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	)	

2018 BROADBAND DEPLOYMENT REPORT

Adopted: February 2, 2018 **Released: February 2, 2018**

By the Commission: Chairman Pai and Commissioners O'Rielly and Carr issuing separate statements; Commissioners Clyburn and Rosenworcel dissenting and issuing separate statements.

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I. INTRODUCTION

1. Americans turn to advanced telecommunications capability for every facet of daily life, using both fixed and mobile broadband services to communicate and to access the Internet. Fixed and mobile broadband services provide Americans, especially those in rural and remote areas of the country, access to numerous employment, education, entertainment, and health care opportunities. Moreover, American consumers today expect broadband at home, at work, and while on the go.

2. Recognizing the importance of high-speed broadband Internet access, Congress tasked the Commission with "encourag[ing] the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans."[1] To ensure the Commission took this obligation seriously, Congress required the Commission to report on our progress each year.[2]

3. The last time the Commission issued a broadband deployment report in 2016, it found "that advanced telecommunications capability is not being deployed to all Americans in a reasonable and timely fashion"[3]—in other words, that Commission policy was not adequately "encourag[ing]" the deployment of advanced telecommunications capability.

4. With this report we can confirm that was true: In the wake of the 2015 *Title II Order*,[4] the deployment of advanced telecommunications capability slowed dramatically. From 2012 to 2014, the two years preceding the *Title II Order*, fixed terrestrial broadband Internet access was deployed to 29.9 million people who never had it before, including 1 million people on Tribal lands. In the following two years, new deployments dropped 55 percent, reaching only 13.5 million people, including only 330,000 people on Tribal lands. From 2012 to 2014, mobile LTE broadband was newly deployed to 34.2 million people, including 21.5 million rural Americans. In the following two years, new mobile deployments dropped 83 percent, reaching only 5.8 million more Americans, including only 2.3 million more rural Americans. And from 2012 to 2014, the number of Americans without access to both fixed terrestrial broadband and mobile broadband fell by more than half—from 72.1 million to 34.5 million. But the pace was nearly three times slower after the adoption of the 2015 *Title II Order*, with only 13.9 million Americans newly getting access to both over the next two years.

5. That's why over the past year, the Commission has followed the congressional command and taken repeated "action[s] to accelerate deployment of such capability by removing barriers to

[1] 47 U.S.C. § 1302(a). Congress also trusted this responsibility to state commissions. *See id.*

[2] 47 U.S.C. § 1302(b).

[3] *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*, GN Docket No. 15-191, 2016 Broadband Progress Report, 31 FCC Rcd 699, 701, para. 2 (2016) (*2016 Report*).

[4] *Protecting and Promoting the Open Internet*, WC Docket No. 14-28, Report and Order on Remand, Declaratory Ruling, and Order, 30 FCC Rcd 5601 (2015) (*Title II Order*).

infrastructure investment and by promoting competition in the telecommunications market."[5] Most notably since the last report, the Commission has taken concrete actions to reduce regulatory barriers to the deployment of wireline and wireless infrastructure, constituted a Broadband Deployment Advisory Committee to assist in these efforts, reformed the legacy high-cost universal service program to ensure accountability and introduce opportunities for new entrants through reverse auctions, modernized our rules for business data services to facilitate facilities-based competition, authorized new uses of wireless spectrum both terrestrially and in the sky, and repealed the heavy-handed regulations of the *Title II Order* by returning to a light-touch approach to broadband Internet access.

6. With these changes in policy to accelerate deployment, we believe that the Commission is now encouraging the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans. That finding, however, does not undermine our continued commitment to closing the digital divide. Far too many Americans remain unable to access high-speed broadband Internet access, and we have much work to do if we are going to continue to encourage the deployment of broadband to all Americans, including those in rural areas, those on Tribal lands, and those in schools and classrooms.

II. BACKGROUND

7. Section 706(b) requires the Commission to annually "initiate a notice of inquiry concerning the availability of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms)."[6] In conducting this inquiry, the Commission must "determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."[7] If that determination is negative, the Commission "shall take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market."[8]

8. On August 8, 2017, the Commission released the *Thirteenth Section 706 Report Notice of Inquiry* (*Notice*),[9] seeking comment on how a range of factors may affect the deployment and availability of advanced telecommunications capability, and whether and how to incorporate those factors into our section 706(b) analysis for both fixed and mobile services. We note that although the Commission did not issue a report in response to the *2016 Notice of Inquiry*,[10] in light of the changes in the industry, and recent Commission actions to encourage broadband deployment, the *Notice* restarted the inquiry afresh, and included updated data and questions focused on the current progress of deployment of advanced telecommunications capability.

[5] 47 U.S.C. § 1302(b).

[6] *Id.*

[7] *Id.*

[8] *Id.*

[9] *Notice*, 32 FCC Rcd 7029.

[10] *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*, Twelfth Broadband Progress Notice of Inquiry, GN Docket No. 16-245, 31 FCC Rcd 9140 (2016) (*2016 Notice of Inquiry*).

III. STATUTORY FRAMEWORK FOR SECTION 706 INQUIRY

A. Evaluating Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion

9. Section 706 requires that the Commission's annual inquiry "determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."[11] Below, we set out how the Commission will determine if deployment is reasonable and timely, namely by analyzing the progress made in deployment. We also describe how the term "advanced telecommunications capability" is defined for the purposes of this Report, including setting out our benchmarks and metrics to analyze both fixed and mobile service.

1. Progress in Deployment

10. Consistent with the approach discussed in the *Notice*, we will measure whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion by evaluating progress—specifically, comparing deployment in the present year to deployment in previous years. Furthermore, we will analyze progress made with respect to both fixed and mobile broadband services, and consider the totality of the evidence in reaching our conclusion under section 706.

11. We find that analyzing progress to determine whether deployment is occurring in a reasonable and timely fashion is the approach that is most consistent with the language of section 706, as the analysis of such progress enables the Commission to determine whether advanced telecommunications capability "is being deployed" in the manner that section 706 requires.[12] The use of the present progressive tense—"is being deployed"—as well as the language requiring an evaluation of whether that deployment is "reasonable and timely" indicates that Congress intended that the Commission evaluate the current state of deployment to all Americans, not a rigid requirement that each and every American be served *at this moment*.[13] In addition to adhering to the plain text of section 706, our approach also finds support in the record[14] and in our precedent.[15]

12. We disagree with commenters who claim that section 706 requires us to find universal availability of advanced telecommunications capability before reaching a positive determination.[16]

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[11] 47 U.S.C. § 1302(b).

[12] *Id*.

[13] *Id*. (emphasis added).

[14] *See, e.g.*, ADTRAN Comments at 11-12; NCTA Comments at 4; WISPA Comments at 11-12; Fiber Broadband Reply at 2-3.

[15] *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, GN Docket No. 07-45, Report, 23 FCC Rcd 9615, 9616, para. 1 (2008); *Availability of Advanced Telecommunications Capability in the United States*, GN Docket No. 04-54, Report, 19 FCC Rcd 20540, 20547 (2004); *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*, CC Docket No. 98-146, Report, 17 FCC Rcd 2844, 2845, para. 1 (2002); *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*, CC Docket No. 98-146, Report, 15 FCC Rcd 20913, 20918, 20995-21003, paras. 8, 217-43 (2000); *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*, CC Docket No. 98-146, Report, 14 FCC Rcd 2398, 2405, para. 16 (1999).

[16] *See* Benton Foundation Comments at 7; CWA Comments at 15-16; ITTA Comments at 9.

Although recent reports have taken this position,[17] the Commission has recognized that such an interpretation "departs" from our historical interpretation of the statute,[18] and we now find it incompatible with section 706. As explained above, the statute requires that we determine whether advanced telecommunications capability "*is being deployed* to all Americans"—not whether it has already been deployed to all Americans. Furthermore, reading section 706(b) to require universal availability as a prerequisite for a positive finding would disregard the statute's "reasonable and timely" language. If Congress' charge to the Commission in section 706 was only to determine whether every American had access to advanced telecommunications capability, there would have been no need for Congress to instruct the Commission to determine whether deployment was occurring "to all Americans *in a reasonable and timely fashion*."[19]

13. Nevertheless, we agree with commenters that, absent universal deployment, we must continue to take concrete steps toward closing the digital divide. As WISPA notes, "there continues to be a significant shortfall in achieving universal access in all parts of the nation to advanced telecommunications, which dictates that the Commission should continue to take affirmative steps toward correcting this imbalance."[20] A finding that deployment of advanced telecommunications capability is reasonable and timely in no way suggests that we should let up in our efforts to foster greater deployment. Section 706(a) mandates that we promote the deployment of advanced telecommunications capability in general,[21] and we believe that continued forward progress toward universal deployment is imperative if all Americans are to enjoy the full promise of our economy. We therefore remain committed to ensuring that all Americans can share in the benefits of access to advanced telecommunications capability, and we will continue to monitor progress in the availability of such services.

2. Defining Advanced Telecommunications Capability

a. Evaluating Fixed and Mobile Services

14. This Report continues the practice of recent past reports of examining fixed and mobile broadband deployment.[22] Furthermore, we consider both fixed and mobile services to be capable of meeting the definition of "advanced telecommunications capability" under section 706. This finding is consistent with both the language of the statute, which defines advanced telecommunications capability "without regard to any transmission media or technology,"[23] and the record in this proceeding.[24]

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[17] *See, e.g.*, *2016 Report*, 31 FCC Rcd at 701, para. 2; *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*, GN Docket No. 14-126, 2015 Broadband Progress Report and Notice of Inquiry on Immediate Action to Accelerate Deployment, 30 FCC Rcd 1375, 1378, para. 4 (2015) (*2015 Report*).

[18] *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act; A National Broadband Plan for Our Future*, GN Docket Nos. 09-137, 09-51, Sixth Broadband Deployment Report, 25 FCC Rcd 9556, 9558, para. 2 (2010) (*2010 Report*).

[19] 47 U.S.C. § 1302(b) (emphasis added).

[20] WISPA Comments at 12; *see also* Benton Comments at 7; CWA Comments at 15-16 ("There is a persistent and troubling digital divide in our nation . . . foreclosing economic opportunity and access to the vast information available on the Internet for too many people."); ITTA Comments at 9.

[21] 47 U.S.C. § 1302(a).

[22] *See 2016 Report*, 31 FCC Rcd at 734-35, paras. 82-84; *2015 Report*, 30 FCC Rcd at 1442-46, paras. 112-21.

[23] 47 U.S.C. § 1302(d)(1).

Accordingly, we consider whether advanced telecommunications capability is being deployed to all Americans by examining the deployment of (1) fixed service alone, (2) mobile service alone, (3) fixed and mobile service together, and (4) fixed or mobile service.

15. First, as in past reports, we find that certain fixed services provide "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology,"[25] and, as such, may be considered "advanced telecommunications capability" pursuant to section 706 so long as they meet the Commission's current speed benchmark of 25 Mbps download/3 Mbps upload (25 Mbps/3 Mbps). Americans continue to rely on fixed broadband connections and require greater bandwidth at home, to the point where some providers have begun deploying fixed gigabit connections in certain areas.[26]

16. Second, we continue "the common-sense step of including mobile broadband services in our assessment of advanced telecommunications capability."[27] Mobile broadband connections increasingly enable users to originate and receive high-quality voice, data, graphics, and video.[28] Indeed, as mobile devices and applications become more and more sophisticated, Americans are increasingly reliant "on mobile devices as indispensable tools of daily life" and the total number of mobile wireless connections continues to rise.[29] The use of smartphones has increased significantly since 2012,[30] with applications that once were confined to fixed use now commonly available for mobile devices.[31] Average

(Continued from previous page)

[24] *See, e.g.*, ADTRAN Comments at 4-5; CWA Comments at 13; INCOMPAS Comments at 7; MMTC Comments at 5; NCBIO Comments at 1; NCTA Comments at 7; NTCA Comments at 5; NYC Comments at 2; UST Comments at 5; AT&T Reply at 4.

[25] 47 U.S.C. § 1302(d)(1); *see also 2016 Report*, 31 FCC Rcd at 708-10, paras. 20-24; *2015 Report*, 30 FCC Rcd at 1379-80, para. 9 (2015).

[26] *Notice*, 32 FCC Rcd at 7032, para. 8. In addition, satellite and fixed wireless providers are continuing to increase their offerings of high-speed services. ViaSat Comments at 2; Hughes Comments at 2; *Notice*, 32 FCC Rcd at 7032, para. 8.

[27] *2016 Report*, 31 FCC Rcd at 701, para. 2.

[28] *See e.g.*, Microsoft Comments at 11 (noting that mobile broadband is "becoming increasingly capable of delivering high-quality video, data, voice, and other broadband applications"); USTelecom at 10-11; AT&T Reply at 4-5; *see also 20th Mobile Competition Report*, 32 FCC Rcd at 8980, 9012-13, 9031, paras. 20, 65, 85.

[29] CTIA estimated that the total number of mobile wireless subscriber connections grew from approximately 355 million at year-end 2014 to approximately 396 million at year-end 2016. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Twentieth Report, 32 FCC Rcd at 8968, 8977-78, para. 19, Chart II.B.1 (*20th Mobile Competition Report*).

[30] *See Notice*, 32 FCC Rcd at 7031, para. 6. In 2016, approximately 81 percent of American mobile subscribers used smartphones, up from approximately 42 percent in 2011. *20th Mobile Competition Report*, 32 FCC Rcd at 9011-12, para. 63. About 90 percent of new mobile phones sold in 2016 were smartphones, compared to approximately 74 percent in 2013. UBS US Wireless 411, Feb. 22, 2017, at 16, Figure 30. The average American checks their smartphone approximately 47 times a day. Deloitte, *2017 Global Mobile Consumer Survey: US Edition* at 2 (2017), https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/global-mobile-consumer-survey-us-edition.html.

[31] *Notice*, 32 FCC Rcd at 7031-32, para. 7. Many consumers today can send and receive high-quality pictures, stream video, and use ride-hailing apps or exercise apps using their mobile devices, and consumers are increasingly using smartphones for getting directions and real-time navigation, listening to music, or participating in video calls, among other uses. Lee Rainie & Andrew Perrin, *10 Facts About Smartphones as the iPhone Turns 10*, Pew Research Center (June 28, 2017), http://www.pewresearch.org/fact-tank/2017/06/28/10-facts-about-smartphones/; Monica Anderson, *More Americans Using Smartphones For Getting Directions, Streaming TV*, Pew Research (Jan. 29, 2016), http://www.pewresearch.org/fact-tank/2016/01/29/us-smartphone-use/.

data use has grown from less than 1 GB per month in 2012 to approximately 4 GB per month in 2016.[32] And, in response to this growing demand for data, mobile wireless providers continue to expand and improve their networks.[33]

17. Given that the record in this proceeding shows that some consumers choose to subscribe to either fixed or mobile broadband Internet access service to the exclusion of the other, we find that any analysis that did not include both services would be incomplete and flawed.[34] As the Commission cited in the *Notice*, while the percentage of Americans subscribing to fixed broadband in 2016 reached an all-time high of approximately 73 percent,[35] approximately 13 percent of Americans across all demographic groups did not have traditional home broadband service but relied solely on smartphones for home internet access.[36]

18. At the same time, we disagree with those that argue that mobile services are currently full substitutes for fixed service.[37] Both fixed and mobile services can enable access to "information, entertainment, [and] employment options,"[38] but there are salient differences between the two technologies. Beyond the most obvious distinction that mobile services permit their users mobility, there are clear variations in consumer preferences and demands for fixed and mobile services.[39] Each clearly provides capabilities that satisfy the statutory definition of advanced telecommunications capability, and are important services that provide different functionalities, tailored to serve different consumer needs.

[32] *20th Mobile Competition Report*, 32 FCC Rcd at 8980, para. 20. CTIA reported wireless data volumes totaled 13.7 trillion MB in 2016, an increase of approximately 42 percent from 9.6 trillion MB in 2015, and an increase of approximately 238 percent from the 4.1 trillion MB reported in 2014. CTIA, Wireless Industry Indices Year-End 2016, at 96; *see also* CTIA, *Annual Year-End 2016 Top-Line Survey Results* at 3, https://www.ctia.org/industry-data/ctia-annual-wireless-industry-survey.

[33] Close to 100 percent of the U.S. population resides in an area with LTE coverage from at least one service provider, and approximately 89 percent of the U.S. population resides in an area with LTE coverage from at least four service providers. *20th Mobile Competition Report*, 32 FCC Rcd at 9022-23, para. 77, Chart III.D.5.

[34] *See* NCTA Comments at 8-9; FSF Comments at 10-11.

[35] *Notice*, 32 FCC Rcd at 7033, para. 9.

[36] *Id*. at 7032, para. 9. *But see* PK AH et al. Comments at 22 (noting that consumers who can afford to buy both fixed and wireless broadband services generally do, but consumers who are forced to choose between these services for economic reasons prefer mobile options).

[37] *See* FSF Comments at 10-11; USTelecom Comments at 6-7; Verizon Comments at 12; *see also* MMTC Comments at 5 (arguing mobile broadband is both a complement to *and* a substitute for fixed broadband). Other commenters contend that mobile and fixed broadband are not substitutes. *See, e.g.*, CWA Comments at 3; INCOMPAS Comments at 8-9 and Attach. at 12-16; Mimosa Comments at 2-3; NTCA Comments at 3; NYC Comments at 2; PK AH et al. Comments at 9; *see also* ILSR & NCC Comments at 1; Microsoft Comments at 7; OTI Comments at 4; PK AH et al. Comments at 20; WISPA Comments at 3 (arguing fixed and mobile broadband are compliments).

[38] USTelecom Comments at 2.

[39] Recognizing these inherent differences between the services, the Commission determined in its *2016 Report* that because fixed and mobile services were tailored to serve different consumer needs, they could not at that time be considered "functional substitutes." *See 2016 Report*, 31 FCC Rcd at 710, para. 24. As a result, the Commission concluded that advanced telecommunications capability should be deemed deployed only in areas where consumers had access to both fixed and mobile services. *See id*. In reaching this conclusion, the Commission used the notion of functional substitutability as a means to define advanced telecommunications capability, rather than determining whether fixed or mobile services actually meet section 706's definition of advanced telecommunications capability, i.e., whether each service enables "users to originate and receive high-quality voice, data, graphics and video telecommunications using any technology." 47 U.S.C. §1302(d)(1). Although fixed and mobile services offer different capabilities and thus serve distinct consumer needs, we find that both types of service can indeed provide capabilities that satisfy the statutory definition of advanced telecommunications capability under section 706.

As such, we find it appropriate to examine the deployment of fixed and mobile services, both individually and in conjunction with one another.

19. Finally, the Commission's historical focus on both fixed and mobile broadband services supports our consideration of those services in this Report. For years, the Commission has recognized the importance of deploying both fixed and mobile technologies. In modernizing the universal service high-cost program and the intercarrier compensation system, for example, the Commission focused its support on networks capable of providing voice and broadband services in rural areas. In particular, the Commission reformed those mechanisms to increase deployment of both fixed and mobile broadband services in rural areas, recognizing the clear benefit for long-term economic health, education, health care, and civic participation.[40]

b. Benchmarks and Metrics

20. Establishing benchmarks for advanced telecommunications capability is a helpful way for the Commission to chart progress in deployment over time. In our view, there is great benefit in charting progress against a particular benchmark (e.g., 25 Mbps download/3 Mbps upload) over time so that we can see how deployment is changing. As long as the benchmark continues to accurately define a service that satisfies the section 706(d)(1) definition of advanced telecommunications capability, we believe it is beneficial to report on the progress against that benchmark. If the Commission decides to set new benchmark(s) for defining advanced telecommunications capability in the future, we believe there is still value in continuing to track progress against previous benchmarks since meaningfully gauging progress necessarily requires doing so against an established standard.[41] Over time, we expect the section 706 report could show deployment progress year after year against various past and current benchmarks as a way to provide a more fulsome representation of the situation.[42] For this reason, we show in this Report progress not simply against our current benchmark but also against others.

(i) Fixed Services

21. We find that the current speed benchmark of 25 Mbps/3 Mbps remains an appropriate measure by which to assess whether a fixed service provides advanced telecommunications capability. This finding follows the proposal in the *Notice*, and there is significant support in the record for maintaining the current 25 Mbps/3 Mbps speed benchmark for fixed services.[43] While some commenters

[40] *See Connect America Fund et al.*, WC Docket No. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17667-68, para. 3 (2011) (*USC/ICC Transformation Order*).

[41] While we are not lowering any benchmarks as some commenters suggest, we agree with the sentiment that it is important to not move the benchmark and obscure the facts. *See, e.g.*, Comment of Jeff Darrow ("Moving the goal posts so that it *appears* we are making progress is no way to achieve any sort of success.").

[42] The improved quality of the Form 477 data, particularly for fixed deployment, greatly facilitates our ability to track deployment in this way.

[43] *See, e.g.*, ADTRAN Comments at 5-7; Consumer Groups Comments at 6; CO SBO Comments at 3; CWA Comments at 13-14, 17; Free State Foundation Comments at 1-3, 9; ITTA Comments at 3-6; John Summer Comments at 1; Justin McMurdie Comments at 1; NTCA Comments at 11-12; NYC Comments at 2; Robert Gavigan Comments at 1; USTelecom at 7-8; WISPA Comments at 7-8; MATI Reply at 4-5; *see also* NDIA Comments at 3 (asserting that "the Commission should not reduce or dilute the speed benchmarks which it uses as indicators of the availability of fixed advanced telecommunications capability to local areas"); New Networks Reply at 2 (stating that "lowering the speed increases the number of broadband users" and "lowers the bar for the companies to deploy wireless in rural areas"); Nez Perce Tribe Comment at 1 (stating that they do not support lowering the current benchmark as they are concerned with Tribal lands receiving worse service); PK AH et. al Comments at 19 (maintaining that lowering the broadband standards would be taking steps backwards toward broadband deployment); Senator Al Franken et al. Comments at 1-2 (arguing that lowering the current standard of 25 Mbps/3 Mbps would not be in line with the Commission's mission of ensuring advanced telecommunications capability is deployed to all); William Gammans Comments at 1 (stating that he does not support lowering the fixed benchmark as it would make telecommuting impossible).

support increasing the 25 Mbps/3 Mbps fixed speed benchmark,[44] we conclude that fixed services with speeds of 25 Mbps/3 Mbps meet the statutory definition of what constitutes advanced telecommunications capability; that is, such services "enable[] users to originate and receive high-quality voice, data, graphics, and video telecommunications."[45] Record evidence indicates that the 25 Mbps/3 Mbps benchmark reflects consumer demand for high-speed broadband services.[46] For example, WISPA states that the current speed benchmark of 25 Mbps/3 Mbps enables Americans "to watch Netflix, play video games and browse online without interruption even if a couple of devices are on the same connection."[47] Moreover, ADTRAN notes that the 25 Mbps/3 Mbps allows for consumers to use 4K TV.[48] ITTA submits that the 25 Mbps/3 Mbps benchmark continues to ensure that a "household can access a range of bandwidth intensive services, including HD video streaming, simultaneously over multiple devices."[49]

22. Furthermore, we find that current consumer usage trends support maintaining the 25 Mbps/3 Mbps fixed speed benchmark. As the *Notice* observed, the most recent Internet Access Service Report finds that 59 percent of residential fixed connections equal or exceed such speed.[50] Thus, subscribership at speeds of at least 25 Mbps/3 Mbps is widespread, but there are still significant numbers of American households that do not subscribe to these services,[51] or in some cases, lack access to these services altogether.

23. We disagree with commenters who argue the current benchmark does not reflect the current market given that some consumers have access to speeds up to 1 Gbps and that demand for robust networks will likely continue to increase in the future.[52] The record demonstrates that our current 25 Mbps/3 Mbps fixed speed benchmark reflects current usage patterns and demand, and provides consumers with the ability to receive high quality, advanced services, including HD video streaming and video calling over multiple devices.[53] Moreover, record evidence suggests that only 18 percent of the population has access to speeds of 1 Gbps,[54] and the Commission's Form 477 data show only 11 percent of Americans have access to such services.[55] And of this small percentage of Americans that have access to 1 Gbps service, Form 477 subscription data indicates that only 3.9 percent are actually subscribing. Although we agree with INCOMPAS and NEMA that our fixed speed benchmark must keep pace with

[44] *See* Garcia Comments at 1; ILSR & NCC Comments at 7; INCOMPAS Comments at 19-20; Microsoft Comments at 2-5; NEMA Comments at 3; New America's Open Technology Institute, Comments, GN Docket No. 16-245 at 3-5 (Sept. 6, 2016) (re-filed in GN Docket 17-199 (Sept. 21, 2017)) (2016 OTI Comments); OTI Reply at 18-19.

[45] 47 U.S.C. § 1302(d)(1).

[46] *See* ADTRAN Comments at 6-7; ITTA Comments at 3-6; *see also* FSF Comments at 5-7 (presenting data showing growth in the number of providers offering 25 Mbps/3 Mbps service or higher, as well as growth in the number of households subscribing to at least 25 Mbps/3 Mbps service).

[47] *See* WISPA Comments at 7; *see also* CO SBO Comments at 3 (maintaining that the current benchmark allows for use of current applications).

[48] *See* ADTRAN Comments at 6-7.

[49] *See* ITTA Comments at 4.

[50] *Notice*, 32 FCC Rcd at 7034, para. 14.

[51] *Accord* ADTRAN Comments at 5-6.

[52] *See* INCOMPAS Comments at 18-20; NEMA Comments at 3. *But see* ADTRAN Comments at 7 (stating that the Commission should "applaud" providers with service up to 1 gigabit, but it is not "an excuse to raise the benchmark").

[53] *See* ADTRAN Comments 6-7; CO SBO Comments at 3; ITTA Comments at 3-6; WISPA Comments at 7.

[54] *See* Free State Foundation Comments at 5-6; NCTA Comments at 10.

[55] *See* FCC, Fixed Broadband Deployment Data from FCC Form 477, Data as of December 31, 2016, https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477 (last visited Jan. 17, 2018).

consumer usage, demand, and technology,[56] the definition of advanced telecommunications capability in section 706 nowhere suggests that "advanced" necessarily means the highest quality service possible.[57] Using standards that exceed investment and deployment capabilities on any large scale creates a never ending and unachievable goal. We do not believe that Congress intended the Commission's annual progress reports to function as this kind of self-defeating exercise. Rather, we employ a benchmark that satisfies the statutory requirement to "enable[] users to originate and receive high-quality voice, data, graphics and video telecommunications."[58]

24. Furthermore, we disagree with commenters who argue that the current fixed upload benchmark is too low.[59] OTI argues that we should increase our upload benchmark to 20 Mbps, which would be paired with a 20 Mbps download benchmark in order to have a "symmetrical download/upload throughout."[60] We find that 3 Mbps of upload speed remains an appropriate metric for advanced telecommunications capability. The record demonstrates that fixed services offering upload speeds of 3 Mbps continue to support upload-intensive applications such as High Definition (HD) video calling, Virtual Private Network (VPN) platforms, telemedicine, and long-distance learning applications.[61]

25. We also disagree with NCTA that use of a single fixed speed benchmark is arbitrary.[62] A single fixed speed benchmark provides a useful and administrable way of conducting our inquiry.[63] However, we agree with commenters, including NCTA, that it would be helpful to use our annual report to show progress at multiple speed thresholds,[64] and we do so below.[65] We agree that providing such additional data is helpful to better understand consumer usage trends and marketplace developments.[66]

26. The *Notice* inquired about "establishing a consistent, objective framework using predictable, reliable, and regularly-released public data from sources on which we can rely to evaluate our benchmarks."[67] We are not convinced, however, that such a methodology is currently workable. Several commenters urge us to maintain flexibility over adoption of a framework that establishes a hard and fast

[56] *See* INCOMPAS Comments at 18-19; NEMA Comments at 3.

[57] 47 U.S.C. § 1302(d)(1).

[58] *Id.*; *see also* Free State Foundation Comments at 8 (stating that speed benchmarks should support consumers' everyday use of the Internet, "[not] minimally available and minimally adopted" services or applications).

[59] *See* ILSR & NCC Comments at 7-8; 2016 OTI Comments at 8-10.

[60] *See* 2016 OTI Comments at 8-10.

[61] *See* ITTA Comments at 4-5; WISPA Comments at 7-8.

[62] *See* NCTA Comments at 5.

[63] *See* ITTA Comments at 5. At the same time, we do not rule out the possibility that multiple benchmarks may serve a purpose for future inquiries.

[64] *See* Deere Comments at 4-6; NCTA Comments at 5-6; Comcast Reply at 11; Letter from Tom Struble, Technology Policy Manager, R Street Institute, and Joe Kane, Technology Policy Associate, R Street Institute, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 17-84, WT Docket No. 17-79, GN Docket No. 17-199, at 2-3 (filed Oct. 6, 2017) (R Street *Ex Parte*); SHLB Reply at 4-5; *see also* USTelecom Comments at 8-9 (asserting that a single benchmark does not reflect broadband deployment progress, but they will "conditionally support[] . . . maintain[ing] speed thresholds . . . [while] taking into account consumer needs and demand[s] . . . ."). *But see* City of Boston (Local Authorities) Reply at 24 (arguing that incorporating multiple speed tiers into our Inquiry is not appropriate).

[65] *See infra* Section IV.B.4, Table 4.

[66] *See* USTelecom Comments at 8-9.

[67] *Notice*, 32 FCC Rcd at 7036, para. 23.

rule.[68] Commenters advocating a framework in most cases fail to provide a methodology or reliable data sources to implement their general ideas.[69] The only data-based approach suggested in the record would use Form 477 subscription data to determine the fixed speed benchmark.[70] Although this approach could have merit, we decline to adopt it at this time, for instance, because it is unclear how this framework would be applied to mobile services given that our Form 477 mobile subscription data collection is currently not sufficiently granular to make a meaningful evaluation of mobile service subscribership.[71]

(ii) Mobile Services

27. Certain mobile services provide "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics and video telecommunications using any technology."[72] In this Report, we evaluate mobile deployment holistically and use various data points to assess the extent to which American consumers have access to advanced telecommunications capability under section 706. While we acknowledge the potential benefits of a single speed benchmark for mobile service, we find–as was the case in the last report–that adoption of a single mobile benchmark is currently unworkable given the inherent variability of actual mobile speeds and our available data.[73] Instead, we will use 4G LTE as our starting point and will present LTE coverage data based on the Form 477 minimum advertised speeds of 5 Mbps/1 Mbps. However we are not asserting that 5 Mbps/1 Mbps is a mobile advanced telecommunications capability benchmark. That's why these results are then supplemented with Ookla's actual speed test data at a median speed of 10 Mbps/3 Mbps or higher.[74] We find that this approach takes into account certain limitations of the current Form 477 mobile data, while helping us better understand the extent to which American consumers today are receiving speeds higher than 5 Mbps/1 Mbps such that, overall, we can evaluate whether LTE deployment in general is reaching speeds that would enable advanced telecommunications capability for an increasing percentage of American consumers.

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[68] *See* USTelecom Comments at 20; ADTRAN Comments at 9; Gabriel Garcia Comments at 3; *see also* Free State Foundation Comments at 8 (submitting that the Commission's Section 706 inquiries should present clear standards in advance and should only alter those standards with ample advanced notice on an incremental basis).

[69] *See, e.g.*, NRECA Comments at 8 (suggesting a framework that sets the benchmark based upon the speed offerings available in the top 25 or 50 urban markets); CPUC at 6 (suggesting the FCC use CPUC's current testing methodology, which analyzes speed along with quality and reliability metrics tracked by CPUC); NCTA at 6 (suggesting the FCC should move away from focusing on a single speed threshold and instead track progress at multiple speed thresholds); Fiber Broadband Reply at 3-5 (agreeing "in principle" with NCTA's multi-speed framework, but submitting that the Commission should examine progress in the deployment of all-fiber networks); Deere at 5 (contending the current approach is too narrow, and the FCC should consider an alternative framework that does "not tie speed benchmarks to technologies, but rather [] examine[s] the uses of the different forms of broadband services").

[70] *See* Free State Foundation Comments at 8 (recommending a methodology that sets the benchmark based on what a majority of consumers are subscribing to); *see also* ADTRAN Comments at 9 (suggesting that instead of making assumptions about demand, the Commission should look to "services/applications that customers are accessing, as well as the broadband speeds customers are subscribing to").

[71] *See Modernizing the FCC Form 477 Data Program*, WC Docket No. 11-10, Further Notice of Proposed Rulemaking, 32 FCC Rcd 6329, 6337, paras. 26-27 (2017) (*Form 477 Modernization FNPRM*). The *Form 477 Modernization FNPRM* sought comment on ways to improve the Form 477 data collection to refine mobile subscribership reporting at a more granular level. *See id*. Despite the limitations of the Form 477 mobile subscribership data, the mobile deployment data provides helpful information about the availability of certain mobile services.

[72] 47 U.S.C. § 1302(d)(1).

[73] *2016 Report*, 31 FCC Rcd at 724-25, paras. 58-61 (declining to set a mobile broadband speed benchmark); *id.* at 734-35, paras. 82-83 (reporting coverage based on LTE technology and a 10 Mbps/1 Mbps benchmark).

[74] *See infra* Section IV.A.

28. The *Notice* sought comment on whether the Commission should set a mobile broadband benchmark or whether it should use a particular mobile technology, such as LTE, as a proxy for advanced telecommunications capability for mobile services (mobile ATC).[75] The Commission stated that it anticipated that the mobile speed benchmark, if one were adopted, would likely be lower than the 25 Mbps/3 Mbps benchmark adopted for fixed broadband services,[76] and the Commission specifically sought comment on whether a 10 Mbps/1 Mbps benchmark or the 5 Mbps download speed used for determining areas eligible for Mobility Fund II support were appropriate.[77]

29. Several commenters advocate that the Commission should only assess LTE deployment when determining whether mobile ATC is deployed,[78] for reasons of administrative ease.[79] These commenters contend that this Report should be consistent with other Commission proceedings and reflect the reality of the mobile environment.[80] Other commenters opposed to this approach argue that the quality of LTE deployment can differ among providers.[81] Various commenters contend that 10 Mbps/1 Mbps should be used for a mobile speed benchmark,[82] claiming that it approximates a high-quality experience for the user,[83] while others argue that it should be the same as the fixed benchmark of 25 Mbps/3 Mbps because all advanced telecommunications capability should be considered the same.[84]

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[75] *Notice*, 32 FCC Rcd at 7035, paras. 18-20.

[76] *Id*. at 7035, para. 18.

[77] *Id*. at 7035, paras. 19-20.

[78] AT&T Comments at 2, 10; USTelecom Comments at 10-11; Verizon Comments at 13; ADT Reply at 5-6; AT&T Reply at 8; Mobile Future Reply at 4-6. Some of these commenters argue that LTE is capable of consistently high-speed broadband service, as demonstrated by evidence from speed tests. AT&T Comments at 2; USTelecom Comments at 10-11; Verizon Comments at 13-14; AT&T Reply at 8; Comcast Reply at 10 n.28. USTelecom asserts that LTE should be used as the benchmark because consumers rely on LTE to access advanced voice, data, graphics, and video telecommunications. USTelecom Comments at 10-11. The Colorado State Broadband Office (CSBO) contends that, for the purposes of assessing mobile broadband deployment, assessing LTE-only would be appropriate because older mobile technologies do not provide the same consumer experience as LTE. CSBO Comments at 4.

[79] AT&T Comments at 2; USTelecom Comments at 8, 11; AT&T Reply at 8 ("[the Commission would have] to resolve endless methodological issues that have no clear answer, such as how many samples should be taken, how often, and in what geographic areas, and many other similar issues"); Mobile Future Reply at 4-6.

[80] *See, e.g.*, AT&T Reply at 8 ("There are many variables that affect speed in a mobile network that do not exist in the wireline context and that would make measurement of speeds needlessly difficult."). Verizon asserts that this Report should be consistent with other Commission proceedings, not create any new standards, and should avoid being distracted by speed thresholds. Verizon Comments at 13-14.

[81] WISPA Comments at 10-11; California PUC Reply at 10-11; ILSR & NCC Reply at 7.

[82] ADTRAN Comments at ii, 7-8; NCTA Comments at 8; NEMA Comments at 3; OTI Comments at 3; PK et al. Comments at 18; Nez Perce Tribe Reply at 1; Gabriel Garcia Comments at 3 (advocating for a 10 Mbps/3 Mbps mobile benchmark).

[83] ADTRAN Comments at ii, 7-8 (noting that mobile screens are smaller than fixed screens); NCTA Comments at 8 (arguing that a speed slower than fixed is appropriate, as fixed is more likely to stream to many devices simultaneously); NEMA Comments at 3 (advocating for a 10 Mbps/1 Mbps mobile benchmark because that speed "approximately reflects 4G LTE speed").

[84] CWA Comments at 14; NYC Comments at 2; Telecommunications for the Deaf and Hard of Hearing et al. (TDI) Comments at 6; *see also* OTI Reply at b, 13; *but cf* OTI Comments at 3, Attach. at 15. Public Knowledge and other consumer groups argue that a 10 Mbps/1 Mbps benchmark is not aspirational enough and falls short of international targets. PK et al. Comments at 18. USTelecom disagrees with the 25 Mbps/3 Mbps standard because it argues that LTE does not currently offer those speeds and that such a speed threshold would not be a realistic standard in the universal service context. USTelecom Comments at 11.

Other commenters are concerned that a 1 Mbps upload speed is too low, given the substantial uploading of information that occurs from mobile-connected devices.[85] Finally, certain commenters argue that the Commission should assess multiple speed tiers.[86]

30. We note that network speed is one of the key characteristics of mobile wireless performance, and mobile broadband speeds experienced by consumers may vary greatly with a number of factors, including the service provider's received signal quality, cell traffic loading, and network capacity in different locations.[87] For example, the received signal quality is dependent on the service provider's deployed cell site density, low/high frequency radio wave propagation losses, user locations, indoor obstructions and outdoor foliage or clutter, weather, inter-cell interference conditions, and wireless network optimization parameters.[88] Moreover, mobile broadband speeds can vary with the capability of consumers' devices.[89] Mobile transmissions are subject to environmental factors that fixed line transmissions do not encounter and, thus, cannot achieve the same kinds of consistent speeds at the current level of technology.[90] We agree therefore with some commenters' concerns that the LTE experience can be highly variable.[91]

31. By looking at where service providers have deployed LTE, however, we can assess the progress that has been made in bringing high-quality mobile service to all Americans. The Form 477 data are used in this part of the analysis because they are currently the most comprehensive data we have available nationwide for evaluating where service providers have deployed LTE at minimum advertised or expected speeds of 5 Mbps/1 Mbps.[92] It is important to recognize nonetheless that these data can only

[85] ILSR & NCC Comments at 7; Microsoft Comments at 4; TDI Comments at 5-6; Gabriel Garcia Comments at 1-2; ADT Reply at 1. LiveStream, for instance, recommends at least 3 Mbps for a video stream to be considered high quality. LiveStream, *What Kind of Internet Connection Do I Need in Order to Stream*, https://help.livestream.com/hc/en-us/articles/212062598-Recommended-Bandwidth-for-Streaming (last visited Dec. 7, 2017).

[86] Deere Comments at 4-5; NDIA Comments at 3; SHLB Reply at 5-6. Verizon argues that this Report should be consistent with other Commission proceedings, not create any new standards, and should avoid being distracted by speed thresholds. Verizon Comments at 13-14. National Digital Inclusion Alliance (NDIA) argues that the Commission should also separately report speeds that match or exceed the speed benchmark for fixed deployment, if such speeds exist. NDIA Comments at 3.

[87] *20th Mobile Competition Report*, 32 FCC Rcd at 9033, para. 87.

[88] We note also that the cell traffic loading or demand is dependent on the overall number of concurrent active mobile broadband users sharing the same cell, which in turn depends on user locations, the day of the week, and the time of day. The capacity of a service provider's wireless network is dependent on the deployed mobile wireless technology, sites and equipment, available bandwidth, and the capacity of backhaul connections. *20th Mobile Competition Report*, 32 FCC Rcd at 9033, para. 87 & n.289.

[89] Differences in consumer devices (e.g., smartphones, tablets, USB dongles, and laptops) or differing capabilities within each device category can also result in users experiencing different data speeds on the same mobile wireless broadband network. *20th Mobile Competition Report*, 32 FCC Rcd at 9033, para. 87 & n.290.

[90] *2016 Report*, 31 FCC Rcd at 711-12, para. 29.

[91] For instance, commenters cite to poor backhaul and limited available spectrum, among other concerns, and LTE performance, like any mobile technology, can be highly variable. *See, e.g.*, WISPA Comments at 10-11; California PUC Reply at 10-11; ILSR & NCC Reply at 7.

[92] As the Commission has stated, having accurate and reliable mobile broadband deployment data is critical to policymakers as well as to consumers. *Form 477 Modernization FNPRM*, 32 FCC Rcd at 6331-32, para. 8. While the current Form 477 deployment data are an improvement over the deployment data previously available on a national scale, questions have arisen in various contexts regarding the bases for certain filings. *Id.*, 32 FCC Rcd at 6332-33, para. 10. For example, in the context of the Mobility Fund II (MF-II) proceeding, the Commission determined that a separate, one-time data collection was necessary to ensure that all Form 477 filers were using a consistent standard when reporting their deployment of 5 Mbps 4G LTE services. *Connect America Fund*,

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provide us with an understanding of the minimum speeds that consumers can expect to receive. We therefore supplement our analysis with on-the-ground data to evaluate the extent to which the typical American consumer receives speeds that are significantly higher than these minimum advertised speeds.[93]

32. Thus, for purposes of this Report, we evaluate 4G LTE deployment holistically, taking into account actual speed variations in the mobile environment, in order to assess whether progress is being made in deploying advanced mobile capabilities in a reasonable and timely fashion. We find that 4G LTE technology generally enables users to originate and receive high-quality voice, data, graphics, and video telecommunications, and the actual speed achieved with LTE depends on several features, including channel bandwidth, modulation type, antenna configuration, and the quality of the wireless path.[94] Our Form 477 data show that most LTE networks have a minimum advertised speed of 5 Mbps/1 Mbps or higher, and these speeds generally are accepted by the industry as consistent with an LTE network.[95] We note however that we are *not* asserting that 5 Mbps/1 Mbps is a mobile advanced telecommunications capability benchmark. Rather, our Form 477 data currently constrain our inquiry by only containing minimum advertised speeds. For this reason, we consider actual speed data from Ookla as well.

33. To account for the limitations of a mobile environment, we also examine the speed of these LTE networks with actual on-the-ground speed data. Using these various data points, we can make a reasonable assessment of the progress and the extent to which American consumers have access to mobile high-quality voice, data, graphics, and video.

34. Accordingly, we present our results based both on the Form 477 LTE data with minimum advertised speeds of 5 Mbps/1 Mbps and on Ookla's speed test data with a median of 10 Mbps/3 Mbps or higher. We believe that, in the mobile environment, it would not be workable to set a single speed benchmark at this time due to the difficulty of evaluating the inherent variability of the mobile experience, combined with current data limitations and methodological issues. By using the Form 477 data, and supplementing with Ookla data, however, we can show that, in those geographical areas (counties) where most consumers live, speeds appear to be well above 5 Mbps/1 Mbps, with a median of 10 Mbps/3 Mbps or higher.[96] In addition, more and more consumers are receiving these higher speeds, as

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Universal Service Reform—Mobility Fund, Order on Reconsideration and Second Report and Order, 32 FCC Rcd 6282, 6286, 6287, 6298, paras. 7, 10, 34 (2017) (*MF-II Challenge Process Order*) (the Commission reconsidered its decision to use the Form 477 data given the various challenges with respect to the accuracy of the Form 477 deployment data, and determined that there would be a new, one-time data collection). In addition, the Commission has initiated a rulemaking to consider improvements in the Form 477 data collection process. *See generally Form 477 Modernization FNPRM*, 32 FCC Rcd 6329; *see also 20th Mobile Competition Report*, 32 FCC Rcd at 9016, para. 70.

[93] The methodology is described below in Section IV.A.

[94] *See, e.g.*, Electronic Design, *An Introduction to LTE-Advanced: The Real 4G*, http://www.electronicdesign.com/4g/introduction-lte-advanced-real-4g (last visited Jan. 11, 2018); Rysavy Research, *LTE to 5G: Cellular and Broadband Innovation*, 5G Americas, http://www.5gamericas.org/files/1915/0282/6623/LTE_to_5G_Cellular_and_Broadband_Innovation_-_Rysavy_for_upload.pdf (last visited Jan. 11, 2018).

[95] *Id.* We note that in the MF-II context, the Commission has decided to use 5 Mbps download speeds as a benchmark for LTE to identify unserved areas that may be presumptively eligible for MF-II support. *Connect America Fund; Universal Service Reform – Mobility Fund*, WC Docket NO. 10-90, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 2152, 2173, 2236-37, 2238, paras. 50-51, 232, 243 (*MF-II R&O and FNPRM*). In that proceeding, commenters consistently cited 5 Mbps download as consistent with 4G LTE service. *MF-II R&O and FNPRM*, 32 FCC Rcd at 2189-90, para. 87 & n.220; *see also MF-II Challenge Process Order*, 32 FCC Rcd 6290-91, para. 16 & n.42 & n.44.

[96] We note that in the Commission's discussion of performance metrics for supported areas in the MF-II proceeding, the Commission also stated that the median data speed of the network for the supported area must be 10 Mbps/1
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shown below. Therefore, while we recognize that minimum speeds are likely to increase over time as network configurations, technology, and consumer demands evolve, by supplementing advertised mobile speed data with on-the-ground data, we can reasonably evaluate the progress of high-speed mobile deployment and assess whether LTE deployment in general is reaching speeds that would enable advanced telecommunications capability for an increasing percentage of American consumers based on current uses.[97]

(iii) Possible Additional Benchmarks and Metrics

35. *Latency and consistency of service benchmarks and metrics.* We decline at this time to adopt additional performance-related benchmarks or metrics, such as latency or consistency of service for fixed or mobile broadband.[98] Several commenters contend that the Commission should adopt a latency benchmark for its analysis under section 706,[99] with certain commenters proposing specific benchmarks, such as 100 millisecond (ms) or 400 ms.[100] NTCA argues that some types of broadband, such as satellite, may not meet a particular latency target and should be excluded from our section 706 analysis.[101] By contrast, ViaSat objects to any latency standard, arguing that the Commission should not single out latency among all the performance characteristics that affect the end-user consumer experience.[102] Verizon and CTIA also oppose adoption of a latency benchmark, urging the Commission instead to focus on consumer needs and experience.[103]

36. We decline to adopt a latency benchmark. The commenters seeking the inclusion of latency in the analysis fail to identify any data sources or methodologies that are both sufficiently disaggregated and reliable that we could rely upon to incorporate latency into our section 706 analysis for fixed or mobile broadband. We also decline to rely on latency information collected in the Measuring Broadband America Report program to establish a latency benchmark, as suggested by the Entertainment Software Association.[104] While this dataset provides some useful information about the latency of fixed broadband networks, the data lack the geographic granularity necessary to evaluate latency performance by census block. Therefore, we do not believe the Measuring Broadband America data can be used to

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Mbps, with at least 90 percent of the required download speed measurements not less than a certain threshold speed. *MF-II R&O and FNPRM*, 32 FCC Rcd 2189-90, para. 87.

[97] We believe that by reporting these two metrics, we are able to evaluate the extent to which, in the context of the mobile environment, mobile services are providing consumers with "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics and video telecommunications." 47 U.S.C. § 1302(d)(1).

[98] *See, e.g.*, Consumer Groups Comments at 9-11; CO SBO Comments at 3; CPUC Comments at 6; Gregory Lucius Comments at 1; Jason Wellman Comments at 1; NTCA Comments at 12-14; NYC Comments at 2; 2016 OTI Comments at 12-14; WISPA Comments at 9; OTI Reply at 11-12; U.S. Telecom Comments, Attach. at 14.

[99] *See, e.g.*, CO SBO Comments at 3; CPUC Comments at 6; Gregory Lucius Comments at 1; Jason Wellman Comments at 1; NTCA Comments at 12-14; NYC Comments at 2; 2016 OTI Comments at 12-14; OTI Reply at 11-12; *but see* U.S. Telecom Comments at 12 (arguing that "reliability of service and latency do not directly or meaningfully affect mobile deployment," and that the Commission "should not expand the inquiry to include benchmarks for such criteria").

[100] WISPA Comments at 9; Consumer Groups Comments at 9-11.

[101] NTCA Reply at 5.

[102] ViaSat Comments at 2, 7.

[103] CTIA Reply at 5-6; Verizon Comments at 2, 14-15; ViaSat Comments at 2, 7-8.

[104] Entertainment Software Association Reply at 8.

evaluate latency at this time and, similar to the *2016 Report*, we find that the current record lacks any reliable and sufficiently comprehensive data.[105]

37. We reject arguments of certain commenters that broadband services with relatively higher latency, such as satellite, should be categorically excluded from our section 706 analysis because they do not qualify as an "advanced telecommunications capability." Indeed, many consumers choose relatively higher latency fixed satellite broadband services that meet the 25 Mbps/3 Mbps speed benchmark and consume services such as Skype, Netflix, and YouTube[106] that fall within the statutory definition of "advanced telecommunications capability." Applying a latency benchmark for all broadband services, whether fixed terrestrial, satellite, or mobile broadband, that would exclude from our section 706 analysis any consideration of broadband services that, on their face, would appear to provide consumers with the relevant capabilities articulated in section 706(d)(1), would prevent a reliable or complete assessment of the deployment of advanced telecommunications capability.

38. We also know of no data that would enable us to analyze consistency of service. Therefore, due to the lack of reliable and sufficient data, we refrain in this Report from evaluating latency and consistency of service in our section 706 analysis at this time. We will, however, continue to monitor and analyze the relevant data to the extent they become available.

39. *Non-performance benchmarks and metrics*. While some commenters contend that our inquiry should also include an examination of non-performance related benchmarks such as data/usage allowances or pricing,[107] we agree with several commenters that such metrics fall outside of the scope of our section 706 inquiry.[108] Section 706 requires us to examine the "availability" and "deployment" of advanced telecommunications capability.[109] While factors such as data allowances or pricing may affect consumers' use of advanced telecommunications capabilities or influence decisions concerning the purchase of these services in the first instance, such considerations do not affect the underlying determination of whether advanced telecommunications capability has been deployed and made available to customers in a given area.[110] Thus, we believe such factors are extraneous to the present inquiry. In any event, as Verizon points out, to the extent that providers offer different types of data plans or pricing offerings, this range of choices for consumers "underscores how robust broadband deployment has been."[111] Furthermore, commenters in support of including such metrics fail to cite reliable, comprehensive data sources that could be used, or sound methodologies for incorporating non-

[105] *2016 Report*, 31 FCC Rcd at 727, para. 66.

[106] *See* OECD Working Party on Communications Infrastructure and Services Policy, The Evolving Role of Satellite Networks in Rural and Remote Broadband Access at 16-17 (2017), http://www.oecd-ilibrary.org/science-and-technology/the-evolving-role-of-satellite-networks-in-rural-and-remote-broadband-access_7610090d-en.

[107] *See, e.g.*, Consumer Groups Comments at 7-9; MDTC Comments at 4-6; Microsoft Comments at 5-6; NTCA Comments at 12-14; NYC Comments at 2; 2016 OTI Comments at 15-17; WISPA Comments at 10. *But see* Verizon Comments at 16 (asserting that the Commission should only review benchmarks and characteristics that are relevant to broadband deployment).

[108] *See* NCTA Comments at 3-4; Verizon Comments at 16; Comcast Reply at 3.

[109] 47 U.S.C. § 1302(b).

[110] *See* NCTA Comments at 3-4; Comcast Reply at 3.

[111] Verizon Comments at 16.

performance metrics into the section 706 inquiry.[112] Thus, we decline to consider additional, non-performance related benchmarks at this time.[113]

B. Demographic Information

40. Section 706(b) directs the Commission to compile a list of geographical areas that are not served by any provider of advanced telecommunications capability and, to the extent that data from the Census Bureau is available, to determine, for each unserved area, the population, the population density, and the average per capita income.[114] We include such demographic data on unserved areas below in Section IV.B.[115] and show the availability of advanced telecommunications capability on a county-by county basis in Appendix F.[116]

C. International Comparisons

41. Section 706(b) requires the Commission to "include information comparing the extent of broadband service capability (including data transmission speeds and price for broadband service capability) in a total of 75 communities in at least 25 countries abroad for each of the data rate benchmarks for broadband service utilized by the Commission to reflect different speed tiers."[117] The statute directs the Commission to choose international communities comparable to various communities in the United States with respect to population size, population density, topography, and demographic profile.[118] As in past years, the staff of the International Bureau has prepared a report providing the information required by the statute, including comparative international information on broadband services and, where possible, the extent of broadband service capability in the United States and select communities and countries abroad.[119] We present a summary of the data in the *Sixth International Broadband Data Report* in Section IV.D. below.[120]

D. Schools and Classrooms

42. Section 706(b) also specifies that our annual inquiry concerning the availability of advanced telecommunications capability to all Americans must include "elementary and secondary schools and classrooms."[121] We assess the current state of deployment in elementary and secondary

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[112] Consumer Groups Comments at 7-9; MDTC Comments at 4-6; Microsoft Comments at 5-6; NTCA Comments at 12-14; NYC Comments at 2; 2016 OTI Comments at 15-17; WISPA Comments at 10.

[113] By contrast, the Broadband Data Improvement Act specifically requires that we consider as part of our section 706 inquiry a comparison of "broadband service capability (including broadband transmission speeds and price for broadband service capability) in a total of 75 communities in at least 25 countries abroad . . . ." 47 U.S.C. § 1303(b).

[114] 47 U.S.C. § 1302(c).

[115] *See infra* Section IV.B.

[116] *See infra* Appendix F.

[117] 47 U.S.C. § 1303(b)(1).

[118] *Id.* § 1303(b)(2). The Commission is required to include "a geographically diverse selection of countries" and "communities including the capital cities of such countries." *Id.*

[119] *International Comparison Requirements Pursuant to the Broadband Data Improvement Act, International Broadband Data Report*, GN Docket No. 17-199, DA 18-99, rel. Feb. 2, 2018 (*Sixth International Broadband Data Report*). We are incorporating by reference the *Sixth International Broadband Data Report*. *See, e.g., 2016 Report*, 31 FCC Rcd at 748, para. 114 (incorporating by reference the *2016 Fifth International Broadband Data Report*); *2015 Report*, 30 FCC Rcd at 1450, para. 130 (same).

[120] *See infra* Section IV.D.

[121] 47 U.S.C. § 1302(b).

schools in Section IV.E. below, using a short-term and long-term goal for broadband connectivity to schools of 100 Mbps per 1,000 students and staff and 1 Gbps per 1,000 students and staff, respectively.[122]

IV. BROADBAND DEPLOYMENT AND AVAILABILITY

A. Data Sources and Methodologies

43. We rely primarily upon our FCC Form 477 deployment data to evaluate deployment for fixed and mobile services.[123] We also consider, however, actual on-the-ground speed data based upon Ookla data in our mobile analysis.[124] Consistent with previous findings by the Commission,[125] and notwithstanding certain issues that have been identified with respect to the Form 477 data, the Form 477 data nonetheless are currently the most accurate data available to the Commission for this analysis.[126] For deployment data prior to 2014, we rely on data from the State Broadband Initiative (SBI), which prior to the Commission's revision of the Form 477 data collection, were the most comprehensive and geographically granular deployment data publicly available.[127] Consequently, we rely upon that data to identify areas with access to services with maximum advertised speeds meeting our 25 Mbps/3 Mbps speed benchmark for fixed advanced telecommunications capability, as well as identifying areas with LTE coverage at minimum advertised (or in the case of SBI data, maximum advertised) or expected speeds of 5 Mbps/1 Mbps. We note that the Form 477 and SBI data only report service at the census block level, and not the household level. A whole census block is classified as served if the Form 477 or SBI data indicate that service is being provided anywhere in the block. Therefore, it is not necessarily the case that every person will have access to a service in a block that this Report indicates is served.[128]

44. In addition, rather than only focus on deployment for the most recent year, our analysis examines how the deployment of fixed and mobile broadband has progressed since December 2012.[129]

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[122] *See infra* Section IV.E.

[123] On August 3, 2017, the Commission adopted a Further Notice of Proposed Rulemaking seeking comment on ways to improve the quality and accuracy of information collected on Form 477. *See generally Form 477 Modernization FNPRM*, 32 FCC Rcd 6329.

[124] *See infra* Appendix C (Data Sources and Definitions) at para. 1 (discussing our data sources and how we incorporate Ookla actual speed data into our evaluation), para. 5 (discussing how we evaluate the fixed deployment data).

[125] *2016 Report*, 31 FCC Rcd at 730, para. 75.

[126] The Commission currently is seeking comment on the *Form 477 FNPRM* to explore whether revisions are needed to this data collection to address concerns about accuracy. *See Form 477 Modernization FNPRM*, 32 FCC Rcd 6329, 6337, paras. 26-27. Here we use the best data available while recognizing improvements may be needed.

[127] *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 11-121, Eighth Broadband Progress Report, 27 FCC Rcd 10342, 10364-65, para. 28 (2012) (*2012 Report*). The SBI data were collected semi-annually through state-led efforts and maintained by the National Telecommunications and Information Administration for the National Broadband Map, in collaboration with the Commission. *Id*. at 10365, para. 28.

[128] We acknowledge the possibility that this analysis may therefore overstate or understate the deployment of services. *See 20th Mobile Competition Report*, 32 FCC Rcd at 9016-17, para. 71; *2016 Report*, 31 FCC Rcd at 730, para. 75 n.234.

[129] We note that figures reported for years prior to 2016 may not be identical to figures reported in prior reports issued pursuant to section 706. Figures relying on Form 477 data may have been updated in subsequent years by reportees submitting corrected data. This Report also relies on a different population data source than previous reports. Furthermore, figures from previous reports also included the U.S. Territories when presenting calculations for the United States as a whole. We report on the U.S. Territories separately in this Report.

We present an analysis of deployment data for fixed terrestrial services and for mobile LTE. Unlike past Reports,[130] our deployment figures for the United States as a whole in this Report do not include data from the U.S. Territories because the 2016 data may significantly overstate current deployment in Puerto Rico and the U.S. Virgin Islands, which account for over 92 percent of the total combined population of the U.S. Territories.[131] While December 2016 Form 477 data suggest that fixed terrestrial 25 Mbps/3 Mbps service and mobile 5 Mbps/1 Mbps LTE were deployed in Puerto Rico and the U.S. Virgin Islands as of December 2016, given the damage to infrastructure in Puerto Rico and the U.S. Virgin Islands from Hurricanes Maria and Irma, we are uncertain as to the current deployment of broadband services in these areas.

45. *Fixed services.* We find that our Form 477 fixed technology coverage data are the most reliable and comprehensive data to assess the availability of fixed terrestrial, and where applicable, satellite, services to American consumers. Using the Form 477 data, we evaluate the availability of fixed terrestrial services with a minimum advertised speed of 10 Mbps/1 Mbps, 25 Mbps/3 Mbps and 50 Mbps/5 Mbps. SBI data are not available for 10 Mbps/1 Mbps or for 50 Mbps/5 Mbps, so for 2012 and 2013 data, we use 10 Mbps/768 kbps for 10 Mbps/1 Mbps and 50 Mbps/6 Mbps for 50 Mbps/5 Mbps, the most comparable speeds reported. We also present data reflecting the initial deployment during 2016 of satellite services at 25 Mbps/3 Mbps. Prior to evaluating the fixed deployment data, the data submitted by providers are examined for quality and consistency.[132] Form 477 subscribership data is used to calculate adoption rates for fixed terrestrial services.

46. *Mobile services.* While recognizing certain limitations of the Form 477 data, we find nonetheless that our Form 477 LTE technology coverage data are the most reliable and comprehensive data that we have to assess the availability of mobile LTE to American consumers at a minimum advertised speed of 5 Mbps/1 Mbps.[133] For 2012 and 2013, we use SBI data, which only include a speed component for mobile services,[134] while for 2014 through 2016, we use the Form 477 LTE deployment shapefiles with a minimum advertised speed of 5 Mbps/1 Mbps. SBI data are not available for 5 Mbps/1 Mbps, so for our analysis of the 2012 and 2013 data, we use maximum advertised speeds of 6 Mbps/768 kbps, which are the most comparable speeds reported. As the Commission has previously done, we employ the centroid methodology in evaluating the Form 477 deployment data for LTE.[135] We consider a

[130] *See, e.g.*, *2016 Report*, 31 FCC Rcd at 732, para. 79; *2015 Report*, 30 FCC Rcd at 1418, para. 79.

[131] We provide separate deployment estimates for fixed 25 Mbps/3 Mbps and mobile LTE 5 Mbps/1 Mbps for the U.S. Territories. *See infra* Table 6; Appendix E. We do not report estimates for mobile LTE 10 Mbps/3 Mbps because we lack sufficiently reliable Ookla speed data for the U.S. Territories.

[132] Our analysis may understate or overstate deployment of services to the extent that broadband providers fail to report data or misreport data. *See* FCC, *Explanation of Broadband Deployment Data* (Nov. 20, 2017), https://www.fcc.gov/general/explanation-broadband-deployment-data (describing quality and consistency checks performed on providers' submitted data and explaining any adjustments made to the Form 477 data as filed).

[133] For fixed services, the Commission has been able to rely upon FCC Form 477 reported maximum advertised speeds to track actual speeds. However, we note that the relationship between actual speeds and the advertised speed reported in the FCC Form 477 for mobile services is more complex because minimum advertised speed is reported by the mobile providers, and different mobile providers estimate their minimum advertised speed based on various points of their actual speed distribution. *2016 Report*, 31 FCC Rcd at 734, para. 82 & n.246. By contrast, the Ookla data provide us with the actual speeds that consumers experience.

[134] Because the SBI data does not identify mobile services by technology, we are unable to limit the data to LTE only. Appendix C, para. 2. In addition, we note that the SBI data include mobile coverage area boundaries by *maximum* advertised download/upload speeds. *2016 Report*, 31 FCC Rcd at 734, para. 82; *2015 Report*, 30 FCC Rcd at 1414, para. 72. This means that the SBI data are not directly comparable to the Form 477 data, which reports *minimum* advertised speeds.

census block to be covered by LTE if there is at least one service provider serving that census block that reports 5 Mbps/1 Mbps as the minimum advertised speed, based on their Form 477 submission.[136]

47. We recognize, however, that actual speeds tend to be much faster than the minimum advertised speed. Therefore, we also present data based on the availability of LTE with a median actual speed of 10 Mbps/3 Mbps or higher.[137] While we acknowledge that there are alternative sources of data on speed,[138] we rely on the Ookla data[139] to supplement our Form 477 analysis,[140] primarily because it provides us with the greatest number of observations of actual speeds that customers receive. We only evaluate actual speeds in counties with a sufficient number of test observations in each time frame; because there generally are more observations in those geographical areas with a higher population density, the more densely populated counties have a higher likelihood of being included in this portion of

(Continued from previous page)

[135] *2016 Report*, 31 FCC Rcd at 730, para. 75 & n.234 (explaining that the Commission evaluated the ability of mobile wireless providers to provide services throughout a census block by evaluating whether the provider's shapefile overlaps the centroid of the census block); *id.* at 730, para. 82, Tbls. 4-5 (reporting the proportion of the population with access to LTE technology); *see also 20th Mobile Competition Report*, 32 FCC Rcd at 9016-17, para. 71. We note that these coverage estimates represent deployment of mobile networks and do not indicate the extent to which service providers affirmatively offer service to residents in the covered areas. Further, this analysis likely overstates the coverage experienced by some consumers, especially in large or irregularly shaped census blocks. *20th Mobile Competition Report*, 32 FCC Rcd at 9016-17, para. 71. In the *20th Mobile Competition Report*, the Commission presented coverage analysis based on both the centroid methodology and the actual area coverage methodology (which calculates the exact area of the block covered by each service provider by technology). At the aggregate national level, the results will be similar whether the centroid methodology or the actual area coverage methodology is utilized and, therefore, at that aggregate level, the centroid approach is a reasonable approach to take. *Id.* at 9017-18, para. 72.

[136] Various commenters support the Commission continuing to rely on Form 477 data to determine broadband deployment. AT&T Comments at 5, 10 (also noting that fixed broadband deployment is determined using Form 477 data); US Telecom Comments at 22; Verizon Comments at 16-17.

[137] Some commenters argue that the Commission should not rely on crowd-sourced data or set a speed benchmark due to the inherent methodological difficulties in doing so. *See, e.g.*, AT&T Comments at 10-11; Verizon Comments at 16-17. CSBO contends that the Commission should factor crowd-sourced speed data into all technology metrics, including fixed. CSBO Comments at 7. We use the Ookla data to supplement our Form 477 analysis, allowing us to better evaluate the extent to which the typical consumer is receiving speeds of 10 Mbps/3 Mbps or higher. We currently lack Ookla data for 2012 and 2013, so we present in this Report data with respect to a median of 10 Mbps/3 Mbps mobile LTE or higher from 2014 onwards.

[138] *See, e.g., 20th Mobile Competition Report*, 32 FCC Rcd at 9036-37, paras. 91-92.

[139] We note that generally, crowd-sourced data can provide the benefit of generating a large volume of data at a very low cost and of measuring actual consumer experience on a network in a wide variety of locations, indoor and outdoor. Crowd-sourced data, however, are often not collected pursuant to statistical sampling techniques, and may require adjustments to construct a representative sample from the raw data. For instance, crowd-sourced mobile data come from a self-selected group of users, and there often is little control for most tests regarding such parameters as when people implement the test, whether the test is performed indoors or outdoors, the geographic location of the tester, and the vintage of the consumer's device. *See, e.g., Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Seventeenth Report, 29 FCC Rcd 15311, 15405-06, para. 191 (2014).

[140] The data collected by the Ookla Speedtest mobile app include test results for download speed, upload speed, and latency, as well as other information, such as the location of the test and operating system of the handset. The results presented in this Report are based on tests that were executed in the second half of 2014, second half of 2015, and second half of 2016, on the smartphone's cellular connection, and using LTE technology. Any test with a reported download or upload speed equal to or less than zero, or greater than 100 Mbps, was dropped. Any test without GPS location data was dropped. Multiple tests by a single phone in the same locality and in the same day were averaged (using the median).

the analysis.[141] When analyzing the Ookla data, although we do not have reliable on-the-ground speed data for every county in the United States, the data we do have nevertheless cover well over 90 percent of the population of the United States,[142] and as such, can reasonably be used to show progress over time.

48. *Schools.* For purposes of this Report, we assess deployment in elementary and secondary schools based upon publicly available data from EducationSuperHighway's *2017 State of the States Report* and the Consortium for School Networking (CoSN) *2017 Annual Infrastructure Survey Report*.[143] The *2017 State of the States Report* tracks public schools' progress toward the Commission's goals for K-12 connectivity using the Commission's FCC Form 471 data and additional outreach efforts to E-rate applicants for clarifications on their broadband purchases.[144] CoSN's report summarizes the results of its survey of a much smaller number of school districts regarding the current state of broadband and technology infrastructure in U.S. school systems.[145]

B. Broadband Deployment Estimates

49. In Tables 1-3 below, we present our measurement of deployment to all Americans, evaluating progress by comparing deployment in the present year to deployment in previous years. We conclude, as previous reports have, that reporting deployment by urban, rural, and Tribal lands shows three relevant categories for purposes of our statutory obligation to consider deployment to "all Americans." Unlike in the past, we report on deployment for each combination of fixed and mobile deployment, as we believe a clear reporting of the data is the best way for us to holistically consider the question before us.

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[141] A county is considered to have a sufficient sample size if there are at least 300 total observations after the cleaning and trimming rules have been applied. This sample size threshold applies to each county for each time frame (2H2014, 2H2015, and 2H2016): If a county does not have at least 300 observations during any of these time frames, it is not included in the actual speed analysis. This threshold of 300 observations is a conservative estimate, and is based on a general mean and median sample size analysis. County geography is assigned using the latitude and longitude coordinates that are collected during each Ookla speed test, via the device's GPS. This allows us to evaluate actual median upload and download speeds at the county level, in each year of the three-year time period, for counties in which approximately 93 percent of the U.S. population live (not including the U.S. Territories). If a census block has LTE coverage of at least 5 Mbps/1 Mbps based on the Form 477 minimum advertised speeds, it is assigned the median upload and download speeds that are calculated for the county in which it is located, which allows us to evaluate the mobile broadband speeds for each census block within the United States.

[142] The percentage of the population in our analysis is based on the total U.S. population, not including the U.S. Territories, for which we separately report our results. The Ookla speed data population in Table 2b is a subset of the total U.S. population evaluated in Table 2a, and refers to the population in those counties for which we believe we have a statistically significant number of on-the-ground speed test observations. In 2016, for example, the U.S. population, not including the U.S. territories, was 322.518 million, whereas in Table 2b, we use 300.036 million as the basis for our 2016 calculations, which excludes counties (approximately 7 percent of the U.S. population evaluated in Table 2a) where we do not have a sufficient number of reliable on-the-ground speed test data observations. We use a threshold of 300 observations at the county level as providing us with a sufficient number of observations. This threshold of 300 observations is a conservative estimate, and is based on a general mean and median sample size analysis.

[143] *See* EducationSuperHighway, *2017 State of the States: Fulfilling Our Promise to America's Students* (Sept. 2017) https://s3-us-west-1.amazonaws.com/esh-sots- pdfs/educationsuperhighway_2017_state_of_the_states.pdf (*2017 State of the States Report*); Comments of the Consortium for School Networking (CoSN) at 5, WC Docket 13-184 (filed Nov. 7, 2017) (*CoSN 2017 Annual Infrastructure Survey Report*).

[144] *See* EducationSuperHighway, *2017 State of the States: Fulfilling Our Promise to America's Students: Methodology*, at 1-2 (Sept. 2017) (*2017 State of the States Methodology*). EducationSuperHighway uses a sample of public school districts receiving broadband services including, but not limited to, fiber services in funding year 2017 in its dataset. *See id*. at 7.

[145] *CoSN 2017 Annual Infrastructure Survey Report* at 3.

1. Deployment of Fixed Advanced Telecommunications Capability

50. Table 1 shows the deployment of fixed terrestrial broadband at speeds of 25 Mbps/3 Mbps. As of year-end 2016, 92.3 percent of the overall population had such access, up from 89.6 percent in 2015 and 81.2 percent in 2012. Nonetheless, over 24 million Americans still lack fixed terrestrial broadband at speeds of 25 Mbps/3 Mbps. And the gap in rural and Tribal America remains notable: 30.7 percent of Americans in rural areas and 35.4 percent of Americans in Tribal lands lack access to fixed terrestrial 25 Mbps/3 Mbps broadband, as compared to only 2.1 percent of Americans in urban areas. Such a gap has narrowed over the last few years, especially between 2012 and 2014; in 2012, fixed terrestrial 25 Mbps/3 Mbps service was unavailable to 54.3 percent and 67.8 percent of Americans in rural and Tribal lands, respectively.

Table 1
Deployment (Millions) of Fixed Terrestrial 25 Mbps/3 Mbps Services

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
United States	254.395	81.2%	263.971	83.6%	284.277	89.4%	286.911	89.6%	297.766	92.3%
Rural Areas	27.694	45.7	29.077	47.6	37.202	60.4	37.795	60.7	43.604	69.3
Urban Areas	226.701	89.7	234.893	92.3	247.075	96.4	249.116	96.5	254.162	97.9
Tribal Lands	1.247	32.2	1.449	37.1	2.250	57.2	2.289	57.8	2.578	64.6
Pop. Evaluated	313.389	100.0%	315.596	100.0%	317.954	100.0%	320.289	100.0%	322.518	100.0%

51. As noted above, 2016 marked the first instance where 25 Mbps/3 Mbps satellite service was reported in the Form 477 data.[146] The 2017 launches of the high throughput Jupiter 2 and ViaSat 2 satellites by Hughes and ViaSat, respectively, could further increase 25 Mbps/3 Mbps satellite offerings in the future.[147] As of December 2016 and including satellite service in our estimate, we find that just over 14 million Americans are unserved by fixed 25 Mbps/3 Mbps service. Overall fixed deployment of 25 Mbps/3 Mbps service in 2016 is 95.6 percent, with deployment to 81.7 percent of Americans in rural areas and 99 percent in urban areas.[148]

2. Deployment of Mobile LTE

52. Table 2a shows that as of December 2016, over 99 percent of the American population has access to mobile LTE with a minimum advertised speed of 5 Mbps/1 Mbps, according to our Form 477 data, while the SBI maximum advertised speed data show that 89.8 percent had such access in 2012. Further, the percentage of Americans living in rural areas with access to LTE at 5 Mbps/1 Mbps was 62.6

[146] *See* ViaSat Comments at 3.

[147] *See* Hughes Network Systems, LLC, *Hughes Announces HughesNet Gen5 High-Speed Satellite Internet Service* (Mar. 7, 2017), https://www.hughes.com/who-we-are/resources/press-releases/hughes-announces-hughesnet-gen5-high-speed-satellite-internet; ViaSat Inc., *High Capacity Satellite System, Transforming Satellite Broadband*, https://www.viasat.com/products/high-capacity-satellites (last visited Jan. 9, 2018).

[148] *See* FCC, Fixed Broadband Deployment Data from FCC Form 477, Data as of December 31, 2016, https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477 (last visited Jan. 17, 2018). We acknowledge that these data could overstate the availability of these services. While satellite operators may be able to offer service to wide swaths of the country, overall satellite capacity may limit the number of consumers that can actually subscribe to satellite service at any one time. *See Notice*, 32 FCC Rcd at 7041, para. 42.

percent in 2012 based on the SBI data, while the Form 477 data show that 98.2 percent of Americans living in rural areas had such access by the end of 2016 with almost all of that improvement occurring by 2014.[149] Considered separately, rural areas continue to lag behind urban areas in deployment. Also, the percentage of Americans living in Tribal lands with access to mobile LTE was 70 percent in 2012 based on the SBI data, while by 2016, it was 94.9 percent based on Form 477 with most of that gap closed by 2014. Table 2b shows some improvement since 2014 in deployment of mobile LTE services at median speeds of 10 Mbps/3 Mbps across the United States as a whole,[150] but consistent with our Form 477 data, there was little change in mobile LTE deployment at these speeds in rural and Tribal lands from 2014 to 2016.

Table 2a
Deployment (Millions) of Mobile LTE with a Speed of 5 Mbps/1 Mbps

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
United States	281.329	89.8%	308.527	97.8%	315.506	99.2%	318.923	99.6%	321.347	99.6%
Rural Areas	37.918	62.6	55.044	90.2	59.463	96.5	60.969	97.9	61.802	98.2
Urban Areas	243.411	96.3	253.483	99.6	256.043	99.9	257.954	100.0	259.545	100.0
Tribal Lands	2.712	70.0	3.386	86.7	3.626	92.2	3.722	93.9	3.788	94.9
Pop. Evaluated	313.389	100.0%	315.596	100.0%	317.954	100.0%	320.289	100.0%	322.518	100.0%

[149] We note that the results reported in Table 2a for 2012 and 2013 are based upon SBI data for mobile services at *maximum* advertised speeds of 6 Mbps/768 kbps as compared to the Form 477 data which are based on *minimum* advertised speeds of 5 Mbps/1 Mbps. *See supra* Section IV.A.

[150] We note that for the counties where we do not have sufficient Ookla data to create a statistically significant county sample that can be included in our analysis, Americans are receiving minimum advertised or expected speeds of 5 Mbps/1 Mbps, and likely will be receiving speeds higher than that. Any county (and associated census block) for which we do not have reliable Ookla data, however, is excluded from our 10 Mbps/3 Mbps analysis.

Table 2b
Deployment (Millions) of Mobile LTE with a Median Speed of 10 Mbps/3 Mbps

	2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%
United States	237.210	80.1%	244.644	83.1%	261.898	87.3%
Rural Areas	32.638	70.3	31.559	70.3	32.962	70.1
Urban Areas	204.573	81.9	213.085	85.4	228.936	90.5
Tribal Lands[151]	2.159	64.5	*	*	2.125	63.7
Pop. Evaluated[152]	296.204	93.2%	294.568	92.0%	300.036	93.0%

3. Deployment of Fixed Services and Mobile LTE

53. Table 3a shows deployment across all geographic areas when considering access to both fixed terrestrial 25 Mbps/3 Mbps services *and* 5 Mbps/1 Mbps mobile LTE. Overall, approximately 25 million Americans lack access to both 25 Mbps/3 Mbps fixed terrestrial service and 5 Mbps/1 Mbps mobile LTE. This means that approximately 92 percent of the population has access to both fixed terrestrial service at 25 Mbps/3 Mbps and mobile LTE at speeds of 5 Mbps/1 Mbps, up from approximately 89 percent in 2014 and 77 percent in 2012.[153] In rural areas, 68.6 percent of Americans have access to both services, as opposed to 97.9 percent of Americans in urban areas, up from 59.2 percent and 96.3 percent, respectively, in 2014 and 33.5 percent and 87.4 percent, respectively, in 2012. Table 3b shows deployment of fixed terrestrial speeds of 25 Mbps/3 Mbps and median mobile LTE speeds of 10 Mbps/3 Mbps. As of December 2016, approximately 49.5 million Americans in the evaluated areas lack access to both services. This indicates that approximately 84 percent of the (sub-set) population evaluated has access to both services, up from approximately 75 percent in 2014.

[151] We do not report the results for Tribal lands in 2015 in Table 2b above that relies on the Ookla data because of our concerns about the reliability of the Ookla data for Tribal land areas during this time period.

[152] From 2014 through 2016, the total population in the United States—*not including* U.S. Territories, for which we report the results separately—was, respectively, 317.954 million, 320.289 million, and 322.518 million. Based on this sub-sample of the total U.S. population, our analysis indicates that we have reliable on-the-ground speed test data for counties for the vast majority—approximately 93 percent—of Americans during this time period. The census block population estimates are based upon the 2010 U.S. Census Data that the Commission staff has updated to account for population growth. Staff have updated the 2010 census block population estimates based upon annual U.S. Census mid-year county (or county-equivalent) level population and housing unit estimates for the fifty states, the District of Columbia, and Puerto Rico. These data are used in conjunction with U.S. Census Bureau Tiger data to indicate new roads, i.e., new housing development, to distribute population amongst the census blocks comprising each county (or county-equivalent). *See infra* Appendix C, para. 4.

[153] We again note that the results reported for 2012 and 2013 are based upon SBI data for mobile services at *maximum* advertised speeds of 6 Mbps/768 kbps as compared to the Form 477 data which are based on *minimum* advertised speeds of 5 Mbps/1 Mbps. *See supra* Section IV.A.

Table 3a
Deployment (Millions) of Fixed Terrestrial 25 Mbps/3 Mbps Services and Mobile LTE with a Speed of 5 Mbps/1 Mbps

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
United States	241.292	77.0%	261.977	83.0%	283.417	89.1%	286.447	89.4%	297.304	92.2%
Rural Areas	20.266	33.5	27.776	45.5	36.517	59.2	37.366	60.0	43.164	68.6
Urban Areas	221.025	87.4	234.200	92.0	246.900	96.3	249.081	96.5	254.141	97.9
Tribal Lands	1.117	28.8	1.385	35.5	2.212	56.2	2.258	57.0	2.550	63.9
Pop. Evaluated	313.389	100.0%	315.596	100.0%	317.954	100.0%	320.289	100.0%	322.518	100.0%

Table 3b
Deployment (Millions) of Fixed Terrestrial 25 Mbps/3 Mbps Services and Mobile LTE with a Median Speed of 10 Mbps/3 Mbps

	2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%
United States	221.255	74.7%	229.189	77.8%	250.494	83.5%
Rural Areas	22.637	48.8	22.046	49.1	25.411	54.0
Urban Areas	198.617	79.5	207.144	83.0	225.082	89.0
Tribal Lands	1.537	45.9	*	*	1.666	50.0
Pop. Evaluated[154]	296.204	93.2%	294.568	92.0%	300.036	93.0%

54. As of December 2016, and including satellite service in our estimate, we find that approximately 14.9 million Americans lack access to both fixed 25 Mbps/3 Mbps service and 5 Mbps/1 Mbps mobile LTE.[155] Overall, 95.4 percent of Americans have access to both services, including 80.7 percent in rural areas and 99 percent in urban areas. With respect to fixed 25 Mbps/3 Mbps and 10 Mbps/3 Mbps LTE, approximately 44 million Americans lack access to both services. Overall, 85.3 percent of Americans have such access, including 61 percent in evaluated rural areas and 89.8 percent in evaluated urban areas.

55. Turning now to our analysis of the areas that have access to fixed terrestrial 25 Mbps/3 Mbps service *or* mobile LTE at speeds of 5 Mbps/1 Mbps, Table 3c shows that over 99 percent of the American population has access to either fixed terrestrial service at 25 Mbps/3 Mbps or mobile LTE at minimum advertised speeds of 5 Mbps/1 Mbps in 2016. As shown in Table 3d, approximately 5.7

[154] As with Table 2b above, this table reports the results of our analysis based not on the total U.S. population, but on a sub-sample of the total U.S. population where certain counties are excluded for lack of reliable Ookla data, and the U.S. Territories are separately reported.

[155] *See* FCC, Fixed Broadband Deployment Data from FCC Form 477, Data as of December 31, 2016, https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477 (last visited Jan. 17, 2018).

million Americans in the evaluated areas do not have access to either 25 Mbps/3 Mbps fixed terrestrial service or 10 Mbps/3 Mbps mobile LTE. This is largely due to gaps in coverage in rural and Tribal lands, where 10.3 percent and 17 percent of Americans living in these respective areas lack access to either service.

Table 3c
Deployment (Millions) of Fixed Terrestrial 25 Mbps/3 Mbps Services or Mobile LTE with a Speed of 5 Mbps/1 Mbps

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
United States	294.432	94.0%	310.521	98.4%	316.366	99.5%	319.386	99.7%	321.809	99.8%
Rural Areas	45.345	74.9	56.345	92.3	60.148	97.6	61.397	98.6	62.242	98.9
Urban Areas	249.087	98.5	254.176	99.9	256.218	100.0	257.989	100.0	259.567	100.0
Tribal Lands	2.843	73.3	3.449	88.3	3.664	93.2	3.753	94.7	3.816	95.6
Pop. Evaluated	313.389	100.0%	315.596	100.0%	317.954	100.0%	320.289	100.0%	322.518	100.0%

Table 3d
Deployment of Fixed Terrestrial 25 Mbps/3 Mbps Services or Mobile LTE with a Median Speed of 10 Mbps/3 Mbps

	2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%
United States	288.119	97.3%	287.714	97.7%	294.341	98.1%
Rural Areas	40.332	86.9	39.710	88.4	42.192	89.7
Urban Areas	247.787	99.2	248.004	99.3	252.149	99.7
Tribal Lands	2.684	80.2	2.544	76.4	2.769	83.0
Pop. Evaluated[156]	296.204	93.2%	294.568	92.0%	300.036	93.0%

56. As of December 2016, and including satellite service in our estimate, approximately 470,000 Americans lack access to *either* fixed 25 Mbps/3 Mbps service *or* 5 Mbps/1 Mbps mobile LTE.[157] Overall, approximately 99.9 percent of Americans have access to one of these services, including 99.3 percent in rural areas and nearly all Americans in urban areas. With respect to fixed 25 Mbps/3 Mbps *or* 10 Mbps/3 Mbps LTE, approximately 3.6 million Americans in the evaluated areas lack access to one of these services when satellite deployment is included. Overall, 98.8 percent of Americans in the

[156] As with Tables 2b and 3b above, Table 3d reports the results of our analysis based not on the total U.S. population, but on a sub-sample of the total U.S. population where certain counties are excluded for lack of reliable Ookla data, and the U.S. Territories are separately reported.

[157] *See* FCC, Fixed Broadband Deployment Data from FCC Form 477, Data as of December 31, 2016, https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477 (last visited Jan. 17, 2018).

evaluated areas have access to one service, including 93.5 percent in evaluated rural areas and 99.8 percent in evaluated urban areas.

4. Additional Deployment Estimates

57. Table 4 shows deployment from 2012 through 2016 of fixed terrestrial services at 10 Mbps/1 Mbps, 25 Mbps/3 Mbps and 50 Mbps/5 Mbps. By presenting data for speed tiers in addition to our current benchmark, we are able to provide a more holistic look at the pace and patterns of broadband deployment. As of December 2016, fixed terrestrial service of 10 Mbps/1 Mbps is available to 96 percent of all Americans, up from 92.8 percent in 2012. Meanwhile, fixed terrestrial 25 Mbps/3 Mbps service is available to 92.3 percent of the population overall, up from 81.2 percent in 2012, and deployment of fixed terrestrial 50 Mbps/5 Mbps service is available to 90.8 percent of the population, up from 49.7 percent in 2012. Deployment in rural and Tribal lands lags behind that of urban areas at all three speeds, but the data shows year-over-year improvements at all three speeds in these areas.

Table 4
Deployment (Millions) of Fixed Terrestrial Services at Different Speed Tiers (2012-2016)

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
Fixed 10 Mbps/1 Mbps										
United States	290.731	92.8%	294.244	93.2%	297.826	93.7%	303.201	94.7%	309.614	96.0%
Rural Areas	41.761	69.0	42.573	69.7	46.219	75.0	48.942	78.6	52.767	83.9
Urban Areas	248.970	98.5	251.671	98.9	251.608	98.2	254.258	98.5	256.847	98.9
Tribal Lands	2.460	63.5	2.622	67.1	2.709	68.9	2.970	74.9	3.264	81.8
Fixed 25 Mbps/3 Mbps										
United States	254.395	81.2%	263.971	83.6%	284.277	89.4%	286.911	89.6%	297.766	92.3%
Rural Areas	27.694	45.7	29.077	47.6	37.202	60.4	37.795	60.7	43.604	69.3
Urban Areas	226.701	89.7	234.893	92.3	247.075	96.4	249.116	96.5	254.162	97.9
Tribal Lands	1.247	32.2	1.449	37.1	2.250	57.2	2.289	57.8	2.578	64.6
Fixed 50 Mbps/5 Mbps										
United States	155.692	49.7%	187.416	59.4%	270.771	85.2%	282.364	88.2%	292.804	90.8%
Rural Areas	12.138	20.0	15.571	25.5	32.127	52.1	34.831	55.9	40.252	64.0
Urban Areas	143.553	56.8	171.844	67.5	238.644	93.1	247.533	95.9	252.552	97.3
Tribal Lands	0.204	5.3	1.161	29.7	1.919	48.8	2.116	53.4	2.328	58.3
Pop. Evaluated	313.389	100.0%	315.596	100.0%	317.954	100.0%	320.289	100.0%	322.518	100.0%

58. Table 5 shows deployment on Tribal lands from 2012 through 2016 of both fixed terrestrial 25 Mbps/3 Mbps service and mobile LTE service with a speed of at least 5 Mbps/1 Mbps. Overall, in 2016, 63.9 percent of Tribal lands have access to fixed terrestrial 25 Mbps/3 Mbps services

and mobile LTE services with a speed of 5 Mbps/1 Mbps based on Form 477 data, while in 2012 (based on SBI data), 28.8 percent of all Tribal lands had such access.[158] Rural areas continue to lag behind urban areas, with only 40.9 percent of all Tribal lands in rural areas having access to both services, as compared to 88.5 percent of Tribal lands in urban areas.

Table 5
Deployment (Ten Thousands) on Tribal Lands with Access to Fixed Terrestrial 25 Mbps/3 Mbps Services and Mobile LTE with a Speed of 5 Mbps/1 Mbps

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
All Tribal Lands	111.653	28.8%	138.505	35.5%	221.177	56.2%	225.788	57.0%	254.954	63.9%
Rural Areas	14.228	7.2	28.306	14.1	59.658	29.5	61.377	30.1	84.452	40.9
Urban Areas	97.425	51.5	110.198	57.9	161.519	84.5	164.412	85.6	170.502	88.5
Alaskan Villages	0.022	0.1%	7.126	28.2%	11.329	44.4%	11.027	42.7%	13.483	51.5%
Rural Areas	0.013	0.1	2.113	13.1	4.214	25.8	3.920	23.7	6.096	36.2
Urban Areas	0.010	0.1	5.013	54.9	7.115	77.4	7.107	76.7	7.387	79.0
Hawaiian Homelands	2.850	89.8%	2.924	90.6%	3.169	96.9%	2.955	88.9%	2.961	88.6%
Rural Areas	0.250	50.9	0.235	45.0	0.455	83.0	0.246	43.9	0.250	43.5
Urban Areas	2.600	96.9	2.688	99.4	2.715	99.8	2.709	98.0	2.711	98.0
Lower 48 States	21.111	19.9%	32.069	30.0%	41.861	38.8%	45.187	41.5%	49.278	44.6%
Rural Areas	5.680	8.1	13.364	18.9	18.512	25.8	20.668	28.4	23.360	31.6
Urban Areas	15.432	43.0	18.705	51.9	23.349	64.8	24.519	67.8	25.918	71.2
Tribal Statistical Areas	87.669	34.6%	96.386	37.8%	164.818	64.2%	166.619	64.5%	189.232	73.0%
Rural Areas	8.285	7.4	12.594	11.2	36.477	32.1	36.542	32.0	54.746	47.6
Urban Areas	79.384	56.1	83.793	58.8	128.341	89.7	130.077	90.3	134.486	93.3

[158] We again note that the results reported for 2012 and 2013 are based upon SBI data for mobile services at *maximum* advertised speeds of 6 Mbps/768 kbps as compared to the Form 477 data which are based on *minimum* advertised speeds of 5 Mbps/1 Mbps. *See supra* Section IV.A.

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
Pop. Evaluated	387.603	100%	390.508	100%	393.310	100%	396.401	100%	399.114	100%

59. Table 6 presents deployment data for fixed terrestrial 25 Mbps/3 Mbps service and mobile LTE service with a speed of at least 5 Mbps/1 Mbps from 2012 through 2016 for the U.S. Territories. The data show that as of December 2016, 83 percent of Americans in the U.S. Territories had access to 25 Mbps/3 Mbps fixed terrestrial service and 5 Mbps/1 Mbps mobile LTE, which represented an increase of approximately 53 percentage points from 2012. However, we note that the 2016 data may significantly overstate current deployment in the U.S. Territories due to the inclusion of Puerto Rico and the U.S. Virgin Islands, which account for over 92 percent of the total combined population of the U.S. Territories. Although the Form 477 data as of December 31, 2016 suggest that fixed 25 Mbps/3 Mbps and mobile LTE 5 Mbps/1 Mbps services were deployed in Puerto Rico and the U.S. Virgin Islands, we are uncertain as to the current deployment of services in these areas due to infrastructure damage from Hurricanes Maria and Irma.[159] We note that the data presented in Table 6 appear to show some potential anomalies with respect to the fixed terrestrial services data. First, the data show a decrease of 30 percentage points in rural areas between 2013 and 2014, which could reflect differences in SBI and Form 477 methodologies.[160] In addition, the Form 477 fixed data for 2015 show a significant decrease in fixed deployment in the U.S. Territories from 2014 to 2015, and show a subsequent increase in deployment above the 2014 deployment levels from 2015 to 2016. The changes in reported deployment from December 2014 to December 2016 are likely due to fluctuations in the Form 477 data from providers in Puerto Rico during this time period and may not reflect actual changes in deployment.

Table 6
Deployment (Millions) in U.S. Territories of Fixed Terrestrial 25 Mbps/3 Mbps and Mobile LTE with a Speed of 5 Mbps/1 Mbps

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
Fixed Terrestrial 25 Mbps/3 Mbps										
U.S. Territories	1.274	31.8%	2.627	66.2%	3.217	82.4%	2.368	61.5%	3.151	83.2%
Rural Areas	0.210	81.8	0.218	85.5	0.135	53.5	0.095	38.1	0.143	57.9
Urban Areas	1.064	28.4	2.409	64.9	3.082	84.4	2.273	63.1	3.008	85.0
Mobile LTE with a Speed of 5 Mbps/1 Mbps										
U.S. Territories	3.884	96.9%	3.866	97.5%	3.762	96.3%	3.701	96.1%	3.717	98.2%
Rural Areas	0.219	85.1	0.228	89.5	0.226	89.4	0.224	89.5	0.230	93.0
Urban Areas	3.665	97.7	3.638	98.1	3.537	96.8	3.477	96.5	3.487	98.6

[159] *See supra* Section IV.A.

[160] The data from 2013 is SBI data while the data from 2014 is Form 477 data.

	2012		2013		2014		2015		2016	
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.	%
Fixed Terrestrial 25 Mbps/3 Mbps and Mobile LTE with a Speed of 5 Mbps/1 Mbps										
U.S. Territories	1.211	30.2%	2.576	65.0%	3.214	82.3%	2.365	61.4%	3.147	83.1%
Rural Areas	0.183	71.1	0.199	78.0	0.132	52.3	0.093	37.0	0.139	56.2
Urban Areas	1.028	27.4	2.377	64.1	3.082	84.3	2.272	63.1	3.008	85.0
Fixed Terrestrial 25 Mbps/3 Mbps or Mobile LTE with a Speed of 5 Mbps/1 Mbps										
U.S. Territories	3.948	98.5%	3.917	98.8%	3.766	96.4%	3.704	96.1%	3.722	98.3%
Rural Areas	0.246	95.9	0.247	97.0	0.229	90.5	0.227	90.5	0.234	94.6
Urban Areas	3.701	98.7	3.669	98.9	3.537	96.8	3.477	96.5	3.488	98.6

C. Demographic Data

60. Table 7 compares the available demographic data across urban, rural, and Tribal lands for Americans with and without access to both fixed terrestrial 25 Mbps/3 Mbps service and mobile LTE with a minimum advertised speed of 5 Mbps/1 Mbps in 2016. Americans with access to these services typically live in census block groups with a lower percentage of households living in poverty, and with higher average populations, population densities, per capita incomes, and median household incomes than Americans living in areas without access to these services.

Table 7
Comparison of Demographic Data Between Areas with and without Fixed Terrestrial 25 Mbps/3 Mbps Services and Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps[161]

	Average Population	Average Population Density	Average Per Capita Income ($2016)	Average Median Household Income ($2016)	Average Poverty Rate
United States (All Areas)					
With Access	1,498.4***	7,621.9***	$30,812.65***	$63,167.03***	15.0%***
Without Access	1,407.7	1,100.9	$25,363.26	$50,629.48	15.8%
U.S. Rural Areas					
With Access	1,437.8***	216.0***	$30,385.91***	$62,163.65***	11.1%***
Without Access	1,312.1	79.1	$25,350.53	$50,775.16	14.4%
U.S. Urban Areas					
With Access	1,504.2***	8,327.7***	$30,853.29***	$63,263.70***	15.4%***
Without Access	1,622.2	3,396.2	$25,392.10	$50,290.76	19.0%
Tribal Lands					
With Access	1,363.5	2,208.2***	$25,545.06***	$49,664.58***	17.0%***
Without Access	1,334.7	278.5	$21,299.63	$43,962.16	21.0%
Tribal Rural Areas					
With Access	1,367.2	174.3***	$25,010.78***	$50,139.99***	16.2%***
Without Access	1,320.2	79.2	$21,460.70	$44,095.06	20.6%
Tribal Urban Areas					
With Access	1,362.7	2,671.9***	$25,665.36***	$49,557.39***	17.2%***
Without Access	1,385.3	971.3	$20,742.71	$43,499.45	22.3%

We test for a statistical difference in the reported means between areas with and without access. The level of statistical significance is indicated by a superscript: * signifies statistical significance at a 90% level of confidence, ** signifies statistical significance at a 95% level of confidence, and *** signifies statistical significance at a 99% level of confidence.

[161] To compare the demographic data between areas with and without these services, we aggregate the census block data up to the census block group level, the lowest aggregation level for which demographic information is available. Because this aggregation can result in rural and urban census blocks falling within the same census block group, we designate a census block group as rural if more than 50 percent of the population in the census block group resides in rural areas. In addition, the aggregation of census blocks up to the census block group level can result in the aggregation of census blocks with and without access to these services falling within a census block group. We designate a census block group as without access if more than five percent of the population in the census block group is without services.

61. Table 8 compares the available demographic data across urban, rural, and Tribal lands for Americans with and without access to both fixed terrestrial 25 Mbps/3 Mbps service and mobile LTE service with a median speed of 10 Mbps/3 Mbps in 2016. Like Table 7, Table 8 shows that Americans with access to these services typically live in census block groups with a lower percentage of households living in poverty, and with higher average populations, population densities, per capita incomes, and median household incomes than Americans living in areas without access to these services.

Table 8
Comparison of Demographic Data Between Areas with and without Fixed Terrestrial 25 Mbps/3 Mbps Services and Mobile LTE with a Median Speed of 10 Mbps/3 Mbps[162]

	Average Population	Average Population Density	Average Per Capita Income ($2016)	Average Median Household Income ($2016)	Average Poverty Rate
United States (All Areas)					
With Access	1,509.5***	8,378.6***	$31,743.58***	$65,198.39***	14.7%***
Without Access	1,413.1	2,131.3	$25,926.11	$52,491.68	16.0%
U.S. Rural Areas					
With Access	1,552.9***	222.6***	$32,693.71***	$68,394.65***	9.5%***
Without Access	1,234.4	99.8	$26,384.25	$53,335.00	13.5%
U.S. Urban Areas					
With Access	1,506.8***	8,897.1***	$31,683.36***	$64,993.61***	15.0%***
Without Access	1,583.0	4,064.1	$25,489.00	$51,671.95	18.4%
Tribal Lands					
With Access	1,361.6**	2,425.9***	$26,765.87***	$51,779.18***	16.4%***
Without Access	1,285.2	610.9	$21,754.84	$45,033.15	20.3%
Tribal Rural Areas					
With Access	1,470.6***	148.8***	$26,875.93***	$53,703.25***	14.5%***
Without Access	1,229.8	87.4	$21,722.81	$45,170.98	20.3%
Tribal Urban Areas					
With Access	1,345.0	2,776.4***	$26,749.08***	$51,484.94***	16.7%***

[162] To compare the demographic data between areas with and without these services, we aggregate the census block data up to the census block group level, the lowest aggregation level for which demographic information is available. Because this aggregation can result in rural and urban census blocks falling within the same census block group, we designate a census block group as rural if more than 50 percent of the population in the census block group resides in rural areas. In addition, the aggregation of census blocks up to the census block group level can result in census blocks with and without access to these services falling within a census block group. We designate a census block group as without access if more than five percent of the population in the census block group is without services.

	Average Population	Average Population Density	Average Per Capita Income ($2016)	Average Median Household Income ($2016)	Average Poverty Rate
Without Access	1,397.9	1,675.1	$21,819.49	$44,752.56	20.2%

We test for a statistical difference in the reported means between areas with and without access. The level of statistical significance is indicated by a superscript: * signifies statistical significance at a 90% level of confidence, ** signifies statistical significance at a 95% level of confidence, and *** signifies statistical significance at a 99% level of confidence.

62. Table 9 shows how the average proportion of the population with access to fixed terrestrial 25 Mbps/3 Mbps service and mobile LTE service with a minimum advertised speed of 5 Mbps/1 Mbps varies with the county-level median household income, the county-level population density, the county-level poverty rate, and the proportion of the population categorized as living in a rural area in 2016. On average, the proportion of the population with access to each type of service is highest in counties with the highest median household income, the highest population density, the lowest poverty rate, and the lowest rural population rate.

Table 9
Average Percentage of Population with Fixed Terrestrial 25 Mbps/3 Mbps Service and Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps by County Level Demographic Variable

	Fixed Services	Mobile LTE	Fixed Services and Mobile LTE
County Median Household Income ($2016)			
First Quartile (Lowest Median Household Income)	58.2%	95.4%	56.2%
Second Quartile	69.7	98.1	69.3
Third Quartile	76.2	97.6	75.3
Fourth Quartile (Highest Median Household Income)	84.1	97.7	83.6
County Population Density			
First Quartile (Lowest Population Density)	55.4%	92.4%	53.4%
Second Quartile	63.1	97.7	61.9
Third Quartile	75.9	98.7	75.2
Fourth Quartile (Highest Population Density)	93.8	99.9	93.8
County Poverty Rate			
Fourth Quartile (Highest Poverty Rate)	61.9%	96.1%	60.2%
Third Quartile	72.4	97.7	71.8
Second Quartile	73.5	98.0	73.0
First Quartile (Lowest Poverty Rate)	80.4	97.1	79.4

	Fixed Services	Mobile LTE	Fixed Services and Mobile LTE
County Rural Population Rate			
Fourth Quartile (Highest Rural Population Rate)	52.8%	92.4%	50.3%
Third Quartile	65.6	97.8	64.7
Second Quartile	77.5	98.8	77.2
First Quartile (Lowest Rural Population Rate)	92.3	99.7	92.1

63. Table 10 shows how the average proportion of the population with access to fixed terrestrial services by speed tier varies with county-level median household income, county-level population density, the county-level poverty rate, and the proportion of the population categorized as living in a rural area in 2016. On average, the proportion of the population with access to each speed tier is highest in counties with the highest median household income, the highest population density, the lowest poverty rate, and the lowest rural population rate.

Table 10
Average Percentage of Population with Fixed Terrestrial Services by County Level Demographic Variable

	10 Mbps/ 1 Mbps	25 Mbps/ 3 Mbps	50 Mbps/ 5 Mbps
County Median Household Income ($2016)			
First Quartile (Lowest Median Household Income)	76.4%	58.2%	53.7%
Second Quartile	85.5	69.7	64.6
Third Quartile	89.3	76.2	71.0
Fourth Quartile (Highest Median Household Income)	91.8	84.1	80.2
County Population Density			
First Quartile (Lowest Population Density)	79.0%	55.4%	47.8%
Second Quartile	79.6	63.1	57.5
Third Quartile	87.8	75.9	71.9
Fourth Quartile (Highest Population Density)	96.6	93.8	92.3
County Poverty Rate			
Fourth Quartile (Highest Poverty Rate)	77.9%	61.9%	57.6%
Third Quartile	86.0	72.4	67.7
Second Quartile	87.9	73.5	68.5
First Quartile (Lowest Poverty Rate)	91.2	80.4	75.8

	10 Mbps/ 1 Mbps	25 Mbps/ 3 Mbps	50 Mbps/ 5 Mbps
County Rural Population Rate			
Fourth Quartile (Highest Rural Population Rate)	75.0%	52.8%	45.8%
Third Quartile	81.6	65.6	60.4
Second Quartile	89.6	77.5	73.1
First Quartile (Lowest Rural Population Rate)	96.7	92.3	90.3

D. International Data

64. The *Sixth International Broadband Data Report* compares fixed and mobile broadband speeds, prices, and deployment in the United States with up to 28 selected countries (which are all members of the Organization for Economic Cooperation and Development (OECD)) to the extent data are available.[163] With regard to speeds, the *Sixth International Broadband Data Report* presents data on actual fixed and mobile broadband speeds based on data gathered by Ookla,[164] which are collected primarily from software-based tests on an end user's device using speedtest.net. With regard to pricing, the report improves upon our pricing comparison from previous reports by providing a more comprehensive assessment of the competitiveness of broadband in each country and the value that broadband providers are delivering to consumers. With regard to deployment, the report includes a comparison of high-speed fixed and mobile broadband deployment in the United States and in Europe. More generally, the international comparisons of broadband speeds, prices, and deployment summarized below reflect that the sources, definitions, and/or time periods of available data often differ by country and by dataset.[165]

65. *Speeds.* The *Sixth International Broadband Data Report* presents data on actual fixed and mobile broadband speeds based on data gathered by Ookla for the United States and 27 comparison countries for a ranking of fastest actual speed (1st) to slowest (28th).[166] The data are aggregated at the city level and include observations in 2014, 2015, and 2016 for both U.S. and international cities. In 2016, with respect to fixed broadband speed, for example, the United States ranked 10th out of a total 28 countries in terms of actual download speeds (55.07 Mbps)[167] when weighted by the number of tests in

[163] The OECD Member countries chosen for the comparison are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Latvia, Luxembourg, Mexico, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

[164] We obtained speed data through a contractual arrangement with Ookla. Ookla Speedtest (Ookla), http://www.speedtest.net (last visited Jan. 17, 2018). Ookla's mobile speed measurements are derived from customer tests run by Ookla Speedtest mobile apps that measure the performance of mobile connections. Ookla Speedtest Mobile Apps, http://www.speedtest.net/mobile/ (last visited Jan. 17, 2018).

[165] The data relied upon in the *Sixth International Broadband Data Report* come from a variety of sources, including contractual arrangements with TeleGeography, S&P Global (formerly SNL Kagan), and Ookla, staff research, and publicly available records. For example, to compare U.S. and European deployment, the *Sixth International Broadband Data Report* relies on Form 477 data as of June 2016 to match the European data as of June 2016, while this Report relies on Form 477 data as of December 2016.

[166] Due to data availability, the broadband speed comparison in the *Sixth International Broadband Data Report* does not include Latvia. *Sixth International Broadband Data Report*, Appendix B at para. 11.

[167] In the *Sixth International Broadband Data Report*, "actual speed" refers to mean actual speed unless otherwise specified. *See id*., Appendix B at para. 2, n.4.

each city—an improvement from a ranking of 11th in 2015 (40.38 Mbps) and 15th in 2014 (28.09 Mbps).[168] In 2016, with regard to actual mobile broadband speeds, the United States ranked 24th out of 28 countries (19.98 Mbps); in 2015, the United States ranked 24th (15.58 Mbps); and in 2014, it ranked 18th (12.62 Mbps).[169] Notwithstanding the reported decline in rank, actual mobile download speeds in the United States increased by approximately 58 percent from 2014 to 2016.[170]

66. *Pricing.* The *Sixth International Broadband Data Report* also examines advertised broadband prices for both fixed and mobile service plans in the United States and up to 28 comparison countries depending on data availability (for a total of up to 29 countries).[171] Between June and August of 2017, staff collected a stratified random sample of advertised prices and terms for almost 3,000 fixed and mobile broadband plans from the websites of broadband providers in the United States and the selected countries.[172] The report ranks the countries by fixed and mobile prices from the least expensive (1st) to most expensive (e.g., 29th) according to three different methodologies. As in previous reports, the first method compares countries according to unweighted average prices for standalone fixed broadband plans within certain download speed ranges and mobile plans within bands of data usage allowances. To more closely match the characteristics of the comparison communities and their broadband offerings with those in the United States, the *Sixth International Broadband Data Report* presents country rankings by two additional methodologies: a broadband price index[173] and a hedonic price index.[174] The additional assessments seek to better assess how the U.S. market is performing relative to other markets after accounting for quality differences as well as market-level cost and demographic differences that are known to affect pricing, such as population density, income, and education levels. The hedonic price index also allows an adjustment for observable differences in broadband quality across countries (e.g., speed and usage limits) and generates prices for a set of standardized broadband plans in every country to produce a price index that accounts for all of these factors and is comparable across countries.[175] The fixed and mobile analyses demonstrate that accounting for country differences in cost, demographic, and quality factors give different assessments of the state of the U.S. broadband economy relative to other countries.

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[168] *Id.*, Appendix B at para. 2.

[169] *Id.*, Appendix B at para. 5.

[170] *Id.*

[171] 47 U.S.C. § 1303(b).

[172] Fixed broadband price data include prices for both standalone broadband and bundles consisting of broadband and video service. Mobile broadband price data include primarily postpaid smartphone plans (both single and shared line) that allowed both unlimited voice calling and texting. Additionally, postpaid plans refer to plans that are paid after usage (i.e., not prepaid or "pay-as-you-go" plans), and smartphone plans refer only to plans that have a data component. *Sixth International Broadband Data Report*, Appendix C at paras. 14-15, and, n.84.

[173] The price index measures the dollar amount that U.S. broadband subscribers would need to have added or subtracted from their incomes to purchase the same basket of broadband services under the pricing structures in other countries. Quantity weights for the price index are the share of broadband subscribers in the United States that subscribe to each of the four broadband speed tiers chosen for analysis. *See id*., Appendix C at paras. 23-28.

[174] A hedonic regression provides an empirical summary of how prices vary with the characteristics of a good. In the *Sixth International Broadband Data Report*, the hedonic regression builds on the price index by allowing adjustment of prices for cost and demographic differences across countries and then predicting broadband prices for each country at the average U.S. values of these variables. *Id.*, Appendix C at paras. 29-32.

[175] The pricing analysis in the *Sixth International Broadband Data Report* is designed to account for: (1) the different costs of deploying and operating broadband networks; (2) demographic differences that affect demand for broadband service; (3) multi-product bundling in broadband pricing; (4) different product offerings in each country; and (5) the availability and quality of complementary content and applications. *Id.*, Appendix C at para. 7.

67. For fixed broadband prices, under the first method comparing unweighted average prices, the *Sixth International Broadband Data Report* finds that the United States ranks 18th out of 23 countries that offer fixed standalone broadband plans with download speeds of at least 25 Mbps and less than 100 Mbps, and 26th out of 28 countries that have fixed standalone plans with download speeds of 100 Mbps or greater.[176] When taking into account fixed broadband bundled with video service, the United States ranks 10th out of 20 countries with download speeds of at least 25 Mbps and less than 100 Mbps.[177] For the highest speed bundle plans with download speeds of 100 Mbps or greater, fixed broadband in the United States ranks 23rd out of 25 countries that offer such plans.[178] Using the second approach, the fixed broadband price index analysis, the United States ranks 21st out of 29 countries aggregating both standalone and bundled broadband products.[179] However, using the third approach, the fixed hedonic price index analysis that adjusts for cost, demographic, and quality differences across the countries, shows that the United States ranks 7th out of the 29 countries.[180]

68. For mobile broadband prices, under the first method, the United States ranks 18th out of 22 countries based on unweighted average prices of individual plans with usage allowances of 2 GB or less.[181] For the highest usage individual plans with data usage allowances greater than 10 GB, the United States ranks 21st out of the 28 countries that offer such plans.[182] According to the second method, the mobile broadband price index, the United States ranks 25th out of the 29 countries in individual plan pricing, and 18th out of the 29 countries in shared data plan pricing (i.e., "family plans" with multiple lines).[183] Combining individual and shared data plan pricing, the overall rank of the United States is 20th out of the 29 countries in the mobile broadband price index.[184] Relying on the third approach, the mobile hedonic price index that adjusts for country-level cost, demographic, and quality differences, the United States ranks 10th out of the 29 countries.[185]

69. *High-Speed Broadband Deployment*. The *Sixth International Broadband Data Report* relies on the Form 477 deployment data to present fixed-terrestrial "high-speed" broadband deployment at download speeds of 30 Mbps or higher to match and compare the available European Union data.[186] The *Sixth International Broadband Data Report* compares international fixed high-speed broadband deployment in the United States and 21 European countries (EU21).[187] To match the fixed technologies used in the *EC Broadband Report*, the *Sixth International Broadband Data Report* does not include

[176] *Id.*, Appendix C at para. 22, Tbl. 1b.

[177] *Id.*, Appendix C at para. 70, Tbl. C6.

[178] *Id.*

[179] *Id.*, Appendix C at paras. 4, 28, Tbl. 3.

[180] *Id.*, Appendix C at paras. 4, 32, Tbl. 4.

[181] *Id.*, Appendix C at paras. 5, 47, Tbl. 5.

[182] *Id.*

[183] *Id.*, Appendix C at paras. 5, 52, Tbl. 7.

[184] *Id.*

[185] *Id.*, Appendix C at paras. 5, 54, Tbl. 8.

[186] *Id.*, Appendix D at para. 1. For an appropriate comparison, the *Sixth International Broadband Data Report* uses the European Union's definition of "high-speed" broadband, which is 30 Mbps. *Id.*

[187] The deployment comparison in the *Sixth International Broadband Data Report* assesses 21 countries that overlap with the European countries selected for the comparison overall (rather than all of the European countries presented in the European Union data). *Sixth International Broadband Data Report*, Appendix D at para. 1; European Commission, Broadband Coverage in Europe 2016: Mapping Progress Towards the Coverage Objectives of the Digital Agenda (2017) (*EC Broadband Report*), https://ec.europa.eu/digital-single-market/en/news/study-broadband-coverage-europe-2016.

satellite technology in the comparison of U.S. and European deployment.[188] The report relies on data gathered in June 2015 and June 2016 by the FCC and the European Commission. With respect to fixed-terrestrial high-speed broadband deployment, as of June 2016, the United States led Europe in both non-rural and rural areas, with 90 percent of all U.S. households having access compared to 76 percent of all households in the EU21 countries.[189] By June 2016, 62 percent of rural households in the United States had access to fixed-terrestrial high-speed broadband services, compared to 41 percent of rural households in the EU21 countries.[190] The report also presents mobile LTE broadband coverage in the United States and the EU21. As of June 2016, mobile LTE coverage in the United States reached nearly 100 percent of all households and 98 percent of rural households.[191] In the EU21, by June 2016, mobile LTE coverage reached 97 percent of all households and 83 percent of rural households.[192]

E. Schools and Classrooms Data

70. As supported by the record,[193] we continue to measure availability of advanced telecommunications capability in "elementary and secondary schools and classrooms"[194] using a short-term and long-term goal for broadband connectivity to schools of 100 Mbps per 1,000 students and staff and 1 Gbps per 1,000 students and staff, respectively.[195] According to the *2017 State of the States Report*, 94 percent of school districts, 88 percent of schools, and 39.2 million students, now meet the Commission's short-term connectivity goal of 100 Mbps per 1,000 users, up from 24.5 million students in 2015 and 34.9 million students in 2016.[196] Thus, six percent of public school districts and 6.5 million students are not receiving broadband service that meets the short-term connectivity goal and 10,000 schools report insufficient Wi-Fi networks in their classrooms.[197] This data is generally consistent with the responses to the CoSN survey showing that four percent of school districts report that none of their schools meet the Commission's short-term connectivity goals.[198] Regarding the long-term connectivity goal for schools, the *2017 State of the States Report* estimates that, based on the most recent FCC Form 471 data, 22 percent of school districts currently meet the goal, which is up from just nine percent in 2015.[199]

71. The *2017 State of the States Report* findings also indicate that the ability to meet connectivity targets is not uniform across different types of school districts. The report estimates that 97 percent of schools have access to fiber and that 88 percent of schools report having sufficient Wi-Fi

[188] *EC Broadband Report* at 11; *Sixth International Broadband Data Report*, Appendix D at para. 9 & n.26.

[189] *Sixth International Broadband Data Report*, Appendix D at para. 12 and Fig. 2.

[190] *Id.*, Appendix D at para. 14 and Fig. 4.

[191] *Id.*, Appendix D at para. 21.

[192] *Id.*

[193] *See, e.g.*, CoSN Comments at 2; EdLiNC Comments at 1-4; SHLB Reply Comments at 5.

[194] 47 U.S.C. § 1302(b).

[195] *See Modernizing the E-rate Program for Schools and Libraries*, WC Docket No. 13-184, Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 8870, 8885, para. 34 (2014) (*2014 E-rate Order*).

[196] *See 2017 State of the States Report* at 6, 18. EducationSuperHighway reports the Commission's short-term goal in terms of 100 kbps per user rather than 100 Mbps per 1,000 users. *2014 E-rate Order*, 29 FCC Rcd at 8885, para. 34.

[197] *2017 State of the States Report* at 9.

[198] *CoSN 2017 Annual Infrastructure Survey Report* at 5. CoSN's survey is based on survey results from 445 districts. Of those districts, 85 percent stated that they were meeting the Commission's short-term connectivity goal in all of their schools. *Id.*

[199] *2017 State of the States Report* at 12.

networks in their classrooms in 2017.[200] While EducationSuperHighway estimates that 2,049 schools still need access to fiber in order to meet connectivity goals, that number is down significantly from 2015, when 9,500 schools lacked such a connection.[201] Over three-quarters of the 2,049 schools that lack access to fiber infrastructure necessary to meet short term goals are rural or small-town schools.[202] According to the *2017 State of the States Report*, when these school districts sought fiber services in 2016, nearly half did not receive any bids from service providers.[203] Similarly, CoSN's report found that 52 percent of rural respondents only had one available provider, compared to 13 percent of urban respondents.[204]

F. Adoption Data

72. Prior reports have included an assessment of a number of factors indicative of fixed broadband availability, including adoption by consumers.[205] More to the point, adoption also is necessarily a lower bound on deployment and therefore may help guide our inquiry into deployment.

73. Table 11 shows the overall adoption rates, using Form 477 subscribership data, from 2012 through 2016 for fixed terrestrial services for the U.S. as a whole, urban and non-urban core areas,[206] and Tribal lands.[207] The data show year-to-year increases across the vast majority of areas, including Tribal lands, for adoption of 10 Mbps/3 Mbps, 25 Mbps/3 Mbps, and 50 Mbps/3 Mbps fixed

[200] *Id.* at 6. EducationSuperHighway makes a number of assumptions in calculating how many schools lack access to fiber. *See 2017 State of the States Methodology* at 9-10.

[201] *2017 State of the States Report* at 13.

[202] *Id.*

[203] *Id.* at 14.

[204] *CoSN 2017 Annual Infrastructure Survey Report* at 12. CoSN uses a different definition of rural from the designation used for FCC Form 471 applications. CoSN's analysis divides schools into one of four categories—city, suburban, small town, and rural—according to the National Center for Education Statistics classifications. For the purposes of E-rate applications, Commission rules designate "urban" schools and libraries as schools and libraries located in an "Urbanized Area" or "Urban Cluster" with a population of 25,000 or more as determined by the U.S. census bureau, and designate all non-urban entities as rural.

[205] *See, e.g.*, *2015 Report*, 30 FCC Rcd at 1411, para. 65; *2012 Report*, 27 FCC Rcd at 10363, para. 27; *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*, GN Docket No. 10-159, Seventh Broadband Progress Report and Order on Reconsideration, 26 FCC Rcd 8008, 8020-21, paras. 18-20 (2011). The Commission has previously found that deployment, competition, and adoption are tightly linked. *2015 Report*, 30 FCC Rcd at 1455, para. 141.

[206] A census tract is designated as "Urban Core" if it has a land area less than three square miles and a population density of at least 1,000 people per square mile. A census tract is designated as "Non-Urban Core" if we have not designated the census tract as Urban Core.

[207] The adoption rate is the ratio of the total number of subscribers to fixed services meeting that reported speed threshold, divided by the number of households with access to fixed services meeting the reported speed threshold. *See infra* Appendix C. We have insufficient information to determine the proportion of the population with access to 50 Mbps/5 Mbps prior to December 31, 2014 because of the limitations of the data at that time. See *2015 Report*, 30 FCC Rcd at 1413, para. 69 n.278. The reported adoption rates for 2014 to 2016 are based upon the FCC Form 477 deployment data and subscriber data as of December 31, 2014, December 31, 2015, and December 31, 2016. The reported adoption rates for 2012 to 2013 are based upon the SBI Deployment data as of December 31, 2012, and December 31, 2013, and the FCC Form 477 subscriber data as of December 31, 2012, and December 31, 2013. For the years 2012 to 2013, a 768 kbps upload speed is used as a proxy for a 1 Mbps upload speed because this is the speed closest to 1 Mbps that was collected in the SBI data collection and the FCC's Form 477 data during this time period. See *id.*, 30 FCC Rcd at 1413.

terrestrial services.[208]

Table 11
Overall Adoption Rate for Fixed Terrestrial Services (2012-2016)

	2012	2013	2014	2015	2016
Fixed 10 Mbps/1 Mbps					
United States	43.1%	53.4%	55.8%	62.0%	66.2%
Non-Urban Core Areas	40.6	48.9	49.6	55.4	60.1
Urban Core Areas	45.0	56.7	60.5	67.0	71.1
Tribal Lands	26.0%	33.0%	37.5%	41.1%	42.2%
Non-Urban Core Areas	32.9	41.6	46.0	56.8	59.0
Urban Core Areas	22.5	28.9	33.5	34.6	35.9
Fixed 25 Mbps/3 Mbps					
United States	11.1%	29.7%	38.2%	48.3%	53.3%
Non-Urban Core Areas	11.4	28.5	34.0	43.5	48.5
Urban Core Areas	11.0	30.4	41.0	51.5	56.9
Tribal Lands	6.5%	31.9%	28.5%	31.7%	32.6%
Non-Urban Core Areas	6.7	36.6	33.9	37.1	39.4
Urban Core Areas	6.4	27.8	25.3	28.5	29.2
Fixed 50 Mbps/5 Mbps					
United States	N.A.	N.A.	24.6%	34.1%	44.2%
Non-Urban Core Areas	N.A.	N.A.	19.5	28.1	40.7
Urban Core Areas	N.A.	N.A.	27.8	38.0	46.7
Tribal Lands	N.A.	N.A.	22.7%	25.0%	28.2%
Non-Urban Core Areas	N.A.	N.A.	28.9	32.0	34.9
Urban Core Areas	N.A.	N.A.	18.0	20.4	24.4

74. Table 12 reports average county level overall adoption rates for fixed terrestrial services by speed tier against the quartile ranking for median household income, population density, the poverty rate, and the proportion of the population that resides in a rural area. These data suggest that the average household adoption rate increases with median household income and population density, although the adoption rate decreases as the poverty rate and rural population rate increase.

[208] Prior to the Commission's revision of the Form 477 data collection, which is reflected for the first time in the 2014 data, Form 477 filers did not report subscribers specifically at a 50 Mbps/5 Mbps (or above) service tier. Therefore, we are unable to provide adoption rates for 50 Mbps/5 Mbps service prior to 2014. To be clear, this does not indicate there were no subscribers in 2012 and 2013 that received service at 50 Mbps/5 Mbps or above.

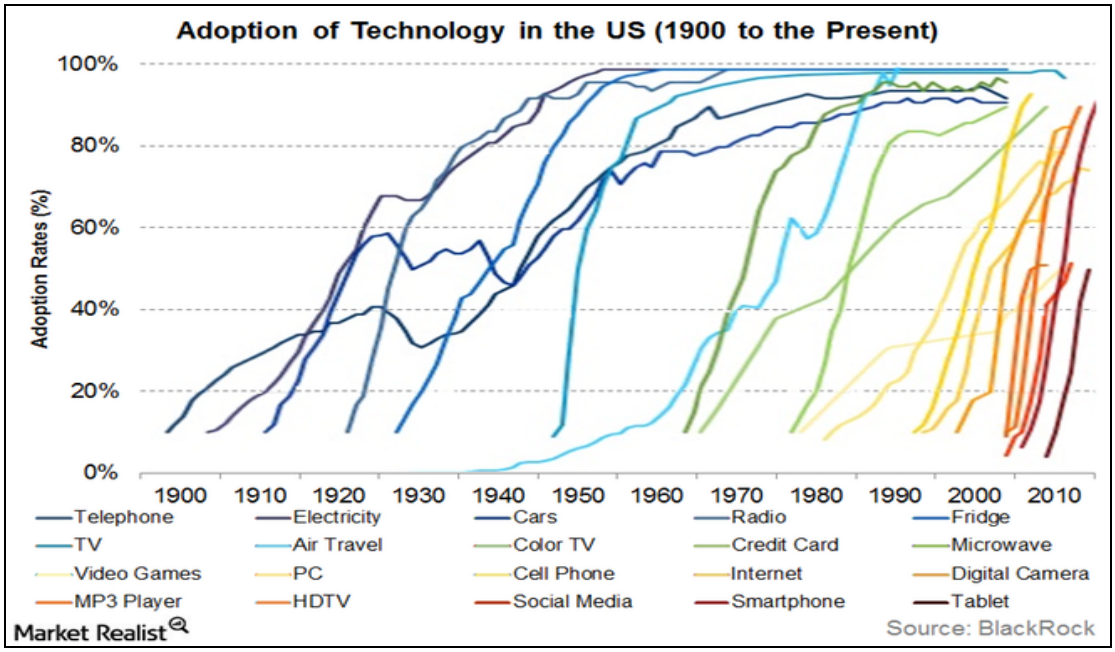
Table 12
Average County Overall Adoption Rate for Fixed Terrestrial Services
by County Level Demographic Variable

	10 Mbps/1 Mbps	25 Mbps/3 Mbps	50 Mbps/5 Mbps
County Median Household Income ($2016)			
First Quartile (Lowest Median Household Income)	28.8%	21.7%	21.1%
Second Quartile	38.9	30.7	25.6
Third Quartile	45.2	32.5	27.4
Fourth Quartile (Highest Median Household Income)	59.7	48.6	42.3
County Population Density			
First Quartile (Lowest Population Density)	34.3%	24.4%	25.5%
Second Quartile	31.4	25.5	21.5
Third Quartile	41.5	32.2	27.5
Fourth Quartile (Highest Population Density)	65.0	50.8	41.4
County Poverty Rate			
First Quartile (Lowest Poverty Rate)	54.9%	43.7%	38.2%
Second Quartile	44.8	37.6	32.1
Third Quartile	41.6	29.8	27.2
Fourth Quartile (Highest Poverty Rate)	31.2	22.6	18.9
County Rural Population Rate			
First Quartile (Lowest Rural Population Rate)	63.5%	51.3%	42.4%
Second Quartile	44.3	37.6	33.9
Third Quartile	33.7	26.5	20.6
Fourth Quartile (Highest Rural Population Rate)	30.7	17.3	18.4

75. The chart below[209] demonstrates typical technology diffusion patterns and how the pace of technological change has accelerated since the beginning of the 21st century. The significantly steeper slope of the curves for technologies introduced more recently indicate faster adoption rates. But also notable is that technology adoption typically increases slowly at first, then experiences a rapid increase, and finally transitions to a slow or even flat pace of increase.[210] For our inquiry this is relevant because it guides us in how we might think about whether the pace of diffusion of advanced telecommunications services is reasonable and timely.

[209] Rick Rieder, *The Topic We Should All Be Paying Attention to (in 3 Charts)*, BlackRock Blog (Dec. 11, 2015), https://www.blackrockblog.com/2015/12/11/economic-trends-in-charts/.

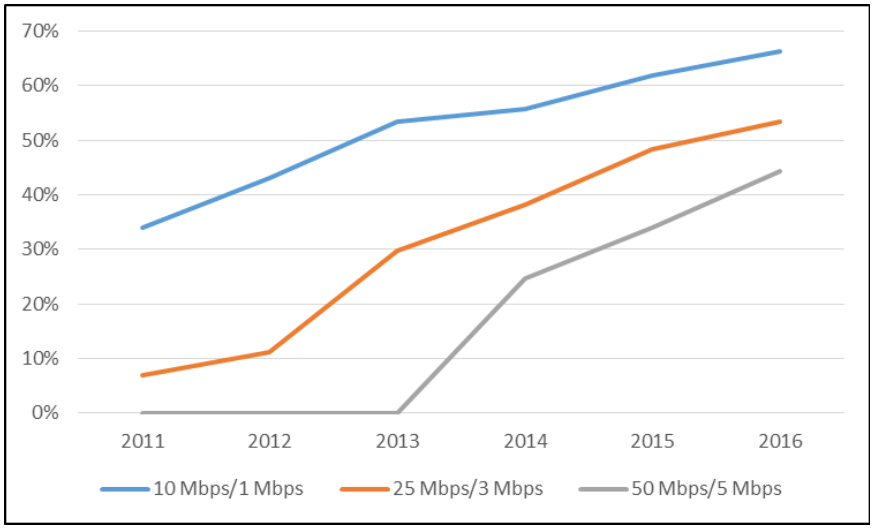
[210] *See* Frank Bass, *A New Product Growth for Model Consumer Durables*, 15 Management Science 215 (1969), https://pubsonline.informs.org/doi/abs/10.1287/mnsc.15.5.215.



76. We now consider the pattern of adoption for various broadband speeds in the United States in recent years.[211] Chart 1 below displays five-year adoption curves for fixed broadband services at varying speeds across the United States. If we evaluate broadband deployment progress by comparing historical adoption rates of other innovative technologies with that for broadband, we see that broadband adoption in many instances has much steeper curves, indicating a more rapid rate of adoption than for other historic technologies such as landline telephones, electricity, or automobiles.

[211] We do not assert that adoption is equivalent to deployment or that analyzing adoption will fulfill our statutory obligation. We do note, however, that as we continue to collect Form 477 *deployment* data, we will be able to chart broadband deployment curves.

Chart 1
Increase in Adoption of Fixed Terrestrial Broadband Services from 2011 to 2016[212]



77. Our Form 477 data show that adoption of service at 25 Mbps/3 Mbps, our current speed benchmark for fixed advanced telecommunications capability, grew from just under 10 percent in 2011 to just over 50 percent in 2016, an increase of approximately 40 percentage points in just five years. This growth rate is similar to that for television adoption rates between 1950 and 1955; though only nine percent of American homes owned television sets in 1950, that figure exploded to 64.5 percent a mere five years later.[213]

78. We note also that smartphone penetration rates have almost doubled over the past five years, from approximately 42 percent in 2011 to approximately 81 percent in 2016.[214] In contrast, landline telephones did not reach 50 percent penetration until the late 1940s,[215] some 70 years after their commercial introduction in 1877,[216] while cable television took almost 20 years to surpass a 50 percent adoption level in the late 1980s.[217] Both landline telephone and cable have some similar characteristics to

[212] As noted previously, the Form 477 data did not provide specific subscribership information for 50 Mbps/5 Mbps service prior to 2014. While subscribership levels for that service between 2011 and 2013 were almost assuredly lower than those for 25 Mbps/3 Mbps service, that does not mean there was zero subscribership of 50 Mbps/5 Mbps service as Chart 1 appears to indicate.

[213] Gordon, Robert J., *The Rise and Fall of American Growth: The U.S. Standard of Living Since the Civil War* (Princeton Univ. Press, 2016) (*American Growth*), at 414-15; *see also id*. at 416 Fig. 12-1. "This increase in percentage ownership [between 1950 and 1955] by 13 points per year is the fastest diffusion of any appliance in history, faster than the smartphone after 2003 or the tablet after 2010." *Id*. at 415. The first U.S. patent for an electric television was issued in 1930, but television technology did not become commercially viable until approximately 1939, when it was introduced at the New York World's Fair. *Id*. at 412-13. The FCC approved commercial standards for television on July 1, 1941, but the United States' subsequent entrance into World War II later that year delayed the expansion of television until after the end of the war. *Id*. at 413.

[214] comScore, *U.S. Smartphone Penetration Surpassed 80 Percent in 2016* (Feb. 3, 2017), https://www.comscore.com/Insights/Blog/US-Smartphone-Penetration-Surpassed-80-Percent-in-2016.

[215] *American Growth* at 431, Figure 12-4.

[216] *Id.* at 181.

[217] *Id.* at 422, Figure 12-3, & 426.

broadband as networks and so provide a particularly interesting point of comparison. Our analysis of whether deployment is reasonable and timely is necessarily qualitative, although we note that advanced telecommunications capability in the United States appears to be progressing at a rapid pace that is better or comparable to other inventions of the past.

V. COMMISSION EFFORTS TO CLOSE THE DIGITAL DIVIDE

79. While more Americans than ever before have access to advanced telecommunications capability, we remain committed to closing the digital divide. The *2016 Report* concluded that deployment of advanced telecommunications capability to all Americans was not reasonable and timely,[218] triggering section 706's mandate to the Commission to "take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market."[219] As described below, since issuing the *2016 Report*, the Commission has undertaken a variety of actions aimed at closing the digital divide.

80. *Wireline Infrastructure.* In April 2017, the Commission adopted a *Notice of Proposed Rulemaking, Notice of Inquiry, and Request for Comment* addressing barriers to investment in and deployment of wireline infrastructure.[220] In November 2017, the Commission adopted a *Report and Order, Declaratory Ruling, and Further Notice of Proposed Rulemaking*.[221] The *Report and Order* addressed pole attachment, copper retirement and 214(a) discontinuance issues. The *Declaratory Ruling* reversed the "functional test" standard to determine if a service is being discontinued, reduced, or impaired under section 214(a). The *Further Notice of Proposed Rulemaking* sought further comment on the issues addressed in the *Report and Order* to continue reducing barriers to broadband deployment.

81. *Wireless Infrastructure.* Also in April 2017, the Commission adopted a *Notice of Proposed Rulemaking and Notice of Inquiry* to comprehensively review the regulatory barriers to wireless network infrastructure deployment and examine how the Commission could act to remove or reduce these barriers.[222] The Commission subsequently adopted a *Report and Order* eliminating the historic preservation review requirement for replacement utility poles that have no potential effect on historic properties. The *Order* also consolidated the Commission's historic preservation review rules and procedures into a single rule.[223] In December 2017, the Commission sought comment on a plan to exclude the collocation of wireless communications equipment on Twilight Towers from routine historic preservation review, in order to make existing infrastructure available for additional wireless deployments.[224]

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[218] *2016 Report*, 31 FCC Rcd at 701-02, 750, paras. 4-5, 119.

[219] 47 U.S.C. § 1302(b).

[220] *Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, WC Docket No. 17-84, Notice of Proposed Rulemaking, Notice of Inquiry, and Request for Comment, 32 FCC Rcd 3266 (2017). (*Wireline Infrastructure NPRM*).

[221] *Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, WC Docket No. 17-84, Report and Order, Declaratory Ruling, and Further Notice of Proposed Rulemaking, FCC 17-154 (rel. Nov. 29, 2017) (*Wireline Infrastructure Order and FNPRM*).

[222] *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, WT Docket No. 17-79, Notice of Proposed Rulemaking and Notice of Inquiry, 32 FCC Rcd 3330 (2017).

[223] *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, WT Docket No. 17-79, Report and Order, 32 FCC Rcd 9760 (2017) (*FCC Streamlines Requirements for Utility Pole Replacements*).

[224] *Comment Sought on Draft Program Comment for the Federal Communications Commission's Review of Collocations on Certain Towers Constructed without Section 106 Review*, WT Docket No. 17-79, Public Notice, FCC 17-165 (WTB Dec. 14, 2017).

82. *Broadband Deployment Advisory Committee*. In March 2017, the Broadband Deployment Advisory Committee (BDAC) was chartered under the Federal Advisory Committee Act for a two-year term to make recommendations on how to accelerate broadband deployment.[225] The BDAC held a two-day meeting in January 2018 and held three meetings in 2017, and has adopted recommendations from several working groups to facilitate broadband deployment relating to pole attachment and federal siting issues.[226] The BDAC's working groups are also developing drafts of state[227] and municipal model codes[228] to encourage broadband deployment.

83. *Alternative Connect America Cost Model and Legacy Rate of Return Carriers*. In the March 2016 *Rate of Return Reform Order*, the Commission established a voluntary path for rate-of-return carriers to receive model-based support for a term of 10 years in exchange for meeting defined buildout obligations.[229] Carriers that did not opt to receive model-based support would receive legacy Connect America Fund Broadband Loop Support and High Cost Loop Support. The *Order* also adopted deployment obligations for all rate-of-return carriers. In December 2016, the Commission adopted an *Order* allocating an additional $500 million in funding over ten years to enable electing carriers to receive model-based support.[230] In April 2017, the Commission adopted an *Order on Reconsideration*[231] allowing carriers to pay for the portion of high-cost projects that exceeds the total project cap with their own funds, rather than disallowing support for such projects altogether.

84. *Connect America Fund Phase II*. The Commission has taken steps to prepare for the Connect America Fund Phase II, which will award up to $1.98 billion over 10 years to service providers that commit to offer voice and broadband services to fixed locations in unserved high-cost areas. In May 2016, the Commission adopted a *Report and Order* establishing high-level rules for the Phase II competitive bidding process.[232] In February 2017, the Commission adopted a *Report and Order and Order on Reconsideration* finalizing bidding rules and establishing weights to compare bids in the auction.[233] In August 2017, the Commission released a *Public Notice* proposing procedures to implement the Phase II auction. The Commission plans for the auction to take place in 2018.[234]

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[225] Broadband Deployment Advisory Committee Charter (March 1, 2017), https://www.fcc.gov/sites/default/files/bdac-charter.pdf; *FCC Announces the Establishment of the Broadband Deployment Advisory Committee and Solicits Nominations for Membership*, Public Notice, 32 FCC Rcd 1037 (2017).

[226] *See* Broadband Deployment Advisory Committee, Approved Recommendations, https://www.fcc.gov/broadband-deployment-advisory-committee.

[227] Broadband Deployment Advisory Committee, Model Code for States – Discussion Draft (Jan. 23-24, 2018), https://www.fcc.gov/sites/default/files/bdac-modelcode-012018.pdf.

[228] Broadband Deployment Advisory Committee, Model Code for Municipalities – Discussion Draft (Jan. 18, 2018), https://www.fcc.gov/sites/default/files/bdac-municipalcode-012018.pdf.

[229] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Report and Order, Order on Reconsideration, and Further Notice of Proposed Rulemaking, 31 FCC Rcd 3087 (2016).

[230] *Connect America Fund*, WC Docket No. 10-90, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 13775 (2016).

[231] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Order on Reconsideration, 32 FCC Rcd 3258 (2017).

[232] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 5949 (2016).

[233] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Report and Order and Order on Reconsideration, 32 FCC Rcd 1624 (2017).

[234] *Comment Sought on Competitive Bidding Procedures and Certain Program Requirements for the Connect America Fund Phase II Auction*, AU Docket No. 17-182, Public Notice, 32 FCC Rcd 6238 (2017).

85. *State-Specific Plans.* To address the availability of broadband service in high-cost areas of Alaska, the Commission adopted a plan in August 2016 to provide Alaskan rate-of-return carriers with the option of receiving fixed amounts of support over the next ten years to deploy and maintain their fixed and mobile networks.[235] In October 2016, the Commission adopted tailored service obligations for the carrier receiving Connect America Fund Phase II frozen support under the Alaska Plan.[236] In January 2017, the Commission allocated up to $170 million over the next decade to the state of New York to expand broadband buildout in eligible areas in coordination with New York's New NY Broadband Program.[237] In October 2017, the Commission pledged up to $77 million to repair communications networks in Puerto Rico and the U.S. Virgin Islands damaged by Hurricane Maria.[238]

86. *Mobility Fund Phase II*. In February 2017, the Commission established a framework for the Mobility Fund Phase II auction, which will allocate up to $4.53 billion over the next decade to advance the deployment of 4G LTE to unserved areas and to preserve service where it might not otherwise exist.[239] In August 2017, the Commission established a challenge process for resolving eligible areas disputes,[240] and shortly thereafter sought comment on procedures to implement the challenge process.[241]

87. *Lifeline.* In March 2016, the Commission adopted reforms to the Lifeline program in the *Third Report and Order, Further Report and Order, and Order on Reconsideration*.[242] The item enabled qualifying low-income consumers to apply the Lifeline monthly subsidy to standalone broadband service and set minimum service standards for broadband and voice services supported by the program. In November 2017, the Commission adopted a *Fourth Report and Order, Order on Reconsideration, Memorandum Opinion and Order, Notice of Proposed Rulemaking, and Notice of Inquiry* targeting enhanced Lifeline support to residents of rural Tribal lands receiving service from facilities-based providers, as well as seeking comment on targeting Lifeline funds to encourage buildout in lower-income communities.[243]

88. *Rural Health Care.* In December 2017, the Commission launched a *Notice of Proposed Rulemaking* to review the Rural Health Care program and sought comment on ways to improve connectivity for health care providers in rural areas including whether to lift the program's funding cap to make additional money available for broadband to rural health care providers. In an accompanying

[235] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 10139 (2016).

[236] *Connect America Fund*, WC Docket No. 10-90, Order, 31 FCC Rcd 12086 (2016).

[237] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Order, 32 FCC Rcd 968 (2017).

[238] *Connect America Fund*, WC Docket No. 10-90, Order, 32 FCC Rcd 7981 (2017).

[239] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 2152 (2017).

[240] *Connect America Fund et al.*, WC Docket Nos. 10-90 et al., Order on Reconsideration and Second Report and Order, 32 FCC Rcd 6282 (2017).

[241] *Comment Sought on Mobility Fund Phase II Challenge Process Procedures and Technical Implementation*, WC Docket No. 10-90, WT Docket No. 10-208, Public Notice, 32 FCC Rcd 7596 (WTB/WCB 2017).

[242] *Lifeline and Link Up Reform and Modernization et al*, WC Docket Nos. 17-287 et al., Third Report and Order, Further Report and Order, and Order on Reconsideration, 31 FCC Rcd 3962 (2016).

[243] *Bridging the Digital Divide for Low-Income Consumers*, WC Docket Nos. 17-287 et al., Fourth Report and Order, Order on Reconsideration, Memorandum Opinion and Order, Notice of Proposed Rulemaking, and Notice of Inquiry, FCC 17-155 (rel. Dec. 1, 2017).

Order, the Commission granted relief to rural health care providers facing potential funding cuts in funding year 2017.[244]

89. *Business Data Services.* In April 2017, the Commission released a *Report and Order* that recognized widespread competition in the business data services market and eliminated pricing regulation and tariffing requirements for most types of business data services.[245]

90. *Spectrum.* In March 2017, the Commission updated technical rules and power limitations in the 800 MHz Cellular band to promote increased broadband deployment.[246] In August 2017, the Commission sought comment on whether increasing construction obligations could help to close the digital divide,[247] and on expanding opportunities for next generation wireless broadband services using spectrum in the range between 3.7 and 24 GHz.[248] In October 2017, the Commission proposed revisions to rules for the 3.5 GHz band designed to facilitate investment in and deployment of 5G networks.[249] In November 2017, the Commission took its most recent step in the *Spectrum Frontiers* proceeding, opening an additional 1,700 MHz of millimeter wave (mmW) spectrum for terrestrial 5G wireless use.[250]

91. *Satellite Issues.* In January 2017, the International Bureau granted ViaSat's request to launch and operate its latest generation satellite, ViaSat-2,[251] which is expected to be operational in early 2018 and is designed to double ViaSat's broadband bandwidth, as well as provide it with seven times the broadband coverage.[252] In June 2017, the Commission adopted an order granting market access to WorldVu d/b/a OneWeb for its non-geostationary satellite orbit (NGSO) fixed-satellite service (FSS) system, which OneWeb plans to use to further its goal to "'provide high-speed, affordable broadband connectivity to anyone, anywhere'" in the United States.[253] The Commission has granted two other NGSO applications since that time.[254] In September 2017, the Commission adopted an updated

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[244] *Promoting Telehealth in Rural America*, WC Docket No. 17-310, Notice of Proposed Rulemaking and Order, FCC 17-164 (rel. Dec 18, 2017).

[245] *Business Data Services in an Internet Protocol Environment et al*., WC Docket No. 16-143 et al., Report and Order, 32 FCC Rcd 3459 (2017) (*2017 Business Data Services Report and Order*).

[246] *Amendment of Parts 1 and 22 of the Commission's Rules with Regard to the Cellular Service, Including Changes in Licensing of Unserved Area et al*., WT Docket No. 12-40 et al., Second Report and Order, Report and Order, and Second Further Notice of Proposed Rulemaking, 32 FCC Rcd 2518 (2017).

[247] *Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services*, WT Docket No. 10-112, Second Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 8874, 8911, para. 100 (2017).

[248] *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Inquiry, 32 FCC Rcd 6373 (2017).

[249] *Promoting Investment in the 3550-3700 MHz Band et al.*, GN Docket No. 17-258 et al., Notice of Proposed Rulemaking and Order Terminating Petitions, 32 FCC Rcd 8071 (2017).

[250] *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, et al.*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, FCC 17-152 (rel. Nov. 22, 2017).

[251] *Policy Branch Information: Actions Taken*, Public Notice, 32 FCC Rcd 347 (IB 2017).

[252] ViaSat Inc., *High Capacity Satellite System: Transforming Satellite Broadband*, https://www.viasat.com/products/high-capacity-satellites (last visited Jan. 9, 2018).

[253] *WorldVu Satellites Limited; Petition for a Declaratory Ruling Granting Access to the U.S. Market for the OneWeb NGSO FSS System*, IBFS File No. SAT-LOI-20160428-00041, Call Sign S2963, Order and Declaratory Ruling, 32 FCC Rcd 5366, 5366, para. 1 (2017).

[254] *See Space Norway AS, Petition for Declaratory Ruling Granting Access to the U.S. Market for the Space Norway NGSO FSS System*, Order and Declaratory Ruling, FCC 17-146 (2017); *Telesat Canada, Petition for Declaratory*

(continued….)

regulatory framework to facilitate the delivery of broadband services through satellite constellations, modernizing, clarifying, and streamlining the rules governing NGSO FSS systems to better reflect current technology and promote additional operational flexibility.[255]

92. *Restoring Internet Freedom.* In May 2017, the Commission adopted a *Notice of Proposed Rulemaking* proposing to restore the pre-2015 "information service" classification of broadband Internet access service and remove the impediments that Title II classification had put on broadband investment and deployment.[256] In December 2017, the Commission adopted a *Declaratory Ruling, Report and Order, and Order*[257] that reinstated the pre-2015 "information service" classification of broadband Internet access service[258] and restored the determination that mobile broadband is not a "commercial mobile service."[259] The Commission found that these measures would "encourage broadband investment and innovation, furthering our goal of making broadband available to all Americans."[260]

93. In the *Notice*, the Commission also sought comment on whether other actions, in addition to those already under way, might encourage more expansive and rapid deployment of networks that provide advanced telecommunications capability, as well as whether federal, Tribal, state, and local efforts to increase broadband deployment can be better coordinated.[261] Commenters offered a wide variety of suggestions in response to this request, ranging from addressing or banning "digital redlining,"[262] to creating tax incentives to spur investment and deployment,[263] to focusing on increasing deployment of new infrastructure or ensuring all-fiber deployment.[264] In addition to expressing support for current Commission proceedings, the most frequently proffered suggestions for additional Commission actions involved identifying and allocating more spectrum for broadband use[265] and further efforts to address access to pole attachments and rights of way.[266]

VI. SECTION 706 FINDING

94. We conclude that advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion. As discussed above, this finding does not mean that all

(Continued from previous page)
Ruling Granting Access to the U.S. Market for the Telesat NGSO FSS System, Order and Declaratory Ruling, FCC 17-147 (2017).

[255] *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, IB Docket No. 16-408, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809 (2017).

[256] *Restoring Internet Freedom*, WC Docket No. 17-108, Notice of Proposed Rulemaking, 32 FCC Rcd 4434 (2017).

[257] *Restoring Internet Freedom*, WC Docket No. 17-108, Declaratory Ruling, Report and Order, and Order, FCC 17-166 (rel. Jan. 4, 2018), https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0105/FCC-17-166A1.pdf.

[258] *Id.* at 8-42, paras. 20-64.

[259] *Id.* at 42-52, paras. 65-85.

[260] *Id.* at 52, para. 86.

[261] *Notice*, 32 FCC Rcd at 7043-44, paras. 48-50.

[262] NDIA Comments at 4; MMTC Comments at 5-6.

[263] ADTRAN Comments at 16-17; CWA Comments at 18.

[264] CO SBO Comments at 8; Fiber Broadband Comments at 6.

[265] ADTRAN Comments at 15; CTIA Comments at 20-21; Microsoft Comments at 10, 12; Mimosa Comments at 9-10; OTI Comments at 21-22; Verizon Comments at 18; WISPA Comments at 12-13; OneWeb Reply at 3-5.

[266] AT&T Comments at 14; CTIA Comments at 22-23; Fiber Broadband Comments at 7; ILSR & NCC Comments at 2; INCOMPAS Comments at 22-23; NCBIO Comments at 2; NTCA Comments at 22-23; Verizon Comments at 19-20; R Street *Ex Parte* at 2.

Americans now have broadband access. Rather, it means that we are back on the right track when it comes to deployment.

95. When the Commission issued the report for this inquiry in 2010, it concluded that a positive finding under section 706 would not be possible "without changes to present policies."[267] Consistent with this conclusion, we find that following the Commission's negative finding in 2016, the Commission's policy efforts are now encouraging the deployment on a reasonable and timely basis of advanced telecommunications capability.

96. In the time since the last report, the Commission has acted aggressively "to accelerate deployment of [advanced telecommunications capability] by removing barriers to infrastructure investment and by promoting competition in the telecommunications market."[268] As the above discussion details, we are hard at work facilitating deployment—for instance, by reducing regulatory barriers to the deployment of wireline and wireless infrastructure, reforming the universal service program to make it more efficient and accessible to new entrants, modernizing the business data service rules to facilitate facilities-based competition, freeing up additional spectrum for terrestrial and satellite services, and ending the adverse impact on investment caused by the *Title II Order*.

97. While the December 2016 Form 477 data in this report does not yet reflect the beneficial effects of the Commission's actions in 2017, the marketplace is already responding to the more deployment-friendly regulatory environment now in place. For instance, several companies, including AT&T, Verizon, Frontier, and Alaska Communications either commenced or announced new deployments in 2017.[269] These new deployments are initial indicators that deployment is likely to accelerate again in part due to our recent efforts.

98. We recognize that despite our positive finding today, our work to close the digital divide is not complete. Several Commission proceedings remain open with more work to be done to continue to close the digital divide. The further deployment of advanced telecommunications capability will remain a top priority as we continue our efforts to help deliver the benefits of broadband to all Americans.

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[267] *2010 Report*, 25 FCC Rcd at 9574, para. 28.

[268] 47 U.S.C. § 1302(b).

[269] *See* Press Release, AT&T, AT&T Launched an Internet Connection to Over 440,000 Homes and Small Businesses in Hard to Reach Areas in 2017 (Jan. 4, 2018), http://about.att.com/story/att_delivers_internet_connection_in_hard_to_reach_areas.html (describing AT&T's deployment of high-speed internet services to over 440,000 homes and small businesses in hard to reach locations across 18 states in 2017); Jeff Baumgartner, *Verizon Tips Launch of 5G-Based Residential Broadband Service: Plans to offer service in up to five markets in 2018* (Nov. 29, 2017), http://www.multichannel.com/news/finance/verizon-tips-launch-5g-based-residential-broadband-service/416824 (describing Verizon's plans to launch 5G-based residential broadband services to as many as 30 million homes in 2018, following its testing of "pre-commercial" gigabit broadband service in 2017 using millimeter wave spectrum in 11 markets); Press Release, Christy Reap, Frontier Communications, Frontier Communications Continues to Deploy Rural Broadband Ahead of Schedule, Reaching Connect America Fund Milestones in Eight Additional States (Dec. 18, 2017), http://investor.frontier.com/releasedetail.cfm?ReleaseID=1052131 (noting that Frontier has exceeded 2017 milestone requirements of the Connect America Fund program in Florida, Idaho, Illinois, Indiana, Michigan, Tennessee, Texas, and Wisconsin); Press Release, Alaska Communications, Alaska Communications Expands Network with Satellite Offering (Nov. 7, 2017), https://www.alaskacommunications.com/-/media/Files/Press-Releases/2017/ALSK_News_2017_11_7_General.pdf (announcing an agreement between Alaska Communications and Eutelsat Americas that will enable the former to provide middle mile broadband capacity to customers in remote areas, including St. Paul Island, a community north of the Aleutian Island chain almost 300 miles out in the Bering Sea).

VII. ORDERING CLAUSE

99. Accordingly, IT IS ORDERED that, pursuant to section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. §§ 1302 and 1303, this Report IS ADOPTED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

List of Comments and Reply Comments

Comments	Abbreviation
ADTRAN, Inc.	ADTRAN
AT&T Services, Inc.	AT&T
Benton Foundation	Benton Foundation
Boulder Regional Emergency Telephone Service Authority	
California Public Utilities Commission	CPUC
City of New York	NYC
Communications Workers of America	CWA
Consortium for School Networking	CoSN
CTIA	CTIA
Deere & Company	Deere
Education and Libraries Networks Coalition	
EducationSuperHighway	EducationSuperHighway
Fiber Broadband Association	Fiber Broadband
The Free State Foundation	Free State Foundation
INCOMPAS	INCOMPAS
Institute for Local Self-Reliance, Next Century Cities	ILSR & NCC
ITTA	ITTA
Massachusetts Department of Telecommunications and Cable	MDTC
Microsoft Corporation	Microsoft
Mimosa Networks, Inc.	Mimosa
MMTC	MMTC
National Digital Inclusion Alliance	NDIA
National Electrical Manufacturers Association	NEMA
National Rural Electric Cooperative Association	NRECA
NCTA - The Internet & Television Association	NCTA
New Networks Institute, IRREGULATORS	New Networks
Nez Perce Tribe	Nez Perce Tribe
North Carolina Broadband Infrastructure Office	NCBIO
NTCA-The Rural Broadband Association	NTCA
Open Technology Institute	OTI
Public Knowledge; Access Humboldt; Access Sonoma; Appalshop; Benton Foundation; Broadband Alliance; California Center for Rural Policy; Center for Rural Strategies; National Consumer Law Center, on behalf of its low-income clients; National Hispanic Media Coalition; and X-Lab	PK AH et al.
Satellite Industry Association	
Senator Al Franken, Senator Sherrod Brown, Senator Tammy Baldwin, Senator Richard Blumenthal, Senator Heidi Heitkamp, Senator Amy Klobuchar, Senator Elizabeth Warren, Senator Brian Schatz, Senator Edward J. Markey, Senator Tom Udall, Senator Kirsten Gillibrand, Senator Ron Wyden	Senator Al Franken et al.
SES and O3b Limited	
State Educational Technology Directors Association	
State of Colorado Broadband Office	CSBO
Telecommunications for the Deaf and Hard of Hearing, Inc., National Association of the Deaf, Deaf and Hard of Hearing Consumer Advocacy Network, Cerebral Palsy and Deaf	

Organization, Communication Service for the Deaf, Inc.,	
Hearing Loss Association of America	TDI
Town of Leverett, Massachusetts	Leverett MA
Tukwila City Council	
USTelecom Association	USTelecom
ViaSat, Inc.	ViaSat
Wireless Internet Service Providers Association	WISPA
WorldVu Satellites Limited	
Verizon	Verizon

Replies	**Abbreviation**
ADT Corporation	ADT
Advanced Analytical Consulting Group	
American Library Association	
AT&T Services, Inc.	AT&T
Cities of Boston, Massachusetts, Portland, Oregon, Anne Arundel County, Maryland, Mt. Hood Cable Regulatory Commission	Local Authorities
Comcast Corporation	Comcast
Communications Workers of America	CWA
CTIA	CTIA
Entertainment Software Association	Entertainment Software Association
EveryoneOn	
Fiber Broadband Association	Fiber Broadband
HUGHES NETWORK SYSTEMS, LLC	
Institute for Local Self-Reliance, Next Century Cities	ILSR & NCC
Mescalero Apache Telecom, Inc.	
Mobile Future	Mobile Future
NATOA	
New Networks Institute, IRREGULATORS	New Networks
NTCA-The Rural Broadband Association	NTCA
Open Technology Institute	OTI
Representative Jared Huffman, Senator Al Franken, Representative Mark Pocan, Representative Keith Ellison, Senator Edward J. Markey, Senator Brian Schatz, Senator Ron Wyden, Senator Chris Van Hollen, Senator Maggie Hassan, Senator Heidi Heitkamp, Senator Richard Blumenthal, Senator Kirsten Gillibrand, Representative Cheri Bustos, Representative David Cicilline, Representative Earl Blumenauer, Representative Ro Khanna, Representative Jared Polis, Representative Sanford Bishop, Representative Mark DeSaulnier, Representative Colleen Hanabusa, Representative John Conyers, Representative Mike Thompson, Representative Raul Grijavla, Representative Louise Slaughter, Representative Anna Eshoo, Representative James McGovern, Representative Paul Tonko, Representative Peter Welch, Representative Seth Moulton, Representative Chellie Pingree, Representative John Lewis, Representative Betty McCollum, Representative Jose Serrano, Representative Gwen Moore, Representative Michael Doyle, Representative John Garamendi, Representative Tulsi Gabbard, Representative Sheila Jackson Lee, Representative Alcee Hastings,	

Representative Darren Soto, Representative Emanuel Cleaver, Representative Timothy Walz, Representative Tom O'Halleran, Representative John Yarmuth, Representative Rick Nolan	
Smith Bagley, Inc.	
Wireless Internet Service Providers Association	WISPA
Wireless RERC	
WorldVu Satellites Limited	

APPENDIX B

Table and Chart Index

APPENDIX C

Additional Data Source Information and Definitions

Data Sources

1. *Deployment Data - Form 477 Data*. Form 477 deployment data as of December 31, 2014, December 31, 2015 and December 31, 2016 are used to present deployment estimates for fixed services in 2014, 2015, and 2016. We report deployment data for fixed services meeting three speed thresholds, 10 Mbps/1 Mbps, 25 Mbps/3 Mbps and 50 Mbps/5 Mbps. The deployment estimates for fixed services reported in the tables are for fixed terrestrial services that meet the reported speed thresholds. We separately report deployment estimates for fixed terrestrial and satellite services in the text of the Report. We report deployment data for mobile services based upon two speed thresholds, 5 Mbps/1 Mbps and 10 Mbps/3 Mbps. Our mobile estimates are based upon our Form 477 data for Terrestrial Mobile Wireless – LTE with a minimum advertised speed of 5 Mbps/1 Mbps as of December 31, 2014, December 31, 2015 and December 31, 2016.[1] We also report deployment estimates based upon Ookla Speed Test Data with a median speed of 10 Mbps/3 Mbps based on Ookla actual speed test data. These speed test data were collected in the second half of 2014, the second half of 2015, and the second half of 2016, on the smartphone's cellular connection using LTE technology. Test data was dropped if the test data was without GPS locations data or if the reported download or upload speed was less than zero or greater than 100 Mbps. We report the results separately for the U.S. Territories because the 2016 data may significantly overstate current deployment in Puerto Rico and the U.S. Virgin Islands, which account for over 92 percent of the total combined population of the U.S. Territories.[2] Given the damage to infrastructure in Puerto Rico and the U.S. Virgin Islands from Hurricanes Maria and Irma, we are uncertain as to the current state of deployment of broadband services in these areas, and do not wish to present an inaccurate picture of current deployment.

2. *SBI Data*. SBI data as of December 31, 2012 and December 31, 2013 are used to present deployment estimates for fixed terrestrial services and mobile services in 2012 and 2013. The fixed terrestrial estimates are based upon deployment data for the following services: Asymmetric xDSL, Symmetric xDSL, Other Wireline (all copper-wire based technologies other than xDSL), Cable Modem—DOCSIS 3.0, Cable Modem—Other, optical carrier (fiber to the home or FTTH), Fixed Terrestrial Wireless (provisioned/equipped over licensed spectrum or over spectrum used on an unlicensed basis), Electric Power Line, and All Other. The mobile services estimates are based upon deployment data for terrestrial mobile wireless. Because the SBI data collection used predetermined speed tiers, we use 6 Mbps/768 kbps as a proxy for 5 Mbps/1 Mbps, 10 Mbps/768 kbps as a proxy for 10 Mbps/1 Mbps and 50 Mbps/6 Mbps as a proxy for 50 Mbps/5 Mbps.

3. *Adoption Data – Form 477 Data.* The fixed terrestrial adoption rates rely on Form 477 subscription data for residential services as of December 31, 2012, December 31, 2013, December 31, 2014, December 31, 2015, and December 31, 2016. Unless otherwise stated, we include only fixed terrestrial services reported on Form 477 that meet the three speed thresholds included in this Report.[3]

4. *Demographic Data*. We rely on the Commission's estimates of population and household count data from 2012 to 2016. This data is based upon the 2010 U.S. Census Data that the

[1] FCC, *Instructions for Local Telephone Competition and Broadband Reporting* (*FCC Form 477)*, at 30-31, Tables 1 & 3, http://transition.fcc.gov/Forms/Form477/477inst.pdf (*FCC Form 477*).

[2] *See infra* Appendix E.

[3] *FCC Form 477* at 30, Table 2.

Commission has updated to account for population growth and economic development.[4] We rely on the American Community Survey (ACS) Five-Year Estimates 2012–2016 for income and poverty measures. These data are based upon surveys conducted from January 1, 2012 to December 31, 2016. The ACS collects survey information continuously nearly every day of the year and then aggregates the results over five years.[5] The data collection is spread evenly across the entire period represented so as not to over-represent any particular month or year within the period.[6] These multiyear estimates describe the population and characteristics of an area for the full five-year period, not for any specific day, period, or year within the multiyear time period.[7] We rely upon the 2010 Census for land area and American Indian Area Alaska Native Area Hawaiian Home Land Class Code (AIANHHCC) affiliation.

Definitions

5. *Fixed Deployment Rate*. The reported percentages of population with access to fixed terrestrial services and/or mobile services are calculated by using the ratio population with access to the services divided by the total population in the area. We report deployment rates for the following geographic areas: the U.S. as a whole, all Tribal Lands, all rural census blocks, all urban census blocks, all urban census block groups, all rural census block groups, each county (or county equivalent), and for each state, the District of Columbia and U.S. Territory.

6. *Fixed Adoption Rate*. The reported adoption rates are calculated by using the ratio of residential connections to fixed terrestrial services at the designated speed divided by the total number of households in the area with access to these fixed terrestrial services. Although our FCC Form 477 deployment data are at the census block level, we must aggregate these data up to the census tract level because the Form 477 subscription data for broadband services are collected at the census tract level. We calculate adoption rates for the following geographic areas: the U.S. as a whole, all urban core census tracts, all non-urban core census tracts, the county (or county equivalent), and for each state and the District of Columbia.

7. *Income Measures*. ACS Five-Year Estimates 2012-2016. We use three income measures: per capita income, median household income, and the poverty rate (the proportion of households living below the poverty level).[8] Per capita income and median household income in the past twelve months are measured in 2016 Inflation-Adjusted Dollars. We use these income measures at two aggregation levels, census block groups and counties.

8. *Land Area.* The land area is based upon the 2010 Census boundaries and measured in square miles of land.

9. *Non-Urban Core Area*. A census tract that is not part of the "urban core." This definition is only used to calculate adoption rates for fixed advanced telecommunications capability reported in Table 11.

10. *Population Density*. Population density of an area is the total population residing in the area divided by the square miles of land in the area.

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[4] FCC, Staff Block Estimates, https://www.fcc.gov/reports-research/data/staff-block-estimates.

[5] U.S. Census Bureau, A Compass for Understanding and Using American Community Survey Data, What Data Users Need to know, Appendix 1 (Understanding and Users Single-year and Multiyear Estimates) at 1-2 (2008) http://www.census.gov/library/publications/2008/acs/general.html (*What Data Users Needs to Know, Appendix 1*).

[6] *Id*.

[7] *Id*.

[8] U.S. Census, American Community Survey, Puerto Rico Community Survey, 2014 Subject Definitions, at 80-86 (2014) (discussing Income Measures in the Past 12 Months and adjustments to the data for inflation); *id*. at 104-107 (discussing poverty status for the past 12 months).

11. *Rural Area*. Census blocks are designated as rural based upon the designation used in the 2010 Census. The term ''rural'' encompasses all population, housing, and territory not included within an urban area.[9] We also identify rural census block groups for our demographic analysis in Tables 7 and 8. Census block groups are designated as rural if more than 50 percent of the population in the census block group reside in rural census blocks.

12. *Tribal Lands*. Our assessment of Tribal lands is conducted by examining the census blocks that have been identified by the Census Bureau as federally recognized Tribal lands for the 2010 Census. These areas fall into one of the following categories of AIANHHCC: (1) Joint Use Areas; (2) legal federally recognized American Indian area consisting of reservation and associated off-reservation trust land; (3) legal federally recognized American Indian area consisting of reservation only; (4) legal federally recognized American Indian area consisting of off-reservation trust land only; (5) statistical American Indian area defined for a federally recognized Tribe that does not have reservation or off-reservation trust land, specifically a Tribal designated statistical area (TDSA) or Oklahoma Tribal Statistical Area (OTSA);[10] (6) Alaskan Native village statistical area; and (7) Hawaiian Home Lands established by the Hawaiian Homes Commission Act of 1921. Two categories of federally recognized areas were not designated by any census block with a population (off-reservation trust land portion of an American Indian area with both a reservation and off-reservation trust land; and the reservation portion of an American Indian area with both a reservation and off-reservation trust land). We exclude state-recognized areas from the analysis of Tribal lands. We note that the Tribal Statistical Areas are largely in Oklahoma, but they also include areas in California, New York, and Washington.

13. For purposes of this Report, we aggregate federally recognized Tribal lands into 4 groups: Tribal Lands in the Lower 48 States (areas 1 through 4 defined above); Tribal Statistical Areas (area 5 defined above); Alaskan Villages (area 6 defined above) and Hawaiian Home Lands (area 7 defined above). For purposes of our demographic analysis in Tables 7 and 8, we designate a census block group as Tribal lands if Tribal lands comprise more than 50 percent of the total land area of the census block group. For purposes of our presentation of adoption rates in Table 11, we designate a census tract as Tribal lands if Tribal lands comprise more than 50 percent of the total land area of the census tract.

14. *Urban Area*. The designation of a census block as urban is based upon the 2010 Census. The term ''urban'' encompasses all population, housing, and territory included within an urban area.[11] We also identify urban census block groups for our demographic analysis in Tables 7 and 8. We designate a census block group as urban if we have not designated it as a rural census block group.

15. *Urban Core Area*. In table 11 we designate a census tract as either an "Urban Core Area" or a "Non-Urban Core Area." A census tract is designated as "Urban Core" if it has a land area less than three square miles and a population density of at least 1,000 people per square mile.[12] A census tract is designated as "Non-Urban Core" if we have not designated the census tract as Urban Core.

[9] *See 2011 Census Bureau Notice*, 76 Fed. Reg. at 53039.

[10] The statistical areas are largely in Oklahoma, but also include areas in California, New York, and Washington.

[11] *See 2011 Census Bureau Notice*, 76 Fed. Reg. at 53039.

[12] *See id*.

APPENDIX D
Americans (Millions) With Access to Fixed Terrestrial 25 Mbps/3 Mbps Service and Mobile LTE by State and District of Columbia

Table D1
Americans (Millions) With Access to Fixed Terrestrial 25 Mbps/3 Mbps; Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps; and Mobile LTE with a Median Speed of 10 Mbps/3 Mbps by State and District of Columbia[1]

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
United States	322.518	297.766	92.3%	321.347	99.6%	300.036	261.898	87.3%
Rural Areas	62.926	43.604	69.3%	61.802	98.2%	47.025	32.962	70.1%
Urban Areas	259.592	254.162	97.9%	259.545	100.0%	253.011	228.936	90.5%
Alabama	4.857	4.036	83.1%	4.826	99.4%	4.189	3.966	94.7%
Rural Areas	2.002	1.277	63.8%	1.970	98.4%	1.475	1.323	89.7%
Urban Areas	2.856	2.759	96.6%	2.856	100.0%	2.713	2.644	97.4%
Alaska	0.738	0.582	78.8%	0.626	84.8%	0.695	0.429	61.8%
Rural Areas	0.259	0.120	46.4%	0.169	65.2%	0.236	0.072	30.5%
Urban Areas	0.479	0.461	96.4%	0.457	95.4%	0.459	0.357	77.8%
Arizona	6.915	5.917	85.6%	6.850	99.1%	6.810	5.299	77.8%
Rural Areas	0.798	0.275	34.4%	0.740	92.7%	0.749	0.276	36.8%
Urban Areas	6.116	5.642	92.2%	6.110	99.9%	6.061	5.023	82.9%
Arkansas	2.982	2.316	77.6%	2.971	99.6%	2.242	1.682	75.0%
Rural Areas	1.318	0.758	57.6%	1.306	99.2%	0.790	0.570	72.2%
Urban Areas	1.665	1.557	93.5%	1.665	100.0%	1.452	1.112	76.5%
California	39.171	37.114	94.7%	39.126	99.9%	39.071	36.530	93.5%
Rural Areas	2.255	1.042	46.2%	2.210	98.0%	2.190	1.735	79.2%
Urban Areas	36.916	36.072	97.7%	36.916	100.0%	36.880	34.795	94.3%

[1] As with Tables 1, 2a, and 2b presented in this Report, the results shown for fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps are based upon the U.S. Population, excluding the U.S. Territories, whereas the results shown for Mobile LTE 10 Mbps/3 Mbps are based on a sub-sample of the total U.S. population where certain counties and the U.S. Territories are excluded.

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Colorado	5.520	5.241	94.9%	5.503	99.7%	5.074	4.294	84.6%
Rural Areas	0.834	0.601	72.1%	0.816	97.9%	0.557	0.425	76.3%
Urban Areas	4.686	4.640	99.0%	4.686	100.0%	4.517	3.869	85.7%
Connecticut	3.571	3.538	99.1%	3.570	100.0%	3.571	3.570	100.0%
Rural Areas	0.431	0.427	99.2%	0.430	99.9%	0.431	0.430	99.9%
Urban Areas	3.140	3.111	99.1%	3.140	100.0%	3.140	3.140	100.0%
Delaware	0.950	0.925	97.4%	0.950	100.0%	0.950	0.731	76.9%
Rural Areas	0.166	0.153	92.2%	0.166	100.0%	0.166	0.075	45.0%
Urban Areas	0.784	0.772	98.4%	0.784	100.0%	0.784	0.656	83.7%
District of Columbia[2]	0.678	0.665	98.1%	0.678	100.0%	0.678	0.678	100.0%
Florida	20.564	19.698	95.8%	20.557	100.0%	20.245	19.829	97.9%
Rural Areas	1.955	1.469	75.2%	1.947	99.6%	1.722	1.476	85.7%
Urban Areas	18.609	18.229	98.0%	18.609	100.0%	18.522	18.354	99.1%
Georgia	10.284	9.341	90.8%	10.266	99.8%	8.861	8.451	95.4%
Rural Areas	2.521	1.812	71.9%	2.503	99.3%	1.512	1.270	84.0%
Urban Areas	7.763	7.529	97.0%	7.763	100.0%	7.348	7.181	97.7%
Hawaii	1.425	1.358	95.3%	1.423	99.8%	1.425	0.434	30.4%
Rural Areas	0.130	0.082	63.1%	0.128	98.3%	0.130	0.117	90.1%
Urban Areas	1.295	1.276	98.5%	1.295	100.0%	1.295	0.317	24.5%
Idaho	1.680	1.490	88.7%	1.657	98.6%	1.362	0.910	66.8%
Rural Areas	0.512	0.346	67.6%	0.489	95.6%	0.314	0.160	50.8%
Urban Areas	1.168	1.144	98.0%	1.168	100.0%	1.048	0.751	71.6%
Illinois	12.791	12.114	94.7%	12.785	100.0%	12.005	11.779	98.1%
Rural Areas	1.473	0.935	63.5%	1.468	99.6%	0.973	0.877	90.1%

[2] We only present this data for the District of Columbia because there are only urban areas in the District of Columbia.

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Urban Areas	11.317	11.179	98.8%	11.317	100.0%	11.032	10.902	98.8%
Indiana	6.626	5.759	86.9%	6.624	100.0%	5.921	5.383	90.9%
Rural Areas	1.829	1.070	58.5%	1.828	99.9%	1.328	0.988	74.4%
Urban Areas	4.797	4.689	97.8%	4.797	100.0%	4.594	4.396	95.7%
Iowa	3.130	2.832	90.5%	3.125	99.8%	2.105	2.101	99.8%
Rural Areas	1.130	0.875	77.4%	1.126	99.6%	0.437	0.433	99.0%
Urban Areas	2.000	1.957	97.9%	2.000	100.0%	1.668	1.668	100.0%
Kansas	2.901	2.589	89.2%	2.901	100.0%	2.277	2.195	96.4%
Rural Areas	0.751	0.499	66.5%	0.750	99.9%	0.338	0.306	90.6%
Urban Areas	2.151	2.090	97.2%	2.151	100.0%	1.939	1.889	97.4%
Kentucky	4.428	3.799	85.8%	4.301	97.1%	3.443	2.941	85.4%
Rural Areas	1.823	1.255	68.8%	1.697	93.1%	1.004	0.678	67.6%
Urban Areas	2.605	2.544	97.7%	2.604	100.0%	2.439	2.263	92.8%
Louisiana	4.670	3.948	84.5%	4.669	100.0%	4.231	2.862	67.6%
Rural Areas	1.252	0.713	56.9%	1.251	99.9%	0.938	0.730	77.9%
Urban Areas	3.418	3.235	94.7%	3.418	100.0%	3.293	2.132	64.7%
Maine	1.332	1.198	89.9%	1.298	97.4%	1.231	0.369	30.0%
Rural Areas	0.826	0.708	85.7%	0.792	95.9%	0.732	0.244	33.4%
Urban Areas	0.506	0.490	96.9%	0.506	100.0%	0.499	0.125	25.0%
Maryland	6.001	5.850	97.5%	6.001	100.0%	5.861	4.895	83.5%
Rural Areas	0.790	0.740	93.7%	0.790	100.0%	0.695	0.356	51.2%
Urban Areas	5.211	5.110	98.1%	5.211	100.0%	5.166	4.539	87.9%
Massachusetts	6.794	6.634	97.7%	6.793	100.0%	6.783	6.712	99.0%
Rural Areas	0.544	0.492	90.3%	0.544	99.9%	0.542	0.503	92.8%
Urban Areas	6.249	6.143	98.3%	6.249	100.0%	6.241	6.209	99.5%
Michigan	9.934	8.965	90.2%	9.926	99.9%	9.450	8.953	94.7%
Rural Areas	2.547	1.692	66.4%	2.538	99.7%	2.213	1.846	83.4%

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Urban Areas	7.387	7.273	98.5%	7.387	100.0%	7.238	7.107	98.2%
Minnesota	5.513	5.102	92.6%	5.506	99.9%	4.843	4.768	98.5%
Rural Areas	1.466	1.099	74.9%	1.459	99.5%	1.001	0.951	95.0%
Urban Areas	4.046	4.003	98.9%	4.046	100.0%	3.842	3.817	99.3%
Mississippi	2.986	2.157	72.3%	2.977	99.7%	1.979	1.359	68.7%
Rural Areas	1.515	0.756	49.9%	1.507	99.4%	0.752	0.449	59.8%
Urban Areas	1.470	1.401	95.3%	1.470	100.0%	1.227	0.910	74.1%
Missouri	6.086	5.080	83.5%	6.065	99.7%	5.097	4.297	84.3%
Rural Areas	1.814	0.897	49.5%	1.793	98.9%	1.084	0.708	65.4%
Urban Areas	4.272	4.183	97.9%	4.272	100.0%	4.013	3.589	89.4%
Montana	1.041	0.803	77.1%	0.981	94.2%	0.722	0.306	42.4%
Rural Areas	0.474	0.280	59.2%	0.419	88.5%	0.271	0.066	24.4%
Urban Areas	0.568	0.523	92.1%	0.561	98.9%	0.450	0.240	53.2%
Nebraska	1.903	1.692	88.9%	1.901	99.9%	1.284	1.246	97.0%
Rural Areas	0.509	0.333	65.5%	0.507	99.5%	0.140	0.126	90.5%
Urban Areas	1.394	1.359	97.5%	1.394	100.0%	1.144	1.120	97.8%
Nevada	2.937	2.820	96.0%	2.926	99.6%	2.864	0.602	21.0%
Rural Areas	0.197	0.104	53.0%	0.185	94.1%	0.160	0.082	51.1%
Urban Areas	2.741	2.716	99.1%	2.741	100.0%	2.704	0.520	19.2%
New Hampshire	1.334	1.258	94.2%	1.329	99.6%	1.262	0.711	56.3%
Rural Areas	0.530	0.465	87.9%	0.524	98.9%	0.483	0.163	33.7%
Urban Areas	0.805	0.792	98.4%	0.805	100.0%	0.779	0.548	70.3%
New Jersey	8.933	8.842	99.0%	8.933	100.0%	8.933	8.778	98.3%
Rural Areas	0.466	0.454	97.3%	0.466	100.0%	0.466	0.432	92.6%
Urban Areas	8.466	8.388	99.1%	8.466	100.0%	8.466	8.347	98.6%
New Mexico	2.075	1.672	80.6%	2.058	99.2%	1.844	0.817	44.3%
Rural Areas	0.487	0.208	42.8%	0.470	96.4%	0.364	0.059	16.2%

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Urban Areas	1.588	1.464	92.2%	1.588	100.0%	1.480	0.757	51.2%
New York	19.721	19.328	98.0%	19.692	99.9%	19.263	17.349	90.1%
Rural Areas	2.351	1.992	84.7%	2.322	98.8%	2.020	1.025	50.7%
Urban Areas	17.370	17.336	99.8%	17.370	100.0%	17.242	16.325	94.7%
North Carolina	10.123	9.481	93.7%	10.045	99.2%	9.440	7.540	79.9%
Rural Areas	3.375	2.768	82.0%	3.302	97.8%	2.807	1.722	61.3%
Urban Areas	6.749	6.714	99.5%	6.743	99.9%	6.633	5.818	87.7%
North Dakota	0.756	0.689	91.2%	0.753	99.6%	0.458	0.455	99.3%
Rural Areas	0.334	0.281	84.1%	0.331	99.1%	0.119	0.116	97.4%
Urban Areas	0.422	0.408	96.7%	0.422	100.0%	0.339	0.339	100.0%
Ohio	11.610	10.724	92.4%	11.600	99.9%	11.101	10.061	90.6%
Rural Areas	2.570	1.827	71.1%	2.561	99.6%	2.199	1.715	78.0%
Urban Areas	9.039	8.896	98.4%	9.039	100.0%	8.902	8.346	93.8%
Oklahoma	3.915	3.014	77.0%	3.906	99.8%	3.518	2.727	77.5%
Rural Areas	1.341	0.617	46.0%	1.331	99.3%	1.046	0.649	62.0%
Urban Areas	2.574	2.397	93.1%	2.574	100.0%	2.471	2.078	84.1%
Oregon	4.086	3.717	91.0%	4.052	99.2%	3.907	3.744	95.8%
Rural Areas	0.813	0.521	64.0%	0.780	95.8%	0.717	0.641	89.3%
Urban Areas	3.273	3.196	97.7%	3.273	100.0%	3.190	3.103	97.3%
Pennsylvania	12.774	12.124	94.9%	12.753	99.8%	12.178	11.626	95.5%
Rural Areas	2.724	2.252	82.7%	2.703	99.2%	2.307	2.010	87.1%
Urban Areas	10.050	9.871	98.2%	10.050	100.0%	9.871	9.616	97.4%
Rhode Island	1.056	1.036	98.1%	1.056	100.0%	1.056	1.056	100.0%
Rural Areas	0.097	0.095	97.6%	0.097	100.0%	0.097	0.097	100.0%
Urban Areas	0.958	0.941	98.2%	0.958	100.0%	0.958	0.958	100.0%
South Carolina	4.950	4.373	88.3%	4.948	100.0%	4.451	3.669	82.4%

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Rural Areas	1.676	1.165	69.5%	1.674	99.9%	1.302	1.107	85.0%
Urban Areas	3.274	3.208	98.0%	3.274	100.0%	3.148	2.562	81.4%
South Dakota	0.863	0.762	88.3%	0.860	99.6%	0.387	0.383	99.2%
Rural Areas	0.384	0.288	75.1%	0.381	99.2%	0.090	0.086	96.4%
Urban Areas	0.479	0.474	98.9%	0.479	100.0%	0.297	0.297	100.0%
Tennessee	6.640	6.049	91.1%	6.606	99.5%	5.705	5.206	91.2%
Rural Areas	2.235	1.716	76.8%	2.200	98.5%	1.483	1.177	79.4%
Urban Areas	4.406	4.332	98.3%	4.406	100.0%	4.222	4.029	95.4%
Texas	27.764	25.943	93.4%	27.754	100.0%	26.660	20.521	77.0%
Rural Areas	4.512	3.260	72.3%	4.503	99.8%	3.826	2.113	55.2%
Urban Areas	23.251	22.683	97.6%	23.251	100.0%	22.834	18.408	80.6%
Utah	3.040	2.936	96.6%	3.022	99.4%	2.882	2.170	75.3%
Rural Areas	0.361	0.265	73.4%	0.343	95.2%	0.263	0.116	44.1%
Urban Areas	2.679	2.671	99.7%	2.679	100.0%	2.619	2.054	78.4%
Vermont	0.624	0.538	86.1%	0.599	96.0%	0.394	0.000	0.0%
Rural Areas	0.383	0.301	78.5%	0.358	93.4%	0.199	0.000	0.0%
Urban Areas	0.241	0.237	98.3%	0.241	100.0%	0.195	0.000	0.0%
Virginia	8.387	7.617	90.8%	8.347	99.5%	7.457	5.549	74.4%
Rural Areas	2.053	1.459	71.1%	2.014	98.1%	1.372	0.340	24.8%
Urban Areas	6.334	6.158	97.2%	6.334	100.0%	6.085	5.209	85.6%
Washington	7.269	7.147	98.3%	7.234	99.5%	7.157	6.806	95.1%
Rural Areas	1.226	1.124	91.7%	1.193	97.4%	1.154	0.964	83.5%
Urban Areas	6.043	6.023	99.7%	6.040	99.9%	6.003	5.842	97.3%
West Virginia	1.830	1.504	82.2%	1.710	93.4%	1.148	0.287	25.0%
Rural Areas	0.934	0.647	69.2%	0.816	87.4%	0.453	0.089	19.6%
Urban Areas	0.896	0.857	95.7%	0.894	99.7%	0.696	0.199	28.5%
Wisconsin	5.775	4.992	86.4%	5.738	99.4%	5.228	4.824	92.3%

	Pop. Evaluated	Fixed 25 Mbps/ 3 Mbps		Mobile LTE 5 Mbps/ 1 Mbps		Pop. Evaluated	Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.	Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Rural Areas	1.736	0.988	56.9%	1.699	97.9%	1.293	1.055	81.6%
Urban Areas	4.039	4.004	99.1%	4.039	100.0%	3.935	3.768	95.8%
Wyoming	0.585	0.457	78.2%	0.574	98.2%	0.341	0.048	14.2%
Rural Areas	0.217	0.099	45.5%	0.207	95.1%	0.084	0.015	18.2%
Urban Areas	0.367	0.358	97.6%	0.367	100.0%	0.257	0.033	12.8%

Table D2
Americans (Millions) With Access to Fixed Terrestrial 25 Mbps/3 Mbps and Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps; Americans With Access to Fixed Terrestrial 25 Mbps/3 Mbps and Mobile LTE with a Median Speed of 10 Mbps/3 Mbps by State and District of Columbia[3]

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
United States	322.518	297.304	92.2%	300.036	250.494	83.5%
Rural Areas	62.926	43.164	68.6%	47.025	25.411	54.0%
Urban Areas	259.592	254.141	97.9%	253.011	225.082	89.0%
Alabama	4.857	4.029	82.9%	4.189	3.554	84.9%
Rural Areas	2.002	1.270	63.5%	1.475	0.977	66.2%
Urban Areas	2.856	2.759	96.6%	2.713	2.577	95.0%
Alaska	0.738	0.563	76.3%	0.695	0.411	59.2%
Rural Areas	0.259	0.108	41.8%	0.236	0.055	23.2%
Urban Areas	0.479	0.454	94.9%	0.459	0.356	77.6%
Arizona	6.915	5.917	85.6%	6.810	4.864	71.4%
Rural Areas	0.798	0.274	34.4%	0.749	0.129	17.3%
Urban Areas	6.116	5.642	92.2%	6.061	4.734	78.1%
Arkansas	2.982	2.312	77.5%	2.242	1.484	66.2%
Rural Areas	1.318	0.755	57.3%	0.790	0.412	52.2%
Urban Areas	1.665	1.557	93.5%	1.452	1.072	73.8%
California	39.171	37.105	94.7%	39.071	34.938	89.4%
Rural Areas	2.255	1.033	45.8%	2.190	0.865	39.5%
Urban Areas	36.916	36.072	97.7%	36.880	34.073	92.4%
Colorado	5.520	5.235	94.8%	5.074	4.203	82.8%
Rural Areas	0.834	0.595	71.4%	0.557	0.360	64.6%
Urban Areas	4.686	4.640	99.0%	4.517	3.843	85.1%
Connecticut	3.571	3.537	99.1%	3.571	3.537	99.1%
Rural Areas	0.431	0.427	99.1%	0.431	0.427	99.1%
Urban Areas	3.140	3.111	99.1%	3.140	3.111	99.1%

[3] As with Tables 3a and 3b presented in this Report, the results shown for fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps are based upon the U.S. Population, excluding the U.S. Territories, whereas the results shown for fixed 25 Mbps/3 Mbps and Mobile LTE 10 Mbps/3 Mbps are based on a sub-sample of the total U.S. population where certain counties and the U.S. Territories are excluded.

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Delaware	0.950	0.925	97.3%	0.950	0.715	75.2%
Rural Areas	0.166	0.153	92.2%	0.166	0.070	42.0%
Urban Areas	0.784	0.772	98.4%	0.784	0.645	82.3%
District of Columbia[4]	0.678	0.665	98.1%	0.678	0.665	98.1%
Florida	20.564	19.695	95.8%	20.245	19.222	94.9%
Rural Areas	1.955	1.466	75.0%	1.722	1.220	70.8%
Urban Areas	18.609	18.229	98.0%	18.522	18.003	97.2%
Georgia	10.284	9.333	90.8%	8.861	8.054	90.9%
Rural Areas	2.521	1.805	71.6%	1.512	1.048	69.3%
Urban Areas	7.763	7.529	97.0%	7.348	7.007	95.4%
Hawaii	1.425	1.357	95.2%	1.425	0.380	26.7%
Rural Areas	0.130	0.081	62.4%	0.130	0.073	55.9%
Urban Areas	1.295	1.276	98.5%	1.295	0.308	23.7%
Idaho	1.680	1.486	88.4%	1.362	0.854	62.7%
Rural Areas	0.512	0.342	66.7%	0.314	0.104	33.2%
Urban Areas	1.168	1.144	98.0%	1.048	0.750	71.5%
Illinois	12.791	12.113	94.7%	12.005	11.432	95.2%
Rural Areas	1.473	0.934	63.4%	0.973	0.647	66.5%
Urban Areas	11.317	11.179	98.8%	11.032	10.785	97.8%
Indiana	6.626	5.759	86.9%	5.921	4.947	83.5%
Rural Areas	1.829	1.070	58.5%	1.328	0.647	48.7%
Urban Areas	4.797	4.689	97.8%	4.594	4.300	93.6%
Iowa	3.130	2.829	90.4%	2.105	1.980	94.0%
Rural Areas	1.130	0.872	77.2%	0.437	0.346	79.1%
Urban Areas	2.000	1.957	97.8%	1.668	1.634	97.9%
Kansas	2.901	2.589	89.2%	2.277	2.079	91.3%
Rural Areas	0.751	0.499	66.5%	0.338	0.221	65.4%
Urban Areas	2.151	2.090	97.2%	1.939	1.858	95.8%
Kentucky	4.428	3.729	84.2%	3.443	2.718	78.9%
Rural Areas	1.823	1.185	65.0%	1.004	0.493	49.1%
Urban Areas	2.605	2.543	97.6%	2.439	2.225	91.2%

[4] We only present this data for the District of Columbia because there are only urban areas in the District of Columbia.

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Louisiana	4.670	3.948	84.5%	4.231	2.577	60.9%
Rural Areas	1.252	0.713	56.9%	0.938	0.531	56.6%
Urban Areas	3.418	3.235	94.7%	3.293	2.046	62.1%
Maine	1.332	1.178	88.4%	1.231	0.321	26.1%
Rural Areas	0.826	0.688	83.3%	0.732	0.204	27.8%
Urban Areas	0.506	0.490	96.9%	0.499	0.117	23.5%
Maryland	6.001	5.850	97.5%	5.861	4.794	81.8%
Rural Areas	0.790	0.740	93.6%	0.695	0.343	49.3%
Urban Areas	5.211	5.110	98.1%	5.166	4.451	86.2%
Massachusetts	6.794	6.634	97.6%	6.783	6.567	96.8%
Rural Areas	0.544	0.491	90.3%	0.542	0.465	85.7%
Urban Areas	6.249	6.143	98.3%	6.241	6.103	97.8%
Michigan	9.934	8.962	90.2%	9.450	8.323	88.1%
Rural Areas	2.547	1.689	66.3%	2.213	1.318	59.6%
Urban Areas	7.387	7.273	98.4%	7.238	7.005	96.8%
Minnesota	5.513	5.098	92.5%	4.843	4.484	92.6%
Rural Areas	1.466	1.095	74.7%	1.001	0.707	70.6%
Urban Areas	4.046	4.003	98.9%	3.842	3.777	98.3%
Mississippi	2.986	2.156	72.2%	1.979	1.188	60.0%
Rural Areas	1.515	0.755	49.8%	0.752	0.308	41.0%
Urban Areas	1.470	1.401	95.3%	1.227	0.880	71.7%
Missouri	6.086	5.075	83.4%	5.097	4.037	79.2%
Rural Areas	1.814	0.893	49.2%	1.084	0.472	43.5%
Urban Areas	4.272	4.183	97.9%	4.013	3.565	88.8%
Montana	1.041	0.777	74.6%	0.722	0.303	42.0%
Rural Areas	0.474	0.258	54.5%	0.271	0.063	23.3%
Urban Areas	0.568	0.519	91.5%	0.450	0.240	53.2%
Nebraska	1.903	1.692	88.9%	1.284	1.211	94.3%
Rural Areas	0.509	0.332	65.3%	0.140	0.104	74.6%
Urban Areas	1.394	1.359	97.5%	1.144	1.106	96.7%
Nevada	2.937	2.816	95.9%	2.864	0.566	19.8%
Rural Areas	0.197	0.100	51.1%	0.160	0.051	32.0%
Urban Areas	2.741	2.716	99.1%	2.704	0.515	19.1%
New Hampshire	1.334	1.256	94.1%	1.262	0.697	55.2%

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Rural Areas	0.530	0.464	87.6%	0.483	0.156	32.3%
Urban Areas	0.805	0.792	98.4%	0.779	0.541	69.5%
New Jersey	8.933	8.842	99.0%	8.933	8.695	97.3%
Rural Areas	0.466	0.454	97.3%	0.466	0.424	90.9%
Urban Areas	8.466	8.388	99.1%	8.466	8.271	97.7%
New Mexico	2.075	1.671	80.5%	1.844	0.793	43.0%
Rural Areas	0.487	0.207	42.5%	0.364	0.039	10.8%
Urban Areas	1.588	1.464	92.2%	1.480	0.753	50.9%
New York	19.721	19.315	97.9%	19.263	17.224	89.4%
Rural Areas	2.351	1.979	84.2%	2.020	0.931	46.1%
Urban Areas	17.370	17.336	99.8%	17.242	16.292	94.5%
North Carolina	10.123	9.426	93.1%	9.440	7.308	77.4%
Rural Areas	3.375	2.715	80.5%	2.807	1.509	53.8%
Urban Areas	6.749	6.710	99.4%	6.633	5.799	87.4%
North Dakota	0.756	0.687	90.9%	0.458	0.417	91.0%
Rural Areas	0.334	0.279	83.6%	0.119	0.090	75.6%
Urban Areas	0.422	0.408	96.7%	0.339	0.327	96.4%
Ohio	11.610	10.721	92.3%	11.101	9.535	85.9%
Rural Areas	2.570	1.825	71.0%	2.199	1.322	60.1%
Urban Areas	9.039	8.896	98.4%	8.902	8.213	92.3%
Oklahoma	3.915	3.011	76.9%	3.518	2.274	64.7%
Rural Areas	1.341	0.614	45.8%	1.046	0.316	30.2%
Urban Areas	2.574	2.397	93.1%	2.471	1.958	79.2%
Oregon	4.086	3.712	90.8%	3.907	3.482	89.1%
Rural Areas	0.813	0.516	63.4%	0.717	0.439	61.2%
Urban Areas	3.273	3.196	97.7%	3.190	3.043	95.4%
Pennsylvania	12.774	12.115	94.8%	12.178	11.185	91.8%
Rural Areas	2.724	2.243	82.4%	2.307	1.730	75.0%
Urban Areas	10.050	9.871	98.2%	9.871	9.456	95.8%
Rhode Island	1.056	1.036	98.1%	1.056	1.036	98.1%
Rural Areas	0.097	0.095	97.6%	0.097	0.095	97.6%
Urban Areas	0.958	0.941	98.2%	0.958	0.941	98.2%
South Carolina	4.950	4.372	88.3%	4.451	3.359	75.5%
Rural Areas	1.676	1.164	69.4%	1.302	0.831	63.8%

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps and Mobile LTE 10 Mbps/3 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Urban Areas	3.274	3.208	98.0%	3.148	2.528	80.3%
South Dakota	0.863	0.760	88.1%	0.387	0.370	95.7%
Rural Areas	0.384	0.287	74.7%	0.090	0.075	83.4%
Urban Areas	0.479	0.474	98.9%	0.297	0.295	99.4%
Tennessee	6.640	6.031	90.8%	5.705	4.925	86.3%
Rural Areas	2.235	1.699	76.0%	1.483	0.961	64.8%
Urban Areas	4.406	4.332	98.3%	4.222	3.964	93.9%
Texas	27.764	25.940	93.4%	26.660	19.858	74.5%
Rural Areas	4.512	3.258	72.2%	3.826	1.802	47.1%
Urban Areas	23.251	22.683	97.6%	22.834	18.056	79.1%
Utah	3.040	2.932	96.5%	2.882	2.138	74.2%
Rural Areas	0.361	0.260	72.2%	0.263	0.088	33.5%
Urban Areas	2.679	2.671	99.7%	2.619	2.050	78.3%
Vermont	0.624	0.523	83.8%	0.394	0.000	0.0%
Rural Areas	0.383	0.286	74.7%	0.199	0.000	0.0%
Urban Areas	0.241	0.237	98.3%	0.195	0.000	0.0%
Virginia	8.387	7.595	90.6%	7.457	5.353	71.8%
Rural Areas	2.053	1.437	70.0%	1.372	0.296	21.6%
Urban Areas	6.334	6.158	97.2%	6.085	5.057	83.1%
Washington	7.269	7.119	97.9%	7.157	6.710	93.7%
Rural Areas	1.226	1.099	89.7%	1.154	0.888	76.9%
Urban Areas	6.043	6.020	99.6%	6.003	5.822	97.0%
West Virginia	1.830	1.440	78.7%	1.148	0.275	23.9%
Rural Areas	0.934	0.584	62.6%	0.453	0.080	17.7%
Urban Areas	0.896	0.855	95.5%	0.696	0.195	28.0%
Wisconsin	5.775	4.982	86.3%	5.228	4.409	84.3%
Rural Areas	1.736	0.978	56.3%	1.293	0.671	51.9%
Urban Areas	4.039	4.004	99.1%	3.935	3.737	95.0%
Wyoming	0.585	0.453	77.5%	0.341	0.043	12.7%
Rural Areas	0.217	0.095	43.5%	0.084	0.011	12.6%
Urban Areas	0.367	0.358	97.6%	0.257	0.033	12.7%

Table D3
Americans (Millions) With Access to Fixed Terrestrial 25 Mbps/3 Mbps or Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps or Mobile LTE with a Median Speed of 10 Mbps/3 Mbps by State and District of Columbia[5]

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
United States	322.518	321.809	99.8%	300.036	294.341	98.1%
Rural Areas	62.926	62.242	98.9%	47.025	42.192	89.7%
Urban Areas	259.592	259.567	100.0%	253.011	252.149	99.7%
Alabama	4.857	4.833	99.5%	4.189	4.096	97.8%
Rural Areas	2.002	1.977	98.8%	1.475	1.392	94.4%
Urban Areas	2.856	2.856	100.0%	2.713	2.704	99.6%
Alaska	0.738	0.645	87.4%	0.695	0.567	81.6%
Rural Areas	0.259	0.181	69.9%	0.236	0.125	52.9%
Urban Areas	0.479	0.464	96.9%	0.459	0.443	96.4%
Arizona	6.915	6.851	99.1%	6.810	6.311	92.7%
Rural Areas	0.798	0.740	92.7%	0.749	0.417	55.6%
Urban Areas	6.116	6.110	99.9%	6.061	5.895	97.3%
Arkansas	2.982	2.974	99.7%	2.242	2.121	94.6%
Rural Areas	1.318	1.309	99.4%	0.790	0.692	87.6%
Urban Areas	1.665	1.665	100.0%	1.452	1.430	98.4%
California	39.171	39.136	99.9%	39.071	38.657	98.9%
Rural Areas	2.255	2.220	98.4%	2.190	1.892	86.4%
Urban Areas	36.916	36.916	100.0%	36.880	36.765	99.7%
Colorado	5.520	5.508	99.8%	5.074	5.016	98.9%
Rural Areas	0.834	0.822	98.6%	0.557	0.504	90.5%
Urban Areas	4.686	4.686	100.0%	4.517	4.512	99.9%
Connecticut	3.571	3.571	100.0%	3.571	3.571	100.0%
Rural Areas	0.431	0.431	100.0%	0.431	0.431	100.0%
Urban Areas	3.140	3.140	100.0%	3.140	3.140	100.0%

[5] As with Tables 3c and 3d presented in this Report, the results shown for fixed 25 Mbps/3 Mbps or Mobile LTE 5 Mbps/1 Mbps are based upon the U.S. Population, excluding the U.S. Territories, whereas the results shown for fixed 25 Mbps/3 Mbps or Mobile LTE 10 Mbps/3 Mbps are based on a sub-sample of the total U.S. population where certain counties and the U.S. Territories are excluded.

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Delaware	0.950	0.950	100.0%	0.950	0.941	99.0%
Rural Areas	0.166	0.166	100.0%	0.166	0.158	95.2%
Urban Areas	0.784	0.784	100.0%	0.784	0.782	99.8%
District of Columbia[6]	0.678	0.678	100.0%	0.678	0.678	100.0%
Florida	20.564	20.560	100.0%	20.245	20.114	99.4%
Rural Areas	1.955	1.950	99.8%	1.722	1.608	93.4%
Urban Areas	18.609	18.609	100.0%	18.522	18.506	99.9%
Georgia	10.284	10.274	99.9%	8.861	8.777	99.1%
Rural Areas	2.521	2.511	99.6%	1.512	1.442	95.4%
Urban Areas	7.763	7.763	100.0%	7.348	7.335	99.8%
Hawaii	1.425	1.424	99.9%	1.425	1.411	99.0%
Rural Areas	0.130	0.128	98.9%	0.130	0.126	97.3%
Urban Areas	1.295	1.295	100.0%	1.295	1.285	99.2%
Idaho	1.680	1.661	98.9%	1.362	1.330	97.6%
Rural Areas	0.512	0.494	96.4%	0.314	0.283	90.2%
Urban Areas	1.168	1.168	100.0%	1.048	1.047	99.8%
Illinois	12.791	12.786	100.0%	12.005	11.955	99.6%
Rural Areas	1.473	1.469	99.7%	0.973	0.929	95.4%
Urban Areas	11.317	11.317	100.0%	11.032	11.026	100.0%
Indiana	6.626	6.625	100.0%	5.921	5.732	96.8%
Rural Areas	1.829	1.828	99.9%	1.328	1.143	86.1%
Urban Areas	4.797	4.797	100.0%	4.594	4.589	99.9%
Iowa	3.130	3.129	99.9%	2.105	2.104	99.9%
Rural Areas	1.130	1.129	99.9%	0.437	0.436	99.6%
Urban Areas	2.000	2.000	100.0%	1.668	1.668	100.0%
Kansas	2.901	2.901	100.0%	2.277	2.262	99.4%
Rural Areas	0.751	0.750	99.9%	0.338	0.331	97.9%
Urban Areas	2.151	2.151	100.0%	1.939	1.932	99.6%
Kentucky	4.428	4.371	98.7%	3.443	3.338	96.9%
Rural Areas	1.823	1.766	96.9%	1.004	0.900	89.7%
Urban Areas	2.605	2.605	100.0%	2.439	2.437	99.9%

[6] We only present this data for the District of Columbia because there are only urban areas in the District of Columbia.

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Louisiana	4.670	4.669	100.0%	4.231	4.034	95.3%
Rural Areas	1.252	1.251	99.9%	0.938	0.815	87.0%
Urban Areas	3.418	3.418	100.0%	3.293	3.218	97.7%
Maine	1.332	1.318	98.9%	1.231	1.175	95.4%
Rural Areas	0.826	0.812	98.3%	0.732	0.681	93.1%
Urban Areas	0.506	0.506	100.0%	0.499	0.493	98.9%
Maryland	6.001	6.001	100.0%	5.861	5.824	99.4%
Rural Areas	0.790	0.790	100.0%	0.695	0.671	96.5%
Urban Areas	5.211	5.211	100.0%	5.166	5.153	99.7%
Massachusetts	6.794	6.793	100.0%	6.783	6.768	99.8%
Rural Areas	0.544	0.544	99.9%	0.542	0.528	97.3%
Urban Areas	6.249	6.249	100.0%	6.241	6.240	100.0%
Michigan	9.934	9.928	99.9%	9.450	9.296	98.4%
Rural Areas	2.547	2.541	99.8%	2.213	2.060	93.1%
Urban Areas	7.387	7.387	100.0%	7.238	7.236	100.0%
Minnesota	5.513	5.510	99.9%	4.843	4.832	99.8%
Rural Areas	1.466	1.464	99.8%	1.001	0.990	98.9%
Urban Areas	4.046	4.046	100.0%	3.842	3.842	100.0%
Mississippi	2.986	2.978	99.7%	1.979	1.850	93.5%
Rural Areas	1.515	1.508	99.5%	0.752	0.637	84.7%
Urban Areas	1.470	1.470	100.0%	1.227	1.213	98.9%
Missouri	6.086	6.070	99.7%	5.097	4.864	95.4%
Rural Areas	1.814	1.798	99.1%	1.084	0.867	80.0%
Urban Areas	4.272	4.272	100.0%	4.013	3.997	99.6%
Montana	1.041	1.007	96.7%	0.722	0.625	86.6%
Rural Areas	0.474	0.441	93.2%	0.271	0.178	65.6%
Urban Areas	0.568	0.565	99.5%	0.450	0.447	99.2%
Nebraska	1.903	1.902	99.9%	1.284	1.281	99.8%
Rural Areas	0.509	0.508	99.7%	0.140	0.136	97.8%
Urban Areas	1.394	1.394	100.0%	1.144	1.144	100.0%
Nevada	2.937	2.930	99.7%	2.864	2.819	98.4%
Rural Areas	0.197	0.189	96.1%	0.160	0.121	75.9%
Urban Areas	2.741	2.741	100.0%	2.704	2.698	99.8%
New Hampshire	1.334	1.330	99.7%	1.262	1.214	96.2%

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Rural Areas	0.530	0.526	99.2%	0.483	0.441	91.2%
Urban Areas	0.805	0.805	100.0%	0.779	0.773	99.3%
New Jersey	8.933	8.933	100.0%	8.933	8.925	99.9%
Rural Areas	0.466	0.466	100.0%	0.466	0.462	99.0%
Urban Areas	8.466	8.466	100.0%	8.466	8.464	100.0%
New Mexico	2.075	2.060	99.2%	1.844	1.581	85.7%
Rural Areas	0.487	0.471	96.7%	0.364	0.188	51.6%
Urban Areas	1.588	1.588	100.0%	1.480	1.394	94.1%
New York	19.721	19.705	99.9%	19.263	19.082	99.1%
Rural Areas	2.351	2.335	99.3%	2.020	1.841	91.1%
Urban Areas	17.370	17.370	100.0%	17.242	17.241	100.0%
North Carolina	10.123	10.101	99.8%	9.440	9.203	97.5%
Rural Areas	3.375	3.354	99.4%	2.807	2.580	91.9%
Urban Areas	6.749	6.747	100.0%	6.633	6.623	99.8%
North Dakota	0.756	0.755	99.8%	0.458	0.457	99.7%
Rural Areas	0.334	0.333	99.6%	0.119	0.118	99.0%
Urban Areas	0.422	0.422	100.0%	0.339	0.339	100.0%
Ohio	11.610	11.602	99.9%	11.101	10.932	98.5%
Rural Areas	2.570	2.563	99.7%	2.199	2.037	92.6%
Urban Areas	9.039	9.039	100.0%	8.902	8.895	99.9%
Oklahoma	3.915	3.908	99.8%	3.518	3.301	93.8%
Rural Areas	1.341	1.334	99.5%	1.046	0.852	81.5%
Urban Areas	2.574	2.574	100.0%	2.471	2.448	99.1%
Oregon	4.086	4.057	99.3%	3.907	3.856	98.7%
Rural Areas	0.813	0.784	96.4%	0.717	0.670	93.4%
Urban Areas	3.273	3.273	100.0%	3.190	3.186	99.9%
Pennsylvania	12.774	12.762	99.9%	12.178	12.103	99.4%
Rural Areas	2.724	2.712	99.5%	2.307	2.237	97.0%
Urban Areas	10.050	10.050	100.0%	9.871	9.866	99.9%
Rhode Island	1.056	1.056	100.0%	1.056	1.056	100.0%
Rural Areas	0.097	0.097	100.0%	0.097	0.097	100.0%
Urban Areas	0.958	0.958	100.0%	0.958	0.958	100.0%
South Carolina	4.950	4.949	100.0%	4.451	4.384	98.5%
Rural Areas	1.676	1.674	99.9%	1.302	1.248	95.9%

	Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps		Pop. Evaluated	Fixed 25 Mbps 3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. With Access	% of Pop.		Pop. With Access	% of Pop.
Urban Areas	3.274	3.274	100.0%	3.148	3.136	99.6%
South Dakota	0.863	0.861	99.8%	0.387	0.385	99.6%
Rural Areas	0.384	0.382	99.6%	0.090	0.088	98.2%
Urban Areas	0.479	0.479	100.0%	0.297	0.297	100.0%
Tennessee	6.640	6.624	99.7%	5.705	5.624	98.6%
Rural Areas	2.235	2.218	99.2%	1.483	1.407	94.9%
Urban Areas	4.406	4.406	100.0%	4.222	4.217	99.9%
Texas	27.764	27.756	100.0%	26.660	25.964	97.4%
Rural Areas	4.512	4.505	99.8%	3.826	3.249	84.9%
Urban Areas	23.251	23.251	100.0%	22.834	22.715	99.5%
Utah	3.040	3.026	99.6%	2.882	2.852	99.0%
Rural Areas	0.361	0.347	96.3%	0.263	0.236	89.7%
Urban Areas	2.679	2.679	100.0%	2.619	2.616	99.9%
Vermont	0.624	0.614	98.3%	0.394	0.359	91.1%
Rural Areas	0.383	0.372	97.2%	0.199	0.168	84.3%
Urban Areas	0.241	0.241	100.0%	0.195	0.191	97.9%
Virginia	8.387	8.369	99.8%	7.457	7.129	95.6%
Rural Areas	2.053	2.035	99.1%	1.372	1.060	77.3%
Urban Areas	6.334	6.334	100.0%	6.085	6.069	99.7%
Washington	7.269	7.262	99.9%	7.157	7.145	99.8%
Rural Areas	1.226	1.219	99.4%	1.154	1.142	99.0%
Urban Areas	6.043	6.043	100.0%	6.003	6.003	100.0%
West Virginia	1.830	1.774	96.9%	1.148	1.034	90.0%
Rural Areas	0.934	0.878	94.0%	0.453	0.357	79.0%
Urban Areas	0.896	0.896	100.0%	0.696	0.676	97.2%
Wisconsin	5.775	5.748	99.5%	5.228	5.094	97.4%
Rural Areas	1.736	1.709	98.4%	1.293	1.162	89.9%
Urban Areas	4.039	4.039	100.0%	3.935	3.932	99.9%
Wyoming	0.585	0.578	98.9%	0.341	0.314	92.0%
Rural Areas	0.217	0.211	97.1%	0.084	0.058	68.5%
Urban Areas	0.367	0.367	100.0%	0.257	0.256	99.7%

APPENDIX E

Americans (Thousands) With Access to Fixed Terrestrial 25 Mbps/3 Mbps Services and/or Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps in the U.S. Territories[1]

	Total Pop.	Fixed 25 Mbps/3 Mbps		Mobile LTE 5 Mbps/1 Mbps		Fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Fixed 25 Mbps/3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. with Access	% of Pop.	Pop. with Access	% of Pop.	Pop. with Access	% of Pop.	Pop. with Access	% of Pop.
U.S. Territories	3,785.540	3,151.384	83.2%	3,717.469	98.2%	3,146.895	83.1%	3,721.958	98.3%
Rural Areas	247.536	143.225	57.9	230.215	93.0	139.221	56.2	234.219	94.6
Urban Areas	3,538.004	3008.159	85.0	3,487.254	98.6	3,007.674	85.0	3,487.739	98.6
American Samoa	54.193	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Rural Areas	7.975	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Urban Areas	46.218	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0
Guam	159.358	2.439	1.5	159.144	99.9	2.408	1.5	159.175	99.9
Rural Areas	9.440	0.152	1.6	9.407	99.7	0.121	1.3	9.438	100.0
Urban Areas	149.918	2.287	1.5	149.737	99.9	2.287	1.5	149.737	99.9
Commonwealth of the Northern Mariana Isl.	53.467	0.000	0.0	47.981	89.7	0.000	0.0	47.981	89.7
Rural Areas	5.848	0.000	0.0	3.000	51.3	0.000	0.0	3.000	51.3
Urban Areas	47.619	0.000	0.0	44.981	94.5	0.000	0.0	44.981	94.5
Puerto Rico	3,415.571	3,046.003	89.2	3,407.789	99.8	3,041.941	89.1	3,411.851	99.9
Rural Areas	218.499	137.308	62.8	212.287	97.2	133.588	61.1	216.007	98.9
Urban Areas	3,197.072	2,908.695	91.0	3,195.502	100.0	2,908.353	91.0	3,195.844	100.0
U. S. Virgin Isl.	102.951	102.942	100.0	102.555	99.6	102.546	99.6	102.951	100.0
Rural Areas	5.774	5.765	99.8	5.521	95.6	5.512	95.5	5.774	100.0
Urban Areas	97.177	97.177	100.0	97.034	99.9	97.034	99.9	97.177	100.0

[1] These data may significantly overstate current deployment in the U.S. Territories, Puerto Rico, and the U.S. Virgin Islands. Puerto Rico and the U.S. Virgin Islands account for over 92 percent of the total combined population of the U.S. Territories. Although the Form 477 data as of December 31, 2016 suggests that fixed 25 Mbps/3 Mbps and mobile LTE 5 Mbps /1 Mbps services were deployed in Puerto Rico and the U.S. Virgin Islands, we are uncertain as to the current deployment of services in these areas because of the damage to infrastructure in these areas from Hurricanes Maria and Irma.

APPENDIX F

–Demographic Analysis of Americans With Access to Fixed Terrestrial 25 Mbps/3 Mbps Services and/or Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps by State, County or County Equivalent

APPENDIX F1

Americans With Access to Fixed Terrestrial 25 Mbps/3 Mbps Services and/or Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps by State, County or County Equivalent

https://apps.fcc.gov/edocs_public/attachmatch/DOC-349000A1.xlsx

APPENDIX F2

Americans With Access to Fixed Terrestrial 25 Mbps/3 Mbps Services and/or Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps by State, County or County Equivalent (Segmented by Urban and Rural Areas)

https://apps.fcc.gov/edocs_public/attachmatch/DOC-349001A1.xlsx

APPENDIX G

Americans (Thousands) Living on Tribal Lands with Access to Fixed Terrestrial 25 Mbps/3 Mbps Services and/or Mobile LTE with a Minimum Advertised Speed of 5 Mbps/1 Mbps by State

	Total Pop.	Fixed 25 Mbps/3 Mbps		Mobile LTE 5 Mbps/1 Mbps		Fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Fixed 25 Mbps/3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. with Access	% of Pop.	Pop. with Access	% of Pop.	Pop. with Access	% of Pop.	Pop. with Access	% of Pop.
Tribal Lands	3,991.141	2,578.205	64.6%	3,787.640	94.9%	2,549.540	63.9%	3,816.305	95.6%
Alaskan Villages	261.818	145.035	55.4	173.249	66.2	134.831	51.5	183.453	70.1
Hawaiian Homelands	33.409	29.612	88.6	33.322	99.7	29.609	88.6	33.325	99.7
Lower 48 States	1,103.942	510.490	46.2	996.042	90.2	492.782	44.6	1,013.750	91.8
Alabama	0.283	0.088	31.1	0.283	100.0	0.088	31.1	0.283	100.0
Alaska	1.452	0.000	0.0	0.949	65.4	0.000	0.0	0.949	65.4
Arizona	197.979	16.203	8.2	137.805	69.6	16.203	8.2	137.805	69.6
California	69.976	36.447	52.1	68.394	97.7	36.447	52.1	68.394	97.7
Colorado	16.132	1.900	11.8	16.033	99.4	1.900	11.8	16.033	99.4
Connecticut	0.354	0.351	99.2	0.354	100.0	0.351	99.2	0.354	100.0
Florida	4.768	3.301	69.2	4.765	99.9	3.301	69.2	4.765	99.9
Idaho	32.955	5.599	17.0	29.710	90.2	5.458	16.6	29.851	90.6
Iowa	0.992	0.349	35.2	0.992	100.0	0.349	35.2	0.992	100.0
Kansas	5.692	0.541	9.5	5.692	100.0	0.541	9.5	5.692	100.0
Louisiana	0.768	0.096	12.5	0.768	100.0	0.096	12.5	0.768	100.0
Maine	2.364	1.627	68.8	1.337	56.6	1.104	46.7	1.860	78.7
Massachusetts	0.075	0.073	97.3	0.075	100.0	0.073	97.3	0.075	100.0
Michigan	34.970	29.269	83.7	34.834	99.6	29.269	83.7	34.834	99.6
Minnesota	38.884	29.428	75.7	37.732	97.0	28.655	73.7	38.505	99.0
Mississippi	7.179	4.467	62.2	7.179	100.0	4.467	62.2	7.179	100.0
Montana	69.268	33.959	49.0	49.673	71.7	23.170	33.4	60.462	87.3
Nebraska	8.643	1.653	19.1	8.622	99.8	1.653	19.1	8.622	99.8
Nevada	13.666	5.771	42.2	13.137	96.1	5.770	42.2	13.138	96.1
New Mexico	142.167	34.037	23.9	135.062	95.0	34.027	23.9	135.072	95.0
New York	13.607	7.968	58.6	13.607	100.0	7.968	58.6	13.607	100.0
North Carolina	9.178	0.215	2.3	7.797	85.0	0.215	2.3	7.797	85.0
North Dakota	25.195	20.049	79.6	24.848	98.6	19.836	78.7	25.061	99.5
Oklahoma	91.616	53.307	58.2	91.387	99.8	53.307	58.2	91.387	99.8
Oregon	9.297	3.246	34.9	9.082	97.7	3.246	34.9	9.082	97.7
Rhode Island	0.003	0.001	33.3	0.003	100.0	0.001	33.3	0.003	100.0
South Carolina	0.977	0.977	100.0	0.977	100.0	0.977	100.0	0.977	100.0

	Total Pop.	Fixed 25 Mbps/3 Mbps		Mobile LTE 5 Mbps/1 Mbps		Fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps		Fixed 25 Mbps/3 Mbps or Mobile LTE 5 Mbps/1 Mbps	
		Pop. with Access	% of Pop.	Pop. with Access	% of Pop.	Pop. with Access	% of Pop.	Pop. with Access	% of Pop.
South Dakota	64.913	34.483	53.1	62.825	96.8	33.045	50.9	64.263	99.0
Texas	1.866	1.395	74.8	1.866	100.0	1.395	74.8	1.866	100.0
Utah	36.183	14.961	41.3	32.851	90.8	14.725	40.7	33.087	91.4
Washington	136.549	127.443	93.3	133.718	97.9	124.620	91.3	136.541	100.0
Wisconsin	39.634	27.685	69.9	37.778	95.3	27.071	68.3	38.392	96.9
Wyoming	26.357	13.601	51.6	25.907	98.3	13.454	51.0	26.054	98.9
Tribal Statistical Areas	2591.972	1893.068	73.0	2585.027	99.7	1892.318	73.0	2585.777	99.8
California	3.177	3.166	99.7	3.177	100.0	3.166	99.7	3.177	100.0
New York	2.711	1.375	50.7	2.711	100.0	1.375	50.7	2.711	100.0
Oklahoma	2547.261	1849.705	72.6	2540.347	99.7	1848.986	72.6	2541.066	99.8
Washington	38.823	38.822	100.0	38.792	99.9	38.791	99.9	38.823	100.0

APPENDIX H

Overall Adoption Rate for Fixed Terrestrial Services by State and District of Columbia (2016)[1]

	Fixed 10 Mbps/1 Mbps	Fixed 25 Mbps/3 Mbps	Fixed 50 Mbps/5 Mbps
United States	66.2%	53.3%	44.2%
Alabama	52.7	40.5	34.2
Alaska	62.9	*	*
Arizona	63.3	57.6	48.2
Arkansas	44.9	29.3	26.9
California	72.7	57.4	53.1
Colorado	63.9	61.5	48.8
Connecticut	75.0	61.0	48.1
Delaware	83.7	81.2	68.8
District of Columbia	75.4	71.9	54.5
Florida	77.8	61.5	50.5
Georgia	63.7	48.3	40.3
Hawaii	88.2	*	*
Idaho	42.3	35.5	6.7
Illinois	64.1	50.4	41.3
Indiana	58.5	44.2	35.5
Iowa	46.3	40.9	36.2
Kansas	58.3	39.8	37.9
Kentucky	52.2	30.8	24.6
Louisiana	55.1	40.6	38.6
Maine	60.7	30.2	11.2
Maryland	78.1	73.5	60.4
Massachusetts	82.2	79.1	65.1
Michigan	64.3	52.4	42.2
Minnesota	58.7	54.3	45.8
Mississippi	44.9	28.8	18.9
Missouri	55.9	42.8	40.9
Montana	53.3	54.9	*

[1] Asterisks in the chart indicate the data has been withheld for confidentiality reasons.

	Fixed 10 Mbps/1 Mbps	Fixed 25 Mbps/3 Mbps	Fixed 50 Mbps/5 Mbps
Nebraska	55.4	42.7	36.1
Nevada	69.1	53.7	*
New Hampshire	76.7	71.9	50.2
New Jersey	84.4	81.7	64.0
New Mexico	40.1	40.6	29.2
New York	77.4	65.4	49.2
North Carolina	61.9	49.8	48.5
North Dakota	62.3	48.2	39.9
Ohio	64.7	32.2	13.2
Oklahoma	49.3	36.4	33.6
Oregon	65.5	61.5	48.9
Pennsylvania	65.0	59.5	47.1
Rhode Island	81.2	72.7	*
South Carolina	63.6	36.7	26.9
South Dakota	65.9	51.3	44.8
Tennessee	58.8	46.8	41.1
Texas	60.7	41.4	36.5
Utah	61.3	54.3	42.1
Vermont	63.5	58.1	45.2
Virginia	69.9	65.3	57.1
Washington	67.5	62.9	54.6
West Virginia	47.9	45.2	42.7
Wisconsin	63.9	40.4	31.4
Wyoming	56.1	54.8	*

STATEMENT OF
CHAIRMAN AJIT PAI

Re: *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199.

In Section 706 of the Telecommunications Act of 1996, Congress tasked the Commission with encouraging the deployment of broadband on a reasonable and timely basis and issuing an annual report on our progress. This report carries out this statutory responsibility.

The report maintains the same benchmark speed for fixed broadband service previously adopted by the Commission, which we earlier proposed to retain: 25 Mbps download/3 Mbps upload. The report also concludes that mobile broadband service is not a full substitute for fixed service. Instead, it notes there are differences between the two technologies, including clear variations in consumer preferences and demands. As a result, the report evaluates progress in deploying fixed broadband service as well as progress in deploying mobile broadband service and takes a holistic approach to evaluating the deployment of these services.

The report also indicates that the pace of both fixed and mobile broadband deployment declined dramatically in the two years following the prior Commission's *Title II Order*. However, the report also discusses how, over the course of the past year, the current Commission has taken steps to reduce barriers to infrastructure investment and promote competition in the broadband marketplace. Taken together, these policies indicate that the current FCC is now meeting its statutory mandate to encourage the deployment of broadband on a reasonable and timely basis.

But while we are now headed in the right direction, we have much to do. Far too many Americans still lack access to high-speed Internet. That's why the FCC's top priority under my leadership remains bridging the digital divide and bringing digital opportunity to all Americans.

Many staff members have been hard at work to bring you this report today: from the Wireline Competition Bureau: Adam Copeland, Nicole Desbois, Lauren Garry, Trent Harkrader, Alex Johns, Dan Kahn, Pam Megna, Kris Monteith, Steve Rosenberg, Arielle Roth, and John Visclosky; from the Wireless Telecommunications Bureau: Monica DeLong, Judith Dempsey, Chas Eberle, Nese Guendelsberger, Kate Matraves, Don Stockdale, Patrick Sun, Matt Warner, and Joe Wyer; from the International Bureau: Stacey Ashton, Denise Coca, Ena Dekanic, Jerry Duvall, Francis Gutierrez, Gabrielle Kim, Heidi Kroll, Arthur Lechtman, Michael Mullinix, Kerry Murray, Jim Schlichting, Walt Strack, Thomas Sullivan, Jacqueline (Lindsay) Tello, and Michele Wu-Bailey; from the Office of General Counsel: Billy Layton, Rick Mallen, Linda Oliver, William Richardson; and from the Office of Strategic Planning and Policy: Paul Lafontaine and Sean Sullivan.

DISSENTING STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN

Re: *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199.

If one were to take quick glance at this report, you would immediately conclude that a whole lot has changed over the past year when it comes to the state of broadband deployment in America. The now-titled 2018 Broadband *Deployment* Report boldly concludes that the Federal Communications Commission (FCC) is meeting its section 706(a) mandate to "encourage the deployment of broadband on a reasonable and timely basis." But what a more critical read of the report reveals is that this year's findings misinterpret "the plain text of section 706," endorse a self-serving and amorphous measurement of "progress," make changes to critical factors in its analysis, and rely heavily on *projected deployment* following actions taken by the FCC in 2017. Simply put, this report is biased, flawed, and woefully incomplete.

The statistics are glaringly clear: persistent digital and opportunities divides remain for far too many in our nation. With respect to fixed 25 Mbps/3 Mbps and 10 Mbps/3 Mbps mobile LTE, approximately 44 million Americans lack access to both services. A whopping 66.2% of Americans living in rural and Tribal areas—as compared to 2.1% of Americans living in urban areas—still lack access to fixed 25/3 broadband. These are tens of millions of our fellow citizens who lack access to broadband putting them at a severe disadvantage when it comes to robust opportunities in education, healthcare, government services, and civic participation.

Instead of grappling with this unfortunate reality, this report blatantly suggests that Congress did not intend for the FCC to meet a *rigid* requirement that *each* and *every* American be served. Pardon me? Congress' intent when it comes to these reports could not have been any clearer. The plain language of Section 706 states "the Commission shall determine whether advanced telecommunications capability **is** being deployed to all Americans in a reasonable and timely fashion." Similarly, the Broadband Data Improvement Act of 2008 requires the Commission to consider a plethora of factors and "compile a list of geographical areas that are not served by any provider of advanced telecommunications capability." Those statutes clearly mandate that the Commission determine if broadband is being deployed to *all Americans*.

Instead of evaluating how close we are to connecting *all Americans*, this report now measures progress by comparing deployment in the present year to deployment in previous years. I am blown away that what is supposed to provide a comprehensive analysis of broadband deployment to *all Americans*—particularly those living in rural and Tribal lands— instead creates a *new* measurement of progress and misinterprets Congressional intent in order to declare "Mission Accomplished." Even as it sets a new metric, the report adopts no standards by which we should judge any progress, nor does it back up its unsourced and breathless assertions that the *2015 Open Internet Order* caused a drop in deployment.

As if manipulating Congressional intent and altering the fundamental analysis were not enough, the report goes further by removing price as a factor in its analysis. Price is a well-known indicator for assessing broadband *availability*. A previous study found that 71% of those without broadband identified affordability as a major factor What is painfully clear, is that a service cannot truly be *available* if you cannot *afford* it. But in the majority's rush to declare victory and rack up brownie points, they once again disregard the plight of low-income Americans.

Additionally, the report includes satellite service in its analysis — a factor that has been recognized by previous reports as likely to overstate deployment to a significant degree. Despite this report's recognition of the same potential overstatement, the majority opted to include such data in their analysis — resulting in a significant increase in statistics showing access to broadband. For example, 25 million Americans lack access to both fixed and mobile broadband at 25 Mbps/3 Mbps and 5 Mbps/1Mbps respectively. However, when satellite is included, the estimate of unserved Americans drops to 14 million. While admittedly there have been noteworthy improvements when it comes to satellite

services, just ask those I met last year in Marietta, Ohio and the year before in Raymond, Mississippi whether their broadband needs are being truly met.

Last, but certainly not least, the report bases its finding of timely broadband deployment pursuant to section 706(b) on *projected* deployment based off a laundry list of actions the FCC took in 2017. Specifically, the report states "while the December 2016 Form 477 data in the report does not yet reflect the beneficial effects of the Commission's actions in 2017, the marketplace is already responding to the more deployment-friendly regulatory environment now in place." This reminds me of the majority's approach to competition in the *Business Data Services Order*, where *potential* competition equated to *actual c*ompetition. Here the majority unsurprisingly and incorrectly states that *projected* reasonable and timely deployment is the same as *actual* reasonable and timely deployment.

Critical progress reports should not rely on the "hypothetical" when it comes to reaching a conclusion. Analysis based on data that shows the current state of "Broadband Progress," not misinterpreted measurements and cavalier explications of Congressional intent that tilts the scale against the needs of the consumer longing for broadband is what we need. Indeed, the deployments the majority loudly touts pale greatly in comparison to the deployments that occurred in the year after the adoption of the *2015 Open Internet Order*. But if you are desperate to justify flawed policy, I think the straw-grasping conclusions contained in this report is for you.

I dissent.

STATEMENT OF
COMMISSIONER MICHAEL O'RIELLY

Re: Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, GN Docket No. 17-199

Overall, this item faithfully and sensibly meets the obligations required by Congress as provided for in Section 706 of the Telecommunications Act of 1996. While I may not agree with all of the findings contained within, it is worthy of my support and I lend it such.

Given the tortured process previous Commissions have used to conduct this work, it is refreshing to see one conducted and completed in an honest and straightforward manner. Instead of presupposing the answer and then working backwards or, alternatively, being afraid to make any determination, the Commission started with a public inquiry to secure the appropriate collection of data, proceeded to its analysis, and reached a corresponding conclusion detailed in this report. This Commission was actually willing to do the expected work and let the plethora of data provided prove the case. What a novel concept!

The Data Support A Positive Finding

Fundamentally, the question that this item must answer is "whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."[1] By any account, the picture with regards to the availability of advanced telecommunications services (i.e., broadband) is very robust and growing. In examining the data, it indicates that 95.6 percent of all Americans have access to fixed broadband with speeds exceeding the 25/3 Mbps threshold that was set by the last Commission.[2] And this excludes consumers that have service at or above 10/1 Mbps, which is a standard supported by my fellow Commissioners for purposes of our universal service High-Cost programs. Moreover, this report reflects a snapshot in time from over one year ago, meaning that deployment is actually more extensive today, as broadband providers have further expanded their networks and/or reach since that time period.

To argue that deployment is not sufficient to meet the statutory test ignores the wording of the law and its context. At no point should – and the statute doesn't require – the standard for a positive finding to be 100 percent, perfection. Instead, a finding should be positive as long as deployment is "reasonable and timely." That is, the provision focuses on year-to-year progress, not achieving a particular threshold any given year.

Certainly, we should acknowledge the progress that has been made. For instance, broadband delivered over fixed terrestrial networks with speeds above 25/3 has increased by over 10 percentage points in four years, from 81.2 to 92.3 percent.[3] Indeed, I continue to be impressed by the progress that has been made given that, as deployment edges closer to universal access, the remaining unserved communities are among the hardest and costliest to serve.

Commission's Work Continues Notwithstanding this Finding

Importantly, the report's conclusion does not mean that there is no additional work necessary to reach those Americans who do not have broadband today. There most certainly is. According to our data, 14 million Americans remain without broadband at the 25/3 threshold, not 24 million as some have claimed.[4] Not to diminish this figure, but it is important that we accurately describe the problem.

[1] 47 U.S.C. § 157 nt.

[2] *Supra* para. 51. This figure includes satellite provided service as it should not matter what technology is used to achieve the result.

[3] *Supra* Table 1.

[4] The 14 million figure also includes satellite provided service that meets the 25/3 threshold.

Addressing this unserved population is why I have worked so hard on modernizing our universal service High-Cost programs. It's why I pushed for quick completion and specifically multi-round, reverse auctions for Connect America Fund (CAF) Phase II. It's why I have publicly commented and testified in Congress for the need for preemption of state, local and Tribal barriers to deployment for broadband infrastructure. It's why I helped lead the passage of needed reforms for rate-of-return standalone broadband reform. It's why I took the lead in seeking passage of the Alaska broadband plan. And, it's why I have been a lone voice at the Commission seeking to stand-up the Remote Areas Fund (RAF), which seems to be nothing more than wishful thinking at this point. I think it is fair to ask any item naysayers, if you truly care so much about the unserved, why have you barely lifted one finger to help me develop and deploy the RAF?

Contrary to the criticism of some, a positive finding under this item *does not mean* that the Commission will stop its efforts to ensure every American who wants broadband access has it. It personally pains me to know that there are so many Americans who have inadequate broadband with little hope of improvement. Nothing in this item or any other will keep me from pushing to address this situation in a timely, thoughtful, and cost-efficient manner. To be abundantly clear, passage of this item does not disrupt the work that will come tomorrow, the next day, or the many days to come. I am committed to ensuring the Commission does all it can, including removing barriers to deployment as referenced in the law, to bring broadband throughout our diverse, geographic landscape.

Misinformation & Missteps

There has been a tremendous amount of misinformation spewed on this item since the Notice of Inquiry (NOI) stage.[5] Take for instance the 25/3 Mbps benchmark for wireline broadband adopted a few years ago, which the NOI clearly proposed that the Commission retain.[6] Accusation after accusation was made that the Commission was watering down the 25/3 benchmark, while nothing could have been farther from the truth. Instead, the NOI explored whether to adopt a different standard – as it is obligated and must do to actually conduct a real review. But there was never any magical conspiracy to snooker everyone into thinking every household had "broadband" by shifting the benchmark. Pure goofiness.

That being said, I strongly disagreed with how the 25/3 benchmark came to be as a result of the Commission's 2015 report. Specifically, I firmly believe that it was adopted under an intellectually-broken process to achieve a political outcome. Moreover, I questioned at its adoption whether such a standard was defensible since it was based on laughable scenarios involving then early-stage 4K television or multiple users and/or devices in a household simultaneously engaging in extremely high-bandwidth activities, which certainly could have occurred but was nowhere near any relative societal norm. It may not be today either. But, while I still have some serious doubts about this benchmark, I tend to see some value in maintaining it, particularly since it allows an apples-to-apples comparison over previous years.

Where I think the item gets it completely wrong is its treatment of wireless broadband. On multiple fronts, the report minimizes the enormous value and market realities brought forth by wireless broadband. In particular, I disagree with the unwillingness of the Commission to set a wireless benchmark. To argue year after year that the data is lacking amounts to an insufficient excuse. The Commission is more than capable of determining a justifiable, sensible benchmark for wireless broadband services, and indeed it has done so for purposes of Mobility Fund Phase II. The 10/1 Mbps suggested in the NOI was a reasonable place to start, but I was willing to be convinced of some other standard. However, abdicating this responsibility, as the report does, boggles the mind and diminishes the value of this report.

[5] *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, 32 FCC Rcd 7029 (2017), http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0808/FCC-17-109A1.pdf

[6] *Id*. at 7033, para. 12.

More importantly, I disagree with the Commission's reluctance to firmly acknowledge that wireless broadband is a substitute for wireline service. It is not a mere complement. Every day, more and more consumers are flocking to wireless broadband and the mobile experience it provides despite the differences in speed. In other words, consumers, especially in the less affluent and younger populations, are willing to trade speed for flexibility. This is not too dissimilar to how consumers were willing in the early 2000s to trade wireline voice call quality for inferior wireless voice service that offered mobility. Today, wireline voice service subscription is a mere pittance compared to its former self. Further, the number of U.S. consumers that have gone completely wireless has exceeded 52 percent.[7] That trend will continue, if not accelerate, especially with the near ubiquitous availability of 4G LTE.

One only has to go visit and talk with actual American consumers to realize what is happening in the marketplace. Given the choice between gigabit speed wireline broadband and slower, data-capped wireless service, consumers that I have met with and providers deploying service in neighborhoods will make clear that the wireless service is preferable – by far. No media stunts or wireline-fasting contests can prove otherwise.

And, the day is fast approaching when any speed differential between the two will disappear completely. New wireless technologies are in the deployment stage, and many more in the development stage, that will eviscerate any perceived speed barriers. Mobile 5G will be here in only a matter of time and it's likely much sooner than the Commission envisions in this item. Maybe next year's report will allow the Commission to fully recognize marketplace and technological reality as it pertains to wireless broadband.

* * *

For the myriad of reasons provided, I support the adoption and release of the Commission's 2018 Broadband Deployment Report.

[7] U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, *Wireless Substitution: Early Release of Estimates From the National Health Interview Survey*, January–June 2017 (released December 2017), https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201712.pdf.

STATEMENT OF
COMMISSIONER BRENDAN CARR

Re: *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199.

For the past few years, the FCC has used the Section 706 Broadband Deployment Report to determine whether all Americans have access to advanced telecommunications capability. Now, there is nothing inherently wrong with such an inquiry. But it answers the wrong question—or, more specifically, it fails to answer the question Congress posed to the Commission in Section 706 of the Telecommunications Act of 1996. The Commission corrects this error with this 2018 Broadband Deployment Report.

In Section 706, Congress determined that the Commission "shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans."[1] It then directs the Commission to conduct an inquiry to determine "whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."[2] If it is not, Section 706 states that the Commission "shall take immediate action to accelerate deployment of such capability."[3]

As this year's Broadband Deployment Report explains, Section 706 thus directs the Commission to measure the progress that providers of advanced telecommunications capability are making in deploying those capabilities to all Americans and to determine whether such progress is reasonable and timely. Reading Section 706 as directing the Commission to determine whether advanced telecommunications capability has been deployed to all Americans, as the FCC has in past Reports, reads the "reasonable and timely" language out of the statute and is inconsistent with Congress's use of the present progressive tense "is being deployed." This conclusion is further reinforced by the language Congress used for FCC inquiries that result in a negative determination. In such cases, Congress states that the Commission "shall take immediate action to *accelerate* deployment,"[4] thus confirming Congress's focus in Section 706 on the pace of deployment and the progress that providers are making.

As a policy matter, it makes sense that Congress would task the Commission with this type of progress-based inquiry. Assessing the pace at which advanced telecommunications capability is being deployed provides far more—and more helpful—information than a binary inquiry into whether or not all Americans already have access to such capability. But of course, the Commission's approach to Section 706 during the prior Administration did not reflect fealty to the statutory text as much as an interest in expanding the scope of the Commission's authority.[5]

I am glad that this year's Report answers the question posed by Congress. The Report correctly determines that advanced telecommunications capability is being deployed in a reasonable and timely manner. Among other things, the data show that 99% of Americans have access to mobile LTE, 95.4% have access to both mobile LTE and fixed broadband at 25 Mbps, and 99.9% have access to either fixed broadband or mobile LTE.

Now, none of this is to say that our job at the FCC is done. As the Report makes clear, far too many Americans remain unable to access high-speed broadband, and we have much more work to do if we are going to encourage the deployment of broadband to all Americans.

[1] 47 U.S.C. § 1302(a).

[2] 47 U.S.C. § 1302(b).

[3] 47 U.S.C. § 1302(b).

[4] 47 U.S.C. § 1302(b) (emphasis added).

[5] With the recent *Restoring Internet Freedom Order*, the Commission returned to its earlier (and proper) view that Section 706 does not constitute an affirmative grant of regulatory authority.

Nor do I have any objection to identifying aggressive speed or deployment goals. By all means, let's shoot for the moon. But the question we must answer in this Report is the one Congress set out in Section 706. Congress specifically defined advanced telecommunications capability "without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications."[6] Whatever one thinks we should be aiming for as an agency or a country, the benchmarks identified in this Report certainly enable users to originate and receive high-quality voice, data, graphics, and video within the meaning of Section 706. Indeed, the record shows that the technologies meeting the Report's benchmarks enable HD video streaming, online gaming, and HD video calling, among other advanced capabilities.

Going forward, we must continue to move with dispatch at the FCC. Over the past year, we turned the corner and moved away from policies that created regulatory headwinds. Over the next year, our success as an agency should and will be measured by whether, in the words of Section 706, we continue to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans." That means we must continue to streamline our wireless and wireline infrastructure deployment rules. We must continue to free up even more spectrum for consumer use. And we must continue to create the incentives that will spur innovation from the edge to the core of the networks. I look forward to working with my colleagues on efforts that will do just that.

[6] 47 U.S.C. § 1302(d)(1).

DISSENTING STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199.

I believe the future belongs to the connected. That's because a broadband connection is more than a technology—it's a platform for opportunity. No matter who you are or where you live in this country, you need access to modern communications to have a fair shot at 21st century success. That's a fact.

There are also many facts in this Broadband Deployment Report, but what stands out most is a single finding. This report concludes that in the United States the deployment of broadband to all Americans is reasonable and timely. This is ridiculous—and irresponsible. Today there are 24 million Americans without access to broadband. There are 19 million Americans in rural areas who lack the ability to access high-speed services at home. There are 12 million school-aged children who are falling into the Homework Gap because they do not have the broadband at home they need for nightly schoolwork. Ask any one of them if they think the deployment of the most essential digital age infrastructure is reasonable and timely and you will get a resounding "No." To call these numbers a testament to our national success is insulting and not credible.

To be sure, there are communications providers across the country that have done yeoman's work to deploy more high-speed services in hard-to-reach places. They deserve kudos for their effort. But it is premature for this agency to declare mission accomplished.

Moreover, I believe that the future belongs to the bold. This is the country that put a man on the moon. We invented the Internet. History demonstrates that when we set audacious goals we can do big things. We need to do better than dream small if we want to lead the world. It's past time for the FCC to go big and update its national broadband standard from 25 Megabits to 100 Megabits. On this point we have work to do—because at this speed when you factor in price the United States ranks only 26th in the world. Our unwillingness to own up to this here has consequences—we shortchange our children, our future, and our digital economy.

I dissent.