

Review of the mobile landscape 1H 2019

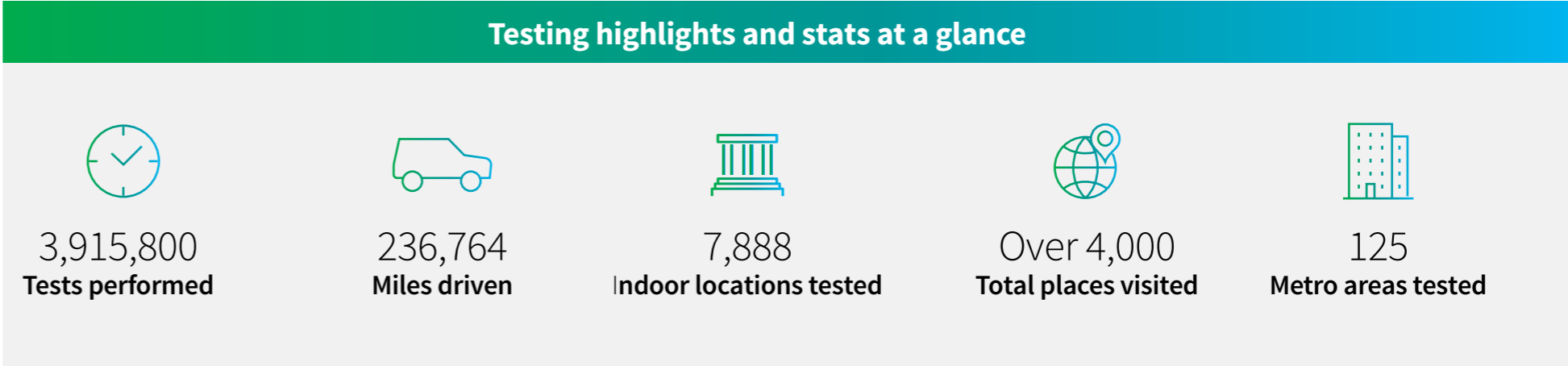
Carrier performance at national, state, and metro levels, and a look at what 5G can mean for your connected lifestyle



Carrier performance across the United States

In today’s connected society, consumers expect always-on connectivity and a flawless mobile experience anytime and anywhere they use their smartphones. To show you how the major US carriers fared in the first half of 2019 across all the spaces in which you use your smartphone, we’re offering our semi-annual special report on mobile performance in the US. This report shows you how the carriers performed across the entire US, within each of the 50 states, and across the 125 most populated metropolitan markets in the country. And with 5G deployments beginning across the US, the metro section of our report includes a high-level look at what 5G can mean for your daily mobile lifestyle.

Providing strong service across the entirety of the United States is a tall order. To earn our United States RootScore Awards, a carrier needs to offer outstanding performance across all of the different spaces where consumers use their smartphones, from cities and towns of all sizes to highways, rural areas, and all the places in between. Check below for individual carrier highlights from our testing across the entire United States in the first half of 2019.



National key takeaways and carrier highlights

AT&T continues to deliver strong results on the national stage.

- **The key story:** AT&T delivered another strong performance at the national level that was generally a step above those of both Sprint and T-Mobile. The carrier’s rankings in this test period remained identical to those from the second half of the 2018, with second-place rankings in five categories and a tie for first with Verizon in the text category.
- For the fifth consecutive test period, AT&T shared the United States Text RootScore Award.

Sprint improves ranking for network reliability in 1H 2019.

- **The key story:** Sprint’s ranking in the network reliability category improved from fourth in second-half 2018 testing to third this time, while the carrier’s ranking in every other category remained unchanged.
- It’s worth noting that while Sprint finished third in the text performance category, its Text RootScore of 95.0 wasn’t far behind the scores of AT&T and Verizon.



National RootScores 1H 2019 (overall, reliability, and speed)								
Overall			Reliability			Speed		
Rank	Carrier	RootScore	Rank	Carrier	RootScore	Rank	Carrier	RootScore
1	Verizon	94.8	1	Verizon	96.4	1	Verizon	91.2
2	AT&T	93.2	2	AT&T	94.9	2	AT&T	89.9
3	T-Mobile	86.9	3	Sprint	88.7	3	T-Mobile	89.0
4	Sprint	86.7	4	T-Mobile	88.1	4	Sprint	83.4

National RootScores 1H 2019 (data, call, and text)								
Data			Call			Text		
Rank	Carrier	RootScore	Rank	Carrier	RootScore	Rank	Carrier	RootScore
1	Verizon	95.5	1	Verizon	93.5	1	AT&T	96.5
2	AT&T	94.4	2	AT&T	91.0	1	Verizon	96.3
3	T-Mobile	92.2	3	Sprint	82.7	3	Sprint	95.0
4	Sprint	88.8	4	T-Mobile	79.1	4	T-Mobile	91.7

IHS Markit **forecasts** 9.1B mobile subscribers by 2023, of which 1.3B will be 5G, and fixed broadband will grow to just over 1B subscribers.

T-Mobile ranks third or fourth in every category at the national level.

- **The key story:** T-Mobile's third- or fourth-place rankings in the categories of overall performance, network speed, data performance, call performance, and text performance have remained the same for multiple test periods. It's worth noting, however, that T-Mobile's RootScores for data performance and network speed weren't far behind those of second-place finisher AT&T.
- T-Mobile's ranking in the network reliability category declined from third in second-half 2018 testing to fourth in this test period.
- T-Mobile typically performs much better in metropolitan markets than it does at state or national levels, and that remained the case in the first half of 2019.

Verizon remains outstanding at the national level, winning or sharing all six awards.

- **The key story:** Verizon's performance in our national testing remained excellent, with the carrier once again winning or sharing all six awards.
- Verizon continued a performance milestone, winning United States RootScore Awards outright in the categories of overall performance, network reliability, data performance, and call performance for the twelfth consecutive test period.

For more information about carrier performance at the national level, check our [United States RootScore Report](#).

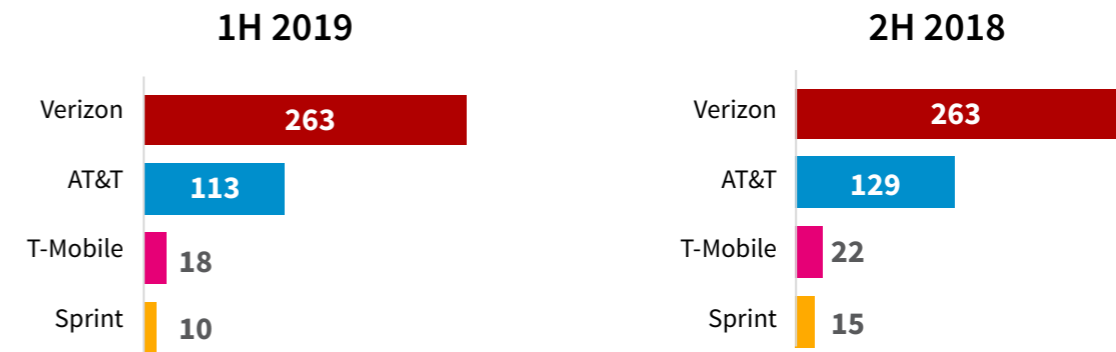


Mobile performance across the 50 states

Providing strong service across an entire state isn't an easy task for the carriers. Excelling in metropolitan markets or big cities doesn't necessarily mean that strong service will translate to success in other areas of a state. Our State RootScore Reports balance performance from dense urban areas, smaller towns, rural spaces, and highways to paint a complete picture of the consumer mobile experience at the state level. Check below for individual network highlights from our state-level testing in the first half of 2019.



State RootScore Award tally



The award tallies above show both outright wins and shared awards in both 1H 2019 and 2H 2018.

State RootScore Awards 1H 2019 (overall, reliability, and speed)

	Overall	Reliability	Speed
AT&T	15	17	13
Sprint	0	0	0
T-Mobile	0	1	9
Verizon	45	46	42

State RootScore Awards 1H 2019 (data, call, and text)

	Data	Call	Text
AT&T	10	23	35
Sprint	0	0	10
T-Mobile	0	1	7
Verizon	44	46	40

The award tallies above include both outright and shared State RootScore Awards by category in 1H 2019.

State key takeaways and carrier highlights

To see how the carriers fared in your state, check our [State RootScore Reports](#)

AT&T maintains its position as a strong second at the state level.

- **The key story:** While AT&T's total of 113 state-level awards marked a decrease from 129 in second-half 2018 testing, the carrier still earned far more awards than either Sprint or T-Mobile and finished a strong second behind Verizon.
- The bulk of AT&T's award declines were in the categories of network speed, data performance, and call performance. It's worth noting that AT&T's losses corresponded with Verizon improving its total of awards won outright. Specifically, Verizon won far more awards outright in this test period—especially for network speed—compared to our last report, in which Verizon and AT&T shared multiple awards in several categories.
- This marks the twelfth consecutive test period in which AT&T finished as a strong number-two performer in state-level testing behind Verizon.

Sprint's text results remain strong at the state level in 1H 2019.

- **The key story:** Sprint's award tally declined from 15 to 10 since second-half 2018 testing. Sprint's total of Call RootScore Awards decreased from three shared awards in 2H 2018 to zero in this test period. The carrier's text results remained strong, however, with Sprint earning all ten of its awards in the text performance category.
- For the second straight test period, Sprint earned the fewest number of state-level RootScore Awards among all carriers. It's important to note, however, that Sprint's performance didn't necessarily decline in this test period. Instead, the fact that Verizon earned far more awards outright in this round of testing lessened the other carriers' ability to earn shared awards.
- Sprint is expected to improve its network infrastructure in 2019 and beyond. We will be keeping a keen eye on Sprint's performance going forward to see if its network investments lead to improved state-level results.



T-Mobile's award tally shows a modest decline, but the carrier improves in two categories.

- **The key story:** While T-Mobile's award total declined by four since our last test period, the carrier showed improvement in the categories of network reliability and call performance. T-Mobile shared one award in each category in this test period compared to zero in the second half of 2018.
- T-Mobile finished with the third-highest total of State RootScore Awards, despite the carrier's state-level award tally decreasing since our previous test period.
- It's worth noting that T-Mobile's lower award total doesn't necessarily mean the carrier's performance was worse in this test period. Rather, as we noted in the AT&T and Sprint sections, Verizon's greater number of outright victories in this test period hindered the other carriers' chances to earn shared awards.

Verizon continues state-level dominance, earning far more awards than any other carrier.

- **The key story:** Verizon won or shared an incredible 263 State RootScore Awards out of 300 possible award opportunities in the first half of 2019. This marks the second straight test period that Verizon has earned 263 State RootScore Awards.
- Verizon earned more than twice as many State RootScore Awards as number-two performer AT&T.
- Verizon's award total remained generally consistent in each test category, but the carrier won 23 more awards outright in the first half of 2019 than it did in the second half of 2018.



Metro area performance: LTE speeds, reliability, and a look at what 5G will soon mean for your daily connected life

Major metropolitan markets are much more than just city centers. They also include the suburbs, business districts, tourist areas, and the highways that connect them. In today's connected society, you expect fast and reliable mobile performance across all of these spaces, whether you live and work in a metropolitan market or are visiting on vacation. And with 5G soon rolling out in major metros across the US, consumers and enterprises alike stand to benefit from even faster speeds and better reliability in the very near future.

This section of our report provides a carrier-by-carrier overview of speed and reliability performance across the 125 most populated metro areas in the country, as well as a high-level look at how 5G technology can affect your mobile life.

Consumers have spoken: 5G portends positive changes to the consumer mobile lifestyle

RootMetrics recently conducted an extensive study on mobile usage to understand user expectations and behaviors once 5G arrives. 5G is expected to have a significant impact on all facets of society, and consumers stand to benefit from 5G in myriad ways. Consider these common responses regarding 5G:

- Users expect better reliability, faster internet speeds, and faster video streaming on 5G.
- Two-thirds of consumers stated they will delay their next smartphone purchase until an appropriate 5G handset is available.
- Nearly 80% of consumers believe 5G will lead them to do more video streaming on their smartphones.
- 90% of consumers would bundle their 5G home internet service in a data plan with their smartphone, automobile, or other connected devices.

5G promises (much) faster speeds

LTE technology currently provides the fast and reliable network experience we've come to expect and enjoy with our smartphones, but the advancement of 5G will take mobile connectivity to another level. 5G is the only network technology that can provide the capacity, low latency, and incredibly fast speeds required to unlock the potential of the Internet of Things (IoT), fuel the growth of smart cities, and (eventually) transform conceptual ideas like driverless cars into fundamental elements of our daily connected lives.

Speeds on 5G should take a quantum leap compared to the speeds experienced today, with median download speeds expected to be in the range of 150 Mbps to 450 Mbps. To put that in perspective, a speed in the middle of that range (300 Mbps) is over four times faster than the fastest median download speed we found across all 125 metros the first half of 2019 (Verizon's 67.8 Mbps in Dayton, OH). While commercial 5G deployments are in their infancy, we will soon be testing 5G networks across the US and will publish those results in a separate report. For more on what 5G means for the consumer experience, see our whitepaper:

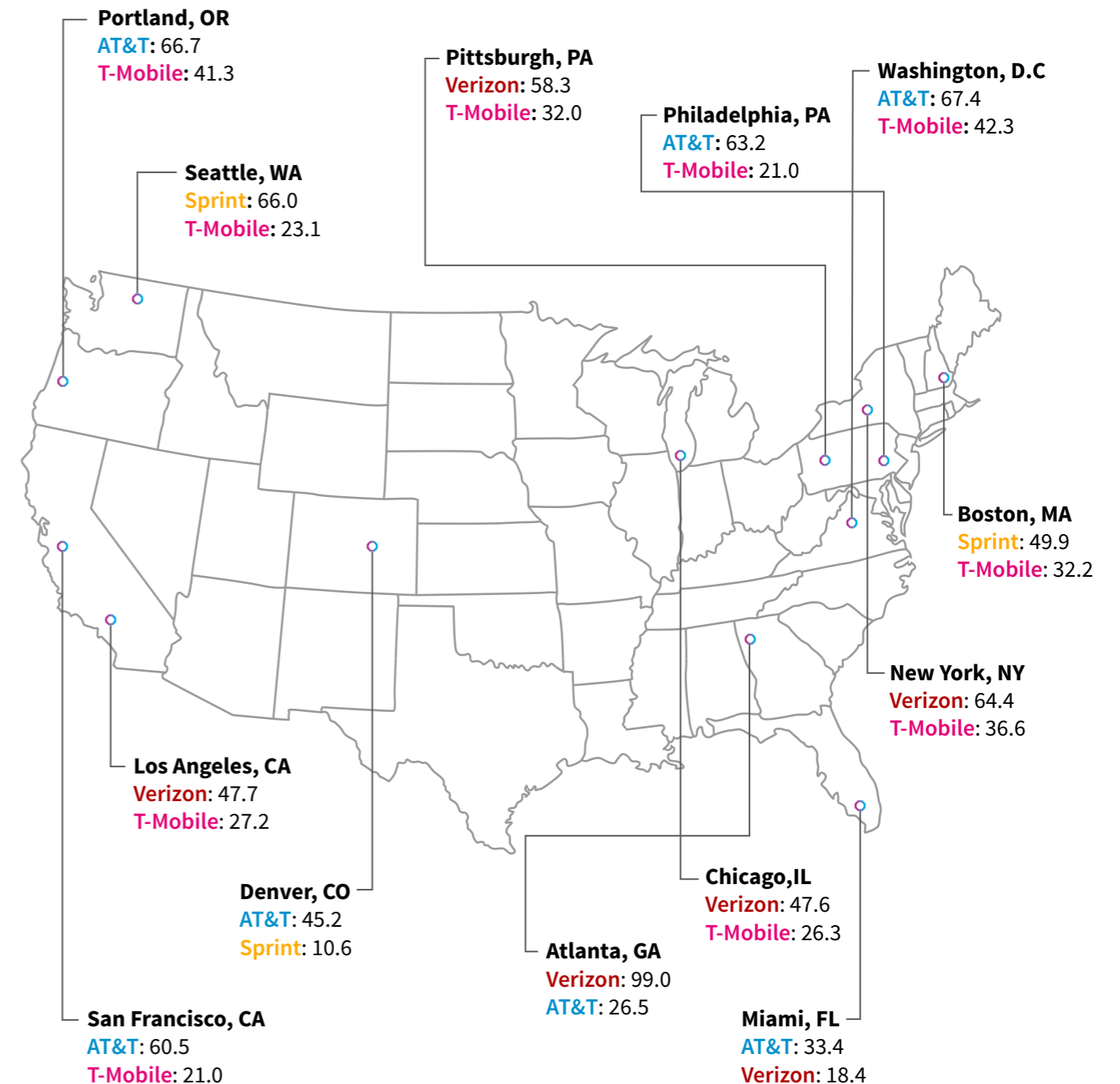
[The promise and potential of 5G: evolution or revolution?](#)



Mobile performance in highly congested areas of 13 select US cities: Which carriers offered the fastest (and slowest) speeds outdoors?

One of the key benefits that 5G promises is greater capacity. Capacity is crucial for a smooth mobile experience, especially in densely populated urban cores. To provide an even more detailed look at the consumer mobile experience in areas where capacity is paramount, we've expanded our testing during peak usage hours within 13 major urban cities. Additional tests were performed in each city where consumers use their smartphones most often: tourist areas, popular travel destinations, business districts, and other high-traffic locations.

See the map below to learn which carriers delivered the fastest and slowest median download speeds outdoors in each market during periods of high congestion.

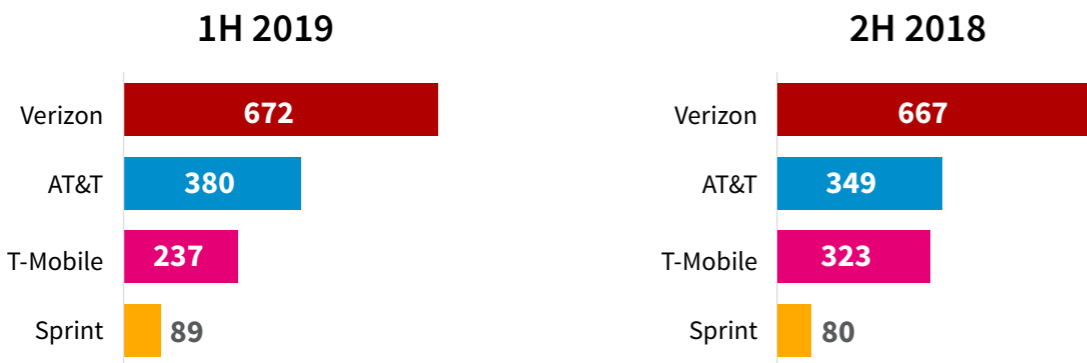


Speeds shown are in Mbps

Metro Area RootScore Awards (1H 2019 and 2H 2018)

Major metropolitan markets are generally where mobile users spend the most of their time, and expectations for a fast and reliable mobile experience remain high. While large-scale 5G deployments have yet to occur in metropolitan markets across the US, LTE technology still provides end users with generally fast speeds and strong reliability. Read on to see how the carriers performed in our testing across the most populated 125 metros across the country.

Metro Area RootScore Award tally



The award tallies above show both outright wins and shared awards in both 1H 2019 and 2H 2018.

Key takeaways

In a nutshell: Verizon earned the highest award tally among all carriers, AT&T and Sprint each improved its award total, but T-Mobile’s award count declined considerably.

AT&T remains a solid performer: AT&T improved its award tally since the second half of 2018 while delivering improved speed results and strong reliability.

Good news for Sprint users looking for faster speeds: Sprint’s median download speeds showed strong improvement since our last test period. The carrier also increased its award total, making particularly impressive gains in the text category.

T-Mobile offers mixed results in 1H 2019: T-Mobile continued its trend of delivering fast speeds and solid data reliability in metro areas, but for the second straight test period, the carrier’s award total decreased.

Verizon remains the carrier to beat: With an unmatched combination of fast speeds and exceptional reliability, Verizon once again earned the highest award total among all carriers.

South Korea and the US are the only two markets in the world to see significant 5G revenue-generating activity so far, according to the **IHS Markit Mobile Infrastructure Market Tracker - Q1 2019**.

Metro speed and reliability results - at a glance

To give insight into speed performance, we measured each network’s consistency of delivering median download speeds at various intervals across the 125 metro areas we tested. Because speeds continue to get faster, we’ve adjusted our speed intervals to highlight the speed gains the carriers are making. In our previous reports, our median download speed intervals considered the number of markets in which each carrier delivered speeds at intervals that began at 0-5 Mbps and topped out at 20 Mbps or faster. For this report, we’ve adjusted these intervals upward to reflect the evolving mobile landscape, particularly with 5G promising faster speeds in the very near future.

To evaluate each network’s data reliability, we used our web/app testing as a proxy for overall data reliability. We looked at each carrier’s ability to get connected to the network and then stay connected long enough to complete our tests. Web/app success rates above 97% for getting connected and staying connected are denoted as “Excellent.”

Median download speed intervals 1H 2019

Network	0 - 10 Mbps	10 -20 Mbps	20-30 Mbps	30 - 40 Mbps	40 + Mbps
AT&T	1	11	35	42	36
Sprint	4	38	49	33	1
T-Mobile	3	19	43	36	24
Verizon	0	3	37	47	38

Number of markets in which each carrier delivered median download speeds at various intervals.

Data reliability 1H 2019

Network	Excellent reliability - getting connected	Excellent reliability - staying connected
AT&T	124	124
Sprint	95	90
T-Mobile	110	125
Verizon	124	125

Key takeaways

Fast speeds across the board: All four carriers delivered impressive and improved speed results in this test period.

Data reliability remains generally strong: AT&T and Verizon delivered outstanding data reliability in nearly every market we tested, and T-Mobile’s data reliability improved in terms of both getting connected and staying connected. Sprint, meanwhile, offered a mixed bag: Sprint’s reliability metrics for getting connected improved since our last test period, but the carrier’s metrics for staying connected showed a modest decline.

Solid call reliability: Call reliability was generally strong for all four carriers, but the results of AT&T and Verizon were a step above those of both Sprint and T-Mobile.

Verizon gets even faster: Verizon delivered median download speeds of 40 Mbps or faster in more markets than any other carrier, doing so in 38 metros.

AT&T delivers fast speeds, strong reliability, and an increased award tally.

Key takeaways

- Faster speeds:** Good news for AT&T subscribers looking for fast speeds: AT&T increased the number of markets in which it delivered median download speeds of at least 30 Mbps, moving from 38 in second-half 2018 testing to 78 in the first half of 2019, with speeds faster than 40 Mbps in 36 of those markets.
- Outstanding reliability:** With a total of 65 Network Reliability RootScore Awards—the second-highest total among all carriers—and strong call and data reliability results in nearly every market we tested, AT&T users looking for a reliable mobile experience shouldn’t be disappointed.

Award insights

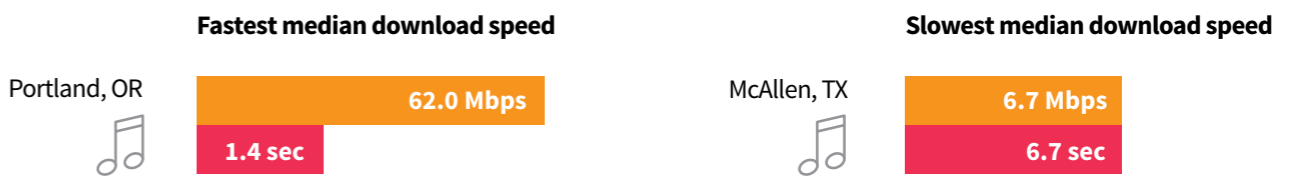
AT&T was one of three carriers to increase its award total since the second half of 2018, and the carrier’s jump from 349 awards to 380 marked the largest improvement among all networks. AT&T’s most significant award gains came in the important and holistic categories of overall performance and network reliability.

AT&T’s median download speed intervals					
Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40+ Mbps
2H 2018	1	26	60	32	6
1H 2019	1	11	35	42	36



AT&T’s fastest and slowest median download speeds

(and how long it takes to download a 5MB song)



Speeds above shows the markets in which AT&T recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

AT&T Metro Area RootScore Award tally				
AT&T	Outright	Ties	1H 2019 total	Difference from 2H 2018
Overall RootScore Award	3	52	55	13
Reliability RootScore Award	3	62	65	15
Speed RootScore Award	4	19	23	4
Data RootScore Award	3	20	23	3
Call RootScore Award	2	88	90	-5
Text RootScore Award	4	120	124	1
Total awards	19	361	380	31

Sprint improves speeds and increases award total in 1H 2019.

Key takeaways

- **Impressive speed improvements:** Sprint’s median download speeds showed strong improvement for the second consecutive test period. Sprint increased the number of markets in which it delivered median download speeds of at least 30 Mbps from 10 in 2H 2018 to 34 in this round of testing.
- **Generally strong reliability:** Sprint’s call reliability was solid. The carrier showed improved blocked and dropped call results since our last test period. Sprint’s data reliability, while generally good, didn’t show the same level of consistent improvement: Sprint reached our mark of Excellent data reliability for getting connected in 95 markets in this test period, an improvement from 91 such markets last time. In terms of staying connected, on the other hand, Sprint reached our mark of Excellence in nine fewer markets compared to 2H 2018. That said, Sprint’s data reliability was quite strong in the majority of markets we tested, with the carrier narrowly missing our threshold for Excellent data reliability in several metros.

Award insights

Sprint’s award total improved from 80 to 89 since the second half of 2018, with the majority of the carrier’s awards earned in the text performance category. Sprint’s tally of Text RootScore Awards jumped from 47 in second-half 2018 testing to 75 this time.

It’s worth noting that Sprint’s tally of Call RootScore Awards declined for the fifth straight test period. In our last report, we noted that Sprint’s call awards declined in part because the carrier had longer call setup times (the time between initiating a call and the time to hear the first ring) than those of the other carriers, and that proved to be the case in 1H 2019 as well. However, we do expect Sprint’s call setup times to improve as the carrier is expected to launch VoLTE nationally later in 2019.

Sprint’s median download speed intervals					
Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40+ Mbps
2H 2018	12	58	45	8	2
1H 2019	4	38	49	33	1



Sprint’s fastest and slowest median download speeds

(and how long it takes to download a 5MB song)



Speeds above shows the markets in which Sprint recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

Sprint Metro Area RootScore Award tally				
Sprint	Outright	Ties	1H 2019 total	Difference from 2H 2018
Overall RootScore Award	0	0	0	-1
Reliability RootScore Award	0	2	2	-1
Speed RootScore Award	0	0	0	0
Data RootScore Award	0	0	0	-1
Call RootScore Award	0	12	12	-16
Text RootScore Award	0	75	75	28
Total awards	0	89	89	9

T-Mobile continues to provide fast speeds but its award total declines in 1H 2019.

Key takeaways

- **Consistently fast in metropolitan markets:** T-Mobile continued its trend of delivering fast speeds in metro areas. The carrier’s total of 60 markets with median download speeds of at least 30 Mbps in first-half 2019 testing—and 24 markets with speeds faster than 40 Mbps—marked a modest improvement compared to our last test period.
- **Data reliability strong and shows improvement:** While T-Mobile’s call reliability remained strong and generally consistent with what we found in our last test period, T-Mobile’s data reliability showed improvement. The carrier increased the number of markets in which it achieved Excellent reliability for getting connected from 104 markets in second-half 2018 testing to 110 this time. Likewise, T-Mobile improved the number of markets where it reached our mark of Excellence for staying connected from 124 to 125.
- **Worth noting:** T-Mobile and Verizon were the only two carriers to reach our threshold of Excellence for staying connected in every metro area we tested.

Award insights

T-Mobile’s performance remains strong but award tally declines: While T-Mobile offered fast speeds and strong call and data reliability, the carrier’s award total decreased from 323 in second-half 2018 testing to 237 in 1H 2019. It’s important to note that despite the lower award tally, T-Mobile’s performance didn’t necessarily get worse. Rather, AT&T, Sprint, and Verizon each made award gains in the test period, which corresponded with T-Mobile’s decreased award count.

T-Mobile’s median download speed intervals					
Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40+ Mbps
2H 2018	1	22	45	39	18
1H 2019	3	19	43	36	24



T-Mobile’s fastest and slowest median download speeds

(and how long it takes to download a 5MB song)



Speeds above shows the markets in which T-Mobile recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

T-Mobile Metro Area RootScore Award tally				
T-Mobile	Outright	Ties	1H 2019 total	Difference from 2H 2018
Overall RootScore Award	2	16	18	-13
Reliability RootScore Award	0	16	16	-18
Speed RootScore Award	18	25	43	-13
Data RootScore Award	8	21	29	-10
Call RootScore Award	0	23	23	-26
Text RootScore Award	0	108	108	-6
Total awards	28	209	237	-86

Verizon remains the carrier to beat, with fast speeds, excellent reliability, and the highest award total.

Key takeaways

- **Consistently fast and reliable:** Verizon’s results remained outstanding across the board, with the strongest combination of stellar reliability and fast speeds among all networks. Verizon delivered median download speeds faster than 40 Mbps in more markets than any other carrier and achieved our mark of Excellent call and data reliability in nearly every market we tested.
- **The single fastest speed in 1H 2019:** Verizon delivered the fastest speed among all networks in this round of testing, clocking a median download speed of 67.8 Mbps in Dayton, OH. It’s also worth noting that Verizon’s speeds were fast even at the “slow” end. For instance, Verizon’s slowest median download speed of 18.5 Mbps, found in Omaha, NE, is still quite fast. At that speed, Verizon subscribers can perform the majority of mobile activities with ease.

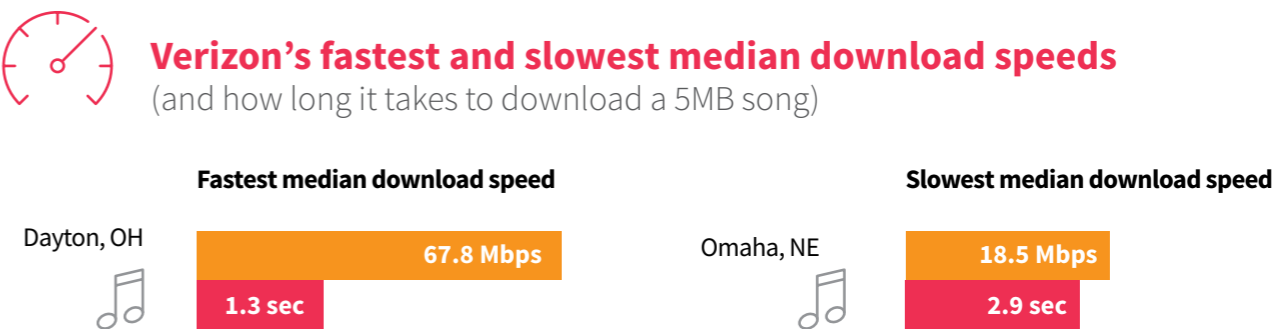
Award insights

Still leading the pack: Verizon’s award tally improved by five since the second half of 2018, increasing from 667 to 672. Verizon’s award total remained the highest among all networks.

Verizon sets records: In the first half of 2019, Verizon earned the highest total of RootScore Awards by any carrier since we began testing in the categories of overall performance, network reliability, network speed, data performance, and call performance.

Awards in perspective: Verizon’s impressive total of 672 awards was far more than its next-closest competitor, AT&T, which earned 380 total awards.

Verizon’s median download speed intervals					
Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40+ Mbps
2H 2018	0	14	47	47	17
1H 2019	0	3	37	47	38



Speeds above shows the markets in which Verizon recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

Verizon Metro Area RootScore Award tally				
T-Mobile	Outright	Ties	1H 2019 total	Difference from 2H 2018
Overall RootScore Award	64	56	120	2
Reliability RootScore Award	59	63	122	4
Speed RootScore Award	67	33	100	6
Data RootScore Award	84	29	113	11
Call RootScore Award	33	90	123	5
Text RootScore Award	0	94	94	-23
Total awards	307	365	672	5

Methodology - how we test

We believe that real-world results come from real-world testing. To that end, all RootMetrics testing is conducted from the consumer's point of view. We used Samsung Galaxy S9 smartphones purchased off the shelf from carrier stores, and tests are conducted during the day and night while walking and driving. We utilize random sampling techniques to ensure our results offer a robust characterization of performance in the places consumers most often use their smartphones, and all testing is focused on the activities for which consumers typically use their smartphones, including data, call, and text usage. To learn more about our testing, visit the [methodology](#) page of the RootMetrics website.

The first 5G phone in the US - the Motorola Moto Z3/5G Mod - is a compromise of cost and design, according to a **teardown analysis** conducted by IHS Markit.





For more information, visit

<http://rootmetrics.com>