry by examining how many areas currently unserved by broadband become served, how many areas that are currently underserved get more service, and how many areas that are currently served get more competitive services.⁴⁶ Measurable progress should be deemed evidence of reasonable and timely deployment.

Are the quality and accessibility of broadband service improving? Broadband availability should keep pace with consumers’ needs and appetites for more and faster broadband. The Commission therefore should examine consumer use of broadband to determine

⁴⁶ See *infra* section D.2.b.i. for a discussion of how to define the terms “unserved,” “underserved” and “served.”

whether, for example, average consumer use is increasing, and whether generally available speeds are increasing to keep pace with demand.

b. An overall finding that broadband is being reasonably and timely deployed need not end the inquiry.

Examination of the foregoing criteria would inform an overall determination of whether deployment is reasonable and timely. If the Commission finds overall deployment to be reasonable and timely, but a more granular examination results in a negative determination in certain areas, the Commission would still be empowered to continue taking remedial action as it traditionally has in response to such findings. These actions historically have been nationwide in scope, and not targeted to specific areas. That is, the Commission has not before undertaken to target its section 706 remedial action specifically to areas where it affirmatively finds a lack of reasonable and timely deployment.

Nothing in the statute dictates such an approach, however. Even where the Commission finds overall deployment to be reasonable and timely, it nevertheless, could find progress to be lacking on an area-by-area basis. Under such circumstances, the Commission could target remedial action to encourage broadband deployment where it is most needed.

i. Unserved, underserved and served areas should be defined using reasonable corresponding speed and technology benchmarks.

In defining the terms “unserved,” “underserved” and “served,” the Commission should assess coverage based on realistic considerations about how broadband is being used to access the internet. For example, because we know Americans have been steadily migrating to mobile broadband service use and frequently using such services even when they have other options, mobile services of an acceptable speed should be deemed advanced telecommunications capability for purposes of this inquiry. It therefore would be reasonable to conclude that mobile

broadband capable of achieving speeds of 10 Mbps download, such as LTE services, would meet typical consumer needs, especially since the Commission funds fixed broadband deployment at that download speed.⁴⁷ In fact, because the 25/3 benchmark was based on a household size of 2.58 persons,⁴⁸ 10 Mbps per person using mobile broadband is roughly equivalent to that benchmark. Thus, unserved areas could be defined as those without an offering of broadband at 10 Mbps download or greater, regardless of technology.

Similarly, underserved areas could be defined as those areas that have two or fewer options at the 10 Mbps download speed or greater, which would provide some competitive, albeit limited alternatives. Served areas could be defined as areas with at least three competitive broadband choices, all of which provide 10 Mbps or greater download speed, and at least one of which meets the current benchmark of 25/3.

ii. Only unserved and underserved areas should be subject to remedial action.

Light-touch regulation of the internet and services such as broadband is the policy of the United States.⁴⁹ Therefore, rather than the broad-based, national regulatory actions the Commission has traditionally taken in response to previous negative findings about the adequacy of broadband deployment, any future action should be targeted only to areas where there is an affirmative finding that broadband is not being deployed in a reasonable and timely manner. That is, only unserved and underserved areas, as defined above or using other rational criteria, should be subject to remedial action taken under the Commission's section 706 authority. Areas not falling into either of these categories should not be subject to such remedial action.

⁴⁷ See *Connect America Fund, et al.*, 29 FCC Rcd 15644 (2014) (adopting a minimum download speed of 10 Mbps for CAF II high-cost support eligibility).

⁴⁸ *2015 Broadband Progress Report and NOI*, 30 FCC Rcd at 1403, n.207.

⁴⁹ See, e.g., 47 U.S.C. §230(b).

Additionally, action should be narrowly tailored to remedy the lack of broadband availability that exists in each unserved or underserved area. To some degree, the Commission already takes this approach with the Universal Service Fund, funneling support to high-cost areas that would be unserved without support. The Commission should also provide incentives for private investment and infrastructure building that recognize a greater need for broadband in some areas over others.

iii. Benchmarks should be examined periodically to ensure they reflect the current state of broadband use.

As earlier noted, to minimize disruption as the Commission transitions to a new framework for assessing broadband deployment, USTelecom supports retaining the current benchmark of 25/3 for wired broadband as a baseline for future progress reports. We also support subjecting mobile broadband to a more appropriate speed benchmark commensurate with the levels currently achieved, which seems to meet the needs of a majority of consumers. As consumer needs change, so should the benchmarks. We recommend that speed benchmarks be examined and adjusted, if necessary, at least every three years,⁵⁰ and that they be based on the speeds of broadband services commonly purchased and used by consumers, with the goal of determining if availability is keeping pace with consumer demand. For example, the Commission might select benchmarks based on the speed of broadband commonly purchased and used by consumers, and determine that broadband is being deployed on a reasonable and

⁵⁰ Although the Commission must conduct the section 706 inquiry annually, it could reasonably determine, based on typical consumer usage, that annual speed benchmark adjustments would be unnecessary and/or unduly burdensome.

timely basis if an area has broadband at that benchmark or at speeds that fall within one or two standard deviations of that benchmark.⁵¹

c. Use of objective criteria and verifiable data will improve the credibility of the section 706 inquiry.

Employing objective criteria that measure multiple aspects of overall deployment efforts would be far less arbitrary than the current inquiry, which ignores progress and focuses only on whether a specific benchmark is met. Given the massive yearly investment in broadband infrastructure from private sources as well as the Universal Service Fund, the current methodology for assessing the adequacy of broadband deployment, which has consistently yielded negative findings, seems fundamentally flawed. The Commission has ample authority and flexibility to take a common sense approach and make a common sense finding that the progress of broadband deployment in this country is not only adequate, but should be acknowledged as a success story.

This approach also facilitates the targeting of remedial action only to those areas that need it; *i.e.*, where consumers are unserved or underserved. Moreover, by taking into account consumers' actual broadband use and experiences, the goal of extending broadband to all Americans in a reasonable and timely manner, as intended by section 706, can finally be fully achieved and acknowledged.

⁵¹ Alternatively, the Commission could find the availability of broadband to be reasonable and timely if an area has broadband speeds that fall within one or two standard deviations of the *average* speed of commonly purchased and used broadband.

III. THE COMMISSION SHOULD USE FORM 477 DATA IN ITS ANALYSIS OF BROADBAND DEPLOYMENT.

USTelecom supports the continued use of Form 477 broadband deployment data for section 706 analysis.⁵² We are not aware of other sources that provide the same level of granular detail, targeted to the specific question of broadband deployment.

The Form 477 data may overstate deployment in some areas; for example, the Census block level data may over-count some unserved locations in a given census block, particularly in more geographically spacious census blocks in rural areas. While the FCC's data are not perfect, they are far superior to earlier used data sets, and any overstatement due to reporting at the census block level is likely to be relatively small at broad geographic levels such as the county, state and national levels. In fact, census block data are quite granular by historical and international standards. The FCC data are an improvement over the National Broadband Map data that the National Telecommunications and Information Administration (NTIA) previously collected through 2014; and the NTIA data were a vast improvement over previous estimates based on aggregations of public company statements and hypothetical models. For analysis at broad geographic levels, the current FCC and NTIA data are likely to provide an accurate picture of broadband availability.

To the extent there are flaws in the 477 data collection, it would be impractical and inappropriate to delay the section 706 inquiry pending their resolution. The Commission instead should address any such concerns in the context of the Form 477 Modernization proceeding⁵³

⁵² See *Broadband Progress NOI*, ¶ 41.

⁵³ See *Modernizing the FCC Form 477 Data Program*, WC Docket No. 11-10 (rel. Aug. 4, 2017).

and incorporate any improved measurements into future section 706 inquiries and benchmark updates.

IV. THE COMMISSION SHOULD CONTINUE TO PROMOTE THE ACCELERATION OF BROADBAND DEPLOYMENT.

Regardless of the findings in this inquiry, the Commission should adhere to the spirit of section 706 by taking measures to encourage deployment, using all options available to it. Broadband deployment in this country is a success story, but the story could be even better if the Commission fully financed broadband infrastructure in high-cost areas, and if incumbent local exchange carriers (ILECs) were given relief from requirements to maintain and lease their costly and decreasingly used legacy networks that employ copper and outdated technology. Chairman Pai acknowledged in a recent speech that the Commission's rules can make it more expensive to build broadband networks:

Broadband networks are expensive to build. And they don't have to be built. Capital doesn't have to be spent. Risks don't have to be taken. So the more difficult government makes the business case for deployment, the less likely it is that broadband providers, big and small, will invest the billions of dollars needed to connect consumers.⁵⁴

Every dollar spent on maintenance of legacy networks is a dollar not spent on high-speed broadband deployment. It is time to treat ILECs like all other competitors providing high-speed broadband services and allow them to continue to focus their efforts on deploying new, modern broadband networks. Modern fiber and IP-based networks are the only viable solution to supporting high-speed advanced telecommunications capability that will meet current and future consumer and business needs.

⁵⁴ Remarks of FCC Chairman Ajit Pai at the Institute for Policy Innovation's Hatton W. Sumners Distinguished Lecture Series, Irving, Texas (Sep. 7, 2017).

One way to accomplish giving ILECs such relief would be through forbearance of leftover regulations that were appropriate when Bell Operating Companies had monopolies on local service, but have outlasted their usefulness. There are no monopolist broadband providers today; in fact, due to the prevalence of mobile, cable, and satellite broadband, ILECs are not even the largest providers of broadband services. We encourage the Commission to examine any remaining legacy ILEC requirements and give serious consideration to whether, in the context of broadband service, they remain necessary in the public interest to ensure just and reasonable broadband service or to protect consumers.

Additionally, although the Commission continues to make great strides under the CAF program in reaching the dwindling proportion of Americans left unserved, the upcoming CAF II auction and implementation of the Remote Areas Fund will cover only a fraction of the costs projected by the Commission as necessary to bring service to those lacking service at 10/1 Mbps or greater. Specifically, these remaining funds will provide roughly \$300 million of the over \$1 billion in projected annual costs. The Commission has already targeted areas where services are not being deployed due to lack of customer density and excessive costs of deployment (high-cost areas), helping to expand service to millions of Americans where market incentives to deploy broadband were insufficient to spur private investment. Providing additional CAF funding would be another effective way to further encourage reasonable and timely broadband deployment to all Americans.

Finally, we also applaud the Commission's establishment of the Broadband Deployment Advisory Committee, which will be developing model codes and making recommendations on how to promote competitive access to broadband infrastructure and speed broadband

deployment.⁵⁵ This and other similar measures will help ensure that the Commission successfully fulfills the mandate of section 706.


V. CONCLUSION

We have made great progress toward universal high-speed broadband deployment in this country, and our collective efforts should be heralded. Although some work remains to be done, it is hard to dispute that deployment is robust and ongoing. Does that mean that advanced telecommunications capability is being deployed in a timely and reasonable manner? The evidence suggests it does. Providers continue to deploy networks such that nearly all Americans can access the internet via high-speed broadband using multiple modes, devices, and carriers. Today, at least 90 percent of Americans enjoy access to advanced telecommunications capability at the current 25/3 benchmark, and availability at this benchmark continues to grow even as fixed and mobile providers deploy broadband services at higher speeds and of higher quality.

⁵⁵ See *Broadband Progress NOI*, ¶ 47.

The Commission should therefore find that the deployment requirements of section 706 are being met. If and where it does not so find, it must strictly adhere to its limited section 706 authority by adopting policies and imposing only necessary requirements to promote continued broadband deployment by removing barriers to infrastructure investment.

Respectfully submitted,

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Dated: September 21, 2017

ATTACHMENT

U.S. Broadband Availability Mid-2016



U.S. BROADBAND AVAILABILITY MID-2016

By Patrick Brogan, Vice President of Industry Analysis

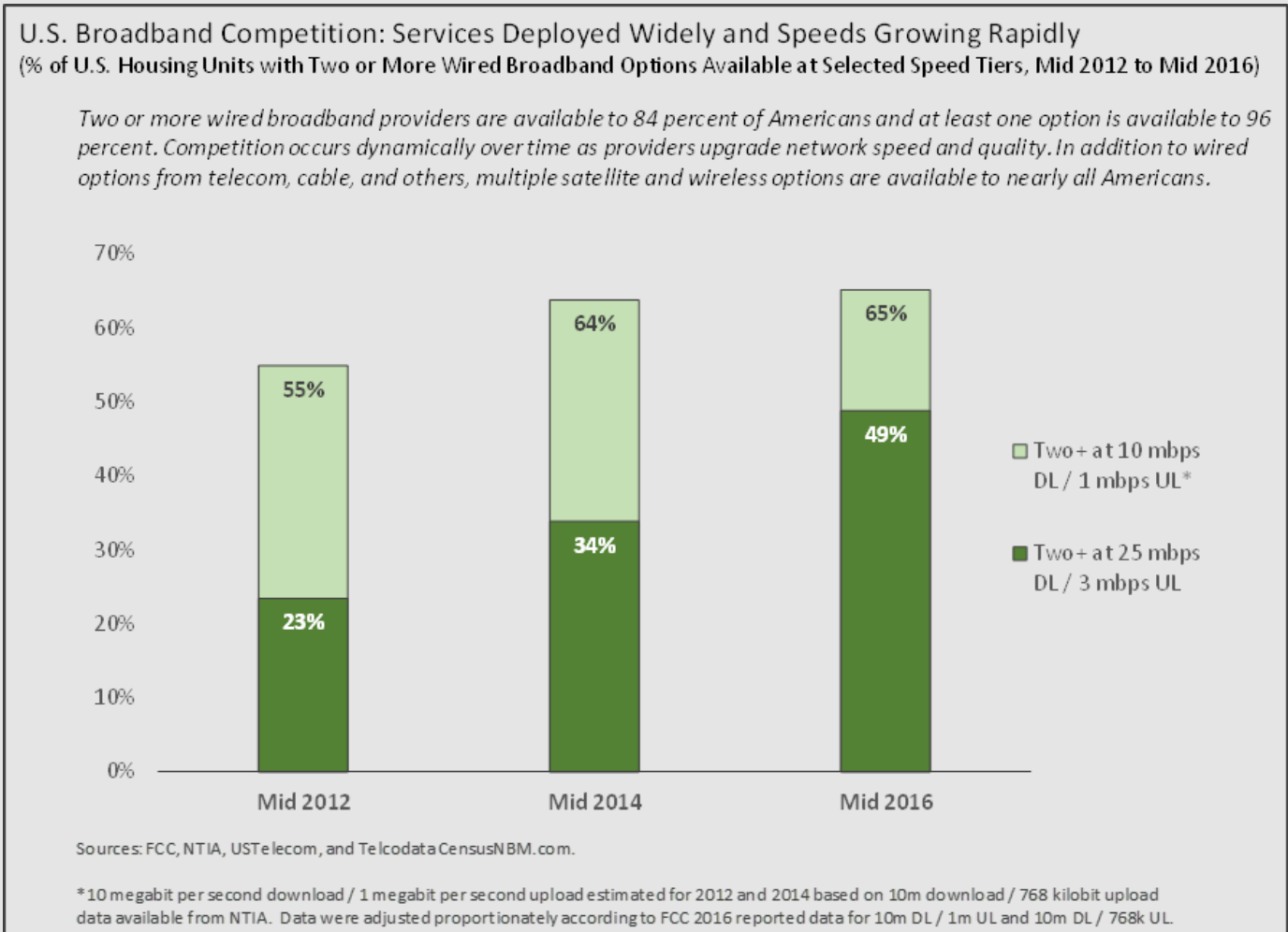
Research Brief
August 25, 2017

U.S. broadband providers continue to deploy and upgrade networks rapidly, bringing consumers across the nation ever-faster service and competitive choice, according to a USTelecom and CensusNBM analysis of the most current Federal Communications Commission (FCC) broadband availability data. As of mid-2016, 96 percent of Americans had at least one wired broadband network platform available to them and 84 percent had at least two wired options. Competitive availability at higher speeds is growing rapidly as providers upgrade their widely deployed broadband networks.

U.S. broadband providers continue to deploy and upgrade networks rapidly, bringing consumers across the nation ever-faster service and competitive choice, according to a USTelecom and CensusNBM analysis of the most current Federal Communications Commission (FCC) broadband availability data. Ongoing, widespread deployment of competitive broadband networks is the result of substantial capital investment in a dynamic, evolving market. Wireline, wireless, and cable providers invest more than \$75 billion annually and have spent more than \$1.5 trillion over two decades to build competitive networks.

As of mid-2016, 96 percent of Americans had at least one wired broadband network platform available to them and 84 percent had at least two wired options. Competitive availability (at least two wired options) at 10 megabits per second download and 1 megabit per second upload to households was 65 percent and at 25 megabits per second download and 3 megabits per second upload was 49 percent. Competitive availability at higher speeds is growing rapidly as providers upgrade their widely deployed broadband networks. See Chart 1.

Chart 1



The FCC categorizes broadband as either fixed or mobile. The most current available data from the FCC are for mid-2016 for fixed broadband and year-end 2015 for mobile wireless broadband. Fixed broadband consists of wired broadband and fixed wireless broadband. Wireless Internet Services Providers (WISPs) use terrestrial fixed wireless technology to deliver broadband services. For the purposes of the analysis below, USTelecom uses the term fixed broadband to refer to *terrestrial* fixed broadband, which excludes satellite broadband. Wired broadband is a subset of fixed broadband, and it predominantly consists of broadband over fiber, digital subscriber line, and cable modem technologies. Mobile wireless broadband is separate from fixed wireless and fixed broadband.

This research brief starts with an analysis of broadband availability at any speed and technology, the availability at different speed tiers and the competitive and technological dynamics at the national level. It also includes a discussion of rural and non-rural availability and a comparison of the U.S. to Europe.

Broadband Availability at Any Speed and Any Technology

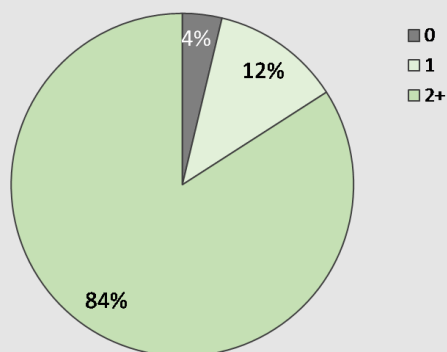
Any assessment of broadband availability and competition must start with an examination of broadband at any speed using any wired broadband technology. This reflects the foundational deployment of competitive facilities. Snapshots based on selective speed thresholds and technologies at a single point in time will understate the availability and competitiveness of broadband. A more accurate view takes into account all speeds and all technologies, as well as the dynamics of deployment and technological advancement over time.

As of mid-2016, 96 percent of Americans had wired broadband at any speed available to them. Among this group, 84 percent of Americans could choose from two or more wired providers and 12 percent had only one provider. See Chart 2. While four percent had no wired broadband option, there are several non-wired options – fixed wireless, mobile wireless, and satellite – discussed below.

According to the FCC data, of the 84 percent of Americans that had a choice of two or more wired broadband providers, 17 percent had a choice of three or more. It is unclear from the data what portion consists of facilities-based competitors. We can identify at least one-third as full facilities-based providers: former cable over-builders, such as Wide Open West and RCN, covered at least 5.5 million housing units; identifiable municipal network operators covered at least 1.5 million housing units; and Google Fiber covered approximately 620,000 housing units. Together these account for availability to approximately six percent of Americans. The remaining two-thirds may include providers using their own facilities, providers who partially resell others' facilities, or some combination of these.

Chart 2

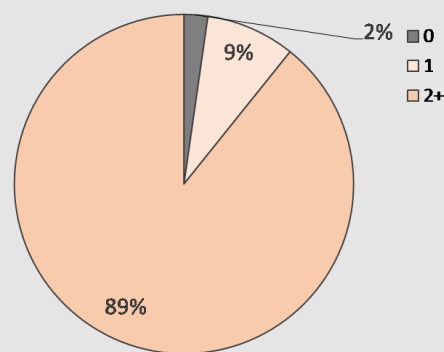
U.S. Wired Broadband Choices Available at Any Speed
(% of Housing Units, Mid 2016)



Source: FCC, USTelecom, and Telcodata CensusNBM.com.

Chart 3

U.S. Fixed Broadband Choices Available at Any Speed
(% of Housing Units, Mid 2016)



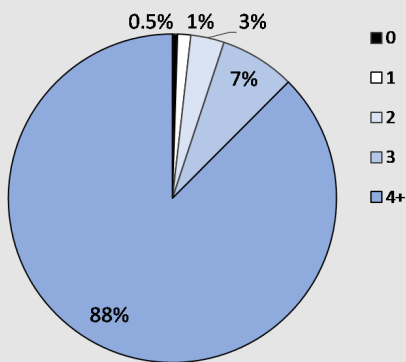
Source: FCC, USTelecom, and Telcodata CensusNBM.com.

As of mid-2016, fixed wireless service at any speed was available to 37 percent of Americans. Fixed broadband availability – wired plus fixed wireless – is only slightly greater than wired broadband availability: as of mid-2016, 98 percent had at least one fixed provider. This breaks down as follows: 89 percent had a choice of two or more fixed providers; 9 percent had only one fixed provider available; and 2 percent had no choice. See Chart 3.

The reported portion of Americans with three or more fixed broadband providers available is significantly greater than for wired broadband, due to the inclusion of fixed wireless. Three or more fixed broadband options at any speed were available to 41 percent of Americans as of mid-2016, compared to 17 percent for wired broadband only, according to the FCC data.

Mobile broadband from multiple providers is also widely available throughout the U.S. The most current mobile broadband data available from the FCC are for year-end 2015. As of 2015, mobile broadband using fourth generation (4G) Long Term Evolution (LTE) wireless technology was available to 99.5 percent of Americans and 98 percent had a choice of two or more providers. Four or more LTE mobile broadband options were available to 88 percent of Americans, 7 percent could choose among three LTE providers, and 3 percent had a choice of two. See Chart 4. While these data are from 2015, availability was likely the same or greater in 2016.

U.S. Wireless LTE Broadband Choices Available
(% of Housing Units, 2015)

Chart 4

Source: FCC, USTelecom, and Telcodata CensusNBM.com.

Some consumers are choosing mobile broadband only. Pew Internet [reported](#) that 12 percent of adults surveyed in 2016 had smartphones but no fixed home broadband. According to Pew, some portion of consumers who have chosen only smart phones [report having](#) adequate fixed broadband alternatives. It is difficult to draw hard conclusions as to how consumers view fixed and mobile broadband choices since factors such as income may influence the decision. Nonetheless, this is a trend worth watching. For voice telephony, the portion of U.S. households who have come to rely on wireless-only telephone service grew from 3 percent in 2003 to [more than 50 percent](#) as of 2016. Some portion of consumers use smart phones only, and this cohort may grow significantly with the deployment of fifth generation (5G) wireless in coming years. Moreover, recent moves by cable operators to provide wireless and telecom providers to provide content underscores the dynamic nature of the marketplace and the usefulness of drawing conclusions based on technologically limited and static snapshots.

Broadband Availability and Deployment at Different Speeds over Time

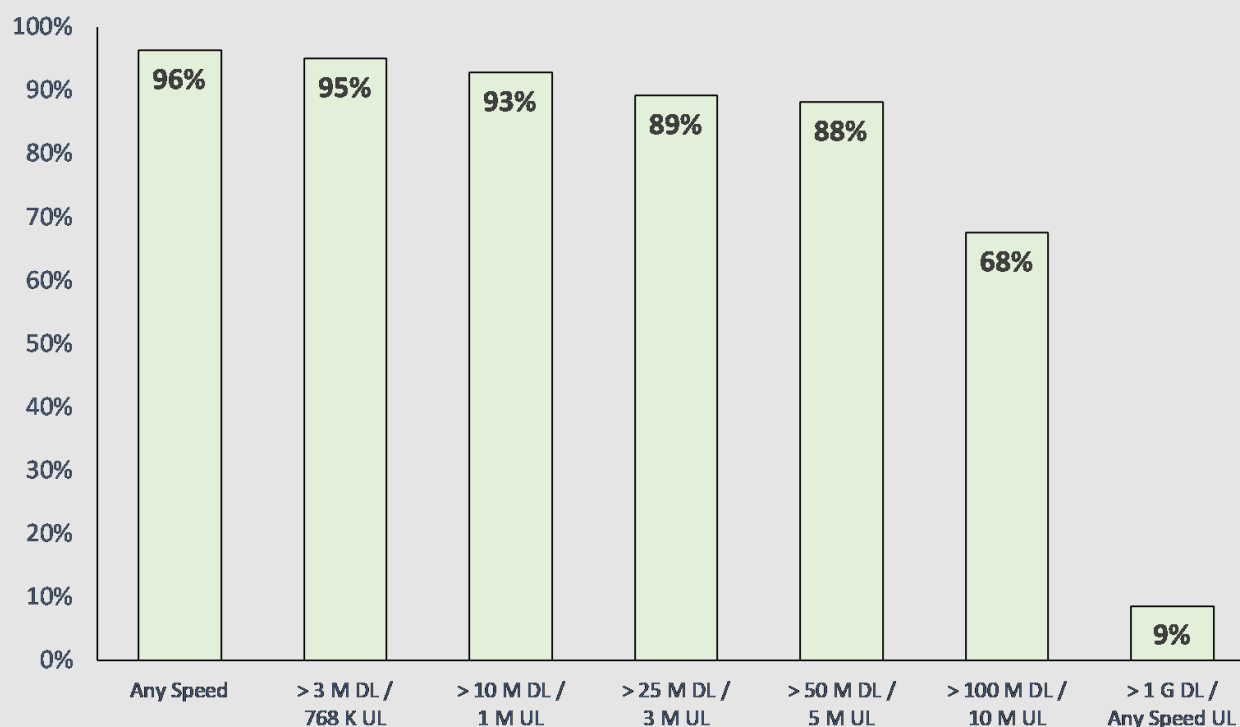
As discussed above, it is necessary to analyze broadband deployment and competition in the context of broader industry dynamics. U.S. providers have been deploying broadband infrastructure with a range of technologies for more than two decades. Basic competitive infrastructure from multiple providers is available in the vast majority of the country. Once providers have deployed the foundational infrastructure to offer broadband, increasing speed and quality is a matter of upgrading networks. Broadband technologies are also constantly evolving and successive generations are becoming increasingly powerful. In a process of competitive and technological leapfrog, certain providers deploy advanced technologies and upgrade their networks, then others follow suit, driving a competitive process of ever-expanding network capabilities.

The process of technological evolution and competitive deployment is costly and time consuming, as the more than \$1.5 trillion dollars in broadband provider investment over the last couple of decades testifies. It is not realistic to expect instantaneous advancement by multiple providers across a wide geographic area such as the U.S. Simple snapshots using arbitrary speed thresholds do not reflect this dynamic reality. Therefore, it is more instructive to look at both current and historical speed data across technologies.

Given the competitive and technological dynamic discussed above, the FCC data for mid-2016 not surprisingly show that the broadband availability rates at higher speeds is lower than availability rates at lower speeds at a given point in time. This is the case whether looking at wired broadband or the broader category of fixed broadband. See Chart 5 and Chart 6. However, the availability of higher speed services grows over time, as shown in Chart 7 below. Moreover, the *competitive* availability of higher-speed services grows over time, as shown in Chart 1 above.

Chart 5

U.S. Wired Broadband Availability by Speed, Mid 2016 (Percentage of Housing Units)



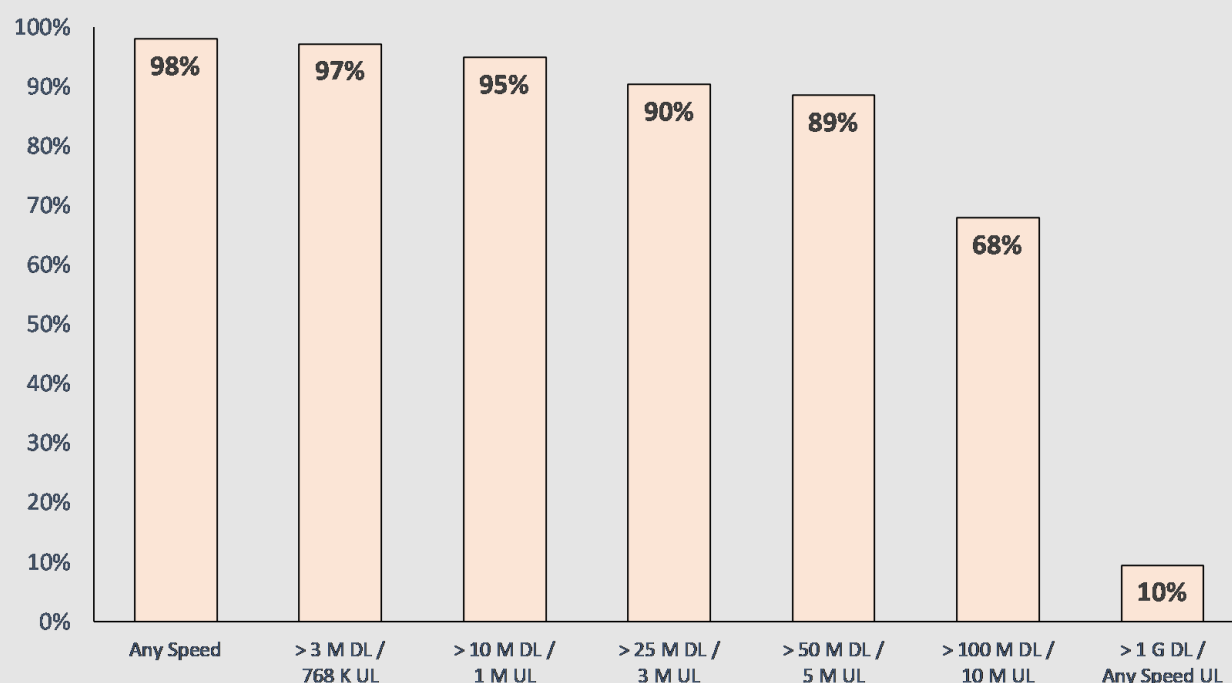
Source: FCC, USTelecom, and Telcodata CensusNBM.com

For wired broadband as of mid-2016 (Chart 5):

- 96 percent of Americans could get broadband at any speed;
- 95 percent at 3 megabits per second (mbps) download (DL) and 768 kilobits per second upload (UL);
- 93 percent at 10 mbps DL and 1 mbps UL;
- 89 percent at 25 mbps DL and 3 mbps UL;
- 88 percent at 50 mbps DL and 5 mbps UL;
- 68 percent at 100 mbps DL and 10 mbps UL; and
- 9 percent at 1 gigabit per second (gbps) DL and any speed UL.

Chart 6

U.S. Fixed Broadband Availability by Speed, Mid 2016 (Percentage of Housing Units)



Source: FCC, USTelecom, and Telcodata CensusNBM.com

For fixed broadband as of mid-2016 (Chart 6):

- 98 percent of Americans could get broadband at any speed;
- 97 percent at 3 megabits per second (mbps) download (DL) and 768 kilobits per second upload (UL);
- 95 percent at 10 mbps DL and 1 mbps UL;
- 90 percent at 25 mbps DL and 3 mbps U;
- 89 percent at 50 mbps DL and 5 mbps UL;
- 68 percent at 100 mbps DL and 10 mbps UL; and
- 10 percent at 1 gigabit per second (gbps) DL and any speed UL.

These data show that as of mid-2016, fixed broadband at any speed was available to 98 percent of Americans and wired broadband was available to 96 percent of Americans. The FCC currently defines advanced services based on a speed threshold of 25 mbps DL and 3 mbps UL. Approximately 90 percent of Americans had fixed broadband available and 89 percent had wired broadband available at the FCC's current speed threshold.

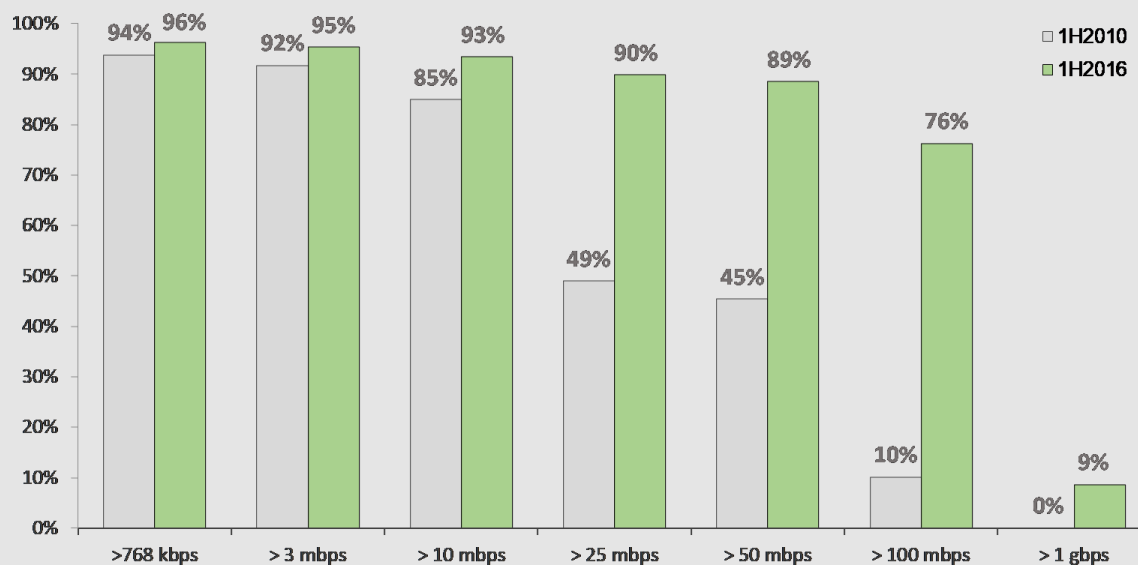
These data show that as of mid-2016, fixed broadband at any speed was available to 98 percent of Americans and wired broadband was available to 96 percent of Americans. The FCC currently defines advanced services based on a speed threshold of 25 mbps DL and 3 mbps UL. Approximately 90 percent of Americans had fixed broadband available and 89 percent had wired broadband available at the FCC's current speed threshold.

Chart 7 shows wired broadband availability by download speed from 2010 to 2016. Wired broadband across all speed categories grew from 2010 to 2016. Availability of broadband at 25 mbps DL grew from 49 percent in 2010 to 90 percent in 2016 while broadband at 50 mbps DL showed similar growth. Availability of broadband at 100 mbps DL grew from 10 percent in 2010 to 76 percent in 2016. Gigabit broadband, which did not exist in 2010 as a practical matter, was available to 9 percent of households in mid-2016, and continues to grow.

The 2010 data did not include a fixed broadband category that aggregated fixed wireless and wired technologies, but they did include an aggregate wired broadband category. Since companies reported fixed wireless differently in the 2010 and 2016 data collections, it is infeasible to compare fixed wireless broadband over time. The 2010 data also did not report the same download-upload combinations as the more current data. As a result, at an aggregate level, it is only feasible to compare download speeds for wired technology over this period. The download-only results in Chart 7 will not match download-upload results in Charts 5 and 6. Also since the 25 mbps DL / 3 mbps UL and 50 mbps DL / 5 mbps UL are so similar, throughout the remainder of this research brief, USTelecom will not report the 50 mbps DL and 5 mbps UL figures.

Chart 7

Broadband Availability by Download Speed for Wired Technologies , 2010-2016 (Percent of Housing Units)



Source: NTIA National Broadband Map, USTelecom, and Telcodata CensusNBM.com. Percentages in bar chart are cumulative.

Chart 1 at the beginning of this research brief shows *competitive* availability of wired broadband by two or more providers at various speeds using data available back to 2012. These data are available for broadband at any speed and available upload-download combinations: 25 mbps DL / 3 mbps UL and 10 mbps DL / 1 mbps UL. For the 10 mbps DL / 1 mbps UL, USTelecom to make estimates for 2012 and 2014 because the historic data were available for 768 kbps or 1.5 mbps UL speeds. USTelecom adjusted the 10 mbps DL / 768 kbps UL reported for 2012 and 2014 in proportion to ratio of 10 mbps DL / 768 kbps UL to 10 mbps DL / 1 mbps UL, which were both available for mid-2016. The analysis indicates that competitive wired infrastructure – telecom fiber or DSL, cable, and others – are competitively available to 84 percent of American homes. Availability of wired broadband at 25 mbps DL / 3 mbps UL from two or more providers grew from 23 percent of home in mid-2012 to 49 percent of homes in mid-2016 and the trend is growing. Availability of wired broadband at 10 mbps DL / 1 mbps UL from two or more providers grew from an estimated 55 percent of homes in mid-2012 to 65 percent of homes in mid-2016 and the trend is growing.

To summarize, as of mid-2016, 84 percent of the Americans were within reach of network infrastructure from multiple wired network providers – 89 percent when including fixed wireless services. At higher speeds, availability is growing rapidly, demonstrating the dynamic nature of broadband competition and investment. As of mid-2016, wired broadband service at 10 megabits per second download and 1 megabit per second upload was available to 93 percent of Americans; availability of wired broadband from two or more providers at 10 megabits per second download and 1 megabit per second upload was 65 percent, up from an estimated 55 percent four years earlier. As of mid-2016, wired broadband at 25 megabits per second download and 3 megabits per second upload was available to 89 percent of Americans; and availability of wired broadband from two or more providers at 25 megabits per second download and 3 megabits per second upload was 49 percent, up from 23 percent four years earlier.

Additionally, mobile broadband tells a similar story of competitive investment and growth. For assessing growth over time, data challenges make direct comparisons from 2010 to the present difficult, but not impossible. With 4G LTE technology, mobile carriers first began to report service at 10 mbps or greater DL. According to National Broadband Map (NMB), as of mid-2010, mobile broadband at 10 mbps DL or greater was available to less than one percent of Americans; by mid-2014 it was available to 98 percent. The FCC measures mobile wireless broadband speeds differently than the NBM, so speed-based comparisons are not feasible. However, the FCC does report mobile broadband availability by technology. By year-end 2015, mobile broadband over LTE – a good proxy for 10 mbps or greater service – was available to 99.5 percent of Americans. In other words, mobile broadband at 10 mbps DL or greater grew from near zero to near 100 percent availability in six years. Moreover, nearly all Americans today have multiple choices for 4G mobile broadband, as discussed and shown above in Chart 4 above.

Collectively, the current and historical data demonstrate that consumers are reaping the benefits of ever-faster broadband services from the tens of billions of dollars competing wired, fixed, and mobile broadband providers invest each year to deploy and upgrade their networks.

Broadband Availability in Rural and Non-Rural Areas

Broadband deployment across the diverse and expansive geography of the United States presents many challenges. In rural areas, costs are high and population densities low, so the cost per user can be extremely high. The economics of providing broadband at affordable and nationally comparable rates in many rural areas is difficult and in some cases prohibitive for wired providers who must deploy facilities all the way to end user locations. As a result, broadband is not surprisingly more widely available in non-rural areas than in rural areas and, due to the timing of upgrade cycles, typically at higher speeds.

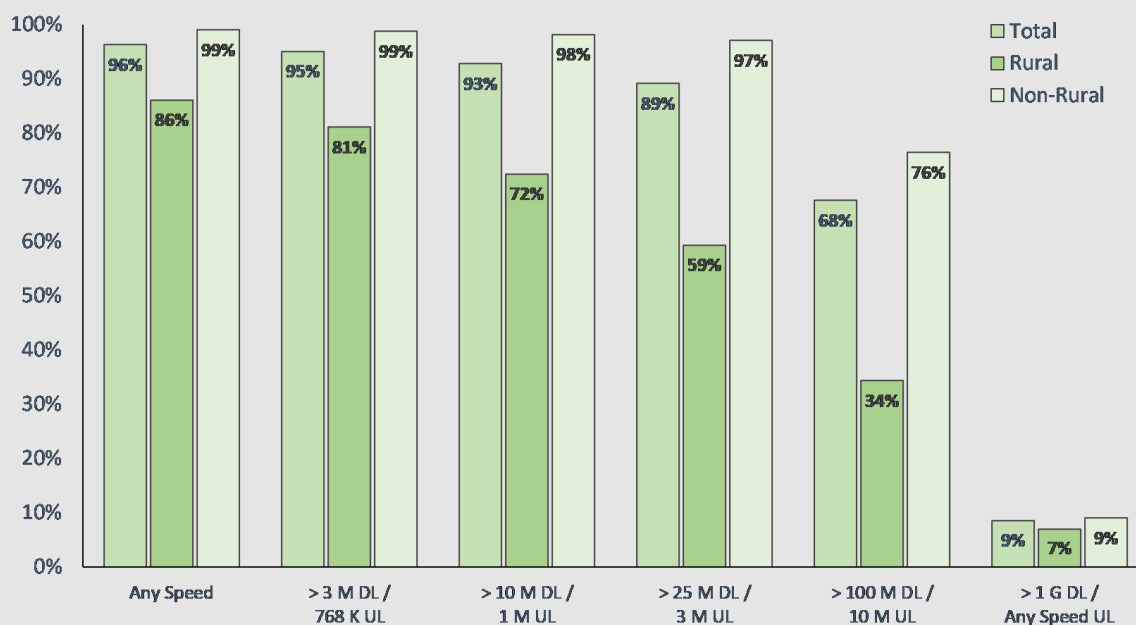
Rural Broadband Availability Overall

The analysis that follows shows that there is variation between rural and non-rural areas, but also within rural areas. In the calculations that follow, deployment is given as a percentage of housing units. Approximately 79 percent of housing units are non-rural and 21 percent are rural according to the 2010 Census.

As of mid-2016, wired broadband at 10 mbps DL and 1 mbps UL was available to 98 percent of Americans in non-rural areas and 72 percent in rural areas. Wired broadband at 25 mbps DL and 3 mbps UL was available to 97 percent of Americans in non-rural areas and 59 percent of Americans in rural areas. Wired broadband at 100 mbps DL and 10 mbps UL was available to 76 percent of Americans in non-rural areas and 34 percent of Americans in rural areas.

Chart 8

U.S. Wired Broadband Availability by Speed and Geographic Area, Mid 2016
(Percentage of Housing Units)

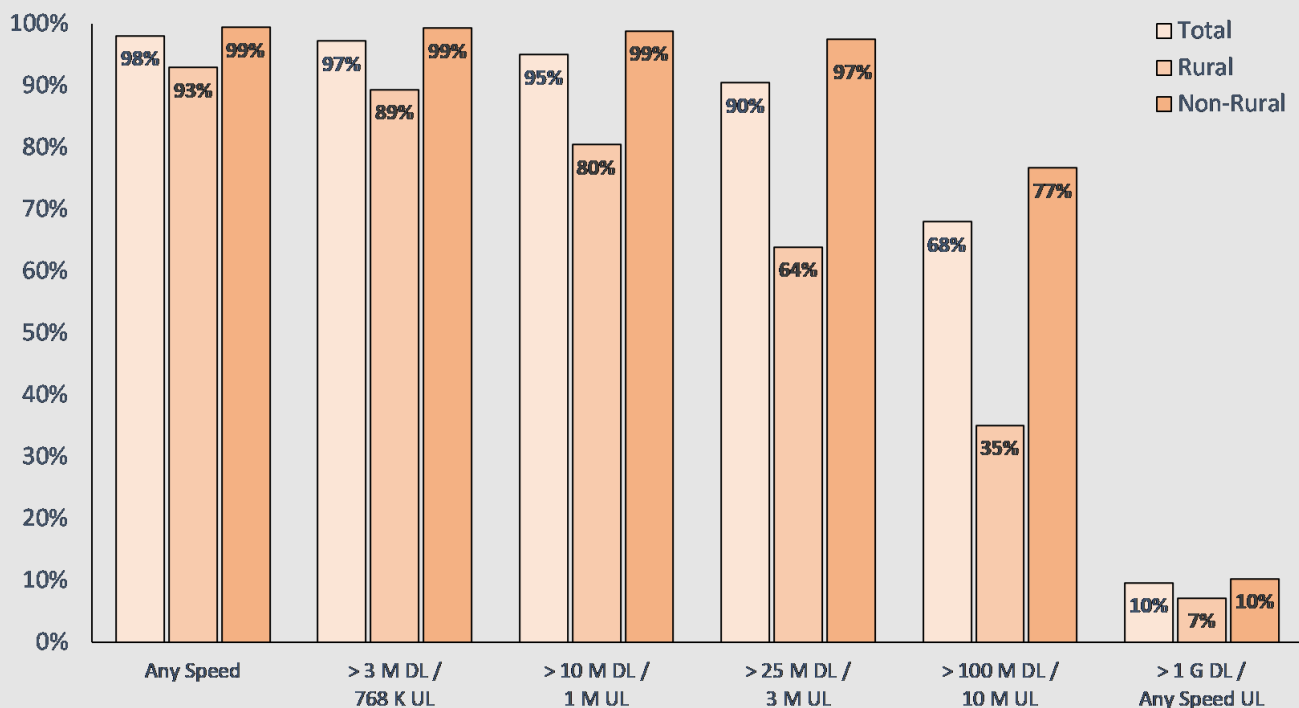


Source: FCC, USTelecom, and Telcodata CensusNBM.com

Including fixed wireless in the analysis results in slightly greater availability estimates in rural areas than wired broadband alone, especially in the mid-range of speeds. Fixed broadband at any speed is available to 99 percent of Americans in non-rural areas and 93 percent of Americans in rural areas (vs. 89 percent for wired broadband). See Chart 9. As of mid-2016, fixed broadband at 10 mbps DL and 1 mbps UL was available to 99 percent of Americans in non-rural areas and 80 percent in rural areas (vs. 72 percent for wired broadband alone). Fixed broadband at 25 mbps DL and 3 mbps UL was available to 97 percent of Americans in non-rural areas and 64 percent of Americans in rural areas (vs. 59 percent for wired broadband alone). Fixed broadband at 100 mbps DL and 10 mbps UL was available to 77 percent of Americans in non-rural areas and 35 percent of Americans in rural areas (vs. 34 percent for wired broadband alone).

Chart 9

U.S. Fixed Broadband Availability by Speed and Geographic Area, Mid 2016
(Percentage of Housing Units)



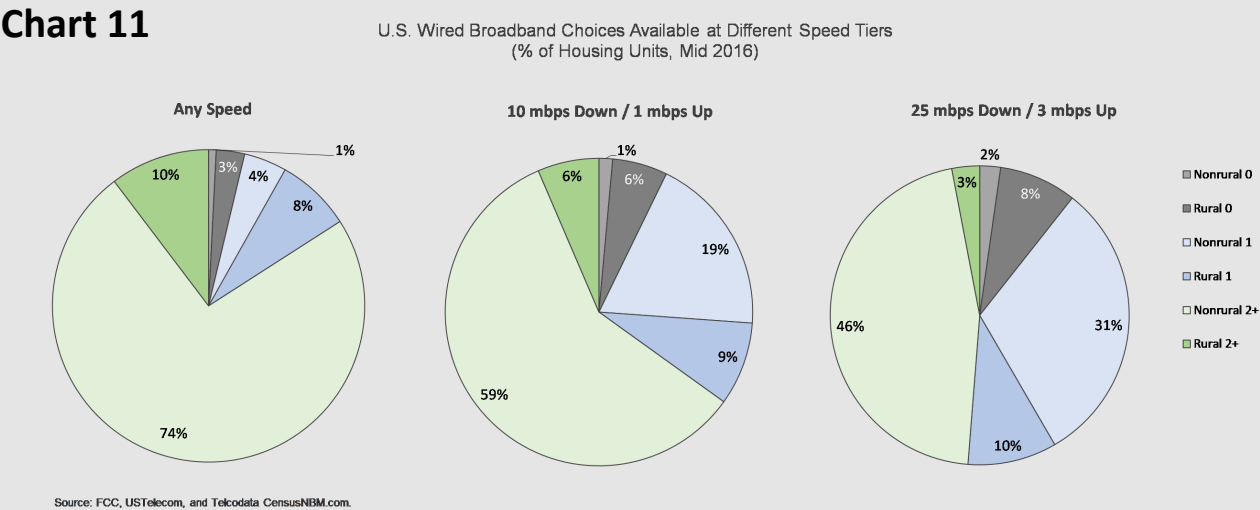
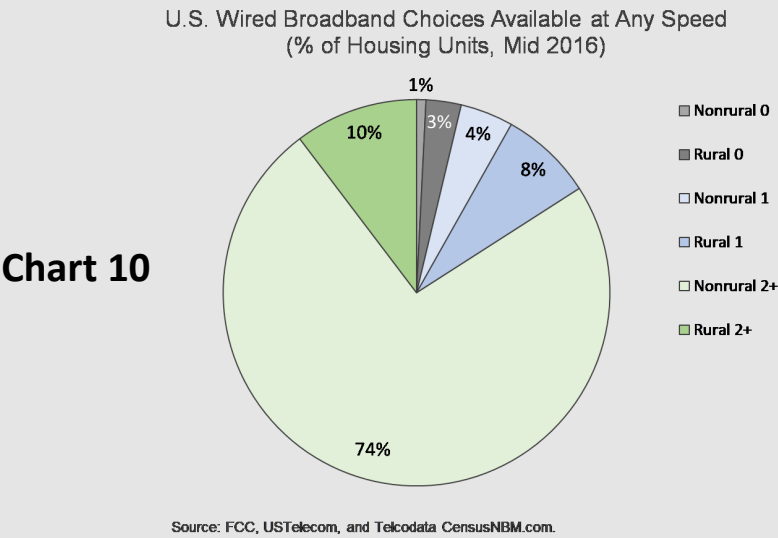
Source: FCC, USTelecom, and Telcodata CensusNBM.com

USTelecom does not provide a separate analysis for rural and non-rural deployment of mobile wireless broadband or satellite broadband. As shown in Chart 4 above, as of the end of 2015, 4G LTE mobile wireless broadband was available to 99.5 percent of Americans, and the vast majority of Americans, including those in rural areas, had 4G mobile broadband available to them from multiple competitive providers.

Competitive Availability: Rural and Non-Rural Components

At mid-2016, wired broadband at any speed was available to 84 percent of Americans from two or more providers, with 12 percent having one option and four percent having no wired broadband option. See Chart 2. The 84 percent with two or more wired broadband options consisted of 74 percent in non-rural areas and 10 percent in rural areas. The 12 percent with one option consisted of four percent in non-rural areas and eight percent in rural areas. The four percent that did not have a wired broadband provider consisted of one percent in non-rural areas and three percent in rural areas. See Chart 10.

At any point in time, competitive availability appears lower at higher speeds since they reflect more recent upgrade cycles. See Chart 11. This result is expected; and it reflects a dynamic, competitive marketplace. While core wired infrastructure is competitively available to 84 percent of Americans, networks are at different stages of upgrading to higher-speeds. As of mid-2016, 65 percent of Americans could get 10 mbps DL and 1 mbps UL, while 49 percent could get 25 mbps DL and 3 mbps UL. As Chart 1 demonstrates, deployment at higher speeds by multiple providers is growing rapidly as competition drives upgrades.

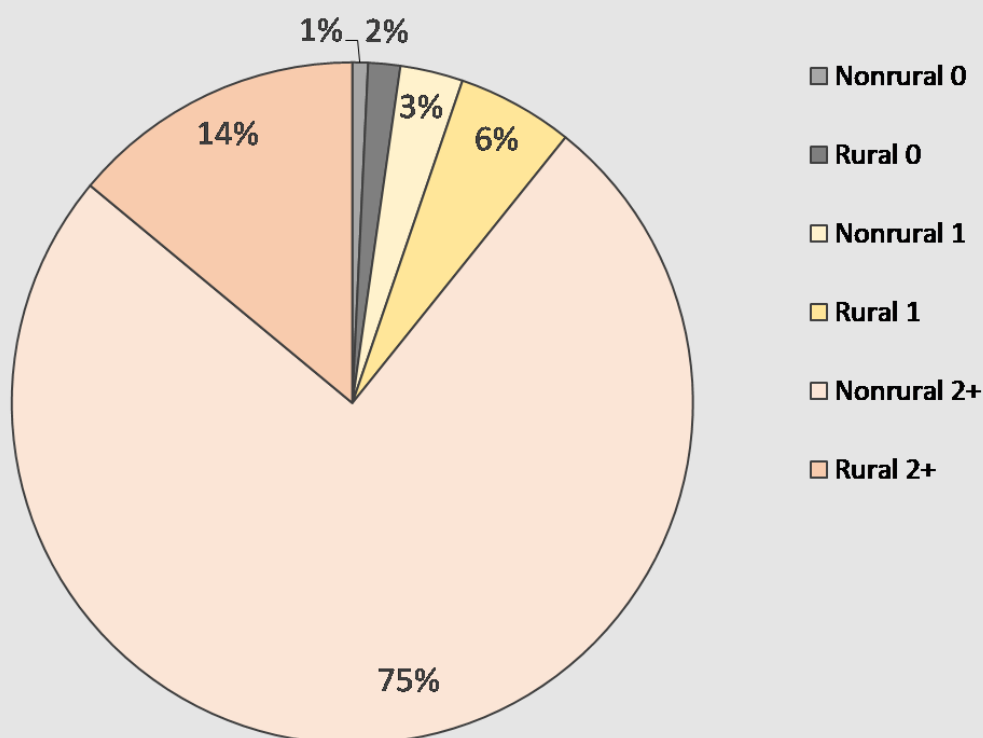


As of mid-2016, fixed broadband – including wired and fixed wireless – at any speed was available to 89 percent of Americans from two or more providers, with nine percent having one option and two percent having no fixed broadband option. See Chart 3. The 89 percent with two or more fixed broadband options consisted of 75 percent in non-rural areas and 14 percent in rural areas. The nine percent with one fixed broadband option consisted of six percent in non-rural areas and three percent in rural areas. The two percent that did not have a fixed broadband provider consisted of less than one percent in non-rural areas and just over one and a half percent in rural areas. See Chart 12.

As with wired broadband, competitive availability estimates for fixed broadband are lower at higher speeds due to competitive dynamics and upgrade cycles. See Chart 13. Including fixed wireless yields slightly higher estimates than wired broadband, especially at the 10 mbps DL and 1 mbps UL speed tier, where an additional 8 percent of Americans – 5 percent in non-rural areas and three percent in rural areas – had two or more fixed broadband offerings available as of mid-2016. In rural areas, fourteen percent more homes (three percent out of the 21 percent of homes that are in rural areas) have multiple options due to fixed wireless.

Chart 12

U.S. Fixed Broadband Choices Available at Any Speed
(% of Housing Units, Mid 2016)



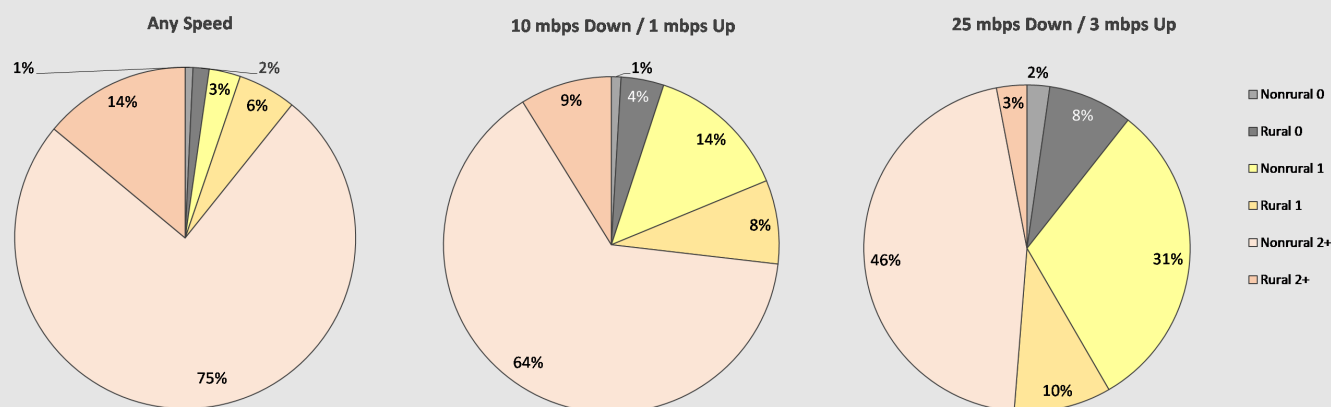
Source: FCC, USTelecom, and Telcodata CensusNBM.com.

“The” Rural Broadband Gap?

Rural broadband is not monolithic. The data show that there is variation across rural areas in terms of deployment, speeds, and competition. While there are gaps in rural broadband, there is no single “rural broadband gap.” Rather, gaps exist in specific rural areas either where broadband is not available due to challenging economics or areas where there is only one provider and either demand, industry technology trends, or subsidies are not driving sufficient upgrades.

Chart 13

U.S. Fixed Broadband Choices Available at Different Speed Tiers
(% of Housing Units, Mid 2016)



Source: FCC, USTelecom, and Telcodata CensusNBM.com.

Almost half of rural areas, where 10 percent of Americans reside, had two or more wired networks deployed, as of mid-2016. More than 37 percent of rural areas, where 8 percent of Americans reside, had just one wired provider. Combined with those areas that had two or more providers, almost 86 percent of rural Americans had at least one provider available to them. Of these, 72 percent could get services at 10 mbps DL and 1 mbps UL; 59 percent could get service at 25 mbps DL and 3 mbps UL; and 34 percent could get service at 100 mbps DL and 10 mbps UL. See Chart 7. If you include fixed wireless and relax the upload requirement, these figures rise to 81 percent for 10 mbps DL; 64 percent for 25 mbps DL; and 35 percent for 100 mbps DL. See Appendix B.

The remainder may be unserved, depending on technology assumptions. Almost 14 percent of rural areas where three percent of Americans reside did not have a wired broadband option as of mid-2016. This falls to less than 7 percent of rural areas, or 2 percent of all Americans, if fixed wireless is included in the analysis. The unserved portion falls to about 2.5 percent of rural areas and 0.5 percent of all Americans if 4G mobile wireless is included in the analysis, conservatively assuming nearly all uncovered areas for 4G mobile wireless are in rural America. Satellite eliminates most of the gap if it is included in the analysis, although the FCC has [noted](#) that latency, or delays in data transmission arising from the distances between users and satellites, may affect perceived quality of real time interactive applications. Nonetheless, in the very highest cost areas, satellite may be the most economical option for fixed broadband.

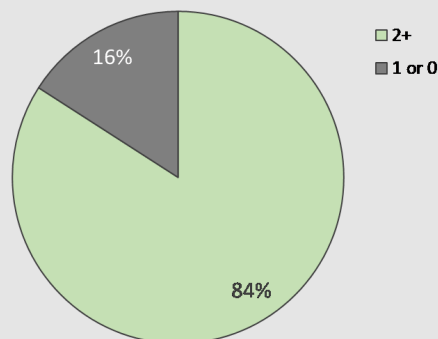
USTelecom believes that every American should have the opportunity to connect to the Internet through sufficiently robust broadband service. For some areas, this may require government support. The FCC's Connect America Fund provides a good starting point. Further progress will require targeted and flexible policies. Policies should target support to specific areas where the economics do not support deployment or upgrades. They must also be sufficiently flexible to allow for the most cost effective solutions rather than adhering to rigid technology or speed requirements; and, of course, sufficient funds must be made available.

U.S. and European Broadband Availability

According to European Union data, U.S. consumers enjoy greater competitive choice among facilities-based wired broadband providers than their counterparts in Europe. As detailed above, as of mid-2016, wired broadband from two or more providers was available to 84 percent of housing units in the U.S. By contrast, as of mid-2016, wired broadband was available to an estimated 44 percent of households in the EU's 28 member states (EU28), assuming that telecom providers cover most of Union and the cable footprint largely overlaps these providers.

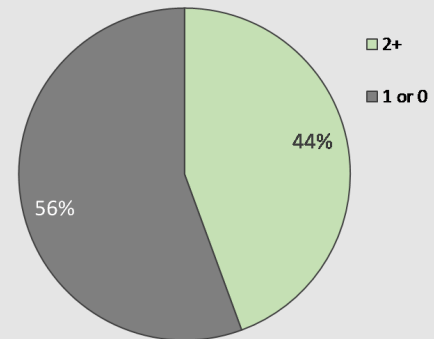
Chart 14

U.S. Wired Broadband Choices Available at Any Speed
(% of Housing Units, Mid 2016)



Source: FCC, USTelecom, and Telcodata CensusNBM.com.

EU28 Broadband Choices Available at Any Speed
(% of Households, Mid 2016)



Source: European Union, USTelecom, and IHS Markit.

Conclusion

As of mid-2016, 96 percent of Americans had at least one wired broadband infrastructure available to them – 98 percent, if fixed wireless is included in the analysis. Moreover, there are competing wired broadband infrastructures in 84 percent of the country – 89 percent, if fixed wireless is included in the analysis. Nearly all Americans could get broadband service via mobile wireless and satellite.

While the FCC 477 data are not perfect, they are the best available and the risk of overstatement is minimal at broad geographic levels of aggregation. These broadband availability data highlight that U.S. broadband providers continue to deploy and upgrade networks rapidly, bringing the vast majority of consumers across the nation ever-faster service and choice in a reasonable and timely fashion. There is no paucity of competition, and there is no systemic market failure when it comes to deploying broadband in the U.S.

The presence of facilities-based competition is spurring ongoing investment in network upgrades across the nation, and as a result, both fixed and mobile broadband speeds are growing. There is not a monolithic broadband gap, but a range of areas that do not have sufficient broadband available to them. Policies must be targeted, addressing specific problem areas, and must be flexible to allow for economically efficient solutions. Overbroad claims of authority based on non-availability of broadband in a small subset of the country are contrary to the spirit of the Communications Act and are bad policy. So are statistical market snapshots that arbitrarily understate the extent of broadband availability and competition in order to justify broad policy intervention.

Methodology

Data and Analysis

USTelecom worked with consultant, Telecodata, to produce this research. Telcodata's broadband research service, CensusNBM (CensusNBM.com), compiled the data for this analysis by combining the Federal Communications Commission's (FCC) broadband availability and US Census housing unit data that is filed at the granular census block detail level and then consistently aggregated by Telcodata analysts to produce statistics for all 50 states plus DC. CensusNBM uses the 2010 Census, the last period that the Bureau produced a full tabulation of housing units, households, and population. For mapping and compatibility purposes, CensusNBM computed the broadband availability and Census information at the census block level in order to produce consistent broadband availability ratios. Census housing units and households track very closely, but housing units is a broader measure: it includes occupied homes, vacant homes and vacation homes; the household measure would include only occupied housing units.

The FCC has reported broadband availability data semi-annually using data collected using its Form 477 since year-end 2014. The most current FCC data available – and the data in this analysis – are for mid-2016. The FCC reports broadband availability at the census block level by provider and by technology type, with maximum download/upload speeds.

The FCC reports the following fixed technology categories based on its Form 477 data collection:

- Asymmetric xDSL
- ADSL2
- VDSL
- Symmetric xDSL
- Copper
- Fiber
- Cable DOCSIS 3.0
- Cable DOCSIS 1 - 1.1 - 2.0
- Cable Other
- Terrestrial Fixed Wireless
- Satellite

To enable certain analyses at higher levels than possible with the FCC-reported technology categories, CensusNBM created several broader groupings using. For example, CensusNBM created categories for all Cable technologies and all DSL technologies. It also created categories for Any Wired Technology except Cable – a category intended to include all wireline telecommunications providers; Any Wired Technology, which includes wireline telecommunications and cable providers; and Any Fixed Technology except Satellite, which combined Any Wired Technology and Terrestrial Fixed Wireless categories.

The following list represents the hierarchy of fixed broadband groupings and sub-groupings (see Appendices):

- Any Fixed Technology except Satellite
 - Any Wired Technology
 - Any Wired Technology except Cable
 - DSL
 - > Asymmetric xDSL
 - > ADSL2
 - > VDSL
 - > Symmetric xDSL
 - Copper
 - Fiber
 - Cable
 - DOCSIS 3.0
 - DOCSIS 1 - 1.1 - 2.0
 - Cable Other
 - Terrestrial Fixed Wireless
- Satellite

The process for creating the broader categories eliminates duplication when appropriate, such as instances where a single provider reported multiple technologies in the same area, or where multiple types of providers in a broader category reported facilities in the same area. For example, since the FCC's Form 477 requires ISPs to record each broadband technology in a census block and its associated download/upload speeds, there can be duplicate records for a single provider. Therefore, when calculating the number of housing units with “Any Wired Technology except Cable” as a category, CensusNBM counts the number of housing units in census blocks where a single ISP reports both DSL and Fiber just one time – not once for fiber and once for DSL. Similarly, when calculating the number of housing units with “Any Wired Technology” as a category, CensusNBM counts the number of housing units in census blocks where both wireline telecommunications and cable operators report facilities just one time.

History

The National Telecommunications and Information Administration (NTIA) collected broadband availability data semi-annually for the “national broadband map” from mid-2010 to mid-2014. Those data are similar to, but not the same as, the broadband availability data the FCC collects using its Form 477. As a result, it is not possible to produce precise consistent time series between the NTIA data and the FCC data; but it is possible to create some rough comparisons over time using high-level data.

As part of the national broadband map, NTIA produced several reports detailing results by discrete technology and speed categories. Thus far, the FCC has released a great deal of raw data, and has used selected data in its Section 706 broadband deployment reports, but has not provided reports similar to those NTIA previously provided. USTelecom worked with CensusNBM to develop several reports similar to, though not identical, to the NTIA technology and speed reports. See Appendixes.

With the FCC data, CensusNBM has flexibility to create speed tiers, technology aggregates, and other reports. It does not have as much flexibility with the NTIA data. Below is a discussion of some of the relevant differences between the NTIA and the FCC data.

- The NTIA only provided speed data in ranges, such as “1.5 mbps to 3.0 mbps.” Certain speed thresholds that have become standards, like upload speeds “greater than 1.0 mbps” are not possible to ascertain with the NTIA data. In contrast, the current FCC 477 data specifies unique maximum advertised speeds, such as “1.0 Mbps.” With such data points, as opposed to pre-defined ranges, it is possible for CensusNBM to create its own ranges or thresholds.
- The FCC 477 report identifies residential and business census blocks and further differentiates residential maximum advertised speeds from business/government maximum contracted speeds. Since the NTIA filings did not distinguish residential from business advertised speeds any comparison over time between the NTIA and FCC are not precisely compatible. Since the NTIA data also include business broadband deployment, earlier data will show relatively higher broadband availability results than the FCC 477 at comparable maximum advertised speeds.
- The NTIA data has only seven categories of fixed technologies, while the FCC data has 10.
- Unlike NTIA, the FCC data treats mobile wireless broadband differently than fixed broadband (currently the FCC does not provide broadband speed data for mobile wireless broadband), so it is now not possible to report mobile data in the same manner as fixed broadband.

Geography

These data are national (50 states plus DC) with breakouts for rural and non-rural areas based on Census classification of census blocks. In terms of housing units, approximately 79 percent are in non-rural areas and 21 percent are in rural areas.

Appendix A – Mid 2016 Broadband Availability by Housing Units, Download and Upload

US Broadband Availability by Technology and Speed, Mid-Year 2016, Selected Download and Upload Speeds (Percentage of Housing Units)

All Areas

Technology	Total HU Any Speed	Total HU > 768 K DL / 200 K UL	Total HU > 3 M DL / 768 K UL	Total HU > 10 M DL / 1 M UL	Total HU > 25 M DL / 3 M UL	Total HU > 50 M DL / 5 M UL	Total HU > 100 M DL / 10 M UL	Total HU >1 gbps DL
Any Fixed Technology Except Satellite	98.1%	97.9%	97.2%	95.0%	90.4%	88.6%	68.0%	9.6%
Any Wired Technology	96.3%	96.1%	95.1%	92.8%	89.2%	88.1%	67.6%	8.6%
Any Wired Technology Except Cable	92.2%	91.7%	84.6%	69.5%	49.3%	39.2%	20.8%	6.0%
DSL	87.8%	87.2%	78.7%	58.2%	31.8%	22.8%	4.0%	0.1%
Asymmetric xDSL	66.1%	65.1%	51.2%	14.9%	3.5%	1.3%	0.0%	0.1%
ADSL2	34.6%	34.0%	28.2%	19.2%	1.5%	0.1%	0.0%	0.0%
VDSL	37.5%	37.5%	34.7%	32.8%	28.4%	21.5%	3.9%	0.0%
Symmetric xDSL	0.8%	0.8%	0.4%	0.3%	0.1%	0.0%	0.0%	0.0%
Copper	2.3%	2.3%	2.0%	1.9%	0.3%	0.2%	0.1%	0.0%
Fiber	22.7%	22.7%	22.7%	22.7%	21.8%	18.0%	17.2%	6.0%
Cable	87.2%	87.2%	87.2%	87.0%	86.2%	85.6%	64.1%	2.7%
DOCSIS 3.0	86.3%	86.3%	86.2%	86.2%	85.7%	85.3%	64.0%	2.7%
DOCSIS 1 - 1.1 - 2.0	2.1%	2.1%	2.1%	2.0%	1.4%	0.5%	0.4%	0.0%
Cable Other	0.9%	0.9%	0.9%	0.8%	0.7%	0.5%	0.3%	0.0%
Terrestrial Fixed Wireless	36.3%	36.0%	33.9%	28.2%	14.9%	6.7%	3.9%	1.0%
Satellite	100.0%	100.0%	100.0%	100.0%	21.2%	0.0%	0.0%	0.0%

Rural Areas

Technology	Rural HU Any Speed	Rural HU > 768 K DL / 200 K UL	Rural HU > 3 M DL / 768 K UL	Rural HU > 10 M DL / 1 M UL	Rural HU > 25 M DL / 3 M UL	Rural HU > 50 M DL / 5 M UL	Rural HU > 100 M DL / 10 M UL	Rural HU >1 gbps DL
Any Fixed Technology Except Satellite	92.9%	92.4%	89.3%	80.5%	63.9%	58.2%	35.0%	7.1%
Any Wired Technology	86.1%	85.1%	81.1%	72.5%	59.4%	57.1%	34.4%	7.0%
Any Wired Technology Except Cable	79.2%	77.5%	68.9%	49.5%	22.3%	19.2%	10.0%	5.4%
DSL	75.0%	73.0%	63.7%	42.2%	12.4%	9.8%	1.4%	0.0%
Asymmetric xDSL	49.4%	47.2%	37.2%	12.6%	3.5%	3.0%	0.1%	0.0%
ADSL2	43.1%	41.2%	35.2%	23.1%	0.6%	0.3%	0.0%	0.0%
VDSL	16.7%	15.4%	13.6%	13.4%	8.5%	6.6%	1.2%	0.0%
Symmetric xDSL	1.0%	1.0%	0.7%	0.5%	0.3%	0.1%	0.1%	0.0%
Copper	1.5%	1.5%	1.1%	0.9%	0.4%	0.4%	0.0%	0.0%
Fiber	12.6%	12.6%	12.5%	12.5%	11.2%	10.3%	8.9%	5.4%
Cable	52.5%	52.5%	52.3%	51.9%	49.7%	48.6%	28.0%	1.7%
DOCSIS 3.0	50.2%	50.2%	50.1%	49.9%	48.8%	48.1%	27.7%	1.7%
DOCSIS 1 - 1.1 - 2.0	2.5%	2.5%	2.4%	2.1%	0.9%	0.7%	0.5%	0.0%
Cable Other	1.5%	1.4%	1.4%	1.3%	0.8%	0.6%	0.3%	0.0%
Terrestrial Fixed Wireless	38.9%	38.4%	33.6%	24.3%	10.6%	2.8%	1.4%	0.1%
Satellite	100.0%	100.0%	100.0%	100.0%	16.8%	0.0%	0.0%	0.0%

Nonrural Areas

Technology	Nonrural HU Any Speed	Nonrural HU > 768 K DL / 200 K UL	Nonrural HU > 3 M DL / 768 K UL	Nonrural HU > 10 M DL / 1 M UL	Nonrural HU > 25 M DL / 3 M UL	Nonrural HU > 50 M DL / 5 M UL	Nonrural HU > 100 M DL / 10 M UL	Nonrural HU >1 gbps DL
Any Fixed Technology Except Satellite	99.4%	99.4%	99.3%	98.8%	97.5%	96.7%	76.7%	10.2%
Any Wired Technology	99.0%	99.0%	98.8%	98.2%	97.1%	96.4%	76.4%	9.0%
Any Wired Technology Except Cable	95.7%	95.5%	88.8%	74.8%	56.5%	44.6%	23.6%	6.2%
DSL	91.3%	90.9%	82.7%	62.4%	37.0%	26.3%	4.7%	0.1%
Asymmetric xDSL	70.5%	69.9%	54.9%	15.5%	3.6%	0.9%	0.0%	0.1%
ADSL2	32.3%	32.0%	26.3%	18.1%	1.7%	0.0%	0.0%	0.0%
VDSL	43.0%	43.4%	40.3%	37.9%	33.6%	25.4%	4.6%	0.0%
Symmetric xDSL	0.7%	0.7%	0.3%	0.2%	0.1%	0.0%	0.0%	0.0%
Copper	2.5%	2.5%	2.3%	2.1%	0.2%	0.2%	0.1%	0.0%
Fiber	25.4%	25.4%	25.4%	25.4%	24.6%	20.0%	19.4%	6.1%
Cable	96.5%	96.5%	96.4%	96.4%	95.9%	95.4%	73.7%	2.9%
DOCSIS 3.0	95.9%	95.9%	95.9%	95.8%	95.5%	95.2%	73.7%	2.9%
DOCSIS 1 - 1.1 - 2.0	2.1%	2.1%	2.0%	2.0%	1.6%	0.5%	0.4%	0.0%
Cable Other	0.8%	0.8%	0.8%	0.7%	0.7%	0.5%	0.3%	0.0%
Terrestrial Fixed Wireless	35.6%	35.4%	34.0%	29.2%	16.0%	7.7%	4.6%	1.2%
Satellite	100.0%	100.0%	100.0%	100.0%	22.4%	0.0%	0.0%	0.0%

Source: FCC, USTelecom, and Telcodata CensusNBM.com

Appendix B – Mid 2016 Broadband Availability by Housing Units, Download Only

US Broadband Availability by Technology and Speed, Mid-Year 2016, Download Speeds Only (Percentage of Housing Units)

All Areas

	Total HU Any Speed	Total HU >768 kbps DL	Total HU >1.5 mbps DL	Total HU >3 mbps DL	Total HU >6 mbps DL	Total HU >10 mbps DL	Total HU >25 mbps DL	Total HU >50 mbps DL	Total HU >100 mbps DL	Total HU >1 gbps DL
Technology										
Any Fixed Technology Except Satellite	98.1%	98.0%	97.6%	97.4%	96.6%	95.4%	91.1%	89.0%	76.5%	9.6%
Any Wired Technology	96.3%	96.3%	95.7%	95.3%	94.7%	93.4%	89.9%	88.5%	76.2%	8.6%
Any Wired Technology Except Cable	92.2%	92.2%	88.3%	85.3%	81.8%	71.3%	52.6%	39.9%	21.3%	6.0%
DSL	87.8%	87.8%	83.6%	79.7%	73.0%	60.4%	35.7%	23.6%	4.5%	0.1%
Asymmetric xDSL	66.1%	65.5%	56.1%	52.1%	44.2%	15.1%	4.2%	1.4%	0.5%	0.1%
ADSL2	34.6%	34.5%	29.9%	28.9%	26.9%	21.6%	6.2%	0.1%	0.0%	0.0%
VDSL	37.5%	37.5%	37.2%	34.8%	34.7%	32.8%	29.9%	22.1%	3.9%	0.0%
Symmetric xDSL	0.8%	0.8%	0.7%	0.4%	0.3%	0.3%	0.1%	0.0%	0.0%	0.0%
Copper	2.3%	2.3%	2.1%	2.0%	1.9%	1.9%	0.3%	0.2%	0.1%	0.0%
Fiber	22.7%	22.7%	22.7%	22.7%	22.7%	22.7%	21.9%	18.0%	17.3%	6.0%
Cable	87.2%	87.2%	87.2%	87.2%	87.1%	87.1%	86.3%	85.9%	73.5%	2.7%
DOCSIS 3.0	86.3%	86.3%	86.3%	86.3%	86.2%	86.2%	85.8%	85.5%	73.3%	2.7%
DOCSIS 1 - 1.1 - 2.0	2.1%	2.1%	2.1%	2.1%	2.1%	2.0%	1.4%	0.5%	0.4%	0.0%
Cable Other	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.7%	0.7%	0.4%	0.0%
Terrestrial Fixed Wireless	36.3%	36.0%	34.2%	34.0%	30.4%	28.2%	14.9%	6.7%	3.9%	1.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	21.2%	0.0%	0.0%	0.0%

Rural Areas

	Any Speed	>768 kbps DL	>1.5 mbps DL	>3 mbps DL	>6 mbps DL	>10 mbps DL	>25 mbps DL	>50 mbps DL	>100 mbps DL	>1 gbps DL
Technology										
Any Fixed Technology Except Satellite	92.9%	92.7%	91.1%	90.2%	86.8%	82.6%	66.3%	59.1%	44.6%	7.1%
Any Wired Technology	86.1%	86.0%	83.8%	82.3%	79.7%	75.2%	62.0%	58.0%	44.0%	7.0%
Any Wired Technology Except Cable	79.2%	79.0%	73.7%	70.6%	65.1%	54.7%	27.4%	19.7%	11.3%	5.4%
DSL	75.0%	74.8%	69.2%	65.8%	59.2%	48.0%	17.9%	10.1%	2.3%	0.0%
Asymmetric xDSL	49.4%	48.8%	42.5%	39.0%	31.9%	13.3%	4.6%	3.1%	1.2%	0.0%
ADSL2	43.1%	42.9%	37.5%	36.5%	34.6%	29.3%	5.8%	0.3%	0.0%	0.0%
VDSL	16.7%	16.7%	16.5%	15.1%	14.9%	13.6%	10.3%	6.9%	1.2%	0.0%
Symmetric xDSL	1.0%	1.0%	0.8%	0.7%	0.5%	0.5%	0.3%	0.1%	0.1%	0.0%
Copper	1.5%	1.5%	1.1%	1.1%	1.1%	0.9%	0.4%	0.4%	0.0%	0.0%
Fiber	12.6%	12.6%	12.6%	12.5%	12.5%	12.5%	11.3%	10.5%	9.1%	5.4%
Cable	52.5%	52.5%	52.5%	52.5%	52.1%	51.9%	50.2%	49.3%	38.2%	1.7%
DOCSIS 3.0	50.2%	50.2%	50.2%	50.2%	50.0%	49.9%	49.2%	48.6%	37.9%	1.7%
DOCSIS 1 - 1.1 - 2.0	2.5%	2.5%	2.5%	2.4%	2.3%	2.1%	0.9%	0.8%	0.5%	0.0%
Cable Other	1.5%	1.4%	1.4%	1.4%	1.4%	1.3%	1.0%	0.8%	0.4%	0.0%
Terrestrial Fixed Wireless	38.9%	38.4%	34.4%	33.7%	28.1%	24.3%	10.7%	3.0%	1.4%	0.1%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	16.8%	0.0%	0.0%	0.0%

Nonrural Areas

	Any Speed	>768 kbps DL	>1.5 mbps DL	>3 mbps DL	>6 mbps DL	>10 mbps DL	>25 mbps DL	>50 mbps DL	>100 mbps DL	>1 gbps DL
Technology										
Any Fixed Technology Except Satellite	99.4%	99.4%	99.3%	99.3%	99.2%	98.9%	97.7%	96.9%	85.0%	10.2%
Any Wired Technology	99.0%	99.0%	98.9%	98.8%	98.7%	98.2%	97.3%	96.6%	84.8%	9.0%
Any Wired Technology Except Cable	95.7%	95.7%	92.2%	89.3%	86.2%	75.7%	59.4%	45.3%	24.0%	6.2%
DSL	91.3%	91.2%	87.4%	83.4%	76.7%	63.7%	40.5%	27.1%	5.0%	0.1%
Asymmetric xDSL	70.5%	70.0%	59.8%	55.6%	47.5%	15.6%	4.1%	0.9%	0.3%	0.1%
ADSL2	32.3%	32.3%	27.9%	26.9%	24.8%	19.6%	6.3%	0.1%	0.0%	0.0%
VDSL	43.0%	43.0%	42.7%	40.0%	39.9%	37.9%	35.1%	26.2%	4.6%	0.0%
Symmetric xDSL	0.7%	0.7%	0.7%	0.3%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%
Copper	2.5%	2.5%	2.3%	2.3%	2.2%	2.1%	0.2%	0.2%	0.1%	0.0%
Fiber	25.4%	25.4%	25.4%	25.4%	25.4%	25.4%	24.7%	20.0%	19.5%	6.1%
Cable	96.5%	96.5%	96.5%	96.5%	96.4%	96.4%	96.0%	95.7%	82.9%	2.9%
DOCSIS 3.0	95.9%	95.9%	95.9%	95.9%	95.8%	95.8%	95.6%	95.3%	82.7%	2.9%
DOCSIS 1 - 1.1 - 2.0	2.1%	2.1%	2.1%	2.1%	2.0%	2.0%	1.6%	0.5%	0.4%	0.0%
Cable Other	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.6%	0.4%	0.0%
Terrestrial Fixed Wireless	35.6%	35.3%	34.1%	34.0%	31.0%	29.2%	16.0%	7.7%	4.6%	1.2%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	22.4%	0.0%	0.0%	0.0%

Source: FCC, USTelecom, and Telcodata CensusNBM.com

Appendix C – Mid 2016 Broadband Availability by Population, Download and Upload

US Broadband Availability by Technology and Speed, Mid-Year 2016, Selected Download and Upload Speeds (Percentage of Population)

All Areas

	Total Pop Any Speed	Total Pop > 768 K DL / 200 K UL	Total Pop > 3 M DL / 768 K UL	Total Pop > 10 M DL / 1 M UL	Total Pop > 25 M DL / 3 M UL	Total Pop > 50 M DL / 5 M UL	Total Pop > 100 M DL / 10 M UL	Total Pop >1 gbps DL
Technology								
Any Fixed Technology Except Satellite	98.3%	98.2%	97.5%	95.4%	91.1%	89.4%	69.1%	9.4%
Any Wired Technology	96.6%	96.3%	95.4%	93.2%	89.9%	88.9%	68.7%	8.5%
Any Wired Technology Except Cable	92.5%	91.9%	84.9%	70.0%	50.6%	40.1%	21.2%	6.0%
DSL	87.9%	87.4%	78.9%	58.2%	32.8%	23.2%	3.9%	0.1%
Asymmetric xDSL	66.6%	65.5%	51.5%	14.7%	3.8%	1.3%	0.0%	0.1%
ADSL2	33.7%	33.1%	27.3%	18.5%	1.7%	0.1%	0.0%	0.0%
VDSL	38.3%	38.3%	35.6%	33.5%	29.1%	21.9%	3.9%	0.0%
Symmetric xDSL	0.8%	0.8%	0.3%	0.2%	0.1%	0.0%	0.0%	0.0%
Copper	2.1%	2.1%	1.9%	1.8%	0.3%	0.2%	0.0%	0.0%
Fiber	23.2%	23.2%	23.2%	23.2%	22.4%	18.4%	17.7%	5.9%
Cable	88.1%	88.1%	88.1%	88.0%	87.1%	86.6%	65.4%	2.6%
DOCSIS 3.0	87.2%	87.2%	87.2%	87.2%	86.7%	86.3%	65.3%	2.6%
DOCSIS 1 - 1.1 - 2.0	1.9%	1.9%	1.9%	1.8%	1.3%	0.5%	0.4%	0.0%
Cable Other	0.9%	0.9%	0.9%	0.9%	0.7%	0.5%	0.3%	0.0%
Terrestrial Fixed Wireless	36.8%	36.5%	34.6%	28.9%	15.3%	6.8%	3.8%	0.9%
Satellite	100.0%	100.0%	100.0%	100.0%	21.7%	0.0%	0.0%	0.0%

Rural Areas

	Rural Pop Any Speed	Rural Pop > 768 K DL / 200 K UL	Rural Pop > 3 M DL / 768 K UL	Rural Pop > 10 M DL / 1 M UL	Rural Pop > 25 M DL / 3 M UL	Rural Pop > 50 M DL / 5 M UL	Rural Pop > 100 M DL / 10 M UL	Rural Pop >1 gbps DL
Technology								
Any Fixed Technology Except Satellite	93.5%	93.1%	90.2%	81.5%	65.2%	59.5%	36.3%	7.2%
Any Wired Technology	86.6%	85.5%	81.6%	73.1%	60.4%	58.3%	35.5%	7.0%
Any Wired Technology Except Cable	79.6%	77.8%	69.0%	49.4%	22.6%	19.5%	10.2%	5.3%
DSL	75.2%	73.4%	63.9%	42.0%	12.6%	10.0%	1.4%	0.0%
Asymmetric xDSL	49.8%	47.6%	37.5%	12.6%	3.5%	3.0%	0.0%	0.0%
ADSL2	42.8%	40.9%	34.7%	22.6%	0.6%	0.3%	0.0%	0.0%
VDSL	17.1%	17.0%	15.1%	13.5%	8.7%	6.8%	1.2%	0.0%
Symmetric xDSL	0.9%	0.9%	0.6%	0.5%	0.2%	0.1%	0.1%	0.0%
Copper	1.4%	1.4%	1.1%	0.9%	0.5%	0.4%	0.0%	0.0%
Fiber	12.7%	12.7%	12.6%	12.6%	11.3%	10.4%	9.0%	5.3%
Cable	53.8%	53.8%	53.6%	53.2%	51.1%	50.1%	29.4%	1.8%
DOCSIS 3.0	51.6%	51.6%	51.4%	51.3%	50.3%	49.6%	29.2%	1.8%
DOCSIS 1 - 1.1 - 2.0	2.4%	2.4%	2.3%	2.1%	0.9%	0.8%	0.5%	0.0%
Cable Other	1.5%	1.5%	1.4%	1.3%	0.8%	0.6%	0.3%	0.0%
Terrestrial Fixed Wireless	40.2%	39.7%	35.1%	25.5%	11.1%	3.0%	1.4%	0.1%
Satellite	100.0%	100.0%	100.0%	100.0%	17.0%	0.0%	0.0%	0.0%

Nonrural Areas

	Nonrural Pop Any Speed	Nonrural Pop > 768 K DL / 200 K UL	Nonrural Pop > 3 M DL / 768 K UL	Nonrural Pop > 10 M DL / 1 M UL	Nonrural Pop > 25 M DL / 3 M UL	Nonrural Pop > 50 M DL / 5 M UL	Nonrural Pop > 100 M DL / 10 M UL	Nonrural Pop >1 gbps DL
Technology								
Any Fixed Technology Except Satellite	99.4%	99.4%	99.2%	98.7%	97.4%	96.6%	76.9%	9.9%
Any Wired Technology	98.9%	98.9%	98.7%	98.0%	96.9%	96.3%	76.6%	8.8%
Any Wired Technology Except Cable	95.5%	95.3%	88.7%	74.9%	57.3%	45.0%	23.9%	6.1%
DSL	91.0%	90.7%	82.4%	62.0%	37.7%	26.4%	4.6%	0.1%
Asymmetric xDSL	70.6%	69.8%	54.8%	15.2%	3.9%	0.9%	0.0%	0.1%
ADSL2	31.5%	31.2%	25.5%	17.5%	1.9%	0.0%	0.0%	0.0%
VDSL	43.4%	43.4%	40.4%	38.3%	34.0%	25.5%	4.5%	0.0%
Symmetric xDSL	0.7%	0.7%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%
Copper	2.3%	2.3%	2.1%	2.0%	0.2%	0.2%	0.1%	0.0%
Fiber	25.7%	25.7%	25.7%	25.7%	25.0%	20.3%	19.7%	6.0%
Cable	96.3%	96.3%	96.3%	96.3%	95.7%	95.3%	74.0%	2.8%
DOCSIS 3.0	95.8%	95.8%	95.7%	95.7%	95.4%	95.1%	73.9%	2.8%
DOCSIS 1 - 1.1 - 2.0	1.8%	1.8%	1.8%	1.8%	1.3%	0.5%	0.4%	0.0%
Cable Other	0.8%	0.8%	0.8%	0.7%	0.5%	0.5%	0.3%	0.0%
Terrestrial Fixed Wireless	36.0%	35.7%	34.5%	29.7%	16.3%	7.7%	4.4%	1.1%
Satellite	100.0%	100.0%	100.0%	100.0%	22.9%	0.0%	0.0%	0.0%

Source: FCC, USTelecom, and Telcodata CensusNBM.com

Appendix D – Mid 2016 Broadband Availability by Population, Download Only

US Broadband Availability by Technology and Speed, Mid-Year 2016, Download Speeds Only (Percentage of Population)

All Areas

	Total Pop Any Speed	Total Pop >768 kbps DL	Total Pop >1.5 mbps DL	Total Pop >3 mbps DL	Total Pop >6 mbps DL	Total Pop >10 mbps DL	Total Pop >25 mbps DL	Total Pop >50 mbps DL	Total Pop >100 mbps DL	Total Pop >1 gbps DL
Technology										
Any Fixed Technology Except Satellite	98.3%	98.2%	97.9%	97.7%	96.9%	95.8%	91.7%	89.8%	77.5%	9.4%
Any Wired Technology	96.6%	96.5%	96.0%	95.6%	95.0%	93.8%	90.5%	89.3%	77.3%	8.5%
Any Wired Technology Except Cable	92.5%	92.4%	88.6%	85.6%	82.1%	71.6%	53.8%	40.7%	21.7%	6.0%
DSL	87.9%	87.9%	83.7%	79.7%	72.9%	60.1%	36.5%	23.8%	4.4%	0.1%
Asymmetric xDSL	66.6%	57.0%	56.3%	52.3%	44.3%	15.0%	4.5%	1.3%	0.5%	0.1%
ADSL2	33.7%	29.4%	29.0%	28.0%	26.0%	20.8%	6.0%	0.1%	0.0%	0.0%
VDSL	38.3%	38.0%	38.0%	35.6%	35.5%	33.5%	30.6%	22.5%	3.9%	0.0%
Symmetric xDSL	0.8%	0.7%	0.7%	0.3%	0.3%	0.2%	0.1%	0.0%	0.0%	0.0%
Copper	2.1%	2.1%	1.9%	1.9%	1.8%	1.8%	0.3%	0.2%	0.0%	0.0%
Fiber	23.2%	23.2%	23.2%	23.2%	23.2%	23.2%	22.4%	18.4%	17.8%	5.9%
Cable	88.1%	88.1%	88.1%	88.1%	88.0%	88.0%	87.3%	86.9%	74.7%	2.6%
DOCSIS 3.0	87.2%	87.2%	87.2%	87.2%	87.2%	87.2%	86.8%	86.5%	74.5%	2.6%
DOCSIS 1 - 1.1 - 2.0	1.9%	1.9%	1.9%	1.9%	1.9%	1.8%	1.3%	0.5%	0.4%	0.0%
Cable Other	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.7%	0.7%	0.4%	0.0%
Terrestrial Fixed Wireless	36.8%	36.5%	34.8%	34.6%	31.0%	28.9%	15.3%	6.8%	3.8%	0.9%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	21.7%	0.0%	0.0%	0.0%

Rural Areas

	Any Speed	>768 kbps DL	>1.5 mbps DL	>3 mbps DL	>6 mbps DL	>10 mbps DL	>25 mbps DL	>50 mbps DL	>100 mbps DL	>1 gbps DL
Technology										
Any Fixed Technology Except Satellite	93.5%	93.4%	91.9%	91.0%	87.7%	83.5%	67.5%	60.4%	45.7%	7.2%
Any Wired Technology	86.6%	86.4%	84.1%	82.7%	80.2%	75.7%	62.9%	59.1%	45.1%	7.0%
Any Wired Technology Except Cable	79.6%	79.4%	73.9%	70.7%	65.2%	54.6%	27.5%	20.0%	11.4%	5.3%
DSL	75.2%	75.0%	69.2%	65.7%	59.0%	47.6%	17.8%	10.2%	2.4%	0.0%
Asymmetric xDSL	49.8%	44.6%	42.7%	39.3%	32.1%	13.3%	4.6%	3.0%	1.2%	0.0%
ADSL2	42.8%	38.6%	37.0%	36.0%	34.1%	28.7%	5.6%	0.3%	0.0%	0.0%
VDSL	17.1%	16.8%	16.8%	15.2%	15.1%	13.6%	10.4%	7.0%	1.2%	0.0%
Symmetric xDSL	0.9%	0.9%	0.8%	0.6%	0.5%	0.5%	0.2%	0.1%	0.1%	0.0%
Copper	1.4%	1.4%	1.1%	1.1%	1.1%	0.9%	0.5%	0.4%	0.0%	0.0%
Fiber	12.7%	12.7%	12.7%	12.6%	12.6%	12.6%	11.4%	10.6%	9.2%	5.3%
Cable	53.8%	53.8%	53.8%	53.7%	53.4%	53.2%	51.6%	50.8%	39.5%	1.8%
DOCSIS 3.0	51.6%	51.6%	51.6%	51.6%	51.4%	51.3%	50.6%	50.0%	39.1%	1.8%
DOCSIS 1 - 1.1 - 2.0	2.4%	2.4%	2.4%	2.4%	2.2%	2.1%	0.9%	0.8%	0.5%	0.0%
Cable Other	1.5%	1.5%	1.4%	1.4%	1.4%	1.3%	1.0%	0.8%	0.5%	0.0%
Terrestrial Fixed Wireless	40.2%	39.7%	35.9%	35.3%	29.3%	25.5%	11.2%	3.2%	1.4%	0.1%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	17.0%	0.0%	0.0%	0.0%

Nonrural Areas

	Any Speed	>768 kbps DL	>1.5 mbps DL	>3 mbps DL	>6 mbps DL	>10 mbps DL	>25 mbps DL	>50 mbps DL	>100 mbps DL	>1 gbps DL
Technology										
Any Fixed Technology Except Satellite	99.4%	99.4%	99.3%	99.3%	99.1%	98.8%	97.5%	96.8%	85.1%	9.9%
Any Wired Technology	98.9%	98.9%	98.8%	98.7%	98.6%	98.1%	97.1%	96.5%	84.9%	8.8%
Any Wired Technology Except Cable	95.5%	95.5%	92.1%	89.2%	86.1%	75.7%	60.0%	45.7%	24.2%	6.1%
DSL	91.0%	90.9%	87.1%	83.0%	76.2%	63.0%	40.9%	27.1%	4.8%	0.1%
Asymmetric xDSL	70.6%	59.9%	59.6%	55.4%	47.2%	15.4%	4.4%	0.9%	0.3%	0.1%
ADSL2	31.5%	27.3%	27.0%	26.1%	24.0%	18.9%	6.1%	0.1%	0.0%	0.0%
VDSL	43.4%	43.0%	43.0%	40.5%	40.4%	38.3%	35.5%	26.2%	4.5%	0.0%
Symmetric xDSL	0.7%	0.7%	0.7%	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%
Copper	2.3%	2.3%	2.1%	2.1%	2.0%	2.0%	0.2%	0.2%	0.1%	0.0%
Fiber	25.7%	25.7%	25.7%	25.7%	25.7%	25.7%	25.1%	20.3%	19.8%	6.0%
Cable	96.3%	96.3%	96.3%	96.3%	96.3%	96.3%	95.8%	95.6%	83.1%	2.8%
DOCSIS 3.0	95.8%	95.8%	95.7%	95.7%	95.7%	95.7%	95.5%	95.2%	83.0%	2.8%
DOCSIS 1 - 1.1 - 2.0	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.3%	0.5%	0.4%	0.0%
Cable Other	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.6%	0.4%	0.0%
Terrestrial Fixed Wireless	36.0%	35.7%	34.6%	34.5%	31.4%	29.7%	16.3%	7.7%	4.4%	1.1%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	22.9%	0.0%	0.0%	0.0%

Source: FCC, USTelecom, and Telcodata CensusNBM.com

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