Internet Access Services: Status as of December 31, 2016

Industry Analysis and Technology Division Wireline Competition Bureau February 2018



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SECTION 1: OVERVIEW & HIGHLIGHTS

Introduction

This report summarizes information about Internet access connections in the United States as of December 31, 2016 as collected by FCC Form 477. For purposes of this report, Internet access *connections* are those in service, over 200 kilobits per second (kbps) in at least one direction, and reported to the FCC through Form 477.¹

The report includes data on total and residential Internet access connections by downstream and upstream speed, by technology, by geography, and over time. Section 2 of the report presents nationwide statistics, Section 3 provides state-level data, and Section 4 includes data on the subscribership differences among counties and census tracts.² In addition, Section 5 of the report includes an analysis of the correlations between subscribership ratios and various demographic measures.³ Maps depicting the number of fixed connections per 1,000 households by census tract and the number of fixed providers by census block are available online at <a href="https://www.fcc.gov/reports-research/reports/internet-access-services-reports/internet-access-servi

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¹ See the Technical Notes and Glossary at the end of this report for more-detailed information about the Form 477 data collection and the meaning of terms used in this report. Note that the Form 477 data for the June 30, 2014 filing period were not subject to typical quality checks. See Internet Access Services: Status as of December 31, 2014 (March 2016) at 2, available at https://apps.fcc.gov/edocs-public/attachmatch/DOC-338630A1.pdf. In addition, the figures on mobile broadband subscribership by speed tier (formerly Figures 4(a), 4(b), and 12) have been removed to maintain firm confidentiality.

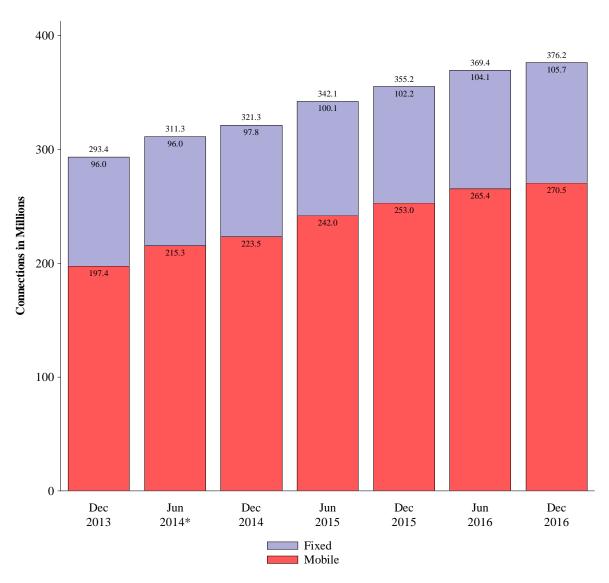
² The Commission began collecting census tract-level data for data as of December 31, 2008. *See High-Speed Services for Internet Access: Status as of December 31*, 2008 (February 2010) (*December 2008 High-Speed Report*) at 1-4, available at http://www.fcc.gov/encyclopedia/high-speed-services-internet-access-reports.

³ Publicly-available data that are too voluminous to include in this report are available online at https://www.fcc.gov/general/fcc-form-477-additional-data.

Total Connections

- As shown in Figure 1, the total number of Internet connections increased by about 6% between December 2015 and December 2016 to 376 million.
- Most of the growth in total Internet connections is attributable to increased mobile Internet access subscribership. The number of mobile Internet connections increased 7% year-over-year to 270 million in December 2016, while the number of fixed connections grew to 106 million up about 3% from December 2015.

Figure 1
Fixed and Mobile Connections 2013-2016

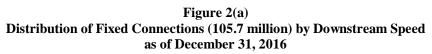


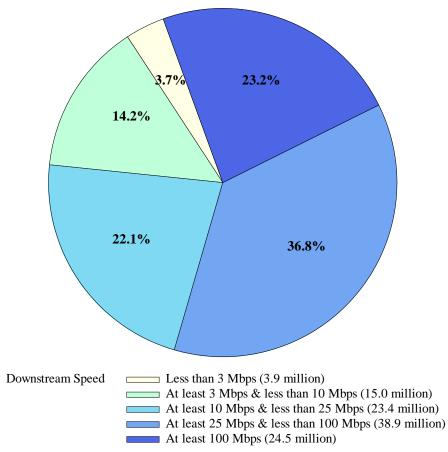
^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

The Commission approved changes to the Form 477 in June 2013 that affect the data beginning in June 2014 (see Technical Notes). Some previously-published data may have been revised. Figures may not sum to totals elsewhere in this report due to rounding. Connections include both residential and business connections.

Connections by Speed

<u>Fixed connections – downstream speeds</u>. Figure 2(a) illustrates how the 106 million fixed connections reported for December 2016 were distributed across the five groups of **downstream speeds** defined by breakpoints at 3 Mbps, 10 Mbps, 25 Mbps, and 100 Mbps.



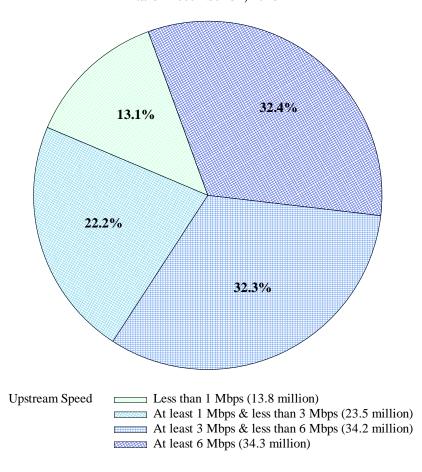


• In December 2016, 4% of fixed connections (or 4 million connections) were slower than 3 Mbps downstream, 14% (or 15 million connections) were at least 3 Mbps downstream but slower than 10 Mbps, 22% (or 23 million connections) were at least 10 Mbps downstream but slower than 25 Mbps, 37% (or 39 million connections) were at least 25 Mbps downstream but slower than 100 Mbps, and 23% (or 25 million connections) were at least 100 Mbps.⁴

⁴ See Figure 9.

<u>Fixed connections – upstream speeds</u>. Figure 2(b) illustrates how the 106 million fixed connections reported for December 2016 were distributed across the four groups of **upstream speeds** defined by breakpoints at 1 Mbps, 3 Mbps, and 6 Mbps.

Figure 2(b)
Distribution of Fixed Connections (105.7 million) by Upstream Speed as of December 31, 2016



• In December 2016, 13% of fixed connections (or 14 million connections) were slower than 1 Mbps upstream, 22% (or 24 million connections) were at least 1 Mbps upstream but slower than 3 Mbps, 32% (or 34 million connections) were at least 3 Mbps upstream but slower than 6 Mbps, and 32% (or 34 million connections) were at least 6 Mbps upstream.⁵

Fixed connections by downstream speed over time. Figure 3 illustrates how the composition of total fixed Internet connections by different speed groups has changed from 2013 to 2016.

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⁵ Ibid.

100.1 102.2 104.1 105.7 100 97.8 12.3 15.5 18.4 24.5 96.0 96.0 4.8 30.4 31.9 34.0 37.5 39.2 40.8 38.9 75 Connections in Millions 33.0 29.9 27.4 50 25.8 25.1 24.1 23.4 21.8 20.2 25 18.8 18.0 16.6 15.7 15.0 10.0 9.1 8.1 6.5 5.8 5.0 3.9 0 Dec Jun Dec Jun Dec Jun Dec 2013 2014* 2014 2015 2015 2016 2016 At least 100 Mbps At least 25 Mbps and less than 100 Mbps At least 10 Mbps and less than 25 Mbps At least 3 Mbps and less than 10 Mbps Less than 3 Mbps

Figure 3
Fixed Connections by Downstream Speed 2013-2016

The Commission approved changes to the Form 477 in June 2013 that affect the data beginning in June 2014 (see Technical Notes). Some previously-published data may have been revised. Figures may not sum to totals elsewhere in this report due to rounding. Connections include both residential and business connections.

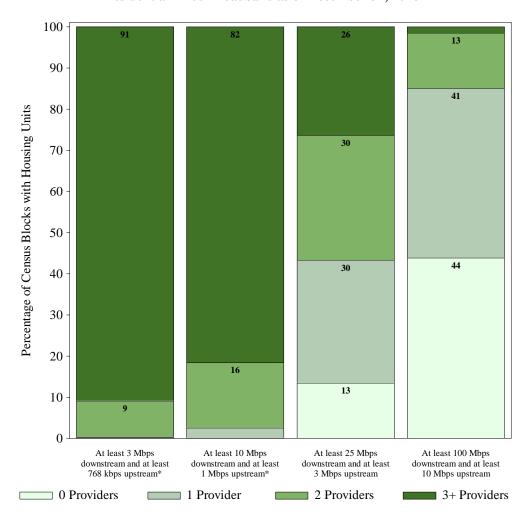
• The percentage of fixed connections with a downstream speed of at least 25 Mbps has grown from 33% (or 31 million connections) in December 2013 to 60% (or 63 million connections) in December 2016. Over the same period, the percentage of fixed connections with slower downstream speeds of less than 3 Mbps has decreased from 10% (or 10 million connections) in December 2013 to 4% (or 4 million connections) in December 2016.

^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

Number of Providers by Census Block

In Figure 4, we show the percentage of "developed" census blocks – blocks that contain housing units – with zero, one, two, or three or more fixed broadband providers offering residential Internet access service at different speeds in December 2016. This information is taken from the block-level Form 477 fixed broadband deployment data that the Commission began collecting in 2014. A provider that reports offering service in a particular census block may not offer service, or service at that speed, to all locations in the census block. Accordingly, the number of providers shown in Figure 4 does not necessarily reflect the number of choices available to a particular household and does not purport to measure competition.

Figure 4
Percentages of Developed Census Blocks in which Providers Reported the Deployment of Residential Fixed Broadband as of December 31, 2016

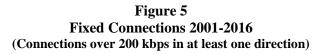


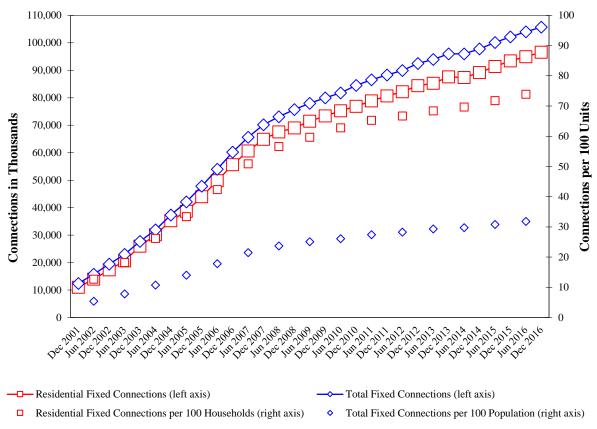
^{*} Satellite service providers report offering Internet access at bandwidths of at least 10 Mbps downstream and 1 Mbps upstream in 99.1% of developed census blocks

Column figures may not sum to 100% due to rounding. Developed census blocks are those with housing units based on the 2010 census

Internet Access Subscribership

Figure 5 illustrates the number of total and residential fixed Internet access connections (connections over 200 kbps in at least one direction except mobile wireless connections), as well as the number of total fixed connections per 100 persons and the number of residential fixed connections per 100 households, since 2001.⁶





• Between December 2006 and December 2016, total (business and residential) fixed connections grew from 60 million connections to 106 million connections – at a compound annual growth rate of 6% per year.⁷

⁶ For data through December 2004, only those providers with at least 250 connections in a state were required to report. Historical fixed-location connection counts not included in this report may be found in *June 2008 High-Speed Report* at Tables 1 and 3, available in Excel format at https://www.fcc.gov/general/reports-high-speed-services-internet-access.

⁷ The compound annual growth rate (CAGR) is a smoothed rate of growth calculated in three steps. First, divide the ending value by the beginning value. Second, raise the result of that division to a power equal to one divided by the number of years in the period (in this case, 10 years, so the power is 1/10). Third, subtract the number one from the result of the second step.

- Over the same ten-year period, residential fixed connections grew from 56 million connections to 97 million connections also at a compound annual growth rate of 6% per year.
- From June 2006 to June 2016, the number of residential fixed connections per 100 U.S. households increased from 42 to 74.8

Other Report Highlights

Average speeds

• The median downstream speed of all reported fixed connections was 40 Mbps and the median upstream speed was 5 Mbps. For residential fixed connections, the median downstream speed was 50 Mbps and the median upstream speed was 5 Mbps.

Residential connections

- Residential fixed Internet access connections increased by about 3% between December 2015 and December 2016, to 97 million. See Figure 7.
- Residential (non-business) mobile wireless Internet access connections on mobile devices with data plans for full Internet access increased by 7%, to 226 million, between December 2015 and December 2016. See Figure 7.
- Approximately 81% of residential fixed connections had a speed of at least 10 Mbps downstream and 1 Mbps upstream in December 2016, while 62% had a speed of at least 25 Mbps downstream and 3 Mbps upstream. About 24% percent of all residential fixed connections had a downstream speed of at least 100 Mbps. See Figures 10 and 27.
- As a national average in December 2016, there were 66 residential fixed connections with speeds of at least 10 Mbps downstream and 1 Mbps upstream per 100 households. See Figure 32.

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⁸ We calculate residential fixed connections per 100 *households* using, in the denominator, U.S. household estimates from the Census Bureau's Current Population Survey (CPS) for July of each year and, for Puerto Rico and the other inhabited island areas, Census 2010 households for 2010 and later years and Census 2000 households for the earlier years. (The CPS also estimates U.S. households for March and November of each year.) Figure 5 also shows total (business and residential) fixed connections per 100 *population*, which we calculate using U.S. Census Bureau population estimates for the United States and Puerto Rico – which are as of July 1 each year – and, for the remaining inhabited island areas, Census 2010 population for 2010 and later years and Census 2000 population for the earlier years. This statistic incorporates connections to business locations into a comparison to persons. (We note that the ratio of accurately-measured residential fixed connections to population has a maximum value for any given country and point in time – the value when every household is connected – if we assume that no household would have more than one fixed connection to its premises. For the United States in June, for example, the maximum value would be 39 because there were about 128 million households in the United States and inhabited insular areas and a population of about 327 million according to the sources used for Figure 5.)

⁹ Increases over time in the ratio of residential fixed connections to households indicate that increasing shares of households are connected at home. The ratio is somewhat different from the "take rate" of offered service (which may also be called an "adoption rate") because some households may be located in areas where no fixed-location service is offered. These methodological differences are discussed in greater detail in *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,*

Census tract and county shares of households with reportable connections

• We estimate the share of households with fixed Internet access connections in individual census tracts and counties as of December 31, 2016.¹⁰ We continue to observe substantial variation among these estimates. See Figures 37 and 39.

Household subscribership rates and demographics

• The report includes charts that illustrate correlations between household subscribership rates and demographic measures. We update charts based on income, household density, education, age, and race. The data indicate that some demographic variables are correlated with Internet access subscribership rates. See Figures 44-50.

Amended by the Broadband Data Improvement Act, GN Docket No.11-121, Eighth Broadband Progress Report, 27 FCC Rcd 10342, 10386, para. 94 (2012).

¹⁰ For both census tracts and counties, we continue to find estimates above 100% for the share of households with fixed Internet access connections. *See* p. 57 for more information.

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Figure 6
Connections over 200 kbps in at Least One Direction 2012-2016
(In thousands)

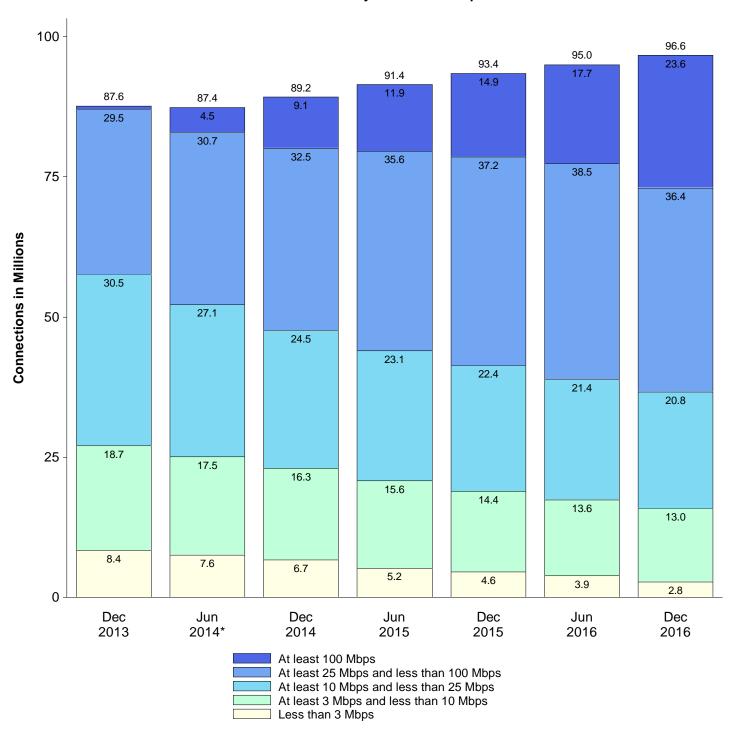
	2012 2013		3	3 2014		2015		2016	
Technology	Dec	Jun	Dec	Jun*	Dec	Jun	Dec	Jun	Dec
Total	262,564	284,692	293,397	311,284	321,305	342,096	355,229	369,431	376,221
Total Fixed	92,511	93,986	96,032	95,998	97,810	100,134	102,212	104,056	105,727
Mobile Wireless	170,053	190,706	197,365	215,286	223,495	241,962	253,017	265,375	270,494

Figure 7
Residential Connections over 200 kbps in at Least One Direction 2012-2016 (In thousands)

	2012 2013		3 2014		2015		2016		
Technology	Dec	Jun	Dec	Jun*	Dec	Jun	Dec	Jun	Dec
Total	215,817	235,273	246,797	264,343	273,950	292,279	303,655	316,467	322,364
Total Fixed	84,392	85,277	87,599	87,360	89,196	91,419	93,430	94,979	96,616
Mobile Wireless	131,425	149,996	159,197	176,983	184,754	200,859	210,224	221,489	225,749

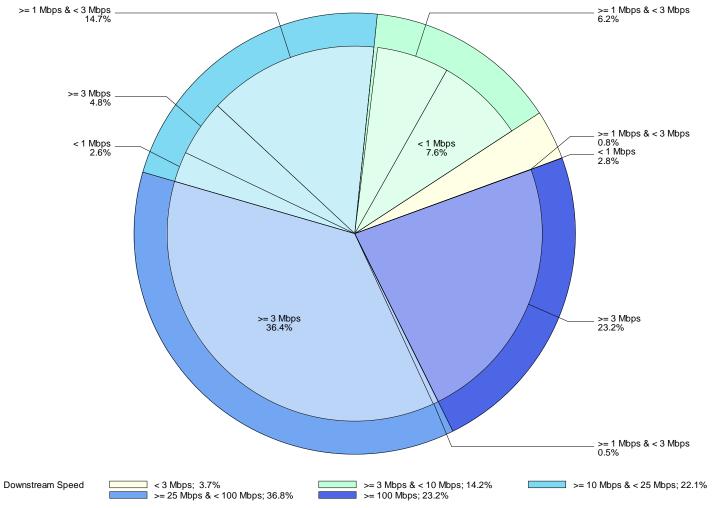
^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

Figure 8
Residential Fixed Connections by Downstream Speed 2013-2016



^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

Figure 9
Distribution of Fixed Connections over 200 kbps in at Least One Direction as of December 31, 2016



Note: Inner circle (light shading) represents upstream speeds.

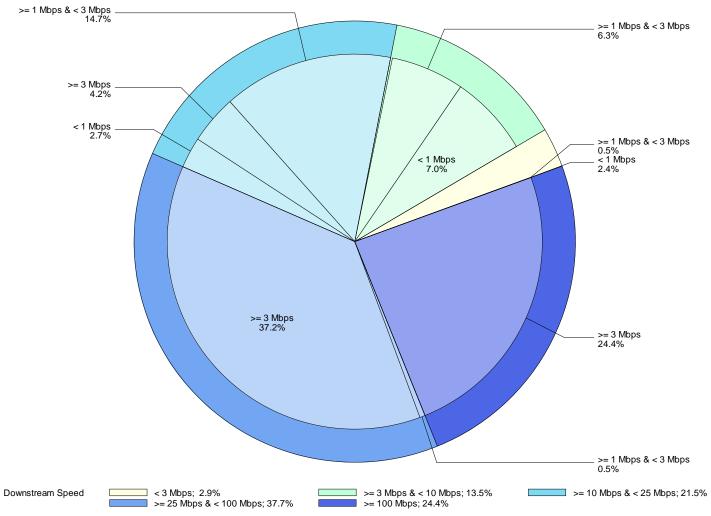
Fixed Connections over 200 kbps in at Least One Direction (in thousands)

		Do	wnstream Spe	eed		
Upstream Speed	Less than 3 Mbps	At least 3 Mbps and less than 10 Mbps	At least 10 Mbps and less than 25 Mbps	At least 25 Mbps and less than 100 Mbps	At least 100 Mbps	Total
Less than 1 Mbps	2,989	8,063	2,762	#	#	13,815
At least 1 Mbps & Less than 3 Mbps	879	6,566	15,532	495	6	23,477
At least 3 Mbps	#	336	5,113	38,452	24,535	68,436
Total	3,868	14,964	23,407	38,946	24,541	105,727
	P	ercentages				
Less than 1 Mbps	2.8	7.6	2.6	0.0	0.0	13.1
At least 1 Mbps & Less than 3 Mbps	0.8	6.2	14.7	0.5	0.0	22.2
At least 3 Mbps	0.0	0.3	4.8	36.4	23.2	64.7
Total	3.7	14.2	22.1	36.8	23.2	100.0

Note: Figures may not sum to totals due to rounding. # =Rounds to zero.

Source: FCC Form 477.

Figure 10
Distribution of Residential Fixed Connections over 200 kbps in at Least One Direction as of December 31, 2016



Note: Inner circle (light shading) represents upstream speeds.

Residential Fixed Connections over 200 kbps in at Least One Direction (in thousands)

		Do	wnstream Spe	eed		
Upstream Speed	Less than 3 Mbps	At least 3 Mbps and less than 10 Mbps	At least 10 Mbps and less than 25 Mbps	At least 25 Mbps and less than 100 Mbps	At least 100 Mbps	Total
Less than 1 Mbps	2,361	6,756	2,571	#	#	11,688
At least 1 Mbps & Less than 3 Mbps	447	6,108	14,158	449	4	21,166
At least 3 Mbps	#	153	4,068	35,933	23,608	63,761
Total	2,808	13,018	20,796	36,382	23,612	96,616
	Р	ercentages				
Less than 1 Mbps	2.4	7.0	2.7	0.0	0.0	12.1
At least 1 Mbps & Less than 3 Mbps	0.5	6.3	14.7	0.5	0.0	21.9
At least 3 Mbps	0.0	0.2	4.2	37.2	24.4	66.0
Total	2.9	13.5	21.5	37.7	24.4	100.0

Note: Figures may not sum to totals due to rounding. # =Rounds to zero.

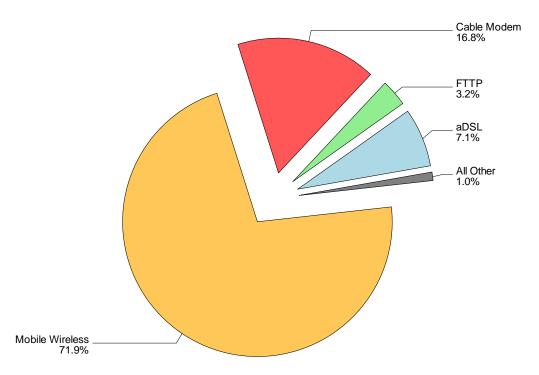
Source: FCC Form 477.

Figure 11
Connections over 200 kbps in at Least One Direction by Technology 2012-2016
(In thousands)

	2012	201	2013		2014		2015		16
Technology	Dec	Jun	Dec	Jun*	Dec	Jun	Dec	Jun	Dec
Total	262,564	284,692	293,397	311,284	321,305	342,096	355,229	369,431	376,221
Total Fixed	92,511	93,986	96,032	95,998	97,810	100,134	102,212	104,056	105,727
aDSL	30,974	30,657	30,690	29,873	28,527	29,341	28,131	27,489	26,526
sDSL	132	117	108	96	85	75	60	56	42
Other Wireline ¹	796	769	772	792	723	682	693	673	673
Cable Modem	51,646	52,760	54,009	54,011	56,301	57,243	59,706	61,456	63,352
FTTP ²	6,733	7,250	7,745	8,326	9,180	9,687	10,499	11,125	12,041
Satellite	1,454	1,623	1,849	1,964	2,006	2,058	2,071	2,079	1,864
Fixed Wireless	777	810	858	935	988	1,049	1,052	1,179	1,230
Mobile Wireless	170,053	190,706	197,365	215,286	223,495	241,962	253,017	265,375	270,494

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 12
Connections by Technology as of December 31, 2016



² Fiber to the premises.

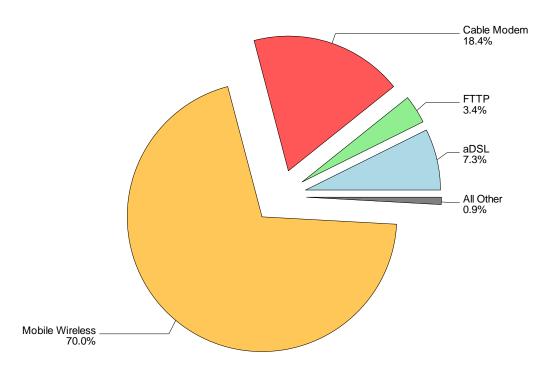
^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

Figure 13
Residential Connections over 200 kbps in at Least One Direction by Technology 2012-2016
(In thousands)

	2012	201	2013		14	201	2015		6
Technology	Dec	Jun	Dec	Jun*	Dec	Jun	Dec	Jun	Dec
Total	215,817	235,273	246,797	264,343	273,950	292,279	303,655	316,467	322,364
Total Fixed	84,392	85,277	87,599	87,360	89,196	91,419	93,430	94,979	96,616
aDSL	27,391	26,869	27,248	26,678	25,603	26,154	25,137	24,488	23,691
sDSL	50	43	39	30	22	17	16	11	8
Other Wireline ¹	34	22	22	57	59	52	54	51	52
Cable Modem	48,716	49,494	50,709	50,389	52,467	53,543	55,799	57,357	59,158
FTTP ²	6,270	6,732	7,176	7,617	8,368	8,841	9,592	10,127	10,949
Satellite	1,242	1,407	1,643	1,760	1,803	1,875	1,891	1,897	1,676
Fixed Wireless	689	710	763	829	874	937	942	1,047	1,082
Mobile Wireless	131,425	149,996	159,197	176,983	184,754	200,859	210,224	221,489	225,749

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 14
Residential Connections by Technology as of December 31, 2016



² Fiber to the premises.

^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

Figure 15
Fixed Connections at Least 3 Mbps Downstream and 768 kbps Upstream by Technology 2012-2016
(In thousands)

	2012	201	3	201	4	201	5	201	6
Technology	Dec	Jun	Dec	Jun*	Dec	Jun	Dec	Jun	Dec
Total	64,657	68,673	78,175	78,981	83,872	88,985	92,352	95,492	98,781
aDSL	13,108	14,233	18,540	17,246	18,557	20,939	20,741	21,150	21,042
sDSL	33	34	36	33	28	24	20	20	20
Other Wireline ¹	276	284	308	310	308	296	330	336	347
Cable Modem	44,133	46,014	50,236	51,304	53,853	55,807	58,423	60,343	62,881
FTTP ²	6,430	6,981	7,486	8,111	8,974	9,551	10,384	11,013	11,942
Satellite	394	791	1,181	1,424	1,558	1,690	1,744	1,775	1,609
Fixed Wireless	284	337	388	553	594	677	710	856	939

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 16
Residential Fixed Connections at Least 3 Mbps Downstream and 768 kbps Upstream by Technology 2012-2016
(In thousands)

	2012	201	2013		2014		2015		6
Technology	Dec	Jun	Dec	Jun*	Dec	Jun	Dec	Jun	Dec
Total	59,914	63,342	72,476	73,042	77,540	82,300	85,435	88,179	91,272
aDSL	11,669	12,666	16,715	15,673	16,867	18,985	18,863	19,210	19,133
sDSL	13	13	13	7	2	1	2	2	3
Other Wireline ¹	20	21	20	45	50	45	47	49	50
Cable Modem	41,561	43,061	47,258	47,924	50,308	52,241	54,650	56,353	58,796
FTTP ²	6,012	6,504	6,958	7,491	8,246	8,750	9,513	10,050	10,876
Satellite	393	788	1,177	1,419	1,552	1,682	1,734	1,764	1,596
Fixed Wireless	245	289	335	483	516	596	626	751	817

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

² Fiber to the premises.

^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

^{# =} Rounds to zero.

² Fiber to the premises.

^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

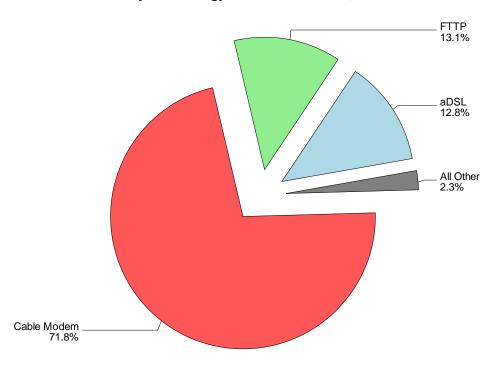
^{# =} Rounds to zero.

Figure 17
Fixed Connections at Least 10 Mbps Downstream and 1 Mbps Upstream by Technology 2014-2016
(In thousands)

	201	4	201	5	2016		
Technology	Jun*	Dec	Jun	Dec	Jun	Dec	
Total	63,849	68,009	72,691	76,939	80,440	84,131	
aDSL	7,573	8,310	9,463	9,799	10,352	10,811	
sDSL	9	6	8	8	8	10	
Other Wireline ¹	169	183	182	203	210	237	
Cable Modem	47,296	49,839	52,646	55,710	57,951	60,367	
FTTP ²	7,615	8,341	8,873	9,575	10,126	10,990	
Satellite	1,016	1,137	1,298	1,393	1,467	1,342	
Fixed Wireless	170	192	220	252	326	375	

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 18
Fixed Connections at Least 10 Mbps Downstream and 1 Mbps Upstream by Technology as of December 31, 2016



² Fiber to the premises.

^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

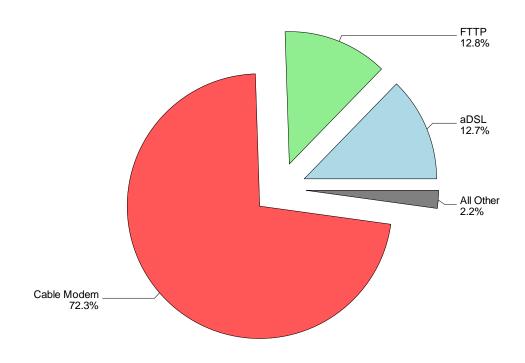
^{# =} Rounds to zero.

Figure 19
Residential Fixed Connections at Least 10 Mbps Downstream and 1 Mbps Upstream by Technology 2014-2016
(In thousands)

	201	201	5	2016		
Technology	Jun*	Dec	Jun	Dec	Jun	Dec
Total	59,751	63,522	67,881	71,784	74,827	78,219
aDSL	7,035	7,741	8,740	9,069	9,529	9,963
sDSL	3	#	#	1	2	2
Other Wireline ¹	33	36	38	43	47	49
Cable Modem	44,480	46,767	49,475	52,294	54,274	56,549
FTTP ²	7,044	7,679	8,144	8,776	9,235	9,997
Satellite	1,014	1,133	1,293	1,386	1,460	1,333
Fixed Wireless	142	166	190	213	280	326

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 20
Residential Fixed Connections at Least 10 Mbps Downstream and 1 Mbps Upstream by Technology as of December 31, 2016



² Fiber to the premises.

^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

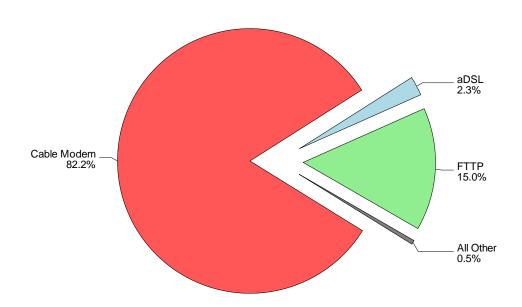
^{# =} Rounds to zero.

Figure 21
Fixed Connections at Least 25 Mbps Downstream and 3 Mbps Upstream by Technology 2014-2016
(In thousands)

	201-	4	201	5	201	6	
Technology	Jun+	Dec	Jun	Dec	Jun	Dec	
Total	35,927	42,390	48,449	54,335	58,740	62,929	
aDSL	420	598	761	938	1,240	1,476	
sDSL	2	2	1	*	*	*	
Other Wireline ¹	114	125	125	141	158	188	
Cable Modem	30,769	36,095	40,646	45,530	48,696	51,755	
FTTP ²	4,603	5,542	6,870	7,691	8,598	9,442	
Satellite	#	#	#	*	*	*	
Fixed Wireless	19	28	47	55	69	87	

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 22
Fixed Connections at Least 25 Mbps Downstream and 3 Mbps Upstream by Technology as of December 31, 2016



² Fiber to the premises.

⁺ The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

^{* =} Data withheld to maintain firm confidentiality.

^{# =} Rounds to zero.

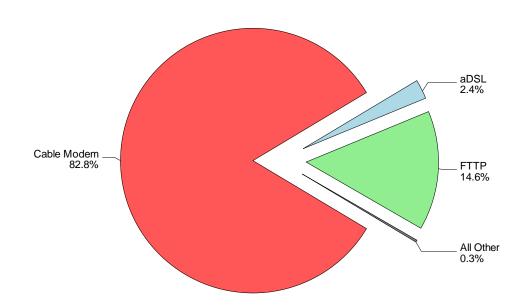
Figure 23
Residential Fixed Connections at Least 25 Mbps Downstream and 3 Mbps Upstream by Technology 2014-2016

(In thousands)

	201	4	201	5	201	6
Technology	Jun+	Dec	Jun	Dec	Jun	Dec
Total	34,439	40,595	46,198	51,788	55,685	59,485
aDSL	397	566	727	897	1,174	1,408
sDSL	#	#	#	*	*	*
Other Wireline ¹	22	26	26	31	41	45
Cable Modem	29,806	34,914	39,083	43,746	46,527	49,310
FTTP ²	4,201	5,068	6,323	7,089	7,908	8,670
Satellite	0	0	0	*	*	*
Fixed Wireless	14	22	40	46	55	72

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figure 24
Residential Fixed Connections at Least 25 Mbps Downstream and 3 Mbps Upstream by Technology as of December 31, 2016



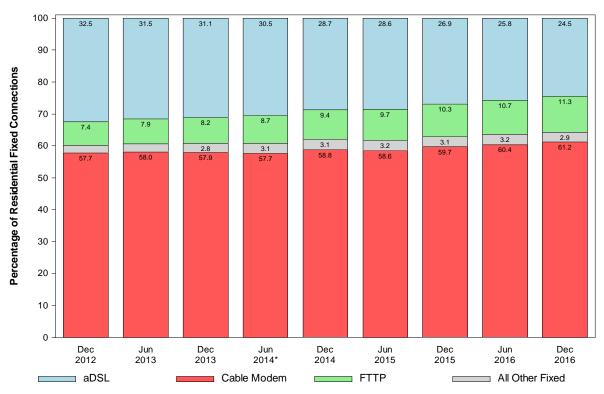
² Fiber to the premises.

⁺ The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

^{* =} Data withheld to maintain firm confidentiality.

^{# =} Rounds to zero.

Figure 25
Residential Fixed Connections over 200 kbps in at Least One Direction 2012-2016
(Shares of selected technologies)



^{*} The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

Figure 26
Residential Fixed Connections over 200 kbps in at Least One Direction 2012-2016
(Net adds for selected technologies)

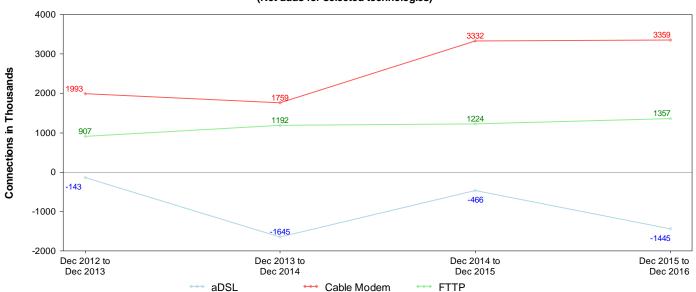


Figure 27
Residential Fixed Connections by Technology as of December 31, 2016
(Shares of selected technologies for selected speeds, connections in thousands)

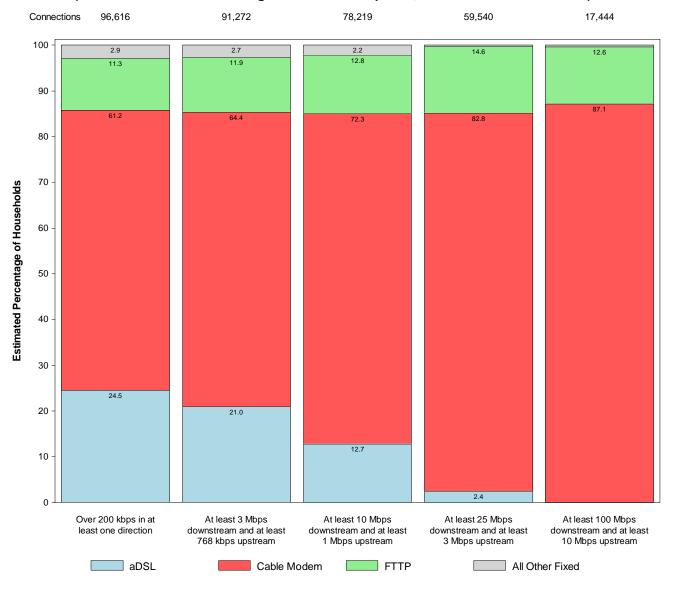


Figure 28
Fixed Connections by Downstream Speed Tier and Technology as of December 31, 2016
(In thousands)

			Downstre	am Speed			
Technology	Less than 1.5 Mbps	At least 1.5 Mbps and less than 3 Mbps	At least 3 Mbps and less than 10 Mbps	At least 10 Mbps and less than 25 Mbps	At least 25 Mbps and less than 100 Mbps	At least 100 Mbps	Total
aDSL	988	1,797	10,635	11,361	1,740	6	26,526
sDSL	13	9	10	7	*	*	42
Other Wireline ¹	53	271	112	47	34	156	673
Cable Modem	74	100	2,688	8,549	30,077	21,864	63,352
FTTP	29	40	637	1,848	7,000	2,486	12,041
Satellite	217	34	271	1,307	*	*	1,864
Fixed Wireless	86	157	612	288	59	29	1,230
Total	1,460	2,408	14,964	23,407	38,946	24,541	105,727
			Percentages				
aDSL	0.9	1.7	10.1	10.7	1.6	0.0	25.1
sDSL	0.0	0.0	0.0	0.0	*	*	0.0
Other Wireline ¹	0.0	0.3	0.1	0.0	0.0	0.1	0.6
Cable Modem	0.1	0.1	2.5	8.1	28.4	20.7	59.9
FTTP	0.0	0.0	0.6	1.7	6.6	2.4	11.4
Satellite	0.2	0.0	0.3	1.2	*	*	1.8
Fixed Wireless	0.1	0.1	0.6	0.3	0.1	0.0	1.2
Total	1.4	2.3	14.2	22.1	36.8	23.2	100.0

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Note: Figures may not sum to totals due to rounding.

Source: FCC Form 477.

^{# =} Rounds to Zero.

^{* =} Data withheld to maintain firm confidentiality.

Figure 29
Residential Fixed Connections by Downstream Speed Tier and Technology as of December 31, 2016
(In thousands)

			Downstre	am Speed			
Technology	Less than 1.5 Mbps	At least 1.5 Mbps and less than 3 Mbps	At least 3 Mbps and less than 10 Mbps	At least 10 Mbps and less than 25 Mbps	At least 25 Mbps and less than 100 Mbps	At least 100 Mbps	Total
aDSL	876	1,457	9,256	10,449	1,648	5	23,691
sDSL	4	1	#	1	*	*	8
Other Wireline ¹	#	1	1	4	8	37	52
Cable Modem	68	57	2,393	7,162	28,130	21,349	59,158
FTTP	17	29	566	1,628	6,511	2,198	10,949
Satellite	66	12	265	1,299	*	*	1,676
Fixed Wireless	78	142	537	254	50	23	1,082
Total	1,109	1,698	13,018	20,796	36,382	23,612	96,616
			Percentages				
aDSL	0.9	1.5	9.6	10.8	1.7	0.0	24.5
sDSL	0.0	0.0	0.0	0.0	*	*	0.0
Other Wireline ¹	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Cable Modem	0.1	0.1	2.5	7.4	29.1	22.1	61.2
FTTP	0.0	0.0	0.6	1.7	6.7	2.3	11.3
Satellite	0.1	0.0	0.3	1.3	*	*	1.7
Fixed Wireless	0.1	0.1	0.6	0.3	0.1	0.0	1.1
Total	1.1	1.8	13.5	21.5	37.7	24.4	100.0

¹ Power Line and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Note: Figures may not sum to totals due to rounding.

Source: FCC Form 477.

^{# =} Rounds to Zero.

^{* =} Data withheld to maintain firm confidentiality.

Figure 30
Nationwide Number of Providers of Connections over 200 kbps in at Least One Direction by Technology 2012-2016

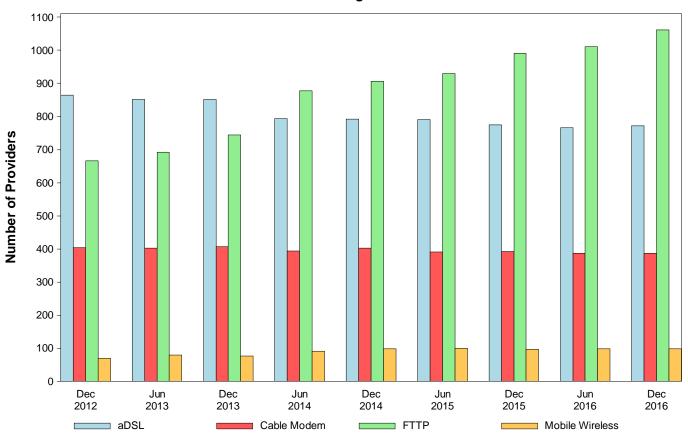
	2012	201	3	201	4	201	5	201	6
Technology	Dec	Jun	Dec	Jun+	Dec	Jun	Dec	Jun	Dec
aDSL	865	852	851	794	792	790	775	766	772
sDSL	255	246	239	195	191	177	181	171	158
Other Wireline ¹	262	246	245	270	245	239	250	241	234
Cable Modem	404	403	407	394	402	391	392	387	386
FTTP	666	692	744	878	906	929	990	1,010	1,062
Satellite	6	5	5	18	16	11	11	6	6
Fixed Wireless	765	771	825	870	916	943	977	1,004	1,047
Mobile Wireless	70	79	77	91	98	100	97	99	98
Power Line and Other ¹	*	0	*	-	-	-	-	-	-
Total	1,722	1,714	1,773	1,813	1,865	1,874	1,911	1,932	1,977

¹ For this Figure, the categories Power Line and All Other were combined with Other Wireline from June 2014 forward.

Multiple Form 477 filers within a holding company structure count as one provider. * = 1-3 providers.

The Commission approved changes to the Form 477 in June 2013 that affect the data beginning in June 2014 (see Technical Notes). Some previously-published data may have been revised.

Figure 31
Nationwide Number of Providers of Connections over 200 kbps in at Least One Direction
Selected Technologies 2012-2016



⁺ The June 2014 data have not been subjected to the typical quality checks (see Technical Notes).

SECTION 3 SUMMARY STATISTICS: THE STATES

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Figure 32
Residential Fixed Connections and Households by State as of December 31, 2016
(Connections and households, in thousands)

		At least 200 at least One D		At least 10 M and 1 Mb		At least 25 Mb and 3 Mbp		At least 100 M and 10 M	
			Subscribership		Subscribership		Subscribership		Subscribership
State	Households	Connections	Ratio	Connections	Ratio	Connections	Ratio	Connections	Ratio
Alabama	1,848	1,290	0.70	955	0.52	653	0.35	68	0.04
Alaska	251	204	0.81	146	0.58	*	*	*	*
American Samoa	10	*	*	0	0.00	0	0.00	0	0.00
Arizona	2,412	2,044	0.85	1,520	0.63	1,237	0.51	383	0.16
Arkansas	1,138	742	0.65	501	0.44	270	0.24	48	0.04
California	12,718	10,986	0.86	9,326	0.73	7,081	0.56	2,827	0.22
Colorado	2,024	1,802	0.89	1,333	0.66	1,223	0.60	*	*
Connecticut	1,353	1,185	0.88	1,035	0.77	837	0.62	252	0.19
Delaware	344	318	0.93	296	0.86	284	0.83	94	0.27
District of Columbia	273	234	0.86	211	0.77	200	0.73	*	*
Florida	7,300	6,864	0.94	5,902	0.81	4,564	0.63	1,192	0.16
Georgia	3,574	2,882	0.81	2,260	0.63	1,630	0.46	296	0.08
Guam	42	*	*	*	*	*	*	0	0.00
Hawaii	451	408	0.91	401	0.89	*	*	*	*
Idaho	589	473	0.80	255	0.43	191	0.32	14	0.02
Illinois	4,786	3,759	0.79	3,108	0.65	2,321	0.48	438	0.09
Indiana	2,502	1,893	0.76	1,443	0.58	992	0.40	228	0.09
Iowa	1,236	917	0.74	587	0.47	469	0.38	92	0.07
Kansas	1,113	881	0.79	658	0.59	404	0.36	174	0.16
Kentucky	1,708	1,297	0.76	892	0.52	465	0.27	230	0.13
Louisiana	1,728	1,212	0.70	949	0.55	620	0.36	136	0.08
Maine	553	486	0.88	343	0.62	154	0.28	10	0.02
Maryland	2,166	1,853	0.86	1,712	0.79	1,594	0.74	509	0.24
Massachusetts	2,550	2,288	0.90	2,111	0.83	2,015	0.79	709	0.28
Michigan	3,841	2,935	0.76	2,442	0.64	1,849	0.48	206	0.05
Minnesota	2,125	1,703	0.80	1,231	0.58	1,081	0.51	257	0.12
Mississippi	1,097	646	0.59	447	0.41	240	0.22	30	0.03
Missouri	2,365	1,781	0.75	1,295	0.55	870	0.37	228	0.10
Montana	409	325	0.79	211	0.51	181	0.44	7	0.02
Nebraska	737	575	0.78	406	0.55	283	0.38	49	0.07

Figure 32 - Continued
Residential Fixed Connections and Households by State as of December 31, 2016
(Connections and households, in thousands)

		At least 200 at least One D		At least 10 M and 1 Mb		At least 25 Mb and 3 Mbp		At least 100 M and 10 Mb	
			Subscribership		Subscribership		Subscribership		Subscribership
State	Households	Connections	Ratio	Connections	Ratio	Connections	Ratio	Connections	Ratio
Nevada	1,017	875	0.86	708	0.70	542	0.53	*	*
New Hampshire	520	479	0.92	403	0.77	359	0.69	139	0.27
New Jersey	3,189	2,903	0.91	2,735	0.86	2,639	0.83	810	0.25
New Mexico	764	538	0.70	306	0.40	269	0.35	71	0.09
New York	7,262	6,249	0.86	5,707	0.79	4,760	0.66	1,373	0.19
North Carolina	3,776	3,192	0.85	2,393	0.63	1,835	0.49	942	0.25
North Dakota	300	228	0.76	193	0.64	144	0.48	24	0.08
Northern Mariana Isl	16	*	*	*	*	*	*	0	0.00
Ohio	4,585	3,791	0.83	2,959	0.65	1,388	0.30	76	0.02
Oklahoma	1,455	1,002	0.69	711	0.49	430	0.30	115	0.08
Oregon	1,533	1,289	0.84	1,011	0.66	886	0.58	262	0.17
Pennsylvania	4,959	3,998	0.81	3,226	0.65	2,868	0.58	944	0.19
Puerto Rico	1,244	*	*	*	*	*	*	*	*
Rhode Island	411	345	0.84	331	0.81	296	0.72	*	*
South Carolina	1,815	1,445	0.80	1,151	0.63	615	0.34	45	0.02
South Dakota	331	252	0.76	210	0.64	156	0.47	13	0.04
Tennessee	2,505	1,816	0.72	1,485	0.59	1,110	0.44	233	0.09
Texas	9,149	7,122	0.78	5,763	0.63	3,724	0.41	1,555	0.17
Utah	906	783	0.86	569	0.63	496	0.55	193	0.21
Vermont	257	239	0.93	165	0.64	131	0.51	52	0.20
Virgin Islands	43	22	0.51	*	*	*	*	*	*
Virginia	3,063	2,497	0.82	2,149	0.70	1,889	0.62	576	0.19
Washington	2,669	2,340	0.88	1,865	0.70	1,703	0.64	633	0.24
West Virginia	741	529	0.71	360	0.49	287	0.39	61	0.08
Wisconsin	2,299	1,856	0.81	1,426	0.62	816	0.35	20	0.01
Wyoming	227	175	0.77	123	0.54	102	0.45	1	0.00
Total	118,281	96,616	0.82	78,219	0.66	59,540	0.50	17,444	0.15

^{# =} Rounds to Zero; * = Data withheld to maintain firm confidentiality.

Note: Figures may not sum to totals due to rounding.

Sources: FCC Form 477 (Connections); 2011-2015 ACS 5-year estimates; Census 2010.

Figure 33 Connections by Type of End User by State as of December 31, 2016 (Connections over 200 kbps in at least one direction, in thousands)

0: :	Connection		Percentage		T	
State		Business		usiness	Total	
Alabama	4,568	620	88.1	11.9	5,18	
Alaska	789	123	86.5	13.5	91	
American Samoa	*	*	*	*		
Arizona	6,374	996	86.5	13.5	7,37	
Arkansas	2,698	415	86.7	13.3	3,11	
California	39,783	7,492	84.2	15.8	47,27	
Colorado	5,639	901	86.2	13.8	6,54	
Connecticut	3,874	686	85.0	15.0	4,55	
Delaware	992	149	87.0	13.0	1,14	
District of Columbia	906	480	65.4	34.6	1,38	
Florida	19,666	3,460	85.0	15.0	23,12	
Georgia	9,711	1,583	86.0	14.0	11,29	
Guam	108	45	70.4	29.6	15	
Hawaii	1,588	207	88.5	11.5	1,79	
Idaho	1,559	237	86.8	13.2	1,79	
Illinois	13,180	2,231	85.5	14.5	15,41	
Indiana	6,265	868	87.8	12.2	7,13	
lowa	2,990	506	85.5	14.5	3,49	
iowa Kansas	2,990 3,708	463	85.5 88.9	14.5	3,49 4,17	
	•					
Kentucky	4,832	571	89.4	10.6	5,40	
Louisiana	4,657	652	87.7	12.3	5,30	
Maine	1,304	207	86.3	13.7	1,51	
Maryland	6,180	1,021	85.8	14.2	7,20	
Massachusetts	7,180	1,222	85.5	14.5	8,40	
Michigan	9,143	1,658	84.7	15.3	10,80	
Minnesota	5,499	940	85.4	14.6	6,44	
Mississippi	2,816	308	90.2	9.8	3,12	
Missouri	5,858	976	85.7	14.3	6,83	
Montana	979	133	88.0	12.0	1,11	
Nebraska	1,721	342	83.4	16.6	2,06	
Nevada	2,901	394	88.0	12.0	3,29	
New Hampshire	1,390	208	87.0	13.0	1,59	
New Jersey	9,906	1,775	84.8	15.2	11,68	
New Mexico	1,829	262	87.5	12.5	2,09	
New York	20,668	3,586	85.2	14.8	24,25	
North Carolina	9,626	1,584	85.9	14.1	11,21	
North Dakota	734	126	85.4	14.6	86	
Northern Mariana Isl	*	*	*	*	00	
Ohio	11,625	1,799	86.6	13.4	13,42	
Oklahoma	3,668	566	86.6	13.4	4,23	
	•					
Oregon	4,095	658	86.2	13.8	4,75	
Pennsylvania	12,729	1,969	86.6	13.4	14,69	
Puerto Rico	3,368	261	92.8	7.2	3,62	
Rhode Island	1,054	174	85.9	14.1	1,22	
South Carolina	4,553	644	87.6	12.4	5,19	
South Dakota	795	106	88.3	11.7	90	
Tennessee	6,209	995	86.2	13.8	7,20	
Texas	25,829	4,727	84.5	15.5	30,55	
Utah	2,760	465	85.6	14.4	3,22	
Vermont	641	123	83.9	16.1	76	
Virgin Islands	105	15	87.9	12.1	12	
Virginia	7,895	1,468	84.3	15.7	9,36	
Washington	7,618	1,230	86.1	13.9	8,84	
West Virginia	1,582	187	89.4	10.6	1,76	
Wisconsin	5,554	946	85.4	14.6	6,50	
Wyoming	590	76	88.6	11.4	66	
		10	00.0	11.7	- 00	

^{# =} Rounds to Zero.
* = Data withheld to maintain firm confidentiality.
Figures may not sum to totals due to rounding.
Source: FCC Form 477.

Figure 34
Connections by Technology by State as of December 31, 2016
(Connections over 200 kbps in at least one direction, in thousands)

State	ADSL	SDSL	Other Wireline¹	Cable Modem	Fiber	Satellite	Fixed Wireless	Mobile Wireless	Total
Alabama	526	#	*	702	115	*	10	3,764	5,188
Alaska	78	#	3	*	4	*	5	674	913
American Samoa	*	*	0	*	*	0	*	*	*
Arizona	565	#	*	1,420	142	*	33	5,168	7,370
Arkansas	350	*	3	383	21	*	7	2,299	3,113
California	3,463	8	*	7,353	894	*	85	35,229	47,275
Colorado	*	#	19	1,155	203	*	63	4,574	6,540
Connecticut	*	#	4	941	9	*	*	3,259	4,559
Delaware	*	*	4	207	*	*	*	796	1,141
District of Columbia	35	*	7	*	*	*	*	1,116	1,385
Florida	1,746	#	*	4,893	698	*	12	15,650	23,127
Georgia	1,089	#	*	1,753	233	*	2	8,129	11,294
Guam	*	0	*	*	*	0	0	113	154
Hawaii	*	*	1	*	34	*	4	1,354	1,795
Idaho	181	*	2	200	71	*	52	1,276	1,796
Illinois	1,263	2	*	2,583	92	*	75	11,321	15,410
Indiana	697	#	*	1,085	169	*	41	5,084	7,133
Iowa	305	1	*	469	165	*	31	2,493	3,496
Kansas	257	#	*	470	170	*	39	3,208	4,170
Kentucky	472	#	*	783	93	*	18	3,994	5,403
Louisiana	423	*	7	774	70	*	6	3,971	5,309
Maine	129	1	*	381	8	*	3	975	1,511
Maryland	*	1	16	1,035	*	*	4	5,191	7,201
Massachusetts	*	#	20	1,807	*	*	3	5,899	8,401
Michigan	878	3	*	2,132	30	*	45	7,609	10,801
Minnesota	525	3	*	1,056	196	*	29	4,588	6,440
Mississippi	336	#	*	308	19	*	2	2,401	3,124
Missouri	741	#	*	898	177	*	39	4,896	6,834
Montana	106	#	*	199	24	*	22	747	1,112
Nebraska	162	#	*	381	53	*	23	1,433	2,063

Figure 34 - Continued

Connections by Technology by State as of December 31, 2016
(Connections over 200 kbps in at least one direction, in thousands)

State	ADSL	SDSL	Other Wireline ¹	Cable Modem	Fiber	Satellite	Fixed Wireless	Mobile Wireless	Total
Nevada	239	#	6	*	14	*	13	2,337	3,295
New Hampshire	81	#	*	415	26	*	#	1,066	1,598
New Jersey	200	#	27	2,017	*	*	1	8,481	11,681
New Mexico	250	#	*	269	36	*	20	1,501	2,091
New York	498	2	37	4,755	*	*	5	17,365	24,253
North Carolina	952	#	*	2,263	190	*	8	7,720	11,210
North Dakota	49	#	*	126	75	*	5	602	860
Northern Mariana Isl	*	0	0	*	*	0	0	*	*
Ohio	1,162	#	*	2,662	177	*	44	9,319	13,424
Oklahoma	386	#	*	572	40	*	48	3,132	4,234
Oregon	278	1	*	890	177	*	25	3,342	4,753
Pennsylvania	696	1	26	2,675	*	*	8	10,332	14,698
Puerto Rico	*	0	*	*	6	*	2	2,942	3,629
Rhode Island	*	*	2	*	*	*	*	852	1,228
South Carolina	476	*	7	944	106	*	3	3,626	5,197
South Dakota	48	*	#	159	53	*	12	623	901
Tennessee	570	#	*	1,137	218	*	10	5,200	7,204
Texas	2,631	1	*	3,849	870	*	211	22,760	30,556
Utah	185	#	*	452	149	*	53	2,377	3,226
Vermont	120	*	3	137	21	*	1	475	764
Virgin Islands	*	0	*	*	*	*	*	*	120
Virginia	338	#	*	1,406	866	*	16	6,632	9,363
Washington	478	1	*	1,743	229	*	30	6,290	8,847
West Virginia	*	*	1	347	10	*	2	1,188	1,769
Wisconsin	647	5	5	*	79	*	32	4,482	6,500
Wyoming	52	#	*	108	11	*	19	468	666
Total	26,526	42	673	63,352	12,041	1,864	1,230	270,494	376,221

¹ PowerLine and Other are summarized with Other Wireline to maintain firm confidentiality. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements.

Figures may not sum to totals due to rounding.

Source: FCC Form 477.

^{# =} Rounds to Zero.

^{* =} Data withheld to maintain firm confidentiality.

Figure 35
Percentage of Fixed Connections by Downstream Speed by State as of December 31, 2016

State	Over 200 kbps Upstream and				
	% over 200 kbps Downstream	% at least 3 Mbps Downstream	% at least 10 Mbps Downstream	% at least 25 Mbps Downstream	% at least 100 Mbps Downstream
Alabama	99.3	93.3	75.9	49.7	6.9
Alaska	97.7	87.0	71.5	49.1	38.0
American Samoa	*	*	*	*	*
Arizona	99.7	96.5	84.8	59.2	21.9
Arkansas	99.3	92.7	70.9	38.9	9.0
California	99.7	97.2	82.8	61.7	32.8
Colorado	99.7	95.1	86.0	65.5	41.9
Connecticut	99.4	98.9	86.0	68.7	29.5
Delaware	99.8	98.3	91.8	86.5	44.7
District of Columbia	99.8	97.1	86.8	80.9	44.4
Florida	99.6	97.3	88.2	65.3	17.0
Georgia	99.1	95.5	79.0	55.3	10.3
Guam	*	*	*	*	*
Hawaii	100.0	99.0	96.8	42.4	20.0
Idaho	99.5	93.6	69.3	39.7	25.7
Illinois	99.7	97.2	81.8	59.5	14.5
Indiana	99.3	96.4	77.2	50.7	11.6
lowa	99.6	92.6	72.4	49.5	11.0
Kansas	99.7	95.4	75.4	44.1	19.9
Kentucky	99.1	94.2	69.6	35.4	16.8
Louisiana	99.2	94.3	78.1	50.6	11.6
Maine	98.9	94.8	69.4	30.4	3.9
Maryland	99.8	98.0	90.6	83.6	38.2
Massachusetts	99.9	98.1	91.0	85.2	46.3
Michigan	99.3	96.9	82.4	61.2	7.2
Minnesota	99.7	94.9	81.0	61.9	26.6
Mississippi	98.9	91.8	70.0	38.5	13.7
Missouri	99.4	94.0	76.8	48.8	35.0
Montana	99.6	90.7	70.7	55.8	2.8
Nebraska	99.6	95.7	74.7	48.5	9.5

Figure 35 - Continued
Percentage of Fixed Connections by Downstream Speed by State as of December 31, 2016

		Over 200 kbps Upstream and												
State	% over 200 kbps Downstream	% at least 3 Mbps Downstream	% at least 10 Mbps Downstream	% at least 25 Mbps Downstream	% at least 100 Mbps Downstream									
Nevada	99.8	97.8	86.5	62.2	15.2									
New Hampshire	99.1	95.9	82.5	70.9	44.1									
New Jersey	99.7	98.3	93.3	88.8	36.5									
New Mexico	99.7	91.9	72.6	48.2	27.7									
New York	99.6	98.3	89.7	74.1	21.0									
North Carolina	99.3	95.9	78.7	55.4	27.6									
North Dakota	99.8	96.6	85.5	64.9	16.9									
Northern Mariana Isl	*	*	*	*	*									
Ohio	99.7	97.0	78.3	35.7	2.7									
Oklahoma	99.6	96.0	70.9	42.5	14.4									
Oregon	99.7	95.6	84.3	67.3	34.7									
Pennsylvania	99.7	96.3	81.9	70.6	35.4									
Puerto Rico	99.9	80.0	47.4	18.6	0.8									
Rhode Island	99.6	98.6	94.1	83.7	21.3									
South Carolina	99.5	95.7	80.1	42.8	3.7									
South Dakota	99.6	96.6	84.9	61.2	6.3									
Tennessee	99.4	96.0	81.9	59.8	13.0									
Texas	99.7	97.0	80.3	50.8	26.3									
Utah	99.9	96.4	83.0	61.6	37.8									
Vermont	98.7	84.8	64.8	48.8	31.4									
Virgin Islands	99.9	85.1	42.7	13.6	0.7									
Virginia	99.6	96.7	85.7	73.0	29.3									
Washington	99.5	96.0	85.3	70.8	45.9									
West Virginia	98.9	97.2	66.4	52.9	22.6									
Wisconsin	99.1	95.1	79.0	43.6	1.9									
Wyoming	99.6	91.8	76.0	57.1	1.2									
Total	99.6	96.3	82.2	60.0	23.2									

Figure 36
Providers of Connections by Technology by State as of December 31, 2016 (Connections over 200 kbps in at least one direction, in thousands)

State	ADSL	SDSL	Other Wireline ¹	Cable Modem	Fiber	Satellite	Fixed Wireless	Mobile Wireless	Total
Alabama	25	6	*	20	38	*	22	6	92
Alaska	13	4	12	*	9	*	15	8	39
American Samoa	*	*	0	*	*	0	*	*	*
Arizona	24	4	*	16	34	*	37	7	99
Arkansas	24	*	17	19	31	*	21	5	76
California	39	14	*	28	63	*	92	6	182
Colorado	*	7	30	18	51	*	58	9	132
Connecticut	*	7	19	10	20	*	*	4	42
Delaware	*	*	16	6	*	*	*	4	31
District of Columbia	9	*	19	*	*	*	*	4	42
Florida	25	10	*	23	59	*	29	5	112
Georgia	31	6	*	34	74	*	20	4	121
Guam	*	0	*	*	*	0	0	4	4
Hawaii	*	*	7	*	9	*	5	5	22
Idaho	27	*	14	19	34	*	37	10	80
Illinois	61	9	*	21	91	*	75	8	189
Indiana	41	7	*	14	59	*	60	5	124
Iowa	103	20	*	48	140	*	81	35	232
Kansas	29	11	*	28	60	*	51	9	116
Kentucky	23	6	*	28	43	*	28	7	96
Louisiana	17	*	22	19	33	*	13	5	67
Maine	16	7	*	9	21	*	9	5	41
Maryland	*	8	25	16	*	*	16	5	72
Massachusetts	*	6	29	10	*	*	16	5	68
Michigan	37	11	*	24	55	*	38	6	117
Minnesota	49	11	*	22	71	*	47	5	129
Mississippi	18	4	*	17	22	*	12	5	64
Missouri	37	11	*	20	53	*	68	8	144
Montana	24	5	*	9	29	*	25	6	63
Nebraska	31	4	*	20	48	*	38	9	92

Figure 36 - Continued

Providers of Connections by Technology by State as of December 31, 2016

(Connections over 200 kbps in at least one direction, in thousands)

State	ADSL	SDSL	Other Wireline ¹	Cable Modem	Fiber	Satellite	Fixed Wireless	Mobile Wireless	Total
Nevada	19	8	27	*	29	*	19	6	67
New Hampshire	14	7	*	6	21	*	5	6	41
New Jersey	20	7	34	11	*	*	10	4	68
New Mexico	23	6	*	11	26	*	26	8	68
New York	40	8	34	21	*	*	27	7	107
North Carolina	26	7	*	26	51	*	22	6	99
North Dakota	26	9	*	8	31	*	17	6	53
Northern Mariana Isl	*	0	0	*	*	0	0	*	*
Ohio	41	7	*	30	67	*	57	4	149
Oklahoma	38	9	*	13	42	*	42	12	100
Oregon	44	12	*	18	55	*	44	6	107
Pennsylvania	32	9	35	26	*	*	24	8	115
Puerto Rico	*	0	*	*	6	*	5	5	15
Rhode Island	*	*	9	*	*	*	*	4	25
South Carolina	20	*	19	16	28	*	11	6	53
South Dakota	24	*	13	7	34	*	26	8	78
Tennessee	26	7	*	23	42	*	29	7	101
Texas	67	14	*	38	100	*	135	9	246
Utah	23	4	*	14	28	*	28	9	72
Vermont	13	*	9	6	19	*	4	6	34
Virgin Islands	*	0	*	*	*	*	*	*	8
Virginia	30	10	*	20	53	*	29	6	106
Washington	30	9	*	26	55	*	55	6	121
West Virginia	*	*	15	17	17	*	12	6	54
Wisconsin	49	11	27	*	62	*	46	6	124
Wyoming	17	5	*	7	19	*	26	8	55
Total	772	158	234	386	1,062	6	1,047	98	1,977

¹ Power Line and Other are summarized with Other Wireline. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements. # = Rounds to Zero.

Figures may not sum to totals due to rounding.

Source: FCC Form 477.

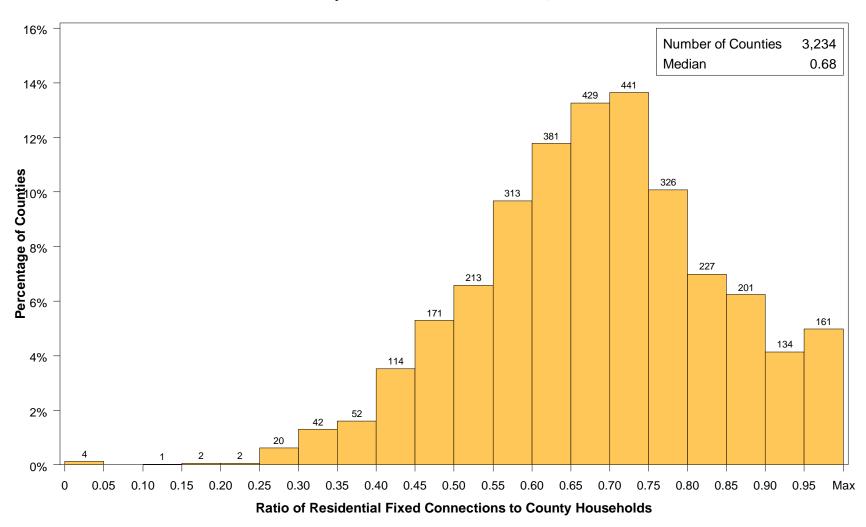
^{* =} Data withheld to maintain firm confidentiality.

SECTION 4 SUMMARY STATISTICS: COUNTIES AND CENSUS TRACTS

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Distribution of Counties by Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to County Households as of December 31, 2016



Note: Ratios over 1 were set to 1. See Technical Notes at the end of the report. Sources: FCC Form 477; 2011-2015 ACS 5-year estimates; and Census 2010.

Figure 38

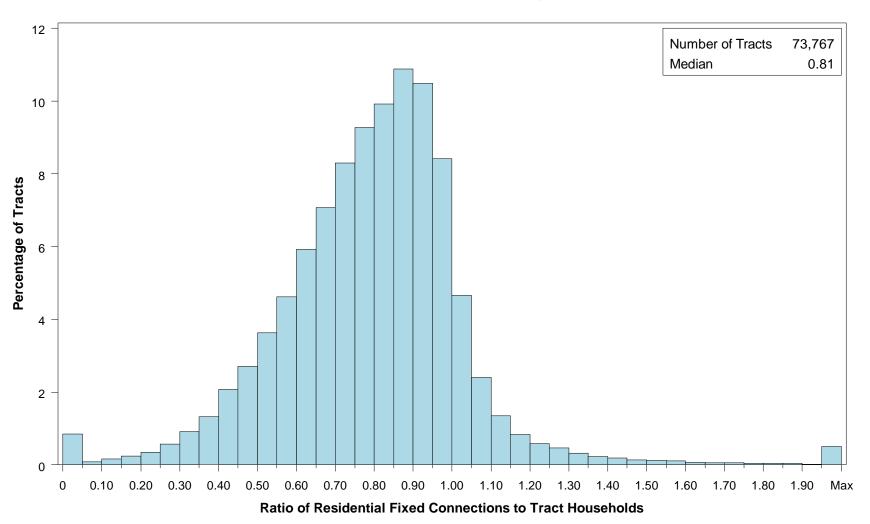
Distribution of Counties by Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to County Households by Technology as of December 31, 2016

	Ratio of Residential Fixed Connections to County Households													
Technology	Zero	Greater than 0 and no more than 5%	Greater than 5 and no more than 10%	Greater than 10 and no more than 20%	Greater than 20 and no more than 30%	Greater than 30 and no more than 40%	Greater than 40 and no more than 50%	Greater than 50 and no more than 60%	Greater than 60 and no more than 80%	Greater than 80 and no more than 100%	100% or more			
aDSL	0.9	5.5	5.8	25.3	30.5	17.9	8.8	3.3	1.5	0.3	0.1			
sDSL	90.2	9.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Other Wireline	92.4	7.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Cable Modem	11.6	7.3	6.8	14.9	13.9	14.0	11.8	10.2	8.2	1.0	0.3			
FTTP	25.4	46.6	7.8	8.4	4.0	2.8	2.1	1.4	1.5	0.1	0.0			
Satellite	1.1	67.0	22.0	8.8	1.1	0.1	0.0	0.0	0.0	0.0	0.0			
Fixed Wireless	28.3	51.1	11.0	6.4	2.2	0.6	0.2	0.0	0.0	0.0	0.0			
Total	0.1	0.0	0.0	0.1	0.7	2.9	8.8	16.3	48.7	19.6	2.7			

¹ Power Line and Other are summarized with Other Wireline. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements. Note: Figures may not sum to totals due to rounding.

Sources: FCC Form 477; 2011-2015 ACS 5-year estimates; and Census 2010.

Figure 39
Distribution of Census Tracts by Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to Tract Households as of December 31, 2016



Note: Ratios over 2 were set to 2. See Technical Notes at the end of the report. Sources: FCC Form 477; 2011-2015 ACS 5-year estimates; and Census 2010.

Figure 40
Distribution of Census Tracts by Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to Tract Households by Technology as of December 31, 2016

	Ratio of Residential Fixed Connections to Tract Households												
Technology	Z ero	Greater than 0 and no more than 5%	Greater than 5 and no more than 10%	Greater than 10 and no more than 20%	Greater than 20 and no more than 30%	Greater than 30 and no more than 40%	Greater than 40 and no more than 50%	Greater than 50 and no more than 60%	Greater than 60 and no more than 80%	Greater than 80 and no more than 100%	100% or more		
aDSL	2.0	18.0	11.9	24.5	20.4	13.1	5.9	2.5	1.3	0.3	0.2		
sDSL	98.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Other Wireline	98.7	1.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Cable Modem	4.7	3.1	1.8	4.4	7.7	12.9	17.0	17.9	22.5	6.2	1.8		
FTTP	54.4	16.3	4.7	6.8	4.9	4.3	3.5	2.5	2.2	0.3	0.1		
Satellite	28.6	62.0	5.1	3.2	0.7	0.2	0.1	0.0	0.0	0.0	0.0		
Fixed Wireless	75.6	18.7	2.5	2.0	0.7	0.3	0.1	0.0	0.0	0.0	0.0		
Total	0.8	0.1	0.1	0.4	0.9	2.2	4.8	8.2	30.6	39.7	12.2		

¹ Power Line and Other are summarized with Other Wireline. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements. Note: Figures may not sum to totals due to rounding.

Sources: FCC Form 477; 2011-2015 ACS 5-year estimates; and Census 2010.

Figure 41

Percentage of Developed Census Blocks with Residential Fixed Service by Technology as of December 31, 2016

(Internet Access Service over 200 kbps in at least one direction)

	Number of Providers											
Technology	Zero	One	Two	Three	Four	Five	Six	Seven or More				
aDSL	26.3	69.8	3.7	0.1	0.0	0.0	0.0	0.0				
sDSL	99.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0				
Other Wireline ¹	98.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0				
Cable Modem	32.7	63.2	3.8	0.3	0.0	0.0	0.0	0.0				
FTTP	81.2	18.3	0.5	0.0	0.0	0.0	0.0	0.0				
Satellite	0.1	0.9	0.2	98.8	0.0	0.0	0.0	0.0				
Fixed Wireless	57.8	25.7	11.4	4.2	0.9	0.1	0.0	0.0				
aDSL and/or Cable Modem and/or FTTP	12.9	25.2	53.3	7.9	0.7	0.0	0.0	0.0				
Any Technology	0.0	0.2	0.1	6.7	18.4	40.9	21.0	12.7				

¹ Power Line and Other are summarized with Other Wireline. See Technical Notes at the end of the report for a description of Form 477 technology categories and other reporting requirements. Note: Figures may not sum to totals due to rounding. The number of providers in a census block does not necessarily reflect the number of choices available to a particular household, and does not purport to measure competition. Providers may list a census block on Form 477 if service can be provided to at least one location in the block. Developed census blocks are those with housing units based on the 2010 census.

Sources: FCC Form 477 and Census 2010.

Figure 42
Distribution of Counties by Ratio of Residential Fixed Connections to County Households by State as of December 31, 2016
(Connections over 200 kbps in at least one direction)

	Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to County Households												
State	Counties	Zero	Greater than 0 and no more than 5%	Greater than 5 and no more than 10%	Greater than 10 and no more than 20%	Greater than 20 and no more than 30%	Greater than 30 and no more than 40%	Greater than 40 and no more than 50%	Greater than 50 and no more than 60%	Greater than 60 and no more than 80%	Greater than 80 and no more than 100%	100% or more	
Alabama	67	0	0	0		1	3	16	20	22	5	0	
Alaska	29	0	0	0	0	2	2	4	3	10	7	1	
American Samoa	5	2	0	0	0	2	0	1	0	0	0	0	
Arizona	15	0	0	0		0	0	1	2	6	6	0	
Arkansas	75	0	0	0		0	6	25	26	17	1	0	
California	58	0	0	0		0	0	0	0	21	34	3	
Colorado	64	0	0	0	0	0	0	2	7	23	23	9	
Connecticut	8	0	0	0	0	0	0	0	0	0	8	0	
Delaware	3	0	0	0	0	0	0	0	0	0	2	1	
District of Columbia	1	0	0	0	0	0	0	0	0	0	1	0	
Florida	67	0	0	0	0	0	0	0	8	17	25	17	
Georgia	159	0	0	0	1	3	9	18	33	57	31	7	
Guam	1	0	0	0	0	0	0	0	0	0	1	0	
Hawaii	5	1	0	0	0	0	0	0	0	1	2	1	
Idaho	44	0	0	0	0	0	0	1	4	29	8	2	
Illinois	102	0	0	0	0	1	0	3	17	70	11	0	
Indiana	92	0	0	0	0	0	0	2	18	62	10	0	
Iowa	99	0	0	0	0	0	0	2	8	82	6	1	
Kansas	105	0	0	0	0	1	1	3	18	67	14	1	
Kentucky	120	0	0	0	0	1	2	11	25	66	14	1	
Louisiana	64	0	0	0	0	1	6	14	11	30	2	0	
Maine	16	0	0	0	0	0	0	0	0	6	9	1	
Maryland	24	0	0	0	0	0	0	0	2	8	13	1	
Massachusetts	14	0	0	0	0	0	0	0	0	2	9	3	
Michigan	83	0	0	0	0	0	0	5	7	55	15	1	
Minnesota	87	0	0	0	_	0	0	0	6	64	16	1	
Mississippi	82	0	0	0		2	15	35	16	10	3	0	
Missouri	115	0	0	0	0	2	3	13	23	64	10	0	
Montana	56	0	0	0	0	0	0	0	8	30	17	1	
Nebraska	93	0	0	0	0	0	2	9	24	53	5	0	

Figure 42 - Continued Distribution of Counties by Ratio of Residential Fixed Connections to County Households by State as of December 31, 2016 (Connections over 200 kbps in at least one direction)

	Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to County Households												
			Greater	Greater	Greater	Greater	Greater	Greater	Greater	Greater	Greater		
			than 0 and no more	than 5 and no more	than 10 and no more	than 20 and no more	than 30 and no more	than 40 and no more	than 50 and no more	than 60 and no more	than 80 and no more	100% or	
State	Counties	Zero	than 5%	than 10%	than 20%	than 30%	than 40%	than 50%	than 60%	than 80%	than 100%	more	
Nevada	17	0	0	0	0	1	1	0	6	6	3	0	
New Hampshire	10	0	0	0	0	0	0	0	0	1	7	2	
New Jersey	21	0	0	0	0	0	0	0	0	2	18	1	
New Mexico	33	0	0	0	0	0	3	3	9	15	3	0	
New York	62	0	0	0	0	0	0	0	0	27	32	3	
North Carolina	100	0	0	0	0	0	0	1	16	47	29	7	
North Dakota	53	0	0	0	0	0	0	1	6	35	10	1	
Northern Mariana Isl	4	1	0	0	0	0	1	1	1	0	0	0	
Ohio	88	0	0	0	0	0	0	2	7	49	29	1	
Oklahoma	77	0	0	0	0	1	7	12	24	31	2	0	
Oregon	36	0	0	0	0	0	0	1	2	18	14	1	
Pennsylvania	67	0	0	0	0	0	0	0	0	46	19	2	
Puerto Rico	78	0	0	0	0	2	16	31	23	6	0	0	
Rhode Island	5	0	0	0	0	0	0	0	0	1	4	0	
South Carolina	46	0	0	0	0	0	1	8	11	16	7	3	
South Dakota	66	0	0	0	0	0	0	4	6	47	9	0	
Tennessee	95	0	0	0	0	0	2	9	30	46	7	1	
Texas	254	0	0	0	0	0	7	27	68	121	28	3	
Utah	29	0	0	0	0	0	0	0	1	13	11	4	
Vermont	14	0	0	0	0	0	0	0	0	3	9	2	
Virgin Islands	3	0	0	0	0	0	0	1	1	0	1	0	
Virginia	134	0	0	0	1	1	7	15	16	60	31	3	
Washington	39	0	0	0	0	0	0	1	3	15	19	1	
West Virginia	55	0	0	0	0	1	0	2	5	41	6	0	
Wisconsin	72	0	0	0	0	0	0	0	3	44	25	0	
Wyoming	23	0	0	0	0	0	0	1	3	14	4	1	
Total	3,234	4	0	0	3	22	94	285	527	1576	635	88	

Note: Figures may not sum to totals due to rounding. See Technical Notes at the end of the report.

Sources: FCC Form 477; 2011-2015 ACS 5-year estimates (Households for U.S. and District of Columbia); Census 2010 (Households for Puerto Rico, American Samoa,

Guam, Northern Mariana Islands and U.S. Virgin Islands).

Figure 43
Distribution of Census Tracts by Ratio of Residential Fixed Connections to Tract Households by State as of December 31, 2016
(Connections over 200 kbps in at least one direction)

Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to Tract Households												
State	Tracts	Zero	Greater than 0 and no more than 5%	Greater than 5 and no more than 10%	Greater than 10 and no more than 20%	Greater than 20 and no more than 30%	Greater than 30 and no more than 40%	Greater than 40 and no more than 50%	Greater than 50 and no more than 60%	Greater than 60 and no more than 80%	Greater than 80 and no more than 100%	100% or more
Alabama	1,179	4	0	1	4	26	91	173	213	376	220	71
Alaska	167	2	0	0	2	7	4	4	11	50	73	14
American Samoa	18	2	1	0	0	6	6	0	1	1	1	0
Arizona	1,526	14	10	8	14	14	33	54	113	353	605	308
Arkansas	686	1	0	0	8	22	57	133	128	218	93	26
California	8,036	53	3	5	14	20	57	104	335	2,112	4,453	880
Colorado	1,249	14	0	1	1	0	6	25	45	329	617	211
Connecticut	829	2	0	0	0	2	1	7	36	172	487	122
Delaware	215	1	0	0	0	1	1	3	11	54	99	45
District of Columbia	179	0	0	0	1	0	1	5	14	53	73	32
Florida	4,199	38	0	1	3	1	33	89	180	817	1,772	1,265
Georgia	1,964	10	1	1	10	21	73	129	222	576	663	258
Guam	56	4	3	1	3	6	2	1	5	6	6	19
Hawaii	326	14	0	0	1	4	4	8	9	64	152	70
Idaho	298	0	0	0	2	2	5	4	12	145	104	24
Illinois	3,121	7	1	0	5	12	49	177	314	1,165	1,251	140
Indiana	1,508	5	2	0	2	5	30	91	215	658	414	86
Iowa	825	3	1	0	1	2	8	26	94	508	155	27
Kansas	770	11	0	0	0	4	9	33	102	310	230	71
Kentucky	1,115	9	2	1	9	15	29	65	161	409	302	113
Louisiana	1,136	12	1	0	4	22	83	117	180	397	275	45
Maine	351	0	0	0	0	3	2	1	9	103	164	69
Maryland	1,394	8	0	0	0	2	27	48	74	337	718	180
Massachusetts	1,471	12	1	0	0	1	6	12	34	317	863	225
Michigan	2,767	28	1	0	14	43	124	208	256	855	1,095	143
Minnesota	1,335	4	0	0	3	2	10	33	73	565	567	78
Mississippi	661	4	0	0	5	32	103	145	116	165	74	17
Missouri	1,393	5	0	0	4	11	46	128	191	476	416	116
Montana	271	2	0	0	1	0	2	7	26	115	97	21
Nebraska	532	4	0	0	0	0	5	26	48	243	157	49

Figure 43 - Continued

Distribution of Census Tracts by Ratio of Residential Fixed Connections to Tract Households by State as of December 31, 2016 (Connections over 200 kbps in at least one direction)

	Ratio of Residential Fixed Connections over 200 kbps in at Least One Direction to Tract Households												
State	Tracts	Zero	Greater than 0 and no more than 5%	Greater than 5 and no more than 10%	Greater than 10 and no more than 20%	Greater than 20 and no more than 30%	Greater than 30 and no more than 40%	Greater than 40 and no more than 50%	Greater than 50 and no more than 60%	Greater than 60 and no more than 80%	Greater than 80 and no more than 100%	100% or more	
Nevada	683	5	0	1	4	4	8	21	49		296	132	
New Hampshire	294	2	0	0	0	0	0	1	2		199	53	
New Jersey	2,004	11	0	0		2	2	12	55		1,148	356	
New Mexico	499	2	4	4	7	10	18	41	82	182	124	25	
New York	4,900	78	1	0	13	15	22	55	162	1,480	2,408	666	
North Carolina	2,183	19	3	0	2	7	14	69	188	711	714	456	
North Dakota	205	0	0	0	0	0	1	7	24	113	44	16	
Northern Mariana Isl	22	2	0	0	1	3	4	2	5	2	1	2	
Ohio	2,946	6	0	0	3	11	47	152	226	997	1,109	395	
Oklahoma	1,046	2	2	3	11	38	50	141	182	334	199	84	
Oregon	827	2	0	0	0	0	3	21	27	255	451	68	
Pennsylvania	3,217	22	0	0	3	16	13	72	222	1,313	1,312	244	
Puerto Rico	903	24	26	28	101	130	144	144	94	96	33	83	
Rhode Island	241	1	0	0	0	0	0	3	8	72	135	22	
South Carolina	1,097	11	0	0	1	12	34	106	133	337	300	163	
South Dakota	222	0	0	1	0	0	4	9	17	128	53	10	
Tennessee	1,497	22	1	0	7	28	75	120	235	536	366	107	
Texas	5,253	41	0	1	15	87	211	496	725	1,577	1,490	610	
Utah	588	4	1	2	2	0	0	3	17	170	316	73	
Vermont	184	1	0	0	0	0	1	0	1	47	91	43	
Virgin Islands	29	0	0	0	2		5	4	4		1	1	
Virginia	1,895	23	0	0		21	53	100	179		804	257	
Washington	1,446	3	0	0		4	10	27	30		827	219	
West Virginia	484	0	1	2		5	18	34	72		102	33	
Wisconsin	1,393	3	1	0			5	38	94		556	123	
Wyoming	132	1	0	0	0	1	1	5	10		42	7	
Total	73,767	558	67	61	295	685	1,650	3,539	6,071	22,551	29,317	8,973	

Note: Figures may not sum to totals due to rounding. See Technical Notes at the end of the report.

Sources: FCC Form 477; 2011-2015 ACS 5-year estimates (Households for U.S. and District of Columbia); Census 2010 (Households for Puerto Rico, American Samoa,

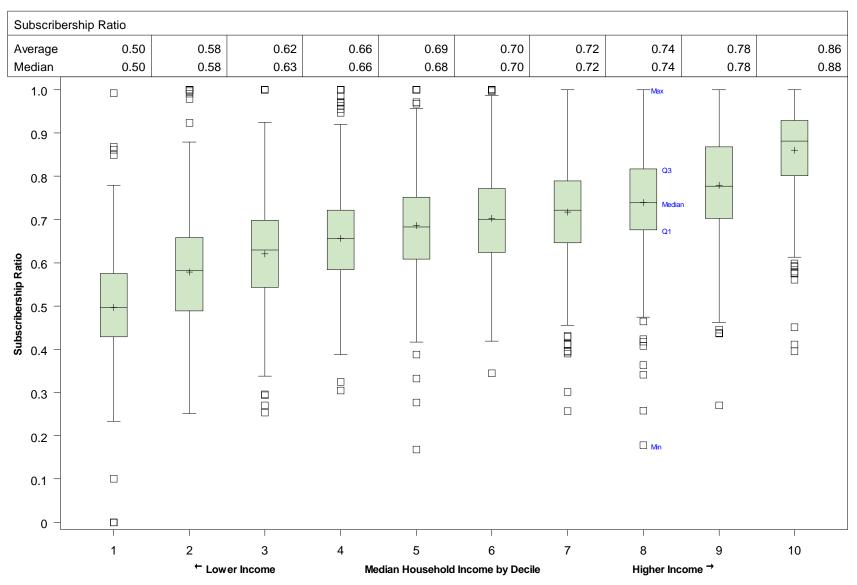
Guam, Northern Mariana Islands and U.S. Virgin Islands).

SECTION 5 CORRELATED RESULTS: DEMOGRAPHIC MEASURES

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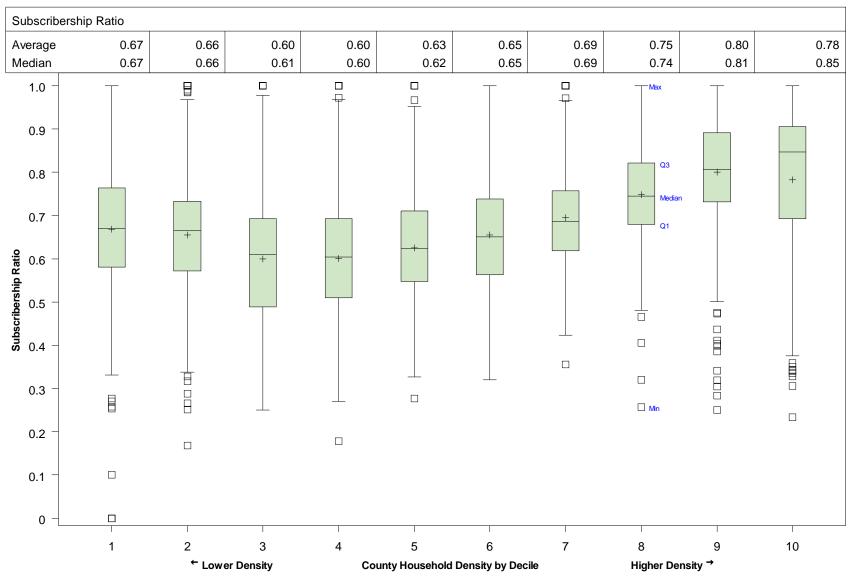
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Figure 44
Subscribership Ratio Distributions by Income Deciles as of December 31, 2016



Note: Each box plot shows the distribution of residential subscribership to connections over 200 kbps in at least one direction for counties in the income decile. Some of the features are labeled, but note also that + denotes the position of the average residential subscribership ratio taken across all counties in the decile; \bot is the minimum observation above Q1-1.5(Q3-Q1); T is the maximum observation below Q3+1.5(Q3-Q1); and \Box is any data point beyond Q1-1.5(Q3-Q1) or Q3+1.5(Q3-Q1). Ratios greater than 1 were set to 1. Sources: FCC Form 477; 2011-2015 ACS 5-year Estimates; Census 2010.

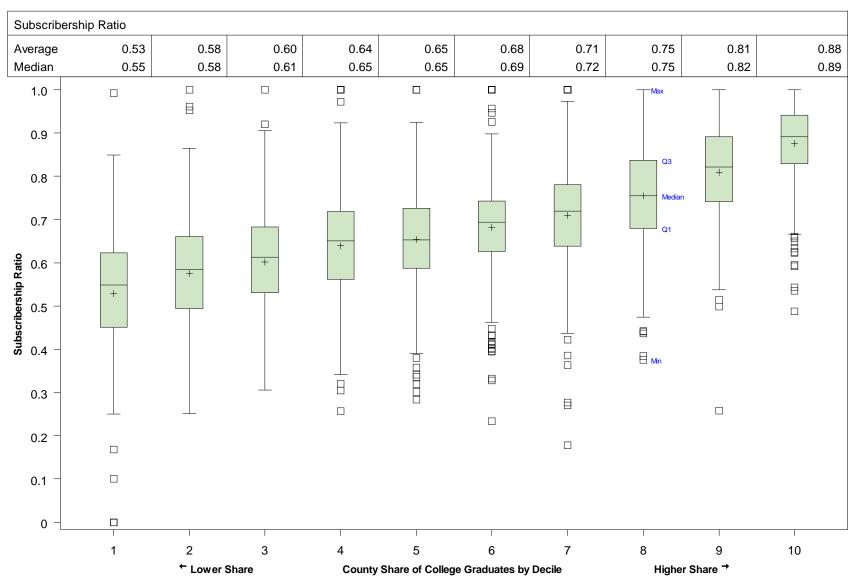
Figure 45
Subscribership Ratio Distributions by Density Deciles as of December 31, 2016



Note: Each box plot shows the distribution of residential subscribership to connections over 200 kbps in at least one direction for counties in the density decile. Some of the features are labeled, but note also that + denotes the position of the average residential subscribership ratio taken across all counties in the decile; ⊥ is the minimum observation above Q1-1.5(Q3-Q1); T is the maximum observation below Q3+1.5(Q3-Q1); and □ is any data point beyond Q1-1.5(Q3-Q1) or Q3+1.5(Q3-Q1). Ratios greater than 1 were set to 1.

Sources: FCC Form 477; 2011-2015 ACS 5-year Estimates; Census 2010.

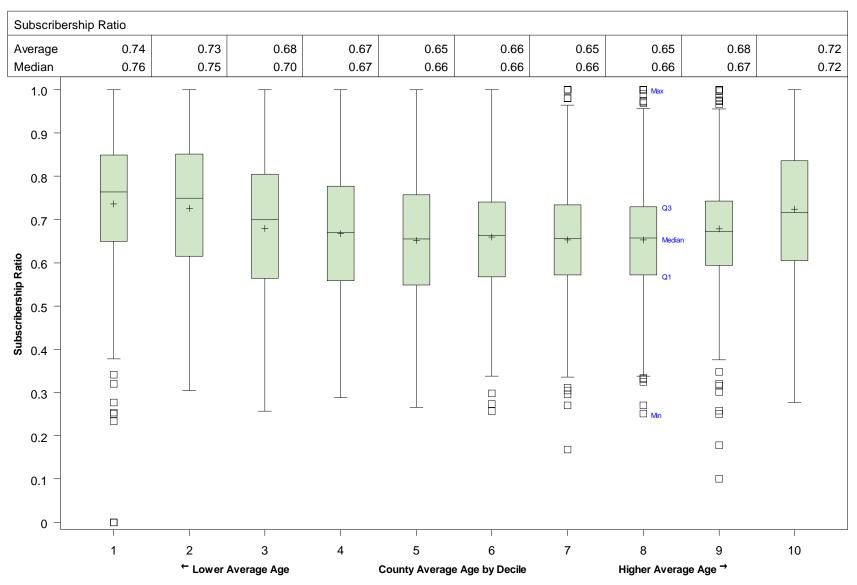
Figure 46
Subscribership Ratio Distributions by Share of Population with a College Degree (in Deciles) as of December 31, 2016



Note: Each box plot shows the distribution of residential subscribership to connections over 200 kbps in at least one direction for counties in the share decile. Some of the features are labeled, but note also that + denotes the position of the average residential subscribership ratio taken across all counties in the decile; ⊥ is the minimum observation above Q1-1.5(Q3-Q1); T is the maximum observation below Q3+1.5(Q3-Q1); and □ is a data point beyond Q1-1.5(Q3-Q1) or Q3+1.5(Q3-Q1). Ratios greater than 1 were set to 1.

Sources: FCC Form 477; 2011-2015 ACS 5-year Estimates; Census 2010.

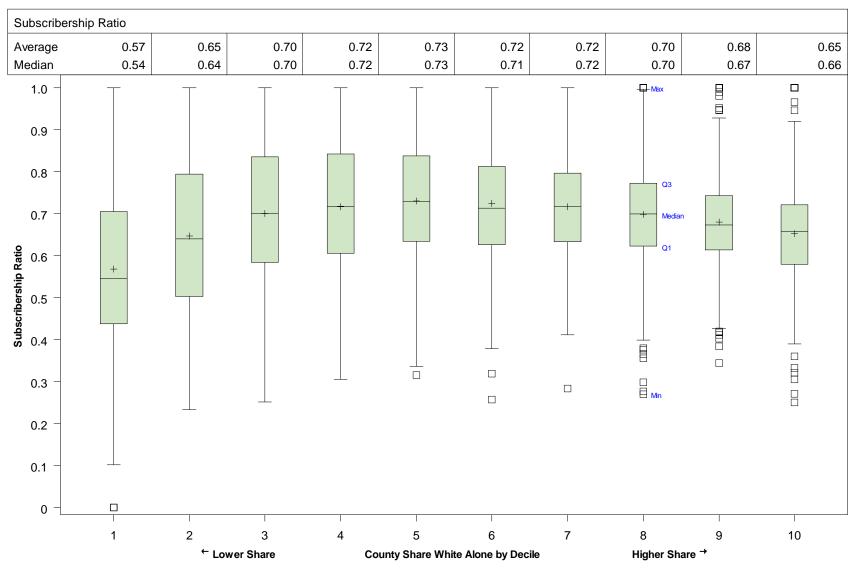
Figure 47
Subscribership Ratio Distributions by Average Age of County Population (in Deciles) as of December 31, 2016



Note: Each box plot shows the distribution of residential subscribership to connections over 200 kbps in at least one direction for counties in the average age decile. Some of the features are labeled, but note also that + denotes the position of the average residential subscribership ratio taken across all counties in the decile; ⊥ is the minimum observation above Q1-1.5(Q3-Q1); T is the maximum observation below Q3+1.5(Q3-Q1); and □ is a data point beyond Q1-1.5(Q3-Q1) or Q3+1.5(Q3-Q1). Ratios greater than 1 were set to 1.

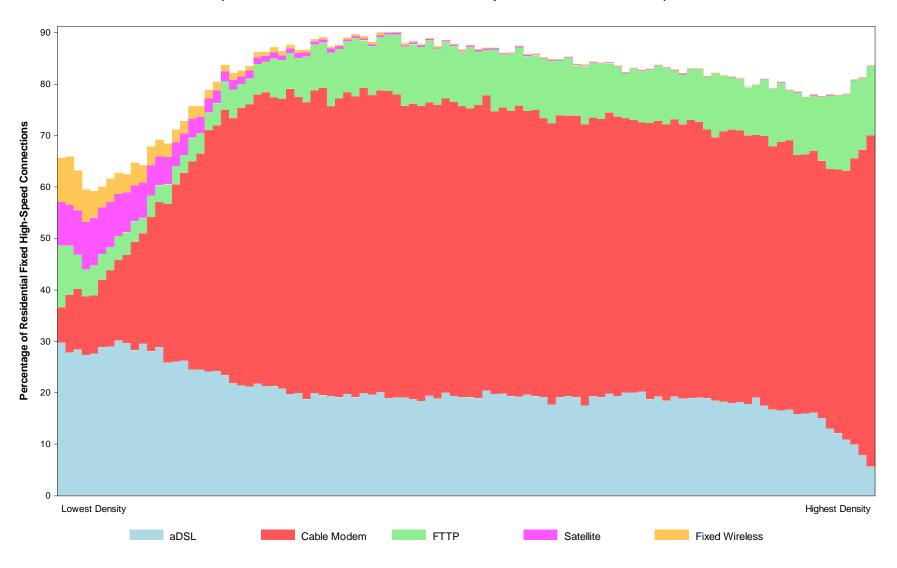
Sources: FCC Form 477; 2011-2015 ACS 5-year Estimates; Census 2010.

Figure 48
Subscribership Ratio Distributions by Share White Alone (in Deciles) as of December 31, 2016



Note: Each box plot shows the distribution of residential subscribership to connections over 200 kbps in at least one direction for counties in each race decile. Counties were grouped into deciles based on the share of the county population that reported their race as white alone. Some of the features are labeled, but note also that + denotes the position of the average residential subscribership ratio taken across all counties in the decile; ⊥ is the minimum observation above Q1-1.5(Q3-Q1); T is the maximum observation below Q3+1.5(Q3-Q1); and □ is a data point beyond Q1-1.5(Q3-Q1) or Q3+1.5(Q3-Q1). Ratios greater than 1 were set to 1. Sources: FCC Form 477; 2011-2015 ACS 5-year Estimates; Census 2010.

Figure 49
Subscribership Ratios by Technology and Tract Household Density as of December 31, 2016
(Residential fixed connections over 200 kbps in at least one direction)

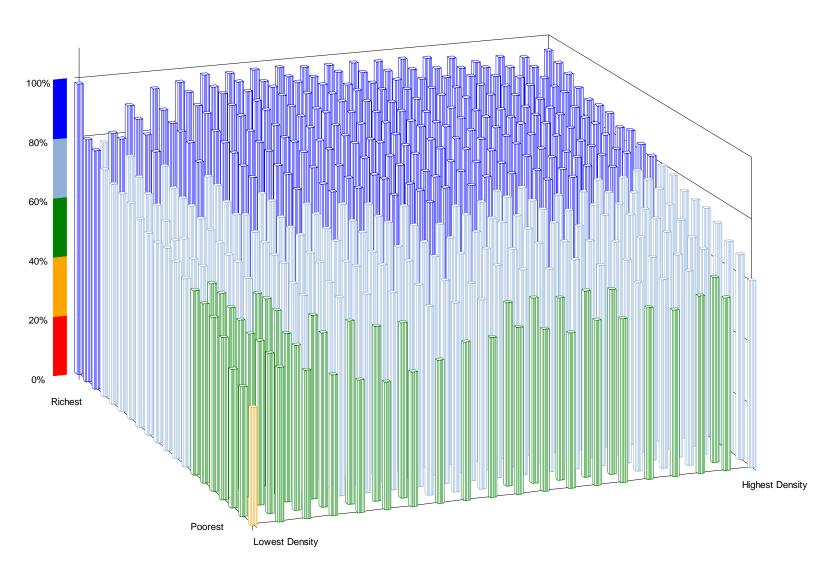


This chart shows subscribership ratios by technology and household density. Tracts were grouped into 100 density percentiles based on households per square mile, calculated as the ratio of estimated tract households to tract land area from the Census Bureau. For each percentile, the height of the bar represents the household-weighted average ratio of residential fixed connections to households across tracts in the percentile.

Sources: FCC Form 477; 2011-2015 ACS 5-year estimates; and Census 2010.

Figure 50

Average Subscribership Ratios by Income and Household Density as of December 31, 2016
(Residential fixed connections over 200 kbps in at least one direction by Tract)



This chart shows subscribership ratios by household density and income quantiles. Tracts were grouped into 400 density/income quantiles based on households per square mile, calculated as the ratio of estimated tract households to tract land area, and median household income. For each quantile, the height of the grid represents the household-weighted average ratio of residential fixed connections to households across tracts in the decile.

Sources: FCC Form 477; 2011-2015 ACS 5-year estimates; and Census 2010.

Technical Notes

General

The information presented in this report is based on data from FCC Form 477. Through Form 477, facilities-based broadband providers submit information to the FCC about where they offer and have subscribers to Internet access services over 200 kilobits per second (kbps) in at least one direction. In June 2013, the Commission adopted several changes to Form 477. Detailed information about those changes and about the Form 477 reporting requirements in general is available at www.fcc.gov/form477. Due to technical difficulties in 2014 with the redesigned Form 477 filing interface, the filing deadline for Form 477 data as of June 30, 2014 was moved to December 11, 2014. Because of that delay, the Commission staff were not able to perform their typical process of identifying anomalies or errors in the data, following up with filers, and requesting updates to the data where appropriate – a process which usually generates a significant number of corrections and hence a more accurate Form 477 data set.

Form 477 collects information about <u>Internet access connections in service</u> to end-user locations that are advertised to deliver information to and/or from the end user – that is, in at least one direction – at transfer rates (speeds) above 200 kilobits per second (kbps). Information is collected about the number of connections by the advertised speeds associated with each product subscribed to in the relevant geographic area, census tracts for fixed and states for mobile. Fixed providers report connections by maximum advertised upload and download speeds, while mobile providers report connections by minimum advertised upload and download speeds. Fixed connections are further categorized by the technology employed by the part of the connection that terminates at the end-user location. Wherever a <u>number of providers</u> is cited in this report, multiple Form 477 filers within a holding company structure count as one provider.

"End users" are residential, business, institutional, or government entities who use services for their own purposes and who do not resell such services to other entities. Facilities-based providers report information about connections they provide directly to their own end-user customers and also connections that they provide to Internet Service Providers for resale to end users. For Form 477 purposes, the facilities-based provider of a connection is the entity that owns the portion of the physical facility that terminates at the end-user location, obtains an unbundled network element (UNE), special access line, or other leased facility that terminates at the end-user location and provisions/equips it as a connection that transfers information at rates over 200 kbps in at least one direction, or provisions/equips a wireless channel that transfers information at rates over 200 kbps in at least one direction to the end-user location over licensed spectrum or over spectrum that the provider uses on an unlicensed basis.

The mutually exclusive Form 477 <u>technology categories</u> are: asymmetric Digital Subscriber Line (aDSL in this report), symmetric Digital Subscriber Line (sDSL), other copper wireline, cable modem, optical carrier / fiber to the end user, satellite, terrestrial fixed wireless (using licensed or unlicensed spectrum), mobile wireless, and all other (which is included to capture deployment of additional technologies over time). In the Form 477 data collection, aDSL-based services delivered over fiber-to-the-node architecture are reported in the aDSL category. The other wireline category comprises T1/DS1, T3/DS3, and other copper-based connections, not elsewhere categorized, that deliver *Internet access* service at the end-user

¹ Modernizing the FCC Form 477 Data Program, WC Docket No. 11-10, Report and Order, 28 FCC Rcd 9887 (2013). See also High-Speed Services for Internet Access: Status as of December 31, 2014 (March 2016) at 1-2, available at https://www.fcc.gov/reports-research/reports/internet-access-services-reports/internet-access-services-reports/internet-access-services-reports.

location. Ethernet connections delivering Internet access service are reported in the other wireline category if the connection terminates over copper and in the FTTP category if the connection terminates over fiber. Connections deployed over hybrid fiber-coax (HFC) architecture are reported in the cable modem category. Wireless ISPs (WISPs) report in the fixed wireless category if providing service to dispersed, fixed end-user locations and report in the mobile wireless category if providing a commercial service that can be received at any location within a service footprint. Wireless local area networks (such as Wi-Fi hotspots) that only enable local distribution and sharing of a premises connection are not included, although the shared premises connection is included.

Numbers of connections presented in this report are not adjusted for the number of persons at a single end-user location who have access to, or who use, the Internet access services delivered over the connection to that location.

Numbers of residential connections are estimated based on the total connections and percentageresidential connections information reported on Form 477.

Census tracts

Since the collection of data as of December 31, 2008, facilities-based providers of reportable fixed-location Internet access connections have been reporting connection counts at the census tract level of detail. Facilities-based mobile wireless providers report connection counts by state rather than census tract.

The census tract-level data summarized in this report were collected for tracts in the 2010 decennial census. For the purposes of this report, there are 73,767 census tracts because we exclude census tracts delineated specifically to cover large bodies of water.

About 110 of the census tracts have population but no households because the population resides in group living quarters. For the purpose of estimating residential subscribership rates by census tract, we assume these census tracts have no reportable *residential* Internet access service because persons residing in group quarters would have Internet access over a business connection provided to the operator of the group quarters. Therefore, these census tracts are included in the "zero" column.

Ratios of residential fixed-location connections to households that exceed 100%

We estimate the share of households with fixed-location connections in individual census tracts by taking the ratio of the reported number of fixed-location residential service connections to the estimated number of households. We continue to find "outlier" estimates at or above 100% and to find that the number of outliers is substantially reduced when estimates are made for individual counties rather than for individual census tracts.

Possible explanations of ratios at or above 100% include (1) geocoding misallocations of service locations to census tracts; (2) proper allocation of connections to the county level by some filers, but improper allocation of all connections to a single tract in the county; (3) possible overestimation of residential connections in service plans for which the customer base is primarily residential; and (4) connections at seasonally or occasionally occupied housing units, such as vacation homes, while the household is counted elsewhere. The numbers of households in census tracts that were used to generate the estimated ratios are themselves estimates (from Census 2011-2015 ACS 5-year estimates), which could have an independent effect.

Maps showing residential subscribership rates by census tract

The two maps based on estimated Internet access connections over 200 kbps in at least one direction per 1,000 households (that is, estimated household subscribership rates) exclude all connections identified as business connections and necessarily exclude residential mobile wireless connections (which are reported for the state but not for individual census tracts).

Glossary

Term	Definition				
aDSL	Asymmetric Digital Subscriber Line: A digital local loop typically using copper facilities and providing greater bandwidth in one direction than the other.				
Cable modem service	A service which offers customers access to the Internet over a cable system.				
Downstream speed	Speed of transmission from the Internet to the end user.				
End users	Residential, business, institutional, or government entities who use services for their own purposes and who do not resell such services to other entities.				
Facilities-based provider	Entity that owns the portion of the physical facility that terminates at the end-user location, obtains an unbundled network element (UNE), special access line, or other leased facility that terminates at the end-user location and provisions/equips it as a connection that transfers information at rates over 200 kbps in at least one direction, or provisions/equips a wireless channel that transfers information at rates over 200 kbps in at least one direction to the end-user location over licensed spectrum or over spectrum that the provider uses on an unlicensed basis.				
Fixed wireless	A radio communication service between specified fixed points.				
Fixed technologies	All technologies other than terrestrial mobile wireless.				
FTTH or FTTP	Fiber to the Home (Premises): A network access architecture in which optical fiber is deployed all the way to the customer's home (premises).				
Internet access service	Service that provides end users access to the Internet.				
ISPs	Internet Service Providers: Companies or organizations that provide Internet access service (see above).				
Mobile wireless service	A radio communication service between mobile and fixed stations, or between mobile stations.				
Mobile wireless provider	Provider of mobile wireless service (see above).				
Other wireline	All copper-wire based technologies other than DSL technologies; Ethernet over copper and T-1 are examples.				
Power line	Internet access service delivered over electric power transmission lines.				
Satellite communications	A telecommunications service provided via one or more satellite relays and their associated uplinks and downlinks.				
sDSL	Symmetric Digital Subscriber Line: DSL technology that provides equal bandwidth for both uploads and downloads.				
Speed tiers	Sub-groupings defined by ranges of upstream speeds and downstream speeds.				
Upstream speed	Speed of transmission from the end user to the Internet.				
Wi-Fi hotspot	Wireless Fidelity: Generic term referring to any type of IEEE 802.11 wireless network. A hotspot is a small geographic area in which users				

	can gain access to a Wi-Fi network which in turn connects to the Internet.
Wireless service	Telephone, Internet, data, and other services provided to customers through the transmission of signals over networks of radio towers.
Wireless service provider	Provider of wireless service (see above).
WISP	Wireless ISP: A company that provides end users with wireless access to the Internet, most commonly by using radio spectrum designated for unlicensed use.

Customer Response

Publication: Internet Access Services: Status as of December 31, 2016

You can help us provide the best possible information to the public by completing this form and returning it to the Industry Analysis and Technology Division of the FCC's Wireline Competition Bureau.

1.	Please check the category that best describes you: press current telecommunications carrier potential telecommunications carrier business customer evaluating vendors/service options consultant, law firm, lobbyist other business customer academic/student residential customer FCC employee other federal government employee other (please specify)									
2.	Please rate the report: Ex Data accuracy Data presentation Timeliness of data Completeness of data Text clarity Completeness of text	cellent (_) (_) (_) (_) (_) (_) (_)	Good (_) (_) (_) (_) (_) (_) (_)	Satisfacto (_) (_) (_) (_) (_) (_) (_)	ry Poor (_) (_) (_) (_) (_) (_)	No opinion (_) (_) (_) (_) (_) (_) (_)				
3.	Overall, how do you E rate this report?	xcellent	Good (_)	Satisfact	ory Poor (_)	No opinion (_)				
4.	How can this report be improved?									
5.	May we contact you to discuss possible improvements? Name: Telephone #:									
Ī	To discuss the information in this report, contact: 202-418-0940 or for users of TTY equipment, call 202-418-0484									
j	Fax this response to 202-418	3-0520		or	Mail this response to					
	Scan and email to IATDreports@fcc.gov FCC/WCB/IATD, Mail Stop 160 Washington, DC 20554									