Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, 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

Adopted: January 29, 2015 **Released: February 4, 2015**

Comment Date: March 6, 2015
Reply Comment Date: April 6, 2015

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

TABLE OF CONTENTS

Para.
I. INTRODUCTION 1
II. BACKGROUND 13
A. Statutory Requirements and Context 13
B. Previous Broadband Progress Reports 14
C. Private Investment 15
D. Commission Action Since the Last Report 17
E. Other Federal Efforts 18
III. DEFINING "ADVANCED TELECOMMUNICATIONS CAPABILITY" 19
A. Relevant Factors in General 24
B. Speed Factor 26
1. Providers Offering Higher Speeds 28
2. Speeds Required to Use High-Quality Applications 29
3. Consumers Adopt Higher Speeds When They Have the Option 41
4. "Advanced Telecommunications Capability" Requires 25 Mbps/3 Mbps for Consumers 45
5. "Advanced Telecommunications Capability" for Elementary and Secondary Schools and Classrooms Requires at Least 100 Mbps and, Longer-Term, 1 Gbps 56
IV. BROADBAND DEPLOYMENT AND AVAILABILITY 63
A. Our Statutory Inquiry Looks Beyond Physical Deployment 64
B. Technology and Data Sources 67
1. Fixed Services 67
2. Mobile Services 72

3. Satellite Services 76
4. Elementary and Secondary Schools and Classrooms 77
C. Fixed Broadband Deployment and Availability 78
1. Physical Deployment 79
2. Fixed Broadband Adoption 90
3. Other Indicators of Availability of Fixed Broadband to All Americans 100
D. Mobile Deployment and Availability Estimates 107
1. Physical Deployment 107
2. Availability of Mobile Broadband to All Americans 114
E. Americans Without Access to Fixed 25 Mbps/3 Mbps and Mobile 10 Mbps/768 kbps Service 120
F. Satellite Deployment and Availability Estimates 122
G. Elementary and Secondary Schools Without Access to Fiber 127
H. International Broadband Service Capability 130
V. ADVANCED TELECOMMUNICATIONS CAPABILITY IS NOT BEING DEPLOYED TO ALL AMERICANS IN A REASONABLE AND TIMELY FASHION 133
VI. REMOVING BARRIERS & PROMOTING COMPETITION 141
VII. NOTICE OF INQUIRY ON IMMEDIATE ACTION TO ACCELERATE DEPLOYMENT 153
A. Introduction 153
B. Additional Actions to Expand Availability and Increase the Rate of Deployment 157
C. Additional Actions to Reduce the Disparity between Americans Living in Urban and Rural and Tribal Lands 161
D. Additional Actions to Increase Deployment to Schools and Classrooms 163
VIII. PROCEDURAL MATTERS 164
A. Ex Parte Rules 164
B. Comment Filing Procedures 165
C. Accessible Formats 166
IX. ORDERING CLAUSES 167
APPENDIX A — Commenters
APPENDIX B — Table, Chart, and Map Index
APPENDIX C — Data Sources and Definitions
APPENDIX D — Americans in Urban and Rural Areas Without Access to Fixed 25 Mbps/3 Mbps Broadband by State & U.S. Territory
APPENDIX E — Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband by County
APPENDIX F — Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband by State
APPENDIX G — Americans Without Access to Fixed 3 Mbps/768 kbps or 10 Mbps/768 kbps Services by State and U.S. Territory
APPENDIX H — Overall Adoption Rates for Fixed Services by State & U.S. Territory

I. INTRODUCTION

1. As required by section 706 of the Telecommunications Act of 1996, as amended, we issue this Report on our annual inquiry regarding the availability of "advanced telecommunications capability" to all Americans and to determine whether such capability is being deployed to all Americans in a reasonable and timely fashion.[1]

[1] 47 U.S.C. § 1302(b). Section 706 of the Telecommunications Act of 1996, Pub. L. No. 104-104, § 706, 110 Stat. 56, 153 (1996) (1996 Act), as amended in relevant part by the Broadband Data Improvement Act (BDIA), Pub. L. No. 110-385, 122 Stat. 4096 (2008), is now codified in Title 47, Chapter 12 of the United States Code. *See* 47 U.S.C. §§ 1302, 1303. For simplicity, in this Report we sometimes refer to "advanced telecommunications capability" as "broadband," but we note that "advanced telecommunications capability" has a unique definition in section 706 that differs from the term "broadband" in other contexts. Thus, our discussion of broadband in this

(continued…)

2. Today, Americans turn to broadband Internet access service for every facet of daily life, from finding a job to finding a doctor, from connecting with family to making new friends, from becoming educated to being entertained. The availability of sufficient broadband capability can erase the distance to high-quality health care and education, bring the world into homes and schools, drive American economic growth, and improve the nation's global competitiveness. New technologies and services such as real-time distance learning, telemedicine, and higher quality video services are being offered in the market today and are pushing demand for higher broadband speeds.

3. Congress directed us to evaluate annually "whether *advanced* telecommunications capability is being deployed to *all* Americans in a reasonable and timely fashion."[2] For a service to be considered advanced, it must enable Americans "to originate and receive high-quality voice, data, graphics, and video telecommunications."[3] We can no longer conclude that broadband at speeds of 4 megabits per second (Mbps) download and 1 Mbps upload (4 Mbps/1 Mbps)—a benchmark established in 2010 and relied on in the last three Reports—supports the "advanced" functions Congress identified.[4] Trends in deployment and adoption, the speeds that providers are offering today, and the speeds required to use high-quality video, data, voice, and other broadband applications all point at a new benchmark. The average household has more than 2.5 people, and for family households, the average household size is as high as 4.3.[5] We take the needs of multiple users into account when considering what level of service is necessary to be considered advanced telecommunications capability. We consider, too, the services that providers are offering today, as well as the services that American consumers are choosing. With these factors in mind, we find that, having "advanced telecommunications capability" requires access to actual download speeds of at least 25 Mbps and actual upload speeds of at least 3 Mbps (25 Mbps/3 Mbps).

(Continued from previous page)
Report may not apply equally to discussions of broadband in other circumstances or in other proceedings. *See* 47 U.S.C. § 1302(d)(1) ("The term 'advanced telecommunications capability' is defined, 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 using any technology.").

[2] 47 U.S.C. § 1302(b) (emphasis added).

[3] 47 U.S.C. § 1302(d)(1).

[4] In the *2010 Sixth Broadband Progress Report*, the Commission updated this speed benchmark from 200 kilobits (kbps) in both directions. *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, 9563, para. 11 (2010) (*2010 Sixth Broadband Progress Report*); *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, 8018-19, paras. 14-15 (2011) (*2011 Seventh Broadband Progress Report*); *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, 10348, para. 7 (2012) (*2012 Eighth Broadband Progress Report*).

[5] U.S. Department of Commerce, United States Census Bureau, *America's Families and Living Arrangements: 2013: Average number of people (AVG table series)*, Table AVG1 (last visited Jan. 7, 2015), http://www.census.gov/hhes/families/data/cps2013AVG.html (*2013 Census Average Household*). We note that households with an average household size of as many as 4.3 people include family households with family and non-family members. *See id*.

4. Although public- and private-sector initiatives continue to advance deployment, these advances are not occurring broadly enough or quickly enough. Recent data show that approximately 55 million Americans (17 percent) live in areas unserved by fixed 25 Mbps/3 Mbps broadband or higher service, and that gap closed only by three percentage points in the last year.[6] We therefore conclude that broadband is not being deployed to all Americans in a reasonable and timely fashion.

5. In addition to examining deployment nationwide, we take a hard look at whether parts of our country are being left behind. A digital divide persists between urban and non-urban parts of the country. The data show that this divide exists for broadband service at a variety of speeds. The data also show that the problem is one of supply, not demand. Consumers in rural America adopt broadband at the same rates as consumers in urban areas. While we have made concerted efforts, particularly through the Connect America Fund, to shrink this gap, we have not eliminated it yet. We will continue our efforts; Congress made clear that *all* Americans should receive the benefits that advanced broadband can provide.

6. Americans living in rural areas and on Tribal lands disproportionately lack access to broadband.[7] Our data show that 25 Mbps/3 Mbps capability is unavailable to 8 percent of Americans living in urban areas, compared to 53 percent of Americans living in rural areas and 63 percent of Americans living on Tribal lands and in the U.S. Territories.[8] The gap between those with and without access declined by only 2 percent in rural areas.[9] While overall the gap has declined by 37 percent in the U.S. Territories and by 5 percent on Tribal lands, there have been no improvements in American Samoa, Guam, or the Northern Mariana Islands where 100 percent of the population still lack access to these services.[10] This disparity between urban, rural, and Tribal lands exists at all speed tiers.[11] Thus, we also separately conclude that broadband is not being deployed in a reasonable and timely fashion because it is not yet available to the majority of rural and Tribal Americans and not becoming available quickly enough.[12] Finally, looking at schools, we find that although many schools have access to the Internet, not all schools have access to fiber consistent with goals the Commission set for them.[13] For this reason as well, we separately conclude that broadband is not being deployed in a reasonable and timely fashion.

7. As part of our inquiry into "the availability of advanced telecommunications capability to all Americans,"[14] we also examine broadband adoption—some reasons why Americans choose not to adopt broadband could reflect factors that are relevant to its "availability," such as price and quality. While we continue to see that adoption lags behind deployment to a significant degree, at all speeds,[15] we do not know precisely why. The recent *2014 NTIA Digital Nation Report* found the top reason given for non-adoption was consumers simply not wanting broadband, and the second most cited reason was

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[6] *See infra* para. 84, Tbl. 7. Since July 2009, National Telecommunications and Information Administration (NTIA), in coordination with the Commission, has been collecting data concerning where broadband is deployed across the nation as part of the State Broadband Initiative (SBI) Grant Program. *See* U.S. Department of Commerce, NTIA, State Broadband Data and Development Grant Program, Notice of Funds Availability, 74 Fed. Reg. 32545 (July 8, 2009), http://www.ntia.doc.gov/files/ntia/publications/fr_broadbandmappingnofa_090708.pdf (*NTIA State Mapping NOFA*). For purposes of this Report, we call this data "SBI Data."

[7] *See infra* para. 79, Tbl. 4.

[8] *Id*.

[9] *See infra* para. 84, Tbl. 7.

[10] *See infra* paras. 85-86, Tbls. 8-9.

[11] *See infra* paras. 84-86, Tbls. 7-9.

[12] 47 U.S.C. § 1302(b).

[13] *See infra* para. 138.

[14] 47 U.S.C. § 1302(b).

[15] *See infra* para. 91, Tbl. 12.

because it was too expensive.[16] Americans with lower median incomes and where the poverty rate, rural population rate, and unemployment rate is higher tend to have lower broadband adoption rates.[17] These facts raise questions about whether broadband is "availab[le] . . . to all Americans" as the statute requires, and we will continue to evaluate both how we can improve our analysis in future Reports and how the Commission can address the adoption gap. Although we evaluate adoption separately from deployment and our determination about whether broadband is being deployed in a reasonable and timely fashion stands independently from our evaluation of broadband adoption, examining adoption is useful both as an indicator of what Americans may consider to be needed and separately as a stimulator for deployment.[18]

8. In a companion report also released today, the International Bureau provides information about broadband in other parts of the world.[19] The available international broadband data, though not fully comparable to U.S. data, continue to suggest that the United States may lag behind a number of other developed countries with regard to some broadband metrics.[20] With respect to speed, for example, the actual download speed when weighted by sample size in the United States increased by 29 percent from 2012 to 2013, the United States ranked 26th of 40 countries in 2013 (18.67 Mbps) and ranked 25th of 40 countries in 2012 (14.50 Mbps).[21]

9. As we did in previous reports, while we consider the availability of mobile and satellite services, we exclude them from our finding of whether advanced telecommunications capability is being deployed in a reasonable and timely fashion.[22] Previously, the Commission explained that it had significant concerns about the quality and reliability of the mobile and satellite service data, and also had concerns about other factors, such as latency concerns and usage allowances.[23] Those concerns remain, but even if they were resolved, it would not alter the negative finding we make in this Report. As detailed below, satellite services are likely not yet offering 25 Mbps/3 Mbps speeds. And the mobile data remain

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[16] NTIA, Exploring the Digital Nation: Embracing the Mobile Internet at 26, Fig. 16 (Oct. 2014), http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_embracing_the_mobile_internet_10162014.pdf (*2014 NTIA Digital Nation Report*); *id*. at i (stating that "[t]he continued persistence of financial and other barriers to Internet use is an urgent problem for policymakers because the 'Internet has become integral to daily life in the United States'"). While the Commission has collected limited broadband pricing data, it has not yet collected comprehensive broadband pricing data to assess affordability of broadband services. *Modernizing the FCC Form 477 Data Program et al*., WC Docket No. 11-10 et al., Notice of Proposed Rulemaking, 26 FCC Rcd 1508, 1533-36, paras. 66-76 (2011) (seeking comment on whether and how to collect data on pricing); *Modernizing the FCC Form 477 Data Program*, WC Docket No. 11-10, Report and Order, 28 FCC Rcd 9887, 9892, para. 13 n.29 (2013) (*Modernizing Form 477 Order*) ("We do not address the collection of price data or service quality and customer satisfaction data at this time, and those issues remain open for consideration."); *Wireline Competition Bureau Announces Timeline For Completion of 2015 Urban Rates Survey,* WC Docket No. 10-90, Public Notice, 29 FCC Rcd 13366 (Wireline Comp. Bur. 2014) (collecting limited targeted broadband price data through the Urban Rate Survey).

[17] *See infra* para. 95, Tbl. 14.

[18] *See infra* paras. 64-66; *see, e.g., 2012 Eighth Broadband Progress Report,* 27 FCC Rcd at 10403, para. 139.

[19] *See International Comparison Requirements Pursuant to the Broadband Data Improvement Act*; *International Broadband Data Report*, GN Docket 14-126, Fourth Report, DA 15-132 (Int'l Bur. rel. Feb. 4, 2015) (*2015 Fourth International Broadband Data Report*).

[20] *Id*. at para. 1.

[21] *Id*. at para. 26.

[22] The Commission has presented an analysis of the available mobile deployment data in prior Reports. *See, e.g.*, *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8089-90, para. 34; *2012 Eighth Broadband Progress Report,* 27 FCC Rcd at 10382-85, paras. 85-91.

[23] *2012 Eighth Broadband Progress Report,* 27 FCC Rcd at 10365-68, paras. 31-43.

unreliable as to physical deployment and do not allow us to analyze fully whether mobile broadband is "available."[24]

10. Future reports will benefit from analysis of more comprehensive and reliable data. In particular, once we begin to rely on the mandatory Form 477 data collection for deployment information, the reliability of the mobile and satellite data should improve substantially.[25] In addition, we expect to examine other factors of availability, including usage allowances and price, latency, whether service at the relevant speed is available on a consistent and reliable basis, and whether the network is secure. We expect to examine these factors in the next Inquiry and will seek out ways to improve our ability to evaluate them, relevant to both fixed and mobile services.[26]

11. In the next Report, we will further explore how to incorporate mobile and satellite in our analysis given consumers want access to a high-speed service that is reliable, affordable, and of consistent quality. But they also want broadband on the go. Consequently, fixed and mobile broadband might be complementary, rather than substitutes, and might warrant different speed and non-speed benchmarks. We look forward to taking advantage of our revised Form 477 data to fully evaluate in future reports whether and how we can better evaluate the role of mobile and satellite services.[27]

12. As a consequence of our conclusion that advanced telecommunications capability is not being deployed to all Americans in a reasonable and timely fashion, section 706 mandates that the Commission "take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market."[28] Our analysis finds that rural and Tribal areas are being left behind from receiving the advanced services envisioned by Congress, not only at our current 25 Mbps/3 Mbps benchmark but even at the lower speeds. While our efforts with current Connect America funds as discussed below are providing support for 10 Mbps/1 Mbps service and we already have in place initiatives that will support faster service, we acknowledge there is more to be done.[29] As such, we will continue to fulfill our statutory obligation through our ongoing actions promoting universal service, competition, and continuing to remove barriers to investment in infrastructure so that all Americans including and especially in rural and Tribal areas have access to "advanced telecommunications capability."

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[24] *See infra* paras. 72-75 (discussing mobile deployment data).

[25] *Modernizing Form 477 Order,* 28 FCC Rcd at 9888, paras. 3-4.

[26] There are a number of ways the Commission could augment its currently available data. For example, we continue to expand the Measuring Broadband America project and expect to publish additional reports in the future, including results of targeted studies of specific performance metrics and results of mobile broadband performance. FCC, Office of Engineering and Technology and Consumer and Governmental Affairs Bureau, 2014 Measuring Broadband America Fixed Broadband Report: A Report On Consumer Fixed Broadband Performance in the U.S. at 55 (2014) (*2014 Fourth Measuring Broadband America Report*). Section 1303(c)(2) requires the Commission to publish results of consumer surveys regarding broadband service. 47 U.S.C. § 1303(c)(2). And the Commission has previously sought comment on whether to augment the Form 477 data collection to include such factors as price, service quality, and customer satisfaction. *See supra* note 16; *Modernizing Form 477 Order*, 28 FCC Rcd at 9892, para. 13.

[27] Similarly, we expect improved data quality on broadband services purchased by schools from the revised FCC Form 471. *See* Schools and Libraries Universal Service Description of Services Ordered and Certification Form 471, OMB 3060-0806 (October 2014).

[28] 47 U.S.C. § 1302(b). The D.C. Circuit recently upheld our interpretation of sections 1302(a) and (b) as independent and overlapping grants of authority. *Verizon v. FCC*, 740 F.3d 623, 637-39 (D.C. Cir. 2014).

[29] *See infra* paras. 17, 54-55.

II. BACKGROUND

A. Statutory Requirements and Context

13. Section 706(b) requires the Commission to "initiate a notice of inquiry concerning the availability of advanced telecommunications capability to *all* Americans (including, in particular, elementary and secondary schools and classrooms)."[30] In conducting this inquiry, the Commission must "determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."[31] In recent years, Congress has augmented the government's role in ensuring that effective broadband services reach all Americans. In 2008, Congress passed the BDIA. In that Act, Congress required the Commission issue its section 706(b) reports annually, rather than "regularly."[32] Congress also amended section 706(b) by requiring that the Commission provide "[d]emographic information for unserved areas"[33] and an international comparison in its annual Report.[34] The revisions to our statutory directive were based on Congress's finding that the deployment and adoption of broadband "has resulted in enhanced economic development and public safety for communities across the Nation, improved health care and educational opportunities, and a better quality of life for all Americans."[35] Congress also recognized that continued efforts were necessary so that "our Nation remains competitive and continues to create business and job growth."[36] In 2009, in the Recovery Act, Congress directed NTIA through the SBI program to collect more robust data about broadband deployment and create a National Broadband Map, "a comprehensive nationwide inventory map of existing broadband service capability and availability."[37] In the Recovery Act, Congress also directed the Commission to create a National Broadband Plan, further reflecting Congress's judgment that the Commission must act to assess whether broadband services are meeting the nation's needs and feeding our economic growth and global competitiveness.[38]

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[30] 47 U.S.C. § 1302(b) (emphasis added).

[31] *Id*.

[32] BDIA § 103(a)(1); 47 U.S.C. § 1302(b).

[33] BDIA § 103(a)(3); 47 U.S.C. § 1302(c). The BDIA requires that the Commission "compile a list of geographical areas not served by any provider of advanced telecommunications capability." *Id.* To the extent that Census Bureau data are available, the Commission must then "determine, for each such unserved area—(1) the population; (2) the population density; and (3) the average per capita income." *Id*.

[34] BDIA § 103(b)(1); 47 U.S.C. § 1303(b).

[35] BDIA § 102(1); 47 U.S.C. § 1301(1).

[36] BDIA § 102(2); 47 U.S.C. § 1301(2).

[37] American Recovery and Reinvestment Act of 2009, § 6001(l), Pub. L. No. 111-5, 123 Stat. 115 (2009) (Recovery Act).

[38] *Id*. § 6001(k)(2) (tasking the Commission with developing a national broadband plan to seek to ensure that all people of the United States have access to broadband); Federal Communications Commission, *Connecting America: The National Broadband Plan*, GN Docket No. 09-51 (2010) (*2010 National Broadband Plan*), http://download.broadband.gov/plan/national-broadband-plan.pdf. The BDIA also required the Government Accountability Office's Comptroller General to conduct a study on broadband metrics and standards and submit a report to Congress on the results of its study by October 10, 2009. BDIA § 104(b). Specifically, the BDIA states that, "[n]ot later than 1 year after the date of enactment of this Act, the Comptroller General shall submit a report to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Energy and Commerce on the results of the study." *Id*.

B. Previous Broadband Progress Reports

14. In the last three Reports, the Commission found that advanced telecommunications capability was not being deployed to all Americans in a reasonable and timely fashion.[39] In the *2010 Sixth Broadband Progress Report*, the Commission took what it described as "the overdue step" of increasing the speed benchmark to 4 Mbps/1 Mbps, up from 200 kbps/200 kbps.[40] The last two Reports relied on the National Broadband Map data, commonly called SBI Data,[41] to the extent the Commission found the data to be sufficiently reliable.[42] In these Reports, the Commission found that the data regarding mobile and satellite were not sufficiently reliable, among other reasons, for purposes of its determination pursuant to section 706(b).[43] The Commission thus based its determination on availability of fixed broadband service and included an assessment of a variety of factors indicative of broadband availability including physical deployment and also broadband price, quality, and adoption by consumers.[44] On August 21, 2012, the Commission released the *2012 Ninth Broadband Progress Notice of Inquiry*.[45] The Commission did not issue a Report on that inquiry.[46] Because the record on that inquiry had become stale, and in light of the statutory obligation to initiate an annual inquiry, the Commission determined that the better course was to proceed to initiate a fresh inquiry given the rapid pace of development and change in the broadband markets. On August 5, 2014, the Commission released the *2014 Broadband Progress Notice of Inquiry* soliciting new data and information to evaluate all of the factors that influence the availability of broadband to all Americans.[47]

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[39] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10344, 10350, paras. 1, 9 & n.47 (also summarizing the findings in the first through seventh reports).

[40] *2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9558, para. 4; *2010 National Broadband Plan* at 135 (stating the Commission should review and reset this target every four years).

[41] *See, e.g.*, *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10344, para. 1; *2011 Seventh Broadband Progress Report* 26 FCC Rcd at 8009, para. 1.

[42] *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8023-24, para. 26; *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10366-68, paras. 36-43. We note that the *2010 Sixth Broadband Progress Report* relied on the Commission's Form 477 broadband subscribership data and the broadband availability model constructed for the *2010 National Broadband Plan*. *2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9557, para. 1.

[43] *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8023-24, para. 26; *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10365-68, paras. 31-43.

[44] *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8020-21, paras. 18-20; *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10363, para. 27.

[45] *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. 12-228, Ninth Broadband Progress Notice of Inquiry, 27 FCC Rcd 10523 (2012) (*2012 Ninth Broadband Progress Notice of Inquiry*).

[46] By separate Order, the Commission has announced the conclusion of the inquiry begun by the *2012 Ninth Broadband Progress Notice of Inquiry*. *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 Nos. 12-228, 14-126, Order, FCC 15-11 (rel. Feb. 4, 2015).

[47] *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, Tenth Broadband Progress Notice of Inquiry, 29 FCC Rcd 9747 (2014) (*2014 Broadband Progress Notice of Inquiry*).

C. Private Investment

15. Private industry continues to invest billions of dollars to expand America's broadband networks.[48] This suggests that the industry recognizes both the value of and the need for continued investment to develop a robust broadband network that will meet consumers' demands. One report estimates that "private sector broadband investment reached $75 billion [annually] in 2013, and the industry has invested more than $1.3 trillion since 1996;"[49] the $75 billion in 2013 investment is "up approximately 10 percent from the previous year and surpassing the pre-recession level of $71 billion in 2008."[50] Both fixed and mobile providers continue to improve broadband speeds, and current and new entrants to the market are investing and expanding broadband availability to many Americans with speeds in some locations exceeding 1 gigabit per second (Gbps).[51] Wireless investment is particularly notable. In recent years, mobile wireless has become one of the most important segments of the national economy. Mobile providers invest billions of dollars in their networks annually to support this burgeoning demand.[52] One estimate indicates that "U.S. wireless providers handled more than 3.2 trillion megabytes (MB) of data in 2013" and to keep up with this "consumer usage in 2013, wireless carriers invested a record breaking $33.1 billion in capital expenditures, approximately $101 per subscriber, excluding the cost of spectrum."[53] Wireless providers in the U.S. have spent more than $134 billion in capital investments during the past five years, and incremental capital investment by wireless providers rose by more than 10 percent from 2012 to 2013 to $33.1 billion.[54] AT&T and Verizon Wireless together spent $20.6 billion on mobile capital investment in 2013.[55] Projections estimate that U.S. wireless broadband investments will continue at this pace or beyond, at approximately "$35 billion a year from 2013 to 2017, up from around $25 billion a year for 2010 to 2012."[56]

16. The broadband industry continues to make other investment and upgrades:

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[48] *See, e.g.*, USTelecom, *Historical Broadband Provider Capex*, http://www.ustelecom.org/broadband-industry-stats/investment/historical-broadband-provider-capex (last visited Jan. 5, 2015) (showing U.S. broadband capital expenditures from 1996 to 2013).

[49] USTelecom, *Broadband Investment*, http://www.ustelecom.org/broadband-industry/broadband-industry-stats/investment (last visited Jan. 5, 2015) (*USTelecom Estimate*).

[50] Letter from Walter B. McCormick, Jr., USTelecom, to Tom Wheeler, Chairman, FCC, GN Docket. No. 14-28, at 1 (Oct. 24, 2014) (McCormick Letter).

[51] While providers are investing in networks that offer speeds as high as 1 Gbps, the National Broadband Map shows very little wireline deployment at that speed or higher based on SBI Data as of December 2013. National Broadband Map, *Maximum Advertised Speed Available, Data as of 12/31/13*, http://www.broadbandmap.gov/availability/wireline/8/8/3/8/ (last visited Jan. 7, 2015). Unlike the estimates in the remainder of this Report, NTIA's wireline map does not include fixed wireless broadband in their wireline estimates.

[52] Press Release, CTIA, CTIA's Annual Survey Says US Wireless Providers Handled 3.2 Trillion Megabytes of Data Traffic in 2013 for a 120 Percent Increase Over 2012 (June 17, 2014), http://www.ctia.org/resource-library/press-releases/archive/ctia-annual-survey-2013.

[53] *Id*.

[54] *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*, WT Docket No. 13-135, Seventeenth Report, DA 14-1862 at para. 170 (Wireless Tel. Bur. rel. Dec. 18, 2014) (*Seventeenth Mobile Wireless Report*). The figures from CTIA include incremental investment in currently operational systems, including expenditures for building operating systems, land and capital leases, and all tangible non-system capital investment, but does not include the cost of spectrum licenses purchased at auctions or other acquisition processes or greenfield builds.

[55] *Id.*

[56] Verizon Comments at 15.

- Cable providers continue to upgrade their systems and "[w]ith DOCSIS 3.0, cable operators can advertise cable modem downstream speed levels of over 100 Mbps" and DOCSIS 3.1 speeds would exceed 1 Gbps.[57]
- Verizon's current FiOS Internet offerings range from 25 Mbps to 500 Mbps downstream, with most customers now subscribing to the FiOS Quantum plans that offer download speeds of 50 Mbps or more.[58] In July 2014, Verizon began upgrading FiOS Internet service so that new and existing customers receive upload speeds that match their download speeds, at no extra charge.[59] One report estimates that Verizon's has invested $23 billion to build its FiOS network.[60]
- CenturyLink has announced deployment of 1 Gbps fiber networks in portions of Omaha, Las Vegas, and Salt Lake City, and its planned deployment in 13 other cities.[61]
- AT&T recently embarked upon a multi-billion dollar investment plan to extend the reach of both its fixed wireline Internet Protocol (IP) broadband network and its long-term evolution (LTE) mobile wireless network.[62] AT&T has announced plans to launch its GigaPower all-fiber network in up to 100 cities.[63]
- Google Fiber has entered the market and offers symmetrical 1 Gbps broadband services in Kansas City, Austin, and Provo, Utah.[64] Google Fiber has engaged in discussions with 34 cities in 9 metro areas to bring fiber-optic networks to these areas.[65]

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[57] *Id*. at 9-10.

[58] *Id*. at 7.

[59] *Id*.

[60] *See, e.g*., Thomas Gryta, Verizon Raises FiOS Prices, Speed, The Wall Street Journal (June 18, 2012), http://online.wsj.com/news/articles/SB10001424052702303703004577474491608119330.

[61] Press Release, CenturyLink, CenturyLink Expands its Gigabit Services to 16 cities, Delivering Broadband Speeds up to 1 Gbps (Aug. 5, 2014), http://news.centurylink.com/news/centurylink-expands-its-gigabit-service-to-16-cities-delivering-broadband-speeds-up-to-1-gigabit-per-second (stating that residential and business customers will have access to 1 Gbps speeds in 16 cities over the next 12 months).

[62] AT&T Comments at 5. On November 7, 2012, AT&T filed a petition asking the Commission to consider conducting trial runs of the transition to next generation services, including the retirement of its time-division multiplexed (TDM) facilities and service offerings and their replacement with IP-based alternatives. *AT&T Petition to Launch a Proceeding Concerning the TDM-to-IP Transition et.al,* GN Docket Nos. 13-5 et al., Order, Report and Order and Further Notice of Proposed Rulemaking, Report and Order, Order and Further Notice of Proposed Rulemaking, Proposal for Ongoing Data Initiative, 29 FCC Rcd 1433, 1440, para. 19 (2014) (*Technology Transitions Order*).

[63] Press Release, AT&T, AT&T Eyes 100 U.S. Cities and Municipalities for its Ultra-Fast Fiber Network (Apr. 21, 2014), http://about.att.com/story/att_eyes_100_u_s_cities_and_municipalities_for_its_ultra_fast_fiber_network.html.

[64] Google Fiber, *Discover Fiber*, https://fiber.google.com/ourcities/ (last visited Jan. 5, 2015) (*Google Fiber Cities*). While Google Fiber has deployed its fiber network in several cities, based on a review of December 2013 SBI Data, Google's network covers only approximately 84,000 homes (or 0.06% of the country). The vast majority of those homes covered by the Google Fiber network have at least one other option for 25 Mbps/3 Mbps fixed-terrestrial broadband; only 3.4% or 2,900 housing units have no other option.

[65] Google Fiber, *Expansion plans*, https://fiber.google.com/newcities/ (last visited Jan. 5, 2015). On January 27, 2015 Google announced that it will next deploy fiber in Charlotte and Raleigh-Durham, NC, Nashville, TN, and Atlanta, GA. *See* Zack Whittaker, ZDNet, *Next stop for Google Fiber? These lucky cities (with more on the way)* (Jan. 27, 2015), http://www.zdnet.com/article/next-stop-for-google-fiber-north-carolina/.

- Local Communities have also invested in broadband networks. For example, there are over 40 communities in 13 states with publicly-owned networks offering some form of 1 Gbps service.[66] There are almost 90 communities with publicly-owned fiber to the home (FTTH) networks reaching most or all of the community.[67]

D. Commission Action Since the Last Report

17. Since the last Report, the Commission has worked steadily to accelerate the deployment of modern communications networks. We continue to implement the *2011 USF/ICC Transformation Order*, which transformed the high-cost universal service program to bring broadband to millions of Americans.[68] As of March 14, 2014, the Commission had dispersed more than $438 million in Connect America Fund Phase I funding, which will bring new broadband service to more than 1.6 million unserved Americans in the next several years.[69] In June 2014, the Commission released the *Connect America Order and FNPRM*, moving forward on Phase II of the Connect America Fund that will provide nearly $9 billion to expand broadband to five million Americans living in rural areas within the next five years.[70] In December 2014, the Commission recognized the need to reassess minimum standards necessary to qualify for universal service high cost support.[71] While the Commission efforts represent important progress on increasing broadband investment and promoting competition to Americans in unserved and underserved areas, these efforts are in progress, and more work remains in order to bring ubiquitous broadband to all Americans. Below, we recount other key initiatives to advance broadband deployment and adoption:

- *E-rate Modernization*. With the adoption of both the *E-rate Modernization Order* and the *Second E-rate Modernization Order*, we took major steps to modernize the E-rate program in 2014.[72] We adopted goals for the program, including a first goal of ensuring affordable

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[66] Institute for Local Self Reliance, *Community Network Map*, http://www.muninetworks.org/communitymap (last visited Jan. 2, 2015).

[67] *Id.*; *see, e.g.*, Highland Communications Services, *Residential Plans*, http://www.highlandcommunicationservices.com/residential-plans.htm (last visited Jan. 2, 2015) (describing Highland Communications Services, a municipally owned telecommunications company that today offers speeds as high as 1 Gbps symmetrical service in Highland, Illinois); Co-Mo Connect, *Blazing-fast Internet!*, http://www.co-mo.net/Co-Mo_Connect/Internet.html (last visited Jan. 2, 2015) (describing Co-Mo Connect, an electric cooperative serving the area in and around Morgan County, Missouri and currently offers from 5 Mbps to 1 Gbps symmetrical service; Midwest Energy Cooperative, *Packages & Pricing*, http://www.teammidwest.com/products-services/midwest-connections-2/package-and-pricing/ (last visited Jan 2, 2015) (offering 100 Mbps in and around the Cass County, Michigan area).

[68] *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 (2011) (*2011 USF/ICC Transformation Order*), *pets. for review denied sub nom.*, *In re FCC 11-161,* 753 F.3d 1015 (10th Cir. 2014).

[69] Press Release, FCC, FCC Takes Major Strides Toward Further Expansion of Rural Broadband (Apr. 23, 2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-326703A1.pdf (*USF April 2014 News Release*); Wireline Competition Bureau, Universal Service Implementation Progress Report, WC Docket No. 10-90 (Wireline Comp. Bur. rel. Mar. 24, 2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-326217A1.pdf.

[70] *Connect America Fund et al.*, WC Docket No. 10-90 et al., Report and Order et al., 29 FCC Rcd 7051, 7083, para. 90 (2014) (*Connect America Order and FNPRM*); *see also Connect America Fund*, WC Docket No. 10-90, Report and Order, 28 FCC Rcd 15060 (Wireline Comp. Bur. 2013) (*Phase II Service Obligations Order*); *USF April 2014 News Release*.

[71] *See Connect America Fund et al.,* WC Docket No. 10-90 et al., Report and Order, FCC 14-190 at para. 2 (rel. Dec. 18, 2014) (*2014 Connect America Order*).

[72] *Modernizing the E-Rate Program for Schools and Libraries*, Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 8870 (2014) (*E-rate Modernization Order*); *Modernizing the E-rate Program for Schools*

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access to high-speed broadband sufficient to support digital learning for schools and robust connectivity for libraries and corresponding connectivity targets to measure progress toward that goal.[73] To meet that goal we refocused the program on providing support for high-speed broadband services to eligible schools and libraries and increased pricing transparency.[74] We also renewed the program's commitment to funding for Wi-Fi which will potentially provide a 75 percent increase in Wi-Fi funding for rural schools over the next five years and a 60 percent increase for urban schools, delivering Wi-Fi to an additional 10 million students in 2015 alone.[75] In the *Second E-rate Modernization Order*, we took steps to maximize the options for schools and libraries seeking to purchase affordable high-speed broadband connectivity.[76] These steps include making the payment options for special construction charges more flexible,[77] modifying the eligible services list and rules to expand access to low cost fiber,[78] and ensuring affordable broadband service to schools and libraries in high-cost areas by obligating certain high-cost recipients to offer high-speed broadband located in areas where the carrier received high-cost support.[79]

- *Mobility Fund Auctions*. The Mobility Fund Phase I auction—the first reverse auction as a mechanism for distributing universal service support—completed on September 27, 2012 with 33 winning bidders eligible to receive a total of up to approximately $300 million in one-time support to provide 3G or better mobile voice and broadband services to areas where those services did not exist.[80] On July 31, 2014, Mobility Fund Phase I support recipients filed the first of their annual reports on use of that support with ten support recipients reporting that they had already extended 3G or 4G coverage to almost 25 percent of the total road miles to be covered with Mobility Fund Phase I support.[81] On February 28, 2014, the Wireless Telecommunications Bureau and Wireline Competition Bureau announced completion of the Tribal Mobility Fund Phase I auction, with five winning bidders eligible to receive a total of up to approximately $50 million in one-time support to provide 3G or better mobile voice and broadband services to Tribal lands.[82] More than $2.7 million in support has

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and Libraries, WC Dockets No. 13-184, 10-90, Second Report and Order and Order on Reconsideration, FCC 14-189 (rel. Dec. 19, 2014) (*Second E-rate Modernization Order*).

[73] *E-rate Modernization Order*, 29 FCC Rcd at 8873, para. 5.

[74] *Id*. at 8894-939, paras. 63-167.

[75] *Id*. at 8898-922, paras. 76-133; Press Release, FCC, FCC Modernizes E-rate Program to Expand Robust Wi-Fi Networks in the Nation's Schools and Libraries, WC Docket No. 13-184 (July 11, 2014).

[76] *Second E-rate Modernization Order* at Section II.

[77] *Id.* at paras. 16-28.

[78] *Id.* at paras. 29-59.

[79] *Id.* at paras. 60-76.

[80] *USF/ICC Transformation Order*, 26 FCC Rcd at 17771-825, paras. 295-497; *Mobility Fund Phase I Auction Closes; Winning Bidders Announced for Auction 901*, AU Docket No. 12-25, Public Notice, 27 FCC Rcd 12031 (Wireless Tel. Bur. 2012) (*Mobility Fund Auction Public Notice*).

[81] Mobility Fund Phase I annual reports are available for viewing via the Commission's Electronic Comment Filing System (ECFS), http://apps.fcc.gov/ecfs/, by entering the docket number, WT No. 10-208.

[82] *Tribal Mobility Fund Phase I Auction Closes; Winning Bidders Announced for Auction 902*, AU Docket No. 13-53, Public Notice, 29 FCC Rcd 1974, 1975, para. 1 (Wireless Tel. Bur. 2014).

been disbursed to four of the winning bidders, and the Bureaus have authorized, or announced they are ready to authorize, the remainder of $50 million.[83]

- *Rural Broadband Experiments*. On July 14, 2014, the Commission adopted the *Rural Broadband Experiments Order* to test how tailored economic incentives can advance the deployment of next generation networks, both wireline and wireless, in rural, high-cost areas, including Tribal lands.[84] The Commission allocated $75 million for the construction of networks capable of delivering 100 Mbps/25 Mbps, while requiring the funding recipients offer at least one service plan that provides 25 Mbps/5 Mbps to all locations within the selected census blocks, also referred to as category one funding.[85] Another $25 million was allocated for projects offering at least 10 Mbps/1 Mbps broadband service in high-cost and extremely high-cost areas. On December 5, 2014, the Bureau announced entities provisionally selected for rural broadband experiments and set deadlines for submission of additional information.[86]
- *Healthcare Connect Fund*. Since July 13, 2013, healthcare providers have been able to apply for funds from the Healthcare Connect Fund, which supports the cost of broadband—including new construction—for healthcare providers, with up to $400 million in support for the combined rural healthcare universal service programs.[87] As of November 30, 2014, a total of $6,816,777 in funds were disbursed through the Healthcare Connect Fund.[88]
- *Technology Transition Order*. On January 14, 2014, the Commission began the process for a diverse set of experiments and data collection initiatives that will allow the Commission and the public to evaluate how customers are affected by the historic technology transitions that are transforming our nation's voice communications services – from a network based on TDM circuit-switched voice services running on copper loops to an all-IP network using copper, co-axial cable, wireless, and fiber as physical infrastructure.[89] The Commission explained that "the type of experiments described in this Order will accelerate broadband deployment and therefore advances the goals of section 706."[90]

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[83] *Tribal Mobility Fund Phase I Support for Eighteen Winning Bids Ready to Be Authorized*, Public Notice, 29 FCC Rcd 7283 (Wireless Tel. Bur. 2014) (*Tribal Mobility Fund Public Notice*).

[84] *Connect America Fund; ETC Annual Reports and Certifications*, WC Docket Nos. 10-90, 14-58, Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 8769 (2014) (*Rural Broadband Experiments Order*).

[85] *Wireline Competition Bureau Provides Information Regarding Usage Allowance and Pricing to Assist Applicants For Rural Broadband Experiments*, WC Docket Nos. 10-90, 14-58, Public Notice, 29 FCC Rcd 11819 (Wireline Comp. Bur. 2014) (*2014 Rural Broadband Public Notice*).

[86] *Wireline Competition Bureau Announces Entities Provisionally Selected For Rural Broadband Experiments; Sets Deadlines for Submission of Additional Information,* WC Docket No. 10-90, Public Notice, DA 14-1772 (Wireline Comp. Bur. rel. Dec. 5, 2014).

[87] *Rural Health Care Support Mechanism*, WC Docket No. 02-60, Report and Order, 27 FCC Rcd 16678, 16699-700, paras. 46-48 (2012) (*2012 Rural Health Care Order*). Those healthcare providers who previously participated in the Rural Healthcare Pilot Projects were able to seek funding beginning July 1, 2013. *Id.* at 16818, para. 353.

[88] *See* Universal Service Administrative Company (USAC), *Rural Health Care,* http://usac.org/rhc/tools/news/default.aspx#1025 (last visited Jan. 2, 2015).

[89] *Technology Transitions Order*, 29 FCC Rcd at 1435, para. 1.

[90] *Id*. at 1461, para. 78. In response to the *Technology Transitions Order*, on February 27, 2014, AT&T filed its Proposal to conduct service-based experiments in two wire centers: Carbon Hill, Alabama and Kings Point (a/k/a West Delray Beach), Florida. Under AT&T's planned trial, the company would grandfather and then discontinue legacy TDM services to customers in the trial wire centers, replacing them with IP-based wired and/or wireless

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- *Emerging Wireline Networks and Services Notice of Proposed Rulemaking* (NPRM). On November 21, 2014, the Commission adopted an NPRM to strengthen its public safety, pro-consumer, and pro-competition policies and protections as the nation transitions to an all-IP network using fiber and other forms of physical infrastructure.[91] The NPRM proposes and seeks comment on steps to safeguard the public interest through these transitions by (1) ensuring reliable backup power during electrical outages; (2) protecting and informing consumers about their choices when legacy facilities and services go away; and (3) preserving competition where it exists today. The steps that the NPRM proposes would enhance consumer confidence in the safety and reliability of IP-based technologies, thereby leading to increased demand for—and resulting deployment of—advanced facilities and services.
- *Open Internet NPRM*. On May 15, 2014, the Commission issued a NPRM seeking comment on the best approach to protect and promote an open Internet in light of the D.C. Circuit opinion in *Verizon v. FCC*.[92] The NPRM proposed a series of rules intended to preserve and facilitate the virtuous cycle of innovation which drives demand for Internet services and deployment of broadband infrastructure.[93] The Commission stated that absent such rules, broadband providers would have the incentive and ability to interfere with the virtuous cycle, therefore inhibiting that deployment.[94]
- *Lifeline Broadband Pilot Program*. Throughout 2014, we have collected survey information from Lifeline subscribers under the Lifeline Broadband Pilot Program.[95] The survey results, which we expect to release in 2015, will assist us in understanding the effects of varying subsidy amounts, end-user charges, access to digital literacy training, usage allowances, choices for broadband speed, access to equipment and other important reasons consumers may not adopt broadband.
- *Modernizing Form 477 Order*. New Form 477 deployment data will be collected in 2014 as required by the *Modernizing Form 477 Order*, which revised the Form 477 data collection to

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services. *See* AT&T Proposal for Wire Center Trials, GN Docket Nos. 13-5 and 12-353 (filed Feb. 27, 2014). AT&T has stated that it intends to file the necessary application to conduct its service-based experiments no sooner than the second half of 2015. *See* Letter from Christopher Heimann, General Attorney, AT&T Services, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 13-5 and 12-353, at 2 (filed Sept. 9, 2014). Separately, on November 21, 2014, the Commission sought comment on CenturyLink's proposal for IP Service Trial proposing to conduct trials of IP business services and IP exchange of business voice traffic in 12 wire centers in Las Vegas, Nevada. *See Commission Seeks Comment on CenturyLink's Proposal for Service-Based Technology Transitions Experiments And Request For Declaratory Ruling*, GN Docket Nos. 13-5 and 12-353, Public Notice, 29 FCC Rcd 13933 (2014); Letter from Timothy M. Boucher, Associate General Counsel, CenturyLink, to Marlene H. Dortch, Secretary, FCC, GN Docket Nos. 13-5 and 12-353, Attachs. (filed Nov. 12, 2014).

[91] *Ensuring Customer Premises Equipment Backup Power for Continuity of Communications et al.*, PS Docket No. 14-174 et al., Notice of Proposed Rulemaking and Declaratory Ruling, FCC 14-185 (rel. Nov. 25, 2014).

[92] *Protecting and Promoting the Open Internet*, GN Docket No. 14-28, Notice of Proposed Rulemaking, 29 FCC Rcd 5561 (2014) (*Open Internet NPRM*); *Verizon v. FCC*.

[93] *Open Internet NPRM* at 5570, para. 26.

[94] *Id*. at 5574, para. 39.

[95] *Lifeline and Link Up Reform and Modernization et al.*, WC Docket Nos. 11-42 et al., Report and Order and Further Notice of Proposed Rulemaking, 27 FCC Rcd 6656 (2012) (setting forth the framework for the 18 month Lifeline Broadband Pilot Program); *Lifeline and Link Up Modernization and Reform*, WC Docket No. 11-42, Order, 27 FCC Rcd 15842 (Wireline Comp. Bur. 2012) (*Lifeline Broadband Pilot Program Order*). Five of the projects will provide wireless broadband service, seven will provide wireline broadband service, and two will provide a combination of both wireless and wireline broadband service. *Id.* at 15843-44, para. 5.

collect network broadband deployment data for both fixed and mobile broadband.[96] These reforms will improve future Broadband Progress Reports and allow us to "update our universal service policies and monitor whether our statutory universal service goals are being achieved, and meet our public safety obligations."[97] We expect that the revised data collection will improve our ability to identify unserved areas and, in particular, may improve our mobile and satellite deployment estimates in the future.[98]

E. Other Federal Efforts

18. Beyond Commission action, the NTIA, Department of Agriculture's Rural Utilities Service (RUS), and the Obama Administration have worked to ensure that high-quality broadband is available to all, particularly to hard-to-serve regions and populations.[99]

- *NTIA's BTOP Program*. The Recovery Act provided NTIA with approximately $4.7 billion to establish a BTOP. BTOP works to increase broadband access and adoption, including at public safety agencies.[100] NTIA indicates that, from January to March 2014, BTOP grant recipients connected approximately 735,000 new subscribers and deployed or upgraded more than 100 network miles, for a total of "more than 112,300 miles of new or upgraded network miles."[101]
- *RUS' BIP Program*. The Recovery Act provided RUS with $2.5 billion, and RUS leveraged its budget authority to provide 320 projects with over $3.5 billion in grants and loans.[102] RUS states that "[t]he $100 million satellite broadband program disbursed 94.7 percent of its funds to the four satellite awardees."[103] RUS indicates that 46 larger infrastructure projects are fully operational, in addition to 199 projects that are partially operational.[104]
- *2014 NTIA Digital Nation Report*. On October 16, 2014, NTIA released the *2014 NTIA Digital Nation Report*.[105] The Report presents an analysis of "the demographic characteristics of home Internet users and the technologies they use to go online, as well as the alternative locations where they use the Internet."[106] The most significant findings are that "adoption of mobile Internet is proceeding faster than earlier technologies, including the

[96] *Modernizing Form 477 Order*, 28 FCC Rcd at 9888, paras. 3-4.

[97] *Id*. at 9892-93, para. 14.

[98] *Id.* at 9888, paras. 3-4.

[99] RUS's Broadband Initiatives Program (BIP) and NTIA's Broadband Technology Opportunities Program (BTOP) are authorized by the Recovery Act. *Recovery Act*; NTIA, Broadband Technology Opportunities Program (BTOP) Quarterly Program Status Report at 1 (August 2014) (*August 2014 NTIA BTOP Quarterly Report*), http://www.ntia.doc.gov/files/ntia/publications/ntia_btop_21st_qtrly_report.pdf; USDA, Rural Utilities Service, Broadband Initiatives Program Quarterly Report As of 9/31/14 at 1 (Sept. 30, 2014) (*September 2014 RUS BIP Status Report*), http://www.rurdev.usda.gov/Reports/RUS_BIPStatus_Report_Q3_2014.pdf.

[100] *August 2014 NTIA BTOP Quarterly Report* at 1. NTIA noted that on August 10, 2010, Congress rescinded $302 million from BTOP, reducing the Program's funding to approximately $4.4 billion. *Id*.

[101] *Id*. at 2.

[102] *September 2014 RUS BIP Status* at 1. RUS indicated that the vast majority of the BIP awards were obligated between March and September 2010 and project oversight has led to the rescission of 42 BIP awards and nearly $325 million has been returned to the Treasury. *Id*. at 2.

[103] *Id*.

[104] *Id*.

[105] *2014 NTIA Digital Nation Report* at v.

[106] *Id*.

television" and "[t]he use of mobile Internet applications skyrocketed between July 2011 and October 2012, rising by double-digit percentage points across generations."[107]

- *Executive Order 13616*. *Executive Order 13616* promotes broadband deployment in Federal buildings and rights-of-way.[108] The Commission participates in the interagency working group established by this executive order. In coordination with the working group, the Department of Transportation encourages "dig once" requirements in its existing programs, as it relates to the placement of below ground fiber optic cable along highway and roadway rights-of-way.[109]

III. DEFINING "ADVANCED TELECOMMUNICATIONS CAPABILITY"

19. For purposes of this and future Reports, we believe it is appropriate to take a fresh, holistic approach as to what constitutes "advanced telecommunications capability" in order to evaluate its availability to all Americans. Congress directed the Commission in section 706 to initiate an inquiry, annually, concerning the "availability of advanced telecommunications capability to all Americans" and to determine whether such capability "is being deployed to all Americans in a reasonable and timely fashion."[110] Advanced telecommunications capability is defined as "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology."[111] Because it is an evolving standard, and there is no single standard for what should qualify as advanced service, the Commission must exercise discretion when it conducts its annual inquiry. Given this, we adopt an approach that is designed to place America at the forefront of broadband offerings and ensure that all Americans, wherever they live, have access to the extensive and ever-expanding offerings available today or on the near horizon.

20. We believe that this approach best reflects Congress's intent in adopting section 706. Congress was looking to ensure that the myriad and evolving array of services that broadband can deliver are available to every American. The Senate Report states that the goal of section 706 is "to promote and encourage advanced telecommunications networks, capable of enabling users to originate and receive affordable, high-quality voice, data, image, graphics, and video telecommunications services."[112] The Senate Report further suggests that we should not limit our assessment to only a few or minimal number of services but should ensure that consumers in all parts of the United States can "send and receive

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[107] *Id*. at i.

[108] Accelerating Broadband Infrastructure Deployment, Executive Order No. 13616, 77 Fed. Reg. 36903 (June 14, 2012), http://www.gpo.gov/fdsys/pkg/FR-2012-06-20/pdf/2012-15183.pdf (*Executive Order 13616*); *see also* Government Accountability Office, Planning and Flexibility Are Key to Effectively Deploying Broadband Conduit through Federal Highway Projects at 2 (June 27, 2012), http://www.gao.gov/assets/600/591928.pdf; *2010 National Broadband Plan* at 114 (recommending that Congress consider enacting "dig once" legislation to obtain "substantial savings" and encourage fiber buildout). The working group is composed of representatives from seven Federal agencies that each have significant ownership of or responsibility for managing Federal lands, buildings, and rights-of-way, federally assisted highways, or Tribal lands, and also includes representatives from four other agencies, including the Commission, that "provide advice and assistance." *Executive Order 13616*, 77 Fed. Reg. at 36903-04.

[109] Department of Transportation, FHWA, Office of Transportation Policy Studies, Minimizing Excavation Through Coordination (Oct. 2013), http://www.fhwa.dot.gov/policy/otps/policy_brief_dig_once.pdf; *see also* U.S. Department of Transportation Federal Highway Administration, *Executive Order on Accelerating Broadband Infrastructure Deployment*, Pol'y and Governmental Aff.: Transp. Pol'y Stud., http://www.fhwa.dot.gov/policy/otps/exeorder.cfm (last visited Nov. 14, 2014).

[110] 47 U.S.C. § 1302(b).

[111] *Id*. § 1302(d)(1).

[112] Senate Report, S. Rep. No. 104-23, at 50 (1995).

information *in all its forms*—voice, data, graphics, and video."[113] Nothing in section 706's legislative history indicates that Congress intended the Commission to take a conservative view of what constitutes advanced telecommunications capability. Moreover, it is reasonable to conclude that Congress used the term "advanced" quite intentionally. Senator Pressler, then Chair of the Senate Commerce Committee and a sponsor of the Telecommunications Act of 1996, explained that the proposed legislation would promote access to capabilities that existed "and a host of other services that soon will be available."[114]

21. The legislative history is also consistent with our view of the term "advanced" as informed by common dictionaries. The American Heritage Dictionary defines "advanced" as "highly developed or complex," "at a higher level than others," "ahead of the times," "progressive," or "far along in course or time."[115] The Oxford English Dictionary defines "advanced" as "far on or ahead in any course of development; (hence) progressive, ahead of one's time," "raised in amount or intensity; increased," and "moved forward; standing or being to the front."[116] Another dictionary, the Macmillan Dictionary similarly defines "advanced" as "based on the most recent methods or ideas," "at a high academic level," and "having achieved a high standard or level"[117]

22. The term "advanced" takes on context when we also consider a global view and how other countries define broadband or identify goals concerning advanced telecommunications services. The European Union considers below 30 Mbps to be "basic broadband," and download connections between 30 Mbps and 100 Mbps to be "fast broadband."[118] Our definition of "advanced telecommunications capability" should similarly evolve to ensure we remain part of the global economy for the benefit of all Americans. We thus find that we should evaluate the availability of services that permit consumers to originate and receive highly developed or progressive services, rather than limit our assessment to the most common or basic capabilities that exist today.

23. In the *2014 Broadband Progress Notice of Inquiry,* we asked whether we should establish multiple benchmarks, including, for example, a "forward-looking" benchmark.[119] NCTA recommends that the Commission "should use multiple benchmarks in performing its section 706 analysis rather than just one" because doing so would "better reflect the multi-faceted nature of today's broadband marketplace, which features a wide variety of technologies and services that are able to cater to the varying needs of American consumers."[120] Others in the record disagree, stating, for example, that "[t]here is no substantive rationale provided to warrant having multiple standards. One standard sends a clear and easily understood message to all parties."[121] At this time we decline to use multiple benchmarks in this Report. We find that the single benchmark we use in this Report, which relies on a higher speed benchmark than prior reports, is the appropriate means to allow us to analyze whether *advanced* service is being deployed.

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[113] *Id*. at 51.

[114] 141 Cong. Rec. 15108 (1995).

[115] The American Heritage Dictionary of the English Language (5th ed. 2014).

[116] Advanced, Oxford English Dictionary, http://www.oed.com/view/Entry/2886?redirectedFrom=advanced& (last visited Jan. 20, 2015).

[117] Advanced, Macmillan Dictionary, http://www.macmillandictionary.com/us/dictionary/american/advanced (last visited Jan. 20, 2015).

[118] European Commission, *Digital Nation for Europe*, http://ec.europa.eu/digital-agenda/en/broadband-strategy-policy (last visited Jan. 20, 2015).

[119] *2014 Broadband Progress Notice of Inquiry***.** 29 FCC Rcd at 9759, paras. 22-23.

[120] NCTA Comments at 3-4.

[121] Thomas West Comments at 2.

A. Relevant Factors in General

24. In past Reports, the Commission has relied on speed as the primary indicator of whether an Internet access service qualifies as broadband, or "advanced telecommunications capability." The Commission has, however, recognized that factors other than speed may affect its determination of whether a service qualifies as advanced telecommunications capability.[122] For example, in the *2014 Broadband Progress Notice of Inquiry*, the Commission indicated that it might examine other factors, such as latency[123] and usage allowances[124] when measuring the availability of advanced telecommunications capability.[125] The *2014 Fourth Measuring Broadband America Report* also considered, for the first time, not only whether consumers are receiving the speeds advertised, but whether those speeds are reached consistently.[126] Mobile and satellite services in particular may be affected by weather, topographical features, or network congestion, for example. We believe that latency and consistency could affect whether a service should be considered advanced telecommunications capability.[127] For example, video and audio quality may be paramount for streaming videos and consistency of service may be paramount for participating in online real-time education courses.

25. At this point, the Commission has reliable data on speed for fixed services.[128] We have limited data on latency for fixed broadband and are working on the data collected in the Measuring Broadband America mobile program including results on the distribution of latencies for mobile services.[129] Thus, we will continue as we have in past Reports to measure advanced telecommunications capability in terms of speed only, while we continue to look at how to improve our data going forward. As explained above, we anticipate assessing the "totality of the circumstances" in the next Report by looking more robustly at other factors, such as usage allowances and price, latency, whether service at the

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[122] *See, e.g., 2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10362-63, paras. 22-25.

[123] Latency is a measure of the time it takes for a packet of data to travel from one point to another in a network and often is measured by round-trip time in milliseconds (ms).

[124] Usage allowance refers to the total volume of data an end user may send and/or receive that is included in a broadband subscription over a period of time, often measured in gigabytes (GB) per month.

[125] *See 2014 Broadband Progress Notice of Inquiry*, 29 FCC Rcd at 9760-62, paras. 25-30.

[126] *2014 Fourth Measuring Broadband America Report* at 11; *see also generally* David Clark, William Lehr, MIT, Understanding Broadband Speed Measurements (Aug. 15, 2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1988332.

[127] The *2014 Fourth Measuring Broadband America Report* examined latency of fixed services at approximately 75,000 locations. *2014 Fourth Measuring Broadband America Report* at 63; *see also id*. at 30 ("While the test results found variance in latencies among technologies, the latencies measured here for all of the terrestrial-based technologies should be adequate for common latency-sensitive Internet applications, such as VoIP. As noted, the situation is more complex for satellite, and dependent on a number of factors, including application sensitivity to latency and user perception of latency's effects."). The Commission expects to publish information about mobile latency in an upcoming report. *Id*. at 55. Usage allowances may in some instances be pertinent to whether a service constitutes advanced telecommunications capability. For example, if a service is cut off or otherwise impaired once the allowance has been reached, that impairment could affect whether it permits the capabilities and the high-quality that Congress mandated. In many instances, however, once the usage allowance has been met, the service will continue unimpeded but the service provider will impose additional charges. In that event, usage allowances are better viewed to affect whether service is properly considered to be available.

[128] *See infra* paras. 67-69, 103.

[129] *2014 Fourth Measuring Broadband America Report* at 55; *see also Seventeenth Mobile Wireless Report* at paras. 195-97, 206 (providing limited mobile speed and latency data from the FCC's Measuring Broadband America program).

relevant speed is available on a consistent and reliable basis, and whether the network is secure, which can be as important as speed in determining whether service is available.[130]

B. Speed Factor

26. In past Reports, the Commission has identified a speed benchmark against which to measure broadband.[131] The Commission has recognized that the benchmark must be periodically reassessed in light of market offerings and consumer demand.[132] The *2010 National Broadband Plan* recommended updating the broadband benchmark every four years.[133] In the *2014 Broadband Progress Notice of Inquiry*, we sought comment on whether we should update the 4 Mbps/1 Mbps broadband benchmark.[134] The Commission updated the speed benchmark once before, in 2010, from 200 kbps/200 kbps to 4 Mbps/1 Mbps[135] and we find it is time once again to update the speed benchmark.[136] For purposes of this Report, we conclude that meeting the definition of "advanced telecommunications capability" requires consumers to have access to actual download (i.e., to the customer) speeds of at least 25 Mbps and actual upload (i.e., from the customer) speeds of at least 3 Mbps (25 Mbps/3 Mbps).[137] For

[130] *See supra* paras. 10-11.

[131] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10360, para. 18 & n.127.

[132] *Id*. at 10361, para. 20 ("We will seek comment on the broadband speed benchmark in the next Inquiry to ensure that our analysis keeps pace with evolving consumer demand and technologies."); *2011 Seventh Broadband Progress Report*, 27 FCC Rcd at 8020, para. 15 ("The Commission may in the future modify the broadband benchmark as consumer demand and technologies evolve."); *see also* TechFreedom Comments at 10 ("'Reasonable and timely deployment' is obviously a moving target that will necessarily depend on consumer demands.").

[133] *2010 National Broadband Plan* at 135.

[134] *2014 Broadband Progress Notice of Inquiry*, 29 FCC Rcd at 9749-50, para. 5.

[135] *2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9563, para. 11.

[136] Many commenters support increasing the speed benchmark. *See, e.g.*, City of Boston Comments at 6; CWA Comments at 1; Eric Case Comments at 1; Eric Ziegenhorn Comments at 1; George Hu Comments at 1; Hughes Comments at 2; Jeff Hoel Comments at 1; Institute for Local Self-Reliance Comments at 1; Martijn Kleinendorst Comments at 1; NTTA Comments at 8; Netflix Comments at 1; NRECA Comments at 3; Joseph Pasqualetti Comments at 1; Public Knowledge Comments at 1; Richard Brown Comments at 1; Ross Jory Comments at 1; SIA Comments at 2; Scott Stewart Comments at 5; Tom Sprunger Comments at 1; Thomas Lucas Comments at 1; Thomas West Comments at 1-2; TechFreedom Comments at 10; UNH BCoE Comments at 2; NATOA Reply at 2-3; Open Technology Institute Reply at iv.

[137] Similar to prior Reports, we adopt a requirement that consumers receive "actual" speeds to ensure that consumers are able "to originate and receive high-quality voice, data, graphics, and video" services, as required by section 1302(d)(1). 47 U.S.C. § 1302(d)(1); *2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9563, para. 11; *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8018-19, paras. 14-15; *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10360-61, paras. 18-19. While the benchmark in this Report refers to actual speeds, as discussed below, we rely on SBI Data, which provide deployment data on advertised speeds. *See infra* para. 67; *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557 ("For this purpose, 'broadband service' is 'available' at an address if the provider does, or could, within a typical service interval (7 to 10 business days) without an extraordinary commitment of resources, provision two-way data transmission to and from the Internet with advertised speeds…."). As we explained in the last Report, the SBI Data on advertised speed may not accurately represent consumers' actual broadband speed. *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10348, para. 7 n.32. For this reason, the Commission established the Measuring Broadband America Report program to test whether providers are delivering actual speeds that meet, or exceed, advertised speeds. As discussed below, and in the *2014 Fourth Measuring Broadband America Report,* among other things, the report established for the fourth time that the majority of residential wireline broadband consumers are receiving performance close to the level advertised by their providers and thus, receiving speeds close to actual speeds. *See infra* para. 103; *2014 Fourth Measuring Broadband America Report* at 14 ("The February 2013 Report showed that the ISPs included in the Report were, on average, delivering 97 percent of advertised download speeds during the peak usage hours. This Report finds that ISPs now provide 101 percent of advertised speeds.").

schools and classrooms, we use the same benchmark that the Commission already established for schools and classrooms of a short term benchmark of 100 Mbps per 1,000 students and staff and a long-term speed benchmark of 1 Gbps per 1,000 students and staff.[138]

27. We base this conclusion on several considerations. We begin, of course, with the statutory language. Congress directed the Commission to evaluate the availability of "advanced" capability: "high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology."[139] We interpret the terms in the definition, such as "advanced," "high-speed," and "high-quality"—terms that Congress left to the agency to define—by examining trends in providers' speed offerings, what technical speeds are required to use various common applications, and data regarding what speeds consumers are adopting when they have the option to purchase various speeds.

1. Providers Offering Higher Speeds

28. In recent years, we have seen tremendous consumer demand for more bandwidth and in response, providers are offering higher speeds. As noted above, this finding is consistent with broadband services on the market today ranging on the high-end from 25 Mbps to 1 Gbps.[140] Comcast offers, in certain markets, speed tiers ranging from 25 to 150 Mbps.[141] Google Fiber offers 1 Gbps today in Kansas City, Missouri; Provo, Utah; and Austin, Texas[142] and is exploring expansion opportunities in other cities.[143] Broadband providers today promote different offerings based on the types of applications consumers will use. Providers are offering higher speeds than ever before, and, as discussed below, consumers are adopting them where they are available.[144] Verizon is telling customers: "[e]ach connected device uses a slice of your bandwidth. Over wi-fi, tablets will use between 20 Mbps and 40 Mbps" and "[l]aptops, televisions, and gaming systems can take from 5 Mbps to 75 Mbps."[145] Comcast informs consumers that 6 Mbps will let you share photos and download music, but recommends 25 Mbps to also stream video, and even more to stream and download HD video and participate in online gaming.[146] Time Warner Cable suggests that 30 Mbps is appropriate for a family with two adults and two children that want to use multiple devices simultaneously.[147] AT&T promotes speeds up to 45 Mbps to "[d]ownload

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[138] *See infra* para. 62.

[139] 47 U.S.C. § 1302(d)(1).

[140] *See supra* para. 16.

[141] Comcast, *Xfinity*, http://www.comcast.com/internet-service.html (last visited Jan. 19, 2015) (*Comcast Xfinity*).

[142] *Google Fiber Cities.*

[143] *Id.*; Verizon Comments at 10.

[144] *See 2014 Fourth Measuring Broadband America Report* at 12 ("Consumers are continuing to migrate to faster speed tiers."). Even reports indicating slower average speeds show rapid growth in demand. For example, an Akamai Technologies report showed an average speed of 11.5 Mbps in the third quarter of 2014 in the U.S., with average speeds of at least 12.8 Mbps in the top ten states, and found with a total of 41 states seeing higher average connection speeds as compared to the previous quarter. Akamai Technologies, Akamai's State of the Internet Report, Q3 2014 Report, Volume 3 Number 3, 28 34 (2015), http://www.akamai.com/stateoftheinternet/. *See also 2015 Fourth International Broadband Data Report*, Appx. F at 3 (Fig. 1a) (citing Actual Download Speeds from Net Index by Ookla, https://www.ookla.com/ (data drawn Dec. 16, 2013)).

[145] Verizon, *Sharing Speed with Multiple Connected Devices* at 3, http://www.verizon.com/cs/groups/public/documents/adacct/bandwith-and-multiple-device.pdf (last visited Jan 16, 2015) (*Verizon Sharing Speed*).

[146] *Comcast Xfinity*.

[147] Time Warner Cable, *The WifiDentifier*, http://www.twcwifidentifier.com/?cid=featurescarousel:1:2:wifidentifier (last visited Jan. 16, 2015); *see also* Time Warner Cable, *Choose your Time Warner Cable Internet Package*, http://www.cabletv.com/time-warner/internet (last visited Jan. 29, 2015).

music, movies, and more in record time."[148] Industry-wide, companies are asserting that a minimum of 25 Mbps downstream is required to take advantage of the services widely offered and used today.

2. Speeds Required to Use High-Quality Applications

29. In this section, we look at the speeds that are required to use high-quality voice, data, graphics, and video applications. Today, Americans increasing rely on broadband to perform multiple functions, and consumers within a household routinely use multiple applications simultaneously. FTTH Council and Verizon state that the average U.S. household has seven Internet-connected devices, and that number increases each year.[149] We thus also examine how a consumer's needs change when considering the consumer's household usage.

a. Common Applications

30. *Video Services.* Video continues to drive demand for faster broadband. Video services range from video streaming video, video on demand (VoD), IP TV, video games, and video conferencing.[150] The *2014 Sandvine Report* stated that real-time entertainment such as streaming video and audio "is *responsible* for over 67% of downstream bytes during peak period."[151] While there is no uniform standard for the bandwidth necessary to receive acceptable quality video, various providers have bandwidth recommendations. Netflix recommends streaming video at 5 Mbps for HD and 25 Mbps for Ultra HD quality,[152] Apple suggests consumers have at least 6 Mbps for 720p content and 8 Mbps for 1080p HD movies and TV shows,[153] and DISH states that an HD video stream requires approximately 5

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[148] *The Right Internet Package for You*, https://www.att.com/shop/internet.html?tab=2#fbid=omWM0AoF60b (last visited Jan. 16, 2015) (select "Key Features"); *see also* CenturyLink, *Shop CenturyLink*, http://www.centurylink.com/ (last visited Jan. 29, 2015) (explaining that 25 Mbps or more is the "perfect choice for…multi-user households [and] HD movie streaming and downloading" while 40 Mbps "[h]andles virtually any internet application") (*CenturyLink Plans*) (select "Residential" and 40 Mbps plan); Comments of Charter Communications, Inc., GN Docket Nos. 14-28, 10-127, at 5 (filed July 18, 2014), http://apps.fcc.gov/ecfs/document/view?id=7521707347 (projecting in July 2014 that "by the end of 2014, 60 Mbps will be the slowest speed it offers to 94% of homes passed").

[149] FTTH Council Comments at 7; *Verizon Sharing Speed* at 1; *see also* Prepared Remarks of FCC Chairman Tom Wheeler, The Facts and Future of Broadband Competition at 2 (Sept. 14, 2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-329161A1.pdf (*2014 Chairman Wheeler Remarks*) ("It's not uncommon for a U.S. Internet connected household to have six or more connected devices – including televisions, desktops, laptops, tablets, and smartphones. When these devices are used at the same time, as they often are in the evenings, it's not hard to overwhelm 10 Mbps of bandwidth.").

[150] Darrell M. West, Center for Technology Innovation at Brookings, The Evolution of Video Streaming and Digital Content Delivery 1-2 (May 2014), http://www.brookings.edu/~/media/research/files/papers/2014/05/02%20video%20streaming/west_evolution%20of%20videostreaming%20and%20digital%20content%20delivery_final.pdf ("There has been tremendous interest among consumers in watching movies on-demand and viewing video content on every device: television, video players, desktops, laptops, tablets, and smartphones. People enjoy the convenience of online video and the high-resolution and 3-D features that now are available.").

[151] Sandvine Intelligent Broadband Networks, Global Internet Phenomena Report, 2H 2014 at 5 (2014), https://www.sandvine.com/downloads/general/global-internet-phenomena/2014/2h-2014-global-internet-phenomena-report.pdf (*2014 Sandvine Report*); *see also Open Internet NPRM*, 29 FCC Rcd at 5572, para. 32 (noting that the number of hours Americans spend watching video over the Internet has grown 70% since June 2010).

[152] Netflix, *Internet Speed Recommendations*, https://help.netflix.com/en/node/306 (last visited Jan. 19, 2015) (*Netflix Speed Recommendations*).

[153] Apple, *Apple TV (2nd and 3rd generation): Troubleshooting playback performance*, http://support.apple.com/en-us/HT203422 (last visited Jan. 19, 2015) (*Apple Speed Recommendations*).

Mbps.[154] Households also commonly have high definition (HD) TVs to watch HD content and movies, which require more bandwidth. Approximately "77% of households in the United States have at least one high definition television (HDTV) set, and about 46% of all households have multiple HDTVs."[155]

31. Telemedicine and distance learning that require real-time video conferencing are also surging in popularity, especially in rural areas. For example, the Department of Veterans Affairs indicated that "its national telehealth programs served more than 690,000 vets during fiscal 2014 via more than 2 million online visits [and] [a]bout 55 percent of the telehealth visits were from veterans who live in rural areas with limited access to a VA healthcare facility."[156] The Department of Education reports that "[p]ostsecondary enrollment in distance education courses, particularly those offered online, has rapidly increased in recent years."[157] According to CEO of edX, a Cambridge, Massachusetts-based, non-profit that offers "free online classes from elite universities to anyone in the world" indicated that "[e]nrollment in edX courses has doubled over last year."[158]

32. Consumers increasingly are choosing higher quality video services that demand increased bandwidth, and projections show new video service options and substantial growth in this area. Cisco indicated that "high-definition VoD surpassed standard-definition VoD by the end of 2011 and by 2016, high-definition Internet video will comprise 79 percent of VoD."[159] Cisco also projects that "[b]y 2018, digital TV and online video will be the two most highly penetrated services, 86 percent and 78 percent respectively."[160] Moreover, video services are rapidly migrating to broadband streaming delivery. Recently, the popular cable channel HBO announced that it will begin offering video streaming service on

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[154] Petition to Deny, DISH Network Corporation, MB Docket No. 14-57 at 27-28 (filed Aug. 25, 2014), http://apps.fcc.gov/ecfs/document/view?id=7521818574 (*DISH MB Docket No. 14-57 Petition to Deny*).

[155] *See* Press Release, Leichtman Research Group, The Majority of TV Sets Used in U.S. Households are Now HDTVs, 4K Ultra HDTV in Early Stages of Development (Mar. 7, 2014), http://www.leichtmanresearch.com/press/030714release.html.

[156] Federal Soup, VA touts growth of telehealth program (Oct. 14, 2014), http://federalsoup.com/articles/2014/10/14/va-touts-growth-of-telehealth-program.aspx#; *see also* Pew Research Center, *Health Fact Sheet*, PewResearch Internet Project, http://www.pewinternet.org/fact-sheets/health-fact-sheet/ (lasted visited Jan. 19, 2014) (noting that 72% of internet users say that they have looked online for health information within the past year); Clay Dillow, *GPS- and WiFi-Enabled Asthma Inhaler Sends Epidemiology Data as it Helps You Breathe*, Popular Sci. (Apr. 12, 2011), http://www.popsci.com/science/article/2011-04/gps-and-wifi-enabled-inhaler-pumps-out-air-quality-and-epidemiology-data (detailing an asthma inhaler that uses GPS and WiFi to enable patients and doctors to analyze their inhaler use); Aditi Pai, Illinois Medical Group to Use Apple Watch in Disease Management Pilot, MobiHealthNews (Oct. 22, 2014), http://mobihealthnews.com/37573/illinois-medical-group-to-use-apple-watch-in-disease-management-pilot/ (describing a pilot program that will examine how nurses and physicians can integrate the Apple Watch into a medical home program for high-risk patients with chronic diseases).

[157] U.S. Department of Education, Enrollment in Distance Education Courses, by State: Fall 2012, WEB Tables at 1 (June 2014), http://nces.ed.gov/pubs2014/2014023.pdf.

[158] Issie Lapowsky, *Why Free Online Classes Are Still the Future of Education*, Wired (Sept. 26, 2014), http://www.wired.com/2014/09/free-online-classes-still-future-education/; *see also* Kimberly F. Colvin et al., Learning in an Introductory Physics MOOC: All Cohorts Learn Equally, Including an On-Campus Class, The Int'l Rev. of Res. in Open and Distance Learning, Vol. 15, No. 4 (2014), http://www.irrodl.org/index.php/irrodl/article/view/1902/3009.

[159] Govloop, *Internet Usage Forecast*, https://www.govloop.com/forums/topic/internet-usage-forecast/ (last visited Jan. 19, 2015).

[160] Cisco, The Zettabyte Era: Trends and Analysis at 17 (2014), http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/VNI_Hyperconnectivity_WP.pdf (*2014 Cisco Zettabyte Report*).

a stand-alone basis in 2015.[161] CBS has already launched a streaming news service, and will likely stream Showtime, its premium cable channel, in the "not too distant future."[162] DISH, Sony, and Verizon have each announced linear Internet-based subscription video services whose launch is imminent.[163] Thus there are strong indications that demand for video broadband capacity will increase.[164] Moreover, higher quality, higher bandwidth offerings are imminent.[165] Services on the market today include "ultra-high definition video services (e.g., 4K technology, which has a resolution of 12 Megapixels per frame, versus present day 1080p High Definition television with a 2 Megapixel resolution)."[166] While 4K is still in the early stages, Cisco projects that this service may "account for 22% of global VOD Traffic in 2018."[167] By some reports, "4K resolution LCD panels are going to be midrange TVs, and biggest manufacturers are actually making more series of 4K TVs than 1080p TVs in 2015."[168] Cisco indicates that "[w]ith the

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[161] James Poniewozik, *It's Not TV. And It's Not Cable. It's HBO, Online*, Time (Oct. 15, 2014), http://time.com/3510434/hbo-online-streaming/#3510434/hbo-online-streaming/ (stating that beginning in 2015, HBO will offer a standalone online service).

[162] Emily Steel, *Cord-Cutters Rejoice: CBS Joins Web Stream*, N.Y. Times (Oct. 16, 2014), http://www.nytimes.com/2014/10/17/business/cbs-to-offer-web-subscription-service.html?_r=0. NBC has also announced that it will begin live streaming in early 2015. *See* Don Reisinger, *NBC pushes live streaming to PCs*, CNET (Dec. 16, 2014), http://www.cnet.com/news/nbc-pushes-live-streaming-to-pcs-as-tv-everywhere-heats-up/.

[163] *Promoting Innovation and Competition in the Provision of Multichannel Video Programming Distribution Services*, MB Docket No. 14-261, Notice of Proposed Rulemaking, FCC 14-210, para. 1, n.1 (rel. Dec. 19, 2014). (*MVPD NPRM*) ("We see daily news that cable operators and satellite television providers are obtaining rights for online distribution of content."); Sam Adams and Christian Plumb, *Verizon CEO says to launch Web TV product in 2015*, Reuters (Sept. 11, 2014), http://www.reuters.com/article/2014/09/11/us-verizon-comms-towers-idUSKBN0H61KB20140911 (reporting that Sony, Dish Network, DIRECTV and Verizon are each developing Internet-delivered streaming video services that are a viable alternative to cable TV service); Edmund Lee, Scott Moritz and Alex Sherman, *Dish Leads in Race to Offer Online TV to Compete With Cable*, Bloomberg (Mar. 15, 2014), http://www.bloomberg.com/news/2014-03-04/dish-takes-lead-in-race-to-offer-streaming-tv-to-rival-cable.html ("If Dish goes ahead with an online service, competitors could follow -- including cable companies like Comcast and Cablevision Systems Corp., which could move out of their traditional regions to offer TV nationwide, said Bernard Gershon, a digital media consultant in New York."); Chris Young, *Industry awaits linear OTT experiment*, SNL Kagan (July 18, 2014), http://www.snl.com/interactivex/article.aspx?id=28627040&KPLT=2; *Comcast branches out cloud DVR, live streaming service*, CED Magazine (May 8, 2014), http://www.cedmagazine.com/news/2014/05/comcast-branches-out-cloud-dvr-live-streaming-service.

[164] *See* Press Release, FCC, FCC Proposes to Modernize MVPD Definition (Dec. 19, 2014) http://www.fcc.gov/document/fcc-proposes-modernize-mvpd-definition (stating that the NPRM seeks comment on modernizing the definition of a multichannel video programming distributor (MVPD) to reflect that video services are no longer tied to a particular distribution technology and proposes to interpret the definition of an MVPD to include providers that make multiple linear streams of video programming available for purchase, regardless of the technology used to distribute the programming, including Internet programming streams and Internet-based services).

[165] *See, e.g.*, Netflix Comments at 5-6 (arguing that the benchmark should accommodate future demand, including emergence of new content and services).

[166] *2014 Fourth Measuring Broadband America Report* at 65, n.35. Netflix recommends 25 Mbps download per device to stream HD 4K video. *See Netflix Speed Recommendations*; Netflix Comments at 4 ("In April 2014, Netflix began streaming Ultra HD 4K versions of some content, and Amazon will soon follow suit.").

[167] *2014 Cisco Zettabyte Report* at 8, 22 ("With cloud gaming, game graphics are produced on a remote server and transmitted over the network to the gamer. Currently, online gaming traffic represents only 0.04 percent of the total information content associated with online and offline game play. If cloud gaming takes hold, gaming could quickly become one of the largest Internet traffic categories.").

[168] David Katzmaier, CES 2015 TV tech: 4K all the way, CNET (Dec. 16, 2014), http://www.cnet.com/news/ces-2015-tvs-4k-all-the-way.

exception of short-form video and video calling, most forms of Internet video do not have a large upstream component" and "[i]f high-end video calling becomes popular, traffic could move toward greater symmetry."[169] For example, Jon Hendricks, who founded Discovery Channel, "is launching an Internet-based video-on-demand subscription service" called CuriosityStream that will include a 4K package.[170]

33. *Data Services*. Recent reports indicate web-browsing accounts for approximately 10 percent of peak period Internet use.[171] As noted above, in the *2014 Fourth Measuring Broadband America Report*, the Commission found that "[i]n specific tests designed to mimic basic web browsing—accessing a series of web pages, but not streaming video or using video chat sites or applications—the total time needed to load a page decreased with higher speeds."[172] Other data services, such as the transfers involved in telecommuting, are on the rise and Americans can work from home, conduct research at home, reduce commuting time, and have better work life balance.[173]

34. *Voice Services*. Many Americans are migrating their voice services to VoIP technology, which allows consumers to make phone calls using a broadband connection. As indicated by the *2014 FCC Local Competition Report*, the number of residential VoIP subscribers increased from 19.7 million subscribers in December 2008 to 37.7 million subscribers in December 2013.[174] As the transition from legacy circuit-switched networks (or public-switched telephone networks (PSTN)) to broadband networks and IP-based connections for voice progresses, we expect Americans' reliance on VoIP service to increase.[175] VoIP is a real-time service, and we have found that it requires a minimum of 100 kbps/100 kbps but also noted that, VoIP quality may suffer during times when household bandwidth is shared by other devices and services.[176]

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[169] *Id*. at 16 (adding that "[p]eer-to-peer (P2P), by definition, is highly symmetric traffic, with between 40 and 60 percent of P2P traffic consisting of upstream traffic. For every high-definition movie downloaded, approximately the same amount of traffic is uploaded to a peer. Now, with increased video traffic, most video streams that cross the network have a highly asymmetric profile, consisting mostly of downstream traffic, except in areas where P2P TV is prevalent (in China, for example)").

[170] Todd Spangler, Variety, *John Hendricks, Founder of Discovery Channel, Launches Internet Subscription VOD Service* (Jan. 14, 2015), http://variety.com/2015/digital/news/john-hendricks-founder-of-discovery-channel-launches-internet-subscription-vod-service-1201405495/.

[171] *2014 Sandvine Report* at 5.

[172] *See 2014 Fourth Measuring Broadband America Report* at 17.

[173] Alina Tugend, It's Unclearly Defined, but Telecommuting Is Fast on the Rise, N.Y. Times (Mar. 7, 2014), http://www.nytimes.com/2014/03/08/your-money/when-working-in-your-pajamas-is-more-productive.html?_r=0#; *see also* The White House, Office of the Press Secretary, Memorandum for the Heads of Executive Departments and Agencies at 1 (June 23, 2014), http://afge.pr-optout.com/ViewAttachment.aspx?EID=cvv1rQNzT5dTC1UoYvZgUm9kRJb9fQCqd1nhT7e8TPU%3d ("We should build on our record of leadership through better education and training, expanded availability of workplace flexibilities and work-life programs…."); United States Government Accountability Office, *GAO-14-409, Telecommunications: Projects and Policies Related to Deploying Broadband in Unserved and Underserved Areas* at 5 (April 2014), http://www.gao.gov/assets/670/662711.pdf (stating that the FCC's 4 Mbps/1 Mbps speed benchmark does not allow for such services as "distance learning, telecommuting, and telemedicine, which can involve transmitting large amounts of data and images in real-time").

[174] Industry Analysis and Technology Division, Wireline Competition Bureau, Local Telephone Competition: Status as of December 31, 2013 at 14 (Oct. 2014), http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db1016/DOC-329975A1.pdf.

[175] *See generally Technology Transitions Order*.

[176] FCC, Office of Engineering and Technology and Consumer and Governmental Affairs Bureau, *2013 Measuring Broadband America February Report: A Report On Consumer Wireline Broadband Performance in the U.S.* at 12-

(continued…)

35. *Social Networking and Cloud Applications.* Americans increasingly use social networking, apps, and "cloud" services. Social networking was once dominated by young adults, but today approximately "73% of online adults now use a social networking site of some kind."[177] Cloud computing allows consumers to store and access "data and programs over the Internet instead of [their] computer's hard drive."[178] Cloud services "offer ubiquitous access to content and services, on multiple devices, delivered to almost anywhere network users are located."[179] Consumers rely on services such as Apple iCloud, Amazon Cloud, and Google Drive, which allow them to access their photos, music, and e-mails anywhere and anytime.[180]

36. *Machine to Machine Applications.* Americans are increasing their use of broadband connections for "machine-to-machine" (M2M) connections, "such as smart meters, video surveillance, healthcare monitoring, transportation, and package or asset tracking."[181] Cisco in its latest report found that "[i]n 2013, only 33 percent of total IP traffic originated with non-PC devices, but by 2018 the non-PC share of total IP traffic will grow to 57 percent."[182] Tablet and M2M use has grown rapidly and continues to do so.[183] PC-originated traffic is projected to grow at approximately "10 percent, while TVs, tablets, smartphones, and machine-to-machine (M2M) modules will have traffic growth rates of 35 percent, 74 percent, 64 percent, and 84 percent, respectively."[184]

b. Common Usage Patterns

37. Americans use many devices – smartphones, tablets, netbooks, computers, and e-readers, for example – in varying combinations with one report claiming that "60 percent of consumers admit they never *unplug* from their devices."[185] Some devices, like desktop computers and Smart TVs, are mainly stationary. While many devices used within the home are mobile or portable, consumers at home often choose to rely on their Wi-Fi to connect those devices to the Internet. Cisco found that "[f]or users with fixed broadband and Wi-Fi access points at home . . . a sizable proportion of traffic generated by mobile

(Continued from previous page)
13 (2013) (*2013 Third Measuring Broadband America Report*); *2014 Fourth Measuring Broadband America Report* at 17.

[177] Maeve Duggan & Aaron Smith, *Social Media Update 2013*, Pew Res. Internet Project (Dec. 30, 2013), http://www.pewinternet.org/2013/12/30/social-media-update-2013/.

[178] Eric Griffith, *What Is Cloud Computing?*, PCMag.com (Mar. 13, 2013), http://www.pcmag.com/article2/0,2817,2372163,00.asp.

[179] *See* Cisco Global Cloud Index: Forecast and Methodology, 2013-2018 at 4 (2014), http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns1175/Cloud_Index_White_Paper.pdf.

[180] *2014 Cisco Zettabyte Report* at 10 ("High-bandwidth speeds will be an essential support for consumer cloud storage, making the download of large multimedia files as fast as a transfer from a hard drive.").

[181] *Id*. at 5.

[182] *Id*. at 2.

[183] *2014 Broadband Progress Notice of Inquiry,* 29 FCC Rcd at 9751, para. 6, n.16.

[184] *2014 Cisco Zettabyte Report* at 2. Cisco indicates that "[w]hile the number of connections is growing threefold, global M2M IP traffic will grow 11-fold over this same period, from 179 petabytes in 2013 (0.4 percent of global IP traffic) to 3.7 exabytes by 2018 (2.8 percent of global IP traffic)." *Id*. at 10. Cisco states that "[t]he higher traffic growth than connections growth is due to more video applications being deployed on M2M connections as well as the use of applications, such as telemedicine and smart car navigation, that require higher bandwidth and lower latency." *Id*.

[185] Brafton, *No surprise here: Brands reach 'always-on' consumers through web content* (Aug. 12, 2014), http://www.brafton.com/news/surprise-brands-reach-always-consumers-web-content.

and portable devices is offloaded from the mobile network onto the fixed network."[186] There has also been tremendous growth in Internet usage. USTelecom points out that "over the last five years, . . . consumer and business usage of the Internet has tripled on a per user basis."[187]

38. The average household includes 2.58 people, and the average family household includes as many as 4.3 people.[188] Household members may use one or more broadband services, from multiple devices, simultaneously;[189] and there is some evidence that the average household has seven Internet-connected devices.[190] The sheer number and wide array of broadband-capable devices in American households suggest that they are often used simultaneously.[191] And companies commonly market their services to permit multiple simultaneous users.[192] For instance, on its website, Verizon reports that higher plans, such as 50 Mbps/50 Mbps are "[b]est for 3-5 devices at the same time," and are "for families or individuals with multiple Internet devices."[193] Similarly, Comcast reports that an internet plan with download speeds of up to 25 Mbps is useful for "[h]ouseholds with 2-3 devices online," and will allow users to "[s]tream and download TV shows [and] shop online."[194]

39. Here are examples of the different services households could do with a 10 Mbps and 25 Mbps downstream speeds:

[186] Cisco, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2013–2018 17 (Feb. 5, 2014), http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.pdf (*Cisco Feb. 2014 VNI Report*). Cisco found that "[g]lobally, 45 percent of total mobile data traffic was offloaded onto the fixed network through Wi-Fi or femtocell in 2013." *Id*. at 2.

[187] McCormick Letter at 1 (referring to Cisco's annual Visual Networking Index).

[188] *2013 Census Average Household*. Again, we note that households with an average household size of as many as 4.3 people include family households with family and non-family members. *See id*.

[189] Netflix Comments at 4 (stating that households increasingly have multiple members simultaneously accessing Internet-delivered content and services on multiple devices).

[190] *See supra* para. 29.

[191] *2014 Broadband Progress Notice of Inquiry,* 29 FCC Rcd at 9751, para. 7, n.16; *see also* White House Office of Science and Technology Policy & The National Economic Council, Four Years of Broadband Growth 7 (2013) (*White House Four Years of Broadband Growth Report*), http://www.whitehouse.gov/sites/default/files/broadband_report_final.pdf; U.S. Census Bureau, *Computer and Internet Use in the United States* at 6 (May 2013), http://www.census.gov/prod/2013pubs/p20-569.pdf (indicating an Internet "connectivity continuum" with households accessing the Internet both inside and outside the homes with multiple devices); Olga Karif, Average Household Has 5 Connected Devices, While Some Have 15-Plus, Bloomberg.com Tech Blog (Aug. 29, 2012), http://go.bloomberg.com/tech-blog/2012-08-29-average-household-has-5-connected-devices-while-some-have-15-plus/("The average U.S. household owns five devices connected to the Internet via Wi-Fi, wired or cellular networks.").

[192] *See, e.g.*, *Comcast Xfinity* (recommending Internet Plus package that allows up to 50 Mbps for "[h]ouseholds with 3-5 devices online"); *Verizon Sharing Speed* at 1; *CenturyLink Plans* (stating the 40 Mbps offers "[a]lways-on households using advanced applications; [h]andles virtually any Internet application; [m]aximum online gaming and movie viewing performance; [e]veryone in your home can download, stream, create and share all day, every day").

[193] Verizon, *FiOS Internet: Most Popular Internet Plans*, http://www.verizon.com/home/fios-fastest-internet/ (last visited Jan. 29, 2015).

[194] C*omcast Xfinity*. Comcast has other higher plans such as 105 Mbps download stating it is useful for "[h]ouseholds with 5-8 devices online," and will allow consumers to "[s]tream & download HD shows [and] game online." *Id*.

Table 1: Simultaneous Household Uses 25 Mbps Versus 10 Mbps Download

	25 Mbps Downstream	10 Mbps Downstream
Download emails and participate in an online class	Yes	Yes
Stream 1 HD video	Yes	Yes
Participate in an online class, download files, and stream a movie	Yes	No
View 2 HD videos	Yes	No
Stream 1 4K TV service	Yes	No

40. Here are examples of the different services households could do with a 1 Mbps and 3 Mbps upstream speeds:

Table 2: Simultaneous Household Uses 3 Mbps Versus 1 Mbps Upload

	3 Mbps Upstream	1 Mbps Upstream
Browse the web	Yes	Yes
Upload 2 large files[195]	Yes	No
Participate in online video chat	Yes	No
Participate in an online class and upload a file	Yes	No

3. Consumers Adopt Higher Speeds When They Have the Option

41. Our own assessment of consumers' likely needs is confirmed by examining broadband adoption. When speeds of 25 Mbps/3 Mbps are available, a substantial and fast-growing number of consumers are adopting and migrating to higher speeds. Examining the adoption trends from December 2011 to December 2013, we find that the adoption rate of this service or higher quadrupled.[196] Customers are deciding for themselves at a very rapid rate that they need services at this or higher speeds.

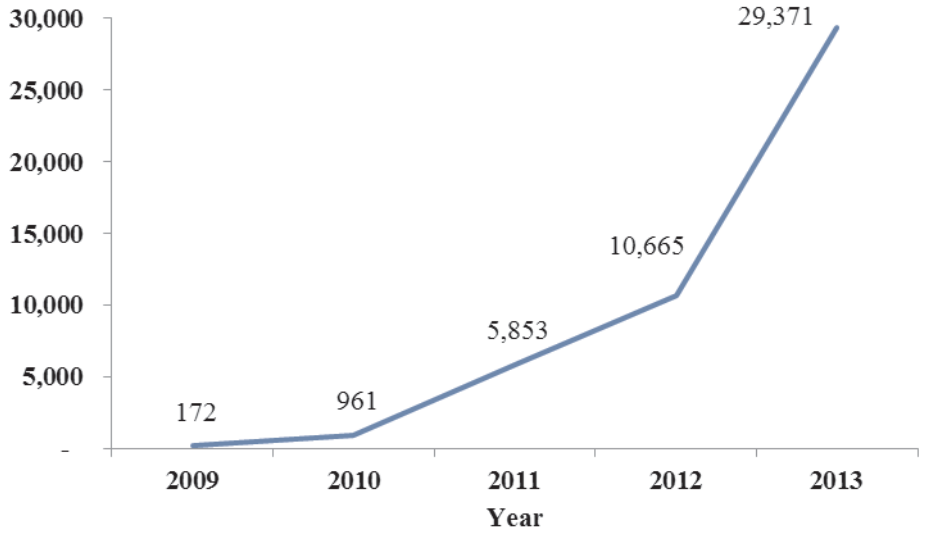
Table 3: Fixed 25 Mbps/3 Mbps Broadband Adoption Rates (2011-2013)

Year	Adoption Rate
2011	7%
2012	11%
2013	29%

[195] We note that it is not impossible to upload two large files simultaneously, but the time it would take to do so might interfere with real-time applications.

[196] The adoption rate is the ratio of residential connections to fixed broadband with a minimum specified speed (Form 477 Data) divided by the total number of households in the area with access to the advertised broadband services meeting the speed category (SBI Data). *See infra* para. 70.

Chart 1: Residential 25 Mbps/3 Mbps Connections (2009 – 2013) (1,000s)



42. The fact that nearly one-third of consumers adopt 25 Mbps/3 Mbps when they have the option to do so supports our finding that this offering is neither futuristic nor attractive only to a narrow set of heavy broadband users or early adopters. And they are migrating to 25 Mbps/3 Mbps at a remarkable rate. Between 2011 and 2013, the adoption rate for those services increased from 7 percent to 30 percent in urban areas;[197] from 7 percent to 28 percent in non-urban areas;[198] and from 1 percent to 33 percent on Tribal lands.[199] As we noted above, advanced services should include progressive and emerging services, not merely those that are the most common.[200] The adoption rate of 25 Mbps/3 Mbps service, and the rapidity with which that rate is growing, comport with our determination that this speed enables consumers to use services that are advanced but relevant for existing broadband uses.

43. We also see that consumers adopt 25 Mbps/3 Mbps at the same rate regardless how extensively it is deployed. That is, when we examine the rate of adoption among different groups over time, we observe migration to 25 Mbps/3 Mbps (or higher) services at similar rates no matter whether consumers live in urban or rural areas, or on Tribal lands.

44. There are other indications from industry as well that this trend will continue and consumers will continue to choose higher speeds. The Commission's *2014 Fourth Measuring Broadband America Report*, which was based on September 2013 data collection, found that the average subscription speed of that program is 21.2 Mbps, an increase of 36 percent from 2012.[201] Cisco projects that "[b]y 2018, global fixed broadband speeds will reach 42 Mbps, up from 16 Mbps in 2013."[202] In the *2014 Fourth Measuring Broadband America Report*, importantly, found that consumers are not staying at lower speeds, but in fact are migrating "to faster speed tiers, continuing the trend that we highlighted both in the February 2013 Report and the July 2012 Report."[203] In light of historic trends, and as more services

[197] *See infra* para. 92, Chart 3.

[198] *See infra* para. 93, Chart 4.

[199] *See infra* para. 94, Tbl. 13.

[200] *See supra* paras. 19-23.

[201] *2014 Fourth Measuring Broadband America Report* at 13.

[202] Cisco Visual Networking Index: Forecast and Methodology, 2013-2018 2 (June 10, 2014), http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.html (*Cisco June 2014 VNI Report*).

[203] *Id.* at 12.

become available online,[204] we anticipate that consumers will continue to migrate to 25 Mbps/3 Mbps service.

4. "Advanced Telecommunications Capability" Requires 25 Mbps/3 Mbps for Consumers

45. Based on the record, we find that a 25 Mbps/3 Mbps benchmark reflects "advanced" telecommunications capability.[205] We have recognized that the concept of broadband does not stand still, but instead must evolve and after a new and updated review of the market, we find that a speed benchmark of 25 Mbps/3 Mbps best captures the statutory definition envisioned by Congress. We reach this conclusion for several reasons.

46. First, as it has done before, the Commission reassesses the existing speed benchmark to reflect advancements over time. The benchmark of 4 Mbps/1 Mbps, which was set in 2010, no longer allows customers to use the broadband services widely marketed and used today (such as HD video), and certainly does not enable more advanced services that are being rolled out (such as 4K TV). Most commenters agree that 4 Mbps/1 Mbps no longer is sufficient.[206] We therefore determine that the speed benchmark should be updated to satisfy Congress's definition of advanced telecommunications capability.

47. Second, we consider what speeds are needed to ensure that consumers enjoy "advanced" capabilities. As noted above, households usually are comprised of two or more persons, and it is not uncommon for each person in the household to use more than one broadband device simultaneously.[207] Because consumers usually purchase fixed broadband service for the household, and because the deployment data represent households rather than individuals, we find it reasonable to consider broadband needs at a household level, rather than what each individual household member, individually, may need.[208] The record further supports a household analysis. The City of Boston, for example, states that the benchmark "must be sufficiently robust to allow every member of a household to use multiple devices simultaneously."[209] The City of Boston further stated that "[p]arents finishing up after dinner work assignments, students on-line for homework, social networking, or entertainment all share network

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[204] *See supra* paras. 30-36.

[205] *See* Netflix Comments at 6 ("As consumers interact with increasingly sophisticated content and services on increasingly sophisticated devices, a 25 Mbps connection is fast becoming 'table stakes' in 21st century communications."); NTTA Comments at 8 (suggesting adopting speeds of at least 25 Mbps downstream and an upstream speed of 2 Mbps or better for fixed broadband service); Public Knowledge Comments at 16 (suggesting a minimum downstream speed for broadband of 25 Mbps to ensure that average households have adequate capacity for online video and other applications); *see also DISH MB Docket No. 14-57 Petition to Deny* at 29 (stating "a typical household relying on the Internet to deliver all video therefore should optimally have no less than 25 Mbps in broadband connectivity. This means that 25 Mbps would be the minimum actual (as opposed to advertised) experienced speed provided to the residence in order to sustain, for example, a robust OTT video product capable of supplanting today's traditional linear pay-TV service.").

[206] NTTA Comments at 2 (stating "the current 4/1 standard will not meet even common moderate household usage"; Netflix Comments at 1 (indicating that "an update is equally overdue"); City of Boston Comments at 2 (stating the 4 Mbps/1 Mbps benchmark "is no longer current").

[207] While we sought comment on whether we should adopt an average household number of three in the *2014 Broadband Progress Notice of Inquiry*, however, we received very little comment and we decline to adopt a specific household number. *2014 Broadband Progress Notice of Inquiry,* 29 FCC Rcd at 9552-53, para. 11; *see also Census Average Household*; U.S. Census Bureau, 2010 Census Briefs Households and Families: 2010 1, 5 (April 2012), https://www.census.gov/prod/cen2010/briefs/c2010br-14.pdf; *see e.g.,* Netflix Comments at 4 ("Given the centrality of the Internet to Americans' everyday lives and the average of 2.58 individuals per household, simultaneous access of Internet content and services by multiple members of the same household is becoming the norm.").

[208] Below, we separately explain why we do not yet consider mobile or satellite. *See infra* paras. 72-76.

[209] City of Boston Comments at 7.

capacity with home security services, VoIP conversations, and smart phones riding Wi-Fi."[210] Household use clearly has changed significantly since we last updated the benchmark in 2010. We find that 25 Mbps downstream is necessary to provide all households the *advanced* services Congress identified: high-quality voice, data, graphics, and video. For example, each HD video stream requires a minimum of 5 to 8 Mbps, and more advanced video services on the market require approximately 25 Mbps.[211] As explained above, 4K requires 25 Mbps download to view 4K movies and services.[212] While video streaming demands the fastest broadband, consumers also need high-quality broadband for other purposes, such as online classes and video conferencing.[213] These facts alone support selecting a download speed of at least 25 Mbps.

48. Third, we consider the fact that the deployment data currently available are collected by specific tiers.[214] We have data for 10 Mbps downstream and 25 Mbps downstream but nothing between those speeds.[215] We determine that 25 Mbps downstream properly reflects Congress's goal of making *advanced* services available to all Americans, while 10 Mbps downstream would not support the use of modern applications including high-quality video, especially by multiple users within a household. Furthermore, setting a benchmark at 25 Mbps/3 Mbps may allow us to retain the same speed benchmark for multiple years.[216]

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[210] *Id*.

[211] There is no single, objective standard for what constitutes HD, or what speed is necessary to achieve it. Some providers continue to state that as little as 5 Mbps will enable HD video, while others state that at least 8 Mbps or higher is necessary for such service. *See, e.g.*, *Apple Speed Recommendations* (recommending 8 Mbps "for 1080p high-definition movies and TV shows" and 6 Mbps for "720p content"); *Netflix Speed Recommendations* (recommending 5.0 Mbps for HD quality). *See, e.g.*, Amazon, http://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Daps&field-keywords=4k+TVs (last visited Nov. 12, 2014) (offering numerous brands of 4KTVs, both new and used, and many for less than $2,000); *Netflix Speed Recommendations* (Ultra HD 4K supported at 25 Mbps); Netflix Comments at 5 ("If even a single family member wishes to stream 4K video content, Netflix recommends a broadband connection of at least 25 Mbps."); *see also* Verizon, *FiOS – The Power You Need*, http://www.verizon.com/home/fios/ (last visited Dec. 31, 2014) (recommending 25/25 Mbps for "Normal Everyday Stuff; best for 1-3 devices at the same time"). Verizon states that 25 Mbps can download HD movie (5 GB) in 27.3 minutes. *Id*.

[212] *See supra* para. 30 & note 166.

[213] *See* Udacity.com, *Technology Requirements*, https://www.udacity.com/tech-requirements (last visited Nov. 20, 2014) (recommending 2 Mbps download and .5 Mbps upload for online class); Skype, *How much bandwidth does Skype need?*, https://support.skype.com/en/faq/FA1417/how-much-bandwidth-does-skype-need (last visited Jan. 20, 2015) (1.5 Mbps/1.5 Mbps for HD video call) (*Skype Speed Recommendations*); *see also* Apple, *FaceTime for Mac: About HD video calling*, http://support.apple.com/kb/HT4534?viewlocale=en_US&locale=en_US (last visited Jan. 15, 2015) ("Sending HD video requires a minimum upload bandwidth of 1 Mbps.").

[214] We rely on the SBI Data for this report. In future reports, we expect to rely on the new Form 477 data, which does not collect data by specified speed tiers.

[215] *See* 47 C.F.R. §§ 1.7000-1.7002 (Form 477 Data). The SBI Data and Form 477 Data collect the following same upload/download speed breakpoints: 200 kbps, 768 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, 10 Mbps, 25 Mbps, and 100 Mbps. SBI Data also collects two additional upload/download speed breakpoints: 50 Mbps and 1 Gbps. *See NTIA State Mapping NOFA*, 74 Fed. Reg. at 32559; *Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691, 9700, para. 20 (2008) (*2008 Broadband Data Gathering Order*). However, as noted below, the new FCC Form 477 will not collect broadband subscription or deployment data in predetermined speed tiers. *See infra* para. 69.

[216] Although the Commission is not required to retain a benchmark for multiple years, it has stated an intent to do so, and has thus far been able to achieve that goal. *2010 National Broadband Plan* at 135.

49. We also take seriously Congress's focus on "advanced" capability, and its direction for the Commission to take "immediate action" if such capability is not being deployed in a reasonable and timely fashion. Verizon asserts that the benchmark should "evaluate whether consumers are receiving a baseline level of broadband, not to determine how many consumers can use top-tier broadband service."[217] But the statute requires the Commission to conduct an inquiry into the availability of *advanced* services; it did not direct us to consider what is most commonly available or subscribed to.[218] By requiring the Commission to conduct an inquiry on advanced telecommunications capability, Congress did not intend for the Commission to measure merely what is commonplace and available to all or almost all, but also to identify emerging needs and capabilities. Congress directed that we measure—and take steps necessary to promote—deployment of those advanced offerings. The 25 Mbps/3 Mbps benchmark permits present day households to access current broadband services and encourages the growth of services that are still nascent. While the speed benchmark is consistent with services already being offered and adopted, it properly accommodates advanced capabilities and encourages deployment of new technologies and services. We thus continue the Commission's policy of attempting to strike an appropriate balance that satisfies the purpose of this report: to establish a practical benchmark that is not merely aspirational, but supports a contemporary and forward-looking vision of the high-quality services referenced in the statute.[219] Indeed, section 706(b) is supplemental to section 706(a), in which Congress directed the Commission to take steps to "encourage" broadband deployment. We read Congress's inclusion of a direction to the Commission to accelerate deployment as its indication that it expected and anticipated that deployment might not be proceeding in a reasonable and timely fashion.

50. We also find that an upload speed of 3 Mbps allows consumers to "originate and receive" voice and video broadband services. Few commenters addressed this issue directly, but those that did recommended that the upload speed be increased to accommodate interactive applications. For example, FTTH Council states that 1 Mbps is inadequate for video conferencing.[220] Scott Stewart asserts that 1 Mbps is not sufficient to upload videos.[221] Jeff Hoel and Martijn Kleinendorst each support a 3 Mbps upload benchmark.[222] Based on the record, we find that 3 Mbps is a sufficient upload benchmark to meet household demands today. Most broadband services require relatively low upload speeds, but some services, such as two-way HD real-time video for telemedicine or online courses, for example, as well as advanced cloud services, are affected by upload speed.[223] Although we recognize that, in the future, applications may require higher upload speeds or speeds that are more symmetric with download speeds,

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[217] Verizon Reply at 8.

[218] When Congress intended the Commission to limit its actions to services subscribed to by the majority, it did so expressly. *See* 47 U.S.C. § 254(c)(1)(B) (directing the Joint Board to consider for universal service support services that have "through the operation of market choices by customers, been subscribed to by a substantial majority" of customers).

[219] *2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9565, para. 13.

[220] FTTH Council Comments at 6 ("The growth of two-way and multi-party video conferencing and video chat applications will also affect bandwidth demand, including upstream demand."); *see*, *e.g.*, Thomas Klobucar, PhD, Presentation at FCC Rural Broadband Workshop, Caring for Rural Veterans and the Smart Rural Community 11 (Mar. 19, 2014), http://transition.fcc.gov/presentations/03192014/Thomas-Klobucar.pptx (indicating that the Department of Veterans Affairs implemented a new initiative that offers veterans in rural areas telemedicine services through video conferencing directly to their home requiring at least 1.2 Mbps symmetrical speeds).

[221] *See, e.g.*, Scott Stewart Comments at 1 (calling upload of video to cloud services "a real problem" and stating that no residential carriers offer sufficient uplink to use YouTube or backing up videos the size of a 30 minute iPhone video).

[222] Jeff Hoel Comments 1; Martijn Kleinendorst Comments at 1.

[223] *Skype Speed Recommendations* (recommending 1.5 symmetrical speeds for HD video calling).

nothing in the record or the market convinces us that such need is imminent.[224] We will continue to monitor the trends that may affect demand for faster upload speeds.

51. We disagree with commenters that contend that 25 Mbps is too high, excessive, or purely aspirational.[225] Each household is unique: some households may not require a 25 Mbps/3 Mbps connection, but many do. The market itself belies the claims that the benchmark is unrealistic or unnecessarily high. Service of at least 25 Mbps/3 Mbps or higher is already available to 83 percent of Americans. Service providers have thus determined that these speeds are worth investing in.[226] We reject the argument that service that is already deployed to a substantial majority of Americans is merely aspirational and cannot be achieved for all. And Americans are rapidly adopting service of 25 Mbps/3 Mbps. Approximately 29 percent of consumers take that service when offered, and the rate of adoption has quadrupled (from 7 percent to 29 percent) from 2011 to 2013.[227]

52. Some commenters urge us to retain the 4 Mbps/1 Mbps benchmark[228] or increase the benchmark to 10 Mbps/1 Mbps.[229] AT&T asserts that section 706(b) is not "myopically" focused on the subset of consumers who are the heaviest users.[230] We agree. Section 706(b) is not "myopically" focused on any particular subset of consumers. But it does require the Commission to assess deployment of advanced services that are capable of performing specific functions, and doing so at a high quality. [231] We are convinced that a 25 Mbps/3 Mbps reflects the needs of many households today, and even more in the near future.[232] Verizon argues that 4 Mbps/1 Mbps services are still popular and meaningful to consumers, and that, for the sake of consistency and stability over time, the Commission should not revisit the benchmark.[233] In adopting a 25 Mbps/3 Mbps benchmark we do not disparage the utility of

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[224] *See 2014 Cisco Zettabyte Report* at 16.

[225] *See, e.g.*, AT&T Reply at 1 (stating that an increase to the speed benchmark would not be based on reasonable analysis of how customer's actually use broadband services, fails to comport with the language of section 706 as interpreted by the courts, and ignores the way networks are actually engineered); NCTA Comments at 3-7 (suggesting the FCC should track multiple benchmarks but not increase the baseline 4 Mbps/1 Mbps speed threshold); Verizon Reply at 7-8 (stating that there is no current reason to increase the 4 Mbps/1 Mbps threshold because such speeds are still meaningful to consumers and that where speeds of at least 6 Mbps/1.5 Mbps and higher are available, the adoption rate is only 27.6%); WISPA Reply at 4 (stating that 4 Mbps/1 Mbps is entirely adequate to meet the primary functions of the statute).

[226] Moreover, providers assume that consumers looking to use their broadband service for voice, data, graphics, and video services should have minimum speeds at or approaching 25 Mbps. *See Comcast Xfinity* (25 Mbps minimum speed offered for video streaming); ETC, *Ignite*, http://www.etcnow.com/Internet/ (last visited Jan. 6, 2015) (offering plans with download speeds of a 20, 40, 60, or 100 Mbps).

[227] *See supra* para. 41, Tbl. 3.

[228] *See, e.g.*, WISPA Reply at 4 (arguing that the 4 Mbps/1 Mbps meets the primary functions of the statute).

[229] *See, e.g.*, CWA Comments at 1 (supporting 10 Mbps/1.5 Mbps); NRECA Comments at 3 (supporting at a minimum 10 Mbps/1 Mbps); NATOA Reply Comments at 3 (supporting 10 Mbps down for residential); SIA Comments at 2; Hughes Comments at 2.

[230] AT&T Comments at 2-3.

[231] The ability to download a video in a reasonable amount of time further supports raising the benchmark to 25 Mbps down. *See* U.S. Dept. of Commerce, Economics and Statistics Administration, Competition Among U.S. Broadband Service Providers i (Dec. 2014), http://www.esa.doc.gov/sites/default/files/reports/documents/competitionamongusbroadbandserviceproviders.pdf (2014 *Commerce Broadband Competition*) ("To understand just how slow 3 Mbps is, it takes about 2.25 hours to download a 6 gigabyte movie. The same movie would only take 16 minutes to download at 25 Mbps.").

[232] For example, video job interviews require various bandwidth depending on the number of participants. *See, e.g.*, *Skype Speed Recommendations*.

[233] Verizon Comments at 30.

other Internet access services, nor do we disparage those that rely heavily on broadband services today. Indeed, the examples above reflect that 10 Mbps/1 Mbps will accommodate a variety of broadband services. We find, however, that a 25 Mbps/3 Mbps speed benchmark best achieves the goals Congress set forth in section 706.

53. We find that a benchmark of 25 Mbps/3 Mbps is better suited than a benchmark of 10 Mbps/1 Mbps for evaluating whether a household has access to *advanced* services.[234] When we look at providers' statements about what bandwidth is necessary to use particular services,[235] and when we take into account that most households include more than two people, that household members routinely use multiple broadband services simultaneously, and that even a single person often uses more than one broadband service at the same time, we find that service of at least 25 Mbps/3 Mbps is the best speed by which to assess broadband availability. While 10 Mbps/1 Mbps suffices for many basic household uses, it is insufficient for some of the video broadband offerings on the market today, and it is not adequate for all household broadband needs. Perhaps more importantly, regardless of whether 10 Mbps/1 Mbps suffices for the majority of households today, it does not satisfy the statutory requirement to consider the availability of *advanced* services. Some samples above reflect the differences between 25 Mbps/3 Mbps and 10 Mbps/1 Mbps.

54. We emphasize that the speed benchmark we adopt in this Report is intended to respond to the directives in section 706. Although we find that a 25 Mbps/3 Mbps benchmark is appropriate here, the Commission has adopted different speeds in other contexts. Recently, in the *2014 Connect America Fund Order*, the Commission decided to require recipients of Connect America Funds to deploy 10 Mbps/1 Mbps capable broadband networks.[236] Although section 706 and section 254 are compatible, in that they are both intended to ensure access to high-quality communications to all Americans, their emphases are different. Section 706 is focused exclusively on the availability of *advanced* services. As noted above, the concept of advanced services indicates that the Commission should focus on services that are progressive or ahead in development. Section 254, in contrast, codified the longstanding goal of making sure that service is ubiquitous. Although it includes, as a principle, access to advanced services, it also addresses access to services that are not "advanced."[237] Thus, section 706 focuses the Commission's inquiry solely on advanced services, whereas section 254 is broader: it requires the Commission to work toward making both basic and advanced services available, while providing flexibility in how that objective is achieved. By setting a lower baseline for Connect America funding, we establish a framework to ensure a basic level of service to be available for all Americans, while at the same time working to provide access to advanced services.

55. In the Connect America Fund proceeding, the "objective with high-cost support is to extend broadband-capable infrastructure to as many high-cost locations as efficiently as possible, and at the same time ensure that we are best utilizing the funds that consumers and businesses pay into the universal service system."[238] Speeds of 10 Mbps/1 Mbps are the minimum, and we already have in place initiatives that will support faster service through the Connect America program. First, to inform the

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[234] In 2013, the median weighted download speed for the United States was 18.43 Mbps, considerably above 10 Mbps. *2015 Fourth International Broadband Data*, Appx. F at 3; *see also id*. at n.8 ("Because the data are aggregated at the city level and do not have individual speed test records, we cannot compute a true median. Here, median refers to the median of the aggregated (average) daily city speed tests weighted by sample size.").

[235] *See supra* para. 28.

[236] *Connect America Fund et al*., WC Docket No. 10-90 et al., Report and Order, FCC 14-190, at para.15 (*December 2014 Connect America Fund Order*).

[237] 47 U.S.C. § 254(b)(2) ("Consumers . . . in rural, insular and high cost areas . . . should have access to . . . . services, *including* . . . advanced . . . services, that are reasonably comparable to those services in urban areas") (emphasis added).

[238] *December 2014 Connect America Fund Order* FCC 14-190, at para. 17.

competitive bidding process that will decide which providers receive support in areas where the incumbent phone company declines its support, the Commission has provisionally selected a set of rural experiments that would offer 25 Mbps/5 Mbps, which are now going through the more detailed application process.[239] Second, we have already decided that in that competitive bidding process, the winning bidders will be required to meet an evolving standard over the 10-year term of support, based on the highest speed adopted by a majority of households nationwide.[240] Third, the Commission also sought comment on structuring the bidding process to prioritize first bids that propose service that exceeds 10 Mbps/1 Mbps.[241] Sections 254 and 706 are related but not identical, and we must strive to fulfill Congress's different mandates in both sections. Thus, we balance the goal of spending the finite amount of Connect America funding as efficiently as possible with the goal of accelerating deployment of advanced telecommunications capability to all Americans.

5. "Advanced Telecommunications Capability" for Elementary and Secondary Schools and Classrooms Requires at Least 100 Mbps and, Longer-Term, 1 Gbps

56. Section 706 directs the Commission to inquire about broadband availability to "all Americans (including, in particular, elementary and secondary schools and classrooms)."[242] Access to "advanced telecommunications capability" or broadband has become essential for students in all levels of education. Today, broadband access, combined with cutting-edge educational tools and content, are transforming teaching and learning. Broadband access, for example, provides customized teaching opportunities as teachers can access online interactive content and offer real-time student performance assessments.[243] Students also benefit from broadband as they "rely on technology for academic success and to improve personal productivity."[244]

57. Broadband is also expanding the boundaries of our schools by allowing for interactive and collaborative distance learning applications, providing all students—from rural communities to inner cities—access to high-quality courses and expert instruction, no matter how small a school they attend or how far they live from experts in their field of study. As explained by the State Education Technology Directors Association (SETDA), "[i]t is a simple fact that access to high-speed broadband is now as vital a component of K-12 school infrastructure as electricity, air conditioning, and heating."[245] The broadband needs of our nation's schools are surging.

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[239] *See Wireline Competition Bureau Announces Entities Provisionally Selected for Rural Broadband Experiments; Sets Deadlines for Submission of Additional Information*, WC Docket No. 10-90, Public Notice, DA 14-1772 (Wireline Comp. Bur. rel. Dec. 5, 2014) (*Provisionally Selected Bidders PN*); *Wireline Competition Bureau Announces Availability of Additional Funding for Rural Broadband Experiments; Seeks Comment on Waiver Petitions of Provisionally Selected Bidders*, WC Docket Nos. 10-90, 14-259, Public Notice, DA 14-1889 (Wireline Comp. Bur. rel. Dec. 23, 2014)..

[240] *December 2014 Connect America Order*, FCC 14-190, at para. 29.

[241] *Connect America Fund et al*., WC Docket No. 10-90 et al., Report and Order et al., 29 FCC Rcd 7051, 7125, para. 231 (2014) *(April 2014 Connect America Order and/or FNPRM).*

[242] 47 U.S.C. § 1302(b).

[243] *See, e.g*., Foundation for Excellence in Education, Digital Learning Now! at 11-12 (Dec. 1, 2010), http://www.edweek.org/media/12-1-10_digital_learning_now_report.pdf.

[244] State Educational Technology Directors Association (SETDA), The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs at 1 (2012), http://www.setda.org/wp-content/uploads/2013/09/Broadband_Trifold.pdf.

[245] *Id*.

58. On July 11, 2014, we adopted the *E-rate Modernization Order*, beginning the process of reorienting the E-rate program to focus on high-speed broadband for our nation's schools and libraries.[246] In the *E-rate Modernization Order* we adopted the short-term Internet access connectivity targets for schools recommended by SETDA of at least 100 Mbps per 1,000 students and staff (users).[247] We also adopted a longer term connectivity target of 1 Gbps Internet access per 1,000 users.[248] We recognized that the SETDA target for Internet access connectivity may not be appropriate for every school or school district, especially very large or very small districts or individual schools, but indicated that we will take that into account when measuring success towards the targets.[249]

59. In the *E-rate* Modernization *Order*, the Commission adopted as a bandwidth target the American Library Association's recommendation that all libraries that serve fewer than 50,000 people have broadband speeds of at least 100 Mbps and all libraries that serve 50,000 people or more have broadband speeds of at least 1 Gbps.[250] In the *2014 Broadband Progress Notice of Inquiry*, we asked whether we should adopt a speed benchmark for libraries.[251]

60. As we explained in the *E-rate Modernization Order*, high-speed broadband is also a critical component of 21st Century libraries.[252] By providing public Internet access, libraries give those Americans who do not have broadband access at home the opportunity to participate in the digital world.[253] Public access to broadband in libraries allows members of the community to complete their education, jumpstart employment and entrepreneurship, and it fosters individual empowerment and engagement.[254] Given the important role of Internet access at libraries, it is not surprising that libraries are seeing a rapid increase in bandwidth demand driven by Wi-Fi-enabled devices. Indeed, the percentage of libraries providing free Wi-Fi to the public grew from 37 percent in 2006 to 91 percent in 2012.[255] At the same time, the data collected in the E-rate proceeding indicate that only a small fraction of libraries have access to fiber connectivity to the building.[256] Because of the importance of broadband to our libraries, as well as our schools, in the E-rate proceeding we adopted a number of the proposals to re-focusing the E-rate program on providing the support necessary to ensure that libraries and schools have affordable access to high-speed broadband.[257] At the same time, we committed to collecting better data about the broadband services provided with E-rate support.[258] Given these changes, we expect

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[246] *E-Rate Modernization Order*, 29 FCC Rcd at 8872, para. 1. We do not adopt a benchmark for libraries here, but will continue to explore whether to do so in the next *Inquiry*.

[247] *Id.* at 8885, para. 34.

[248] *Id*.

[249] *Id*.

[250] *Id*. at 8886, para. 37.

[251] *2014 Broadband Progress Notice of Inquiry*, 29 FCC Rcd at 9759, para. 23.

[252] *E-rate Modernization Order*, 29 FCC Rcd at 8873, para. 3.

[253] *Id*.

[254] *Second E-rate Modernization Order* at para. 9.

[255] *E-Rate Modernization Order*, 29 FCC Rcd at 8883, para. 30.

[256] *See* E-Rate Maps of Fiber Connectivity to Schools and Libraries, http://www.fcc.gov/maps/E-rate-fiber-map (last visited Jan. 23, 2015); *see also* Federal Communications Commission, E-rate Modernization Data webpage, http://www.fcc.gov/encyclopedia/e-rate-modernization-data (last visited Jan. 23, 2015) (E-rate Modernization Data webpage) (including a series of updates of the direct access to broadband connectivity datasets based on new data on the record).

[257] *See, e.g.*, *Second E-rate Modernization Order* at paras. 9-60.

[258] *E-Rate Modernization Order*, 29 FCC Rcd at 8889-90, para. 48.

libraries, and schools, to have improved access to high-capacity broadband, and for the Commission and the public to have more detailed information about libraries' and schools' broadband purchases. Because of the critical role libraries play in our communities, we will plan to monitor the deployment of infrastructure to libraries and include such data in future reports.

61. *Elementary and Secondary Schools Speed Benchmark*. We agree with commenters that, in determining whether broadband is being deployed in a reasonable and timely fashion, we should use a separate speed benchmark that is higher than the speed benchmark we use for households. Congress singled out elementary and secondary schools and classrooms for particular attention. Moreover, the broadband needs of schools are likely to be significantly greater than the needs of most households. Elementary and secondary schools are, in effect, enterprise customers. Setting a benchmark that can accommodate simultaneous demands of multiple users in schools is consistent with the rationale and methodology we used to set the 25 Mbps/3 Mbps speed benchmark for households above.[259]

62. As we noted previously, the benchmarks and analyses we use pursuant to section 706 need not be the same as the ones we use pursuant to section 254.[260] The statutory language and underlying purposes of those sections are not identical. In this instance, however, we conclude that the Internet access shorter term benchmark of 100 Mbps per 1,000 students and staff and the long-term speed benchmark of 1 Gbps per 1,000 students and staff – the assessments adopted in the *E-rate Modernization Order* – are reasonable speed benchmarks by which to assess whether "advanced telecommunications capability" is being deployed to elementary and secondary schools. Those benchmarks are capable of delivering the advanced services that Congress articulated in section 706. Moreover, those benchmarks represent the more extensive record in the E-rate proceeding as well as the analysis therein regarding schools' broadband requirements. We determine that we should use both the shorter term and the long-term benchmarks for our analysis of broadband availability to schools and classrooms. This approach is consistent with how the Commission has interpreted section 706 in prior reports, considering both whether service is meeting existing market offerings and consumer demand while also seeking to establish a benchmark that will endure for several years. Thus as we consider whether advanced telecommunications capability is being deployed to schools and classrooms in a reasonable and timely fashion we find it appropriate to assess both immediate and emerging needs.

IV. BROADBAND DEPLOYMENT AND AVAILABILITY

63. This section presents the results from the inquiry into the deployment and availability of broadband to all Americans. We discuss the section 706(b) statutory directive and the data sources on which we rely for our deployment and adoption estimates, and explain the bases for excluding certain data from our finding under section 706(b).[261] We also present our deployment and adoption estimates and discuss international broadband service capability.[262]

A. Our Statutory Inquiry Looks Beyond Physical Deployment

64. We affirm the Commission's prior findings that, for the purpose of our analysis, the terms broadband "deployment" and "availability" are broader than mere physical presence of broadband networks.[263] This interpretation is the most natural reading of section 706(b). Moreover, section 706 requires the Commission to conduct an inquiry into broadband "availability" and determine whether broadband "is being deployed" in a reasonable and timely fashion. The statute does not indicate that a

[259] *See supra* para. 47.

[260] *See supra* para. 54.

[261] 47 U.S.C. § 1302.

[262] *Id*. § 1303(b).

[263] *See 2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10363, para. 27; *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8020-21, paras. 18-20.

determination about whether broadband is being deployed must consider a set of circumstances narrower than the "availability" inquiry. We continue to interpret "all Americans" as establishing the goal of universal broadband availability for every American. As such, our annual determination as to how broadband ''is being deployed'' is simply an assessment of how well we are progressing toward the goal of "availability to all Americans."

65. Some commenters urge that we look only to physical deployment.[264] Others recommend that we continue to interpret these terms more broadly, and consider, for example, price and quality.[265] We conclude that in determining whether broadband is "being deployed to all Americans in a reasonable and timely fashion," we must look at a variety of factors that affect access to broadband. Congress did not define the terms "deployment" and "availability" in section 706(b), nor did it define the term "served" in subsection (c). However, Congress included the term "high-quality" in the definition of advanced telecommunications capability. This supports our finding, now as in past years, that we should not consider physical facilities without also considering service quality. As explained in the last Report, the legislative history further supports the view that Congress intended us to examine more than physical network deployment.[266] Accordingly, as in prior Reports, our inquiry includes an assessment of a variety of factors indicative of broadband availability, such as price, quality, and adoption by consumers, as well as physical network deployment.[267]

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[264] Thus, we reject comments that request other interpretations of section 706(b). *See, e.g.*, Rural Broadband Company Comments at 11 (claiming that our interpretation is "too varied and subject to too many interpretations to make for adequate definitional terms); Verizon Comments at 26 (stating that the Commission should not conflate broadband adoption with broadband availability).

[265] *See, e.g.*, Public Knowledge Comments at 3 ("Consumers will see very little value from broadband access services with speeds that can support applications such as real-time video telephony or streaming video if capacity limits make actually using those services prohibitively expensive."); UNH BCoE Comments at 2 (stating that "the price of broadband in America is among the most expensive in the world as measured by most indicators," and that "millions of Americans lack access to broadband, many due to physical location and others due to pricing or performance").

[266] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10363, para. 27 n.151 ("The legislative history of section 706 further supports the view that Congress expects us to examine more than physical availability. The Senate Report explains that the Commission 'shall include an assessment . . . of the availability, at reasonable cost, of equipment needed to deliver advanced broadband capability.' The Senate Report also states that the goal of section 706 is 'to promote and encourage advanced telecommunications networks, capable of enabling users to originate and receive affordable, high-quality voice, data, image, graphics, and video telecommunications services.' Broadband service that is not, for example, of a quality sufficient to enable high-quality voice, data, image, graphics, and video telecommunications services does not satisfy these goals. This history closely accords with the goals of the BDIA, which recently amended section 706, and emphasizes Congress's interest in the cost, quality and adoption of broadband**.").**

[267] Price is relevant to whether the service is in fact "available." Consumers take into account how much of their income they want to spend on a particular good or service. While we do not know the precise reasons some Americans do not adopt broadband, the recent *2014 NTIA Digital Nation Report* found that the second most cited reason was because broadband was too expensive. *2014 NTIA Digital Nation Report* at 26, Fib. 16. The pricing structure of broadband market today is complicated and could include "multiple characteristics (i.e., download and upload bandwidth, usage allowance) that may affect its price." *Connect America Fund*, WC Docket No. 10-90, Report and Order, 29 FCC Rcd 13485, 13487, para. 7 (Wireline Comp. Bur. rel. Oct. 29, 2014); GAO, Broadband Internet: FCC Should Track the Application of Fixed Internet Usage-Based Pricing and Help Improve Consumer Education at GAO Highlights (Nov. 2014), http://www.gao.gov/assets/670/667164.pdf (finding that, under usage-based pricing (UBP), providers can charge varying prices, change connection speeds, or take other actions based on Internet data consumed); *id* ("[a]ccording to the literature, providers facing limited competition could use UBP to increase profits, potentially resulting in negative effects, including increased prices, reductions in content accessed, and increased threats to network security. Several researchers and stakeholders GAO interviewed said that UBP could reduce innovation for applications and content if consumers ration their data."); *see also, e.g.,* NTTA

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66. We also abide by the same statutory construction of section 706(b) as the Commission did in the last Report.[268] We find that "is being deployed" refers to "existing deployment and current actions that will meaningfully affect broadband deployment in the near future . . . [but not] general plans or goals to deploy broadband, particularly long-range plans or goals that are uncertain to be realized."[269] The phrase "reasonable and timely fashion" also lends itself to various interpretations. While there is no single objective standard, we interpret the language in light of Congress' directive to encourage and promote the universal availability of advanced telecommunications capability as a national priority.[270] In addition, progress in the United States should compare favorably to progress in other countries as demonstrated by the international comparison of broadband capabilities that Congress added to the inquiry in 2008.[271] As the Commission has stated previously, "broadband deployment is more likely to be reasonable and timely if communities in the United States compare favorably to comparable foreign communities on broadband service capability metrics, and less likely to be reasonable and timely if U.S. communities compare unfavorably."[272]

B. Technology and Data Sources

1. Fixed Services

67. *Fixed Broadband Deployment (SBI Data)*. Since July 2009, NTIA and the states, in coordination with the Commission, have been collecting data concerning the locations of broadband facilities across the nation.[273] The SBI Data provide information for each census block about each broadband provider's advertised ability to deliver broadband services of a particular technology type (e.g., fixed, mobile, satellite) by various download/upload speed tiers.[274] The SBI Data identify the maximum speed a provider asserts that it can deliver, if requested, within a typical service interval (7 to 10 business days).[275]

68. We rely on SBI Data as of December 31, 2013 to provide our fixed deployment estimates for the section 706(b) finding. We also present fixed deployment estimates based on SBI Data as of December 31, 2012 and December 31, 2011. Although we find the fixed SBI Data sufficiently reliable to serve as the basis of our finding, they are imperfect. In particular, the SBI Data are part of a voluntary data collection. We are beginning to collect deployment data through the FCC's Form 477, a mandatory collection in which the data must be certified and provided in a specific, uniform manner that will improve the reliability of the data.[276]

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Comments at 8 ("In order for legitimate levels of broadband services to be available and adopted by residents of rural Tribal lands, the price of such services will have to be addressed.").

[268] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10400-01, para. 135 n.347.

[269] *Id*.

[270] *See, e.g.*, 47 U.S.C. § 1302(a) ("shall encourage"); 47 U.S.C. § 157 ("It shall be the policy of the United States to encourage the provision of new technologies and services to the public.").

[271] *Id*. § 1303(b).

[272] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10400-01, para. 135 n.347.

[273] *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557.

[274] *Id*. The SBI Data are categorized into nine tiers of advertised download speeds and eleven tiers of advertised upload speeds. *Id*. at 32559.

[275] *Id.* at 32557.

[276] The Commission has, in the meantime, implemented a "challenge process" in the context of the Connect America Fund. *See, e.g.*, *Connect America Fund*, WC Docket No. 10-90, Report and Order, 28 FCC Rcd 7766, 7766-67, 7777-79, paras. 2, 28-33 (2013); *Connect America Fund*, WC Docket No. 10-90, Report and Order, 28 FCC Rcd 7211, 7211, 7216-21, paras. 2, 12-22 (Wireline Comp. Bur. 2013); *id.* at 7776, para. 28; *id*. at 7775, para. 23; *see*
(continued…)

69. The SBI Data collect broadband deployment information at both residential and business locations. We have observed that some of the served areas are served only by providers who identify themselves as offering service only to business customers. We offer an analysis of the impact of excluding business-only providers from our estimates below.[277] Finally, we note that the SBI Data collect information about certain predetermined fixed speed tiers.[278] Thus, we cannot at this time analyze deployment at every upload and download speed combination, but present fixed estimates at 3 Mbps/768 kbps, 10 Mbps/768 kbps, 25 Mbps/3 Mbps, and 50 Mbps download. We have historically relied on proxies, for example, using data about 3 Mbps download speed to estimate 4 Mbps download speed. This limitation will also be corrected once we can rely on the Form 477 deployment data, which are not collected in predetermined speed tiers.[279]

70. *Fixed Broadband Adoption (Form 477 and SBI Data)*. As part of our inquiry, we also examine and present data on broadband adoption rates. Broadband adoption informs us in multiple ways, including both what consumers choose to purchase when they have options at multiple speed levels and prices, and also whether service in a particular area is truly available in the sense of being offered on terms and conditions that allow consumers the capability to access high-quality voice, data, graphics and video service. The Commission collects broadband providers' residential subscribership data through FCC Form 477, which contains information on the number of broadband subscribers in each census tract by technology, and by specific download/upload speeds.[280] We calculate fixed broadband adoption rates using both Form 477 Data and SBI Data, by dividing the Form 477 residential fixed broadband subscriptions at the census tract level (subscription data) by the total number of households with access to broadband services at the relevant upload/download speed combination, also at the census tract level (deployment data). To estimate fixed broadband adoption, we also rely on SBI Data as of December 31, 2013 in combination with Form 477 as of December 31, 2013, unless otherwise stated.

71. *Fixed Technologies as of December 31, 2013.* Our broadband deployment and adoption estimates present estimates for fixed terrestrial technologies. The fixed terrestrial broadband technologies

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also Replies Sought in Connect America Phase II Challenge Process, WC Docket Nos. 10-90, 14-93, Public Notice, 29 FCC Rcd 11497, 11498 (Wireline Comp. Bur. rel. Sept. 26, 2014), https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1397A1_Rcd.pdf. Under that process, parties are allowed to provide information to supplement the SBI Data to ensure that the Commission is not funding areas already served by other broadband providers. We sought comment on whether, and how, we should incorporate the results of the challenge process in our analysis of the SBI Data. *2014 Broadband Progress Notice of Inquiry* at 9763-64, para. 33 n.78. No commenters suggested that we incorporate any findings concerning the SBI Data in the Connect America Fund challenge proceedings, and it appears that any modifications would be *de minimis* to our analysis of fixed broadband deployment. We therefore decline to modify the SBI Data to reflect results of the challenge process underway.

[277] *See infra* para. 79.

[278] SBI Data collect the following speed tiers: (1) 200 kbps; (2) 768 kbps; (3) 1.5 Mbps (4) 3.0 Mbps; (5) 6.0 Mbps; (6) 10.0 Mbps; (7) 25.0 Mbps; (8) 50 Mbps; (9) 100 Mbps; and (10) 1 Gbps. *NTIA State Mapping NOFA*, 74 Fed. Reg. at 32557.

[279] *Modernizing Form 477 Order*, 28 FCC Rcd at 9888, para. 3. Providers are required to provide advertised speeds—the maximum advertised speed in each census block for fixed broadband and the minimum advertised speed in each coverage area for mobile. *Id*. at 9888, para. 3. We explained that this will provide greater flexibility to group and analyze broadband speed data in useful ways. *Id*.

[280] *See generally* 47 C.F.R. §§ 1.7000-1.7002 (Form 477 Data). The SBI Data and Form 477 Data collect the following same upload/download speed breakpoints: 200 kbps, 768 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, 10 Mbps, 25 Mbps, and 100 Mbps. SBI Data also collects two additional upload/download speed breakpoints: 50 Mbps and 1 Gbps. *See NTIA State Mapping NOFA*, 74 Fed. Reg. at 32559; *2008 Broadband Data Gathering Order*, 23 FCC Rcd at 9700-01, para. 20.

include FTTH, digital subscriber line (xDSL), all copper-based technologies other than xDSL, cable modem, fixed wireless, and electric power line.[281]

2. Mobile Services

72. Mobile services continue to grow, and we include an expanded discussion of these services to help ensure a comprehensive picture of what services are available to Americans.[282] This year's Report examines the same two sources of mobile broadband deployment data as it did in the last Report, the SBI Data as of December 2013[283] and data provided by Mosaik Solutions (Mosaik Data) as of January 2014.[284] The SBI Data include mobile coverage area boundaries by maximum advertised download/upload speeds, and Mosaik Data include coverage area boundaries by mobile network technology. As we have in prior Reports, we use these sources to estimate the extent of deployment of mobile broadband services. However, because there is very little, if any, mobile service that meets the 25 Mbps/3 Mbps speed, we analyze instead mobile service offered at the fastest tier for which there is a significant amount of data – service at or above 10 Mbps/768 kbps. We find that this will be a more useful assessment of changes in mobile offerings than an assessment of 25 Mbps/3 Mbps, for which we have limited data. Moreover, once the Commission has data about mobile service that are sufficiently reliable, the Commission might determine that it should assess mobile availability using a speed benchmark that differs from the speed benchmark for fixed services.

73. Using the SBI Data, we calculate the population living in census blocks covered by mobile networks with speeds at or above 10 Mbps/768 kbps.[285] Using the Mosaik Data, we calculate the population living in census blocks covered by certain mobile network technologies: WiMAX, HSPA+, or LTE.[286] These technologies may be capable of delivering 10 Mbps/768 kbps speeds under certain network conditions.[287]

74. While we present these data because they are the best available, we continue to have concerns that our mobile deployment estimates based on speed and technology may overstate actual

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[281] *See* Appx. C (Data Sources and Definitions) for a complete listing of included technologies.

[282] *See infra* paras. 107-119.

[283] SBI Data may overestimate network deployment. Additionally, network deployment does not necessarily mean that service is being offered to any or all residents in the census block. A provider reporting mobile broadband deployment in a particular census block may not provide coverage everywhere in the census block.

[284] Mosaik was formerly known as "American Roamer." *See* Mosaik Solutions, http://www.mosaik.com/ (last visited Jan. 20, 2015). The Commission receives SBI Data twice a year and Mosaik Data quarterly, and the January 2014 Mosaik Data collection is the closest in time to the December 2013 SBI Data collection. Mosaik network coverage also does not necessarily mean that service is being offered to residents in the census block. In addition, we emphasize that to provide reporting mobile broadband coverage in a particular census block may not provide coverage everywhere in the census block. In addition, calculations based on Mosaik Data on coverage, while useful for measuring developments in mobile wireless coverage, have certain limitations that likely overstate the extent of mobile wireless and mobile broadband coverage. *See Seventeenth Mobile Wireless Report* at para. 45.

[285] *See infra* para. 113, Tbl. 15.

[286] *Id.*

[287] Verizon, *4G LTE Speeds vs. Your Home Network*, http://www.verizonwireless.com/insiders-guide/network-and-plans/4g-lte-speeds-compared-to-home-network/ (last visited Jan. 16, 2015) (*Verizon 4G LTE Speeds vs. Home Network*); Debi Lewis, *XLTE: America's Best Network Gets Even Better*, Verizon (Nov. 20, 2014), http://www.verizonwireless.com/news/article/2014/05/verizon-wireless-xlte.html (*Verizon XLTE News*) ; *see also* Computerworld, Verizon's XLTE Promises Faster Peak Speeds' with Double the Bandwidth (May 20 2014), http://www.computerworld.com/article/2489558/wireless-carriers/verizon-s-xlte-promises--faster-peak-speeds--with-double-the-bandwidth.html (*Computerworld XLTE Speeds*).

deployment.[288] The SBI Data and Mosaik Data on mobile deployment, while useful for measuring developments in mobile broadband deployment, have certain limitations that likely overstate the extent of deployment of 4G and LTE mobile broadband services and deployment of 10 Mbps/768 kbps speeds or higher. Several commenters agree that these data sources are imprecise or unreliable.[289]

75. The Commission is taking steps to resolve inadequacies in the mobile data. On June 27, 2013, the Commission adopted the *Modernizing Form 477 Order*.[290] Pursuant to that order, the Commission has begun to collect broadband deployment data about fixed terrestrial, mobile, and satellite services. Service providers are required to submit deployment data in a uniform format nationwide[291] and must submit data about each speed they offer and the technology deployed.[292] In addition, mobile providers must identify the *minimum* advertised speed offered, in each coverage area, by technology (e.g., WiMAX, LTE) and spectrum band.[293] This will enable the Commission to assess the speeds that consumers should expect to experience.[294] Therefore, while we find that the mobile data available today are not sufficiently reliable to include when we determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely manner,[295] we have put in place a method for collecting more reliable speed data in the future, and we expect to be able to rely on those data in the next Report once the data become available and tested for accuracy.[296] However, as indicated above, collecting reliable data on other characteristics, including, but not limited to, latencies, usage limits, and affordability will be a priority in the next Inquiry and we will continue to explore how best to collect information on these issues further.[297]

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[288] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10366-68, paras. 36-40; *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8023-24, para. 26.

[289] *See e.g.,* California PUC at 6 ("CPUC has found that its methodology yields more realistic results than the methodologies that the FCC and Ookla currently use."). Some commentators argued that mobile broadband is distinguishable from fixed broadband in significant ways, including latency, usage allowances, and pricing tiers. *See, e.g*., California PUC Comments at 6; CCA Comments at 15-16; TIA Comments at 8 (stating the Commission should adopt a more nuanced approach to assessing broadband deployment that accounts for differing technologies, needs, and usage.).

[290] *See generally Modernizing Form 477 Order*.

[291] *Id*. at 9900-01, para. 28. SBI Data submissions were voluntary and not required to be certified, and filing formats could vary among jurisdictions.

[292] *Id.* at 9888, paras. 3-4. SBI Data collects information by speed tier.

[293] *Id*. at 9888, para. 3. Mosaik Data collects information by technology type. The Form 477 collection will combine the speed and technology information, which will improve our ability to identify and resolve anomalies in the data, such as claims that an older mobile technology reliably delivers speeds of 4 Mbps downstream.

[294] The Commission has expressed concerns that the SBI Data may tend to overstate speeds and ignore variances related to non-upgraded backhaul, spectrum limitations or other considerations that might reduce speeds. *See, e.g.*, *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10367-68, para. 40. Further, the Commission has also expressed concerns that the Mosaik coverage data by technology does not include a speed dimension and therefore combining the Mosaik Data with SBI Data (which does not differentiate between technologies) may not reflect speed that consumers experience across geography and service provider.

[295] *American Public Communications Council v. FCC*, 215 F.3d 51, 56 (D.C. Cir. 2000) (upholding a Commission decision declining to include a cost recovery for bad debt expenses on the ground that the data were too unreliable).

[296] The Form 477 Data collection was due in December 2014 for data as of June 2014. *Form 477 Filing Interface Reopened; Filings of Data as of June 30, 2014 Due December 11, 2014*, WC Docket No. 11-10, Public Notice, DA 14-1668 (Wireline Comp. Bur. rel. Nov. 10, 2014); *Modernizing Form 477 Order*, 28 FCC Rcd at 9898-99, para. 25.

[297] *See supra* paras. 10-11.

3. Satellite Services

76. At present, we have insufficient data by which to analyze satellite service. The December 2013 SBI Data for satellite show significant inconsistencies, so we cannot rely on the data for a reasonable estimate of satellite deployment. For example, while one state shows satellite coverage over the entire state, the neighboring state shows no coverage.[298] Such a coverage pattern is inconsistent with satellite network deployments considering that satellite beams are not typically designed to terminate at the boundaries of individual states. We expect that new Form 477 deployment data collection will enable us to better understand satellite deployment data in the next Report.[299]

4. Elementary and Secondary Schools and Classrooms

77. We also rely on the data developed in the *E-rate Modernization Order* proceeding to evaluate whether broadband that meets the 100 Mbps per 1,000 users Internet access benchmark in the short-term and the 1 Gbps per 1,000 users benchmark in the longer-term is being deployed to schools in a reasonable and timely fashion. In that proceeding, in August and November 2014, the Wireline Competition Bureau (Bureau) released two staff reports that, among other things, summarize much of the available data on fiber connectivity and availability to schools.[300] The Bureau collected from states, service providers, program applicants, and federal agencies a large amount of data on school fiber connectivity.[301] Commission staff combined these datasets with SBI community anchor institution connectivity data, using school and library codes from the Department of Education's National Center for Education Statistics (NCES) as the unique identifier for each school.[302] Below, we use that data to report the deployment estimates of fixed broadband services at public elementary and secondary schools. We recognize that there may be technologies other than fiber that provide broadband services that meet the speed benchmark, but we must rely on the data regarding fiber because it is the best data available regarding deployment to schools. We lack data on other technologies that serve schools with at least 1 Gbps per 1,000 users. We also present the Commission's School Fiber Connectivity Map, which show at a granular level the connectivity available at schools throughout the country.[303]

C. Fixed Broadband Deployment and Availability

78. This section presents fixed broadband information for the nation, for both rural and urban Americans, for Tribal lands, and for U.S. Territories.[304] First, we present estimates of fixed broadband

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[298] NTIA similarly does not present satellite estimates for purposes of the National Broadband Map. *See National Broadband Map Frequently Asked Questions*, http://www.broadbandmap.gov/faq#ms11 (last visited Jan. 22, 2015) (stating "NTIA is still working to incorporate satellite providers into the map. To see more information about satellite providers, please see the Broadband Classroom").

[299] *See Modernizing Form 477 Order*, 28 FCC Rcd at 9900-01, para. 28.

[300] *Wireline Competition Bureau & Office of Strategic Planning and Policy Staff Report*, WC Docket No. 13-184, Staff Report, 29 FCC Rcd 9646, 9655 (Wireline Comp. Bur. 2014), https://apps.fcc.gov/edocs_public/attachmatch/DA-14-1177A2_Rcd.pdf (*August 2014 E-Rate Staff Report*) (stating that the data provides "direct, 'actual' data on the connectivity status of about half of all U.S. public schools"); *Wireline Competition Bureau & Office of Strategic Planning and Policy Staff Report*, WC Docket No. 13-184, Staff Report (Wireline Comp. Bur. rel. Nov. 17, 2014), http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db1117/DOC-330505A1.pdf (*November 2014 E-Rate Staff Report*).

[301] *Id*. While some schools may not have as many as 1,000 or more users and therefore the long term target for those schools may be less than 1 Gbps and could be served by something other than fiber.

[302] *August 2014 E-Rate Staff Report* at 9655, para. 18.

[303] *See infra* paras. 128-129.

[304] The deployment estimates are based on SBI Data, as of December 31, 2013, unless otherwise noted. Rural areas are identified using the 2010 Census block identification. Our assessment of Tribal lands is conducted by examining

(continued…)

physical deployment. Next we examine fixed broadband adoption, including trends in consumer behavior. Then, we present other information in our record regarding availability of fixed broadband, including information concerning why some consumers choose not to adopt broadband even when they have physical access. We also provide the demographic analysis required by section 706(c), including analysis by population, average population density, and average per capita income, and additional demographic information.[305]

1. Physical Deployment

a. Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband Service

79. As of December 31, 2013, approximately 55 million Americans lack access to fixed 25 Mbps/3 Mbps or higher broadband service.[306] That represents 17 percent, or one out of six Americans. The significant number of Americans that lack access to broadband at the speed we find to best represent advanced service convince us that broadband is not available to all Americans. But equally important, the data reflect a gaping disparity between urban populations and rural and Tribal populations. The disparity is not limited to higher speeds, but persists at lower speeds as well.[307]

- *Rural/Urban Disparity*. More than 53 percent of Americans living in rural areas lack access to fixed 25 Mbps/3 Mbps broadband service as compared to 8 percent of Americans living in urban areas.[308]
- *Tribal and U.S. Territories Deployment Gap*. Approximately 63 percent of Americans living on Tribal lands and in the U.S. Territories lack access to fixed 25 Mbps/3 Mbps broadband service as compared to 17 percent of the U.S. population as a whole.
- *Excluding Business-Only Providers*. The SBI Data include broadband deployment estimates to both residential and business. Some providers, for some states, indicate that they provide service only to businesses. We present data below that include these providers. In the next Report, we anticipate being able to more precisely segregate these providers and thus report on residences more accurately because the new Form 477 requires providers to indicate whether they market only to businesses.[309]

(Continued from previous page)
the census blocks identified by the Census Bureau in the 2010 Census as federally recognized Tribal lands. Tribal lands are identified using the American Indian Area Alaska Native Area Hawaiian Home Land Class Code (AIANHHCC) affiliation. *See* Appx. C (Data Sources and Definitions); Appx. D (Americans in Urban and Rural Areas Without Access to Fixed 25 Mbps/3 Mbps Broadband by State & U.S. Territory; Appx. F (Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband by State); Appx. G (Americans Without Access to Fixed 3 Mbps/768 kbps or 10 Mbps/768 kbps Services by State & U.S. Territory).

[305] 47 U.S.C. § 1302(c). *See* Appx. E (Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband Services by County).

[306] *See* Appx. D (Americans in Urban and Rural Areas Without Access to Fixed 25 Mbps/3 Mbps Broadband by State & U.S. Territory) and Appx. E (Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband Services by County).

[307] *See infra* paras. 84-86, Tbls. 7-9.

[308] We will continue to monitor the deployment of higher broadband speeds. For example, SBI Data suggest that only 136.6 million Americans (43%) have access to fixed 50 Mbps download broadband service or higher.

[309] If we exclude these business-only providers from the SBI Data, the percentage of Americans without access to fixed 25 Mbps/3 Mbps broadband service increases from 55 million to 60 million, or from 17% to 19%.

Table 4: Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband

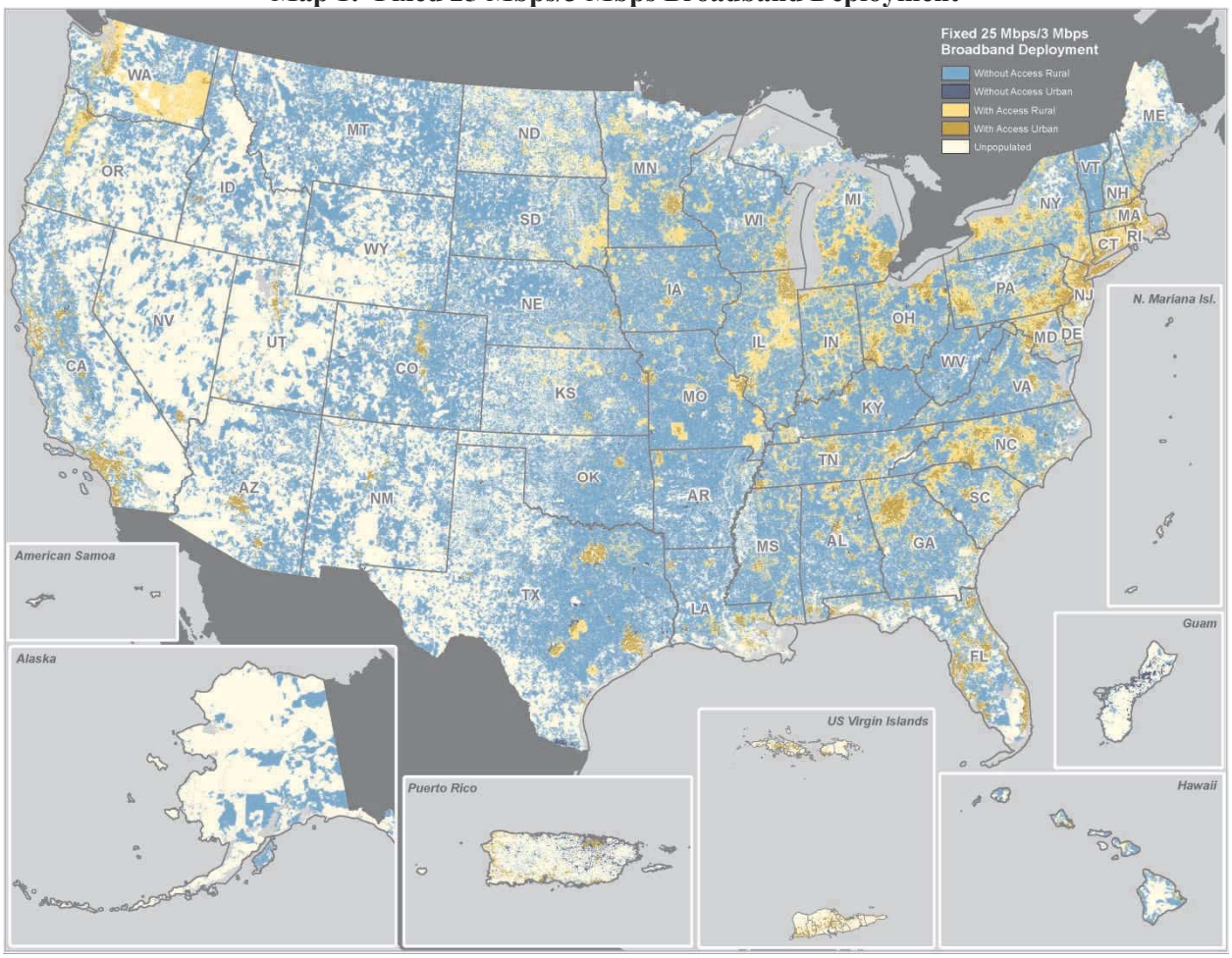
Area	Population Without Access	Percent of Population
United States	54,560,019	17%
Rural Areas	32,628,319	53%
Urban Areas	21,931,700	8%
Tribal Lands	2,468,534	63%
Rural Areas	1,674,188	85%
Urban Areas	794,346	41%
U.S. Territories	2,571,849	63%
Rural Areas	880,144	79%
Urban Areas	1,691,706	57%

b. National Map of Fixed 25 Mbps/3 Mbps Broadband Service

80. In conjunction with this Report, we provide an interactive online map that shows the census block areas of the United States with and without access to fixed 25 Mbps/3 Mbps broadband service.[310] The map also identifies rural and urban areas. The map allows visitors to view the demographic analysis required in section 706(c) (i.e., population, population density, and per capita income) in "mouse over" pop-up windows for each county. Below is a printed version of this map.

[310] FCC, *Online Fixed 25 Mbps/3 Mbps Broadband Deployment Map*, http://www.fcc.gov/maps/2015-broadband-progress-report-fixed-broadband-deployment-map. The map also outlines Tribal lands. The SBI Data used for the online map are the same data relied upon in the Report except the online map is based on population and housing units and the Report estimates are based on population and households. *See* Appx. C (Data Sources and Definitions).

Map 1: Fixed 25 Mbps/3 Mbps Broadband Deployment



c. Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband Service

81. Table 5 presents the number of Americans residing on Tribal lands that lack access to fixed 25 Mbps/3 Mbps broadband service. Our assessment of Tribal lands is conducted by examining the census blocks identified for the 2010 Census as federally recognized Tribal lands.[311]

[311] *See* Appx. C (Data Definitions and Sources) and Appx. F (Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband by State). Of all the Tribal lands, the smallest population is in the Hawaiian Home Lands and "[t]he overarching goal of the Hawaiian Homes Commission Act is to establish Hawaiian Home Lands and to provide homesteading opportunities for Native Hawaiians, and to advance related economic development purposes." *See* Hawaiian Homes Commission Act, ch. 42, 42 Stat. 108 (1921), as amended.

Table 5: Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband

Area	Population Without Access	Percent of Population
Tribal Lands	2,468,534	63%
Rural Areas	1,674,188	85%
Urban Areas	794,346	41%
Alaskan Village	161,054	63%
Rural Areas	130,277	83%
Urban Areas	30,777	32%
Hawaiian Home Lands	2,823	9%
Rural Areas	2,698	58%
Urban Areas	125	1%
Tribal Lands in the Lower 48 States	714,131	68%
Rural Areas	542,399	79%
Urban Areas	171,733	47%
Tribal Statistical Areas	1,590,525	62%
Rural Areas	998,814	89%
Urban Areas	591,711	41%

d. U.S. Territories Without Access to Fixed 25 Mbps/3 Mbps Broadband Service

82. Table 6 presents the number of Americans residing in each of the U.S. Territories considered in this Report that lack access to fixed 25 Mbps/3 Mbps broadband service.[312]

[312] *See also* Appx. G (Americans Without Access to Fixed 3 Mbps/768 kbps or 10 Mbps/768 kbps Services by State & U.S. Territory); Appx. E (Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband Services by County).

Table 6: U.S. Territories Without Access to Fixed 25 Mbps/3 Mbps Broadband

Area	Population Without Access	Percent of Population
U.S. Territories	2,571,849	63%
Rural Areas	880,144	79%
Urban Areas	1,691,706	57%
American Samoa	54,928	100%
Rural Areas	13,297	100%
Urban Areas	41,631	100%
Northern Mariana Islands	51,363	100%
Rural Areas	17,524	100%
Urban Areas	33,839	100%
Guam	159,878	100%
Rural Areas	52,239	100%
Urban Areas	107,639	100%
Puerto Rico	2,258,897	61%
Rural Areas	752,449	78%
Urban Areas	1,506,448	55%
U.S. Virgin Islands	46,783	45%
Rural Areas	44,635	72%
Urban Areas	2,149	5%

e. Competitive Options for Residential Fixed Services

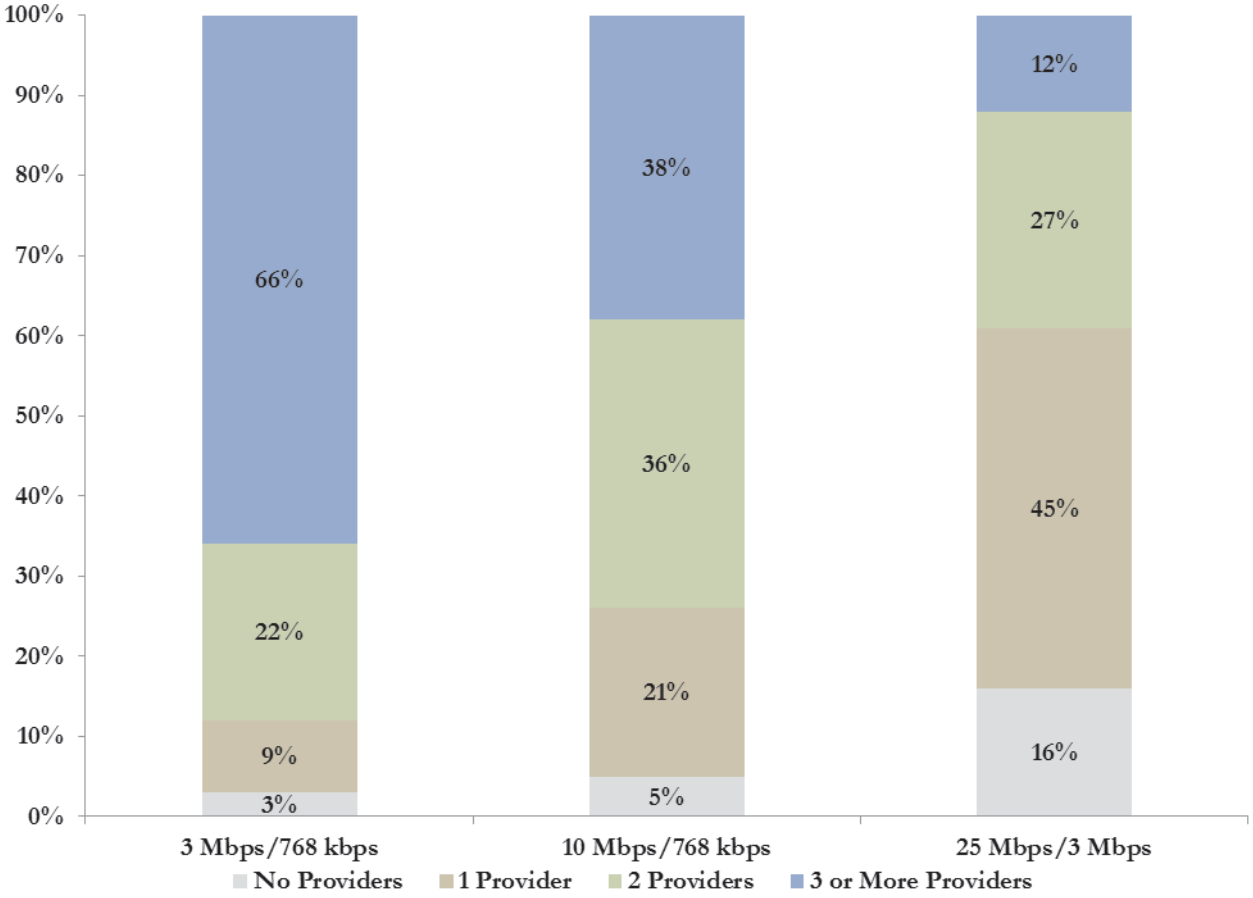
83. Chart 2 shows the percentage of American households with multiple options to purchase fixed 3 Mbps/768 kbps, 10 Mbps/768 kbps, and 25 Mbps/3 Mbps service, as of December 31, 2013.[313]

- The data suggest that only 12 percent of households have 3 or more options for 25 Mbps/3 Mbps broadband service; 27 percent of households have two provider options for this service; and 45 percent of households have only a single provider option for these services. Approximately 16 percent of households are in areas without a single provider of 25 Mbps/3 Mbps fixed broadband services.[314]

[313] The data overstate the options because the current SBI Data do not distinguish between providers of residential services and providers of business-only services. *See supra* para. 69.

[314] The estimates provided here are based on households, which provide slightly different results from the estimates given above regarding population. *See supra* para. 79, Tbl. 4. The estimates in Chart 2 are for households and include fixed wireless providers and providers that may focus on business customers. If we reported figures for housing units (i.e., occupied and unoccupied houses), and if we excluded fixed wireless providers and providers focusing solely on business customers, fewer Americans would have access to multiple providers. For example, only 2% of housing units would have access to 3 or more providers, 23% of housing units would have access to 2 providers, 55% of housing units would have access to one provider and 19% of housing units would be without a single provider of 25 Mbps/3 Mbps fixed broadband services. *See Chairman Wheeler Remarks* at 2.

Chart 2: American Households With Access to Multiple Providers



f. Americans Without Access to Fixed Broadband at 25 Mbps/3 Mbps: December 2011 to December 2013

(i) Trends in the United States, Urban, and Rural Areas

84. Table 7 shows the changes for the U.S. as a whole and in rural and urban areas for fixed 3 Mbps/768 kbps, 10 Mbps/768 kbps, and 25 Mbps/3 Mbps service from December 31, 2011 to December 31, 2013.[315] The data show, generally, some deployment growth, particularly of 25 Mbps/3 Mbps service, but the data also depict a striking disparity between urban and rural areas, at every speed tier reported below.

- From December 2011 to December 2013, Americans without access to a fixed 25 Mbps/3 Mbps broadband service or higher declined approximately 11 percentage points for the United States as a whole, declined 12 percentage points in rural areas, and declined 11 percentage points in urban areas.
- From December 2011 and December 2013, there was no clear improvement in deployment of fixed 3 Mbps/768 kbps service or higher in rural areas. The percentage of Americans without access to fixed 3 Mbps/768 kbps services remained unchanged in urban areas. In rural areas, there was a slight improvement as the number of unserved Americans declined from 21 percent to 20 percent.

[315] *See* Appx. G (Americans Without Access to Fixed 3 Mbps/768 kbps or 10 Mbps/768 kbps Services by State and U.S. Territory).

Table 7: Americans Without Access to Fixed Broadband (2011-2013)

	Year	3 Mbps/768 kbps	10 Mbps/768 kbps	25 Mbps/3 Mbps
United States	2011	5%	9%	28%
	2012	4%	8%	20%
	2013	4%	7%	17%
Rural Areas	2011	21%	35%	65%
	2012	19%	32%	55%
	2013	20%	31%	53%
Urban Areas	2011	1%	3%	19%
	2012	1%	2%	11%
	2013	1%	1%	8%

(ii) Trends on Tribal Lands

85. Table 8 shows the changes in deployment of fixed 3 Mbps/768 kbps, 10 Mbps/768 kbps, and 25 Mbps/3 Mbps service on Tribal lands from December 31, 2011 to December 31, 2013.[316]

- While changes over time may reflect changes in broadband network deployment (including increases in speed), changes in population, and/or improved data, the data suggest that between December 2011 and December 2013, the number of Americans living on Tribal lands without access to fixed 25 Mbps/3 Mbps broadband service or higher has not changed significantly.
- Between December 2011 and December 2013 the percentage of Americans without access to fixed 3 Mbps/768 kbps service or higher declined from 23 percent to 17 percent. However, these services still remain unavailable to many Americans on Tribal lands. Approximately 25 percent of Americans living in Alaskan Villages and 33 percent of Americans living on Tribal Lands in the Lower 48 States are without access to fixed 3 Mbps/768 kbps service or higher.

[316] *See* Appx. C (Data Definitions and Sources) & Appx. F (Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband by State).

Table 8: Tribal Lands Without Access to Fixed Broadband (2011-2013)

	Year	3 Mbps/768 kbps	10 Mbps/768 kbps	25 Mbps/3 Mbps
Tribal Lands	2011	23%	38%	62%
	2012	19%	37%	68%
	2013	17%	33%	63%
Alaskan Villages	2011	36%	40%	100%
	2012	19%	37%	100%
	2013	25%	41%	63%
Hawaiian Home Lands	2011	1%	1%	7%
	2012	1%	1%	8%
	2013	2%	2%	9%
Tribal Lands in the Lower 48 States	2011	45%	60%	75%
	2012	36%	51%	71%
	2013	33%	48%	68%
Tribal Statistical Areas	2011	13%	30%	53%
	2012	13%	31%	65%
	2013	9%	27%	62%

(iii) Trends in the U.S. Territories

86. Table 9 shows the changes in deployment of fixed service at 3 Mbps/768 kbps, 10 Mbps/768 kbps, and 25 Mbps/3 Mbps in the U.S. Territories from December 31, 2011 to December 31, 2013.

- From December 2011 and December 2013, Americans living in the U.S. Territories without access to fixed 25 Mbps/3 Mbps broadband service or higher declined from 100 percent to 63 percent. There was no improvement during this period in the deployment of these services for Americans residing in American Samoa, Northern Mariana Islands, or Guam.
- Overall, there was no improvement in the deployment of fixed 3 Mbps/768 kbps services between 2011 and 2013 in the U.S. Territories and 26 percent of the population continue to lack access to this service. Approximately, 43 percent of Americans residing in the U.S. Virgin Islands and 38 percent of Americans residing the Northern Mariana Islands are without access to fixed 3 Mbps/768 kbps service or higher.

Table 9: U.S. Territories Without Access to Fixed Broadband (2011-2013)

	Year	3 Mbps/768 kbps	10 Mbps/768 kbps	25 Mbps/3 Mbps
U.S. Territories	2011	26%	29%	100%
	2012	27%	37%	100%
	2013	26%	32%	63%
American Samoa	2011	79%	100%	100%
	2012	26%	100%	100%
	2013	26%	100%	100%
Guam	2011	54%	57%	100%
	2012	1%	4%	100%
	2013	1%	4%	100%
Northern Mariana Islands	2011	100%	100%	100%
	2012	38%	38%	100%
	2013	38%	38%	100%
Puerto Rico	2011	20%	23%	100%
	2012	27%	37%	100%
	2013	27%	32%	61%
U.S. Virgin Islands	2011	100%	100%	100%
	2012	42%	75%	100%
	2013	43%	44%	45%

g. Demographic Analysis of the Areas Without Physical Deployment of Fixed Broadband at 25 Mbps/3 Mbps

87. We report average population, average population density (pop./sq. mi) and average per capita income for each area without access to fixed 25 Mbps/3 Mbps broadband service or higher.[317] In addition, we report median household income and the average proportion of households living in poverty. To report demographic information, including income measures, we aggregate the SBI census block data up to the census tract level.[318]

88. Our demographic analysis includes the United States as a whole, Tribal lands, and U.S. Territories.[319] For each of these geographic areas, we also present results within the urban core and outside of the urban core using the 2010 Census classification of a census tract as part of the "urban core."[320] For purposes of this Report, we call these areas urban and non-urban. We conduct this analysis

[317] 47 U.S.C. § 1302(c).

[318] A census tract is categorized as "Without Full Access" if any of the census blocks have been identified as without access to fixed broadband. We compare demographic data between census tracts in which any resident lacks access to fixed broadband to census tracts in which all residents have access to fixed broadband. This approach is conservative because a census tract is classified as "Without Full Access" to fixed broadband even if only a small portion of the population of the census tract is without access to the service.

[319] A census tract is designated as Tribal land if at least 50% of the land area in the census tract is Tribal land. *See* Appx. C (Data Sources and Definitions). While the Census Bureau has created Tribal Census tracts, we do not employ these in this report because our analysis of broadband adoption is based upon form 477 data collected using the Census Bureau's standard census tract boundaries. We do not have sufficient information to segment the Form 477 Data between the Tribal and standard census tracts.

[320] The Census defines an "urban core" as an area smaller than 3 square miles with a population density of at least 1,000 people per square mile. All other census tracts are "outside of the urban core." Department of Commerce, Census Bureau, Urban Area Criteria for the 2010 Census, 76 Fed. Reg. 53030, 53040 (Aug. 24, 2011) (*2011 Census Bureau Notice*).

because census tracts are large and typically include urban centers as well as rural or sparsely population areas. Finally, we conduct hypothesis testing to determine if there is a statistically significant difference in the demographics between areas with and without access to fixed broadband.

- Comparing Americans with and without access to fixed 25 Mbps/3 Mbps broadband service, we find that Americans without access to these services typically live in areas with a higher average population,[321] a lower average population density, lower average per capita income, lower median household income, and a higher percentage of households living in poverty than Americans livings in areas with access to this broadband service.

[321] This analysis is based upon census tracts. We note that, on average, the population is generally larger in census tracts without access compared to census tracts with access because most of the census tracts without access tend to be very large either because they are entirely or in part in non-urban areas. For example, referring to the first two rows of Table 10, we find that an average population of 4,530 for census tracts without access compared to an average population of 4,148 for census tracts with access. The average land area of the census tracts without access is 95 square miles compared to 2.6 square miles for census tracts with access.

Table 10: Comparison of Demographic Data Between Areas With and Without Access to Fixed 25 Mbps/3 Mbps Broadband

Census Tracts	Average Population	Average Population Density (pop./sq. mi.)	Average Per Capita Income ($2013)	Median Household Income ($2013)	Average Percentage of Households Living in Poverty
All Areas					
Without Access	4,530[1]	1,752[1]	$26,445[1]	$54,007[1]	16%[1]
With Access	4,148	8,634	$29,012	$58,499	18%
Urban					
Without Access	4,177[1]	5,022[1]	$27,144[1]	$53,388[1]	19%[1]
With Access	4,046	10,239	$28,434	$56,693	18%
Non-Urban					
Without Access	4,686[1]	351[1]	$26,146[1]	$54,271[1]	15%[1]
With Access	4,859	899	$31,947	$67,742	13%
Tribal Lands					
Without Access	3,835[1]	353[1]	$20,550[1]	$42,806[1]	21%
With Access	3,440	2,600	$28,210	$52,544	16[1]%
Urban[1]					
Without Access	3,315	2,621[1]	$19,154[1]	$36,910[1]	24%[1]
With Access	3,361	3,260	$27,608	$50,323	18%
Non-Urban					
Without Access	3,880	153[1]	$20,673[1]	$43,327[1]	21%[1]
With Access	3,945	684	$30,144	$59,682	12%
U.S. Territories					
Without Access	4,190[1]	3,163[1]	$11,030	$21,229[1]	46%
With Access	1,388	5,476	$11,053	$18,847	48%
Urban					
Without Access	3,419	6,244	$12,882[2]	$23,408[1]	43%[1]
With Access	1,782	6,563	$10,808	$18,771	49%
Non-Urban					
Without Access	4,976	818	$9,586	$19,523	48%
With Access	951	605	$12,638	$19,343	47%

The level of statistical significance is indicated by a superscript: 1 signifies statistical significance at a 95% level of confidence and 2 signifies statistical significance at a 99% level of confidence.

89. Table 11 shows how the average proportion of the population without access to fixed services by speed tier varies with the county-level median household income, county-level population density, the proportion of the population categorized as living in a rural area, and the county-level poverty rate.[322]

[322] The quartile county rankings are presented from the lowest value to highest value for the particular demographic variable being examined. The first quartile represents the lowest median household income, the lowest population density, lowest poverty rate, and the lowest rural population rate. *See also* Appx. E (Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband by County).

- On average, the proportion of the population without access is highest in counties with the lowest median household income, the lowest population density, the highest rural population rate and the highest poverty rate.

Table 11: Percentage of Population Without Access by Speed Tier and by Demographic Variable

Quartile Ranking	3 Mbps/768 kbps	10 Mbps/768 kbps	25 Mbps/3 Mbps
County Median Household Income			
First Quartile	28%	38%	69%
Second Quartile	16%	27%	57%
Third Quartile	12%	21%	46%
Fourth Quartile	9%	16%	33%
County Population Density			
First Quartile	21%	39%	73%
Second Quartile	22%	33%	65%
Third Quartile	15%	23%	46%
Fourth Quartile	6%	9%	22%
County Poverty Rate			
First Quartile	10%	19%	41%
Second Quartile	13%	23%	49%
Third Quartile	15%	25%	50%
Fourth Quartile	25%	35%	65%
County Rural Population Rate			
First Quartile	4%	8%	24%
Second Quartile	12%	20%	47%
Third Quartile	21%	32%	60%
Fourth Quartile	27%	44%	74%

2. Fixed Broadband Adoption

90. This section presents fixed broadband adoption rates for the United States as a whole, non-urban, urban, Tribal lands,[323] and for the U.S Territories.[324] As noted earlier, part of our inquiry, includes an examination of broadband adoption rates. Broadband adoption informs us in multiple ways, including both what consumers choose to purchase when they have options at multiple speed levels and prices, and also whether service in a particular area is truly available in the sense of being offered at an affordable price and with features and functionalities that cause consumers to want to purchase it.[325] We also present demographic analysis and the changes in fixed adoption that occurred from December 31,

[323] Because the Form 477 Data are based upon the standard census tract definition, we caution interpretation of the estimates as being representative for all Tribal lands. Our process for segmenting areas into Tribal lands and non-Tribal lands is the best available analysis for this Report, but will result in the exclusion of some Tribal lands from a Tribal land category and include non-Tribal land in the Tribal land category.

[324] We include adoption for the U.S. Territories in the national figures but we do not separately report figures for the U.S. Territories in this section to maintain confidentiality of the providers. To the extent possible, we report adoption rates for the U.S. Territories in Appendix H. *See infra* Appx. H (Overall Adoption Rates for Fixed Services by State & U.S. Territory).

[325] *See supra* para. 65.

2011 to December 31, 2013.[326] The adoption rate is the ratio of residential connections to fixed broadband with a minimum specified speed (Form 477 Data) divided by the total number of households in the area with access to the advertised broadband services meeting the speed category (SBI Data).[327] As noted above, our analysis considers more than physical network deployment and includes an assessment of broadband adoption because it is indicative of the availability of broadband services.[328]

a. Current Fixed Broadband Adoption Estimates

91. Table 12 shows the overall adoption rates for several fixed speed tiers, as of December 31, 2013.[329] The adoption rates are cumulative. That is, they represent the percentage of Americans adopting at least the identified speed. For example, the approximately 72 percent of Americans that adopt fixed 768 kbps/200 kbps service includes the 29 percent of Americans that adopt fixed 25 Mbps/3 Mbps broadband service or higher.

- The data indicate that Americans residing in non-urban and urban areas adopt fixed broadband services at similar rates when service is available. In particular, at 25 Mbps/3 Mbps, the differential in adoption rates is negligible. This suggests that the lack of deployment of advanced telecommunications capability presents a significant disadvantage for Americans who live in areas without access, relative to Americans with access.
- The adoption rate for 25 Mbps/3 Mbps quadrupled between 2011 and 2013, in both urban and non-urban areas.

Table 12: Overall Adoption Rates by Speed Tier

	768 kbps/200 kbps	3 Mbps/768 kbps	10 Mbps/768 kbps	25 Mbps/3 Mbps
United States	72%	62%	52%	29%
Non-Urban	70%	57%	47%	28%
Urban	74%	65%	56%	30%

b. Fixed Adoption Trends: December 2011 to December 2013

92. Chart 3 shows the fixed adoption rates in urban areas for various speed tiers from December 31, 2011 to December 31, 2013.

- *Changes in Adoption Rates in Urban Areas*.[330] Adoption grew 23 percentage points for fixed 25 Mbps/3 Mbps broadband service or higher (7 percent to 30 percent), 20 percentage points for fixed 3 Mbps/768 kbps service or higher (45 percent to 65 percent) and 6 percentage points for fixed 768 kbps/200 kbps service or higher (68 percent to 74 percent).

[326] Because the mobile subscription data are collected at a highly aggregated statewide level, we have insufficient information to calculate an adoption rate for mobile services.

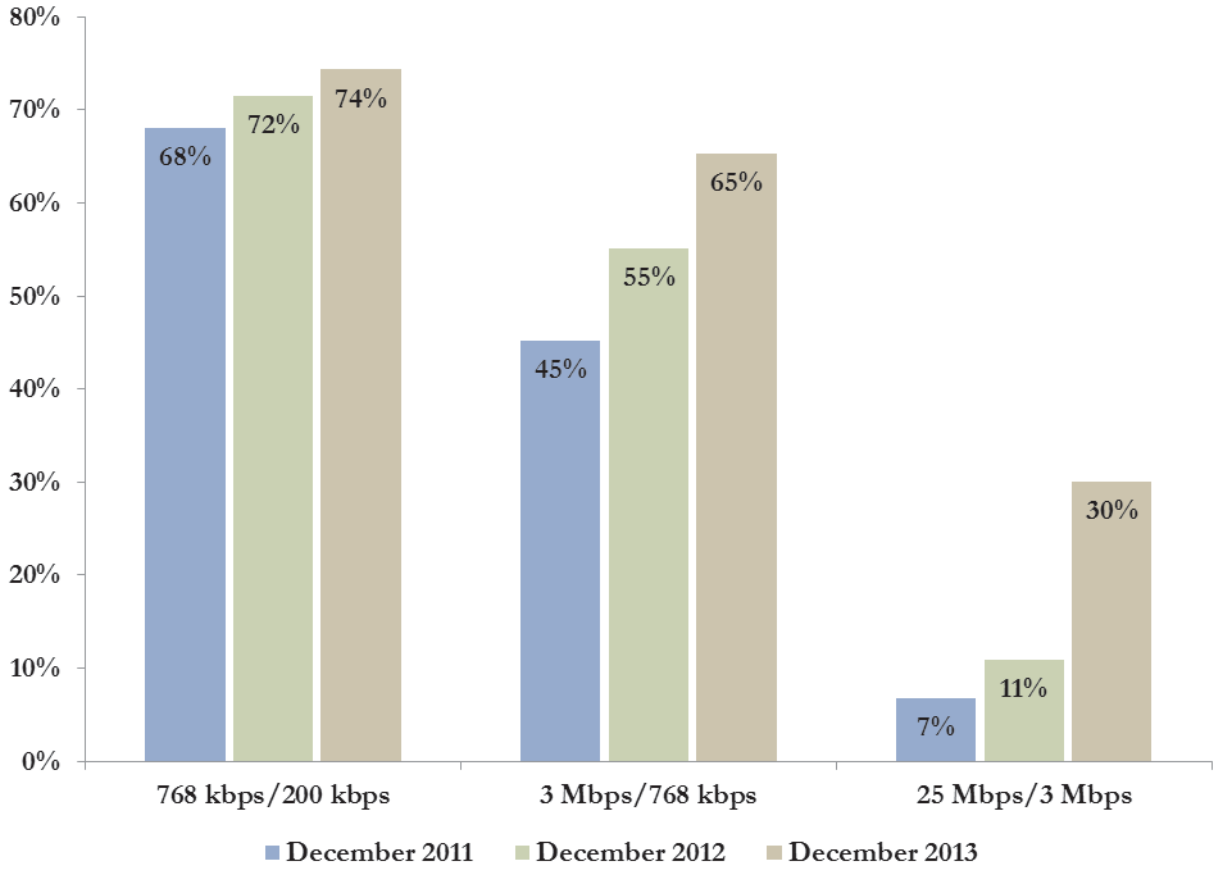
[327] *See* Appx. C (Data Sources and Definitions). Our adoption rate does not account for households that use broadband services at work, their local library, community center, or a retail establishment.

[328] *See supra* paras. 64-66, 70.

[329] *See* Appx. H (Overall Fixed Broadband Adoption Rate by State & U.S. Territory).

[330] These changes are cumulative, so increases in speeds of include higher speeds as well.

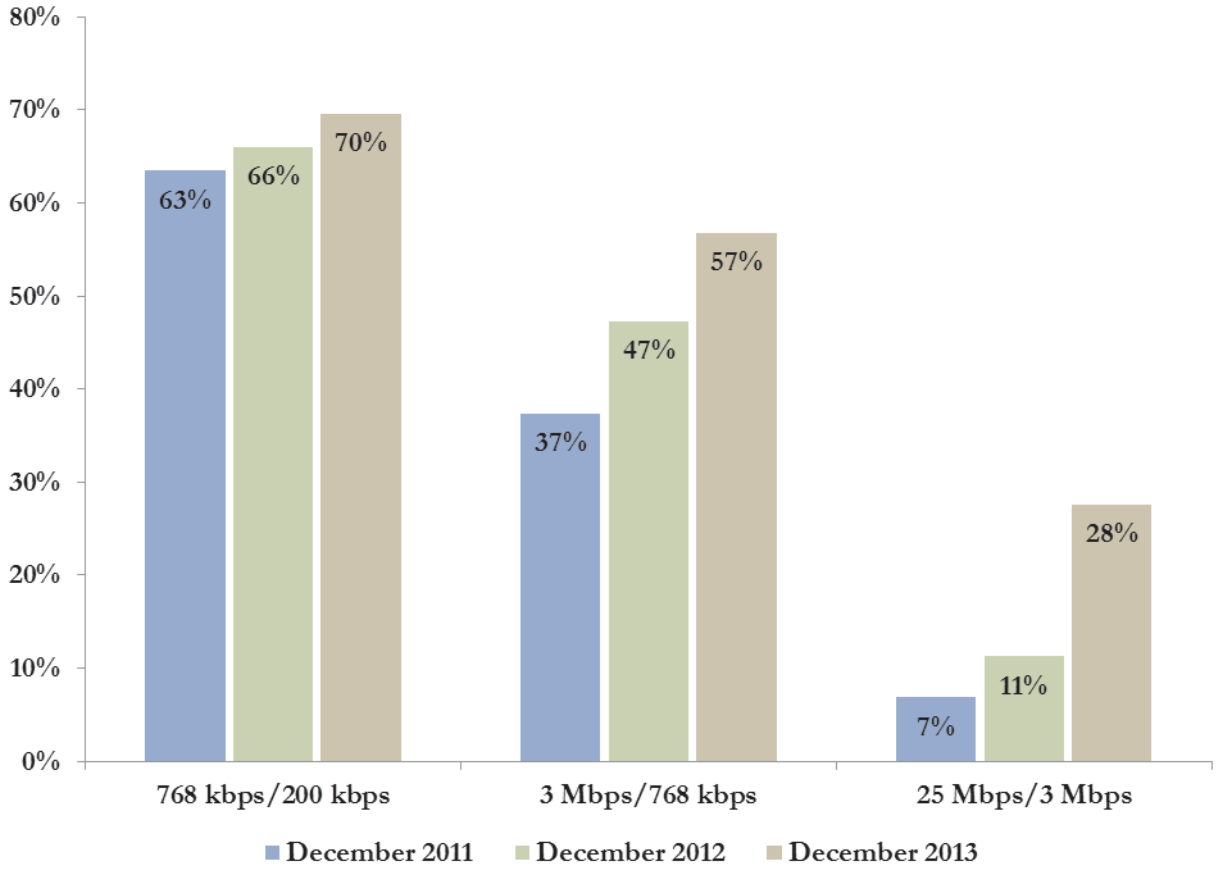
Chart 3: Overall Adoption Rates for Fixed Broadband in Urban Areas (2011-2013)



93. Chart 4 reports the overall adoption rates for various fixed services in non-urban areas from December 31, 2011 to December 31, 2013.

- *Changes in Fixed 25 Mbps/3 Mbps Adoption Rate in Non-Urban Areas*. Overall adoption grew 21 percentage points for fixed 25 Mbps/3 Mbps broadband service or higher (7 percent to 28 percent), 20 percentage points for fixed 3 Mbps/768 kbps service or higher (37 percent to 57 percent) and 7 percentage points for fixed 768 kbps/200 kbps service or higher (63 percent to 70 percent).

Chart 4: Overall Adoption Rates for Fixed Broadband in Non-Urban Areas (2011-2013)



94. Table 13 reports overall adoption rates for all Tribal lands, Tribal Lands in the Lower 48 States, and Tribal Statistical Areas.[331] To maintain confidentiality of subscribership data, we do not separately report figures for Alaskan Village Areas and Hawaiian Home Lands.

- *Fixed 25 Mbps/3 Mbps Adoption Rate*. Overall, 33 percent of Americans residing on Tribal lands adopt fixed 25 Mbps/3 Mbps broadband service. This compares to an adoption rate of 39 percent for Tribal Statistical Areas and an adoption rate of 20 percent for Americans residing on Tribal Lands in the Lower 48 States. These differences in the estimates of the overall adoption rates appear to track differences in the demographics between these areas.[332]
- *Increase in Fixed Adoption Since 2011*. Adoption grew 32 percentage points for fixed 25 Mbps/3 Mbps broadband service or higher (1 percent to 33 percent), 16 percentage points for fixed 3 Mbps/768 kbps service or higher (26 percent to 42 percent) and 4 percentage points for fixed 768 kbps/200 kbps service or higher (53 percent to 57 percent).

[331] We do not present the adoption trends in U.S. Territories to maintain firm confidentiality. *See* Appx. H (Overall Adoption Rates for Fixed Services by State & U.S. Territory)

[332] For example, the average median household income is $46,338 for Tribal Statistical Areas compared to $39,430 for Tribal Lands in the Lower 48 States. The household poverty rate, the proportion of households living at or below the poverty level is respectively 17% and 28%. The proportion of the population self-identifying as either "American Indian Alone or in Combination" is respectively 16% and 53%, and the population density is respectively 1134.7 people per square mile and 389 people per square mile. The difference between Tribal Statistical Areas and Tribal Lands in the Lower 48 States for these variables is statistically different at the 99% confidence level.

Table 13: Overall Adoption Rates on Tribal Lands (2011-2013)

	Year	768 kbps/200 kbps	3 Mbps/768 kbps	25 Mbps/3 Mbps
All Tribal Lands	2011	53%	26%	1%
	2012	54%	32%	7%
	2013	57%	42%	33%
Tribal Lands in the Lower 48 States	2011	50%	29%	2%
	2012	52%	35%	9%
	2013	56%	50%	20%
Tribal Statistical Areas	2011	53%	24%	0%
	2012	54%	30%	6%
	2013	56%	39%	39%

c. Demographic Analysis of Adoption Rates for Fixed Services

95. Table 14 reports county level households adoption rates against the quartile ranking for median household income, the population density, the poverty rate, the rural population rate (the proportion of the population that resides in a rural area), and the unemployment rate. Examining the data by quartile and demographic features offers another way to understand differences in adoption rates.[333] For example, the data indicate that, in the counties with the lowest median household income (the first quartile), the average adoption rate for fixed 25 Mbps/3 Mbps broadband service is 12 percent. The average adoption rate for the counties with the highest median household income, the fourth quartile, is 28 percent. These data suggest that the average household adoption rate increases with median household income and population density, but the adoption rate decreases as the poverty rate, rural population rate, and unemployment rate increase.

[333] The quartile county rankings are presented from the lowest value to highest value for the particular demographic variable being examined. The first quartile represents the lowest median household income, the lowest population density, the lowest poverty rate, the lowest rural population rate, and the lowest unemployment rate.

Table 14: Average Adoption Rate by Speed Tier and by County Demographic Variable

Quartile Ranking	3 Mbps/768 kbps	10 Mbps/768 kbps	25 Mbps/3 Mbps
County Median Household Income			
First Quartile	33%	20%	12%
Second Quartile	40%	27%	18%
Third Quartile	46%	31%	20%
Fourth Quartile	57%	45%	28%
County Population Density			
First Quartile	39%	22%	11%
Second Quartile	35%	21%	15%
Third Quartile	44%	32%	21%
Fourth Quartile	57%	48%	28%
County Poverty Rate			
First Quartile	53%	38%	24%
Second Quartile	47%	33%	22%
Third Quartile	42%	31%	20%
Fourth Quartile	34%	22%	14%
County Rural Population Rate			
First Quartile	56%	47%	30%
Second Quartile	44%	32%	22%
Third Quartile	38%	24%	15%
Fourth Quartile	37%	19%	10%
County Unemployment Rate			
First Quartile	45%	30%	21%
Second Quartile	47%	35%	22%
Third Quartile	45%	33%	20%
Fourth Quartile	38%	26%	16%

d. Other Information Regarding Fixed Broadband Adoption

96. Broadband access has become a necessity in our everyday lives. In the past few years, broadband has "brought sweeping changes in the ways Americans communicate, gather information, conduct commerce, and entertain themselves."[334] Today, the benefits of broadband extend from health to education to the environment and "provides consumers with deep and far-reaching opportunities, enhancing overall quality of life in many respects."[335]

97. In light of the potential for broadband service to stimulate economic growth and improve quality of life, we seek to understand barriers to adoption. As we have stated before, deployment and

[334] NTIA, Exploring the Digital Nation: America's Emerging Online Experience at 1 (June 2013), http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf (*2013 NTIA Digital Nation Report).*

[335] United States Telecom Association (USTelecom), *Benefits of Broadband*, http://www.ustelecom.org/issues/broadband/benefits-broadband (last visited Jan. 16, 2015); *see also* USA.gov, *Get it Done Online!*, http://www.usa.gov/Business/Services.shtml (last visited Jan. 16, 2015) (listing the U.S. government services that are available online).

adoption are symbiotic: consumers cannot adopt services until they are deployed, and higher adoption rates will encourage providers to deploy advanced services.[336]

98. *NTIA's Broadband Adoption Analysis.* Some data suggest that price and perceived relevance rank high as the reasons why some segments of the population adopt at lower rates than others.[337] On October 16, 2014, NTIA released the *2014 NTIA Digital Nation Report* that supports our analysis of a broadband adoption gap.[338] The *2014 NTIA Digital Nation Report* updates and builds on the previous study, presenting an analysis of "the demographic characteristics of home Internet users and the technologies they use to go online, as well as the alternative locations where they use the Internet."[339] NTIA found that "a significant portion—28 percent" of survey respondents did not use broadband at home.[340] NTIA indicated that participants commonly cited several reasons for not using broadband: (1) they don't need it, not interested (48 percent); (2) too expensive (29 percent); (3) no computer or computer inadequate; (11 percent); (4) can use it somewhere else (3 percent); (5) not available in area (1 percent); (6) privacy or security concerns (1 percent); and (7) other reasons (7 percent).[341]

99. NTIA also reports that broadband adoption differs by demographic and geographic characteristics.[342] NTIA found that "[l]ow-income households were far behind their wealthier counterparts: Forty-nine percent of households making less than $25,000 used the Internet at home, compared to 96 percent of households making $100,000 or more."[343] While a disparity remains, with adoption still lower among rural households, that gap is declining.[344] NTIA also found that urban households had higher rates of computer usage and broadband usage than their rural counterparts.[345] NTIA also reports that disabled persons were less likely to have Internet at home (52 percent) than their non-disabled counterparts (79 percent).[346] Examining demographics even further, NTIA reports that "while home Internet use increased during the last decade, adoption continued to be lowest among

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[336] *See 2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10403, para. 139 (stating that the Commission has, in the past, found the concepts of deployment and adoption to be "interrelated," and that "low adoption rates" present a barrier to broadband deployment); *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8040, para. 65 (stating that deployment and adoption are "tightly linked").

[337] *See 2014 Commerce Broadband Competition* at 1 (stating that more than one in four households in the U.S. have not adopted broadband technology and that 29% of these households cited cost as the primary reason).

[338] *See 2014 NTIA Digital Nation Report*. The *2014 NTIA Digital Nation Report* is based on data from the Census Bureau's October 2012 Current Population Survey Computer and Internet Use Supplement with information collected from more than 53,000 households. *See id.* at v.

[339] *Id*.

[340] *Id.* at vii. We note that the term "broadband service" as used in the *2014 NTIA Digital Nation Report* may include service that falls below our 25 Mbps/3 Mbps speed benchmark.

[341] *Id.* at 26, Fig. 16.

[342] *Id.* at 15.

[343] *Id*.; *see also* Pew Research Center, Home Broadband 2013 2 (Aug. 26, 2013), http://www.pewinternet.org/files/old-media/Files/Reports/2013/PIP_Broadband%202013_082613.pdf (*Pew Research Center Home Broadband 2013*) (stating that "[t]he demographic factors most correlated with home broadband adoption continue to be educational attainment, age, and household income").

[344] *2014 NTIA Digital Nation Report* at 16; *see also* Pew Research Center Home Broadband 2013 at 3 (noting that 70% of surveyed adults living in urban areas and 73% of surveyed adults living in suburban areas had a home broadband connection, versus 62% of surveyed adults living in rural areas).

[345] *2014 NTIA Digital Nation Report* at 16 (placing computer usage for urban residents at 80% versus 72% for rural residents, and broadband usage for urban residents at 75%, versus 63% for rural residents).

[346] *Id.* at 16.

African American, Hispanic, and American Indian and Alaska Native householders."[347] The findings in the *2014 NTIA Digital Nation Report* suggest some significant gaps in broadband adoption. Given the close relationship between adoption and deployment, we will strive to better understand the causes for these gaps.

3. Other Indicators of Availability of Fixed Broadband to All Americans

100. For purposes of evaluating broadband availability, we examine not only physical deployment and adoption, as presented above, but also quality and price.[348] To understand broadband service quality, we look at the *2014 Fourth Measuring Broadband America Report.*[349] The Measuring Broadband America program is an ongoing, rigorous, nationwide study of residential broadband performance in the United States.[350] The *2014 Fourth Measuring Broadband America Report* provides the latest results from the Commission's nationwide study of fixed broadband performance (DSL, cable, and FTTH).[351] At this point, we are unable to provide any rigorous analysis regarding price because, while we have access to advertised broadband prices and other limited data, we lack reliable data indicating the price consumers actually pay for broadband service.[352]

101. We are also unable to provide any rigorous analysis regarding usage allowances. We believe that usage allowances go primarily to the question of whether advanced telecommunications capability is available; usually, more data can be purchased from the provider, thus making it more appropriate to consider the price of the service and the usage allowance together.[353] However, to the

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[347] *Id.* at 15.

[348] *See supra* paras. 64-66. We provide our deployment and adoption estimates above. *See supra* paras. 78-95.

[349] *See generally 2014 Fourth Measuring Broadband America Report*.

[350] *Id.* at 4.

[351] The Commission collected data regarding mobile service quality but published limited results in the *Seventeeth Mobile Wireless Report*. *See id.* at 55; *Seventeenth Mobile Wireless Report* at paras. 195-97, 206.

[352] We note that the *2014 Rural Broadband Experiments Public Notice* indicates that "[w]hen examining urban rate survey responses for only 25 Mbps/5 Mbps offerings, prices range from $56.96 to $74.95," but "the Bureau has not yet finalized the methodology for determining a reasonable comparability benchmark for broadband services." *2014 Rural Broadband Experiments Public Notice*, 29 FCC Rcd at 11820. We also note that in the *2015 Fourth International Broadband Data Report*, the International Bureau collected advertised broadband prices for both fixed and mobile service rather than prices that consumers actually paid. *See 2015 Fourth International Broadband Data Report* at paras. 29-41 & Appx. C. A number of commenters agree that price continues to affect broadband availability. *See* CWA Comments at 4 (stating that "adoption is constrained by what is available and affordable"); NTTA Comments at 7-8 (stating that in order for legitimate levels of broadband services to be available and adopted by residents of rural Tribal lands, the price of such services will have to be addressed); UNH BCoE Comments at 2 (stating that "[t]he price of broadband in America is among the most expensive in the world as measured by most indicators").

[353] We note that while fixed wireline providers have not historically capped data usage, this trend may be reversing. Several providers of fixed broadband services have already begun to impose caps on usage. *See* AT&T, *U-verse Internet Support*, http://www.att.com/esupport/article.jsp?sid=KB409045&cv=812&_requestid=8628594#fbid=YBFqrTmJgDq (last visited Jan. 6, 2015) (describing an AT&T Internet service plan that imposes monthly data caps and overage fees); CenturyLink, *CenturyLink Excessive Use Policy FAQ*, http://internethelp.centurylink.com/internethelp/pdf/EUP.pdf (last visited Jan. 6, 2015) (describing the data usage caps in CenturyLink high-speed Internet service plans); Comcast, *Questions & Answers About Our Data Usage Plan Trials* (Dec. 5, 2014), http://customer.comcast.com/help-and-support/internet/data-usage-trials/ (discussing a series of trials conducted by Comcast imposing mandatory data caps with overage fees); Cox, *Speeds and Usage Information for High Speed Internet Service by Location*, http://www.cox.com/aboutus/policies/speedsusage.cox (lasted visited Jan. 6, 2015) (describing the usage allowances, pricing and fees for Cox Internet service in various locations); Time Warner Cable, *What is Time Warner Cable Essentials Internet?*, http://www.timewarnercable.com/en/support/faqs/faqs-

(continued…)

extent that usage allowances affect the usability of a service, they could also be relevant to whether a service meets the definition of advanced telecommunications capability. Unfortunately, we lack sufficient data regarding usage allowances for all customers (i.e., not just the allowances of current retail offerings) across the country. However, we will continue to explore how we can improve our data regarding usage allowances, and we expect it to be a topic for examination in future reports.

102. We consider the quality of broadband services that are deployed and made available to consumers as part of our section 706(b) analysis.[354] As explained above, the definition of advanced telecommunications capability provides that the services identified must be "high-quality."[355] A service is not "deployed" or "available" if the services does not allow the consumer to "originate and receive" high-quality services as specified in section 706(d)(1). We must consider the quality of service routinely available, and not what might be available hypothetically or under ideal conditions. For example, inconsistent speed or excessive congestion that prevents consumers from having reliable VoIP calls or the ability to take online courses is service that cannot be said to be "deployed" or "available." These factors are therefore important indicators of whether advanced telecommunications capability is available to all Americans.

103. The *2014 Fourth Measuring Broadband America Report* measures network performance of "over 80% of the residential marketplace."[356] For the first time in that Report, the Commission presented results on "service consistency" and also tracked the maximum download/upload speeds offered by an ISP in a given year."[357]

- *Actual Speeds*. The *2014 Fourth Measuring Broadband America Report* examined residential wireline broadband service and found that "[m]any ISPs now closely meet or exceed the speeds they advertise, but there continues to be room for improvement."[358] All ISPs, except for four providers that use DSL technology (Verizon DSL, CenturyLink, Frontier DSL and Windstream) met 90 percent of performance or better, on average, during peak periods.[359]
    - *Download Speeds*. The *2014 Fourth Measuring Broadband America Report* stated that on average, during peak periods, DSL-based services delivered download speeds that were 91 percent of advertised speeds; cable-based services delivered 102 percent of advertised speeds; and FTTH services delivered 113 percent of advertised speeds.[360] This compared to the *2013 Measuring Broadband America Report* results showing largely the same performance levels: 85 percent for DSL, 99 percent for cable, and 115 percent for fiber.[361]
    - *Upload Speeds*. On average, FTTH delivered 114 percent, cable-based services delivered 111 percent, and DSL-based services delivered 98 percent of advertised

(Continued from previous page)
internet/essentials-internet/plans/what-is-time-warner-cable-esse.html (last visited Jan. 6, 2015) (describing several voluntary data plans that impose monthly caps in exchange for a discount on the regular monthly bill).

[354] 47 U.S.C. § 1302(b); *see also supra* paras. 64-66.

[355] 47 U.S.C. § 1302(d)(1).

[356] *2014 Fourth Measuring Broadband America Report* at 4.

[357] *Id*. at 10.

[358] *Id*. at 11.

[359] *Id*.

[360] *Id.* at 15.

[361] *2013 Third Measuring Broadband America Report* at 9.

upload speeds.[362] In the *2013 Measuring Broadband America Report*, on average, FTTH and cable-based services delivered 108 percent, and DSL-based services delivered 99 percent of advertised upload speeds.[363]

- *Latency*. The *2014 Fourth Measuring Broadband America Report* found that latency for all terrestrial technologies[364] during peak periods averaged 34.9 ms, an increase over the figure of 29.6 ms from the prior Report.[365] The Report also found that latency increased across all terrestrial technologies during peak periods by between 12 percent and 19 percent.[366] In the *2013 Measuring Broadband America Report*, during peak periods, latency increased across all terrestrial technologies by 10 percent.[367] According to the *2014 Fourth Measuring Broadband America Report*, latency was lowest in FTTH services, which provided 24 ms round-trip latency on average, while cable-based services averaged 32 ms, and DSL-based services averaged 49 ms.[368]

- *Consistency of Speeds*. The *2014 Fourth Measuring Broadband America Report* includes a metric designed to convey how likely any given consumer is to experience broadband speeds of a particular level.[369] The *2014 Fourth Measuring Broadband America Report* found that Cablevision, for example, delivered 100 percent or better of advertised speed to 80 percent of the study participants 80 percent of the time during peak periods, and about half the ISPs delivered approximately 90 percent or better of the advertised speed for 80/80 (i.e., even when the average speed is approximately 100 percent of advertised speed, all consumers do not necessarily get that speed at all times).[370] However, about one-third of the ISPs delivered only 60 percent or better of advertised speeds 80 percent of the time to 80 percent of the consumers.

- *Applications (Web Browsing, VoIP, Streaming Video)*. The *2014 Fourth Measuring Broadband America Report* evaluated web browsing, VoIP, and streaming video, and found that "[i]n specific tests designed to mimic basic web browsing—accessing a series of web pages, but not streaming video or using video chat sites or applications—the total time needed to load a page decreased with higher speeds."[371] The Report added that "this

[362] *2014 Fourth Measuring Broadband America Report* at 15.

[363] *2013 Third Measuring Broadband America Report* at 10.

[364] We note that the term "terrestrial technologies," as used here, includes all mobile services, as well as other non-satellite based services. The *2014 Fourth Measuring Broadband America Report* uses the term "terrestrial technologies" to distinguish between the data for fixed versus satellite services.

[365] *2014 Fourth Measuring Broadband America Report* at 16 (defining latency as "the round-trip time from the consumer's home to the closest speed measurement server within the provider's network and back").

[366] *Id*.; *see id*. at 64 n.31 ("This was calculated by taking the percentage change of the unweighted average cable, DSL, and fiber 24 hour test results and the peak results for the same technologies in the statistical averages test results."); *see also id*. at 16 ("This increase in latency is likely at least partly the result of the changes in using test servers discussed earlier. By excluding certain servers whose paths were found to be congested, we would invariably be forcing some traffic over longer paths to alternate servers, increasing latency.").

[367] *2013 Measuring Broadband America Report* at 11.

[368] *2014 Fourth Measuring Broadband America Report* at 16.

[369] *Id*. at 11.

[370] *Id*.

[371] *Id*. at 17.

performance increase diminishes beyond about 10 Mbps, as latency and other factors begin to dominate."[372] VoIP services were adequately supported by all of the service tiers studied, but the Report noted that "VoIP quality may suffer during times when household bandwidth is shared by other services."[373] The Report found that the quality of video streaming depends upon the speed.[374]

104. *Privacy & Security Concerns*. Among other things, the *2014 Broadband Progress Notice of Inquiry* sought additional information on the relevance of consumer concerns regarding privacy and network security to broadband adoption.[375] Although we do not base our determination in this *2015 Broadband Progress Report* on these issues, we note that there are indications that there is a correlation between these concerns and non-adoption of broadband.[376] For example, a 2010 Commission staff paper found 78 percent of those who responded to a 2009 survey were already Internet users and 65 percent were broadband users.[377] Thirty-nine percent of broadband users expressed security concerns, while non-adopters were almost 50 percent more likely than broadband users to raise concerns about security of personal information online.[378] The staff paper also deduced that "[t]his is one factor linked to their lower likelihood of adoption" and there was "significant positive correlation between high levels of worries about personal privacy and non-adoption" of broadband.[379] Additionally, NTIA recently indicated that "although only 1 percent of households expressed privacy concerns in both 2011 and 2012 as their primary reason for not using the Internet at home, well-publicized data breaches and greater consumer awareness of Internet privacy issues may affect this response in future years."[380] We agree with the Federal Trade Commission that "promoting consumer trust in digital technology is of critical importance to consumers and businesses alike."[381]

105. We believe that privacy and network security are among the factors that can affect the quality and reliability of broadband services.[382] Communications security, integrity, and reliability must be maintained as providers transition to IP-supported networks. Due to the inherent global nature of Internet Protocol-based communications and attacks that are delivered via IP-supported networks, legacy communications services that are transitioning to IP-supported networks are now vulnerable to threats that previously would not have had physical access to the legacy communications infrastructure. As communications technologies emerge and change, we must reassess and update methods for ensuring that communications, including telephony and other switched or legacy services, remain as secure and reliable over broadband as they were under legacy technologies. Addressing these challenges requires the continuous, coordinated effort of many stakeholders. We note for example, that the Federal Trade Commission also protects the privacy and security of consumer broadband data through several laws, including the Federal Trade Commission Act, the Fair Credit Reporting Act, and the Children's Online

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[372] *Id*.

[373] *Id*.

[374] *Id*.

[375] *See 2014 Broadband Progress Notice of Inquiry*, 29 FCC Rcd at 9768-69, paras. 45-47.

[376] *See* John B. Horrigan, Broadband Adoption and Use in America 4 (OBI Working Paper Series No. 1 2010), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296442A1.pdf.

[377] *See id*. at 3.

[378] *Id*. at 4.

[379] *Id*.

[380] *See 2014 NTIA Digital Nation Report* at 37.

[381] Federal Trade Commission Comments at 1-2; s*ee also* Tech America Comments at 8.

[382] *See 2014 Broadband Progress Notice of Inquiry*, 29 FCC Rcd at 9768-69, paras. 45-47.

Privacy Protection Act.[383] These laws "prohibit broadband operators from making deceptive claims in their representations to consumers about privacy and data security."[384]

106. As the expert regulatory agency for communications, the Commission has unique, indispensable knowledge and responsibilities in the communications sector. For example, a fundamental responsibility of the Commission is to promote public safety and network security.[385] We will continue in our efforts to promote broadband deployment and availability, and in general, ensure that the transition to new technologies proceeds in a manner that does not diminish the privacy and network security protections that have been embedded in the fabric of the traditional circuit-switched network.[386]

D. Mobile Deployment and Availability Estimates

1. Physical Deployment

107. We provide here some estimates of deployment that include mobile services. For reasons discussed above concerning the mobile data quality issues and other concerns, we are unable to incorporate mobile in our section 706(b) finding.[387] In the next Report, however, we anticipate having more reliable mobile deployment data.

108. We report the deployment estimates for mobile based on Mosaik Data as of January 14, 2014, or based on SBI Data, as of December 31, 2013.[388] For SBI Data, we present the estimate for the number of Americans without access to mobile 10 Mbps/768 kbps service. For Mosaik Data, we present estimates of the number of Americans living in census blocks without network coverage, based upon the Centroid Method for WiMAX, HSPA+, and LTE technologies.[389]

109. During 2013, mobile providers continued to upgrade and expand their networks with advanced technologies that allow for faster mobile broadband connection speeds.[390] As of January 2014, over 98 percent of the total U.S. population lived in census blocks that were covered by at least two facilities-based mobile wireless broadband providers, and 93 percent of the population lived in census blocks covered by at least three providers.[391] However, we note that mobile broadband network coverage

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[383] Federal Trade Commission Comments at 2.

[384] *Id*.

[385] *See* 47 C.F.R. § 151 (stating that the FCC is created for several purposes, including those of "national defense" and of "promoting safety of life and property through the use of wire and radio communications").

[386] *See Technology Transitions Order*, 29 FCC Rcd at 1446, para. 37.

[387] We are also unable to assess satellite deployment. *See supra* para. 76.

[388] *See infra* para. 113, Tbl. 15.

[389] Mosaik network coverage does not necessarily mean that service is being offered to any or all residents in the census block. In addition, a provider reporting mobile broadband coverage in a particular census block may not provide coverage everywhere in the census block. In addition, calculations based on Mosaik Data on coverage, while useful for measuring developments in mobile wireless coverage, have certain limitations that likely overstate the extent of mobile wireless and mobile broadband coverage. *See Seventeenth Mobile Wireless Report* at para. 45.

[390] For purposes of this Report, our estimates of mobile deployment include 4G network technologies: WiMAX, HSPA+, and LTE. *See supra* para. 73. The Commission may include other combinations of mobile network technologies when referring to "mobile broadband" in other contexts or proceedings.

[391] Staff estimates are based on January 2014 Mosaik Data. We note that mobile broadband network coverage does not necessarily mean that service is offered to any or all to residents in the census block. In addition, we emphasize that to provide reporting mobile broadband coverage in a particular census block may not provide coverage everywhere in the census block. In addition, calculations based on Mosaik Data on coverage, while useful for measuring developments in mobile wireless coverage, have certain limitations that likely overstate the extent of mobile wireless and mobile broadband coverage. *See Seventeenth Mobile Wireless Report* at para. 50 and Chart II.A.2.

does not necessarily mean that service is offered to any or all residents in the census block. SBI Data as of December 2013 indicate the mobile Internet access at 10 Mbps/768 kbps is broadly deployed.[392] LTE, in particular, has been growing in importance over the past few years, as it can provide faster speeds and improved user experience. LTE networks are capable of delivering download speeds between 5 and 12 Mbps and upload speeds between 2 and 5 Mbps.[393] As of January 2014, 98 percent of the population lived in census blocks covered by an LTE network, compared to 67 percent of the population in January 2012.[394] As of December 31, 2013, while mobile 10 Mbps/768 kbps service was ubiquitous in urban areas, 11 percent of Americans living in rural areas lived in census blocks without mobile broadband network coverage.

110. There is also evidence in the record of "a new, and growing, digital divide for mobile broadband – between urban, rural and Tribal demographics."[395] A study of data collected by CalSPEED concludes that the bulk of California's mobile networks are not ready to support VoIP and that mobile broadband service for rural and Tribal areas in California is "materially less robust" in terms of "coverage, throughput, reliability, streaming media capability and wireless technology" than in urban areas.[396]

111. The Mosaik Data as of January 2014 indicate widespread deployment of WiMAX, HSPA+, and LTE technologies.[397] However, similar to the SBI Data, the Mosaik Data present challenges to the type of analysis needed to inform the conclusion contained in this Report. The Mosaik Data indicate deployment by network technology, but do not indicate whether the network technology provides 10 Mbps/768 kbps. Even technologies such as WiMAX, HSPA+, and LTE deployments, which have the potential to meet the 10 Mbps/768 kbps speed tier, may not meet the threshold depending on the version of the technology deployed, the configuration of the network, the amount of spectrum used, and the type of backhaul connection to the cell site and traffic on the network. This is particularly true of certain HSPA+ deployments.[398] Similarly, LTE may not achieve the threshold speeds in a specific location if copper instead of fiber optic cable is used as the backhaul connection to the cell site. Therefore, while the Mosaik Data are a valuable resource generally for determining which mobile technologies have been

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[392] The SBI Data are interpreted at the census block level and are not consistent with certain other data submitted in the record. *See* CPUC Comment at 4 (stating that CPUC's analysis of its testing results estimate that 51.4% of Californians has access to mobile speeds at 10 Mbps/1 Mbps or higher and 51.3% at 10 Mbps/4 Mbps or higher).

[393] *Verizon 4G LTE Speeds vs. Home Network*; *Verizon XLTE News*; *Computerworld XLTE Speeds*.

[394] *See infra* para. 113, Tbl. 15 (reporting percentage of Americans without access to mobile services). The analysis of mobile wireless network coverage in this section is based on U.S. census blocks overlaid on provider coverage maps provided to the Commission through a contract with Mosaik Solutions. Population data are from the 2010 Census, and the square miles include the United States and Puerto Rico. The estimates also include federal lands. *See also Seventeenth Mobile Wireless Report* at para. 59, Tbl. III.A.2; *but see* CPUC Comment at 4 (stating that CPUC's analysis of its testing results estimate that 51.4% of Californians has access to mobile at 10 Mbps/1 Mbps or higher and 51.3% at 10 Mbps/4 Mbps or higher).

[395] CPUC Comments, Appx. A at 24.

[396] *Id*.

[397] *See infra* para. 113, Tbl. 15. The Mosaik Data uses the Centroid Method to calculate coverage of various mobile technologies. The Centroid Method overlays the geographic polygons showing wireless coverage onto a map of census blocks. The Centroid Method codes a census block as covered if the calculated center point (the "centroid") of the census block is within the coverage polygon. If a centroid is covered, then all of the population and land area in the corresponding census block is coded as covered as well. We also note that in some cases the calculated center point may lay outside of the boundaries of a census block. In these cases, the centroid will be identified as the point inside the census block nearest to the calculated center point.

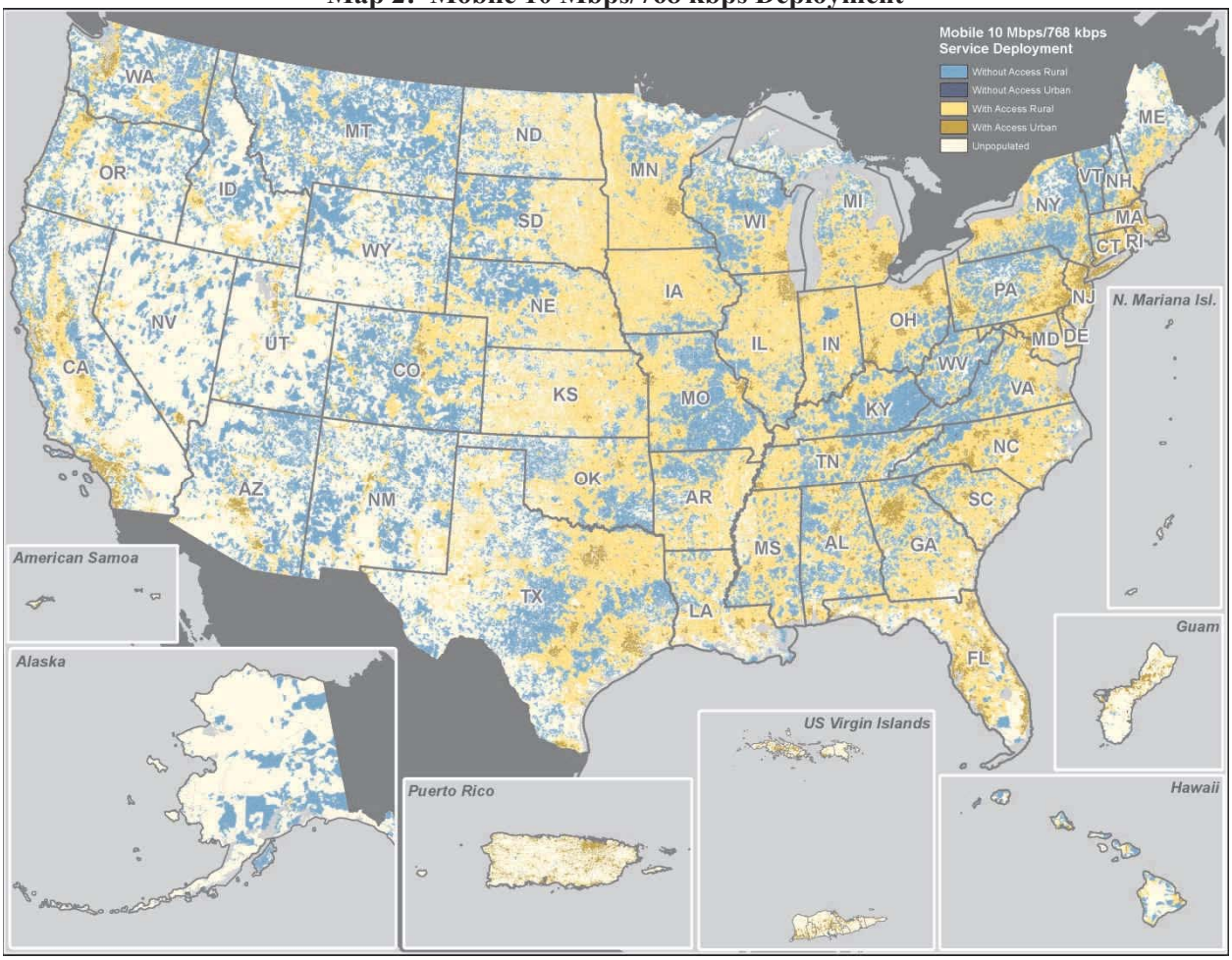
[398] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10367, para. 40.

deployed and where, the data are not designed to assess whether the technology in a particular area will satisfy a speed threshold.

a. National Map of Mobile 10 Mbps/768 kbps Service

112. We have created an online map that shows, based on SBI Data, the census block areas of the United States with and without mobile network coverage of 10 Mbps/768 kbps service or higher.[399] We also attach a printed version of this map below.

Map 2: Mobile 10 Mbps/768 kbps Deployment



b. Americans Without Access to Mobile Services: December 2011 to December 2013

113. Below we summarize our mobile deployment estimates.

- Differences in the deployment estimates between the speed-based SBI Data and the technology-based LTE Mosaik Data declined for urban areas between December 2011 and December 2013. By December 2013 there was no difference.

[399] FCC, *Online Mobile 10 Mbps/768 kbps Deployment Map*, http://www.fcc.gov/maps/2015-broadband-progress-report-mobile-broadband-deployment-map. The SBI Data used for the online map are the same data relied upon in the Report except the online map is based on population and housing units and the Report estimates are based on population and households. *See* Appx. C (Data Sources and Definitions). As noted above, the data may overstate deployment of services because service may not be available throughout the entire census block. *See supra* paras. 72-75.

- By contrast, there remain differences in the deployment estimates between the speed-based SBI Data and the technology-based LTE Mosaik Data for rural areas.
- The data suggest that deployment of LTE networks in rural areas lagged behind deployment in urban areas prior to 2013. Since 2011, the percentage of the population living in census blocks without LTE network coverage declined from 22 percent to 0 percent in urban areas and from 76 percent to 7 percent in rural areas.

Table 15: Americans Without Access to Mobile Services (2011-2013)[400]

	Year	SBI Data	Mosaik Data	
		10 Mbps/768 kbps	WIMAX, HSPA+, & LTE	LTE
All Areas	2011	27%	17%	33%
Rural Areas	2011	72%	53%	76%
Urban Areas	2011	17%	8%	22%
All Areas	2012	11%	4%	10%
Rural Areas	2012	40%	17%	34%
Urban Areas	2012	5%	1%	4%
All Areas	2013	3%	1%	2%
Rural Areas	2013	11%	4%	7%
Urban Areas	2013	1%	0%	0%

2. Availability of Mobile Broadband to All Americans

114. Coincident with this extensive investment in these networks, mobile wireless services have gone from a luxury to a convenience to an absolutely central part of Americans' daily lives. Increasing numbers of users now have multiple devices connected to mobile networks. The capabilities of handsets, tablets, and other connected devices continue to grow. Handsets are no longer used just for voice communication, email, social networking, and web browsing, but increasingly as hubs for entertainment, mobile commerce, and to connect other personal devices such as smart watches and fitness monitors. These innovations have made mobile wireless one of the most important sectors in the national economy.[401] Global mobile data traffic, including mobile video traffic, account for a growing proportion of data traffic. Cisco states that global mobile data traffic grew 81 percent in 2013 and mobile video traffic was 53 percent of traffic by the end of 2013.[402] CTIA estimates the total number of mobile wireless connections grew by three percent from 326.5 million at the end of 2012, to 335.7 million at the end of 2013, an addition of more than 10 million connections.[403]

115. When considering mobile broadband, we note there are tradeoffs between speed and mobility. As we have explained in the past, mobile broadband differs from fixed broadband in terms of speed, latency, price and usage allowances, consistency of service throughout an area, and the potential for congestion.[404] Even if we found that the deployment data were reliable, other characteristics of

[400] The estimates for SBI Data are as of December of the stated year (2011, 2012 and 2013) and the estimates for LTE service are based on Mosaik Data as of January of the stated year (2012, 2013, and 2014).

[401] We recognize that some connected devices, such as fitness monitors and some tablets, are Wi-Fi-only devices that are not devices used with mobile services.

[402] *Cisco Feb. 2014 VNI Report* at 1.

[403] *Seventeenth Mobile Wireless Report* at para. 20. While CTIA states that "the terms subscriber, subscriptions, and connections are being used interchangeably in their report and survey," their data actually reflects the number of devices or "connections." *Id*. at 20 n.38. An individual, or a subscription, is likely to have multiple simultaneously active "connections" or devices.

[404] We acknowledge these differences without prejudging their significance in the context of mobile services. *See, e.g.*, CTIA Comments at 4 (stating that the Commission should refrain from identifying specific "benchmarks" –

(continued…)

mobile services, such as latency and usage allowance limits, among other things, would need to be evaluated to determine whether the services "enable users to originate and receive high-quality voice, data, graphics, and video telecommunications."[405] Currently we do not have sufficient information, including reliable data on speeds and technology, about the extent to which these characteristics of mobile service offerings prevent consumers from using mobile services for these purposes:

116. *Speed*. Mobile broadband network speeds tend to be significantly lower than fixed broadband speeds. The SBI Data as of December 2013 indicate widespread deployment of technologies that offer 10 Mbps/768 kbps.[406] However, because this data collection directs filers to determine the speed tiers of their offerings based on the maximum advertised speed, we are concerned that these data may be misleading.[407]

117. *Price, Usage Allowances, and Latency*. Fixed services generally have unlimited, or very high-usage allowances; mobile broadband data plans today typically contain usage allowances starting from 1 GB[408] depending on provider. However, because we received few comments on what latency and data usage allowance thresholds would be appropriate for benchmarking purposes, and in the absence of reliable information regarding the latencies for mobile services or usage allowance policies, we are not in a position to consider possible thresholds for latency and data usage allowances for mobile services.

118. *Consistency and Reliability*. Consistency and reliability factors also differ as between mobile and fixed services. For instance, if the reported maximum advertised speed for a particular location is at or above 10 Mbps/768 kbps, the SBI Data indicate that mobile broadband has been deployed in this location regardless of whether the maximum advertised speeds are available regularly or on rare occasion.[409] Many factors, such as terrain, congestion, weather, structural boundaries, and tower placements can affect the consumer experience, and the fact that a provider advertises a maximum speed in an area does not establish that such speeds are regularly or ubiquitously available.[410] In addition, the

(Continued from previous page)
speed, latency, usage, and other characteristics – and instead should report on the services that consumers actually are buying in the marketplace).

[405] 47 U.S.C. § 1302(d)(1).

[406] The SBI Data uses the Percent Area Method to calculate broadband deployment. The Percent Area Method overlays the geographic polygons showing wireless coverage onto a map of census blocks. Then, the percentage of land area of each census block that lies within each coverage polygon is calculated. The Percent Area Method codes each census block as follows: if greater than or equal to 99.4% of the census block is within the wireless coverage polygon, 100% of the population in that block is estimated to have wireless coverage; if between 0.4% and 99.4% of the block is within the coverage polygon, 50% of the population in that block is estimated to have wireless coverage; and if less than or equal to 0.4% of the block is within the coverage polygon, 0% of the population in that block is estimated to have coverage.

[407] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10367, para. 37 ("With respect to the SBI Data on mobile deployment, we have concerns that providers are reporting services as meeting the broadband speed benchmark when they likely do not."); *see also 2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8023-24, para. 26 ("We do not draw conclusions based on SBDD Data about mobile wireless services due to our concern that these data do not accurately reflect where mobile wireless subscribers actually are able to obtain service that meets the broadband performance threshold.").

[408] For some providers unlimited data plans may imply high speed data up to a certain usage allowance, and then a speed reduction, mostly to 2G, after that threshold.

[409] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10366-67, para. 37.

[410] While consumers of fixed broadband also may not always experience the maximum advertised speed, as explained below, the *2014 Fourth Measuring Broadband America Report* examined residential wireline broadband service with data collected in September 2013 and found that wireline providers "on average delivered 97 percent of advertised download speeds during peak usage hours." *See supra* para. 103; *2014 Fourth Measuring Broadband America Report* at 14.

SBI Data do not distinguish coverage by network technology and therefore do not indicate which locations have coverage by which technologies.[411] For example, there is no indication of how widespread LTE coverage is in the SBI Data.

119. Despite such tradeoffs, mobile devices may make Internet access services accessible to different segments of Americans who would otherwise not have access to such broadband service.[412] Also, as we note above, we will want to consider the significance of other factors, such as latency and usage allowance limits, in the offering of mobile services in determining whether users can "originate and receive high-quality voice, data, graphics, and video telecommunications."[413] We will continue to explore these issues in the next *Inquiry*.[414]

E. Americans Without Access to Fixed 25 Mbps/3 Mbps and Mobile 10 Mbps/768 kbps Service

120. As consumers depend more and more on smartphones and other portable devices,[415] and many Americans rely on both a fixed service and a mobile service for broadband access,[416] the day may be fast approaching when we would consider, "advanced telecommunications capability" to be fully deployed only in areas where consumers have access to both mobile and fixed high-speed broadband in light of the distinct characteristics of these services.[417] We recognize that many households subscribe to both fixed and mobile services because they use fixed and mobile services in fundamentally different ways and, as such, view fixed and mobile services as distinct product offerings. If we were to include mobile services in future findings, we would have to assess carefully how to take both of these distinct offerings into account in evaluating the statutory criteria.[418] In light of our determination that the currently available mobile data are not reliable, we need not decide that issue in this Report.[419]

121. As explained above, we anticipate examining whether to adopt a separate, complementary mobile benchmark in a future report.[420] Below, Chart 5 presents the SBI Data estimates

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[411] *See 2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10367, para. 38.

[412] *See* TIA Comments at 3; CCA Comments at 5-6 (stating that wireless plans with data lower cost of Internet access for many users).

[413] 47 U.S.C. § 1302(d)(1).

[414] *See supra* paras. 10-11.

[415] *Asymco: Smartphone Penetration Reaches 70% in the US*, GSMArena.com (July 9, 2014), http://www.gsmarena.com/asymco_pricing_doesnt_affect_smartphone_adoption_in_the_us-news-8982.php (reporting that the U.S. market has passed the Early Adopters stage, the Early Majority and is now entering the Late Majority stage).

[416] Pew reports that 58% of American adults have a smartphone and 63% of adult cellphone owners use their phones to go online. Pew Research Internet Project, *Mobile Technology Fact Sheet*, http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/ (last visited Nov. 7, 2014).

[417] In light of the differences between fixed and mobile services, we might analyze each service differently. For instance, we could set a lower speed benchmark for mobile broadband, such as 10 Mbps/1 Mbps, in light of consumers' different needs on mobile devices.

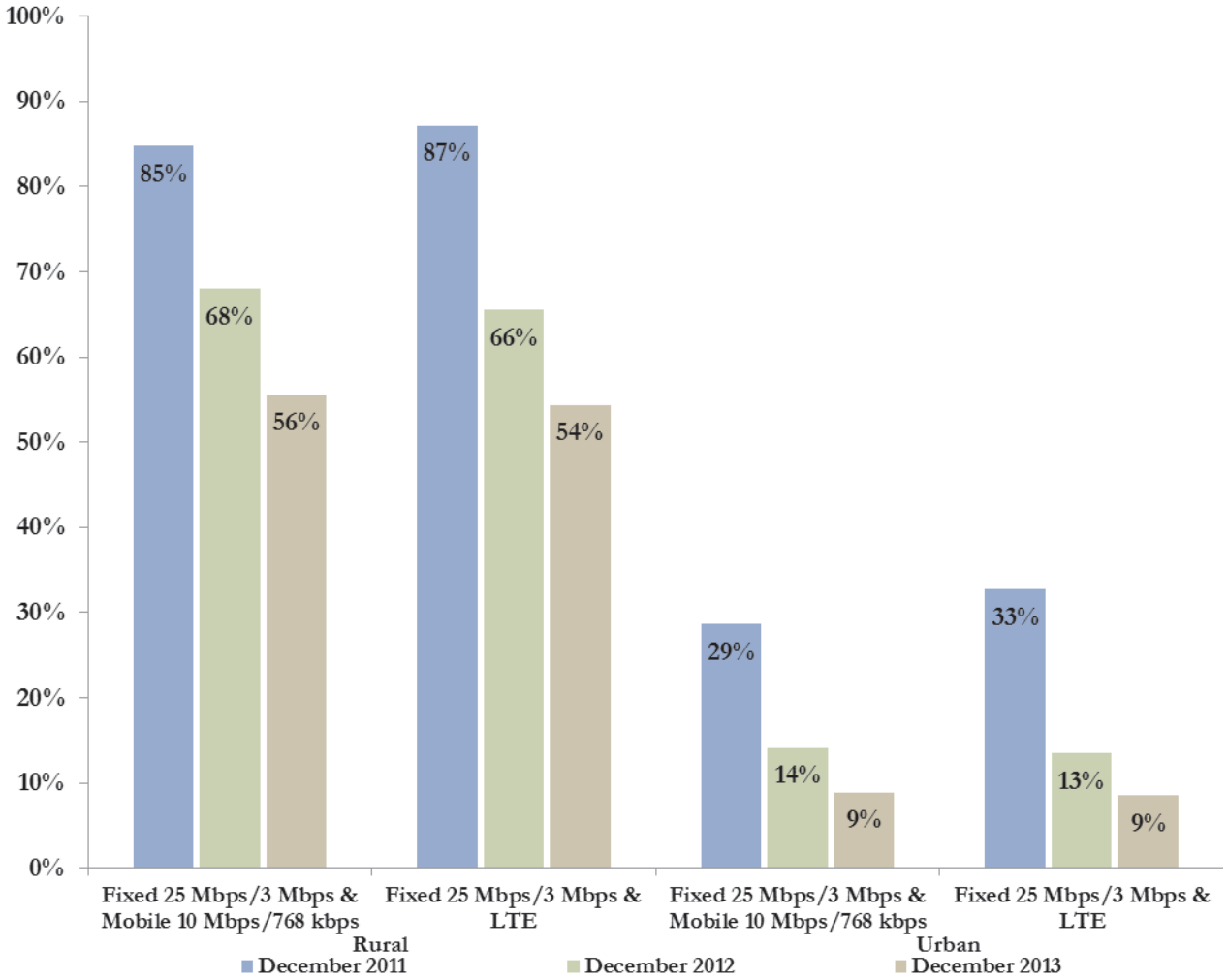
[418] *See, e.g.*, Verizon Comments at 19 (arguing that, now that LTE services are widely deployed, the Commission must include mobile wireless Internet services in analyzing broadband availability); CTIA Comments at 7 (stating that wireless service providers are rapidly deploying and upgrading mobile wireless broadband networks far ahead of any "reasonable and timely" benchmark); CCA Comments at 16 (stating that the Commission must recognize differences among broadband technologies, and that benefits and challenges exist for each separate network technology).

[419] *See supra* paras. 72-75.

[420] *See supra* para. 11.

of Americans without access to *both* fixed 25 Mbps/3 Mbps broadband service and mobile 10 Mbps/768 kbps service. We also present estimates of Americans without access to fixed 25 Mbps/3 Mbps broadband service (based on SBI Data) and LTE mobile service (based on Mosaik Data). While the deployment of *both* fixed 25 Mbps/3 Mbps broadband service and mobile 10 Mbps/768 kbps service has increased significantly since December 2011, approximately 56 percent of Americans in rural areas remain without access to these services as compared to nine percent of Americans in urban areas.

Chart 5: Americans Without Access to Fixed 25 Mbps/3 Mbps & Mobile 10 Mbps/768 kbps or LTE[421] Service



F. Satellite Deployment and Availability Estimates

122. In the past few years, satellite broadband providers have invested substantial resources in their networks, and launched a new generation of satellites that is now offering increasingly robust broadband services to Americans.[422] For example, today "satellite services provided by Hughes go as high as 15/2 Mbps and by ViaSat go as high as 12/3 Mbps."[423] In 2016, Hughes plans to launch Jupiter 2

[421] The estimates for SBI Data are as of December of the stated year (2011, 2012 and 2013) and the estimates for LTE service are based on Mosaik Data as of January of the stated year (2012, 2013, and 2014).

[422] *2014 Fourth Measuring Broadband America Report* at 4-5; *see also id*. at 15-16, 18.

[423] SIA Comments at 4. ViaSat indicates that its ViaSat-1 satellite offers 12 Mbps/3 Mbps satellite broadband service to approximately 1 million subscribers. *See* ViaSat, *High-Capacity Satellite System*,

(continued…)

in 2016 and states that the new satellite "will have more than 150 Gbps throughput – 50 percent greater capacity" than Jupiter 1 (EchoStar 17) satellite.[424] Other satellite providers have announced plans for future launches as well. For example, O3b, a global broadband satellite provider that offers middle mile capacity to large service providers from satellites in medium Earth orbit, has offered full commercial service since September 1, 2014.[425] O3b has twelve satellites in orbit.[426] O3b indicates that its service is comparable to terrestrial fiber service because, with its "lower orbital altitude and high power, spot-beam design, O3b reliably provides latency between 120 ms and 150 ms."[427]

123. Satellite broadband service has improved significantly, and many consumers today have high speeds, low prices, and generous data usage allowances. Satellite broadband providers offer a range of speeds with different usage limits at different prices, depending on the type of services, with monthly service price offerings currently as low as $50.[428] For example, ViaSat's high-speed 12 Mbps/3 Mbps offering comes with unlimited email and web page access, and monthly usage allowances that range from 20 GB to 50 GB, and some promotions advertise unlimited usage from 3 a.m. to 8 a.m. or between midnight and 5:00 a.m.[429] Hughes' offerings provide a 55 GB to 70 GB monthly data usage allowances with "anytime" download usage plus "bonus bytes" available between 2 a.m. and 8:00 a.m.[430] In addition, satellite industry operators have reduced overall latency by making improvements to other elements of their architecture.[431]

124. The *2014 Fourth Measuring Broadband America Report* includes comparisons between satellite and wireline technologies, providing results on satellite technology based on test results collected from ViaSat.[432] On average, during peak periods, satellite delivered 138 percent of advertised upload and download speeds.[433]

125. While satellite broadband speeds are continuing to improve significantly, we nonetheless find that we cannot include satellite deployments in our finding under section 706(b) for several

(Continued from previous page)
http://www.viasat.com/broadband-satellite-networks/high-capacity-satellite-system (last visited Jan. 20, 2015). According to Hughes, it currently provides satellite Internet service to approximately 935,000 U.S. subscribers utilizing its Jupiter 1 (EchoStar 17) and SPACEWAY 3 satellites with speeds up to 15 Mbps/2 Mbps. Hughes Comment at 2-3.

[424] *Id*. at 3 n.5.

[425] O3b Comments at 1; SIA Comments at 4-5 (stating that O3b is "enabling broadband of up to 12 Mbps to individual consumers using its non-geostationary broadband satellite system with high-quality IP application functionality").

[426] *Press Release: Initial constellation complete as O3b successfully launches 4 more satellites*, O3b Networks http://www.o3bnetworks.com/media-centre/press-releases/2014/initial-constellation-complete-as-o3b-successfully-launches-4-more-satellites (last visited Jan. 21, 2015).

[427] O3b Comments at 1, 3.

[428] Exede Internet, *Exede Internet Packages and Pricing* (2014), http://www.goexede.com/packages/ (last visited Jan. 21, 2015) (*Exede Packages and Pricing*); HughesNet, *HughesNet Pricing* http://www.hughesnet.com/index.cfm?page=Plans-Pricing# (last visited Jan. 21, 2015) (*HughesNet Pricing*).

[429] *Exede Packages and Pricing*.

[430] *Hughes Net Pricing*.

[431] *2014 Fourth Measuring Broadband America Report* at 18.

[432] The *2014 Fourth Measuring Broadband America Report* expects to expand "the number of participating satellite providers in future Reports." *Id*. at 4-5.

[433] *Id*. at 15. We note that in the *2013 Third Measuring Broadband America Report*, on average, satellite services delivered 161% of advertised upload speeds. *See 2013 Third Measuring Broadband America Report* at 10.

reasons.[434] First, we have insufficient data on which to analyze satellite service. The December 2013 SBI Data for satellite show significant inconsistencies, so we cannot rely on the data for a reasonable estimate of satellite deployment.[435] Second, satellite service providers today advertise that they offer speeds as high as 15 Mbps/2 Mbps, and likely have not yet deployed 25 Mbps/3 Mbps speeds or higher.[436] Moreover, a large portion of the nation cannot subscribe to the highest speed satellites; the last generation of satellites serves the coasts, but is unavailable in much of the middle of the country. Third, satellite capacity constraints may limit the number of subscribers that can subscribe to satellite broadband service.[437] Finally, latency and usage allowances remain a particular concern for satellite broadband technology and offerings and whether satellite service allows consumers to "originate and receive" high-quality broadband services, as required by section 706(b).[438] Due to the distances between the satellite and terrestrial points, satellite had the highest measured latency of the fixed broadband technologies (satellite, DSL, cable, and fiber) of 671.1 ms.[439] The *2014 Fourth Measuring Broadband America Report*

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[434] Hughes Comments at 4 (noting that satellite services can be used to browse the internet at high speeds, send and receive email, view and upload photos, stream audio, communicate on social networks, and stream video from Netflix); O3b Comments at 2 (noting that its high throughput satellite systems allow service providers to offer broadband service at 10 Mbps download and 1 Mbps upload); SIA Comments at 2 (stating that "[c]urrent generation satellite broadband services readily meet the proposed 10 Mbps downlink and 1 Mbps uplink benchmark required to support these types of data-intensive broadband Internet applications").

[435] The SBI Data include inconsistencies in reported satellite coverage, which calls into question the reliability of the data. For example, while one state shows satellite coverage over the entire state, the neighboring state shows no coverage. Such a coverage pattern is inconsistent with satellite network deployments considering that satellite beams are not typically designed to terminate at the boundaries of individual states. We expect that new Form 477 deployment data collection will enable us to better understand satellite deployment data in the next Report.

[436] *FCC, Industry Analysis and Technology Division & Wireline Competition Bureau, Internet Access Services: Status as of June 30, 2013* at 30, Tbl. 10 (2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-327829A1.pdf. We also note that Hughes indicates that its newer, higher-speed, higher-capacity satellites are limited to the east and far west of the United States. *See* Letter from Dean A. Manson, Executive Vice President, General Counsel, and Secretary, EchoStar Technologies L.L.C., Hughes Network Systems, LLC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 10-90 at 2 (filed May 7, 2013) (*May 2013 Hughes Ex Parte*) (Hughes's next-generation satellite provides broadband service using spot beams that cover the vast majority of the U.S. population, but which are focused on areas east of the Mississippi River and west of the Rocky Mountains).

[437] *2014 Fourth Measuring Broadband America Report* at 18, 48. Issues with capacity constraints make comparisons between satellite services and terrestrial-based broadband services difficult. *See* Joseph Pasqualetti Comments at 3 (stating satellite is unusably slow and low usage caps must be taken into account); SIA Comments at 6 (spectrum-based service providers, such as satellite-based providers, "must impose much lower data caps on customers than terrestrial wireline service providers to maintain a minimum level of performance across the network").

[438] *See supra* paras. 10-11, 75; *see also* Eric Case Comments at 2 (noting that low latency is important, as evidenced by satellite connections with fast advertised speeds that are, in reality, practically useless due to their high latency); Eric Rovenolt Comments at 1 (stating that latency is an important factor that the Commission should consider); Hughes Comments at 2 ("signals travelling at the speed of light from geostationary satellites cannot physically traverse the distance from earth to space in less than 100 milliseconds"); Public Knowledge Comments at 2 (stating that wireless limits are even more constricting than fixed with Verizon's 4G network promising speeds of up to 12 Mbps, but pushes users towards a 2 GB cap that could be used up in 20 minutes).

[439] *2014 Fourth Measuring Broadband America Report* at 16. Hughes urges the Commission to adopt a latency test that would permit inclusion of satellite – rather than the 100 ms standard it proposed in the *2014 Broadband Progress Notice of Inquiry* – but concedes that satellite cannot meet the proposed latency standard. *See* Letter from Dean A. Manson Executive Vice President, General Counsel, and Secretary, Hughes Network Systems, LLC, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 14-126 at Attach. (filed Oct. 15, 2014) (*Oct. 2014 Hughes Ex Parte*). Because of the significant, independent reasons for excluding satellite service from our finding, we need not decide whether to adopt a different latency threshold.

shows latency remains a concern for satellite service quality.[440] Because satellite systems involve the transmission of information over long distances and have correspondingly higher latencies than for terrestrial technologies, ViaSat had a measured latency of 671.1 ms, approximately 19 times the terrestrial average.[441] In the *2013 Third Measuring Broadband America Report*, satellite measured latency of 638 ms, approximately 20 times that for the terrestrial average.[442] *The 2014 Fourth Measuring Broadband America Report* noted the differences in satellite and wireline service offerings, which also compounded the difficulty of direct comparisons between the two technologies.[443]

126. We will continue to examine whether satellite service with high latencies allows consumers to view high-quality video and VoIP, for example. Although we cannot include satellite service in our section 706(b) determination in this Report, satellite broadband deployment data may improve when we collect data from Form 477,[444] and we expect it to be a topic for closer examination in future reports. Notwithstanding the reasons that did not allow the inclusion of satellites in our section 706(b) determination, we recognize that satellites continue to have a role to play in the provision of broadband services, especially in areas not served by other means. In particular, we also recognize that the latency associated with the use of satellites is ultimately bounded by the laws of physics and for any given satellite orbit there is a lower bound that will never be crossed.

G. Elementary and Secondary Schools Without Access to Fiber

127. We rely on the data developed in the E-rate proceeding to assess deployment of high-capacity broadband services to elementary and secondary schools.[445] Based upon data submitted to the Commission as part of that proceeding, Chart 6 below reports our estimates of the percentage of public elementary and secondary schools with and without access to fiber facilities.[446] As noted above, we adopted a short term, benchmark of 100 Mbps per 1,000 users and a longer-term benchmark of 1 Gbps per 1,000 users for schools and classrooms. In many cases, this type of scalable connectivity can only be provided or can most cost-effectively be provided via fiber, which is readily scalable to very high speeds.[447] We categorize public schools without fiber by whether the school is located in a rural area, using the locale codes developed by the National Center for Education Statistics to identify rural locations.[448]

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[440] *2014 Fourth Measuring Broadband America Report* at 16; *see also* SIA Comments at 5 (noting that new satellite offerings are being developed that further improve latency for satellite broadband consumers).

[441] *See 2014 Fourth Measuring Broadband America Report* at 16; *see also Oct. 2014 Hughes Ex Parte* at Attach. (stating that "the laws of physics make compliance with a 100 millisecond threshold impossible for broadband provided via [geostationary] satellites").

[442] *See 2013 Third Measuring Broadband America Report* at 11.

[443] *2014 Fourth Measuring Broadband America Report* at 18.

[444] *Modernizing Form 477 Order*, 28 FCC Rcd at 9900-01, para. 28.

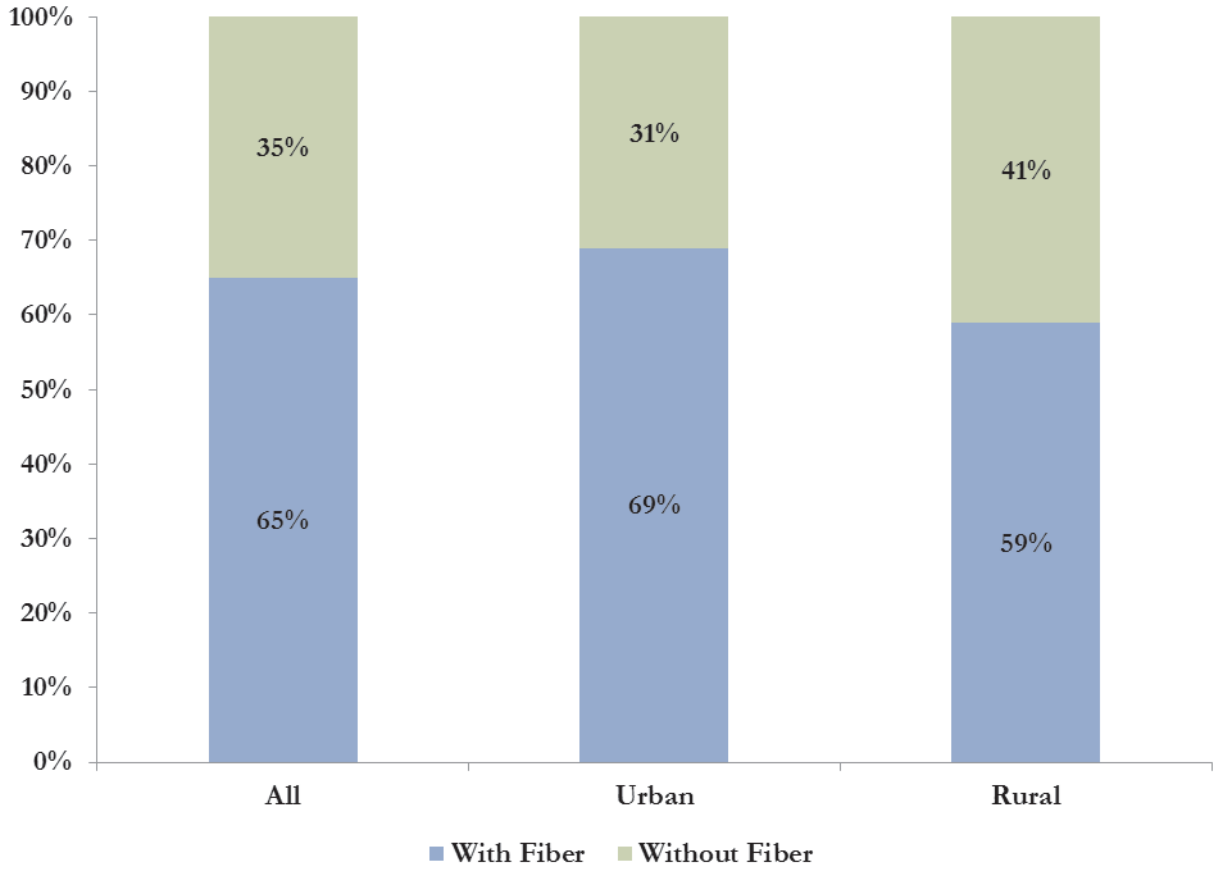
[445] *See supra* para. 77.

[446] These estimates are based upon data submitted to the Commission as part of the E-rate Modernization proceeding and are combined with the SBI Data using the school codes from the NCES. *See August 2014 E-rate Staff Report; November 2014 E-rate Staff Report*. These data provide information for about 50% of all U.S. public schools. *November 2014 E-rate Staff Report* at 19. For the reasons explained in the staff report, this analysis may tend overstate the extent of fiber connectivity to schools. *Id.*

[447] *August 2014 E-Rate Staff Report* at 9656, para. 19.

[448] For details on NCES locale codes, refer to http://nces.ed.gov/ccd/rural_locales.asp.

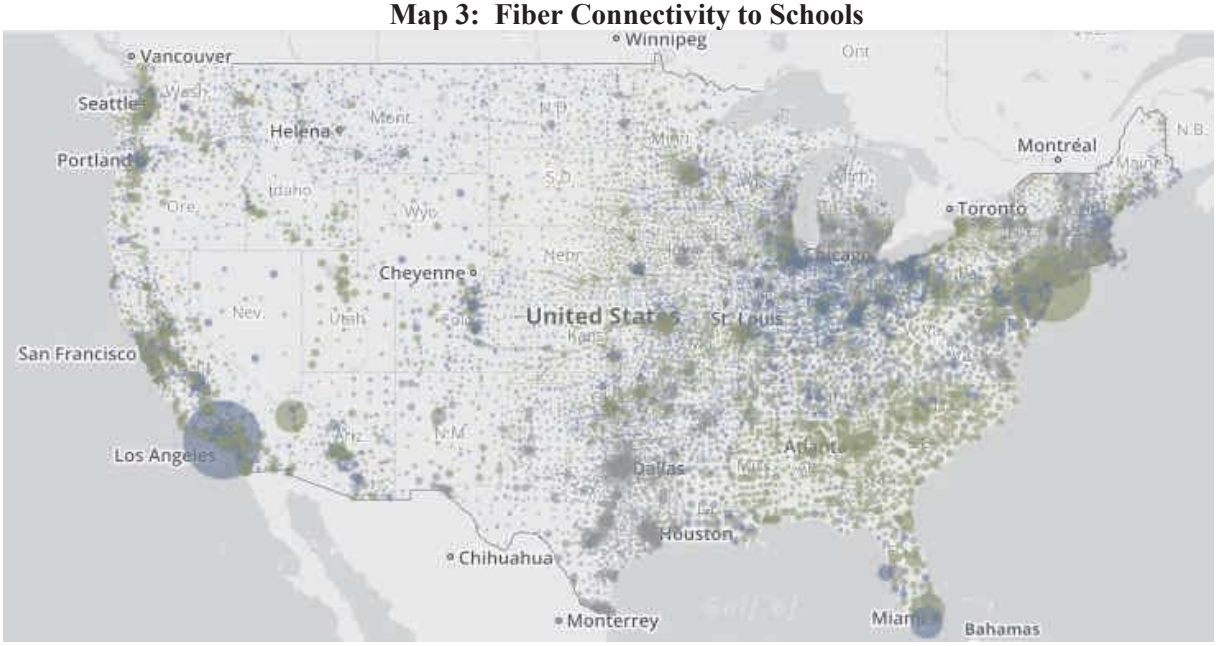
Chart 6: Public Elementary and Secondary School Fiber Connectivity



128. As part of the E-rate proceeding, Commission staff released an interactive online map that shows, by school district, the percent of public schools with fiber connectivity sized by number of students.[449] Commission staff continues to update the schools and libraries connectivity maps. A printed version of the map is below (includes data as of November 6, 2014).

[449] FCC, *FCC E-rate Maps of Fiber Connectivity to Schools and Libraries*, http://www.fcc.gov/maps/E-rate-fiber-map (last visited Jan. 16, 2015).

Map 3: Fiber Connectivity to Schools



Percentage of Schools with Fiber

Mostly Connected (>50% Fiber) **Mostly Unconnected (<50% Fiber)** **Mostly Unknown (Not Enough Data)**

129. The data indicate that roughly 35 percent of public schools do not have fiber facilities to the building.[450] The data further reveal that approximately 41 percent of public schools in rural areas do not have access to fiber whereas approximately 31 percent of public schools in urban areas are without fiber. The data we have regarding deployment of fiber to schools is consistent with other studies that indicated a large gap between schools' broadband access and their needs. While many schools may not be subscribing to Gbps speeds yet, having fiber facilities in place gives schools the option to easily increase bandwidth as needed. A recent CoSN survey finds that only 10 percent of school districts currently meet the Commission's longer-term Internet access target of 1 Gbps per 1,000 users; however, the majority of schools say that affordability and inadequate funding are the most significant barriers to connectivity (as opposed to access).[451]

H. International Broadband Service Capability

130. 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."[452] We are incorporating by reference a Report from our International Bureau.[453] The *2015 Fourth International*

[450] For most recent figures, *see id.* This estimate is based on data with connectivity information for approximately 50% of public schools.

[451] Letter from Reg Leichty, Partner, Education Counsel to Marlene H. Dortch Secretary, FCC, WC Docket No. 13-184, Attach. at 4 and 11 (filed Oct. 15, 2014) (attaching CoSN's 2nd Annual E-rate and Infrastructure Survey) (*CoSN E-rate Survey*).

[452] 47 U.S.C. § 1303(b).

[453] The *2015 Fourth International Broadband Data Report* explains that the Report satisfies the Commission's obligations under the BDIA. *See 2015 Fourth International Broadband Data Report* at paras. 1-2.

Broadband Data Report approaches its analysis differently from this Report by employing, in certain cases, different data sources, different definitions, and/or different time periods to facilitate comparisons across national borders, and its observations must be read in that context.[454] The international analysis serves as a year-to-year measure of our progress in comparison to other nations. Like this Report, the *2015 Fourth International Broadband Data Report* assesses high-speed broadband at 25 Mbps download.[455]

131. The International Bureau found that with respect to speed, for example, the actual download speed when weighted by sample size in the United States increased by 29 percent from 2012 to 2013, the United States ranked 26th (18.67 Mbps) of 40 countries in 2013 and ranked 25th of 40 countries in 2012 (14.50 Mbps).[456] The International Bureau also compared the Commission's most recent Measuring Broadband America[457] data for fixed broadband to the European Commission's actual broadband speed measurement data for Europe. In the United States, broadband providers appear to be more effective than European providers in delivering (or exceeding) promised broadband speeds to consumers when comparing results of hardware-based speed tests.[458]

132. The International Bureau examined advertised broadband prices for both fixed and mobile service plans around the world, and reported data including detailed price information for mobile broadband plans, broken down by devices (*e.g.*, smartphones, stick modems, and tablets). With regard to unlimited stand-alone fixed broadband pricing, the research indicates that U.S. plan prices tend to be higher than those in other countries surveyed. For plans with usage limits, however, U.S. plan prices divided by the number of GB of data allowed tend to be on the lower end.[459] With regard to mobile broadband, the United States is one of a smaller group of countries that offer smartphone plans with unlimited data and unlimited minutes. Among countries with such plans, the United States ranked fifth least expensive out of nine countries in 2012 and fourth least expensive out of five countries in 2013.[460] The International Bureau added that, based on the Organization for Economic Co-operation and Development (OECD) data from December 2013, for wireless broadband penetration (based on subscriptions per inhabitant), the United States ranks seventh among OECD countries (compared to sixth in 2012).[461] The United States also ranks 16th for overall fixed (wired) broadband penetration (based on subscriptions per inhabitant) (compared to 15th in 2012).[462]

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[454] For example, for fixed services, the *2015 Fourth International Broadband Data Report* includes in its analysis any service above 200 kbps as "basic broadband." *2015 Fourth International Broadband Data Report*, Appx. G at 3-4, n.23. The *2015 Fourth International Broadband Data Report* also includes a broader range of mobile technologies than included in this Report. *Id.* at para. 46 n.91. The *2015 Fourth International Broadband Data Report* also relies on different sources of data or different time-sets than the analysis contained herein.

[455] *Id*. at para. 13 ("For purposes of the comparison of high-speed broadband, we use the SBI speed data for 25 Mbps, which most closely matches the 30 Mbps threshold in the European study."). The *2015 Fourth International Broadband Data Report* uses the 25 Mbps benchmark for high-speed broadband in the context of a comparison of U.S. and European (specifically, those countries that form the basis of a European Union study group) broadband coverage. *See id*.

[456] *Id.* at para. 26;*see also id*., Appx. F at 2. The International Bureau used actual speed data from Ookla, proprietor of speedtest.net and a leading provider of Internet performance data. *Id*. at para. 26.

[457] Measuring Broadband America is discussed in more depth above. *See supra* paras. 100-103.

[458] *2015 Fourth International Broadband Data Report* at para. 27; *see generally* Appx. F.

[459] *Id*. at para. 33.

[460] *Id*. at para. 38.

[461] *Id*. at para. 21; Organization for Economic Co-operation and Development (OECD), *OECD Broadband Portal*, Broadband and telecom, Table 1(d)(2) (Dec. 2012 and 2013), http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm. The OECD defines broadband as service with advertised download speeds of at least 256 kbps. *See* OECD, *OECD Broadband Subscriptions Criteria (2010)*,

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V. ADVANCED TELECOMMUNICATIONS CAPABILITY IS NOT BEING DEPLOYED TO ALL AMERICANS IN A REASONABLE AND TIMELY FASHION

133. In this Report, we assess our nation's progress to date with a view that our goal is for all households to have access to advanced telecommunications services.[463] We conclude that advanced telecommunications capability is not being deployed to all Americans in a reasonable and timely fashion. We reach this conclusion for several distinct and independent reasons. First, we find that a significant number of Americans – approximately 55 million, 17 percent – lack access to service capable of originating and receiving at, respectively, 25 Mbps download and 3 Mbps upload speeds or higher – the speed we have determined best satisfies the statutory definition of advanced telecommunications capability.[464] Not only do a significant number and percentage of Americans lack access to advanced telecommunications capability, but the deployment rate is not reasonable and timely. The overall percentage of Americans without access to 25 Mbps/3 Mbps dropped only three percentage points between 2012 and 2013, and the percentage of Americans in rural areas without such access dropped by a mere two percentage points over the same span of time.[465] Moreover, more than half of Americans living in rural areas cannot subscribe to advanced telecommunications capability. There is arguably a tension between the directive to make broadband available to *all* Americans and the directive to consider whether service is being deployed *in a reasonable and timely fashion.* The Commission must exercise its discretion and make a judgment about how to resolve this tension in light of the best available data. Looking at the significant number of Americans that lack access to advanced telecommunications capability, and the pace at which such service is being deployed, we find that we are not adequately progressing toward our goal of "availability to all Americans."[466] We therefore find that advanced telecommunications service is not being deployed to all Americans in a reasonable and timely fashion.

134. Second, we find that the disparities in rural areas and on Tribal lands, relative to urban areas, and the slow rate of deployment to these areas, also necessitate a negative finding.[467] Congress

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Broadband and telecom, http://www.oecd.org/sti/broadband/oecdbroadbandsubscribercriteria2010.htm (last visited Dec. 15, 2014). The OECD includes satellite and fixed wireless subscriptions in its definition of wireless broadband. *See* OECD, *OECD Broadband Subscriptions Criteria (2010)*, Broadband and telecom, http://www.oecd.org/sti/broadband/broadband-methodology.htm (last visited Dec. 15, 2014). In this Report, the Commission does not include mobile or satellite in its broadband deployment determination under section 1302(b) and considers fixed wireless to be a fixed service, much like cable or DSL. *See supra* paras. 9, 74-75.

[462] *2015 Fourth International Broadband Data Report* at para. 21.

[463] *See supra* para. 64; 47 U.S.C. § 1302(b).

[464] *See supra* para. 45.

[465] *See supra* para. 84, Tbl. 7.

[466] It is thus not correct to characterize this determination as an inflexible test mandating that if some Americans do not have access to advanced telecommunications capability, then the standard is not met.

[467] *See, e.g.*, CWA Comments at 4 (stating that "adoption is constrained by what is available and affordable"); NTTA Comments at 8 (stating that in order for legitimate levels of broadband services to be available and adopted by residents of rural Tribal lands, the price of such services will have to be addressed); Public Knowledge Comments at 3 ("[c]onsumers will see very little value from broadband access services with speeds that can support applications such as real-time video telephony or streaming video if capacity limits make actually using those services prohibitively expensive."); UNH BCoE Comments at 2 (stating that "the price of broadband in America is among the most expensive in the world as measured by most indicators," and that "millions of Americans lack access to broadband, many due to physical location and others due to pricing or performance"); *see also* Anne L. Kim, *Fastest Broadband For Your Buck? Try Seoul, Hong Kong, Tokyo or Paris*, Roll Call (Oct. 30, 2014), http://blogs.rollcall.com/technocrat/fasted-broadband-for-your-buck-try-seoul-hong-kong-tokyo-or-paris/?dcz= (*Fastest Broadband for Your Buck*) (stating that, when compared to European markets, the U.S. had "noticeably" higher median prices for four out of five speed tiers). In its *2014 NTIA Digital Nation Report*, NTIA found that low-income households were far less likely than their wealthier counterparts to use the Internet at home. *See 2014 NTIA*
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directed us to consider whether broadband is being deployed in a reasonable and timely fashion to *all* Americans. Therefore, we must consider not only whether most Americans have access to broadband, but whether segments of the population are disproportionately lacking adequate service. The measure of success must include whether the most disadvantaged or hard-to-serve populations – low-income, less-educated, those living in remote areas – are able to access broadband service.[468] The data show not only that Americans in rural areas and Tribal lands lack access, but that the differential between those populations and urban populations is dramatic at fixed 25 Mbps/3 Mbps broadband as well as at slower speeds.

135. Our analysis shows that people living in rural areas and on Tribal lands remain persistently behind their urban counterparts in terms of broadband adoption and deployment to these unserved areas is not progressing quickly enough.[469] While 25 Mbps/3 Mbps is available to the vast majority of Americans living in urban areas, a majority of Americans in rural areas (53 percent) and nearly two-thirds of Americans on Tribal lands and the U.S. Territories (63 percent) lack access to fixed broadband services at this speed.[470] The number of Americans without access to fixed 25 Mbps/3 Mbps broadband services dropped from 28 percent to 17 percent overall between 2011 and 2013; we do not yet see as much improvement, proportionally, in expanding service to reach rural areas and Tribal areas.[471]

136. The disparity between urban areas versus rural and Tribal lands exists even at slower speeds. Thus our conclusions about disparity in availability among U.S. populations are not tied to a particular speed tier. Nationwide, only four percent of the population lacks access to fixed 3 Mbps/768 kbps service or higher, and only one percent of Americans in urban areas lack access, but 20 percent – one fifth – of Americans residing in rural areas still do not have access to this service.[472] Similarly, only seven percent of the country as a whole and only one percent of Americans living in urban areas lack access to fixed 10 Mbps/768 kbps service or higher, while 31 percent – or nearly a third – of Americans in rural areas lack access to broadband at such speeds.[473] The disparity persists as well for Americans on Tribal lands. For example, 25 percent of residents of Alaskan Villages and 33 percent of Americans in Tribal Lands in the Lower 48 States lack access to service at 3 Mbps/768 kbps or higher.[474] Further, 41 percent of residents of Alaskan Villages and 48 percent of Americans in Tribal Lands in the Lower 48 States lack access to service at 10 Mbps/768 kbps or higher.[475]

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Digital Nation Report at 15 (finding that only 49% of households making less than $25,000 used the Internet at home, compared to 96% of households making $100,000 or more); *see also Pew Research Center Home Broadband* 2013 at 2 (finding the demographic factors most related to home broadband adoption to be age, education, and household income).

[468] *See supra* paras. 5-6.

[469] *See supra* paras. 84-86, Tbl. 7-9, paras. 92-94, Charts 3-4, Tbl. 13. Between December 2011 and December 2013, the percentage of Americans without access to fixed 25 Mbps/3 Mbps broadband service or higher decreased approximately 11% for the U.S. as a whole, declined by 12% in rural areas and increased by 1% on Tribal lands. *See supra* paras. 84-85, Tbls. 7-8; *see also 2014 NTIA Digital Nation Report* at 16.

[470] *See supra* para. 79, Tbl. 4; *see also* CWA Comments at 4 (stating that it is "clear that broadband is not being deployed in a reasonable and timely manner"); NTTA Comments at 2 ("It is NTTA's contention that broadband is demonstrably not being deployed to Native Americans living in Tribal areas in a reasonable or timely fashion.").

[471] *See supra* paras. 84-86, Tbls. 7-9.

[472] *See supra* para. 84, Tbl. 7.

[473] *Id*.

[474] *See supra* para. 85, Tbl. 8.

[475] *Id*. We also consider it significant that the record before us indicates disparities in the provision of mobile services between urban and rural areas. For instance, compared to urban areas, a greater proportion of rural areas are not covered by LTE technologies, but only by slower technologies. *See supra* para. 113, Tbl. 15. In addition,

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137. The available international broadband data, though not perfectly comparable to U.S. data, suggest that the availability of broadband in the United States may lag behind a number of other developed countries in certain respects, although we also compare favorably to some developed countries in other respects.[476] These data also independently indicate that advanced telecommunications capability is still not being reasonably and timely deployed to all Americans.[477]

138. Third, section 706(b) specifically directs the Commission to evaluate the availability of advanced telecommunications capability "to all Americans (including, in particular, elementary and secondary schools and classrooms)."[478] We find that approximately 35 percent of schools are without access to fiber and thus lack access to our speed benchmark for schools to have "at least 100 Mbps per 1,000 students and staff."[479] Our estimates further indicate that 31 percent of urban public schools and 41 percent of rural public schools do not have access to fiber facilities.[480] Recent third-party models support our estimates.[481] This lack of access means that many schools do not have sufficiently robust broadband connections to allow their students to take advantage of "advanced telecommunications capability" and access to modern digital learning and further independently justifies a finding that advanced telecommunications capability is not being deployed to elementary and secondary schools in a reasonable and timely fashion.

139. Our negative finding does not undermine or ignore important progress. Broadband networks continue to grow due to significant investments by private industry.[482] Some reports indicate that broadband providers invest tens of billions of dollars each year to further extend the reach of their networks, with providers spending a total $1.3 trillion since 1996 and $75 billion in 2013 alone.[483] The wireless industry in particular has been a key contributor to these investments, with one estimate accounting for $33 billion in total investment in 2013 made by mobile providers.[484] Wireline cable companies have also invested billions of dollars to upgrade their infrastructure to DOCSIS 3.0 in order to

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the CPUC provided state-level data indicating that mobile broadband service for rural and Tribal areas is "materially less robust" in terms of "coverage, throughput, reliability, streaming media capability and wireless technology" than in urban areas. *See* CPUC Comments, Appx. at 24 (data for California). We anticipate analyzing this issue in more detail once we have more reliable mobile broadband data.

[476] *See supra* paras. 130-32.

[477] We incorporate by reference here our findings concerning availability to all Americans above. *See supra* paras. 79-106, 127-29. We reject commenters' claims that there is pervasive broadband coverage throughout the United States, and that the Commission should therefore conclude that broadband is being deployed to all Americans in a reasonable and timely manner. *See* CTIA Comments at 7 (recommending the Commission should find that "mobile broadband is being deployed in a reasonable and timely manner"); Verizon Comments at 4 (stating that "the broadband marketplace in the United States is thriving, as competition and choices continue to expand"). While we recognize that some broadband service is available to most Americans, we still find that a large number of Americans remain unserved and that progress toward the statutory goal of availability of advanced telecommunications capability to all Americans is not adequate.

[478] 47 U.S.C. § 1302(b).

[479] *See supra* paras. 61-62, 127-129.

[480] *See supra* para. 127, Chart 6; FCC Fiber Connectivity Map. We recognize that there may be technologies other than fiber that provide broadband services that meet the speed benchmark, but we must rely on the data regarding fiber because it is the best data available regarding deployment to schools. We lack data on other technologies that serve schools with at least 1 Gbps per 1,000 users. *See supra* para. 77.

[481] *See supra* para. 129; *CoSN E-rate Survey*.

[482] *See* CTIA Comments at 8-9; Verizon Comments at 4.

[483] *See USTelecom Estimate*; Verizon Comments at 1.

[484] *See* CTIA Comments at 8-9.

provide higher broadband speeds.[485] And, as detailed above, satellite has made significant investments to upgrade satellite broadband services and infrastructure.[486] Mobile services, particularly LTE, have increased significantly since our last report. This is seen by the United States having the most total wireless broadband connections in the world as of December 2013, with more than 316.4 million connections, according to data released by the OECD.[487]

140. While we commend and support these efforts, they have not yet resulted in advanced telecommunications capability for all. Millions of Americans remain without access to advanced telecommunications capability and concerning disparities persist between urban and rural communities. It is simply not acceptable for rural and Tribal areas to be left behind from the *advanced* services envisioned by Congress, not only at our current 25 Mbps/3 Mbps benchmark but even at the lower speeds. While our efforts with current Connect America funds are providing support for 10 Mbps/1 Mbps service and we already have in place initiatives that will support faster service, we acknowledge there is more to be done.[488] As we have stated in the last three reports, the standard for success is universal broadband and we will continue to take action to achieve Congress' directive.[489] Schools also continue to lack sufficient access to broadband preventing students and staff from taking full advantage of the immense benefits of broadband. For all of these distinct and independent reasons, we are precluded from finding that advanced telecommunications capability is being deployed to all Americans in a reasonable and timely manner. In light of our findings, we must continue to work to ensure that all Americans have the access they need to the most critical communications network of today, as Congress demanded in section 706.[490]

VI. REMOVING BARRIERS & PROMOTING COMPETITION

141. In light of our finding that advanced telecommunications capability is not being deployed to all Americans in a reasonable and timely manner, the Commission must "take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market."[491] In the last two Reports, the Commission found numerous barriers to infrastructure investment.[492] In particular, the high costs associated with deploying and operating a broadband network coupled with low broadband adoption rates, present barriers.[493] As we have done in the past, we will continue to work on removing barriers to infrastructure investment by identifying and helping to reduce potential obstacles to deployment, competition, and adoption—concepts that we continue to recognize are tightly linked.[494] By taking steps to remove any barriers to the deployment of networks, the Commission can continue its efforts of ensuring that all Americans have access to affordable, high-quality broadband.

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[485] *See* Verizon Comments at 9.

[486] *See supra* paras. 122-26.

[487] Organization for Economic Cooperation and Development (OECD), *OECD Broadband Portal*, Broadband and telecom (July 22, 2014), http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

[488] *See supra* paras. 54-55.

[489] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10403, para. 138; *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8033, para. 48; *2010 Sixth Broadband Progress Report*, 25 FCC Rcd at 9574, para. 28.

[490] Private industry, state and local governments, and federal agencies, including the Commission, continue to work on closing this broadband deployment gap. *See supra* paras. 15-18.

[491] 47 U.S.C. § 1302(b).

[492] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10403-10, paras. 139-54; *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8040, para. 65; *2010 National Broadband Plan* at 167-90.

[493] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10403, para. 139.

[494] *Id*.

142. Because providers will consider adoption rates when determining whether to build out facilities and offer service in a particular area, we consider barriers to adoption as well as deployment. The key barriers to deployment and adoption include: (1) costs and delays in building out networks; (2) broadband service quality; (3) lack of affordable broadband Internet access services; (4) lack of access to devices and other broadband-capable equipment; and (5) barriers to entry by potential competitors and, consequently, lack of competitive choice for consumers.[495] Below, we discuss each of these barriers and the steps that the Commission has taken to address them.

143. *Costs and Delays in Building Out Networks.* As this Report demonstrates, not all Americans have access to networks capable of delivering broadband at speeds of 25 Mbps/3 Mbps, with particular challenges for those living in rural areas and on Tribal lands.[496] The existence of these unserved areas may be attributable, at least partially, to the cost of building infrastructure over long distances in areas with low population density, as well as the lower incomes and higher rates of poverty and unemployment in rural versus urban areas.[497] This translates into fewer revenue generating opportunities for service providers and ultimately affects their incentive to build broadband networks. Other obstacles to deploying broadband infrastructure include lack of access to key inputs, such as utility poles, conduits, rooftops, and rights-of-way.[498] These challenges raise costs, limit competitive entry, reduce service quality and negatively impact businesses and consumers.[499] These factors likely impact industry decisions about when and where to enter the market, and what services to deploy. Congress directed the Commission to remove barriers and establish conditions that will encourage rapid and ubiquitous deployment.

144. Since the last Report, the Commission has taken several steps to remove more barriers to broadband deployment and adoption and promote competition.[500] As noted above, implementation of the *2011 USF/ICC Transformation Order*, which transformed the high-cost universal service program to bring broadband to millions of Americans, is well underway.[501] As of March 14, 2014, the Commission has dispersed more than $438 million in Connect America Fund Phase I funding, which will bring new broadband service in the next several years.[502] We are also moving forward on Phase II of the Connect America Fund that will provide nearly $9 billion to expand broadband to five million Americans living in rural areas within the next five years.[503] Although the Connect America Fund will support speeds below

[495] We adopt many of the same barriers identified in the *2014 Broadband Progress Notice of Inquiry*. *See 2014 Broadband Progress Notice of Inquiry*, 28 FCC Rcd at 9770, para. 50.

[496] *See supra* para. 79, Tbl. 4.

[497] *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10404, para. 141; *see also* Rural Broadband Company Comments at 11 (stating that there is a problem of infrastructure parity for rural America); Rural Associations Comments at 6 (stating that "[d]eployment costs remain the most significant barrier to widespread deployment of fiber, followed by regulatory uncertainty, long loops, current regulatory rules, low customer demand, obtaining financing, and obtaining cost-effective equipment").

[498] *2012 Eighth Broadband Progress Report,* 27 FCC Rcd at 10404, para. 142; *see also* FTTH Council Comments at 18 (stating that the Commission should focus on ensuring reasonable, expeditious, and cost-based access to rights of way and poles, ducts, and conduits so that broadband providers have a workable business case to expand broadband coverage and upgrade current infrastructure, and that the "Commission should remain vigilant against other local barriers to deployment that may hinder private providers from deploying all-fiber networks to all Americans in a reasonable and timely fashion").

[499] In the last Report, the Commission discussed past efforts to ease access to utility poles and speed processes for siting cell towers. *See 2012 Eighth Broadband Progress Report,* 27 FCC Rcd at 10405–06, para. 144.

[500] *See supra* para. 17.

[501] *Id.*; *see generally 2011 USF/ICC Transformation Order*.

[502] *See supra* para. 17.

[503] *Id*.

25 Mbps/3 Mbps, it stimulates broadband development in areas that today lack access. Moreover, although recipients of high-cost universal service support are required to offer a minimum of 10 Mbps/1 Mbps, they may offer service at higher speeds, and in some locations, we expect they will do so.[504] In July of 2014, the Commission further adopted the *Rural Broadband Experiments Order* to test how tailored economic incentives might advance the deployment of next generation wireline and wireless networks in rural, high-cost areas, including Tribal lands.[505] As part of this initiative, the Commission allocated $75 million for the construction of networks capable of delivering 100 Mbps/25 Mbps, while also requiring that funding recipients offer at least one service plan that provides 25 Mbps/5 Mbps to all locations within the selected census blocks.[506] An additional $25 million was allocated for projects offering at least 10 Mbps/1 Mbps broadband service in high-cost and extremely high-cost areas.[507]

145. Separately, in the *Second E-rate Modernization Order*, we adopted a number of different options aimed at lowering the barriers for schools seeking to purchase affordable high-speed broadband, such as permitting self-construction of high-speed broadband networks, which will provide a new option for those schools that are currently unserved.[508]

146. *Broadband Service Quality*. Broadband service reliability remains a key factor to broadband availability. Low broadband service quality has the potential to affect adoption rates, which in turn may affect customer demand, leading to less deployment. Broadband service quality remains an essential *component* of broadband deployment. Providers must maintain and upgrade their broadband offerings to ensure that high-quality broadband remains available to consumers. As noted above, consistent speed and latency are also subject to testing in the *Measuring Broadband America Reports*.[509] The ongoing measurement of such service attributes, and the publication of the related data by the Commission, help ensure that providers deliver and improve upon the services they deliver. In addition, we recently released the first aggregate results of mobile performance based on data collected by the FCC Speed Test App.[510] On March 4, 2014, the new Connect2health FCC task force will examine how

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[504] The Commission also disbursed funds under Phase I of the Mobility Fund Auction to help expand mobile broadband nationwide, and those funds are being used to advance mobile broadband deployment. *See* para. 17 & nn. 82-85. Although the Mobile and Tribal Mobility Fund Phase I auction distributed funds in order to provide mobile voice and broadband services at speeds below our established benchmark, they are still providing significant support to advance mobile service in underserved areas. *Tribal Mobility Fund Public Notice*. Moreover, while the Commission decided to require recipients of Connect America Funds to deploy 10 Mbps/1 Mbps capable broadband networks, speeds of 10 Mbps/1 Mbps are the minimum, and we already have in place initiatives that will support faster service through the Connect America program. *See supra* para. 55.

[505] *See supra* para. 17; *Rural Broadband Experiments Order*.

[506] *See supra* para. 17; *2014 Rural Broadband Experiments Public Notice*.

[507] *See supra* para. 17.

[508] *Id*.; *Second E-rate Modernization Order* at paras. 1-9.

[509] *See supra* para. 103. We also discuss latency, and consistency of service as part of benchmarking broadband above and consider other indicators of broadband availability to all Americans. *See supra* paras. 24-25, 64-66, 96-106; *see also supra* para. 65 ("[O]ur inquiry includes an assessment of a variety of factors indicative of broadband availability, such as price, quality, and adoption by consumers, as well as physical network deployment."); *2014 Fourth Measuring Broadband America Report* at 11; *Technology Transitions Order*, 29 FCC Rcd at 1527, Appx. B para. 33 ("For example, in reviewing proposals, it will be important for the Commission to understand in detail any changes in the speed, latency, or jitter of the Internet access services offered in the experiment area."); *2012 Rural Health Care Order*, 27 FCC Rcd at 16732, para. 116 ("The Commission also sought comment on the minimum quality of service standards necessary to meet health IT needs, and whether the broadband services program should include a minimum quality of service requirement (including metrics such as reliability, bit delay, jitter, packet dropping probability, and/or bit error rate)."); *USF/ICC Transformation Order*, 26 FCC Rcd at 17701-02, para. 104.

[510] *See Seventeenth Mobile Wireless Report* at paras. 195-97, 206.

stakeholders could "accelerate the adoption of health care technologies by leveraging broadband and other next-gen communications services" and how we can improve broadband reliability and service.[511] We will explore these results and continue to take steps on improving broadband reliability and service.

147. *Affordability.* Broadband that is more affordable is more likely to be adopted (and contribute to demand) than broadband that is not affordable. In the *2014 NTIA Digital Nation Report*, NTIA found that the second highest reason for not subscribing to broadband was the Internet is "too expensive."[512] NTIA also reported in the *2013 NTIA Digital Nation Report*, "[t]he percentage of households reporting that home Internet service was 'too expensive' increased by 4 points in the nine-month period between the 2010 and 2011 data collections, possibly reflecting some consumers' concern about their personal financial circumstances during a period of slow economic recovery."[513] The record also indicates that "[i]n order for legitimate levels of broadband services to be available and adopted by residents of rural Tribal lands, the price of such services will have to be addressed."[514]

148. Since the last Report, the Commission has continued its efforts to reduce the affordability barrier and spur broadband adoption.[515] For example, the Bureau selected 14 projects to participate in the Commission's broadband adoption Lifeline Broadband Pilot Program, authorizing approximately $13.8 million in support for rural, urban and suburban projects spanning 21 states and Puerto Rico.[516] With respect to schools, through the E-Rate Modernization proceeding, the Commission has set a goal of "[e]nsuring affordable access to high-speed broadband sufficient to support digital learning in schools,"[517] and has taken steps to increase transparency and encourage consortia purchasing to drive down high-speed broadband prices.[518]

149. *Lack of Access to Devices.* One aspect of affordability is the cost of computers and other devices necessary to access broadband.[519] In its latest survey result, "no or inadequate computer" was the

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[511] Press Release, FCC , FCC Chairman Announces New Connect2Health FCC Task Force (Mar. 4, 2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-325873A1.pdf.

[512] *2014 NTIA Digital Nation Report* at 26, Fig. 16.

[513] *2013 NTIA Digital Nation Report* at viii.

[514] NTTA Comments at 8. Prices of broadband services in the U.S. may affect consumer purchases of such services. *See supra* paras. 100, 133 note 469; *see also Fastest Broadband For Your Buck*. The price of fixed services in the U.S. is high and not merely a problem of consumer perception. *2015 Fourth International Broadband Data Report* at para. 33 & Appx. C at 4-13, Sections 2.1-3 (discussion of advertised fixed broadband prices).

[515] Some private entities have also undertaken efforts to make broadband accessible to low-income Americans. *See* Comcast's Third Annual Report of Compliance With Transaction Conditions, MB Docket No. 10-56 at 20-22 (filed July 31, 2014), http://corporate.comcast.com/images/MB-10-56-C-NBCU-Annual-Compliance-Report-2013-2014-02-28.pdf (describing Comcast's Internet Essentials program initiative, which is an effort to make home broadband access available for America's schoolchildren); San Diego County, Office of Education, *Cox Communications Narrows Digital Divide with Connect2Compete Broadband Adoption Program* (Aug. 19, 2014), http://www.sdcoe.net/news/Pages/Connect2Compete-Expanded.aspx (announcing a two-year extension of Cox's "broadband adoption program that offers discounted high speed Internet service to low-income families with children who qualify for the National School Lunch Program," and indicating that Cox has "pledged $15 million in support of broadband adoption initiatives through 2016").

[516] *See Lifeline Broadband Pilot Program Order*, 27 FCC Rcd at 15842, para. 1; *see also supra* para. 17.

[517] *E-Rate Modernization Report & Order*, 29 FCC Rcd at 8881, para. 25.

[518] *Id.* at 8934, Section V.

[519] *See* McKinsey & Company, Technology, Media, and Telecom Practice, Offline and falling behind: Barriers to Internet adoption at 35 (2014), http://www.mckinsey.com/~/media/McKinsey/dotcom/client_service/High%20Tech/PDFs/Offline_and_falling_behind_Barriers_to_Internet_adoption.ashx (stating that "[l]arge swaths of the offline population are simply too poor to afford even the cheapest devices and data plans"); *see also 2014 NTIA Digital Nation* at 33; *2013 NTIA Digital*

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third highest reason for not accessing the Internet. NTIA adds that "[t]his reason for not using the Internet at home has continued to decrease in prominence, declining by 2 percentage points between 2011 and 2012 to 11 percent." To address this issue, the Commission's Lifeline Broadband Pilot Program has selected projects that offer access to discounted computer equipment to determine the extent to which such factors affect adoption.[520] Five of the projects selected will "measure adoption and subscriber usage based on type of equipment used or whether cost of equipment impacts adoption."[521] As noted above, the Commission continues its efforts to increase adoption and reduce barriers to deployment.

150. *Lack of Competitive Choice*. Competition has the potential to bring new broadband services, better service quality, greater selection, and lower prices. Section 706(b) requires the Commission to take immediate action to accelerate deployment of broadband capability by "promoting competition" in the telecommunications market.[522] In this Report, we have provided estimates on the number of competitive choices at various speeds.[523] And, we have seen first-hand that competition does in fact encourage other providers to build-out or upgrade broadband services. For example, where Google Fiber has built-out in certain cities, Comcast and other providers have responded.[524] Competition benefits both consumers and the industry at large by forcing firms to adopt business processes and technical innovations to lower costs.[525] This in turn allows consumers to benefit from expanded choice, improved quality of services, and lower prices.[526] Through this proceeding and others, we will continue to promote competitive choices for consumers.

151. In addition to addressing those challenges, we also must continue to protect the freedom and openness of the Internet. As the Commission recognized in the *Open Internet Order*, "[t]he Internet's openness . . . enables a virtuous circle of innovation in which new uses of the network—including new content, applications, services, and devices—lead to increased end-user demand for broadband, which drives network improvements, which in turn lead to further innovative network uses."[527] As noted above, the Commission is now exploring proposals such as whether to reinstitute the no-blocking rule adopted in 2010 and possibly create new rules that would prevent broadband providers from engaging in conduct that threatens Internet openness (as well as enhancing the transparency rule that is currently in effect).[528]

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Nation Report at 41 ("Approximately 13 percent of households without home Internet services cited their lack of an adequate computer or any computer at all as their main reason for not accessing the Internet at home.").

[520] *Lifeline Broadband Pilot Program Order*, 27 FCC Rcd at 15845, para. 8.

[521] *Id*. at 15846, para. 11.

[522] 47 U.S.C. § 1302(b).

[523] *See supra* para. 83, Chart 2 (noting that 45% of households have only a single provider option for fixed 25 Mbps/3 Mbps broadband services, and an additional 16% are in areas without a single provider option for these services).

[524] Sam Colt, *Comcast Is Boosting Speeds So You'll Forget About Google Fiber*, Business Insider (Aug. 4, 2014), http://www.businessinsider.com/comcast-is-boosting-speeds-so-youll-forget-about-google-fiber-2014-8 (noting that "Comcast is increasing its broadband internet speeds in areas where Google Fiber is set up").

[525] William Lehr, MIT, *Benefits of Competition in Mobile Broadband Services* 1 (2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2420488.

[526] *Id*. We note that the number of Internet service providers from which consumers can choose varies by speed; there are multiple providers of lower speed broadband, but this number lessens at higher speeds. Having fewer competitors at a given speed "is likely to drive up prices," and as a result, some consumers may decide not to adopt Internet access at all, and others may choose service at a slower speed. *2014 Commerce Broadband Competition* at i.

[527] *Preserving the Open Internet*; *Broadband Industry Practices,* GN Docket No. 09-191, WC Docket No. 07-52, Report and Order, 25 FCC Rcd 17905, 17910-11, para. 14 (2010) (*Open Internet Order*).

[528] *See supra* para. 17; *Open Internet NPRM*.

The efforts in that proceeding will assist the Commission in ensuring that the Internet remains "a vital platform for innovation, economic growth and free expression in America."[529]

152. To achieve universal broadband deployment and availability, we must continue to address all of these obstacles. Since the *2012 Eighth Broadband Progress Report*, the Commission has made progress in promoting competition and removing barriers to infrastructure investment, as required by the statute.[530] This remains a work in progress. We are continuing to improve the data we collect to better inform our policies and adopt policies that will accelerate broadband deployment, remove barriers to infrastructure investment, and promote competition in telecommunications markets.[531]

VII. NOTICE OF INQUIRY ON IMMEDIATE ACTION TO ACCELERATE DEPLOYMENT

A. Introduction

153. Section 706(b) provides that, if the Commission determines that advanced telecommunications capability is not being deployed in a reasonable and timely fashion, 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."[532]

154. The Commission has already undertaken numerous efforts to remove barriers to infrastructure investment and promote competition. In particular, ongoing efforts to remove barriers to infrastructure investment include implementation of the *2011 USF/ICC Transformation Order*, the *Rural Broadband Experiments Order*, *E-rate Modernization Order,* and *Second E-rate Modernization Order*.[533] Our efforts to promote competition include the *Open Internet NPRM,* which is exploring the best approach to protect and promote an open Internet[534] and a *VoIP Access to Numbering NPRM* that may allow interconnected VoIP providers to obtain telephone numbers.[535]

155. Although we expect that pending actions will serve the purposes set forth in section 706(b), we also acknowledge that more efforts may be needed. We seek comment on additional ways to remove barriers to infrastructure investment and promote competition. This Notice of Inquiry is intended

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[529] FCC, Fact Sheet: Protecting and Promoting The Open Internet (May 15, 2014), http://www.fcc.gov/document/fact-sheet-protecting-and-promoting-open-internet .

[530] *See supra* para. 17.

[531] *See, e.g.*, *Modernizing Form 477 Order*; *Lifeline Broadband Pilot Program Order.*

[532] 47 U.S.C. § 1302(b).

[533] *See supra* para. 17. *See also, e.g., Acceleration of Broadband Deployment by Improving Wireless Facilities Siting Policies*, WT Docket No. 13-238, Report and Order, 29 FCC Rcd 12865 (2014) (the Commission updated and tailored the manner in which it evaluates the impact of proposed facilities deployments on the environment and historic properties, with a particular focus on Distributed Antenna Systems (DAS) and small cell facilities, and adopted rules to clarify and implement statutory requirements related to state and local government review of wireless infrastructure siting applications); *id*. at 12867, 12871, paras. 4, 13 (indicated ongoing work with the Advisory Council on Historic Preservation, State Historic Preservation Officers, Tribal Nations, and other stakeholders on a "program alternative" to bring further efficiencies to the review of DAS and small-cell deployments under the NHPA and indicated discussions with stakeholders to develop a process for "clearing" existing towers that were not subject to historic preservation review prior to construction); *2004 and 2006 Biennial Regulatory Reviews – Streamlining and Other Revisions of Parts 1 and 17 of the Commission's Rules Governing Construction, Marking and Lighting of Antenna Structures*, WT Docket No. 10-88, Report and Order, 29 FCC Rcd 9787 (2014) (substantially reformed the rules governing tower registration, lighting, and marking to ease unnecessary compliance burdens).

[534] *See supra* para. 17; *see generally Open Internet NPRM.*

[535] *Numbering Policies for Modern Communications, et al.,* WC Docket No. 13-97 et al., Notice of Proposed Rulemaking, Order, and Notice of Inquiry, 28 FCC Rcd 8889 (2013) (*VoIP Access to Numbering NPRM*).

to supplement, not supplant, other efforts that are underway.[536] We focus in particular on addressing the three distinct underpinnings for our negative finding in the *2015 Broadband Progress Report*.

156. As a preliminary matter, we interpret the directive to "take immediate action" to encompass efforts that are not solely within the Commission's purview. For example, we believe that joint efforts with industry to develop and promote best practices would be responsive to the statutory directive. We also believe that joint efforts might advance the requirement in section 706(b). We encourage commenters to offer suggestions on any steps the Commission could take, on its own or in coordination with others, to accelerate deployment of advanced telecommunications capability to all Americans.

B. Additional Actions to Expand Availability and Increase the Rate of Deployment

157. The Commission found that a significant number of Americans lack access to 25 Mbps/3 Mbps, and that the rate of deployment of such service in not reasonable and timely. The Commission has already initiated proceedings that will expand the availability of advanced telecommunications capability, but the progress resulting from these efforts may be incremental rather than instantaneous and ubiquitous. We seek comment on additional efforts that might expand deployment of service that (i) provides speeds of at least 25 Mbps/3 Mbps and (ii) enables users to originate and receive high quality voice, data, graphics, and video telecommunications. We seek comment on actions that will accelerate the rate at which such service is deployed.

158. The Report identified potential barriers to infrastructure investment. For example, the Report asserted that service providers may lack ready and affordable access to inputs such as utility poles, conduit, rooftops, and rights-of-way. We seek comment on whether there are actions, in addition to those already under way, that might remove barriers to infrastructure investment and encourage more expansive and more rapid deployment of networks that can provide advanced telecommunications capability.

159. Some possible actions include finding ways facilitate coordinating federal support with other funding opportunities that, collectively, could increase the availability of services that offer at least 25 Mbps/3 Mbps. We also seek comment on ways to improve coordination among federal agencies (similar to the earlier *Executive Order* 13616, designed to allow easier access to public lands).[537] We seek comment on these ideas and on any other efforts that would expand broadband availability and increase the rate at which it is being deployed. We also seek comment on whether federal, state, and local efforts to increase broadband can be better coordinated. For example, are there restrictions on the use of funds that discourage providers from entering the market? Are there ways in which governmental efforts to promote broadband can more effectively complement and boost private actions?

160. The Report also found that competition can increase and enhance broadband service. In light of our negative finding, we are required to promote competition in the telecommunications market.[538] The Commission is committed to eliminating its outmoded or unnecessary regulations, which can deter market entry.[539] The Commission is equally committed to ensuring that the marketplace is open

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[536] We further note that this Notice of Inquiry will not replace the inquiry specifically required pursuant to section 706(b) that precedes the Commissions determination about whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion. 47 U.S.C. § 1302(b).

[537] *See Executive Order 13616*,; *see also* Broadband Deployment on Federal Property Working Group, Implementing Executive Order 13616: Progress on Accelerating Broadband Infrastructure and Deployment (2013), http://www.whitehouse.gov/sites/default/files/microsites/ostp/broadband_eo_implementation.pdf (Implementation Report).

[538] 47 U.S.C. § 1302(b).

[539] *See, e.g., FCC Seeks Public Comment on Report on Process Reform*, GN Docket No. 14-25, Public Notice, 29 FCC Rcd 1338, 1344, Attach., Report on FCC Process Reform (2014) (*2014 Process Reform Report*) ("The Report identifies specific rules or categories of rules and processes that are candidates for modification or elimination as a

(continued…)

to all service providers, on reasonable terms and conditions.[540] We invite comment on additional actions the Commission can take to increase competition, remove barriers to market entry or stimulate the offering of innovative services. For example, are there efforts in addition to those we have taken that would encourage providers to enter the market or expand their reach to unserved or underserved areas, including Tribal lands?

C. Additional Actions to Reduce the Disparity between Americans Living in Urban and Rural and Tribal Lands

161. The Commission concluded that the disparity in broadband availability between Americans living in urban areas with those living in rural areas and Tribal lands is, standing alone, the basis for a determination that broadband is not being deployed to all Americans in a reasonable and timely fashion. The Commission has taken numerous actions through its universal service programs to increase broadband availability in high-cost areas. For example, recipients of high-cost support are required to provide broadband service that is reasonably comparable to comparable offerings in urban areas, at reasonably comparable rates.[541] We seek comment on whether there are additional actions that will bring broadband, in a reasonable and timely fashion, to Americans who today are most lacking access.

162. The Commission has recognized a link between deployment and adoption: service providers are more likely to invest in areas where consumers will subscribe to the service.[542] In addition, data reflect that rural areas and Tribal lands tend to have lower income levels, relative to urban areas.[543] What other steps could the Commission, working on its own or in coordination with other federal, Tribal, state or private entities, take to reduce the disparity in broadband availability between urban and rural areas and Tribal lands?

D. Additional Actions to Increase Deployment to Schools and Classrooms

163. Section 706(b) requires the Commission, as part of its determination, to evaluate the availability of advanced telecommunications capability in elementary and secondary schools and

(Continued from previous page)
result of marketplace or technology changes that render the rules no longer necessary in the public interest. It also considers modification or elimination of rules that have had unintended negative effects or could result in greater net benefits to the public if modified"). Specifically, the *2014 Process Reform Report* recommends that the Bureaus eliminate or streamline outdated rules in many functional areas, including satellite applications and licensing, international assignments and transfers of control, certain media rules addressing technical standards and cable requirements, cellular tower and lighting specifications, broadband radio service, commercial mobile radio and cellular service licensing, telephone terminal attachments, radiofrequency equipment certification, and product labeling. *Id*. at 1412-15.

[540] *See, e.g.*, *VoIP Access to Numbering NPRM*; *Open Internet NPRM*; *Acceleration of Broadband Deployment: Expanding the Reach and Reducing the Cost of Broadband Deployment by Improving Policies Regarding Public Rights of Way and Wireless Facilities Siting*, WC Docket 11-59, Notice of Inquiry, 26 FCC Rcd 5384 (2011) (seeking comment on challenges to and best practices for broadband deployment by improving access to rights of way and wireless facilities siting).

[541] 47 U.S.C. § 254(b)(3); 47 C.F.R. §§ 54.308-.309.

[542] *See supra* paras. 141-42; *2012 Eighth Broadband Progress Report*, 27 FCC Rcd at 10355-56, para. 14 ("The increase in new uses of the network corresponds with an increase in home broadband adoption and smartphone ownership, which leads to further network improvements and infrastructure investment, and that spurs yet further innovative uses.); *2011 Seventh Broadband Progress Report*, 26 FCC Rcd at 8040, para. 65 ("Removing barriers to infrastructure investment therefore requires the Commission to identify and help reduce potential obstacles to deployment, competition, and adoption--concepts that are tightly linked.").

[543] *See supra* para. 88, Tbl. 10. The Report also noted that affordability remains a significant barrier to broadband adoption. *See supra* para. 142.

classrooms. The Commission found that more than one-third of schools lack access to service at 100 Mbps per 1,000 users, and that even more lack access to service of at least 1 Gbps per 1,000 users. The Commission concluded that this lack of access, standing alone, necessitates a finding that broadband is not being deployed to all Americans in a reasonable and timely fashion. The Commission has worked steadily to improve access to high-quality broadband service in schools and classrooms throughout the nation. The Commission recently took two major steps to modernize the E-rate program to ensure affordable access to high speed broadband, and maximize the program's cost-effectiveness and make the application and other E-rate processes faster, simpler and more efficient.[544] We seek comment on any other efforts the Commission could take, on its own or with public or private partners, to increase availability of advanced telecommunications capability to schools and classrooms.

VIII. PROCEDURAL MATTERS

A. Ex Parte Rules

164. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[545] Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.*, .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

B. Comment Filing Procedures

165. Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/.

- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

[544] *See generally E-rate Modernization Order*; *Second E-rate Modernization Order*.

[545] 47 C.F.R. § 1.1200 *et seq.*

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of *before* entering the building.

- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.

- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

C. Accessible Formats

166. To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an email to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

IX. ORDERING CLAUSES

167. Accordingly, IT IS ORDERED that, pursuant to section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. §§ 1302, 1303, this Report, with its associated Appendices A-H, IS ADOPTED.

168. IT IS ALSO ORDERED that, pursuant to section 706 of the Telecommunications Act of 1996, as amended, 47 U.S.C. §§ 1302, 1303, and section 403 of the Communications Act of 1934, as amended, 47 U.S.C. § 403, this Notice of Inquiry IS ADOPTED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Commenters

Commenter	Abbreviation
AT&T	AT&T
Ada Ghuman	Ada Ghuman
California Public Utilities Commission	California PUC
Carl Bender	Carl Bender
CTIA – The Wireless Association	CTIA
Christopher S. Yoo	Christopher S. Yoo
City of Boston, Massachusetts	Boston
Communications Workers of America	CWA
Competitive Carriers Association	CCA
Donny Eckland	Donny Eckland
Elana Johnson	Elana Johnson
Eric Case	Eric Case
Eric Rovenolt	Eric Rovenolt
Eric Ziegenhorn	Eric Ziegenhorn
Eric Manzler	Eric Manzler
Federal Trade Commission	Federal Trade Commission
Fiber to the Home Council Americas	FTTH Council
George Hu	George Hu
Hughes Network Systems, LLC	Hughes
Institute for Local Self- Reliance	Institute for Local Self-Reliance
Jason Thompson	Jason Thompson
Jeff Hoel	Jeff Hoel
Joseph Pasqualetti	Joseph Pasqualetti
Karen Thompson	Karen Thompson
Laura McMillan	Laura McMillan
Marian Norton	Marian Norton
Martijn Kleinendorst	Martijn Kleinendorst
Megan Edwards	Megan Edwards
Mick Hoeltzel	Mick Hoeltzel
National Cable & Telecommunications Association	NCTA
National Rural Electric Cooperative Association	NRECA
NTCA, WTA, ERTA and NECA	Rural Associations
National Tribal Telecommunications Association	NTTA
Netflix, Inc.	Netflix
O3b Limited	O3b
Public Knowledge	Public Knowledge
Richard Brown	Richard Brown
Robert Sayman	Robert Sayman
Ross Jory	Ross Jory
Rural Broadband Company, Inc.	Rural Broadband Company
Satellite Industry Association	SIA
Scott Stewart	Scott Stewart
TechFreedom	TechFreedom
Telecommunications Industry Association	TIA
Thomas Lucas	Thomas Lucas

Thomas West	Thomas West
Tom Sprunger	Tom Sprunger
University of New Hampshire Broadband Center of Excellence (filed under Dr. Rouzbeh Yassini)	UNH BCoE
Verizon	Verizon

Reply Commenters

Reply Commenter	**Abbreviation**
AT&T	AT&T
COMPTEL	COMPTEL
Internet Association	Internet Association
National Association of Telecommunications Officers and Advisors	NATOA
Open Technology Institute at New America	Open Technology Institute
United States Cellular	U.S. Cellular
Wireless Internet Service Providers Association	WISPA
Verizon	Verizon

APPENDIX B

Table, Chart, and Map Index

Tables		**Para.**
Table 1:	Simultaneous Household Uses 25 Mbps Versus 10 Mbps Download	39
Table 2:	Simultaneous Household Uses 3 Mbps Versus 1 Mbps Upload	40
Table 3:	Fixed 25 Mbps/3 Mbps Broadband Adoption Rates (2011-2013)	41
Table 4:	Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband	79
Table 5:	Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband	81
Table 6:	U.S. Territories Without Access to Fixed 25 Mbps/3 Mbps Broadband	82
Table 7:	Americans Without Access to Fixed Broadband (2011-2013)	84
Table 8:	Tribal Lands Without Access to Fixed Broadband (2011-2013)	85
Table 9:	U.S. Territories Without Access to Fixed Broadband (2011-2013)	86
Table 10:	Comparison of Demographic Data Between Areas With and Without Access to Fixed 25 Mbps/3 Mbps Broadband	88
Table 11:	Percentage of Population Without Access by Speed Tier and by County Demographic Variable	89
Table 12:	Overall Adoption Rates by Speed Tier	91
Table 13:	Overall Adoption Rates on Tribal Lands (2011-2013)	94
Table 14:	Average Adoption Rate by Speed Tier and by Demographic Variable	95
Table 15:	Americans Without Access to Mobile Services (2011-2013)	113
Charts		
Chart 1:	Residential 25 Mbps/3 Mbps Connections (2009 – 2013) (1,000s)	41
Chart 2:	American Households With Access to Multiple Providers	83
Chart 3:	Overall Adoption Rates for Fixed Broadband in Urban Areas (2011-2013)	92
Chart 4:	Overall Adoption Rates for Fixed Broadband in Non-Urban Areas (2011-2013)	93
Chart 5:	Americans Without Access to Fixed 25 Mbps/3 Mbps & Mobile 10 Mbps/768 kbps or LTE Service	121
Chart 6:	Public Elementary and Secondary School Fiber Connectivity	127
Maps		
Map 1:	Fixed 25 Mbps/3 Mbps Broadband Deployment	80
Map 2:	Mobile 10 Mbps/768 kbps Deployment	112
Map 3:	Fiber Connectivity to Schools	128

APPENDIX C

Data Sources and Definitions

Data Sources

1. *SBI Data*. The fixed and mobile deployment estimates are based upon SBI Data as of December 31, 2013, December 31, 2011, and December 31, 2012. We include the following fixed broadband services (with corresponding technology codes): Asymmetric xDSL (10), Symmetric xDSL (20), Other Wireline (all copper-wire based technologies other than xDSL) (30), Cable Modem—DOCSIS 3.0 (40), Cable Modem—Other (41), optical carrier (fiber to the home or FTTH) (50), Terrestrial Fixed Wireless (provisioned/equipped over licensed spectrum (71) or over spectrum used on an unlicensed basis (70)), Electric Power Line (90), and a catch all category, All Other (0). For mobile estimates, we include Terrestrial Mobile Wireless (80).

2. *Form 477 Data*. The fixed adoption rates rely on Residential Form 477 subscription data as of December 31, 2013, December 31, 2012 and December 31, 2011. We include the following fixed broadband services: Asymmetric xDSL (1), Symmetric xDSL (2), Other Wireline (3) (all copper-wire based technologies other than xDSL), Cable Modem (4), optical carrier (5) (fiber to the home or FTTH), Terrestrial Fixed Wireless (7) (provisioned/equipped over licensed spectrum or over spectrum used on an unlicensed basis), Electric Power Line (9), and a catch all category, All Other (0).[1]

3. *Mosaik Data*. Using the Centroid method, we report mobile deployment estimates based upon the CoverageRight data set provided by Mosaik Solutions as of January 14, 2014, January 14, 2013, and January 14, 2012.[2] We report data for the following technology groups: LTE alone, and WiMAX, HSPA+, and LTE.

4. *Demographic Data*. We rely primarily upon 2013 GeoLytics data for population and household count for the fifty states and the District of Columbia. For the U.S. Territories, we rely on the July 2012 CIA World Fact Book for population and household count. We rely on the Bureau of Labor Statistics, Labor Force Data, by county for estimates of the unemployment rate for December 2013. We rely on the ACS Five-Year Estimates 2009–2013 for income and poverty measures. These data are based upon surveys conducted from January 1, 2009 to December 31, 2013. The ACS collects survey information continuously nearly every day of the year and then aggregates the results over five years. 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. 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. The ACS surveys were conducted only for the 50 states, the District of Columbia and Puerto Rico; they did not include American Samoa, Guam, Northern Mariana Islands, or the U.S. Virgin Islands. Thus, our demographic analysis excludes the U.S. Territories for which we do not have data. 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 Adoption Rate*. We measure adoption of services at or above the speed benchmark. We rely on both Form 477 Data and SBI Data aggregated up to the census tract level. The adoption rate

[1] FCC, *Instructions for Local Telephone Competition and Broadband Reporting (FCC Form 477)*, http://transition.fcc.gov/Forms/Form477/477inst.pdf (last visited July 24, 2013).

[2] *See supra* para. 72.

is the ratio of residential connections to fixed broadband at a specified level of service quality (i.e., speed) (Form 477 Data) divided by the total number of households in the area with access to advertised broadband services of that service quality (SBI Data). We calculate adoption rates for four geographic areas: the census tract, the county, the state, and the United States as a whole.

6. *Fixed Deployment Estimates*. We measure deployment of services at or above the speed benchmark based on SBI Data. The deployment rate is the ratio of the population with access to fixed broadband service to the total population. We calculate deployment rates for three geographic areas: the county, the state, and the United States as a whole.

7. *Income Measures*. ACS Five-Year Estimates 2009-2013. We report three income measures: mean per capita income, median household income, and the poverty rate (the proportion of households living below the poverty level).[3] Mean per capita income and median household income in the past twelve months are measured in 2013 Inflation-Adjusted Dollars. The survey also reports for the households for which income data are available, the proportion of households living below the poverty threshold.

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

9. *Non-Urban Area*. A *census tract* that is not part of the "urban core."

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.

11. *Rural Population Rate.* The rural population rate is the proportion of the county population living in a rural census block as categorized in the 2010 Census.

12. *Rural Area*. The designation of a *census block* as rural is based upon the 2010 Census. The term ''rural'' encompasses all population, housing, and territory not included within an urban area.[4]

13. *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 the 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);[5] (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-

[3] U.S. Census, American Community Survey, Puerto Rico Community Survey, 2013 Subject Definitions (2013) 80-87 (discussing Income Measures in the Past 12 Months and adjustments to the data for inflation); 104-107 (discussing poverty measures).

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

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

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.

14. 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 Village Areas (area 6 defined above) and Hawaiian Home Lands (area 7 defined above).

15. Because demographic data are generally not available at the census block and the Form 477 subscription data for broadband services is available at the census tract, we aggregate the SBI Data up to the census tract. Because a census tract can be composed of Tribal lands and non-Tribal lands, a census tract is designated as one of the four Tribal land groupings if the land area of the Tribal lands comprises at least 50 percent of the land area within the census tract. The Tribal lands grouping is determined by the Tribal land that accounts for the largest proportion of the census tract. We exclude Hawaiian Home Lands from our demographic analysis because this process results in only two census tracts designated as a Hawaiian Home Land and are too few observations for the statistical analysis.

16. *Urban Area*. Our identification of areas without access to broadband services is based upon availability within a census block. 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.[6] In contrast, our demographic analysis of unserved areas and our analysis of adoption rates is based upon *census tract* data. A *census tract* is designated as urban if it is in the "urban core." A *census tract* is in the "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.[7]

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

[7] *See id*.

APPENDIX D

Americans in Urban and Rural Areas Without Access to Fixed 25 Mbps/3 Mbps Broadband by State & U.S. Territory

	All Areas			Urban Areas			Rural Areas		
	Pop.	Pop. Without Access	% of Pop	Pop.	Pop. Without Access	% of Pop.	Pop.	Pop. Without Access	% of Pop.
United States	321.325	54.560	17%	260.007	21.932	8%	61.318	32.628	53%
All States & the District of Columbia	317.264	51.988	16%	257.061	20.240	8%	60.203	31.748	53%
Alabama	4.880	1.701	35%	2.898	0.588	20%	1.982	1.113	56%
Alaska	0.740	0.285	38%	0.493	0.086	17%	0.247	0.199	81%
Arizona	6.751	1.162	17%	6.079	0.622	10%	0.671	0.540	80%
Arkansas	2.992	1.751	59%	1.704	0.668	39%	1.288	1.084	84%
California	38.338	2.601	7%	36.451	1.335	4%	1.888	1.266	67%
Colorado	5.262	0.943	18%	4.553	0.438	10%	0.709	0.504	71%
Connecticut	3.619	0.050	1%	3.184	0.029	1%	0.435	0.021	5%
Delaware	0.931	0.030	3%	0.775	0.010	1%	0.156	0.020	13%
District of Columbia	0.622	0.009	2%	0.622	0.009	2%			
Florida	19.631	1.278	7%	17.903	0.571	3%	1.728	0.708	41%
Georgia	10.129	1.403	14%	7.632	0.303	4%	2.497	1.100	44%
Hawaii	1.406	0.057	4%	1.295	0.007	1%	0.111	0.050	45%
Idaho	1.645	0.820	50%	1.174	0.446	38%	0.472	0.374	79%
Illinois	12.958	0.710	5%	11.499	0.139	1%	1.459	0.570	39%
Indiana	6.606	0.947	14%	4.816	0.160	3%	1.790	0.787	44%
Iowa	3.090	0.761	25%	2.009	0.109	5%	1.081	0.652	60%
Kansas	2.908	0.794	27%	2.190	0.282	13%	0.718	0.512	71%
Kentucky	4.435	1.767	40%	2.616	0.445	17%	1.819	1.322	73%
Louisiana	4.584	1.325	29%	3.348	0.531	16%	1.237	0.793	64%
Maine	1.340	0.291	22%	0.511	0.033	6%	0.829	0.258	31%
Maryland	5.925	0.418	7%	5.168	0.216	4%	0.757	0.202	27%
Massachusetts	6.624	0.238	4%	6.092	0.140	2%	0.532	0.098	18%
Michigan	9.858	1.250	13%	7.344	0.282	4%	2.514	0.968	39%
Minnesota	5.424	0.725	13%	4.000	0.055	1%	1.424	0.669	47%
Mississippi	3.006	1.196	40%	1.483	0.261	18%	1.523	0.935	61%
Missouri	6.103	1.792	29%	4.307	0.523	12%	1.796	1.269	71%
Montana	1.018	0.882	87%	0.574	0.482	84%	0.444	0.400	90%
Nebraska	1.867	0.502	27%	1.390	0.154	11%	0.477	0.349	73%
Nevada	2.876	0.173	6%	2.722	0.075	3%	0.155	0.098	64%
New Hampshire	1.335	0.228	17%	0.801	0.037	5%	0.534	0.191	36%
New Jersey	8.900	0.172	2%	8.430	0.112	1%	0.470	0.060	13%
New Mexico	2.136	0.643	30%	1.672	0.287	17%	0.465	0.356	77%
New York	19.531	0.518	3%	17.199	0.022	0%	2.333	0.496	21%
North Carolina	9.977	1.446	14%	6.671	0.292	4%	3.307	1.154	35%
North Dakota	0.690	0.102	15%	0.427	0.004	1%	0.263	0.098	37%
Ohio	11.587	1.935	17%	9.053	0.705	8%	2.535	1.230	49%
Oklahoma	3.856	1.882	49%	2.563	0.738	29%	1.293	1.145	89%
Oregon	3.957	0.276	7%	3.228	0.029	1%	0.730	0.248	34%
Pennsylvania	12.842	1.695	13%	10.111	0.717	7%	2.731	0.979	36%

Americans in Urban and Rural Areas Without Access to Fixed 25 Mbps/3 Mbps Broadband by State & U.S. Territory

	All Areas			Urban Areas			Rural Areas		
	Pop.	Pop. Without Access	% of Pop	Pop.	Pop. Without Access	% of Pop.	Pop.	Pop. Without Access	% of Pop.
Rhode Island	1.052	0.007	1%	0.953	0.000	0%	0.098	0.006	6%
South Carolina	4.812	1.085	23%	3.229	0.387	12%	1.583	0.698	44%
South Dakota	0.837	0.160	19%	0.489	0.003	1%	0.348	0.157	45%
Tennessee	6.547	1.148	18%	4.369	0.159	4%	2.177	0.989	45%
Texas	26.549	9.987	38%	22.585	6.653	29%	3.964	3.334	84%
Utah	2.931	0.149	5%	2.662	0.044	2%	0.268	0.105	39%
Vermont	0.630	0.502	80%	0.247	0.157	63%	0.383	0.346	90%
Virginia	8.290	1.734	21%	6.295	0.453	7%	1.995	1.281	64%
Washington	6.998	0.277	4%	5.887	0.039	1%	1.111	0.238	21%
West Virginia	1.869	1.042	56%	0.909	0.328	36%	0.960	0.714	74%
Wisconsin	5.783	0.962	17%	4.071	0.052	1%	1.712	0.910	53%
Wyoming	0.585	0.175	30%	0.378	0.023	6%	0.207	0.152	74%
U.S. Territories	4.061	2.572	63%	2.946	1.692	57%	1.116	0.880	79%
American Samoa	0.055	0.055	100%	0.042	0.042	100%	0.013	0.013	100%
Guam	0.160	0.160	100%	0.108	0.108	100%	0.052	0.052	100%
Northern Mariana Islands	0.051	0.051	100%	0.034	0.034	100%	0.018	0.018	100%
Puerto Rico	3.690	2.259	61%	2.719	1.506	55%	0.970	0.752	78%
U.S. Virgin Islands	0.105	0.047	45%	0.043	0.002	5%	0.062	0.045	72%

Population in millions.

APPENDIX E

Americans Without Access to Fixed 25 Mbps/3 Mbps Broadband by County

http://www.fcc.gov/reports/2015-broadband-progress-report

APPENDIX F

Tribal Lands Without Access to Fixed 25 Mbps/3 Mbps Broadband by State

Area	Pop.	Pop. Without Access	% of Pop.
All Tribal Lands	3,902,464	2,468,534	63%
Tribal Lands in the Lower 48 States & an Alaskan Reservation	1,048,980	714,131	68%
Alabama	295	64	22%
Alaska	1,295	1,295	100%
Arizona	177,788	168,094	95%
California	58,846	31,009	53%
Colorado	13,997	4,705	34%
Connecticut	344	25	7%
Florida	3,465	1,646	48%
Idaho	31,091	27,942	90%
Iowa	1,044	1,044	100%
Kansas	5,711	5,711	100%
Louisiana	795	549	69%
Maine	2,588	1,594	62%
Massachusetts	98	-	0%
Michigan	34,668	760	2%
Minnesota	39,007	22,650	58%
Mississippi	7,884	7,546	96%
Montana	67,182	64,349	96%
Nebraska	8,324	8,324	100%
Nevada	10,742	7,220	67%
New Mexico	138,685	123,668	89%
New York	13,095	11,047	84%
North Carolina	9,491	9,329	98%
North Dakota	23,906	14,345	60%
Oklahoma	92,608	82,478	89%
Oregon	9,014	5,292	59%
South Carolina	851	851	100%
South Dakota	63,302	38,066	60%
Texas	1,900	1,900	100%
Utah	32,391	32,171	99%
Washington	130,839	13,858	11%
Wisconsin	40,099	12,792	32%
Wyoming	27,635	13,809	50%
Tribal Statistical Areas	2,567,206	1,590,525	62%
California	3,369	13	0%
New York	2,688	682	25%
Oklahoma	2,520,507	1,589,771	63%
Washington	40,642	59	0%
Alaskan Tribal Villages	253,924	161,054	63%
Hawaiian Homelands	32,354	2,823	9%

APPENDIX G

Americans Without Access to Fixed 3 Mbps/768 kbps or 10 Mbps/768 kbps Services by State & U.S. Territory

Area	Pop. Without Access to 3 Mbps/768 kbps	% of Pop.	Pop. Without Access to 10 Mbps/768 kbps	% of Pop.
United States	13.844	4%	22.64	7%
Alabama	0.641	13%	0.762	16%
Alaska	0.1	13%	0.148	20%
Arizona	0.268	4%	0.527	8%
Arkansas	0.401	13%	0.669	22%
California	0.5	1%	1.351	4%
Colorado	0.08	2%	0.129	2%
Connecticut	0.031	1%	0.038	1%
Delaware	0.02	2%	0.025	3%
District of Columbia	0.007	1%	0.009	2%
Florida	0.585	3%	0.744	4%
Georgia	0.7	7%	0.874	9%
Hawaii	0.045	3%	0.046	3%
Idaho	0.061	4%	0.165	10%
Illinois	0.106	1%	0.344	3%
Indiana	0.258	4%	0.545	8%
Iowa	0.181	6%	0.379	12%
Kansas	0.144	5%	0.308	11%
Kentucky	0.55	12%	0.713	16%
Louisiana	0.572	12%	0.687	15%
Maine	0.122	9%	0.172	13%
Maryland	0.125	2%	0.193	3%
Massachusetts	0.064	1%	0.13	2%
Michigan	0.204	2%	0.612	6%
Minnesota	0.212	4%	0.406	7%
Mississippi	0.583	19%	0.686	23%
Missouri	0.399	7%	0.579	9%
Montana	0.137	14%	0.223	22%
Nebraska	0.021	1%	0.106	6%
Nevada	0.042	1%	0.077	3%
New Hampshire	0.078	6%	0.105	8%
New Jersey	0.068	1%	0.105	1%
New Mexico	0.177	8%	0.427	20%
New York	0.331	2%	0.393	2%
North Carolina	0.661	7%	0.787	8%
North Dakota	0.038	5%	0.083	12%
Ohio	0.307	3%	0.696	6%
Oklahoma	0.269	7%	0.77	20%
Oregon	0.077	2%	0.114	3%
Pennsylvania	0.288	2%	0.598	5%
Rhode Island	0.005	0%	0.007	1%

Americans Without Access to Fixed 3 Mbps/768 kbps or 10 Mbps/768 kbps Services by State & U.S. Territory

Area	Pop. Without Access to 3 Mbps/768 kbps	% of Pop.	Pop. Without Access to 10 Mbps/768 kbps	% of Pop.
South Carolina	0.336	7%	0.48	10%
South Dakota	0.085	10%	0.121	15%
Tennessee	0.524	8%	0.723	11%
Texas	0.879	3%	1.855	7%
Utah	0.027	1%	0.043	1%
Vermont	0.138	22%	0.162	26%
Virginia	0.589	7%	0.907	11%
Washington	0.116	2%	0.163	2%
West Virginia	0.281	15%	0.459	25%
Wisconsin	0.284	5%	0.574	10%
Wyoming	0.058	10%	0.1	17%
U.S. Territories	1.068	26%	1.316	32%
American Samoa	0.014	26%	0.055	100%
Guam	0.002	1%	0.006	4%
Northern Mariana Islands	0.019	38%	0.019	38%
Puerto Rico	0.988	27%	1.19	32%
U.S. Virgin Islands	0.045	43%	0.046	44%

Population in millions.

APPENDIX H

Overall Adoption Rates for Fixed Services by State & U.S. Territory

Area	Adoption Rate 3 Mbps/768 kbps	Adoption Rate 10 Mbps/768 kbps	Adoption Rate 25 Mbps/3 Mbps
United States	62%	52%	29%
Alabama	44%	38%	26%
Alaska	54%	45%	*
Arizona	64%	52%	42%
Arkansas	38%	29%	25%
California	65%	54%	27%
Colorado	69%	58%	*
Connecticut	69%	61%	33%
Delaware	74%	68%	*
District of Columbia	70%	59%	*
Florida	64%	56%	32%
Georgia	55%	45%	33%
Hawaii	83%	*	*
Idaho	49%	35%	29%
Illinois	57%	46%	34%
Indiana	53%	42%	25%
Iowa	33%	19%	3%
Kansas	54%	44%	26%
Kentucky	53%	41%	5%
Louisiana	46%	40%	29%
Maine	73%	54%	9%
Maryland	74%	67%	47%
Massachusetts	80%	72%	52%
Michigan	58%	50%	35%
Minnesota	58%	49%	38%
Mississippi	34%	30%	25%
Missouri	48%	41%	20%
Montana	51%	44%	25%
Nebraska	59%	42%	34%
Nevada	59%	49%	*
New Hampshire	81%	70%	52%
New Jersey	81%	75%	42%
New Mexico	49%	41%	28%
New York	78%	71%	18%
North Carolina	62%	56%	10%
North Dakota	61%	53%	40%
Ohio	62%	49%	5%
Oklahoma	44%	37%	*
Oregon	64%	54%	40%
Pennsylvania	66%	53%	37%
Rhode Island	75%	66%	*
South Carolina	58%	53%	20%
South Dakota	64%	49%	40%
Tennessee	52%	46%	37%
Texas	56%	46%	17%
Utah	66%	51%	35%

Overall Adoption Rates for Fixed Services by State & U.S. Territory

Area	Adoption Rate 3 Mbps/768 kbps	Adoption Rate 10 Mbps/768 kbps	Adoption Rate 25 Mbps/3 Mbps
Vermont	88%	59%	100%
Virginia	69%	61%	47%
Washington	68%	59%	47%
West Virginia	64%	43%	20%
Wisconsin	58%	51%	19%
Wyoming	53%	48%	5%
U.S. Territories	18%	12%	0%
American Samoa	0%	0%	NA
Guam	*	*	NA
Northern Mariana Islands	*	0%	NA
Puerto Rico	17%	*	0%
U.S. Virgin Islands	29%	*	0%

STATEMENT OF
CHAIRMAN TOM WHEELER

Re: *Inquiry Concerning the Development 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 Nos. 14-126 and 12-228.

Earlier this month, I was in Las Vegas for the annual Consumer Electronics Show, along with almost everyone else in this room. As usual, I saw innovators pushing the envelope of what is technologically possible even further than the year before. As diverse as this year's offerings were, one common element was that almost every device on display requires high-speed connectivity. The more sophisticated and powerful these products and services get, the more bandwidth they require. Our challenge at the FCC is making sure that the U.S. has continually improving fast and open broadband networks that enhance growth in this vital sector of our economy and will enable *all* Americans to enjoy the Internet-powered innovations of today and tomorrow.

In 1996, Congress had the wisdom to require the FCC to ask regularly how we are doing toward that goal. More specifically, they asked the Commission to "determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion."

Today, by issuing the first Broadband Progress Report of my chairmanship, the Commission offers its assessment of where we stand. We found that we have made notable progress, but many challenges remain. Perhaps most significantly, we found that to get the right answers we needed to update the question.

First, the good news. Private industry continues to invest billions of dollars to expand America's broadband -- $75 billion a year by one analysis. Both fixed and mobile providers continue to improve broadband speeds, and current and new entrants to the market are investing and expanding broadband availability to many Americans with speeds in some locations exceeding 1 gigabit per second (Gbps).

No doubt, we have seen improvements in our wired and wireless broadband infrastructure that are delivering real benefits for our economy and the American people. But remember what Congress asked: are "*advanced* telecommunications … being deployed to *all* Americans in a reasonable and timely fashion?" The first step to answering that question is to define "advanced telecommunications" in 2015. As this report makes clear, it ain't what it used to be.

For starters, "advanced" means at the forefront, progressive, cutting-edge. It doesn't mean the average or the happy medium. The current benchmark of 4 megabits per second (Mbps) was established in 2010, before the iPad had even been introduced. Safe to say, consumer behavior and the marketplace has changed.

Four Mbps is less than the recommended capacity to stream a single HD video. Now consider that the average connected household has seven Internet-connected devices -- including televisions, desktops, laptops, tablets, and smartphones. On any given evening, it would not be surprising to see one child doing online homework, another streaming a movie, one parent uploading data files for work, and another parent paying bills or downloading photos while also streaming music or video. That's not just tough to do with a 4 Mbps connection, it's pretty much impossible without taking turns being online, which is a non-starter. In 2015, taking turns to share the Internet bandwidth is as absurd as taking turns to use the electricity.

As I saw at the Consumer Electronics Show and during my travels across the country, true high-speed connections are crucial not only for delivering today's entertainment and basic communications, but tomorrow's innovations that will educate our children, deliver quality health care, improve energy efficiency, fill the employment ranks, and maintain the United States as the world's innovation leader for the 21st Century.

A 25 Mbps connection has become "table stakes" in 21st century communications. That's why today's report increases the benchmark for "advanced telecommunications" to 25 Mbps down, 3 Mbps up.

Why 25 Mbps?

Application and service providers, consumers, and the broadband providers are all pointing to 25/3 as the new standard. Content providers are increasingly offering high-quality video online, which uses a lot of bandwidth and could use a lot more as 4K video emerges. If you were to look at the ISPs marketing materials, most recommend speeds of 25 Mbps or higher if you plan on using multiple connected devices at the same time. Connections under 10 Mbps are marketed as "best for 1 device" and uses like sharing photos or downloading music.

Consumers are flocking to 25/3 when they have the opportunity. The percentage of consumers adopting 25/3 has quadrupled since 2011 and 2013 – from 7 percent to 29 percent.

So, today's report sets the standard for advanced telecommunications as 25 Mbps broadband service. That leads to the follow up question: Are those services being "deployed to all Americans in a reasonable and timely fashion?" Simply put, no.

Nationwide, 17 percent of U.S. households -- about 1 in 6 Americans -- don't have access to 25 megabit broadband.

There is a large, and unacceptable, disparity in broadband access between urban Americans and Americans in rural areas and Tribal lands.

In rural areas, more than half – 53 percent – lack access to broadband at the new benchmark; in Tribal lands, it's almost two thirds – 63 percent – that lack access. The disparity persists at all speeds. For example, at our previous benchmark of 4 Mbps/1 Mbps, 20 percent of Americans in rural areas cannot get that level of service. In urban areas, only 1 percent lack access to that service. Sadly, we wouldn't be where we need to be on broadband deployment to all Americans, even if we hadn't increased the benchmark speed.

Despite the billions in network investment, progress in deployment of faster networks to underserved areas is too slow. The percentage of Americans without access to 25/3 service came down only 3 percentage points between 2012 and 2013, and improvement was even slower in rural areas.

The FCC doesn't just have a statutory obligation to report on the status of broadband deployment; we have a duty to take immediate action if we assess that the goal of deployment to all Americans is not being met. And act we have.

We have many ongoing efforts to remove barriers to infrastructure investment and promote competition. For example:

- In June and December, the Commission issued two Connect America Fund orders that will disburse $11 billion to support build-out to Americans in rural areas without broadband;

- The Commission is well underway to provide support to mobile providers that will extend voice and broadband services to unserved areas;
- We have allocated $75 million and provisionally selected participants for the Rural Broadband Experiments, which will bring next generation service to rural, high cost, and Tribal areas; and
- Our E-rate Modernization efforts are expected to support the deployment of fiber to schools that need it to support digital learning.

But we acknowledge that more efforts may be needed. Today, we are issuing a Notice of Inquiry seeking comment on additional ways to bring 25 megabit broadband to all Americans in a reasonable and timely fashion, beyond what we have done to date.

There's an old adage from my days in the private sector that, "What gets measured gets managed." Today's report offers a valuable assessment of U.S. broadband and will hopefully serve as an impetus for meaningful improvements in the speed and availability of true high-speed networks for all Americans. We know where we need to be. Now we need to do the hard work to get there.

Thank you to the members of the FCC staff who worked on this report, notably Julie Veach and her team in the Wireline Bureau. This team has done a great public service by raising the bar for broadband in America.

STATEMENT OF
COMMISSIONER MIGNON CLYBURN

Re: *Inquiry Concerning the Development 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.

When afforded the opportunity to travel internationally, I beam with pride as I represent this great nation. So many look to the United States for expertise and leadership because of our advanced broadband networks, world-class research, innovation and investment and more.

We lead and are admired in large part because we are visionary – we are never satisfied with the status quo. We want to be better, we continue to push the limits and that is most notable when it comes to technology.

At CES, we witnessed some amazing innovations, like wearables, which promise to greatly improve the quality of life, particularly for our most vulnerable and fragile. But without ubiquitous broadband, and absent the means to connect, these incredible inventions are simply gadgets and flashy expensive toys for us to gaze, marvel and wonder.

As consumers adopt and demand more from their platforms and devices, the need for broadband will increase requiring robust networks to be in place in order to keep up. And what is crystal clear is that the broadband speeds of yesteryear are woefully inadequate today and beyond

So today's Broadband Progress Report adopts a forward-looking speed of 25 Mbps to ensure that America continues to lead the world and meet the needs of its consumers because as a nation we should always aspire to deliver the very best. We must ensure that all consumers have access to these life-changing technologies. Yet, what the Report affirms is that too many Americans still lack access to the broadband speeds to support the very technologies that promise to be both life altering and life-saving.

Today, however, that persistent gap affects too many households especially those who are low-income Americans, living on Tribal lands and in rural communities. This is unacceptable. And we must do more.

We must not be in such a rush to declare victory until we can honestly proclaim that we have broken down the barriers to broadband adoption, accelerated the deployment of broadband networks, and have ensured that broadband technology continues to evolve and keep pace with consumer needs.

I also believe is that the FCC has an obligation and the ability to tackle some of these barriers through the modernization of its Lifeline program. Affordability remains a barrier for too many and a recent report from the Southern Education Foundation affirmed what we already knew if we bothered to pay attention -- over 50% of our students enrolled in public schools today are living in poverty. We took a noble and noteworthy step just a few weeks ago to close the broadband gap for schools and libraries but the race is not won if it is plain to see that millions of families are still struggling to gain educational and economic parity in part because they remain disconnected at home.

Will modernizing the Lifeline solve the adoption, connectivity and educational disparity problems on its own? No, it will not. But what it will do, and what is incumbent upon the FCC to do, is to use every tool at its disposal to close as many layers of the connectivity divide as possible. Last November, I outlined principles to reform the Lifeline Program and today I am reissuing the call to all stakeholders to engage now for the returns of greater connectivity to our society are limitless. As Michelangelo famously

said, “The greatest danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it.”

I want to thank the staff of the Wireline Competition Bureau and the Wireless Telecommunications Bureau for their work on this item.

STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *Inquiry Concerning the Development 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 Nos. 14-126 and 12-228.

Broadband is not just a technology, it's a platform for opportunity. Extending its reach across this country is our new manifest destiny because it is an essential part of modern civic and commercial life. No matter who you are or where you live, you need access to modern communications to have a fair shot at prosperity in the 21st century.

Our report today is our most comprehensive snapshot of where we stand in bringing broadband to all Americans. I am pleased that the report shows that we are making some headway in extending the reach of this service, thanks in no small part to the tremendous investment that communications providers are making to deploy broadband across the country. At the same time, the report highlights places where we have more work to do, namely in rural and Tribal areas.

It was just five years ago that the Commission changed our downstream broadband speed threshold from 200 kilobits to 4 Megabits. Today, we up the ante and change that threshold to 25 Megabits. Chairman Wheeler has pressed for this change—and I am pleased to support it.

But I, for one, am tired of dreaming small. It's time to dream big. This is the country that put a man on the moon. We invented the Internet. We can do audacious things—if we set big goals. I think our new threshold should be 100 Megabits. I think anything short of that shortchanges our children, our future, and our digital economy.

I don't think reaching a benchmark like this is easy—but nothing worthwhile ever is. Still, the history of technological innovation is rife with examples of the great depths of American known-how. It is time to put that know-how to work and use it to bring really big broadband everywhere.

DISSENTING STATEMENT OF COMMISSIONER AJIT PAI

Re: *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.

Before Humpty Dumpty had a great fall in *Through the Looking-Glass*, he told Alice, "When I use a word, . . . it means just what I choose it to mean—neither more nor less."[1] So too, apparently, at the FCC. For today's report declares that 10 Mbps Internet access service is no longer broadband. Only 25 Mbps or more counts.

This decision should surprise American consumers. 71% of consumers who can purchase fixed 25 Mbps service—over 70 million households—choose not to.[2] And before today, 58 million Americans thought they had subscribed to mobile broadband.[3] But now the FCC says they're getting something else.

This decision should also surprise the FCC itself. Just last month, the agency voted to spend $10.8 billion over the next six years to deploy what it called 10 Mbps "broadband" so that millions of rural Americans could enjoy "access to *advanced* telecommunications and information services."[4] That's billions of dollars that may help Americans get the Internet access services they actually want. But apparently that funding won't be supporting broadband, even though last month's item, in fact, used that term no fewer than 320 times.

Indeed, today's report raises the question: Why are we spending over $10 billion to deploy something that isn't broadband? Don't those in rural America deserve broadband access? Taken together, our decision last month and our decision today are incoherent.

Unfortunately, rather than "assessing common household broadband uses or relying on broadband adoption rates as bases for establishing a speed benchmark," as we proposed to do last summer,[5] the Commission picks an arbitrary 25 Mbps threshold. It does this by looking at ISPs' marketing materials,[6] asking what speed is needed to stream 4K video that few actually watch,[7] and italicizing the word *advanced* nine separate times.[8] Random factors like these are hardly a compelling basis for policymaking.

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[1] Lewis Carroll, *Through the Looking-Glass* 94 (Random House ed., 1946).

[2] *See Report* at Table 3 & Chart 1.

[3] FCC, Internet Access Services: Status as of December 31, 2013 at 4 (Oct. 2014) (reporting the number of 10 Mbps mobile connections), *available at* http://go.usa.gov/SwPd.

[4] *Connect America Fund; ETC Annual Reports and Certifications; Petition of USTelecom for Forbearance Pursuant to 47 U.S.C. § 160(c) from Obsolete ILEC Regulatory Obligations that Inhibit Deployment of Next-Generation Networks*, WC Docket Nos. 10-90, 14-58, 14-192, Report and Order, FCC 14-190, paras. 15–16 (rel. Dec. 18, 2014) (*CAF Phase II Order*) (emphasis added); 47 U.S.C. § 254(b)(2).

[5] *Tenth Broadband Deployment NOI*, 29 FCC Rcd at 9751, para. 7.

[6] *Report* at paras. 28, 53.

[7] *Report* at Table 1 & paras. 46, 47.

[8] *Report* at paras. 3, 23, 47, 48, 49, 53, 53, 54, 140.

Instead, the driving factor in defining broadband should be consumer preference. And only this year has the majority of consumers with access actually adopted speeds of 10 Mbps or higher.[9] That's why the FCC acknowledged when we commenced this inquiry that 10 Mbps accommodates the needs of consumers whose intensity of Internet use spans a broad range. At 10 Mbps, one family member could stream a super HD movie, another could make an HD video call, and yet another could deliver files to and retrieve them from the cloud, all while everyone in the house sends emails, gets alerts, and checks the weather.[10] Similarly, consider that the median American Internet service provider streamed Netflix at a rate of 3.14 Mbps in December.[11] This means that members of a household could stream an episode of *House of Cards*, Aziz Ansari's latest standup routine, and *Sesame Street* all at the same time with a 10 Mbps connection.[12]

But for some time now under this Administration, grounding the new benchmark for broadband in reality hasn't been the point. No, the ultimate goal is to seize new, virtually limitless authority to regulate the broadband marketplace. Under its interpretation of section 706 of the Telecommunications Act, the FCC can do that only by determining that broadband is not "being deployed to all Americans in a reasonable and timely fashion"—or, more colloquially, by ignoring the consistent progress in Internet connectivity that's obvious to anyone with a digital connection and an analog pulse.[13] That explains why the FCC rewrote the statutory test the last time it was considering net neutrality rules.[14] That explains why this Administration has studiously excluded satellite and mobile broadband services from its evaluation.[15] And that explains why the FCC is suddenly upping the benchmark by a factor of six.[16] A thriving marketplace must be found to have failed so that the agency can regulate it back to health. We'll see if the agency sticks with this benchmark when it really matters—in rulemakings and adjudications to come.

Instead of reciting a slew of facts to demonstrate why broadband clearly is being deployed to all Americans in a reasonable and timely fashion, I'll stick with just two: 98.5% of Americans now live in areas covered by 4G LTE networks (*i.e.*, networks capable of delivering 12 Mbps mobile Internet

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[9] *CAF Phase II Order*, FCC 14-190, at para. 17.

[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*, GN Docket No. 14-126, Tenth Broadband Progress Notice of Inquiry, 29 FCC Rcd 9747, 9754, Table 2 (2014) (*Tenth Broadband Deployment NOI*).

[11] Netflix, USA ISP Speed Index Dec. 2014, http://ispspeedindex.netflix.com/usa (last visited Jan. 28, 2015) (reporting speed for Charter). The fastest reported speed was only 3.36 Mbps. *Id.* (reporting speed for Verizon FiOS).

[12] Given these facts and our prior findings, I find it puzzling that the report blithely asserts that a 10 Mbps connection is insufficient for members of a household to simultaneously "[p]articipate in an online class, download files, and stream a movie" or "[v]iew 2 HD videos." *Report* at Table 1.

[13] 47 U.S.C. § 1302 (codifying the Telecommunications Act of 1996, Pub. L. No. 104-104, § 706, 110 Stat. 153 (as amended)).

[14] *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, 27 FCC Rcd 10342, 10518–21 (2012) (Dissenting Statement of Commissioner Ajit Pai) (explaining the switch in 2010 and why the new test cannot be reconciled with the statutory language), *available at* http://go.usa.gov/Sm6A.

[15] *Report* at paras. 74–76 (repeating the refrain that mobile and satellite data will be excluded because they "may overstate actual deployment").

[16] The benchmark before today was 4 Mbps. *See Report* at para. 3.

access).[17] That's 97.99 million more Americans than just two years ago.[18] And that's real, concrete progress towards universal—dare I say it—broadband service. Further, one can only smile at the irony of the Commission's insistence in finding failure the *very same month* that Google announces expansion of the Google Fiber project to 18 new cities, companies like Dish introduce over-the-top video options that rely on broadband, and bids for AWS-3 mobile broadband spectrum approach $45 billion. At some point, the agency has to take "yes" for an answer when it comes to broadband deployment.

All of this ends with a Kafkaesque twist. The statute that inspires this exercise in broadband reporting tells us to accelerate broadband deployment "by removing barriers to infrastructure investment."[19] Yet the FCC appears dead set on doing precisely the opposite. The report itself offers no plan of action. And when you survey the Commission's future agenda, barriers dot the horizon, from regulating the Internet like a public utility next month to slowing down the IP transition to micromanaging spectrum policy. Each of these policies, and others, will reduce broadband investment, raise the cost of deployment, and deter competitive entry into the broadband market. That's not what the American consumer wants or deserves.

For all of these reasons, I dissent.

[17] *Report* at para. 109.

[18] *Cf. Report* at para. 109.

[19] *See* 47 U.S.C. § 1302 ("If the Commission's determination is negative, it shall take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market.").

DISSENTING STATEMENT OF COMMISSIONER MICHAEL O'RIELLY

Re: *Inquiry Concerning the Development 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.

Today's Report, which is the one thing that section 706 actually does authorize, relies on intentionally flawed analyses to find that broadband is not being deployed to all Americans in a reasonable and timely fashion. Equally problematic, it is accompanied by an embarrassingly weak NOI that confirms the Commission has no concrete plans to promote broadband deployment, particularly in rural and unserved areas. Accordingly, I must dissent from the item.

The Report sets a new broadband benchmark of 25/3 Mbps for purposes of section 706, which I suspect will be applauded by some as a sign that the Commission supports ever higher speeds. And, to be clear, I too support higher speeds for all Americans. But selecting an artificially high standard and applying it in a way that is impossible to achieve in order to reach all Americans, certainly in the near term, makes a mockery of a process that was supposed to provide an honest assessment of broadband deployment in the United States. Some have suggested that it is designed to preserve the ability to regulate broadband under section 706 even as the Commission seems poised to reclassify broadband as a Title II service. Regardless of the reason, I cannot support this charade.

To justify setting the new benchmark at 25/3, as opposed to the current 4/1 or even 10/1 as several commenters suggested,[1] the Report notes that 4K TV requires 25 Mbps. But 4K TV is still relatively new and is not expected to be widely adopted for years to come.[2] While the statute directs us to look at "advanced" telecommunications capability, this stretches the concept to an untenable extreme. Some people, for example, believe, probably incorrectly, that we are on the path to interplanetary teleportation.[3] Should we include the estimated bandwidth for that as well?

Perhaps recognizing the weakness of that line of argument, the Report quickly shifts from analyzing individual usage to household usage in order to multiply the speed requirements. It assumes that several users and/or devices in a household are simultaneously engaged in very high-bandwidth activities. But while the Report cites evidence that households have many devices, and that some devices are used for high-bandwidth activities, there's no actual data in the Report linking the two. Unless four or more people are each streaming HD videos at the same time, which is neither the norm nor the analysis required by the statute, it's hard to come up with a use case that warrants the 25/3 standard. Other activities, such as email, VoIP calls, and web browsing are simply not data intensive enough to approach this benchmark.

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[1] *See, e.g.*, NATOA Reply Comments at 3 (supporting 10 Mbps down for residential); CWA Comments at 1 (supporting 10 Mbps/1.5 Mbps); SIA Comments at 2; Hughes Comments at 2.

[2] *See, e.g.*, Business Insider, Our 4K Future — The New TV Standard Is Here And It Will Roll Out Much Faster Than HD (Mar. 12, 2014), http://www.businessinsider.com/the-rise-of-4k-tv-2014-3#ixzz3OFobgNAx ("4K-capable TVs will be in 10% of all North American households by year-end 2018. We forecast that this number will reach 50% by the end of 2024, just 10 years from now.").

[3] *See* Pew Research Center, Reality check: How close are we to teleportation and Mars colonies? (Apr. 17, 2014), http://www.pewresearch.org/fact-tank/2014/04/17/reality-check-how-close-are-we-to-teleportation-and-mars-colonies/.

Having settled on this new standard, it comes as no surprise that the Report finds that 25/3 service is not being deployed to all Americans. By setting the benchmark at this level, the Report is able to exclude both mobile and satellite broadband service from its analysis, despite the ever expanding capabilities and popularity of both services.

Even worse, it makes the finding by misreading the phrase "is being deployed", and by giving essentially no weight to the statutory language "in a reasonable and timely fashion". The former suggests that the Commission should look at "progress—not total achievement" as my colleague Commissioner Pai has said before.[4] The latter implies that the Commission should take into account factors such as network engineering and the economics of serving rural and other high-cost areas. Read together, these provisions appropriately recognize that deployment to all Americans isn't going to be uniform and certainly can't happen overnight. Following that reasoning, the Commission would still be able to evolve the standard (at a realistic pace) while reaching a positive finding as long as there has been reasonable and timely progress towards it.

In fact, the data in the report suggest that there could be a positive finding even at the higher standard using the more realistic analysis required by the statute. Between 2011 and 2013, the percentage of Americans lacking access to 25/3 dropped from 28 percent to 17 percent. That's remarkable given that the high benchmark limits the number of technologies, and therefore providers, that are currently able to offer such service. The Report takes issue with the fact that the gap narrowed by just three percentage points between 2012 and 2013. But that's not at all surprising given that providers quickly confront a significant cost curve as they edge out into more rural areas. Indeed, that is why the Commission created a Remote Areas Fund to help bring alternative technologies such as fixed wireless and satellite broadband to areas that it knew could not be cost-effectively served by "wireline or cellular terrestrial broadband technologies" (much less fiber).[5]

Nonetheless, the Report narrowly holds that if some Americans do not have access to 25/3, then the standard isn't met. This inflexible test constructed by the majority, which ignores the significant time and costs required to expand and upgrade networks, simply does not comport with the statute or with reality. It also ensures that any standard the Commission sets will never be met, which seems to be the purpose.

In a startling confession of things to come, the report suggests that the "day may be fast approaching" when the consumers must have wired and wireless broadband, assumedly at 25/3 or a higher standard. In other words, it's not one or the other but both, and it means that wireless can never be a substitute for wireline but should be viewed as "distinct product offerings". This admission highlights that the Commission has a broadband vision completely divorced from reality. Such a precarious path of thinking should cease immediately. While consumers may use the wireless and wireline broadband

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[4] *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 (2012) (Dissenting Statement of Commissioner Ajit Pai), https://apps.fcc.gov/edocs_public/attachmatch/FCC-12-90A1.pdf.

[5] *See Connect America Fund; A National Broadband Plan for Our Future; Establishing Just and Reasonable Rates for Local Exchange Carriers; High-Cost Universal Service Support; Developing an Unified Intercarrier Compensation Regime; Federal-State Joint Board on Universal Service; Lifeline and Link-Up; Universal Service Reform— Mobility Fund*, WC Docket Nos. 10-90, 07-135, 05-337, 03-109, GN Docket No. 09-51, CC Docket Nos. 01-92, 96-45, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, para. 533 (2011) (USF/ICC Transformation Order), http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-11-161A1_Rcd.pdf.

differently today, it does not mean that they could not use one for the other if that is all that was available to them (based on many factors, including cost). Procedurally, it perpetuates the strong belief that the Commission is seeking the next justification for a negative finding for American broadband deployment.

Adding insult to injury, appended to the Report is a scant NOI on ways to accelerate broadband deployment. If the state of broadband deployment is so dire, one would think it would warrant at least an NPRM and, ideally, one with concrete proposals to remedy the alleged problems. I could have supported a true NPRM. Regardless of whether the section 706 finding is positive or negative, there is always more that the Commission can do to promote broadband deployment. Where are the proposals to remove barriers to market entry? Where are the suggestions of FCC regulations that should be repealed or waived to promote broadband deployment?

Goals without actions are meaningless – as the Report itself underscores. Several years into its universal service reforms, 20 percent of rural Americans still do not have access to even 4/1 service that was the goal at the time. Part of this is due to the slow pace of the reforms themselves. But it is also due to a failure to focus on unserved areas.

Last year, as we proposed and then adopted various Connect America Fund reforms, I was told not to worry about unserved consumers because "virtually everyone" has access to at least 4/1. Based on my experience and travels throughout rural America, I knew that wasn't the case and today's Report bears that out. Unfortunately, it comes a month after the Commission made certain decisions that shift some of the funding to upgrade existing service in lower cost areas rather than connecting unserved consumers in truly high-cost areas. What is more, in many parts of the country, after six or more years, those upgrades are only guaranteed to get consumers to 10/1 service – a level that, as of today, we no longer consider to be true broadband service. I look forward to the Commission defending to Congress the second class citizen status for rural Americans rendered under this conclusion.

Although some decisions have been finalized, there are other opportunities to accelerate broadband deployment in truly unserved areas if the Commission finally devotes time to them. In particular, the Commission should fully commit itself to completing a plan for the Remote Areas Fund to ensure that the hardest to reach consumers are not left behind indefinitely. The Commission also needs to adopt a Connect America Fund for rate-of-return carriers.

Another key way to accelerate broadband deployment is to remove unnecessary regulations. For example, the Commission has an open proceeding on streamlining the Part 32 accounting rules. In addition, the Separations Joint Board is currently considering comprehensive reform of the Part 36 separations requirements. I have questioned the need for both sets of rules and I hope that we will soon consider orders sunsetting both, at least on a voluntary basis.

Finally, the Commission must refrain from imposing costly new requirements that deter broadband investment and deployment. Unfortunately, the Commission has been moving in the opposite direction. For example, the Commission recently made it harder for carriers to discontinue legacy services – a decision I dissented from because it will force carriers to continue to bear the cost of maintaining legacy services and networks instead of focusing those resources on new deployments.

And, now, the Commission appears ready to reclassify broadband as a Title II service. While the Commission is expected to forbear from a number of the Title II provisions, there will undoubtedly be at least some (and I suspect many) burdensome new requirements on broadband providers, including a whole host of small businesses. In addition, there will be a protracted period of uncertainty as parties challenge various decisions at the Commission and in the courts that will also deter investment in broadband.

In sum, I am deeply disappointed in both the Report and NOI. As an expert agency for communications, we are expected to deliver high-quality reports on the state of the industry and put forth consistent and thoughtful ideas to improve access to modern communications networks. Today, we fail to do both. I dissent.