E. International Broadband Data Report Appendices

APPENDIX E-1

Country List

1. In the Table below, we list the United States and the 28 foreign countries selected for purposes of the IBDR and identify the countries that are excluded in an Appendix with an "X."

Countries	**Appendix E-2** Broadband Speed Comparison	**Appendix E-3** Broadband Price Comparison	**Appendix E-4** High-Speed Broadband Deployment Comparison with Europe	**Appendix E-5** Demographics Dataset
Australia		X	X	
Austria		X		
Belgium		X		
Canada		X	X	
Chile		X	X	
Czech Republic		X		
Denmark				
Estonia				
Finland		X		
France				
Germany				
Greece		X		
Iceland		X		
Ireland		X		
Italy		X		
Japan		X	X	
Latvia		X		
Luxembourg		X		
Mexico			X	
Netherlands		X		
New Zealand		X	X	
Norway		X		
Portugal		X		
South Korea			X	
Spain		X		
Sweden		X		
Switzerland		X		
United Kingdom				
United States			X	

APPENDIX E-2

Broadband Speed Comparison

1. We present information on "data transmission speeds" for broadband service capability for both fixed and mobile broadband.[1] We present data on actual fixed and mobile broadband speeds based on data gathered by Ookla for the United States and 28 comparison countries for a ranking of fastest actual speed (1st) to slowest (29th).[2] The data are aggregated at the city level and include observations in 2016 and 2017 for both U.S. and international cities.[3] As a historical overview, we also present available data on U.S. fixed download speeds and rankings from 2012 to 2017, which show how actual speeds have evolved over time.

I. OVERVIEW AND DATA HIGHLIGHTS

2. *Fixed Broadband Speed Results*. In 2017, the United States ranked 5th out of 29 countries (73.79 Mbps) in terms of mean (weighted) fixed download speeds.[4] Iceland had the highest mean fixed download speed, and Greece had the lowest. Iceland's mean fixed download speeds were 131.07 in 2017 and 89.83 Mbps in 2016. By contrast, Greece's mean fixed download speeds were 13.85 Mbps in 2017 and 11.83 Mbps in 2016.

3. Given the large population density and area of several U.S. states, we also compare U.S. states to foreign countries.[5] In 2017, the highest ranked state is Delaware, which ranked 3rd out of 78 states and countries with a mean fixed download speed of 91.19 Mbps. In 2017, the highest ranked U.S. state capital is Salt Lake City, Utah, which ranked of 3rd out of 79 capital cities with a mean fixed

[1] 47 U.S.C. § 1303(b)(1); *see also* 47 U.S.C. § 163.

[2] We obtained speed data through a contractual arrangement with Ookla, proprietor of speedtest.net, whose data are collected primarily from software-based tests on an end user's device. Ookla, *Ookla Speedtest*, http://www.speedtest.net. Ookla aggregates consumer-initiated tests on Speedtest after the tests undergo a "sample construction" process that creates standardized data points for advanced statistical analysis. Each sample represents the cumulative test results for each unique device/user per location, per calendar day, with the goal of ensuring that each unique user is fairly represented in the data. Among other things, this methodology prevents repeated testing from the same device during a short time period from having an outsized impact. Ookla, *Speedtest Awards Methodology*, https://www.speedtest.net/awards/methodology/. We rely on the fixed and mobile speed testing methodology used in the *2018 Sixth IBDR*, and the data caveats identified in the *2018 Sixth IBDR* similarly apply here. *2018 Sixth IBDR*, 33 FCC Rcd at 997-98, Appx. B, paras. 7-12. We include annual, city-level observations with average download speeds for 256 kbps and higher.

[3] We also present data on median (weighted) fixed and mobile download speeds. Our calculations are based on the median of the city-level averages reported by Ookla. Because the data are aggregated at the city level and do not include individual speed test records, we cannot compute a true median. Here, the median refers to the median of the aggregated (average) annual city speed tests weighted by sample size, and average refers to the averages at the city level as provided by Ookla. Therefore, we took the median of the city level averages reported by Ookla. *2018 Sixth IBDR*, 33 FCC Rcd at 982-83, para. 9, n.31; 1001, Appx. B, para. 15, n.14.

[4] The *2018 Sixth IBDR* reported speeds for 28 comparison countries because the Ookla dataset did not include data for Latvia. *Id.* at 982, n.26. The *2018 Sixth IBDR* observed that the United States ranked 10th out of 28 countries in 2016 in terms of actual fixed download speeds. *Id*. at 982, para. 9; 996, Appx. B, para. 2. Since release of that report, Ookla has recompiled the data for 2016, which now contain data for Latvia as well as some minor variations from speeds reported in the *2018 Sixth IBDR.* As a result, there are slight variations in the 2016 speed data and rankings for fixed and mobile broadband speed between this analysis and the *2018 Sixth IBDR*.

[5] We present a comparison of U.S. state capitals with the capitals of the comparison countries, as directed by the BDIA that "[t]he Commission shall include in the comparison under this subsection . . . communities including the capital cities of such countries." 47 U.S.C. § 1303(b)(2).

download speed of 120.90 Mbps.

4. *Historical Overview of U.S. Fixed Broadband Speed*. Based on data from past International Broadband Data Reports, we present U.S. mean fixed download speeds and rankings from 2012 to 2017 to illustrate how speeds and U.S. rankings have evolved over time. We note that due to differences in the Ookla data from 2012 to 2013 and the data from 2014 to 2016, the earlier data are not directly comparable to the later data.[6] Nevertheless, the data indicate that for the United States, both fixed speeds and international rank have been on a rising trend since 2012.[7]

5. *Mobile Broadband Speed Results*. In 2017, the United States ranked 23rd out of 29 countries in terms of mean mobile download speeds. In 2017, mean mobile download speeds ranged from a high of 63.59 Mbps in Norway to a low of 17.15 Mbps in Chile. The highest-ranked country in 2016 was South Korea, with a mean mobile download speed of 39.19 Mbps in 2016.

6. We also compare U.S. states to foreign countries. In 2017, the highest ranked state is Minnesota, which ranked 12th out of 78 states and countries with a mean mobile download speed of 34.73 Mbps. In addition, we present a comparison of U.S. state capitals with the capitals of the comparison countries. In 2017, the highest ranked U.S. state capital is Saint Paul, Minnesota, which ranked 14th out of 79 capital cities with a mean mobile download speed of 35.77 Mbps.

[6] The *Fourth International Broadband Data Report* and the *Fifth International Broadband Data Report* relied on Ookla speed data for 2012 to 2014 that consisted of daily speed test results for all cities (previous methodology). The *2018 Sixth IBDR* relied on Ookla speed data for 2014 to 2016 that consist of city speed test results averaged up to the yearly level, which has far fewer observations than the previous methodology (new methodology). Additional discussion of these methodologies is provided in the *2018 Sixth IBDR*. *2018 Sixth IBDR*, 33 FCC Rcd at 1018-19, paras. 24-25.

[7] *See infra* Tbl. 11 and Fig. 1.

Table 1

Fixed Broadband Summary Statistics (2016-2017)

All Available Data	2016	2017
Number of Countries	29	29
Number of Cities	129,141	186,196
Mean Tests Per City	2361.75	2916.77
Median Tests Per City	249	102
Download (Mbps)		
Minimum	0.27	0.26
Maximum	924.20	759.87
Mean	44.15	54.04
Median	42.63	55.03
Upload (Mbps)		
Minimum	0.01	0.00
Maximum	931.10	416.26
Mean	16.44	21.82
Median	10.31	12.94

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: The cities that make up the complete set of observations and the number of mean and median tests for each city vary from year to year, though some do repeat.

Table 2
Mean (Weighted) Fixed Download Speed by Country (2016-2017)

Country	2016		2017	
	Rank	Mbps	Rank	Mbps
Iceland	3	89.83	1	131.07
South Korea	4	86.95	2	120.16
Sweden	6	73.79	3	82.83
Switzerland	5	79.47	4	77.60
United States	**11**	**55.07**	**5**	**73.79**
Netherlands	7	67.62	6	72.88
Norway	13	54.64	7	69.54
Denmark	8	61.44	8	68.09
Japan	2	102.40	9	68.07
Canada	18	44.19	10	64.23
Spain	10	57.89	11	62.59
New Zealand	17	45.00	12	61.01
France	12	54.82	13	59.23
Luxembourg[8]	1	377.56	14	57.30
Belgium	14	48.65	15	53.36
Latvia	9	58.75	16	51.68
Ireland	21	40.46	17	51.51
Portugal	16	46.15	18	50.63
United Kingdom	19	42.14	19	48.86
Germany	20	41.98	20	47.65
Finland	15	47.97	21	46.12
Estonia	23	34.96	22	42.60
Chile	25	24.33	23	34.30
Czech Republic	22	37.07	24	34.17
Austria	24	32.60	25	32.77
Italy	28	17.24	26	26.88
Australia	26	20.04	27	23.89
Mexico	27	18.91	28	19.13
Greece	29	11.83	29	13.85

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

[8] We note that Luxembourg had substantially higher speeds in 2014 and 2015 than in 2017 with mean download speed in the range of 200 to 350 Mbps. *2018 Sixth IBDR*, 33 FCC Rcd at 1000, 1002, Appx. B, Tbl. 2.

Table 3
Median (Weighted) Fixed Download Speed by Country (2016-2017)

Country	2016		2017	
	Rank	Mbps	Rank	Mbps
Iceland	2	96.37	1	133.05
South Korea	4	87.85	2	127.49
Sweden	6	74.98	3	83.93
Switzerland	5	77.22	4	76.76
United States	**11**	**55.44**	**5**	**73.99**
Norway	12	55.27	6	73.03
Netherlands	7	65.03	7	72.20
Denmark	10	58.45	8	69.22
Japan	3	95.62	9	67.69
Spain	9	58.82	10	64.74
Canada	18	42.75	11	64.30
New Zealand	16	44.63	12	60.16
Ireland	22	37.00	13	59.64
Luxembourg	1	355.81	14	59.17
Latvia	8	64.22	15	55.61
France	14	47.25	16	55.49
Belgium	15	47.17	17	53.67
Portugal	13	51.20	18	52.70
United Kingdom	20	39.93	19	51.93
Germany	19	40.88	20	48.41
Estonia	21	37.40	21	48.19
Finland	17	43.18	22	44.17
Austria	24	35.45	23	35.61
Czech Republic	23	35.73	24	34.06
Chile	25	22.99	25	33.22
Italy	28	15.32	26	26.07
Australia	26	18.94	27	23.56
Mexico	27	15.97	28	19.20
Greece	29	11.83	29	13.74

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 4
Mean (Weighted) Fixed Download Speeds by U.S. States and Countries (2016-2017)

Country/U.S. State	2016		2017	
	Rank	Mbps	Rank	Mbps
Iceland	3	89.83	1	131.07
South Korea	4	86.95	2	120.16
Delaware	22	58.23	3	91.19
North Carolina	13	62.57	4	90.04
New Jersey	24	57.69	5	89.40
Kansas	5	80.69	6	87.41
Maryland	27	56.63	7	87.41
Tennessee	11	64.79	8	87.37
Virginia	41	49.10	9	85.94
New York	33	53.18	10	84.61
Georgia	20	59.32	11	83.23
Utah	12	64.24	12	82.93
Sweden	8	73.79	13	82.83
Hawaii	7	75.95	14	82.78
Massachusetts	26	56.79	15	81.56
Colorado	25	57.28	16	80.37
Washington	19	59.64	17	80.19
Texas	9	69.01	18	80.12
Nevada	18	60.52	19	79.51
Missouri	16	62.17	20	78.56
Switzerland	6	79.47	21	77.60
Pennsylvania	47	46.07	22	75.75
Arizona	15	62.36	23	74.85
California	14	62.46	24	74.49
Oklahoma	37	51.29	25	74.33
South Dakota	45	46.93	26	74.17
North Dakota	32	53.29	27	73.29
Netherlands	10	67.62	28	72.88
Louisiana	31	53.30	29	72.40
Oregon	38	50.61	30	71.63

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 4 (continued)

Country/U.S. State	2016		2017	
	Rank	Mbps	Rank	Mbps
New Hampshire	36	51.43	31	71.12
Norway	30	54.64	32	69.54
Rhode Island	35	51.46	33	68.31
Denmark	17	61.44	34	68.09
Japan	2	102.40	35	68.07
Florida	34	51.85	36	67.66
Canada	52	44.19	37	64.23
Connecticut	39	49.88	38	64.21
Illinois	44	47.43	39	63.88
Arkansas	61	39.25	40	63.74
New Mexico	48	45.87	41	63.51
Alaska	28	55.93	42	62.84
Kentucky	53	43.00	43	62.66
Spain	23	57.89	44	62.59
Indiana	54	42.89	45	61.28
New Zealand	51	45.00	46	61.01
Iowa	64	37.25	47	59.95
West Virginia	49	45.55	48	59.61
France	29	54.82	49	59.23
Nebraska	62	38.98	50	59.23
Minnesota	50	45.11	51	58.73
Mississippi	58	40.55	52	57.99
Luxembourg	1	377.56	53	57.30
Michigan	57	41.12	54	57.10
Alabama	60	39.52	55	53.64
Belgium	42	48.65	56	53.36
Idaho	63	38.14	57	52.95
Latvia	21	58.75	58	51.68
Ireland	59	40.46	59	51.51
Portugal	46	46.15	60	50.63
South Carolina	66	36.33	61	50.30

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 4 (continued)

Country/U.S. State	2016		2017	
	Rank	Mbps	Rank	Mbps
United Kingdom	55	42.14	62	48.86
Ohio	71	29.42	63	48.82
Germany	56	41.98	64	47.65
Vermont	40	49.12	65	46.94
Finland	43	47.97	66	46.12
Wisconsin	72	28.61	67	44.00
Estonia	67	34.96	68	42.60
Montana	70	30.61	69	38.65
Wyoming	68	33.13	70	36.93
Chile	73	24.33	71	34.30
Czech Republic	65	37.07	72	34.17
Austria	69	32.60	73	32.77
Maine	74	21.28	74	32.33
Italy	77	17.24	75	26.88
Australia	75	20.04	76	23.89
Mexico	76	18.91	77	19.13
Greece	78	11.83	78	13.85

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 5
Mean (Weighted) Fixed Download Speed
by Country Capital and U.S. State Capital Cities (2016-2017)

City, Country	2016			2017		
	Rank	Mbps	Number of Tests	Rank	Mbps	Number of Tests
Reykjavik, Iceland	4	96.37	75,652	1	133.05	162,989
Seoul, South Korea	6	87.85	370,776	2	127.49	1,349,931
Salt Lake City, UT, United States	12	72.47	235,863	3	120.90	237,341
Austin, TX, United States	2	111.21	558,711	4	118.43	1,311,796
Paris, France	3	96.83	957,635	5	115.89	2,179,639
Raleigh, NC, United States	24	58.41	142,812	6	104.93	484,534
Stockholm, Sweden	5	89.48	149,363	7	97.58	323,891
Atlanta, GA, United States	18	64.61	270,571	8	97.00	467,873
Boston, MA, United States	32	55.24	128,906	9	96.06	414,145
Dover, DE, United States	20	63.48	17,416	10	95.35	15,841
Trenton, NJ, United States	29	56.63	41,252	11	93.96	13,547
Nashville, TN, United States	13	69.97	103,238	12	93.69	504,623
Wellington, New Zealand	31	55.50	55,734	13	89.05	268,053
Washington, DC, United States	30	55.96	231,571	14	88.67	439,301
Oklahoma City, OK, United States	14	67.45	77,986	15	87.24	473,572
Concord, NH, United States	25	57.77	14,174	16	87.00	26,094
Madrid, Spain	16	64.92	865,586	17	83.96	2,452,461
Salem, OR, United States	17	64.82	46,273	18	82.09	79,054
Richmond, VA, United States	45	47.46	59,914	19	82.03	80,012
Olympia, WA, United States	19	63.89	35,538	20	80.74	28,574
Annapolis, MD, United States	28	56.80	19,298	21	78.57	21,064
Phoenix, AZ, United States	7	85.71	155,096	22	77.74	1,440,209
Harrisburg, PA, United States	37	51.24	29,134	23	77.69	13,824
Honolulu, HI, United States	15	65.12	168,095	24	77.62	477,058
Denver, CO, United States	26	57.74	418,686	25	77.45	654,172
Lansing, MI, United States	22	60.40	47,122	26	75.59	68,857
Oslo, Norway	10	77.31	256,096	27	73.03	934,548
Jackson, MS, United States	8	80.86	10,006	28	72.48	28,430
Amsterdam, Netherlands	23	59.69	282,992	29	71.66	1,029,924

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla. We note that we cannot draw statistical conclusions from cities with less than 300 tests per year.
Note: City-year observations are collapsed to the country/state-year level and are weighted by the number of tests.

Table 5 (continued)

City, Country	2016			2017		
	Rank	Mbps	Number of Tests	Rank	Mbps	Number of Tests
Copenhagen, Denmark	27	57.58	141,230	30	71.12	578,398
Sacramento, CA, United States	36	51.53	233,290	31	70.82	362,069
Bismarck, ND, United States	33	53.29	6,851	32	70.73	22,288
Bern, Switzerland	21	60.95	39,865	33	69.66	85,914
Baton Rouge, LA, United States	48	46.76	101,267	34	69.05	187,676
Tokyo, Japan	9	80.15	863,042	35	67.69	1,422,396
Ottawa, Canada	53	42.95	186,252	36	67.61	1,270,321
Indianapolis, IN, United States	39	50.66	149,018	37	65.91	462,782
Providence, RI, United States	41	49.94	42,608	38	64.60	71,081
Lincoln, NE, United States	66	34.34	122,440	39	63.54	325,948
Pierre, SD, United States	68	33.59	1,456	40	62.53	2,938
Saint Paul, MN, United States	42	48.75	55,328	41	60.42	107,167
Santa Fe, NM, United States	44	48.18	36,427	42	60.30	52,596
Des Moines, IA, United States	38	51.17	44,604	43	59.77	157,108
Dublin, Ireland	51	43.82	139,841	44	59.64	1,153,573
Luxembourg City, Luxembourg	1	303.23	25,925	45	59.17	91,455
Boise, ID, United States	35	51.74	56,697	46	59.13	206,292
Jefferson City, MO, United States	67	34.00	26,811	47	57.49	56,843
Charleston, WV, United States	59	39.63	7,443	48	56.65	40,402
Montgomery, AL, United States	50	45.34	10,454	49	56.33	71,147
Riga, Latvia	11	75.27	291,925	50	55.61	890,237
Columbus, OH, United States	54	41.80	238,021	51	55.03	666,659
Little Rock, AR, United States	49	45.45	29,632	52	54.33	92,377
Topeka, KS, United States	69	31.98	13,403	53	53.11	75,734
Lisbon, Portugal	34	51.95	329,982	54	52.70	938,815

Source: Ookla SPEEDTEST intelligence data, We note that we cannot draw statistical conclusions from cities with less than 300 tests per year.
Note: City-year observations are collapsed to the country/state-year level and are weighted by the number of tests.

Table 5 (continued)

City, Country	2016			2017		
	Rank		Number of Tests	Rank	Mbps	Number of Tests
Hartford, CT, United States	47	46.90	19,826	55	52.51	29,400
Tallahassee, FL, United States	56	41.42	81,718	56	51.40	90,303
Springfield, IL, United States	46	47.23	30,924	57	51.21	26,452
Madison, WI, United States	58	40.64	96,407	58	51.03	200,334
Carson City, NV, United States	65	34.46	11,563	59	51.00	31,626
Tallinn, Estonia	40	50.42	159,501	60	48.19	615,656
London, United Kingdom	63	34.90	700,791	61	48.03	4,711,717
Cheyenne, WY, United States	57	40.92	25,809	62	47.39	36,070
Montpelier, VT, United States	64	34.66	5,167	63	44.51	2,669
Helsinki, Finland	52	43.18	358,716	64	44.17	1,373,567
Berlin, Germany	62	36.12	305,662	65	44.07	2,186,811
Juneau, AK, United States	72	28.28	1,077	66	43.68	8,582
Prague, Czech Republic	43	48.64	333,744	67	43.49	1,064,988
Columbia, SC, United States	73	27.97	50,034	68	42.36	75,620
Brussels, Belgium	60	39.20	176,281	69	42.10	419,449
Helena, MT, United States	61	39.14	18,258	70	40.58	14,826
Vienna, Austria	55	41.57	481,363	71	39.49	2,708,139
Albany, NY, United States	70	31.40	39,062	72	38.18	45,464
Santiago, Chile	75	22.80	943,474	73	36.47	231,104
Augusta, ME, United States	77	18.73	4,832	74	33.94	11,290
Rome, Italy	76	20.85	614,404	75	29.29	5,366,916
Canberra, Australia	71	30.28	3,500	76	29.10	4,301
Frankfort, KY, United States	78	14.03	12,432	77	29.07	15,145
Mexico City, Mexico	74	27.04	905,111	78	23.63	10,626,917
Athens, Greece	79	11.94	809,196	79	13.74	2,579,156

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla. We note that we cannot draw statistical conclusions from cities with less than 300 tests per year.
Note: City-year observations are collapsed to the country/state-year level and are weighted by the number of tests.

Table 6
Mobile Broadband Summary Statistics (2016-2017)

All Available Data	2016	2017
Number of Countries	29	29
Number of Cities	120,417	164,468
Mean Tests Per City	526.55	351.54
Median Tests Per City	46	17
Download (Mbps)		
Minimum	0.26	0.26
Maximum	190.41	252.61
Mean	22.75	28.11
Median	21.91	26.34
Upload (Mbps)		
Minimum	0.00	0.00
Maximum	72.54	69.55
Mean	9.11	10.54
Median	9.12	10.38

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: The cities that make up the complete set of observations and the number of mean and median tests for each city vary from year to year, though some do repeat.

Table 7
Mean (Weighted) Mobile Download Speed by Country (2016-2017)

Country	2016		2017	
	Rank	Mbps	Rank	Mbps
Norway	3	38.03	1	63.59
Netherlands	2	39.08	2	50.19
Iceland	8	30.93	3	46.89
Australia	4	36.57	4	45.35
South Korea	1	39.19	5	41.37
Luxembourg	6	32.47	6	38.65
Denmark	5	33.12	7	38.58
Canada	17	26.02	8	38.20
Sweden	16	26.16	9	37.55
Belgium	12	27.22	10	37.07
New Zealand	9	30.36	11	35.72
Switzerland	11	28.07	12	34.51
Finland	14	26.61	13	33.88
Austria	7	31.09	14	33.58
Greece	10	29.34	15	33.10
Spain	19	24.14	16	32.53
Czech Republic	21	23.13	17	31.66
Estonia	18	24.27	18	30.98
Italy	23	22.03	19	30.20
Latvia	15	26.25	20	28.47
France	13	26.87	21	27.98
United Kingdom	20	24.00	22	26.64
United States	**25**	**19.97**	**23**	**24.78**
Germany	22	22.85	24	23.46
Portugal	24	20.31	25	23.02
Ireland	26	16.33	26	23.01
Mexico	29	15.24	27	20.28
Japan	27	15.95	28	19.53
Chile	28	15.60	29	17.15

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Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 8
Median (Weighted) Mobile Download Speed by Country (2016-2017)

Country	2016		2017	
	Rank	Mbps	Rank	Mbps
Norway	2	40.68	1	64.75
Netherlands	1	41.73	2	52.13
Iceland	9	32.01	3	48.11
Australia	4	37.01	4	45.27
Luxembourg	8	32.43	5	40.21
South Korea	3	38.91	6	39.96
Canada	18	26.55	7	39.08
Denmark	7	32.60	8	38.22
Sweden	16	27.29	9	38.19
Belgium	17	26.77	10	37.46
New Zealand	6	33.24	11	37.29
Switzerland	12	28.90	12	36.22
Finland	13	27.97	13	35.48
Austria	5	33.26	14	34.55
Estonia	15	27.31	15	34.47
Spain	19	25.63	16	33.01
Greece	14	27.66	17	32.56
Czech Republic	22	23.36	18	31.73
Italy	23	22.65	19	31.09
Latvia	11	29.21	20	30.05
France	10	29.64	21	28.98
United Kingdom	20	23.51	22	25.56
United States	**25**	**19.62**	**23**	**24.66**
Germany	21	23.42	24	24.11
Portugal	24	21.63	25	22.80
Ireland	26	16.51	26	22.62
Japan	28	15.97	27	19.56
Mexico	27	16.15	28	19.50
Chile	29	15.27	29	15.92

Source: Ookla SPEEDTEST intelligence data, © 2017 Ookla, LLC. All rights reserved. Published with permission of Ookla.
Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 9
Mean (Weighted) Mobile Download Speeds
by U.S. States and Countries (2016-2017)

Country/U.S. State	2016		2017	
	Rank	Mbps	Rank	Mbps
Norway	3	38.03	1	63.59
Netherlands	2	39.08	2	50.19
Iceland	8	30.93	3	46.89
Australia	4	36.57	4	45.35
South Korea	1	39.19	5	41.37
Luxembourg	6	32.47	6	38.65
Denmark	5	33.12	7	38.58
Canada	17	26.02	8	38.20
Sweden	16	26.16	9	37.55
Belgium	12	27.22	10	37.07
New Zealand	9	30.36	11	35.72
Minnesota	18	24.47	12	34.73
Switzerland	11	28.07	13	34.51
Finland	14	26.61	14	33.88
Austria	7	31.09	15	33.58
Greece	10	29.34	16	33.10
Spain	21	24.14	17	32.53
Czech Republic	24	23.13	18	31.66
Estonia	19	24.27	19	30.98
Italy	27	22.03	20	30.20
Michigan	25	23.10	21	29.97
Washington	20	24.19	22	29.81
Georgia	23	23.77	23	28.95
Kansas	38	20.93	24	28.78
Ohio	30	21.65	25	28.54
Latvia	15	26.25	26	28.47
Illinois	33	21.39	27	28.45
Indiana	37	21.05	28	28.39
France	13	26.87	29	27.98
Rhode Island	29	21.70	30	26.97

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Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 9 (continued)

Country/U.S. State	2016		2017	
	Rank	Mbps	Rank	Mbps
United Kingdom	22	24.00	31	26.64
Massachusetts	45	20.22	32	26.46
Oregon	32	21.46	33	26.01
Missouri	47	19.09	34	25.90
Florida	40	20.90	35	25.81
North Dakota	39	20.92	36	25.81
New Jersey	34	21.27	37	25.78
Connecticut	35	21.17	38	25.52
New York	36	21.09	39	25.33
Pennsylvania	43	20.36	40	25.26
South Dakota	28	21.70	41	25.09
Alabama	31	21.52	42	24.80
California	42	20.53	43	24.15
Wisconsin	41	20.58	44	23.73
Germany	26	22.85	45	23.46
Maryland	50	18.74	46	23.44
Portugal	44	20.31	47	23.02
Ireland	65	16.33	48	23.01
Texas	52	18.28	49	22.78
Virginia	55	18.08	50	22.74
Kentucky	49	18.83	51	22.71
Tennessee	53	18.27	52	22.34
Delaware	46	20.02	53	22.14
South Carolina	61	17.24	54	22.05
New Hampshire	54	18.24	55	21.69
North Carolina	60	17.28	56	21.64
Colorado	71	14.69	57	21.47
Arizona	63	16.51	58	21.42
Arkansas	51	18.28	59	21.35
Louisiana	57	17.77	60	21.33
Utah	59	17.35	61	21.08
Iowa	48	19.05	62	20.76
Hawaii	56	17.80	63	20.34

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Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 9 (continued)

Country/U.S. State	2016		2017	
	Rank	Mbps	Rank	Mbps
Mexico	69	15.24	64	20.28
Nebraska	58	17.48	65	20.22
Japan	66	15.95	66	19.53
Montana	70	14.77	67	19.46
New Mexico	73	14.11	68	19.36
Nevada	62	16.62	69	19.33
Oklahoma	64	16.41	70	18.99
Chile	67	15.60	71	17.15
Mississippi	68	15.38	72	16.87
Idaho	72	14.40	73	16.86
Alaska	75	13.32	74	16.04
West Virginia	74	13.77	75	15.84
Vermont	77	12.48	76	14.81
Maine	76	12.73	77	14.42
Wyoming	78	9.90	78	11.64

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Note: City-year observations are collapsed to the country-year level and are weighted by the number of tests.

Table 10
Mean (Weighted) Mobile Download Speed
by Country Capital and U.S. State Capital Cities (2016-2017)

City, Country	2016			2017		
	Rank	Mbps	Number of Tests	Rank	Mbps	Number of Tests
Oslo, Norway	2	40.68	119,217	1	64.75	88,650
Amsterdam, Netherlands	1	42.07	61,000	2	48.28	64,270
Reykjavik, Iceland	7	32.01	13,160	3	48.11	16,785
Prague, Czech Republic	16	27.74	79,886	4	41.66	69,010
Canberra, Australia	19	26.42	14,528	5	40.98	3,012
Luxembourg City, Luxembourg	5	32.43	17,018	6	40.21	11,079
Seoul, South Korea	3	38.91	92,812	7	39.96	81,569
Wellington, New Zealand	9	30.53	9,077	8	39.44	10,151
Stockholm, Sweden	8	31.42	24,710	9	39.30	24,079
Copenhagen, Denmark	10	30.21	100,778	10	37.42	102,148
Madrid, Spain	14	28.35	200,330	11	36.53	162,705
Bern, Switzerland	13	28.90	13,588	12	36.42	15,143
Brussels, Belgium	20	26.31	28,546	13	35.95	12,049
Saint Paul, MN, United States	23	25.14	28,216	14	35.77	26,341
Helsinki, Finland	6	32.38	347,676	15	35.48	447,171
Vienna, Austria	4	34.77	450,644	16	34.55	454,378
Tallinn, Estonia	18	27.31	123,540	17	34.47	121,449
Athens, Greece	17	27.66	138,488	18	32.56	185,961
Ottawa, Canada	31	22.49	46,039	19	32.37	45,625
Bismarck, ND, United States	32	22.37	1,926	20	31.96	1,592
Annapolis, MD, United States	41	20.08	4,620	21	31.75	2,271
Dover, DE, United States	33	22.31	2,742	22	31.51	2,329
Rome, Italy	26	24.11	537,626	23	31.09	637,839
Lansing, MI, United States	21	26.16	12,964	24	30.98	11,384
Salem, OR, United States	22	25.61	11,700	25	30.94	9,580
Atlanta, GA, United States	34	22.28	170,471	26	30.75	109,901
Montgomery, AL, United States	25	24.54	11,003	27	30.43	11,163
Riga, Latvia	12	29.21	148,845	28	30.05	166,305
Indianapolis, IN, United States	35	22.05	72,218	29	30.02	80,438
Little Rock, AR, United States	28	23.32	13,844	30	29.58	15,230

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Note: City-year observations are collapsed to the country/state-year level and are weighted by the number of tests. We note that we cannot draw statistical conclusions from cities with less than 300 tests per year.

Table 10 (continued)

City, Country	2016			2017		
	Rank	Mbps	Number of Tests	Rank	Mbps	Number of Tests
Paris, France	11	29.64	366,806	31	28.98	626,148
Lisbon, Portugal	15	28.26	50,622	32	27.87	82,323
Columbus, OH, United States	36	22.02	88,165	33	27.40	83,801
Austin, TX, United States	44	19.62	111,128	34	26.10	111,199
Tallahassee, FL, United States	30	23.08	12,244	35	26.06	11,892
Springfield, IL, United States	29	23.10	8,443	36	25.97	7,125
Providence, RI, United States	45	19.54	16,818	37	25.76	11,996
London, United Kingdom	27	23.48	794,560	38	25.08	817,799
Raleigh, NC, United States	50	19.00	40,699	39	25.03	38,307
Berlin, Germany	24	24.75	172,721	40	25.02	204,579
Boston, MA, United States	53	18.25	88,039	41	24.73	92,405
Pierre, SD, United States	38	20.51	317	42	24.41	270
Washington, DC, United States	43	19.67	109,894	43	24.17	122,672
Richmond, VA, United States	58	17.63	32,270	44	24.07	16,339
Baton Rouge, LA, United States	57	17.70	20,941	45	23.57	17,267
Lincoln, NE, United States	42	19.99	16,143	46	23.46	20,199
Des Moines, IA, United States	39	20.36	20,494	47	23.45	24,164
Dublin, Ireland	40	20.26	170,265	48	22.62	167,521
Nashville, TN, United States	56	17.75	80,705	49	22.50	90,396
Topeka, KS, United States	71	15.56	7,240	50	22.48	9,154
Albany, NY, United States	51	18.92	10,275	51	22.36	8,089
Hartford, CT, United States	49	19.04	16,463	52	22.31	11,720
Harrisburg, PA, United States	37	21.41	7,399	53	22.18	3,563
Phoenix, AZ, United States	62	17.02	183,819	54	22.15	156,251

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Note: City-year observations are collapsed to the country/state-year level and are weighted by the number of tests. We note that we cannot draw statistical conclusions from cities with less than 300 tests per year.

Table 10 (continued)

City, Country	2016			2017		
	Rank	Mbps	Number of Tests	Rank	Mbps	Number of Tests
Sacramento, CA, United States	46	19.21	111,809	55	22.04	83,911
Denver, CO, United States	73	14.16	140,760	56	21.55	132,369
Frankfort, KY, United States	55	18.10	2,797	57	21.42	2,965
Columbia, SC, United States	67	16.07	13,674	58	21.33	13,455
Salt Lake City, UT, United States	54	18.23	88,701	59	20.66	37,652
Boise, ID, United States	68	16.02	14,845	60	20.65	12,466
Oklahoma City, OK, United States	70	15.93	71,115	61	20.61	85,568
Honolulu, HI, United States	59	17.25	118,987	62	20.20	89,283
Tokyo, Japan	69	15.97	664,877	63	19.56	219,758
Mexico City, Mexico	66	16.15	576,975	64	19.24	563,491
Helena, MT, United States	61	17.13	1,529	65	19.15	1,701
Olympia, WA, United States	52	18.58	4,688	66	19.12	4,073
Madison, WI, United States	63	16.71	16,139	67	18.82	18,350
Jackson, MS, United States	65	16.66	5,511	68	17.70	6,851
Jefferson City, MO, United States	64	16.70	3,351	69	17.62	4,090
Juneau, AK, United States	47	19.09	662	70	17.58	541
Trenton, NJ, United States	48	19.07	6,216	71	17.47	3,454
Montpelier, VT, United States	75	13.39	307	72	17.29	259
Augusta, ME, United States	74	13.66	968	73	17.14	1,473
Concord, NH, United States	78	11.33	1,443	74	16.28	1,936
Carson City, NV, United States	60	17.14	2,945	75	15.94	2,901
Santiago, Chile	72	15.27	488,563	76	15.92	433,865
Cheyenne, WY, United States	76	12.08	3,574	77	15.91	3,513
Charleston, WV, United States	77	11.93	4,657	78	15.84	3,217
Santa Fe, NM, United States	79	11.28	6,725	79	13.97	7,463

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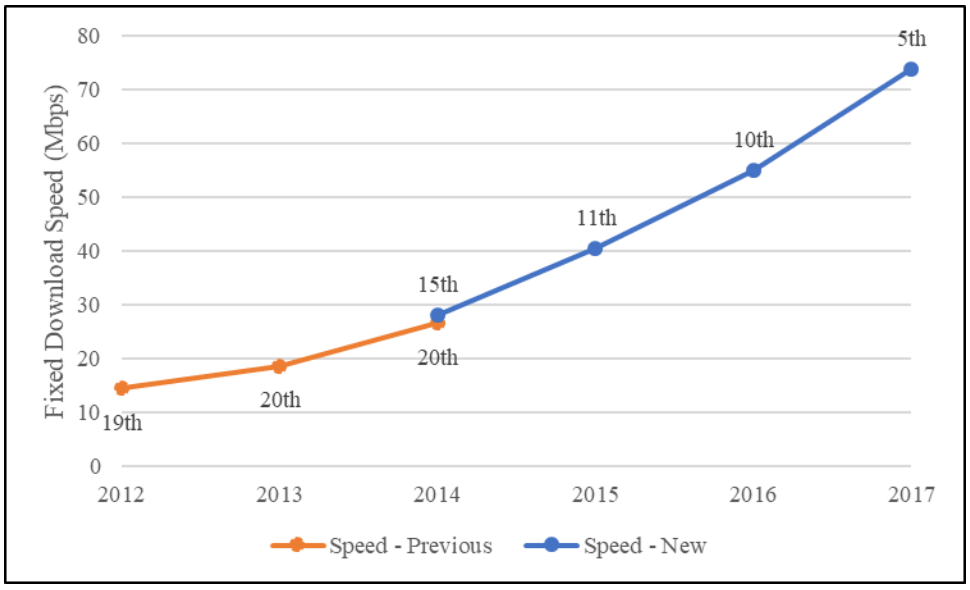
Note: City-year observations are collapsed to the country/state-year level and are weighted by the number of tests. We note that we cannot draw statistical conclusions from cities with less than 300 tests per year.

Table 11
U.S. Fixed Download Speeds and Rankings[9]

Year	Speed (Mbps) (Previous Methodology)	Speed (Mbps) (New Methodology)	U.S. Rank (Previous Methodology)	U.S. Rank (New Methodology)
2012	14.5		19	
2013	18.67		20	
2014	26.68	28.09	20	15
2015		40.38		11
2016		55.07		10
2017		73.79		5

Figure 1
U.S. Fixed Download Speed with Ranking, 2012-2017



[9] Table 11 and Figure 1 provide fixed download speed data for the United States and the comparison countries for which we have data for every year from 2012 to 2017. The sole comparison country not included is Latvia.

APPENDIX E-3

Broadband Price Comparison

1. We present information on "price for broadband service capability" for both fixed and mobile broadband plans in the United States and select comparison countries.[1] For the analysis, we include a comparison of "a geographically diverse selection of countries" and "communities including the capital cities of such countries."[2]

II. OVERVIEW

2. *Assessing Whether Prices Changed Since the 2018 Sixth IBDR.* As with earlier IBDRs, the *2018 Sixth IBDR* ranked countries by fixed and mobile broadband prices from the least expensive (1st) to most expensive (e.g., 29th) according to unweighted average prices for standalone fixed broadband plans within certain download speed ranges and mobile broadband plans within bands of data usage allowances.[3] For the first time, to more closely match the characteristics of the comparison communities and their broadband offerings with those in the United States, the *2018 Sixth IBDR* presented country rankings by two additional methodologies: a broadband price index and a hedonic price index.[4] The *2018 Sixth IBDR* stated that the hedonic price index "allows an adjustment for observable differences in broadband quality across countries (e.g., speed and usage limits) and generates prices for a set of standardized broadband plans in every country to produce a price index that accounts for all of these factors and is comparable across countries."[5] A summary of all the results for each of the methodologies can be found in the *2018 Sixth IBDR*.[6]

3. Here, we conduct statistical tests for both fixed and mobile broadband prices and focus on whether there were indications of statistically significant changes in broadband prices from 2017 to 2018 by assessing a smaller subset of countries.[7] The expectation from this analysis was that we could potentially draw inferences from the data about pricing trends reported in the *2018 Sixth IBDR*. To conduct this analysis, for fixed broadband plans, we collected prices from the selected eight countries and ten cities for comparison. For mobile broadband plans, we collected prices at the national level from the eight countries. In contrast to the *2018 Sixth IBDR,* we do not rank countries by price.

III. BROADBAND PRICING ANALYSIS

A. Hedonic Price Indexes and Statistical Results

4. Below, we provide the results of our analysis for fixed and mobile broadband prices, respectively, in the selected eight countries. In Table 1a and 1b, the "Index" represents the country-specific hedonic index calculated from the original data collection. We then calculated a 95% confidence

[1] 47 U.S.C. § 1303(b)(1); *see also* 47 U.S.C. § 163.

[2] 47 U.S.C. § 1303(b)(2).

[3] *2018 Sixth IBDR*, 33 FCC Rcd at 1020, Appx. C, para. 2.

[4] *Id*. at 984, para. 13 ("Our additional assessments seek to better assess how the U.S. market is performing relative to other markets after accounting for quality differences as well as market-level cost and demographic differences that are known to affect pricing, such as population density, income, and education levels.").

[5] *Id*.

[6] *Id.* at 983-85, paras. 12-15.

[7] Specifically, we are estimating whether the quality-adjusted prices of 2017 plans have changed relative to the predicted quality-adjusted prices of 2017 plans had they been offered in 2018.

interval for each country to determine if the relative price change (from 2017 to 2018) is statistically different than zero. The lower and upper bounds of the 95% confidence interval are represented by "95% CI LB" and "95% CI UB," respectively. If zero is within the lower and upper bounds of the confidence interval, we cannot conclude there has been a price change. If zero is *not* within the lower and upper confidence interval bounds, this suggests quality-adjusted prices have changed.

5. In Table 1a, Germany displays a statistically significant change in fixed broadband prices from 2017 to 2018.

Table 1a
Fixed Broadband - Hedonic Index by Country

Country	Index	95% CI LB	95% CI UB
Denmark	-5.3%	-14.5%	6.2%
Estonia	-6.3%	-12.8%	1.7%
France	13.7%	-2.9%	42.4%
Germany	**-15.8%**	**-21.4%**	**-9.0%**
Mexico	12.7%	-3.6%	33.5%
South Korea	0.6%	-1.7%	3.0%
United Kingdom	-5.7%	-11.6%	0.4%
United States	-1.6%	-6.2%	4.0%

Note: Statistically signficiant results are bolded. The 95% Confidence Interval calculated using bootstrapping resampling.

6. In Table 1b, Denmark, Estonia, Germany, and South Korea display statistically significant changes in mobile broadband prices from 2017 to 2018.

Table 1b
Mobile Broadband - Hedonic Index by Country

Country	Index	95% CI LB	95% CI UB
Denmark	**-23.7%**	**-31.8%**	**-14.8%**
Estonia	**-14.9%**	**-23.8%**	**-4.0%**
France	-12.9%	-27.2%	11.8%
Germany	**-18.1%**	**-29.2%**	**-4.9%**
Mexico	-4.3%	-18.9%	20.7%
South Korea	**-7.4%**	**-11.9%**	**-0.7%**
United Kingdom	-2.2%	-11.9%	10.5%
United States	-7.7%	-18.3%	7.4%

Note: Statistically signficiant results are bolded. The 95% Confidence Interval calculated using bootstrapping resampling.

B. Data Collection and Methodology

1. Data Collection

7. *Country Selection and General Data Collection*. We selected eight countries, which are a subset of the countries selected in the *2018 Sixth IBDR*, based on geographical diversity. For each of the countries, we selected the capital cities and added two additional cities for the United States and Mexico for the reasons noted below.[8] Similar to the *2018 Sixth IBDR*, staff also collected data from broadband providers with market shares of at least 10%[9] and based on data availability.

8. *Fixed Broadband Data Collection.* To obtain the raw price data, we relied largely on the sampling methodology and data collection methodology used in the *2018 Sixth IBDR*,[10] with certain differences. With the exception of Mexico and the United States, we collected plan prices and terms at ten randomly sampled addresses for the capital city in each country between June and August 2018. We took this approach because we observed that the data collected for the *2018 Sixth IBDR* generally did not show variation in the plan prices across the cities selected within countries.[11] Also, in the United States and Mexico not all of the providers in our sample offer broadband service in the capital city. To improve our analysis, we collected plan prices and terms for two cities in Mexico and in the United States: the capital city and a city where those providers do offer broadband service and is represented in the 2017 data collection.[12] In addition, we simplified certain variables for the 2018 data collection[13] and made minor corrections to the 2017 data collection.

9. *Mobile Broadband Data Collection.* To obtain the raw price data, we relied largely on the sampling methodology and data collection methodology used in the *2018 Sixth IBDR*,[14] with certain differences. We collected mobile broadband plan prices and terms in the same eight countries at the national level between June and August 2018. We eliminated certain variables from the 2018 data

[8] The *2018 Sixth IBDR* generally captured fixed broadband prices in two or three cities per country with the expectation that the report would find price variation between cities. *Id.* at 1027, Appx. C, para. 14.

[9] Similar to the *2018 Sixth IBDR*, we rely on the TeleGeography GlobalComms Database to select providers with broadband market shares of at least 10% as of March 2017 and March 2018, with certain exceptions. *Id.* For example, Verizon is estimated to have a national broadband market share below 10% in the United States, but it was sampled due to being the largest FTTP provider as well as the second largest ILEC. *Id.* at para. 14, n.41.

[10] *Id.* at 1027-29, paras. 14-18.

[11] Certain fees, such as Regional Sports Network fees, associated with fixed broadband plans may vary across cities in a country. We assume, however, that such fees do not vary significantly from year to year in a city.

[12] *See supra* Section II.H, para. 272, note 825. While we observe that fixed broadband plan prices generally do not vary across cities within a country, the availability of a provider's fixed broadband plans may vary across cities in that country. For example, in 2017 and 2018, 50 Mbps was the highest download speed offered by AT&T at the ten addresses sampled in Los Angeles. In other U.S. cities, AT&T offered speeds up to 1 Gbps in 2017. For each provider, we compared 2017 and 2018 broadband price data pertaining to the same city for each year to ensure that the availability of broadband plans is consistent from year to year.

[13] In the *2018 Sixth IBDR*, advertised download speeds were recorded as minimum, maximum, and/or typical, but we simplified this variable by collecting one of these because most providers did not report more than one download speed metric. Similarly, we simplified advertised upload speeds to collect either minimum or maximum (rather than record both) because most providers did not report more than one upload speed metric. We also clarified the definitions of Installation Fee and Activation Fee as one-time fees and of Set-Top Box Price and Modem/Router Price as recurring monthly prices.

[14] *See 2018 Sixth IBDR*, 33 FCC Rcd at 1040-42, Appx. C, paras. 40-44.

collection and clarified the definitions of other variables.[15] We also modified the framework of the data collection to better distinguish pricing and product characteristics between single line plans and plans with multiple lines and made corrections to the 2017 data to fit this framework.[16]

10. *Data Caveats.* We note certain limitations and inconsistencies in the data. Given the limited scope of our methodology and analysis, as well as any data collection issues, we do not draw conclusions regarding our observations or as to the competitiveness of broadband pricing across the United States and the comparison countries in 2018 relative to 2017. There may be various factors that affect these results, such as changes in promotional prices or availability of certain broadband plans.

2. Hedonic Price Indexes and Statistical Tests

11. For both fixed and mobile broadband, we conducted a statistical test using a hedonic price index to assess whether there were statistically significant changes in broadband prices between 2017 and 2018 for the eight countries examined. To make such an assessment, we first computed a hedonic price index, which is a measure of price change for plans in 2017 had they been offered in 2018 relative to 2017.[17] This approach is preferable to directly comparing country-level weighted average prices because changes may occur in plan offerings and plan characteristics from year to year. For example, the fastest plan offered by a carrier might have been 50 Mbps in 2017 but in 2018 that carrier may no longer offer a 50 Mbps plan and instead offer a 100 Mbps plan. Without controlling for such changes in the availability of plans, the resulting country-level average price would suggest a larger price increase from year-to-year than if product characteristics had been controlled for in the analysis. Second, for our statistical test, we then calculated a 95% confidence interval for each country to determine if the relative price change is statistically different than zero. If zero is within the lower and upper bounds of the confidence interval, we cannot conclude that quality-adjusted prices have changed from 2017 to 2018.

12. *Fixed Broadband Hedonic Price Index and Statistical Test.* We calculate a hedonic index.[18] To calculate this index, we undertake several steps. First, we estimate two identical regression models[19]: one regression model uses only the 2017 plans and the other regression model uses only the 2018 plans:

$$\log(price) = \beta_0 + \beta_1 * \log(DownloadSpeed) + \beta_2 * Bundle + \beta_3 * Provider + \beta_4 * Country + \varepsilon$$

[15] Specifically, we did not collect variables with respect to technology, data cap overage fees and data amounts, promotional data and duration, text price if not unlimited, and zero-rated offers because these variables were not used in the analysis in the *2018 Sixth IBDR*. We also clarified the definitions of Access Fee to signify a monthly fee and Activation Fee to signify a one-time fee.

[16] For example, we observe that some providers increase the data cap if additional lines are added to a plan, while some providers allow subscribers of a shared plan to use a fixed amount of data regardless of how many lines are included in the plan.

[17] By estimating separate 2017 and 2018 hedonic regression models, we predict the price of 2017 plans using the 2018 model to predict what the plans offered in 2017 would have cost if they had been offered in 2018. With the predicted prices, we calculate the ratio of each 2017 plan's predicted 2018 price to its predicted 2017 price.

[18] We use the approach discussed in Ariel Pakes' *A Reconsideration of Hedonic Price Indexes with an Application to PC's*. *See* Ariel Pakes, A Reconsideration of Hedonic Price Indexes with an Application to PC's (2003), https://scholar.harvard.edu/files/pakes/files/hedonics_8-03.pdf.

[19] We cluster at the provider.

We use the two regression models to predict the price of 2017 plans. Then, we calculate the ratio of the predicted 2018 price to the predicted 2017 price of each 2017 plan. Next, we calculate the weighted average of the ratios using the plan weights for each country to produce the hedonic index:

$$H = \sum_i \frac{h^{18}(x_i^{17})}{h^{17}(x_i^{17})} * w_i^{17}$$

where $h^{18}(x_i^{17})$ is a predicted price (or, fitted left-hand-side variable) for a 2017 plan using the 2018 hedonic regression model, $h^{17}(x_i^{17})$ is a predicted price for a 2017 plan using the 2017 hedonic regression model, and w_i^{17} is the 2017 plan weight. This hedonic index estimates the relative change in prices for 2017 plans. Finally, to calculate a 95% confidence interval for the hedonic index, we use a bootstrapping resampling method.[20] We generate 500 stratified (by country and year) random samples of the full data set[21] and then repeat the steps described above to produce 500 estimates of the hedonic index. The lower bound of the 95% confidence interval is the 5th percentile of the estimates and the upper bound is the 95th percentile of the estimates.

13. *Mobile Broadband Hedonic Price Index.* We follow the same approach as the fixed broadband statistical test, except we use slightly modified regression models[22]:

$$\log(price) = \beta_0 + \beta_1 * \log(DataCap) * \beta_2 * UnlimitedData * \beta_3 * Bundle + \beta_4 * Provider + \beta_5 * Country + \varepsilon$$

We include a dummy variable to represent plans with unlimited data caps without a specified soft data cap.[23] This regression model allows a different coefficient on data cap for each country. After estimating the two regression models, we use an approach identical to that of the fixed broadband statistical test.

3. Calculation of Plan Weights for Hedonic Price Index

14. Ideally, to calculate the hedonic price index discussed above, we would have the following data specific to each year: the prices at which consumers purchase all of the fixed and mobile broadband plans and the number of consumers that subscribe to each plan. Because we do not have these data, we then must consider that the broadband plans offered by any single provider may not have equally proportionate numbers of subscribers.[24] Therefore, we created weights to apply in the regression models to give greater weight to plans with a larger number of subscribers than those plans with a fewer number of subscribers. The weights represent the estimated percentage of consumers that purchase each of the

[20] In this context, bootstrapping means that we sample with replacement 100 times and calculate our hedonic price index for each sample. Each sample will produce a different hedonic price index, resulting in a distribution of hedonic price indexes. This distribution can be used for a 95% confidence interval.

[21] For each sample, we recalculate the plan weights to ensure the weights sum to one for each sample.

[22] We cluster at the provider.

[23] When soft data caps were available, we recorded these as the data cap. For unlimited data plans without soft data caps, we set their data caps to two times the maximum data cap in that year.

[24] For example, approximately 40% of fixed broadband plans offered in the United States in 2017 had download speeds of 100 Mbps or higher. However, only about 12% of U.S. consumers have fixed broadband plans with speeds of 100 Mbps or higher as of December 2016. OECD Broadband Portal, Fixed Broadband Subscriptions per 100 Inhabitants, per Speed Tiers (Dec. 2016) (*2016 OECD Fixed Broadband Subscriptions per 100 Inhabitants, per Speed Tiers*), http://www.oecd.org/sti/broadband/broadband-statistics/.

broadband plans in our data collection in a given country and year.[25]

15. While our data collections consist of advertised prices and terms for fixed and mobile broadband plans collected in 2017 and 2018, there may be consumers with existing subscriptions to broadband plans that are no longer offered by a provider in 2017 or 2018. Consequently, such broadband plans are not captured in our data collections. As a result, the broadband plans in our data collections might not represent the prices and terms of these earlier, unobserved broadband plans. To represent in our analysis how much consumers actually pay for their broadband plans in each selected country, we assume that the earlier, unobserved broadband plans are similarly priced as the broadband plans collected in 2017 and 2018.[26] Therefore, our analysis focuses on prices and price changes of new plans, but we must assume that consumers purchase these products in the same distribution as plans that consumers have historically purchased. Consumers are most likely switching to higher speed or higher data cap plans over time within a given country, but we do not know the distribution of these newly purchased plans.

16. We determine the plan weights by calculating the product of: (1) annual national provider market shares,[27] (2) an estimated percentage of bundle shares, which refers to the percentage of consumers that bundle fixed broadband with television or that bundle mobile broadband with multiple lines,[28] and (3) the product share, which represents the national percentage of consumers that subscribe to certain speed tiers for fixed broadband or certain data cap tiers for mobile broadband in each selected country.[29]

17. *National Provider Market Shares*. We use the TeleGeography GlobalComms Database to collect annual national provider market shares.[30] As discussed in the *2018 Sixth IBDR*, we select providers with broadband market shares of at least ten percent, with certain exceptions.[31] The national provider market shares may vary each year. We use national provider market shares as of March 2017 and March 2018 for our analysis.

18. *Bundle Shares*. Because we do not have data at the country level or the year level on the percentage of consumers that purchase fixed broadband bundled with television or purchase mobile broadband bundled with multiple lines on a single plan,[32] we assume that the percentage of consumers that purchase such bundles in each comparison country is equal to the percentage of customers that

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[25] The *2018 Sixth IBDR* used U.S. weights for all countries to make comparisons across countries. For this analysis, each country has its own set of weights.

[26] Ideally, we would have data on which and how many new consumers purchase each available plan collected, so that we could use the distribution of newly purchased plans.

[27] *TeleGeography GlobalComms Database*. We use data on national provider market shares as of March 2017 and March 2018.

[28] *See 2018 Sixth IBDR*, 33 FCC Rcd at 1021-22, paras. 4-5 & n.18. We observe that consumers usually receive discounts when they bundle broadband and television or purchase multiple mobile broadband plans, rather than when they purchase these services separately.

[29] *2016 OECD Fixed Broadband Subscriptions per 100 Inhabitants, per Speed Tiers*; OECD Broadband Portal, Mobile Data Usage per Mobile Broadband Subscription (Dec. 2017) (*2017 OECD Mobile Data Usage per Mobile Broadband Subscription*), http://www.oecd.org/sti/broadband/broadband-statistics/.

[30] *TeleGeography GlobalComms Database*.

[31] *See supra* note 9. *See also 2018 Sixth IBDR*, 33 FCC Rcd at 1027, Appx. C, para. 14 & n.41.

[32] In other words, a "bundled" mobile offering consists of a multi-line package rather than a combination of broadband and video. *See id.* at 1022, Appx. C, para. 5, n.18.

purchase these bundles in the United States.[33] For this, we rely on estimates that 75% of U.S. subscribers bundle fixed broadband with video service and, for mobile broadband, that 75% of U.S. subscribers bundle multiple lines.[34]

19. *Product Shares*. We categorize each plan into one of four products (i.e., product categories) based on download speed tiers for fixed broadband or data cap tiers for mobile broadband. Where a provider offers multiple broadband plans in a product category, the plan weight is distributed equally among the plans in that product category. We use the OECD's Broadband Portal to collect product shares for fixed broadband.[35] We use the approach in the *2018 Sixth IBDR* to determine product shares for mobile broadband, except that we use data usage means obtained from the OECD,[36] which is specific for each country, as the log-normal distribution's location parameter, and assume that the scale parameter of all countries is the same as the United States' scale parameter of 0.95.[37]

20. *Fixed Broadband Product Share Results.* In Table 2a below, we identify the four product categories and product shares based on download speed tiers for fixed broadband.

Table 2a
Fixed Broadband Product Shares by Country

Country	Product 1	Product 2	Product 3	Product 4
	0.256 ≤ Mbps < 10	10 ≤ Mbps < 25	25 ≤ Mbps < 100	100 ≤ Mbps
Denmark	10.8%	44.8%	33.6%	10.8%
Estonia	15.0%	18.0%	38.0%	29.0%
France	4.5%	78.5%	6.5%	10.5%
Germany	29.0%	43.0%	21.0%	7.0%
Mexico	25.9%	60.8%	13.1%	0.2%
South Korea	24.2%	0.0%	0.0%	75.8%
United Kingdom	7.0%	51.3%	33.0%	8.7%
United States	24.4%	25.7%	37.5%	12.4%

Note: Two lowest reported tiers are combined into Product 1.

Source: OECD Broadband Portal, Speeds, 5.1 Fixed Broadband Subscriptions per 100 inhabitants, per speed tiers (Dec. 2016)

21. *Mobile Broadband Product Share Results.* In Table 2b below, we identify the four product categories and product shares based on data cap tiers for mobile broadband.[38]

[33] *See id.* at 1021, Appx. C, para. 4 & n.7 (noting that Kagan, a media research group within S&P Global Market Intelligence, estimates that 75% of U.S. broadband subscribers from the top 5 publicly reported MSOs subscribe to double or triple-play bundles); *id.* at 1039, Appx. C, para. 33 (noting that Cisco estimates that 75% of subscribers in the United States obtain their mobile service through shared data plans (i.e., "family plans")).

[34] *Id.* We note that Section II.B observes that in a recent survey, 56% of MVPD subscribers responded that a top reason for keeping the video service was because it was bundled with Internet service. *See supra* Section II.B at para. 63.

[35] *2016 OECD Fixed Broadband Subscriptions per 100 Inhabitants, per Speed Tiers*.

[36] *2017 OECD Mobile Data Usage per Mobile Broadband Subscription*.

[37] *See 2018 Sixth IBDR*, 33 FCC Rcd at 1044, Appx. C, para. 50 & Tbl. 6.

[38] We assume that consumers choose mobile broadband plans with data caps approximately equal to their expected data usage.

Table 2b
Mobile Broadband Product Shares by Country

Country	Data Usage per Subscription	Product 1	Product 2	Product 3	Product 4
		0 < Data (GB) ≤ 2	2 < Data (GB) ≤ 5	5 < Data (GB) ≤ 10	10 < Data (GB)
Denmark	5.70	13.5%	31.0%	27.8%	27.7%
Estonia	7.16	9.0%	26.3%	28.5%	36.3%
France	3.39	28.9%	36.9%	21.4%	12.7%
Germany	1.77	55.2%	31.1%	10.3%	3.4%
Mexico	1.23	16.2%	32.9%	26.9%	24.0%
South Korea	5.11	69.6%	23.4%	5.6%	1.4%
United Kingdom	2.53	40.3%	36.1%	16.2%	7.4%
United States	3.03	33.1%	37.0%	19.5%	10.4%

Note: Product Shares calculated assuming a log-normal distribution with a country-specific mean and constant US standard deviation.

Source: OECD Broadband Portal, 1.14 Mobile data usage per mobile broadband subscription (Dec. 2017)

APPENDIX E-4

High-Speed Broadband Deployment Comparison with Europe

1. In this Appendix, we compare fixed high-speed and mobile broadband deployment[1] in the United States and 21 European countries (EU21).[2] To conduct the comparison, we rely on the European Commission (EC) deployment data published in the *EC Broadband Report*. To match the EC definition of fixed high-speed broadband, we examine U.S. fixed broadband deployment with download speeds of 30 Mbps or higher.[3] To match the fixed technologies used in the *EC Broadband Report*, we do not include satellite technology.[4] We also compare mobile high-speed broadband deployment in the United States and EU21 by focusing exclusively on LTE, which is the baseline industry standard for the marketing of mobile broadband service.[5] For our primary fixed and mobile analysis, we rely on data gathered by the FCC and the EC in June 2016 and June 2017. We also present a historical overview of fixed deployment in the United States and the EU21 countries from 2012 to 2017. Finally, we provide maps that show fixed high-speed broadband deployment in the United States and Europe.

I. FIXED HIGH-SPEED BROADBAND COMPARISON

A. Total and Rural Household Fixed High-Speed Broadband Deployment

[1] Prior International Broadband Data Reports released by the International Bureau as part of the annual Broadband Deployment Report included comparisons of broadband deployment in the United States and Europe. *See, e.g.*, *2018 Sixth IBDR*, 33 FCC at 1072-90, Appx. D; *see also* RAY BAUM'S Act of 2018 § 402(c), 132 Stat. at 1089.

[2] We refer to the set of countries that we compare here as the EU21, as we selected only 21 of the 31 European countries addressed in the *EC Broadband Report* for our analysis. The *EC Broadband Report* discusses the 28 member countries of the European Union (EU), as well as Iceland, Norway, and Switzerland. *EC Broadband Report* at 5. The 21 countries included in our analysis are: Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Ireland (IE), Italy (IT), Latvia (LV), Luxembourg (LU), Netherlands (NL), Portugal (PT), Spain (ES), Sweden (SE), United Kingdom (UK), Iceland (IS), Norway (NO), and Switzerland (CH). We corrected an error in the information provided in the *2018 Sixth IBDR*, which presented broadband deployment data associated with Lithuania instead of Latvia. *2018 Sixth IBDR*, 33 FCC Rcd at 1072-88, Appx. D.

[3] *EC Broadband Report* at 5. We rely on the same data sources, technologies, and methodology as described in the *2018 Sixth IBDR*. *2018 Sixth IBDR*, 33 FCC Rcd at 1073-75, 1078, Appx. D, paras. 5-9 & n.27. As in the *2018 Sixth IBDR*, we rely on the FCC's Form 477 fixed and mobile LTE deployment data to estimate U.S. broadband deployment as of June 2015, 2016, and 2017. FCC, Fixed Broadband Deployment Data from FCC Form 477, https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477; FCC, Mobile Broadband Deployment Data from FCC Form 477, https://www.fcc.gov/mobile-deployment-form-477-data. For fixed historical analysis, we also rely on data from the State Broadband Initiative (SBI) as of December 2012, 2013, and 2014, which the Commission relied on prior to the revision of the Form 477 data collection. For U.S. fixed technologies capable of at least 30 Mbps download speed, we include: DSL—Asymmetric xDSL, ADSL2, symmetric xDSL, VDSL; Cable Modem—DOCSIS 1, 1.1, 2, 3.0, and 3.1; Optical Carrier/Fiber to the End User; Copper Wireline; and Fixed Wireless. We also note that our analysis does not include U.S. territories.

[4] *EC Broadband Report* at 11.

[5] *Twentieth Report*, 32 FCC Rcd at 9018, para. 73. In this Appendix, we analyze mobile LTE coverage regardless of minimum advertised speeds or actual speeds to match the *EC Broadband Report*.

Figure 1
Fixed High-Speed Broadband Deployment
All Households (June 2016 and June 2017)

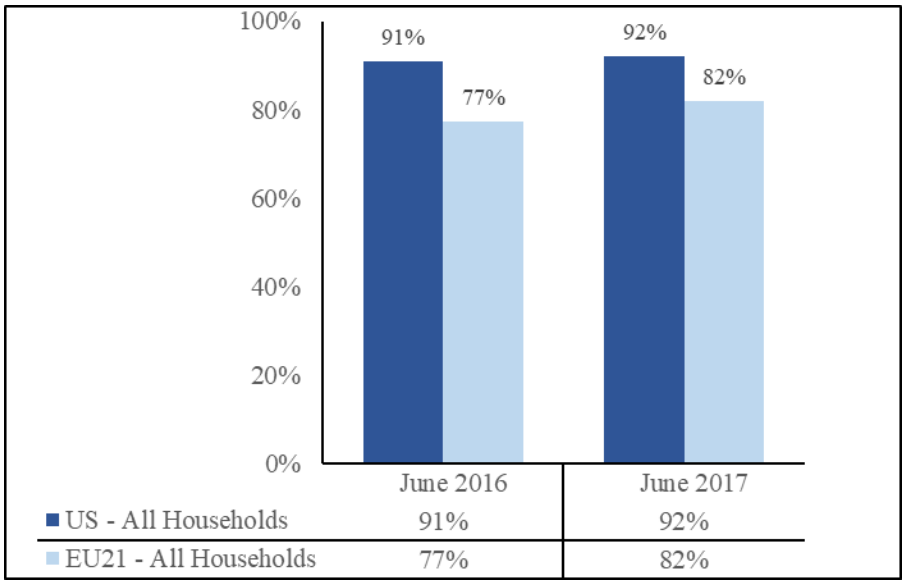
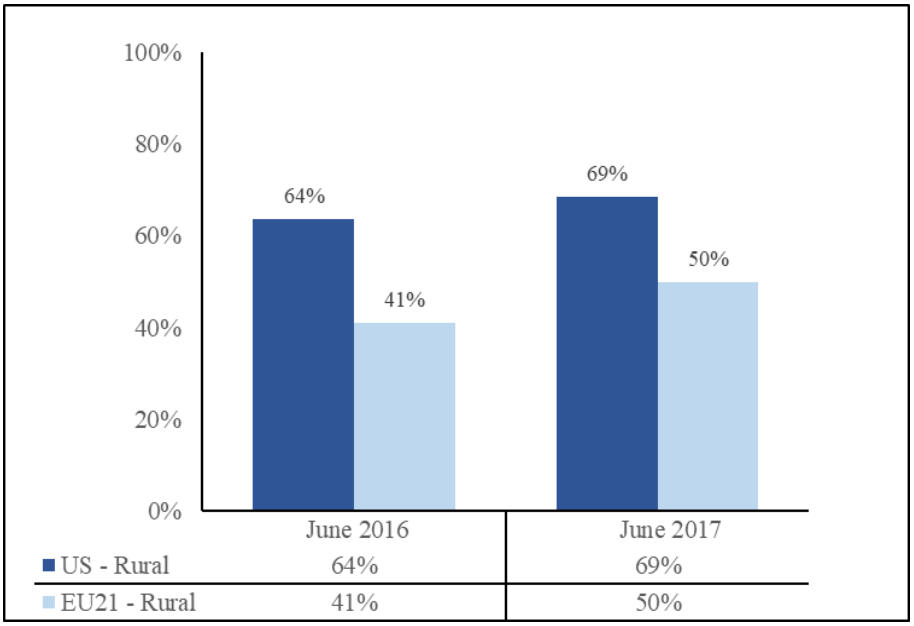


Figure 2
Fixed High-Speed Broadband Deployment
All Rural Households (June 2016 and June 2017)



B. High Speed Rural and Non-Rural Household Broadband Deployment

Figure 3
United States and EU21 Rural vs. Non-Rural (Households)
Fixed High-Speed Broadband Deployment (June 2016)

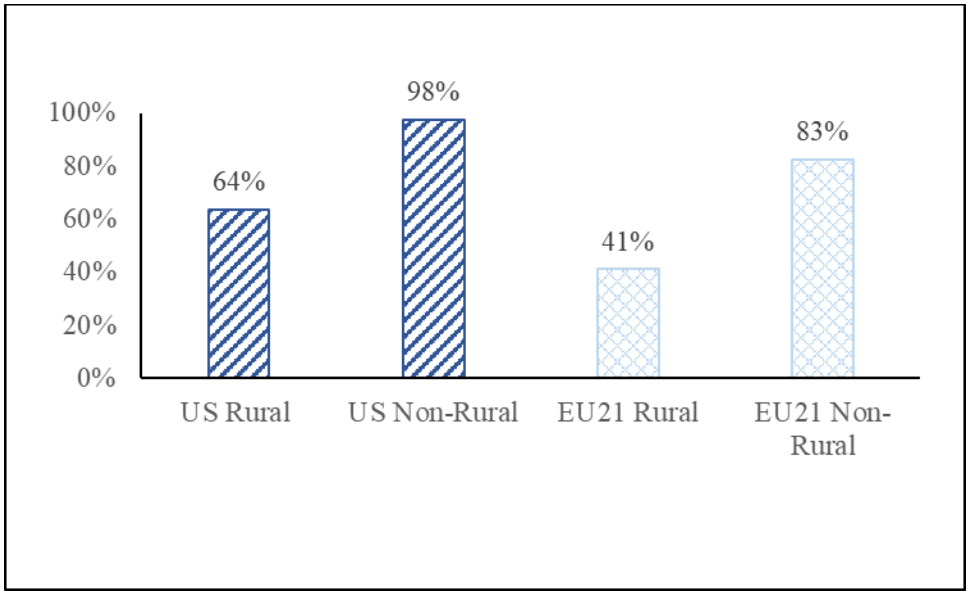
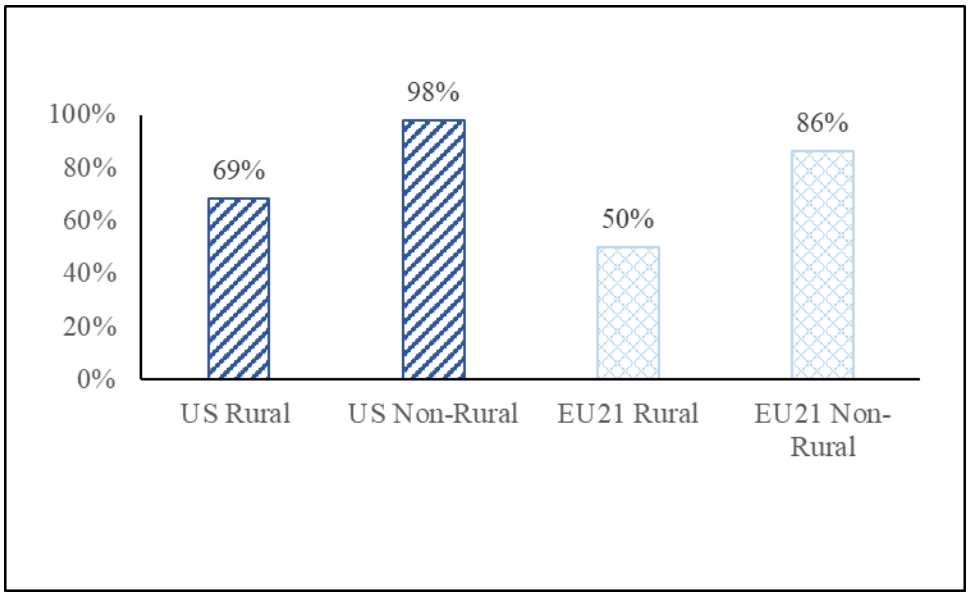
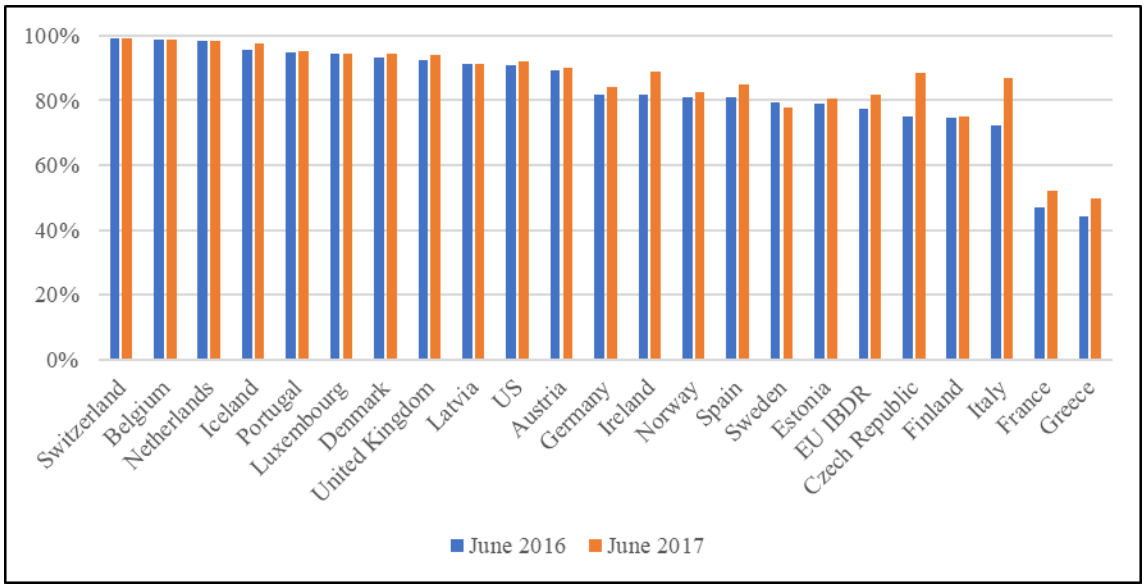


Figure 4
United States and EU21 Rural vs. Non-Rural (Households)
Fixed High-Speed Broadband Deployment (June 2017)



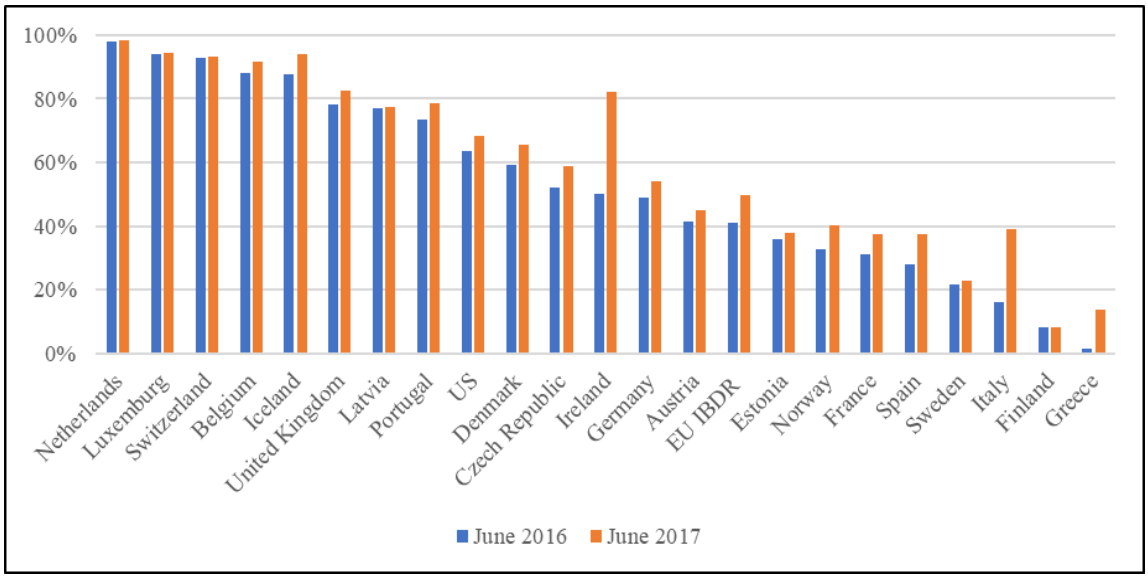
C. Total High-Speed Broadband Deployment by Country

Figure 5
Fixed High-Speed Broadband Deployment by Country for All Households (June 2016 and June 2017)



D. Rural High-Speed Broadband Deployment by Country

Figure 6
Fixed High-Speed Broadband Deployment by Country for All Rural Households (June 2016 and June 2017)



E. High-Speed Fixed Broadband Deployment by Technology and Technology Combination

Figure 7
Fixed High-Speed Broadband Deployment for All Households by Technology (June 2016)

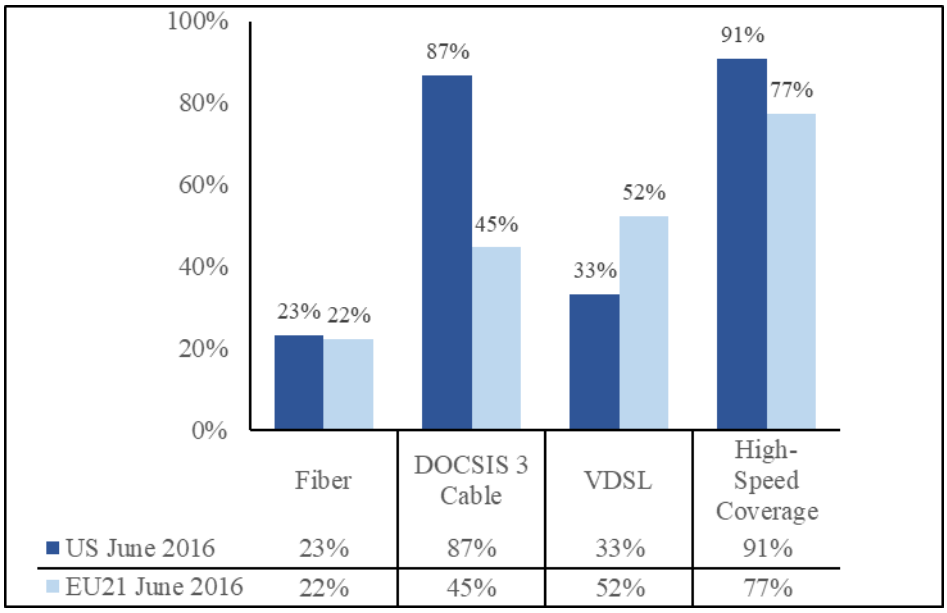
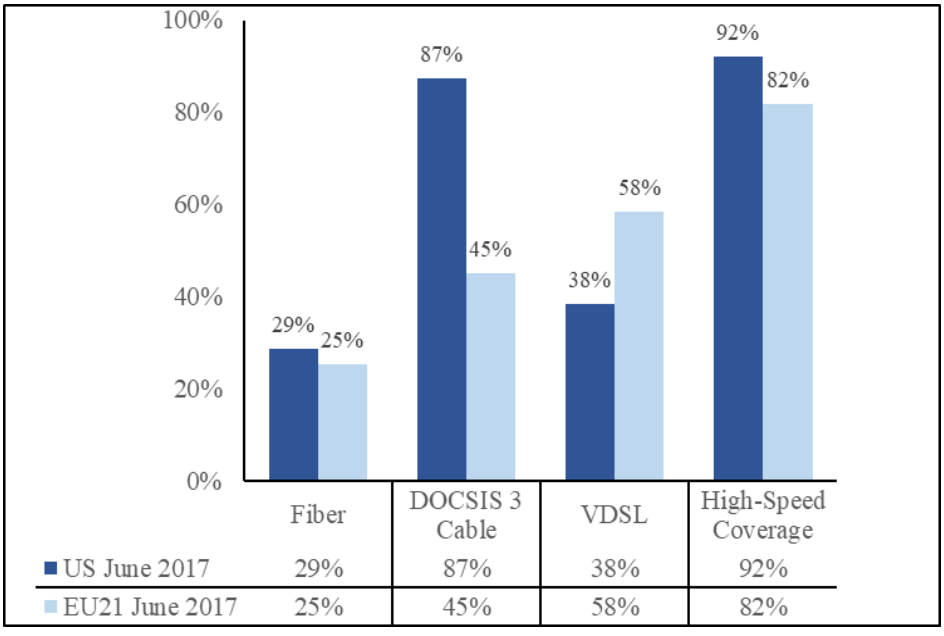


Figure 8
Fixed High-Speed Broadband Deployment for All Households by Technology (June 2017)



F. Comparison of 2 Mbps, 30 Mbps, and 100 Mbps Fixed Broadband Deployment in the United States and the EU21

Figure 9
Fixed High-Speed Broadband Deployment for All Households by Speed (June 2016)

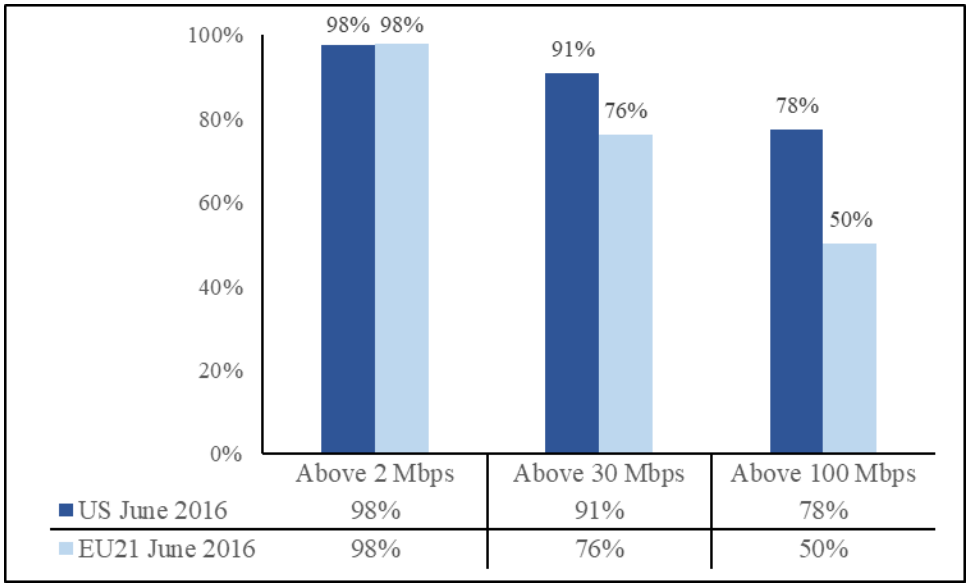
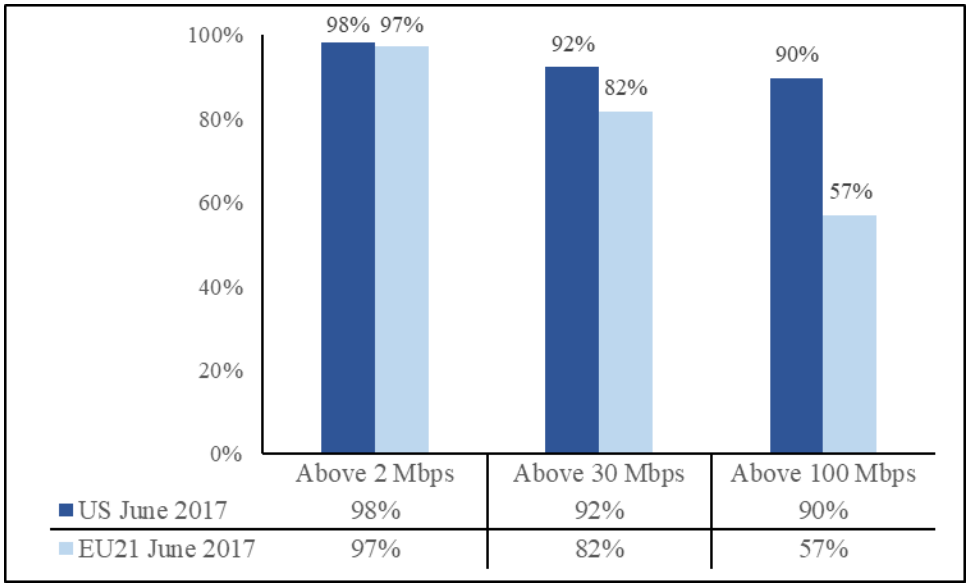


Figure 10
Fixed High-Speed Broadband Deployment for All Households by Speed (June 2017)



II. MOBILE HIGH-SPEED BROADBAND COMPARISON

Figure 11
Mobile LTE Broadband Deployment for
All Households (June 2016 and June 2017)

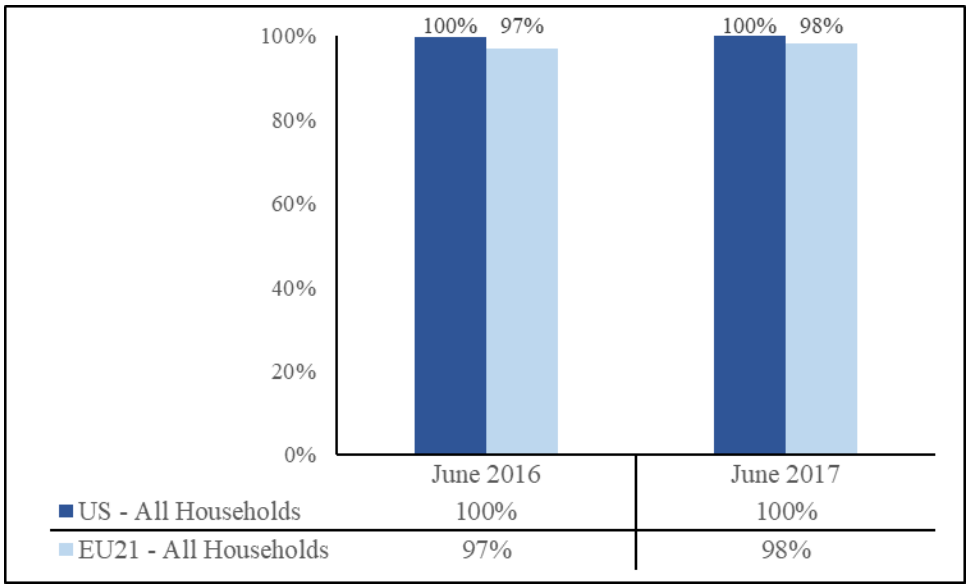
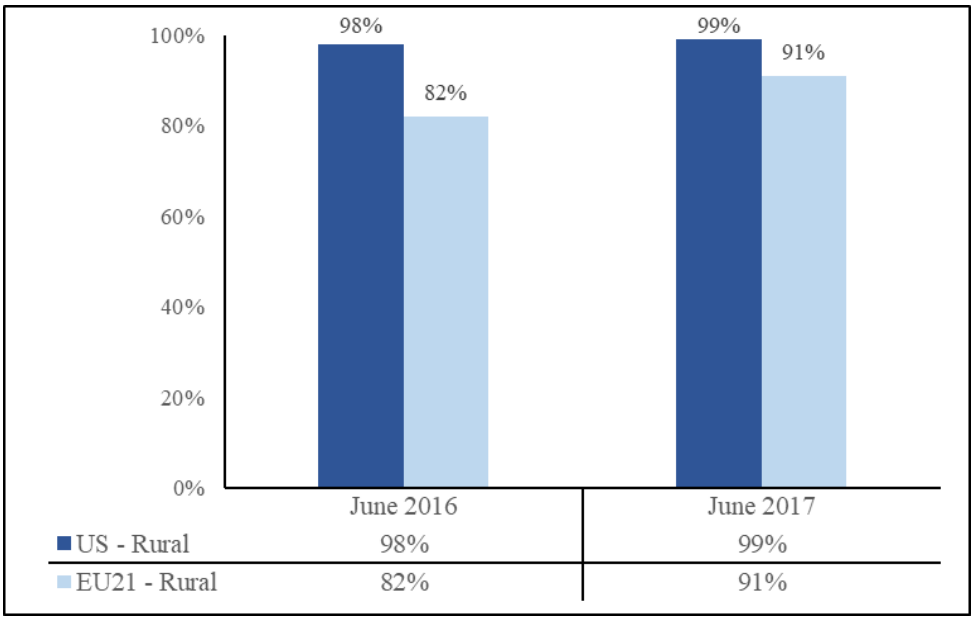


Figure 12
Mobile LTE Broadband Deployment for
All Rural Households (June 2016 and June 2017)



III. HISTORICAL OVERVIEW OF FIXED HIGH-SPEED DEPLOYMENT, 2012-2017

Figure 13
Fixed High-Speed Deployment
All Households

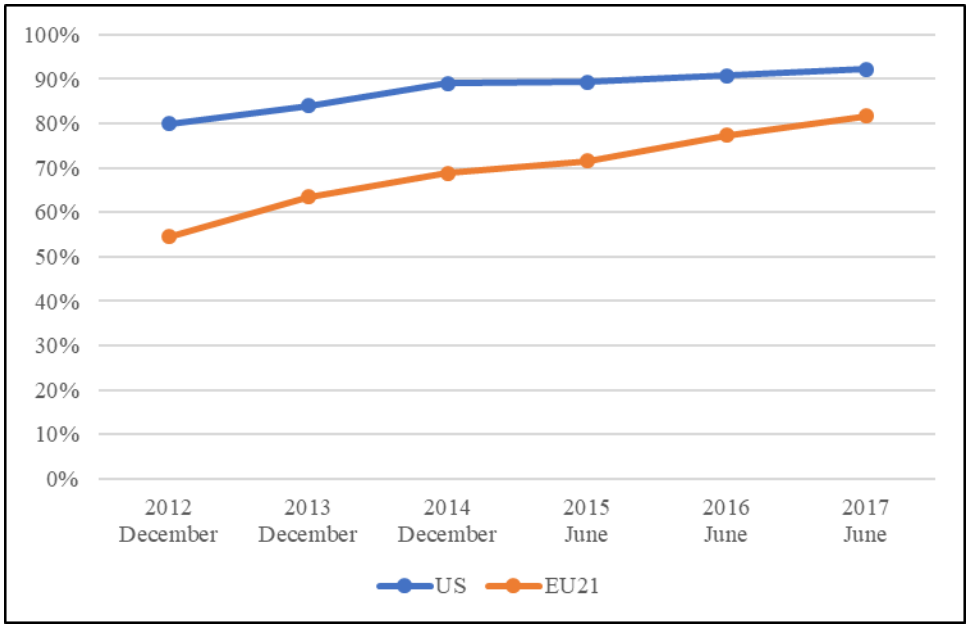


Figure 14
Fixed High-Speed Deployment
All Rural Households

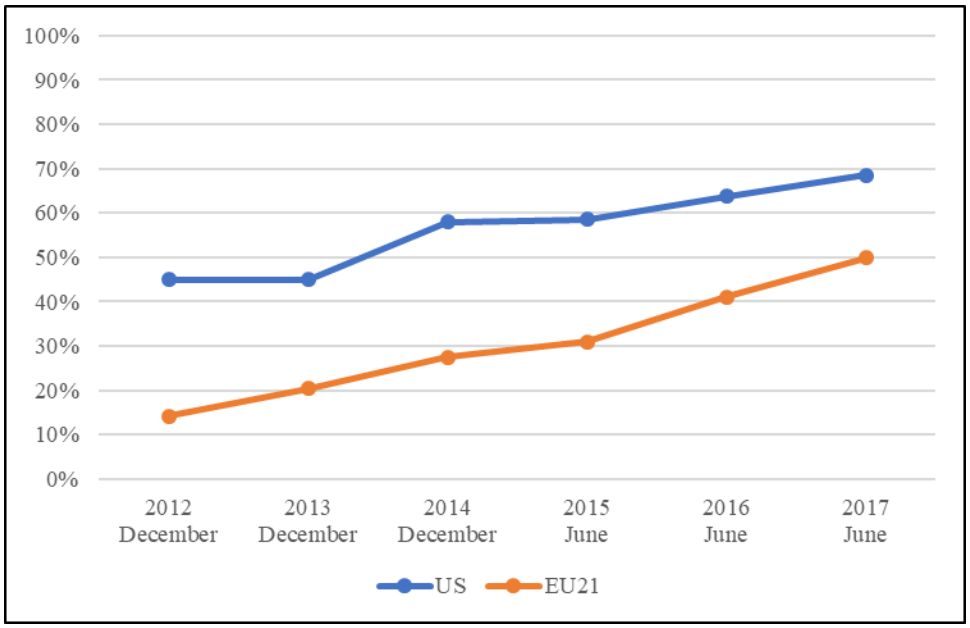
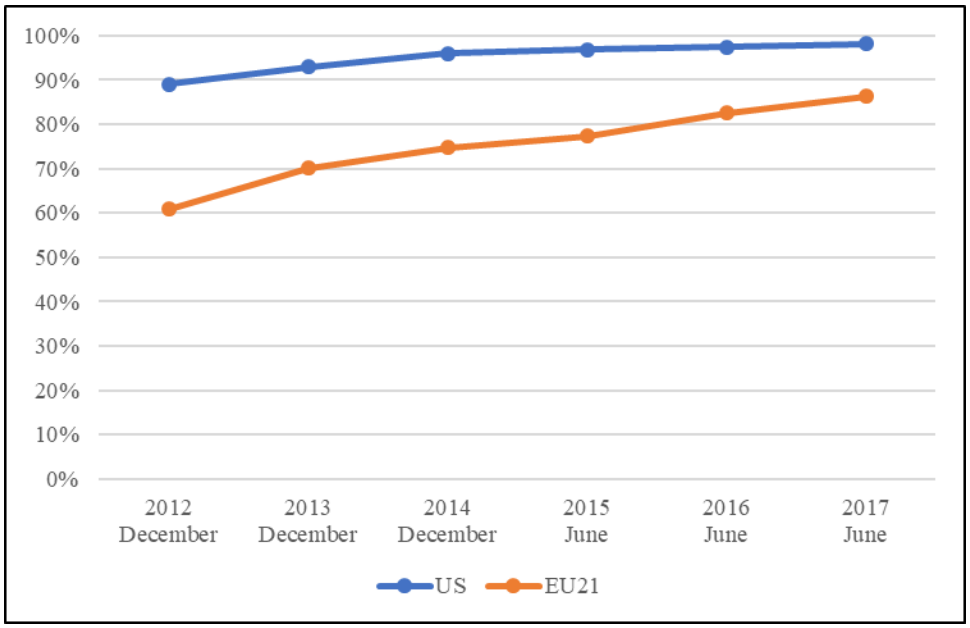


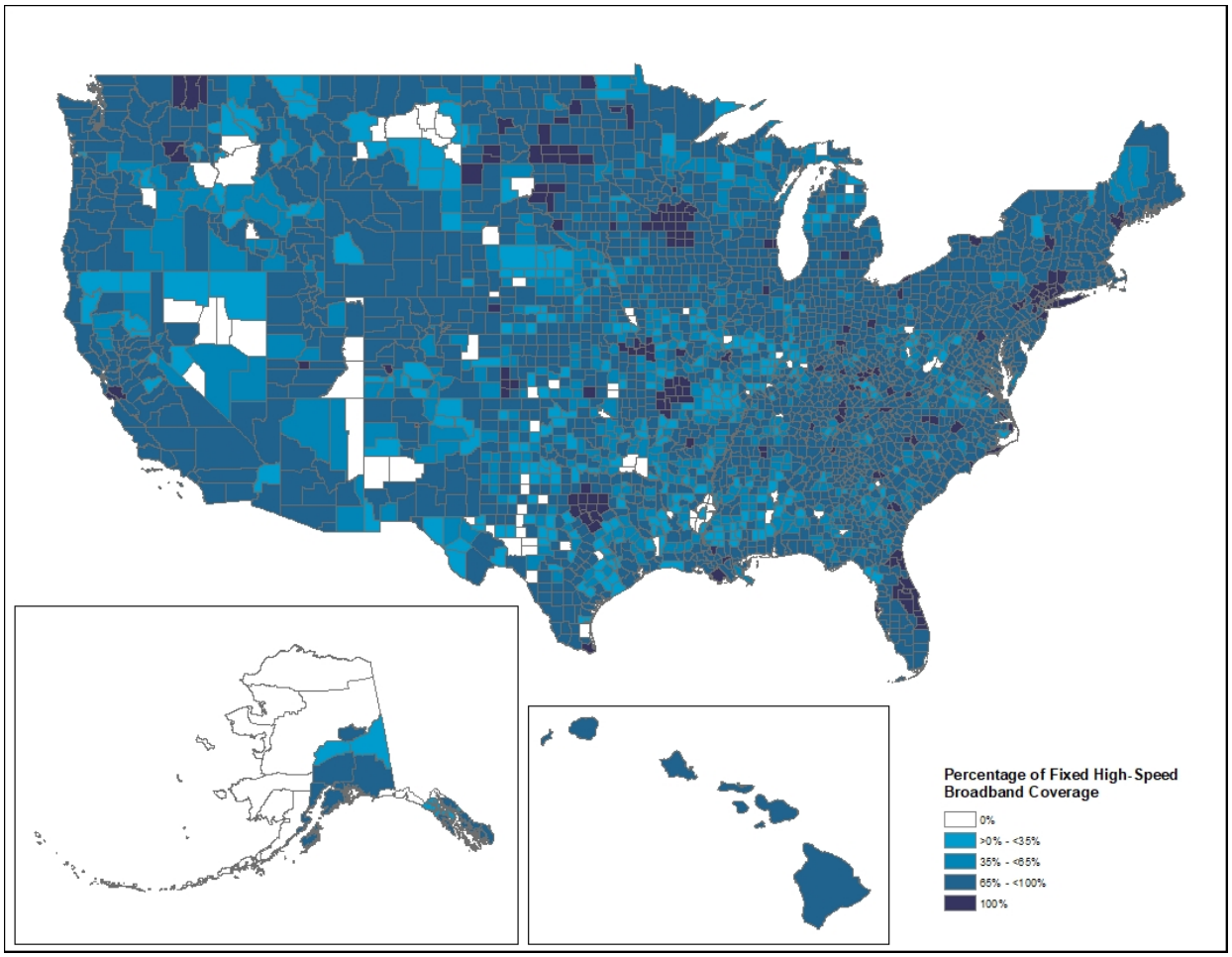
Figure 15
Fixed High-Speed Deployment
Non-Rural Households



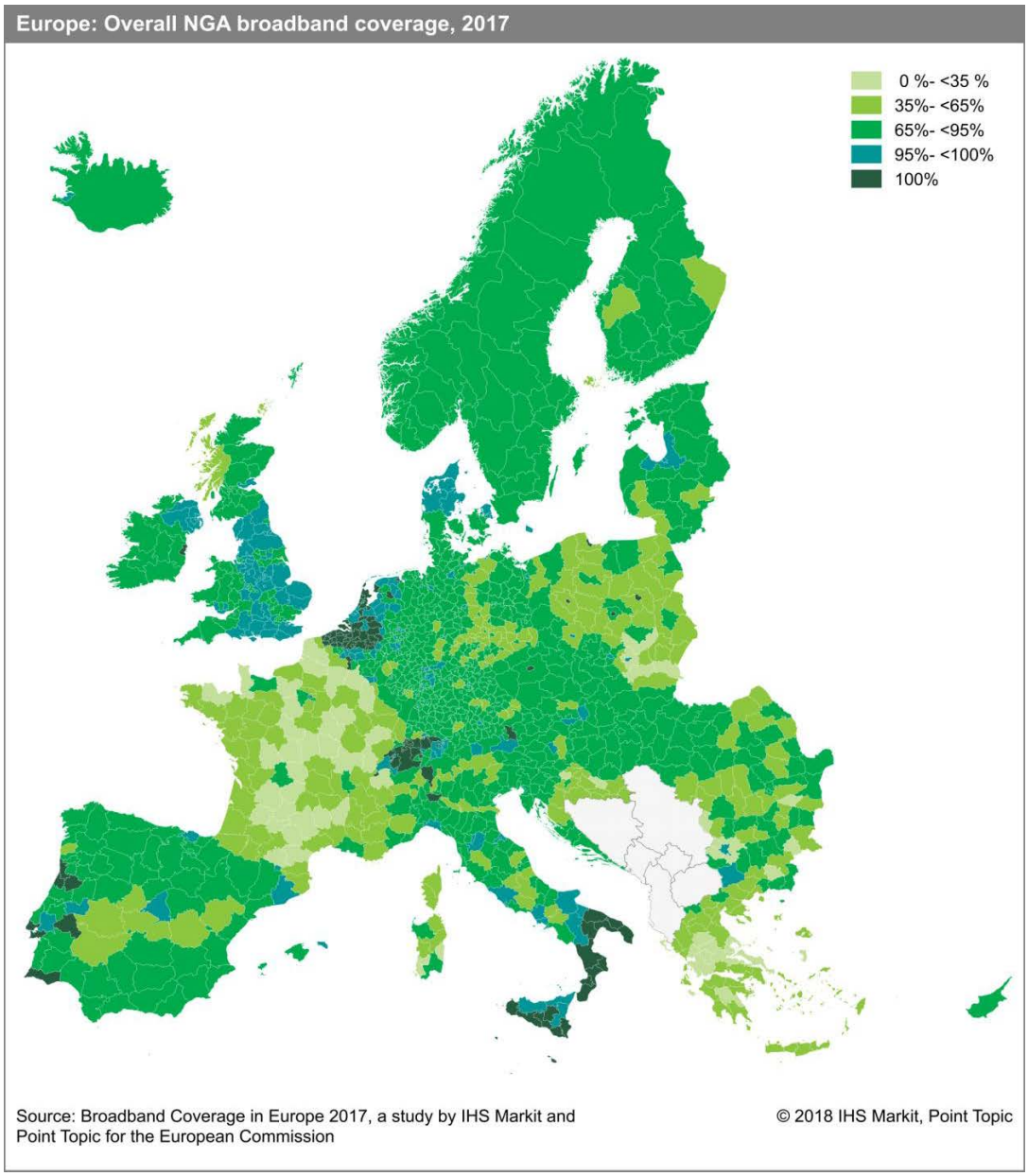
IV. FIXED HIGH-SPEED BROADBAND COVERAGE MAPS FOR THE UNITED STATES AND EUROPE

2. Below are maps of fixed high-speed fixed terrestrial broadband coverage at 30 Mbps in the United States and the Europe as of June 2017. Given that the *EC Broadband Report* already provides a map of its data, we reproduce that map below.

Map 1
United States Fixed High-Speed Broadband Coverage Map
June 2017



Map 2
Europe Fixed High-Speed Broadband Coverage (30 Mbps)
June 2017[6]



[6] *EC Broadband Report* at 48.

APPENDIX E-5
Demographics Dataset

1. As part of its assessment, the Commission compares broadband development in communities comparable to U.S. communities in terms of population size, population density, topography, and demographic profile.[1] In this Appendix, we present updated data[2] since the release of the *2018 Sixth IBDR*.[3] For the comparison countries excluding the United States and Canada, we present the Organization for Economic Cooperation and Development's (OECD's) most recent published data ranging from 2012 to 2017, depending on the data category.[4] For the United States, we present 2017 data from the U.S. Census Bureau.[5] For Canada, we present 2016 data from the Canadian Radio-television and Communications Commission, the latest available data by province/territory.[6]

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[1] 47 U.S.C. § 1303(b)(2).

[2] Certain data, such as population data for certain countries or data on households with broadband (%) for almost all countries, have not been updated since the release of the *2018 Sixth IBDR*. For such data, we include data available as of the most recent year for each country. The province/county communities are based on the OECD classification of the subnational territorial levels of OECD Member countries. *OECD Regions and Cities*.

[3] 47 U.S.C. § 1303(b)(2). We incorporate by reference the topography information contained in the *2018 Sixth IBDR* for the United States and the 28 comparison countries. *2018 Sixth IBDR*, 33 FCC Rcd at 1104-05, Tbl. 2. The topography information was based on Central Intelligence Agency's The World Factbook. Central Intelligence Agency, The World Factbook (2017), https://www.cia.gov/library/publications/download/download-2017/index.html. We note some inadvertent errors in the information provided in the *2018 Sixth IBDR*. We clarify that the CIA World Factbook states that: (1) Canada is the second largest country in the world rather than third as indicated in the *2018 Sixth IBDR*; (2) Latvia is slightly larger than West Virginia rather than slightly smaller as indicated in the *2018 Sixth IBDR*; (3) the reference is to "metropolitan France" rather than "French metropole" as indicated in the *2018 Sixth IBDR*; and (4) the location of the United Kingdom is described as "Western Europe, islands—including the northern one-sixth of the island of Ireland—between the North Atlantic Ocean and the North Sea" rather than "Atlantic archipelago" as indicated in the *2018 Sixth IBDR*. *See 2018 CIA World Factbook* (last updated Sept. 19, 2018).

[4] *OECD Regions and Cities*. Not all OECD data have been updated since the release of the *2018 Sixth IBDR*. *See* Table 1a. For instance, only Mexico and South Korea have updated their OECD data on households with broadband, updating that metric as of 2016. We note that the OECD data do not include any data on household broadband penetration for 2017. To access the online OECD data on households with broadband (%), population size, population density, GDP total, GDP per capita, and educational attainment, select the left-hand column titled "Data by Theme," then "Regions and Cities," and then "Regional Statistics." For data on households with broadband (%), select "Regional Social and Environmental Indicators," and then "Internet Broadband Access." For data on population size, select "Regional Demography," then "Population (Large Regions TL2)," and then "Indicator" – "Population, All ages." For data on population density, select "Regional Demography," then "Population Density and Regional Area," and then "Indicator" – "Population density (pop. per km2)." For data on GDP total, select "Regional Economy," then "Regional Gross Domestic Product (Large regions TL2)," and then "Measure" – "Millions USD, constant prices, constant PPP, base year 2010." For data on GDP per capita, select "Regional Economy," then "Regional Gross Domestic Product (Large regions TL2)," and then "Measure" – "USD per head, constant prices, constant PPP, base year 2010." For data on educational attainment, select "Regional Innovation," then "Educational Attainments of the Labour Force," and then "Indicator" – "Share of Labour Force with Tertiary Education (in % of labour force"). In Table 1a below, we identify the sources. The term PPP refers to Purchasing Power Parity.

[5] U.S. Census Bureau, *Percent Of Households With A Broadband Internet Subscription*, https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_1YR_GCT2801.US01PR&prodType=table. In Table 1, the data for the percentage of households with broadband in all of the communities except Canada represent households with fixed and/or mobile broadband subscriptions.

[6] Canadian Radio-television and Communications Commission (CRTC), 2018 Communications Monitoring Report

(continued….)

Table 1
Demographics Dataset

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Australia (AUS)	**86***	**24,598,900**	**3**	**1,105,430**	**45,817**	**46**
New South Wales (AU1)	85	7,861,070	10	363,316	47,026	49
Victoria (AU2)	86	6,323,610	28	256,100	42,205	50
Queensland (AU3)	86	4,928,460	3	205,998	42,522	40
South Australia (AU4)	82	1,723,550	2	65,092	38,106	44
Western Australia (AU5)	88	2,580,350	1	156,048	59,625	44
Tasmania (AU6)	81	520,877	8	18,451	35,543	35
Northern Territory (AU7)	89	246,105	0.2	16,369	66,846	42
Australian Capital Territory (AU8)	94	410,301	175	24,057	60,728	61
Austria (AUT)	**85**	**8,772,870**	**106**	**376,914**	**43,142**	**34**
Burgenland (AT) (AT11**)**	83	291,942	80	8,707	29,870	32
Lower Austria (AT12)	83	1,665,750	88	58,636	35,329	34
Vienna (AT13)	88	1,867,580	4,728	96,134	51,855	44
Carinthia (AT21)	84	561,077	60	20,550	36,645	32
Styria (AT22)	82	1,237,300	76	47,243	38,264	30
Upper Austria (AT31)	86	1,465,050	125	63,964	43,826	30
Salzburg (AT32)	86	549,263	78	28,467	51,990	33
Tyrol (AT33)	84	746,153	60	34,650	46,657	30
Vorarlberg (AT34)	88	388,752	153	18,425	47,676	29
Belgium (BEL)	**82**	**11,351,700**	**374**	**465,730**	**41,101**	**45**
Brussels Capital Region (BE1)	86	1,199,100	7,448	83,550	69,614	52
Flemish Region (BE2)	84	6,526,060	488	273,848	42,072	45

(Continued from previous page)
at 6 (2018) (*2018 Communications Report*), https://crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2018/cmr2018-cdn.pdf; CRTC, 2017 Communications Monitoring Report at 279 (2017) (*2017 Communications Report*), https://crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2017/cmr2017.pdf. In Table 1, the data for the percentage of households with broadband in Canada by province/territory represent fixed broadband subscription. *2017 Communications Report* at 279. The data for the percentage of households with broadband in Canada at the national level represent all broadband subscriptions. *2018 Communications Report* at 10 & n.5.

[7] As of November 30, 2018, OECD data on Share of Labour Force with Tertiary Education (in % of labour force) for subnational communities in Japan are not available at http://stats.oecd.org/. The *2018 Sixth IBDR* presented OECD data as of 2010 on Share of Labour Force with Tertiary Education (in % of labour force) for subnational communities in Japan (data accessed in Sept. 2017). *See 2018 Sixth IBDR*, 33 FCC Rcd at 1096, Appx E, Tbl. 1.

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Wallonia (BE3)	79	3,626,570	216	108,130	29,852	43
Canada (CAN)	**87**	**36,264,600**	**4**	**1,542,120**	**42,524**	**65**
Newfoundland and Labrador (CA10)	84	530,128	1	23,571	44,462	64
Prince Edward Island (CA11)	83	149,472	26	4,789	32,039	60
Nova Scotia (CA12)	79	953,869	18	31,612	33,324	65
New Brunswick (CA13)	86	757,384	11	25,929	34,234	60
Quebec (CA24)	80	8,394,030	6	299,119	35,944	68
Ontario (CA35)	84	14,193,400	15	602,176	43,085	66
Manitoba (CA46)	79	1,338,110	2	51,414	39,006	56
Saskatchewan (CA47)	76	1,163,930	2	57,019	49,642	57
Alberta (CA48)	87	4,286,130	7	238,605	56,323	62
British Columbia (CA59)	88	4,757,660	5	199,787	41,993	61
Yukon (CA60)	--	38,459	0.8	2,121	55,698	--
Northwest Territories (CA61)	--	44,617	0.04	3,590	80,470	--
Nunavut (CA62)	--	37,996	0.02	1,851	49,785	--
Chile (CHL)	**53***	**18,373,900**	**25**	**382,058**	**21,002**	**24**
Tarapacá (CL01)	56	352,712	8	8,086	23,455	23
Antofagasta (CL02)	73	640,950	5	33,048	52,301	24
Atacama (CL03)	57	320,799	4	8,024	25,336	19
Coquimbo (CL04)	48	794,359	20	10,367	13,244	21
Valparaíso (CL05)	56	1,859,670	113	32,251	17,500	26
O'Higgins (CL06)	47	934,671	57	17,245	18,606	19
Maule (CL07)	38	1,057,530	35	12,697	12,089	14
Bio-Bío (CL08)	49	2,141,040	58	28,787	13,528	23
Araucanía (CL09)	39	1,001,980	31	9,975	10,015	19
Los Lagos (CL10)	46	853,663	18	11,937	14,085	17
Aysén (CL11)	53	110,288	1	2,550	23,331	24
Magallanes y Antártica (CL12)	67	166,395	1	4,007	24,206	25
Santiago Metropolitan (CL13)	62	7,482,640	486	162,165	21,917	27
Los Ríos (CL14)	42	410,097	22	5,155	12,656	21
Arica y Parinacota (CL15)	57	247,129	15	2,792	11,481	23
Czech Republic (CZE)	**80**	**10,578,800**	**137**	**323,445**	**30,611**	**24**
Prague (CZ01)	91	1,280,510	2640	80,856	63,467	45
Central Bohemian Region (CZ02)	84	1,338,980	124	37,436	28,086	22

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Southwest (CZ03)	82	1,217,410	71	32,697	26,891	20
Northwest (CZ04)	75	1,118,130	132	24,646	22,018	15
Northeast (CZ05)	79	1,508,530	123	38,101	25,268	21
Southeast (CZ06)	78	1,687,760	123	47,691	28,284	26
Central Moravia (CZ07)	74	1,217,620	134	30,391	24,941	20
Moravia-Silesia (CZ08)	79	1,209,880	228	31,626	26,102	22
Denmark (DNK)	**92**	**5,748,770**	**134**	**257,709**	**44,991**	**37**
Capital (DK)	93	1,807,400	706	103,847	57,748	47
Zealand (DK02)	91	832,553	115	26,158	31,515	30
Southern Denmark (DK03)	89	1,217,220	99	49,699	40,922	31
Central Jutland (DK04)	92	1,304,250	100	52,497	40,420	34
Northern Jutland (DK05)	92	587,335	75	22,071	37,637	30
Estonia (EST)	**85**	**1,315,640**	**30**	**35,135**	**26,702**	**40**
Estonia (EE00)	85	1,315,640	30	35,135	26,702	40
Finland (FIN)	**91**	**5,503,300**	**18**	**211,916**	**38,563**	**42**
Western Finland (FI19)	88	1,380,590	24	47,259	34,249	40
Helsinki-Uusimaa (FI1B)	95	1,638,290	180	82,564	50,675	49
Southern Finland (FI1C)	93	1,159,170	37	39,470	34,031	39
Eastern and Northern Finland (FI1D)	89	1,296,020	6	41,222	31,777	38
Åland (FI20)	--	29,214	19	1,345	46,204	27
France (FRA)	**79**	**66,989,100**	**106**	**2,485,250**	**37,171**	**38**
Île de France (FR10)	85	12,193,900	1015	759,021	62,387	50
Champagne-Ardenne (FR21)	75	1,334,450	52	40,020	29,966	29
Picardy (FR22)	73	1,934,170	100	53,963	27,903	27
Upper Normandy (FR23)	81	1,865,330	151	59,359	31,845	31
Centre-Val de Loire (FR24)	79	2,582,300	66	79,098	30,641	33
Lower Normandy (FR25)	80	1,477,290	84	43,518	29,442	26
Burgundy (FR26)	77	1,637,370	52	49,258	30,063	33
Nord-Pas-de-Calais (FR30)	76	4,087,130	329	121,089	29,641	35
Lorraine (FR41)	82	2,330,670	99	67,214	28,804	35
Alsace (FR42)	80	1,888,940	228	63,754	33,794	36
Franche-Comté (FR43)	74	1,179,900	73	34,304	29,072	36
Pays de la Loire (FR51)	77	3,765,800	117	123,912	33,006	36
Brittany (FR52)	74	3,323,130	122	105,114	31,697	37

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Poitou-Charentes (FR53)	79	1,811,210	70	52,704	29,131	32
Aquitaine (FR61)	83	3,422,180	83	112,467	32,988	37
Midi-Pyrénées (FR62)	82	3,046,470	67	103,493	34,095	42
Limousin (FR63)	71	735,908	43	22,127	30,045	33
Rhône-Alpes (FR71)	81	6,621,560	152	241,407	36,602	41
Auvergne (FR72)	78	1,365,260	52	43,026	31,530	31
Languedoc-Roussillon (FR81)	76	2,815,940	103	76,287	27,193	35
Provence-Alpes-Côte d'Azur (FR82)	81	5,047,940	161	173,010	34,340	39
Corsica (FR83)	62	334,283	39	10,144	30,505	42
Germany (DEU)	**90**	**82,521,700**	**231**	**3,550,020**	**43,110**	**29**
Baden-Württemberg (DE1)	89	10,951,900	306	540,276	49,495	30
Bavaria (DE2)	89	12,930,800	183	643,639	49,944	30
Berlin (DE3)	91	3,574,830	4,008	146,700	41,354	42
Brandenburg (DE4)	84	2,494,650	84	77,635	31,182	28
Bremen (DE5)	91	678,753	1,620	36,556	54,148	29
Hamburg (DE6)	94	1,810,440	2,398	125,418	69,719	36
Hesse (DE7)	91	6,213,090	294	305,280	49,281	32
Mecklenburg-Vorpommern (DE8)	89	1,610,670	69	46,949	29,133	27
Lower Saxony (DE9)	92	7,945,690	167	299,270	37,710	24
North Rhine-Westphalia (DEA)	90	17,890,100	524	758,892	42,449	27
Rhineland-Palatinate (DEB)	91	4,066,050	205	158,031	38,929	26
Saarland (DEC)	88	996,651	388	39,780	39,935	23
Saxony (DED)	88	4,081,780	222	134,238	32,875	29
Saxony-Anhalt (DEE)	88	2,236,250	109	67,288	30,028	23
Schleswig-Holstein (DEF)	90	2,881,930	182	101,114	35,227	24
Thuringia (DEG)	88	2,158,130	133	68,949	31,856	28
Greece (GRC)	**68**	**10,768,200**	**82**	**255,907**	**23,748**	**34**
Attica (EL30)	--	3,773,560	991	122,620	32,461	42
North Aegean (EL41)	--	203,700	53	3,543	17,701	26
South Aegean (EL42)	--	338,383	64	8,650	25,698	22
Crete (EL43)	--	632,674	76	12,713	20,108	29
Eastern Macedonia, Thrace (EL51)	--	602,799	43	9,856	16,327	28
Central Macedonia (EL52)	--	1,880,120	100	35,037	18,619	34
Western Macedonia (EL53)	--	271,488	29	5,654	20,737	28

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Epirus (EL54)	--	335,250	37	5,646	16,800	33
Thessaly (EL61)	--	725,874	52	13,230	18,182	32
Ionian Islands EL62	--	205,431	89	4,501	21,873	22
Western Greece (EL63)	--	663,970	60	11,528	17,306	25
Central Greece (EL64)	--	555,761	36	11,644	20,949	27
Peloponnese (EL65)	--	579,182	37	11,287	19,457	25
Iceland (ISL)	**93**	**338,349**	**3**	**14,962**	**44,603**	**37**
Capital Region (IS01)	93	216,878	220	--	--	41
Other Regions (IS02)	91	121,471	1	--	--	25
Ireland (IRL)	**86**	**4,784,380**	**70**	**295,670**	**62,559**	**48**
Border, Midland and Western (IE01)	82	1,274,990	40	36,241	28,770	41
Southern and Eastern (IE02)	87	3,509,400	97	259,429	74,836	48
Italy (ITA)	**77**	**60,589,400**	**205**	**2,033,280**	**33,537**	**21**
Piedmont (ITC1)	78	4,392,530	177	156,468	35,574	20
Aosta Valley (ITC2)	75	126,883	39	5,367	42,225	19
Liguria (ITC3)	76	1,565,310	294	58,423	37,255	22
Lombardy (ITC4)	82	10,019,200	439	443,482	44,287	22
Abruzzo (ITF1)	78	1,322,250	124	38,668	29,197	20
Molise (ITF2)	73	310,449	71	7,541	24,230	22
Campania (ITF3)	70	5,839,080	436	129,162	22,098	19
Apulia (ITF4)	70	4,063,890	212	87,605	21,522	18
Basilicata (ITF5)	70	570,365	59	14,255	24,920	20
Calabria (ITF6)	68	1,965,130	133	39,992	20,323	19
Sicily (ITG1)	69	5,056,640	199	105,260	20,780	18
Sardinia (ITG2)	79	1,653,140	69	40,600	24,522	20
Province of Bolzano-Bozen (ITH1)	76	524,256	71	26,947	51,567	17
Province of Trento (ITH2)	82	538,604	88	22,785	42,319	22
Veneto (ITH3)	80	4,907,530	279	188,159	38,311	19
Friuli-Venezia Giulia (ITH4)	80	1,217,870	161	44,688	36,643	21
Emilia-Romagna (ITH5)	81	4,448,840	207	186,323	41,884	22
Tuscany (ITI1)	79	3,742,440	165	135,799	36,277	22
Umbria (ITI2)	79	888,908	108	25,821	29,011	23
Marche (ITI3)	78	1,538,060	161	49,592	32,184	23
Lazio (ITI4)	80	5,898,120	349	224,965	38,173	28

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Japan (JPN)	**62***	**126,933,000**	**340**	**4,759,750**	**37,498**	**42**
Hokkaido (JPA)	51	5,352,000	64	167,356	30,992	--
Tohoku (JPB)	57	8,915,000	134	295,007	32,648	--
Northern-Kanto, Koshin (JPC)	64	9,756,000	276	351,345	35,760	--
Southern-Kanto (JPD)	77	36,294,000	2768	1,504,590	41,885	--
Hokuriku (JPE)	67	5,280,000	161	188,949	35,457	--
Toukai (JPF)	67	15,025,000	673	600,248	39,947	--
Kansai region (JPG)	71	20,681,000	788	731,016	35,230	--
Chugoku (JPH)	58	7,406,000	235	259,039	34,836	--
Shikoku (JPI)	54	3,818,000	205	124,857	32,196	--
Kyushu, Okinawa (JPJ)	53	14,405,000	330	433,922	29,967	--
Latvia (LVA)	**75**	**1,950,120**	**31**	**44,805**	**22,865**	**35**
Latvia (LV00)	75	1,950,120	31	44,742	22,833	35
Luxembourg (LUX)	**97**	**590,667**	**228**	**51,605**	**88,446**	**43**
Luxembourg (LU00)	97	590,667	228	51,605	88,446	43
Mexico (MEX)	**48***	**123,518,000**	**63**	**2,074,810**	**16,969**	24
Aguascalientes (ME01)	47	1,321,450	235	28,195	21,609	26
Baja California Norte (ME02)	68	3,584,610	50	69,424	19,641	23
Baja California Sur (ME03)	75	809,833	11	16,963	21,557	25
Campeche (ME04)	54	935,047	16	45,136	48,980	26
Coahuila (ME05)	52	3,029,740	20	75,965	25,361	27
Colima (ME06)	54	747,801	133	12,603	17,130	26
Chiapas (ME07)	13	5,382,080	73	35,291	6,636	17
Chihuahua (ME08)	47	3,782,020	15	70,943	18,937	23
Federal District (MX)	68	8,811,270	5,938	352,095	39,859	38
Durango (ME10)	46	1,799,320	15	25,761	14,454	23
Guanajuato (ME11)	40	5,908,850	193	87,579	14,935	17
Guerrero (ME12)	33	3,607,210	57	29,745	8,289	19
Hidalgo (ME13)	38	2,947,210	141	32,613	11,195	20
Jalisco (ME14)	59	8,110,940	103	148,070	18,458	24
Mexico (ME15)	45	17,363,400	777	184,964	10,805	21
Michoacan (ME16)	34	4,658,160	79	50,896	10,998	18
Morelos (ME17)	53	1,965,490	402	23,900	12,300	21
Nayarit (ME18)	46	1,268,460	46	14,887	11,946	24
Nuevo Leon (ME19)	67	5,229,490	81	152,117	29,493	30

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Oaxaca (ME20)	20	4,061,500	44	31,590	7,825	17
Puebla (ME21)	29	6,313,790	184	69,768	11,155	21
Queretaro (ME22)	54	2,063,150	177	48,281	23,736	26
Quintana Roo (ME23)	62	1,664,670	39	33,324	20,574	22
San Luis Potosi (ME24)	51	2,801,840	46	44,428	15,993	23
Sinaloa (ME25)	41	3,034,940	53	47,532	15,792	29
Sonora (ME26)	72	3,011,810	17	71,864	24,176	27
Tabasco (ME27)	62	2,431,340	98	48,718	20,233	25
Tamaulipas (ME28)	56	3,622,610	45	61,421	17,141	25
Tlaxcala (ME29)	28	1,313,070	329	12,118	9,351	21
Veracruz (ME30)	30	8,163,960	114	97,555	12,035	21
Yucatan (ME31)	59	2,172,840	55	30,780	14,344	23
Zacatecas (ME32)	33	1,600,410	21	20,290	12,773	22
Netherlands (NLD)	**95**	**17,081,500**	**507**	**787,655**	**46,250**	**36**
Groningen (NL11)	98	583,581	251	27,018	46,292	36
Friesland (NL12)	95	646,874	195	20,829	32,220	28
Drenthe (NL13)	95	491,792	187	15,827	32,287	28
Overijssel (NL21)	95	1,147,690	345	43,785	38,207	33
Gelderland (NL22)	96	2,047,900	412	79,354	38,868	33
Flevoland (NL23)	100	407,818	289	14,527	35,786	31
Utrecht (NL31)	96	1,284,500	929	68,887	53,858	47
North Holland (NL32)	94	2,809,480	1,054	166,179	59,410	43
South Holland (NL33)	95	3,650,220	1,301	168,905	46,450	37
Zeeland (NL34)	92	381,568	214	13,723	35,980	28
North Brabant (NL41)	96	2,512,530	511	120,942	48,268	34
Limburg (NL42)	93	1,117,550	520	44,088	39,473	31
New Zealand (NZL)	**75**	**4,692,700**	**18**	**163,025**	**34,740**	32
Northland Region (NZ11)	60	171,400	14	4,210	24,561	24
Auckland Region (NZ12)	80	1,614,400	361	61,077	37,832	37
Waikato Region (NZ13)	71	449,200	19	13,726	30,556	29
Bay of Plenty Region (NZ14)	69	293,500	24	8,658	29,500	24
Gisborne Region (NZ15)	68	47,800	6	5,640	26,945	22
Hawke's Bay Region (NZ16)	68	161,500	11	--	--	--
Taranaki Region (NZ17)	69	116,700	17	5,012	42,950	21

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Manawatu-Wanganui Region (NZ18)	66	236,900	11	6,175	26,066	23
Wellington Region (NZ19)	80	504,800	63	21,451	42,495	40
Tasman-Nelson-Marlborough (NZ21)	75	146,300	7	5,552	31,052	25
West Coast Region (NZ22)	75	32,500	1	--	--	--
Canterbury Region (NZ23)	75	599,900	13	21,048	35,085	28
Otago Region (NZ24)	73	219,200	7	7,050	32,162	29
Southland Region (NZ25)	76	98,000	3	3,426	34,958	23
Norway (NOR)	**96**	**5,258,320**	**17**	**312,530**	**59,706**	**43**
Oslo and Akershus (NO01)	96	1,271,130	254	87,152	69,091	54
Hedmark and Oppland (NO02)	93	385,669	8	15,165	39,395	37
South-Eastern Norway (NO03)	97	992,962	29	39,806	40,254	36
Agder and Rogaland (NO04)	98	772,813	33	39,086	50,729	39
Western Norway (NO05)	99	896,503	19	46,649	52,203	41
Trøndelag (NO06)	99	454,596	12	21,885	48,414	41
Northern Norway (NO07)	91	484,647	5	23,036	47,676	38
Portugal (PRT)	**73**	**10,309,600**	**112**	**280,837**	**27,198**	**25**
North (PT) (PT11)	70	3,584,580	168	82,595	22,980	22
Algarve (PT15)	71	441,469	88	12,622	28,577	22
Central Portugal (PT16)	68	2,243,930	80	53,495	23,774	23
Metropolitan area of Lisbon (PT17)	82	2,821,350	936	100,884	35,812	34
Alentejo (PT18)	62	718,087	23	18,446	25,575	20
Autonomous Region of the Azores (PT20)	79	245,283	106	5,956	24,257	18
Autonomous Region of Madeira (PT30)	78	254,876	318	6,602	25,823	22
South Korea (KOR)	**99***	**50,976,500**	**513**	**1,792,290**	**34,975**	**45**
Capital Region (KR01)	100	25,383,400	2,169	887,938	34,999	49
Gyeongnam Region (KR02)	99	7,834,440	635	285,168	35,816	42
Gyeonbuk Region (KR03)	99	5,087,010	256	162,718	31,590	40
Jeolla Region (KR04)	99	5,071,450	247	163,015	31,735	38
Chungcheong Region (KR05)	99	5,485,190	331	229,217	41,775	41
Gangwon Region (KR06)	98	1,515,680	91	45,706	30,073	37
Jeju (KR07)	99	599,333	325	18,531	29,959	44
Spain (ESP)	**81**	**46,528,000**	**93**	**1,522,520**	**32,754**	**39**
Galicia (ES11)	78	2,710,220	92	79,560	29,302	41

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Asturias (ES12)	79	1,034,300	98	29,440	28,373	47
Cantabria (ES13)	77	581,490	110	17,074	29,336	44
Basque Country (ES21)	82	2,167,320	302	93,673	43,253	54
Navarra (ES22)	82	640,353	62	26,070	40,803	48
La Rioja (ES23)	79	312,624	62	10,774	34,452	40
Aragon (ES24)	80	1,316,070	28	46,782	35,513	39
Madrid (ES30)	88	6,476,840	813	287,930	44,637	49
Castile and León (ES41)	77	2,435,950	26	75,591	30,914	38
Castile-La Mancha (ES42)	78	2,040,980	26	52,413	25,630	30
Extremadura (ES43)	78	1,077,530	26	24,368	22,537	30
Catalonia (ES51)	82	7,441,280	233	290,977	39,190	42
Valencia (ES52)	80	4,935,180	213	142,424	28,867	35
Balearic Island (ES53)	81	1,150,960	231	39,000	34,113	32
Andalusia (ES61)	80	8,408,980	97	203,519	24,210	32
Murcia (ES62)	81	1,472,990	130	39,707	27,017	32
Ceuta (ES63)	83	85,034	4,475	2,216	26,120	--
Melilla (ES64)	85	84,946	6,534	2,028	23,900	--
Canary Islands (ES70)	81	2,154,980	290	57,796	26,944	32
Sweden (SWE)	**89**	**9,995,150**	**25**	**447,954**	**45,143**	**40**
Stockholm (SE11)	90	2,269,060	348	142,346	63,258	49
East Middle Sweden (SE12)	89	1,664,150	43	64,325	38,950	37
Småland with Islands (SE21)	83	847,667	26	32,268	38,370	32
South Sweden (SE22)	93	1,483,020	107	55,779	37,908	43
West Sweden (SE23)	89	1,992,120	68	87,498	44,240	38
North Middle Sweden (SE31)	87	848,451	13	30,484	36,136	32
Central Norrland (SE32)	82	374,245	5	14,151	37,962	32
Upper Norrland (SE33)	85	516,451	3	21,001	40,796	36
Switzerland (CHE)	**86**	**8,419,550**	**211**	**457,169**	**54,598**	**40**
Lake Geneva Region (CH01)	85	1,613,520	195	81,090	51,251	40
Espace Mittelland (CH02)	81	1,859,560	190	92,264	50,301	37
Northwestern Switzerland (CH03)	87	1,142,160	586	63,297	56,367	41
Zurich (CH04)	93	1,487,970	896	97,063	66,646	49
Eastern Switzerland (CH05)	87	1,162,680	103	55,002	47,868	34
Central Switzerland (CH06)	87	799,287	187	42,270	53,750	40
Ticino (CH07)	77	354,375	129	19,979	56,897	38

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
United Kingdom (GBR)	**92**	**65,808,600**	**271**	**2,543,670**	**38,778**	**43**
North East England (UKC)	91	2,639,010	308	73,757	27,984	36
North West England (UKD)	92	7,214,940	512	242,399	33,661	39
Yorkshire and The Humber (UKE)	91	5,430,000	352	163,297	30,138	37
East Midlands (UKF)	89	4,727,210	303	145,675	30,926	37
West Midlands (UKG)	89	5,806,360	447	184,247	31,826	35
East of England (UKH)	92	6,151,440	322	214,512	35,003	38
Greater London (UKI)	93	8,868,070	5,641	594,534	67,455	59
South East England (UKJ)	95	9,056,700	475	376,827	41,755	44
South West England (UKK)	93	5,526,650	232	185,388	33,649	42
Wales (UKL)	89	3,112,810	150	86,724	27,892	38
Scotland (UKM)	92	5,400,160	69	195,090	36,206	48
Northern Ireland (UKN)	88	1,875,230	138	54,198	29,031	38
United States (USA)	**84**	**323,128,000**	**35**	**16,817,700**	**52,047**	**36**
Alabama (US01)	78	4,863,300	37	186,810	38,412	31
Alaska (US02)	86	741,894	1	45,792	61,723	32
Arizona (US04)	86	6,931,070	24	277,864	40,090	32
Arkansas (US05)	73	2,988,250	22	110,276	36,903	28
California (US06)	88	39,250,000	97	2,382,750	60,707	37
Colorado (US08)	88	5,540,550	21	293,122	52,905	44
Connecticut (US09)	86	3,576,450	285	236,135	66,025	44
Delaware (US10)	86	952,065	188	64,915	68,183	35
District of Columbia (US11)	83	681,170	4284	114,905	168,688	67
Florida (US12)	83	20,612,400	148	841,315	40,816	32
Georgia (US13)	83	10,310,400	69	482,688	46,816	36
Hawaii (US15)	85	1,428,560	86	76,924	53,847	35
Idaho (US16)	83	1,683,140	8	62,121	36,907	31
Illinois (US17)	84	12,801,500	89	723,177	56,491	40
Indiana (US18)	81	6,633,050	71	315,476	47,561	31
Iowa (US19)	82	3,134,690	22	168,239	53,670	33
Kansas (US20)	83	2,907,290	14	136,798	47,054	38
Kentucky (US21)	79	4,436,970	43	178,685	40,272	30
Louisiana (US22)	76	4,681,670	42	215,313	45,991	29
Maine (US23)	82	1,331,480	17	53,870	40,458	35
Maryland (US24)	88	6,016,450	238	347,444	57,749	44

Community	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)[7]
Massachusetts (US25)	87	6,811,780	335	459,497	67,456	49
Michigan (US26)	83	9,928,300	67	445,381	44,860	34
Minnesota (US27)	86	5,519,950	27	308,069	55,810	39
Mississippi (US28)	73	2,988,730	25	98,568	32,980	27
Missouri (US29)	81	6,093,000	34	271,744	44,599	34
Montana (US30)	81	1,042,520	3	41,997	40,284	35
Nebraska (US31)	84	1,907,120	10	106,700	55,948	36
Nevada (US32)	83	2,940,060	10	132,894	45,201	25
New Hampshire (US33)	88	1,334,800	57	70,143	52,550	40
New Jersey (US34)	87	8,944,470	466	522,688	58,437	44
New Mexico (US35)	76	2,081,020	7	85,030	40,860	30
New York (US36)	83	19,745,300	161	1,362,800	69,019	42
North Carolina (US37)	82	10,146,800	80	473,892	46,704	36
North Dakota (US38)	81	757,952	4	48,562	64,070	34
Ohio (US39)	83	11,614,400	110	569,286	49,016	33
Oklahoma (US40)	80	3,923,560	22	164,691	41,975	30
Oregon (US41)	87	4,093,470	16	207,943	50,799	37
Pennsylvania (US42)	82	12,784,200	110	653,969	51,154	38
Rhode Island (US44)	86	1,056,430	390	52,265	49,473	40
South Carolina (US45)	79	4,961,120	64	190,657	38,430	32
South Dakota (US46)	81	865,454	4	43,930	50,759	33
Tennessee (US47)	79	6,651,190	62	301,502	45,330	32
Texas (US48)	83	27,862,600	41	1,452,950	52,147	33
Utah (US49)	88	3,051,220	14	143,244	46,947	35
Vermont (US50)	81	624,594	26	28,246	45,223	40
Virginia (US51)	85	8,411,810	82	447,829	53,238	44
Washington (US53)	89	7,288,000	42	433,145	59,433	39
West Virginia (US54)	76	1,831,100	29	66,194	36,150	28
Wisconsin (US55)	83	5,778,710	41	284,440	49,222	34
Wyoming (US 56)	84	585,501	2	34,821	59,472	30

Figures marked with an asterisk (*) were calculated by FCC staff using simple averages of OECD data.

Table 1a
Sources for Demographics Dataset

Country	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP[1] (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)
Australia	2015, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2015, OECD
Austria	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Belgium	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Canada	2016, CRTC	2016, OECD (national/subnational) 2017, OECD (subnational)	2016, OECD (national/subnational) 2017, OECD (subnational)	2016, OECD	2016, OECD	2016, OECD
Chile	2013, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2015, OECD
Czech Republic	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Denmark	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Estonia	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Finland	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
France	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Germany	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Greece	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Iceland	2012, OECD (subnational) 2014, OECD (national)	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2012, OECD (subnational) 2017, OECD (national)
Ireland	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Italy	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Japan	2015, OECD	2016, OECD	2016, OECD	2014, OECD (subnational) 2016, OECD (national)	2014, OECD (subnational) 2016, OECD (national)	2010, OECD

Country	Households with Broadband (%)	Population Total	Population Density (Persons per Square km)	GDP Total (US$mm), PPP[1] (Constant Real Prices 2010)	GDP Per Capita, (US$) PPP (Constant Real Prices 2010)	Education (% of Labor Force with Tertiary Education)
Latvia	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Luxembourg	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Mexico	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2015, OECD
Netherlands	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
New Zealand	2012, OECD	2016, OECD	2016, OECD	2016, OECD	2016, OECD	2016, OECD
Norway	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Portugal	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Spain	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
South Korea	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2016, OECD
Sweden	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
Switzerland	2014, OECD	2017, OECD	2017, OECD	2015 OECD (subnational) 2016, OECD (national)	2015 OECD (subnational) 2016, OECD (national)	2017, OECD
United Kingdom	2016, OECD	2017, OECD	2017, OECD	2016, OECD	2016, OECD	2017, OECD
United States	**2017, Census Bureau**	**2016, OECD**	**2016, OECD**	**2016, OECD**	**2016, OECD**	**2016, OECD**