

APPENDIX D

MOBILE WIRELESS SERVICES

APPENDIX D-1: Estimated Total Mobile Wireless Connections: 2003-2023

APPENDIX D-2: Change in Consumer Price Index (CPI), 1997-2023

APPENDIX D-3: Annualized Average Revenue Per Reported Subscriber Unit (ARPU): 1993-2023

APPENDIX D-4: Mobile Wireless Speeds

APPENDIX D-5: Mobile Wireless Outdoor Stationary Coverage Maps

APPENDIX D-6: Mobile Wireless Outdoor Stationary Coverage

APPX. D-1
Estimated Total Mobile Wireless Connections: 2003-2023

Year	NRUF			CTIA
	Connections (Millions)	Increase from previous year (Millions)	Connections per 100 People	Estimated Connections (Millions)
2003	160.6	18.8	54	158.7
2004	184.7	24.1	62	182.1
2005	213	28.3	71	207.9
2006	241.8	28.8	80	233.0
2007	263	21.2	86	255.4
2008	279.6	16.6	91	270.3
2009	290.7	11.1	94	285.6
2010	301.8	11.1	97	296.3
2011	317.3	15.5	101	316.0
2012	329.2	11.9	105	326.5
2013	339.2	10.0	108	335.7
2014	357.1	17.2	114	355.4
2015	378.2	21.1	121	377.9
2016	398.4	20.2	127	395.9
2017	410.7	12.3	126	400.2
2018	421.7	11.0	128	421.8
2019	430.3	8.6	130	442.5
2020	438.7	8.4	132	468.9
2021	456.9	18.2	138	498.9
2022	468.4	11.5	139	523.0
2023	492.1	23.7	145	558.1

Source: Numbering Resource Utilization/Forecast (NRUF) 2003–2023; CTIA Year-End 2023 Wireless Industry Indices Report; Census data.

APPX. D-2
Change in Consumer Price Index (CPI), 1997-2023

Year	CPI		Wireless Telephone Services CPI		Telephone Services CPI		Residential Telephone Services CPI	
	Annual Index Average	Annual Change	Annual Index Average	Annual Change	Annual Index Average	Annual Change	Annual Index Average	Annual Change
1997	100.0		100.0		100.0			
1998	101.6	1.6%	95.1		100.7			
1999	103.8	2.2%	84.9	-10.7%	100.1	-0.6%		
2000	107.3	3.4%	76.0	-10.5%	98.5	-1.6%		
2001	110.3	2.8%	68.1	-10.4%	99.3	0.8%		
2002	112.1	1.6%	67.4	-1.0%	99.7	0.4%		
2003	114.6	2.3%	66.8	-0.9%	98.3	-1.4%		
2004	117.7	2.7%	66.2	-0.9%	95.8	-2.5%		
2005	121.7	3.4%	65.0	-1.8%	94.9	-0.9%		
2006	125.6	3.2%	64.6	-0.6%	95.8	0.9%		
2007	129.2	2.9%	64.4	-0.3%	98.2	2.6%		
2008	134.1	3.8%	64.2	-0.2%	100.5	2.2%		
2009	133.7	-0.4%	64.3	0.0%	102.4	1.9%	100.0	
2010	135.8	1.6%	62.4	-2.9%	102.4	0.0%	101.6	
2011	140.1	3.2%	60.1	-3.6%	101.2	-1.1%	103.3	1.7%
2012	143.0	2.1%	59.7	-0.8%	101.7	0.5%	105.6	2.2%
2013	145.1	1.5%	58.6	-1.8%	101.6	-0.1%	108.1	2.4%
2014	147.5	1.6%	57.4	-2.1%	101.1	-0.4%	111.1	2.7%
2015	147.7	0.1%	55.2	-3.8%	99.3	-1.8%	113.4	2.1%
2016	149.5	1.3%	54.7	-1.0%	98.8	-0.5%	114.5	1.0%
2017	152.7	2.1%	48.8	-10.7%	91.8	-7.2%	116.1	1.4%
2018	156.5	2.4%	47.6	-2.5%	90.4	-1.5%	117.2	1.0%
2019	159.3	1.8%	46.4	-2.5%	89.4	-1.1%	120.8	3.0%
2020	161.3	1.3%	47.3	2.0%	92.2	3.2%	128.9	6.7%
2021	165.9	2.9%	48.2	1.7%	94.4	2.4%	136.2	5.7%
2022	182.3	8.0%	47.9	-0.5%	94.8	0.4%	142.3	4.5%
2023	189.8	4.1%	47.8	-0.3%	95.3	0.6%	150.6	5.8%
1997 to 2023		89.8%		-52.2%		-4.7%		50.6%

Source: U.S. Bureau of Labor Statistics.

Notes: Beginning January 2010, the CPIs for local telephone service and long-distance were replaced by a new CPI for land-line (now residential) telephone service.¹

¹ The CPI for All Urban Consumers represents about 93% of the total U.S. population. Bureau of Labor Statistics, *Consumer Price Index: Frequently Asked Questions*, <https://www.bls.gov/cpi/questions-and-answers.htm> (last visited Dec. 18, 2024). “Telephone Services” has two components: wireless telephone services and landline (continued....)

APPX. D-3
Annualized Average Revenue Per Reported Subscriber Unit (ARPU): 1993-2023

Year	Total Annual Service Revenue (thousands)	Percentage Change	Average Reported Subscribers	Average Monthly Revenue per Active Subscriber Unit
1993	\$10,895,175		11,861,362	\$76.55
1994	\$14,229,922	30.6%	18,299,487	\$64.80
1995	\$19,081,239	34.1%	26,757,320	\$59.43
1996	\$23,634,971	23.9%	35,554,818	\$55.40
1997	\$27,485,633	16.3%	46,375,849	\$49.39
1998	\$33,133,175	20.6%	58,455,471	\$47.23
1999	\$40,018,489	20.8%	71,885,076	\$46.39
2000	\$52,466,020	31.1%	90,048,320	\$48.55
2001	\$65,316,235	24.5%	109,318,848	\$49.79
2002	\$76,508,187	17.1%	125,002,023	\$51.00
2003	\$87,624,093	14.5%	141,658,059	\$51.55
2004	\$102,121,210	16.5%	161,980,026	\$52.54
2005	\$113,538,221	11.2%	186,801,940	\$50.65
2006	\$125,456,825	10.5%	213,077,033	\$49.07
2007	\$138,869,304	10.7%	234,921,960	\$49.26
2008	\$148,084,170	6.6%	252,539,475	\$48.87
2009	\$152,551,854	3.0%	265,038,212	\$47.97
2010	\$159,929,648	4.9%	280,392,201	\$47.53
2011	\$169,767,314	6.2%	306,840,648	\$46.11
2012	\$185,013,936	9.0%	314,685,754	\$48.99
2013	\$189,192,812	2.3%	323,133,932	\$48.79
2014	\$187,848,477	(0.7%)	335,606,098	\$46.64
2015	\$191,949,025	2.2%	358,228,494	\$44.65
2016	\$188,524,256	(1.8%)	378,554,642	\$41.50
2017	\$179,091,135	(5.0%)	386,013,771	\$38.66
2018	\$182,779,484	2.1%	402,376,536	\$37.85
2019	\$187,361,982	2.5%	423,609,827	\$36.86
2020	\$189,912,414	1.4%	448,206,414	\$35.31
2021	\$204,214,004	7.5%	476,179,415	\$35.74
2022	\$208,683,242	2.2%	503,170,441	\$34.56
2023	\$214,472,418	2.8%	532,611,598	\$33.56

Source: CTIA Year-End 2023 Wireless Industry Indices Report.

telephone services. For additional information, see Bureau of Labor Statistics, *Consumer Price Index: How the Consumer Price Index Measures Price Change for Telephone Services*, <https://www.bls.gov/cpi/factsheets/telephone-services.htm> (last visited Dec. 18, 2024).

APPX. D-4
Mobile Wireless Speeds

Appx. D-4.i
Ookla Speedtest–Estimated 4G Long-Term Evolution (LTE) Download Speeds by Service Provider, Nationwide

Service Provider	2H2022			1H2023			2H2023		
	Mean Down load Speed (Mbps)	Median Down load Speed (Mbps)	Sample Count ('000s)	Mean Down load Speed (Mbps)	Median Down load Speed (Mbps)	Sample Count ('000s)	Mean Down load Speed (Mbps)	Median Down load Speed (Mbps)	Sample Count ('000s)
AT&T	45.75	31.07	173	49.00	31.66	195	51.80	32.43	244
T-Mobile	47.3	35.18	160	46.25	30.39	170	46.67	27.39	210
UScellular	27.34	17.82	5	25.58	15.85	7	24.24	14.93	10
Verizon	38.08	25.1	206	44.99	28.87	290	48.04	30.11	405

Source: Ookla SPEEDTEST intelligence data, © 2023 Ookla, LLC. All rights reserved. Published with permission of Ookla.

Appx. D-4.ii
Ookla Speedtest–Estimated 4G LTE Upload Speeds by Service Provider, Nationwide

Service Provider	2H2022			1H2023			2H2023		
	Mean Upload Speed (Mbps)	Median Upload Speed (Mbps)	Sample Count ('000s)	Mean Upload Speed (Mbps)	Median Upload Speed (Mbps)	Sample Count ('000s)	Mean Upload Speed (Mbps)	Median Upload Speed (Mbps)	Sample Count ('000s)
AT&T	7.45	4.37	173	7.55	4.00	195	7.37	3.62	244
T-Mobile	7.8	4.51	160	7.18	3.7	170	6.99	3.18	210
UScellular	5.57	3.85	5	5.55	3.52	7	5.41	3.17	10
Verizon	7.78	4.58	206	8.29	4.65	290	8.16	4.39	405

Source: Ookla SPEEDTEST intelligence data, © 2023 Ookla, LLC. All rights reserved. Published with permission of Ookla.

Appx. D-4.iii
Opensignal–Estimated Overall Download Speeds, Nationwide²

Service Provider	2H2022	1H2023	2H2023
	Average Download Speed (Mbps)	Average Download Speed (Mbps)	Average Download Speed (Mbps)
AT&T	38.20	40.10	45.50
T-Mobile	79.50	97.10	113.10
Verizon	31.30	34.30	38.10

Source: Opensignal, © 2023 Opensignal.

Appx. D-4.iv
Opensignal–Estimated Overall Upload Speeds, Nationwide³

Service Provider	2H2022	1H2023	2H2023
	Average Upload Speed (Mbps)	Average Upload Speed (Mbps)	Average Upload Speed (Mbps)
AT&T	6.30	6.40	6.50
T-Mobile	10.70	11.70	12.10
Verizon	7.90	8.30	8.20

Source: Opensignal, © 2023 Opensignal.

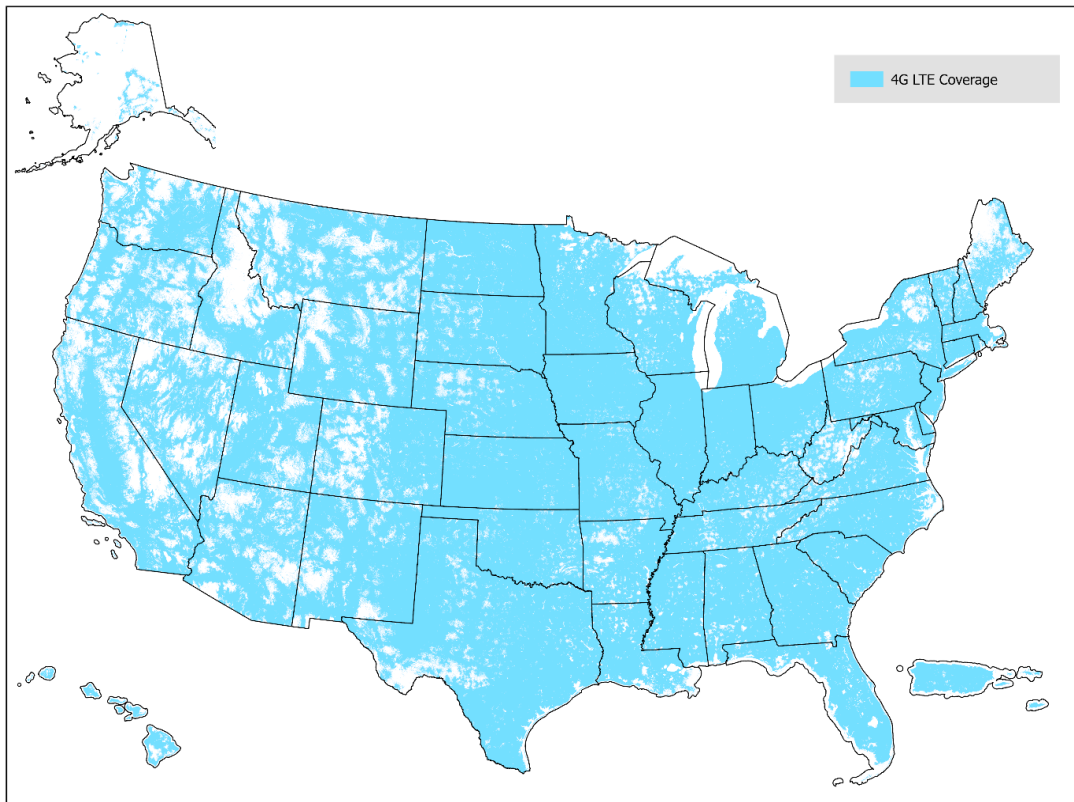
² Appx. D-4.iii presents Opensignal’s Overall Download Speed Experience. Measured in Mbps, Opensignal’s Download Speed Experience represents the typical everyday speeds a user experiences across an operator’s mobile data networks. Robert Wyrzykowski, Opensignal, *USA Mobile Network Experience Report, January 2024* (Jan. 2024), <https://www.opensignal.com/reports/2024/01/usa/mobile-network-experience> (navigate to “Market Overview” subsection, click on “Overall Experience” heading, and then click on “Download Speed Experience” subheading); Robert Wyrzykowski, Opensignal, *USA Mobile Network Experience Report, July 2023* (July 2023), <https://www.opensignal.com/reports/2023/07/usa/mobile-network-experience> (navigate to “Market Overview” subsection, click on “Overall Experience” heading, and then click on “Download Speed Experience” subheading); Robert Wyrzykowski, Opensignal, *USA Mobile Network Experience Report, January 2023* (Jan. 2023), <https://www.opensignal.com/reports/2023/01/usa/mobile-network-experience> (navigate to “Market Overview” subsection, click on “Overall Experience” heading, and then click on “Download Speed Experience” subheading).

³ Appx. D-4.iv presents Opensignal’s Overall Upload Speed Experience. Measured in Mbps, Opensignal’s Upload Speed Experience measures the average upload speeds for each operator observed by our users across their mobile data networks. Robert Wyrzykowski, Opensignal, *USA Mobile Network Experience Report, January 2024* (Jan. 2024), <https://www.opensignal.com/reports/2024/01/usa/mobile-network-experience> (navigate to “Market Overview” subsection, click on “Overall Experience” heading, and then click on “Upload Speed Experience” subheading); Robert Wyrzykowski, Opensignal, *USA Mobile Network Experience Report, July 2023* (July 2023), <https://www.opensignal.com/reports/2023/07/usa/mobile-network-experience> (navigate to “Market Overview” subsection, click on “Overall Experience” heading, and then click on “Upload Speed Experience” subheading); Robert Wyrzykowski, Opensignal, *USA Mobile Network Experience Report, January 2023* (Jan. 2023), <https://www.opensignal.com/reports/2023/01/usa/mobile-network-experience> (navigate to “Market Overview” subsection, click on “Overall Experience” heading, and then click on “Upload Speed Experience” subheading).

APPX. D-5
Mobile Wireless Outdoor Stationary Coverage Maps

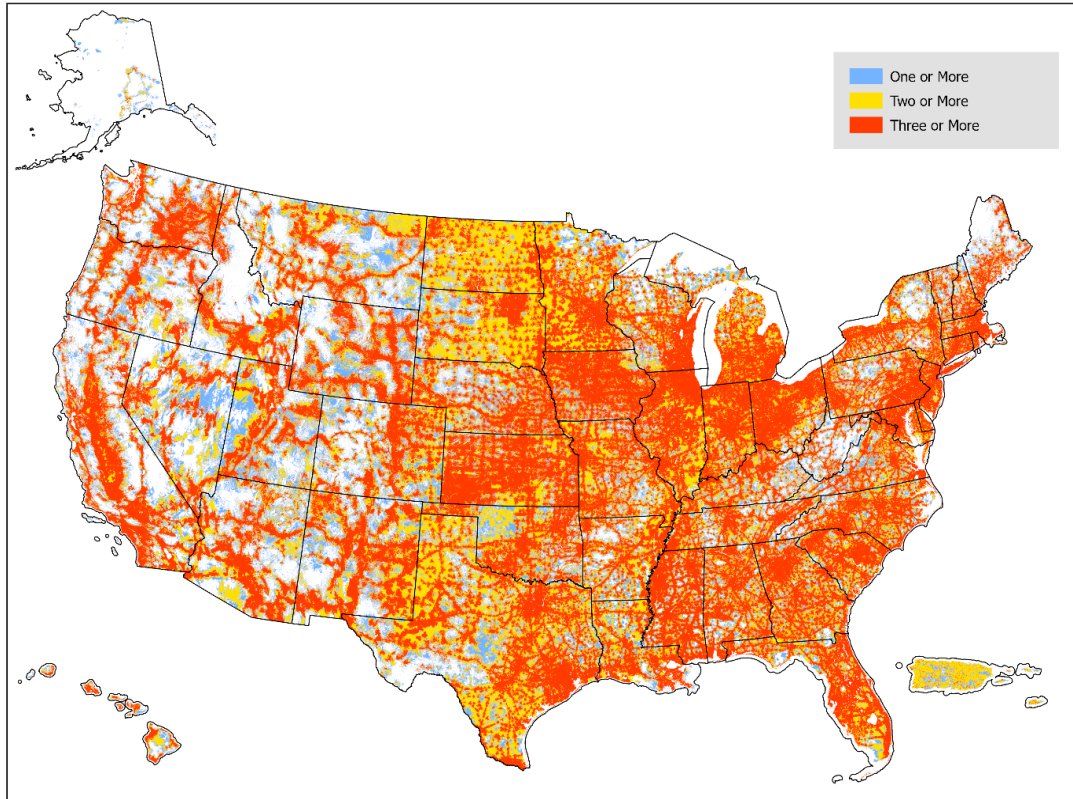
The maps presented below are based on Commission staff estimates derived from the Broadband Data Collection (BDC) mobile broadband data as of December 31, 2023.

Appx. D-5.i
4G LTE 5/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)



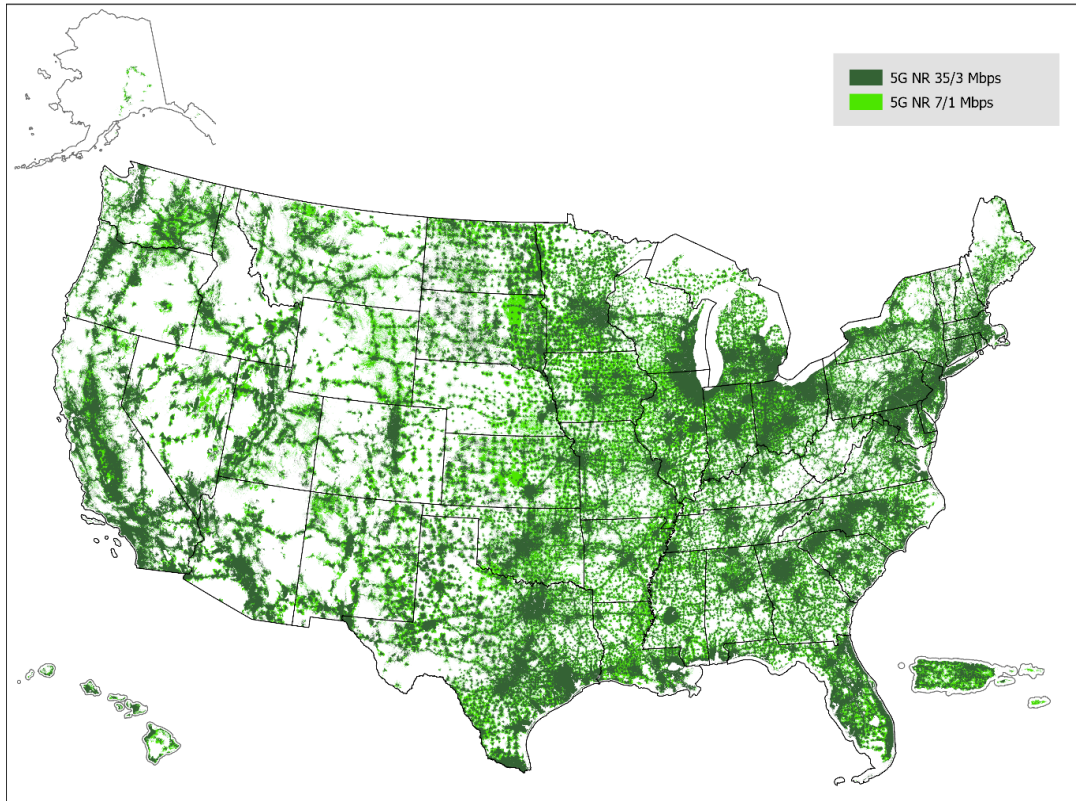
Source: FCC BDC.

Appx. D-5.ii
Number of 4G LTE 5/1 Mbps Outdoor Stationary Coverage Providers (Dec. 31, 2023)



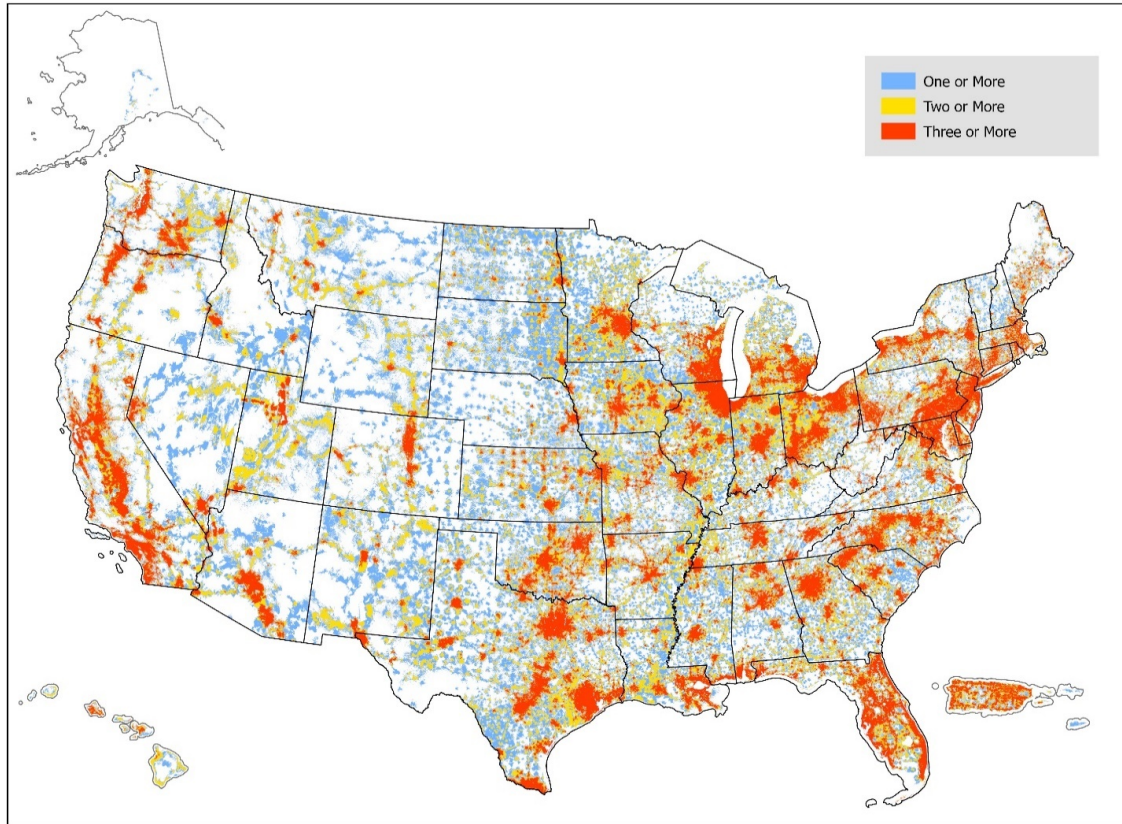
Source: FCC BDC.

Appx. D-5.iii
5G New Radio (5G-NR) 7/1 and 35/3 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)



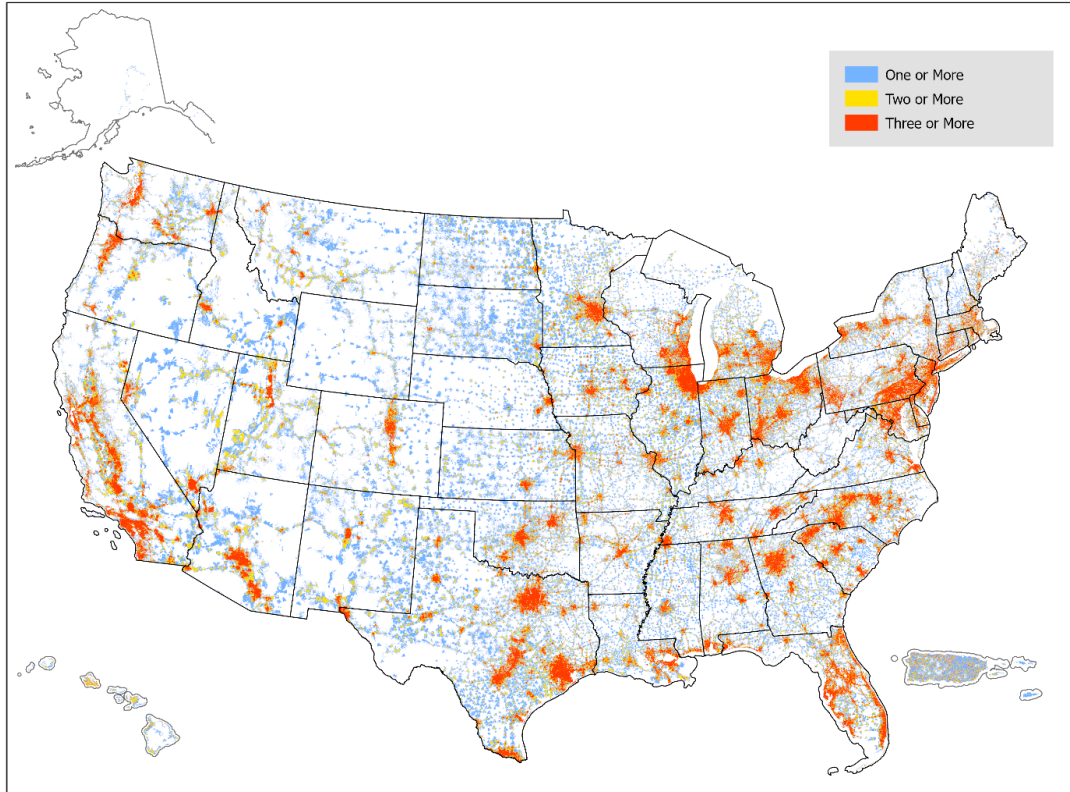
Source: FCC BDC.

Appx. D-5.iv
Number of 5G-NR 7/1 Mbps Outdoor Stationary Coverage Providers (Dec. 31, 2023)



Source: FCC BDC.

Appx. D-5.v
Number of 5G-NR 35/3 Mbps Outdoor Stationary Coverage Providers (Dec. 31, 2023)

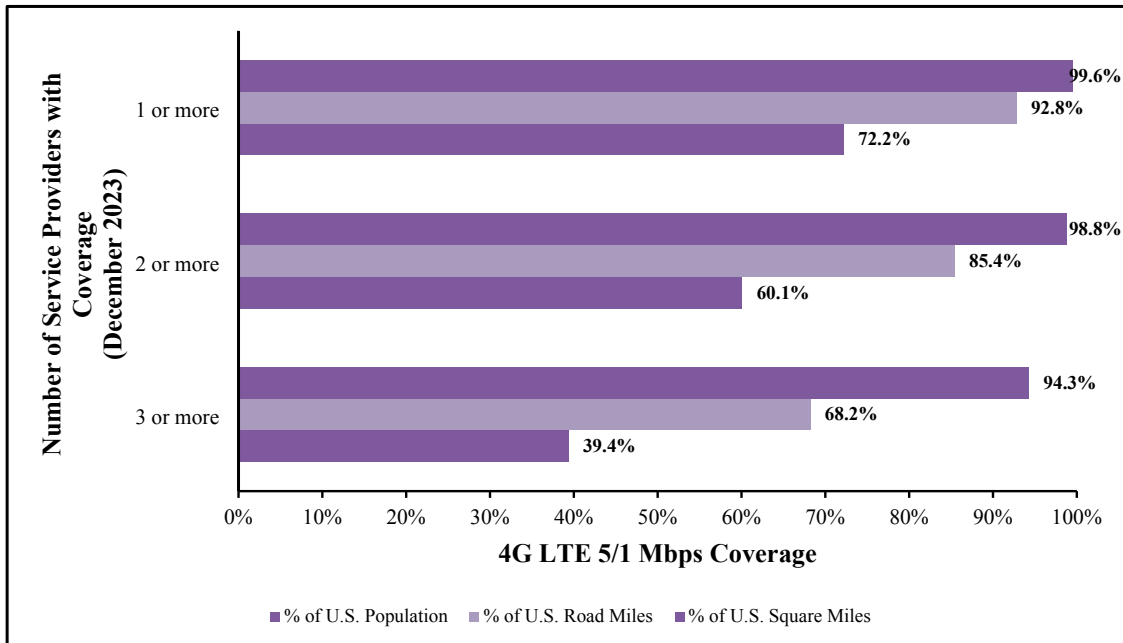


Source: FCC BDC.

Appx. D-6
Mobile Wireless Outdoor Stationary Coverage

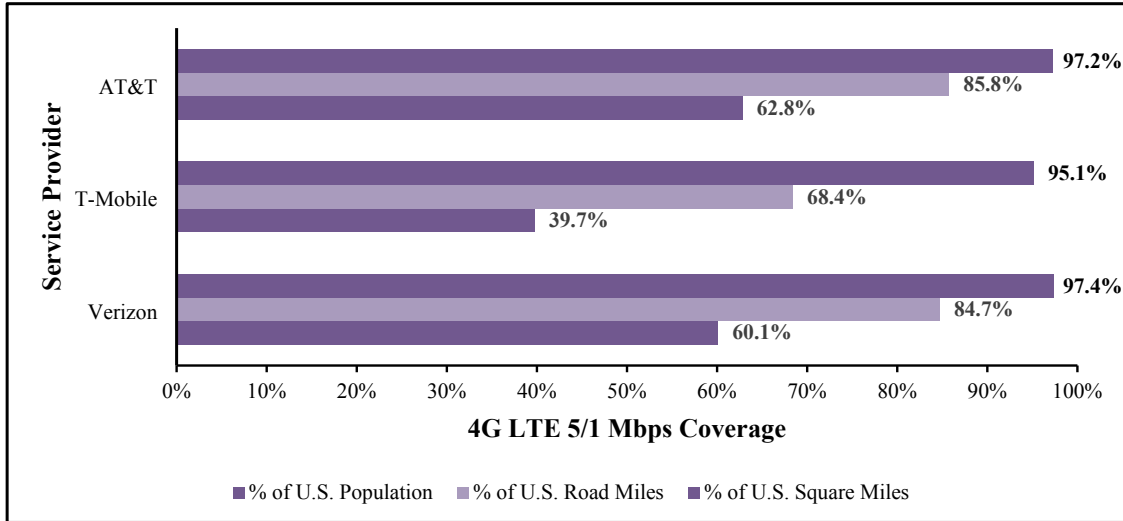
The figures presented below are based on Commission staff estimates derived from the December 31, 2023 BDC coverage data for 4G LTE 5/1 Mbps outdoor stationary coverage.

Appx. D-6.i
Estimated 4G LTE 5/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)



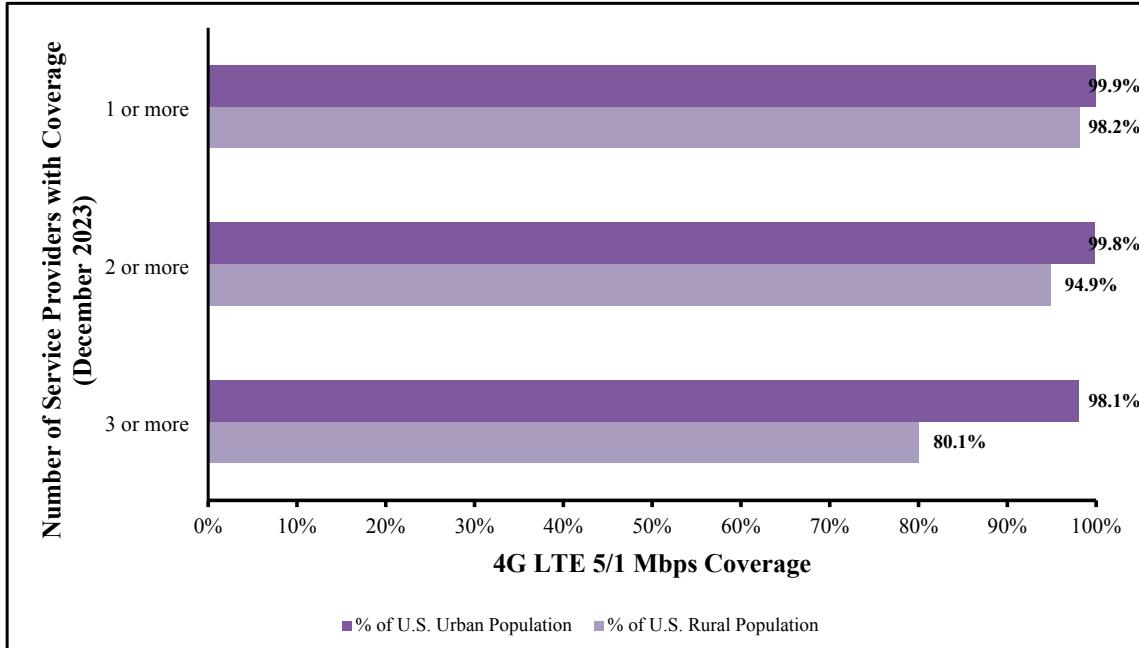
Source: FCC BDC, 2020 Census data, and Staff Block Estimates.

Appx. D-6.ii
Estimated 4G LTE 5/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)



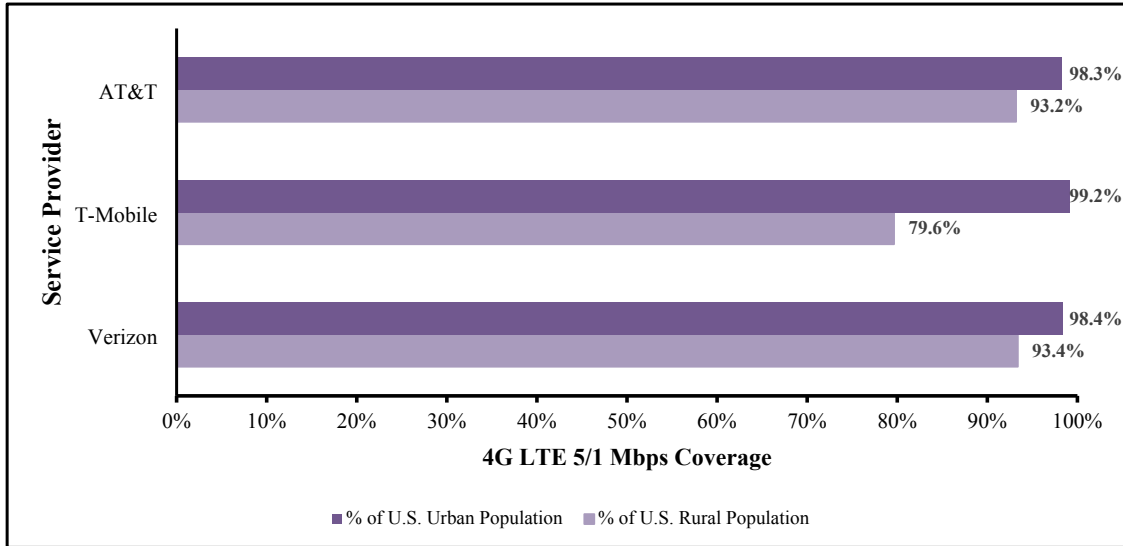
Source: FCC BDC, 2020 Census data, and Staff Block Estimates.

Appx. D-6.iii
Estimated 4G LTE 5/1 Mbps Outdoor Stationary Coverage in Rural vs. Urban Areas (Dec. 31, 2023)



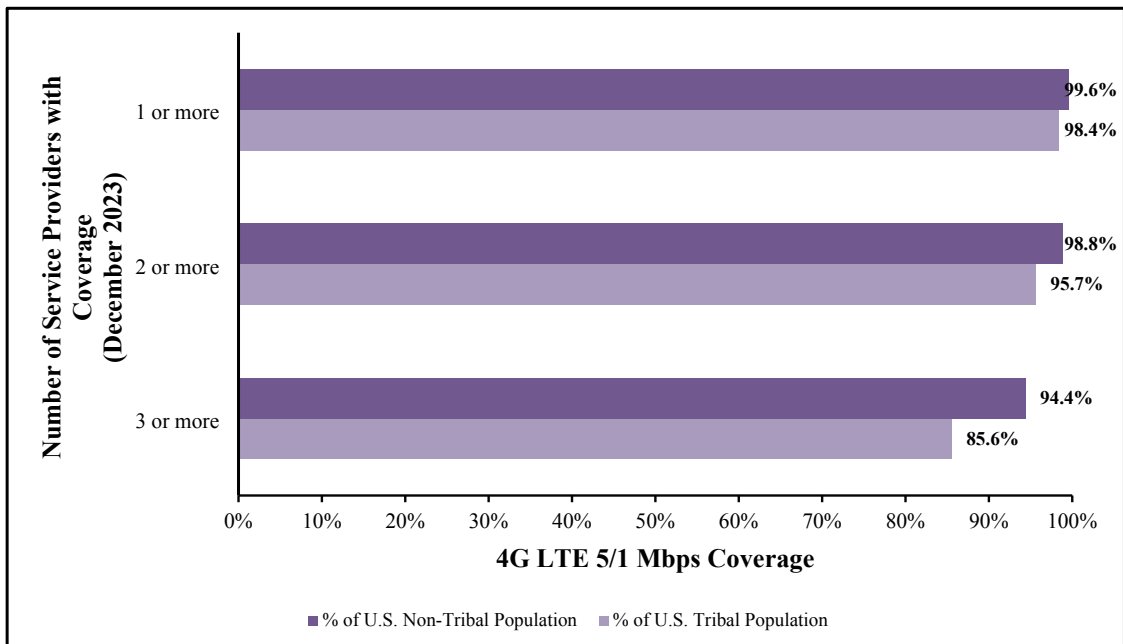
Source: FCC BDC, 2020 Census data, and Staff Block Estimates.

Appx. D-6.iv
Estimated 4G LTE 5/1 Mbps Outdoor Stationary Coverage
in Rural vs. Urban Areas by Provider (Dec. 31, 2023)



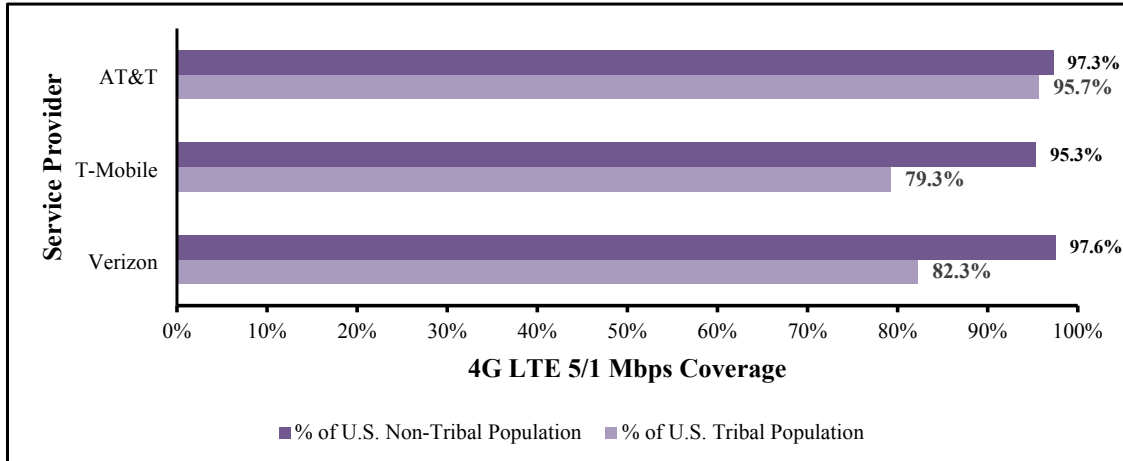
Source: FCC BDC, 2020 Census data, and Staff Block Estimates.

Appx. D-6.v
Estimated 4G LTE 5/1 Mbps Outdoor Stationary Coverage
in Tribal Vs. Non-Tribal Areas (Dec. 31, 2023)



Source: FCC BDC, 2020 Census data, and Staff Block Estimates.

Appx. D-6.vi
Estimated 4G LTE 5/1 Mbps Outdoor Stationary Coverage
in Tribal Vs. Non-Tribal Areas by Provider (Dec. 31, 2023)



Source: FCC BDC, 2020 Census data, and Staff Block Estimates.

Appx. D-6.vii
Estimated Rural 4G LTE 5/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)

Number of Providers	U.S. Rural Area Sq. Miles Covered	% of Total U.S. Rural Area Covered	U.S. Rural Road Miles Covered	% of Total U.S. Rural Road Miles Covered
1 or more	2,464,938	71.3%	5,518,374	90.5%
2 or more	2,034,216	58.9%	4,925,034	80.8%
3 or more	1,299,347	37.6%	3,574,558	58.6%

Source: FCC BDC and 2020 Census data.

Appx. D-6.viii
Estimated Rural 4G LTE 5/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)

Provider	U.S. Rural Area Sq. Miles Covered	% of Total U.S. Rural Area Covered	U.S. Rural Road Miles Covered	% of Total U.S. Rural Road Miles Covered
AT&T	2,133,064	61.7%	4,978,909	81.7%
T-Mobile	1,310,913	37.9%	3,572,001	58.6%
Verizon	2,036,933	58.9%	4,890,614	80.2%

Source: FCC BDC and 2020 Census data.

Appx. D-6.ix**Estimated Urban 4G LTE 5/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Urban Area Sq. Miles Covered	% of Total U.S. Urban Area Covered	U.S. Urban Road Miles Covered	% of Total U.S. Urban Road Miles Covered
1 or more	106,975	99.8%	1,966,239	99.9%
2 or more	106,699	99.5%	1,963,713	99.8%
3 or more	103,660	96.7%	1,927,902	98.0%

Source: FCC BDC and 2020 Census data.

Appx. D-6.x**Estimated Urban 4G LTE 5/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Urban Area Sq. Miles Covered	% of Total U.S. Urban Area Covered	U.S. Urban Road Miles Covered	% of Total U.S. Urban Road Miles Covered
AT&T	104,572	97.5%	1,936,937	98.4%
T-Mobile	105,078	98.0%	1,944,078	98.8%
Verizon	104,785	97.7%	1,939,197	98.6%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xi**Estimated Tribal 4G LTE 5/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Tribal Area Sq. Miles Covered	% of Total U.S. Tribal Area Covered	U.S. Tribal Road Miles Covered	% of Total U.S. Tribal Road Miles Covered
1 or more	147,168	79.6%	289,479	90.8%
2 or more	114,283	61.8%	248,044	77.8%
3 or more	62,009	33.5%	166,799	52.3%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xii**Estimated Tribal 4G LTE 5/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Tribal Area Sq. Miles Covered	% of Total U.S. Tribal Area Covered	U.S. Tribal Road Miles Covered	% of Total U.S. Tribal Road Miles Covered
AT&T	130,015	70.3%	266,744	83.6%
T-Mobile	56,758	30.7%	152,902	47.9%
Verizon	90,912	49.2%	192,071	60.2%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xiii**Estimated Non-Tribal 4G LTE 5/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Non-Tribal Sq. Miles Covered	% of Total Non-Tribal Area Covered	U.S. Non-Tribal Road Miles Covered	% of Total U.S. Non-Tribal Road Miles Covered
1 or more	2,424,745	71.8%	7,195,133	92.9%
2 or more	2,026,632	60.0%	6,640,702	85.7%
3 or more	1,340,998	39.7%	5,335,662	68.9%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xiv**Estimated Non-Tribal 4G LTE 5/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Non-Tribal Sq. Miles Covered	% of Total Non-Tribal Area Covered	U.S. Non-Tribal Road Miles Covered	% of Total U.S. Non-Tribal Road Miles Covered
AT&T	2,107,620	62.4%	6,649,102	85.9%
T-Mobile	1,359,233	40.2%	5,363,177	69.3%
Verizon	2,050,806	60.7%	6,637,740	85.7%

Source: FCC BDC and 2020 Census data.

The figures presented below are based on Commission staff estimates derived from December 31, 2023 BDC coverage data for 5G-NR 7/1 Mbps outdoor stationary coverage.

Appx. D-6.xv

Estimated Rural 5G-NR 7/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)

Number of Providers	U.S. Rural Area Sq. Miles Covered	% of Total U.S. Rural Area Covered	U.S. Rural Road Miles Covered	% of Total U.S. Rural Road Miles Covered
1 or more	1,549,482	44.8%	4,090,803	67.1%
2 or more	780,257	22.6%	2,491,604	40.9%
3 or more	290,916	8.4%	1,154,518	18.9%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xvi

Estimated Rural 5G-NR 7/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)

Provider	U.S. Rural Area Sq. Miles Covered	% of Total U.S. Rural Area Covered	U.S. Rural Road Miles Covered	% of Total U.S. Rural Road Miles Covered
AT&T	970,982	28.1%	2,667,516	43.8%
T-Mobile	981,130	28.4%	2,860,099	46.9%
Verizon	359,908	10.4%	1,277,030	20.9%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xvii

Estimated Urban 5G-NR 7/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)

Number of Providers	U.S. Urban Area Sq. Miles Covered	% of Total U.S. Urban Area Covered	U.S. Urban Road Miles Covered	% of Total U.S. Urban Road Miles Covered
1 or more	106,678	99.5%	1,962,059	99.7%
2 or more	103,185	96.2%	1,919,676	97.6%
3 or more	91,980	85.8%	1,762,323	89.6%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xviii

Estimated Urban 5G-NR 7/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)

Provider	U.S. Urban Area Sq. Miles Covered	% of Total U.S. Urban Area Covered	U.S. Urban Road Miles Covered	% of Total U.S. Urban Road Miles Covered
AT&T	91,732	85.5%	1,756,768	89.3%
T-Mobile	102,574	95.7%	1,913,371	97.2%
Verizon	80,581	75.1%	1,578,936	80.2%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xix**Estimated Tribal 5G-NR 7/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Tribal Area Sq. Miles Covered	% of Total U.S. Tribal Area Covered	U.S. Tribal Road Miles Covered	% of Total U.S. Tribal Road Miles Covered
1 or more	81,004	43.8%	197,668	62.0%
2 or more	37,890	20.5%	119,717	37.5%
3 or more	14,757	8.0%	62,283	19.5%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xx**Estimated Tribal 5G-NR 7/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Tribal Area Sq. Miles Covered	% of Total U.S. Tribal Area Covered	U.S. Tribal Road Miles Covered	% of Total U.S. Tribal Road Miles Covered
AT&T	59,071	32.0%	153,207	48.0%
T-Mobile	40,388	21.8%	123,314	38.7%
Verizon	17,352	9.4%	66,852	21.0%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxi**Estimated Non-Tribal 5G-NR 7/1 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Non-Tribal Sq. Miles Covered	% of Total U.S. Non-Tribal Area Covered	U.S. Non-Tribal Road Miles Covered	% of Total U.S. Non-Tribal Road Miles Covered
1 or more	1,575,156	46.6%	5,855,194	75.6%
2 or more	845,552	25.0%	4,291,563	55.4%
3 or more	368,140	10.9%	2,854,558	36.9%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxii**Estimated Non-Tribal 5G-NR 7/1 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Non-Tribal Sq. Miles Covered	% of Total U.S. Non-Tribal Area Covered	U.S. Non-Tribal Road Miles Covered	% of Total U.S. Non-Tribal Road Miles Covered
AT&T	1,003,644	29.7%	4,407,436	56.9%
T-Mobile	1,043,315	30.9%	4,813,380	62.2%
Verizon	423,137	12.5%	2,890,264	37.3%

Source: FCC BDC and 2020 Census data.

The figures presented below are based on Commission staff estimates derived from December 31, 2023 BDC coverage data for 5G-NR 35/3 Mbps outdoor stationary coverage.

Appx. D-6.xxiii

Estimated Rural 5G-NR 35/3 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)

Number of Providers	U.S. Rural Area Sq. Miles Covered	% of Total U.S. Rural Area Covered	U.S. Rural Road Miles Covered	% of Total U.S. Rural Road Miles Covered
1 or more	943,188	27.3%	2,810,596	46.1%
2 or more	355,847	10.3%	1,357,504	22.3%
3 or more	115,306	3.3%	546,720	9.0%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxiv

Estimated Rural 5G-NR 35/3 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)

Provider	U.S. Rural Area Sq. Miles Covered	% of Total U.S. Rural Area Covered	U.S. Rural Road Miles Covered	% of Total U.S. Rural Road Miles Covered
AT&T	466,928	13.5%	1,368,985	22.5%
T-Mobile	526,866	15.2%	1,733,494	28.4%
Verizon	237,069	6.9%	916,434	15.0%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxv

Estimated Urban 5G-NR 35/3 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)

Number of Providers	U.S. Urban Area Sq. Miles Covered	% of Total U.S. Urban Area Covered	U.S. Urban Road Miles Covered	% of Total U.S. Urban Road Miles Covered
1 or more	103,901	96.9%	1,932,076	98.2%
2 or more	93,415	87.1%	1,796,070	91.3%
3 or more	73,022	68.1%	1,484,588	75.5%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxvi

Estimated Urban 5G-NR 35/3 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)

Provider	U.S. Urban Area Sq. Miles Covered	% of Total U.S. Urban Area Covered	U.S. Urban Road Miles Covered	% of Total U.S. Urban Road Miles Covered
AT&T	57,141	53.3%	1,162,092	59.1%
T-Mobile	92,670	86.4%	1,788,945	90.9%
Verizon	71,914	67.1%	1,443,989	73.4%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxvii**Estimated Tribal 5G-NR 35/3 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Tribal Area Sq. Miles Covered	% of Total U.S. Tribal Area Covered	U.S. Tribal Road Miles Covered	% of Total U.S. Tribal Road Miles Covered
1 or more	47,629	25.8%	136,742	42.9%
2 or more	15,798	8.5%	65,539	20.5%
3 or more	4,824	2.6%	29,847	9.4%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxviii**Estimated Tribal 5G-NR 35/3 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Tribal Area Sq. Miles Covered	% of Total U.S. Tribal Area Covered	U.S. Tribal Road Miles Covered	% of Total U.S. Tribal Road Miles Covered
AT&T	27,906	15.1%	81,245	25.5%
T-Mobile	20,634	11.2%	77,351	24.3%
Verizon	13,069	7.1%	55,360	17.4%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxix**Estimated Non-Tribal 5G-NR 35/3 Mbps Outdoor Stationary Coverage (Dec. 31, 2023)**

Number of Providers	U.S. Non-Tribal Sq. Miles Covered	% of Total Non-Tribal Area Covered	U.S. Non-Tribal Road Miles Covered	% of Total U.S. Non-Tribal Road Miles Covered
1 or more	999,461	29.6%	4,605,930	59.5%
2 or more	433,464	12.8%	3,088,035	39.9%
3 or more	183,505	5.4%	2,001,460	25.8%

Source: FCC BDC and 2020 Census data.

Appx. D-6.xxx**Estimated Non-Tribal 5G-NR 35/3 Mbps Outdoor Stationary Coverage by Provider (Dec. 31, 2023)**

Provider	U.S. Non-Tribal Sq. Miles Covered	% of Total Non-Tribal Area Covered	U.S. Non-Tribal Road Miles Covered	% of Total U.S. Non-Tribal Road Miles Covered
AT&T	496,163	14.7%	2,545,851	32.9%
T-Mobile	598,902	17.7%	3,591,779	46.4%
Verizon	295,914	8.8%	2,396,750	30.9%

Source: FCC BDC and 2020 Census data.