State of Mobile Networks: USA (August 2016)

It's safe to say that LTE is now the most important mobile technology in the U.S. LTE accounts for the vast majority of data connections and as more people upgrade to new devices, the percentage of 3G connections will be a fleeting statistic. Yet there's a strategy among the traditional players that is still in motion. Through its LTE networks, T-Mobile is overtaking AT&T and Verizon, dominant, while Sprint's 3G pathway is the source of its recent success. Meanwhile, the 4G/LTE networks of Sprint and T-Mobile are still in a tight race for third place. These and other findings are collected by OpenSignal network analysis from more than 1 million users in the month of August 2016.

T-Mobile inches ahead of Verizon in our LTE speed tests

It was a close contest, but T-Mobile edged out Verizon for the fastest average LTE download speed. Verizon, however, was first on the podium for the fastest average upload speeds. Sprint's average speeds for both LTE upload and download were the slowest of the four. Upload speeds were 1.2 Mbps on Sprint and 10 Mbps on Verizon.

T-Mobile surpasses AT&T in our LTE availability rankings

T-Mobile leapfrogged AT&T in our 4G availability rankings. We found that T-Mobile customers were able to access an LTE signal more than 76% of the time, while AT&T connected to 4G/LTE of the time for 4G/LTE connections.

Verizon ranks highest in our LTE availability scores

Though Verizon is facing challenges in many of the areas we measure, it still ranks highest in our latest scores for availability. We define availability category, which measures the percentage of connections users spend on LTE signal. Our Verizon network tester was able to connect to LTE connections 90% of the time during our measurement period.

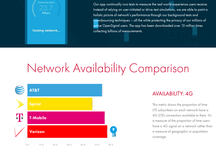
GSM operators maintain their 3G speed edge

In the increasingly rare situations in which customers are connected to 3G networks, our data found AT&T and T-Mobile's HSPA networks delivered faster speeds than Verizon and Sprint's CDMA networks. T-Mobile's average 3G download speed was the fastest at 1.4 Mbps, while our measured average speeds to Sprint Free 3 Mbps on Sprint and Verizon's 3G connections.

REPORT FACTS

Report Location	USA
Data Sample Size	2,416,126 hrs
Date Sample Size	150,386
Sample Period	May 1st - 31st 2016

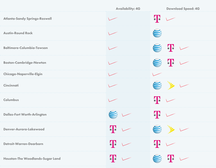
Overall Network Comparison



THE OPENSIGNAL APP: TESTING NETWORK PERFORMANCE ON MILLIONS OF PHONES GLOBALLY

Our app, OpenSignal, runs tests to measure the network connection users experience. Instead of relying on user-collected or drive-test simulations, we are able to poll from a balanced sample of connections that represent the actual network experience of users. Crowdsourcing techniques—all the while protecting the privacy of our actives of the OpenSignal crew. The app has been downloaded over 10 million times collecting billions of measurements.

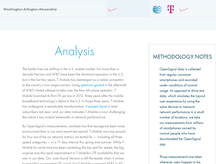
Network Availability Comparison



AVAILABILITY: 4G

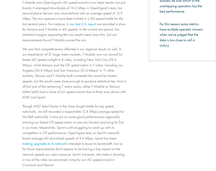
This metric shows the proportion of time users' phones were connected to an active 4G LTE connection across the networks. It is a measure of the proportion of time users have a 4G signal on a network rather than a measure of geographic or population coverage.

Network Speed Comparison



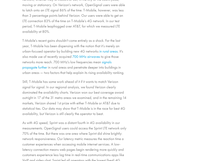
DOWNLOAD SPEED: 4G

This metric shows the average download speed on each network on 4G LTE connections.



DOWNLOAD SPEED: 3G

This metric shows the average download speed on each network on 3G connections.



DOWNLOAD SPEED: OVERALL

This metric shows the average download speed experienced by a user across all of connections to the network. It includes data downloaded from 2G and 3G networks, but also the availability of each network technology. Operators including LTE coverage tend to have lower overall speeds because their customers spend much more time connected to slower 2G networks.

Network Latency Comparison

LATENCY: 4G

This metric shows the average latency on each network on 4G LTE connections. Latency, measured in milliseconds, is the delay between a request for a data transfer and the start of a response. A lower score in this metric is a sign of a more responsive network.

LATENCY: 3G

This metric shows the average latency on each network on 3G connections. Latency, measured in milliseconds, is the delay data experiences as it travels between points in the network. A lower score in this metric is a sign of a more responsive network.

Regional results

This chart shows the regional winners in each category OpenSignal measures. Click on the icons to see a more detailed graph showing each operator's performance.

	Availability: 4G	Download Speed: 4G
Atlanta-Sandy Springs-Roswell		
Austin-Round Rock		
Baltimore-Columbia-Towson		
Boston-Cambridge-Newton		
Chicago-Naperville-Elgin		
Cincinnati		
Columbus		
Dallas-Fort Worth-Arlington		
Denver-Aurora-Lakewood		
Detroit-Warren-Dearborn		
Houston-The Woodlands-Sugar Land		
Indianapolis-Carmel-Anderson		
Kansas City		
Los Angeles-Long Beach-Anaheim		
Miami-Fort Lauderdale-West Palm Beach		
Minneapolis-St. Paul-Bloomington		
New York-Newark-Jersey City		
Orlando-Kissimmee-Sanford		
Philadelphia-Camden-Wilmington		
Phoenix-Mesa-Scottsdale		
Portland-Vancouver-Hillsboro		
Riverside-San Bernardino-Ontario		
Sacramento--Roseville--Arden-Arcade		
San Antonio-New Braunfels		
San Diego-Carlsbad		
San Francisco-Oakland-Hayward		
San Jose-Sunnyvale-Santa Clara		
Seattle-Tacoma-Bellevue		
St. Louis		
Tampa-St. Petersburg-Clearwater		
Washington-Arlington-Alexandria		

Analysis

The battle lines are shifting in the U.S. mobile market. For more than a decade, Verizon and AT&T have been the dominant players in the U.S., but in the last few years, T-Mobile has emerged as a nimble competitor. Our country-by-country ranking has been a fixture in the tech press since at AT&T's latest attempt to take over the then-fifth-place operator, T-Mobile has been the talk of the town. The "Uncarrier" has made T-Mobile a household technology in about a decade. In the U.S. to have three strong, but not dominant, mobile networks is a remarkable transformation. It proved Sprint is tried and true competitor, but it also underscores how challenging the market has ended since mobile dominance in network performance.

By OpenSignal's measurements, numbers but that resurgence been more pronounced than in our recent tests of T-Mobile's speed. It's only natural for fast one of the six network testers are tested for — including all three carrier categories — to be the most improved. Sprint's scores in the T-Mobile for some time has been contesting the top spot for speed, the big leap forward for T-Mobile underscores how far Sprint has fallen since the days of our data. Our crew found Verizon, of the leader table in terms to providing a consistent LTE signal, but T-Mobile surpassed AT&T in 4G availability in our latest tests. Our app measures the time users spend (though 4G/LTE and T-Mobile sometimes refer to 4G/3G or 4G). OpenSignal calculates LTE uptime, the time users spend connected to a 4G/LTE signal.

In our newest iteration of Mobile Networks report for the U.S., OpenSignal compared 3 of the major carriers in 4 major metrics across 4 speeds in 3 major U.S. operators. Starting in 3Mbps. OpenSignal mobile sensor network, which is made up of users who have installed our app, collects the methodology we use to gather the data and the methodology we make more measurements, assemble new types of network metric and present the results of the measurements we already collected, having to isolate the typical consumer mobile experience more effectively. Our app measures the time users spend on 4G/LTE connections, and our overall rankings of networks should be a fair reflection of what people sign up to expect making our direct comparisons between results collected from the top 3 different networks.

For this report we also built a novel dataset drawn into regional results that we have in the newsroom of our research. Our sample of 150,386 U.S. users provides us ten tests from the operators compared in our city-by-city tables. Our data is based on 2,416,126 hours of operator time.

A tight race for the speed crown

T-Mobile won OpenSignal's 4G speed crown in our latest results, but just barely. It averaged download speeds of 16.3 Mbps in OpenSignal tests, but second-place Verizon was close behind with an average speed of 15.9 Mbps. Sprint's average speed was 12.7 Mbps, which was the slowest of the four tested carriers. For reference, it was that 12.7 Mbps was enough to stream a video for Verizon and T-Mobile's 4G speeds. In the current test period, the average speed on Sprint's 4G network was 12.7 Mbps, which was not sufficient for HD video, but it was fast enough for SD.

We uses that comprehensive, enhanced in our regional results as well. In our breakdown of regional results, T-Mobile was the top performer in 7 of the tested 4G speed categories in cities, including Miami, Tech City, LOS 4 Angeles, Dallas-Fort Worth and San Francisco. Verizon, in Los Angeles, Chicago, Dallas-Fort Worth and San Francisco (7.6 Mbps) for 17 other cities, Sprint's 4G speed was the slowest of the three carriers. In 4G speeds, the results were more close enough to produce ties. And, the all but one of the remaining 7 metro areas, either T-Mobile or Verizon tied for the top spot. Sprint's 4G speed was the slowest due to fewer cities with 4G/4G and Sprint.

Though 4G/4G Sprint has in the closer bought battle for top speed nationally, we still recorded a respectable 12.7 Mbps average speed for Sprint 4G. Sprint's 4G speed was the slowest of the three carriers, but averaging over 10 Mbps is still a speed that most users will find to be fast in our tests. Meanwhile, Sprint's still struggling to catch up with its competitors in 4G availability. Sprint's 4G/LTE connections were the least average 4G connections at 4G/LTE connections, Sprint's 4G/LTE making upgrades to its networks intended to boost its bandwidth, but so the three improvements in 4G speed. Sprint's 4G/LTE connections were the network speeds can cause nonsense. Sprint, however, did make a strong showing in our latest tests in the cities of Kansas City, Minneapolis, Cincinnati and Denver.

3G data services are increasingly becoming a rare feature in the U.S., as 2G coverage spreads and consumers increasingly upgrade to 4G-capable devices, but on the occasions customers are forced to connect with a 3G connection, T-Mobile and AT&T subscribers were at a distinct advantage. Our cases measured speed tests to five tests from these in the 3G connections, T-Mobile's average download speed was 1.4 Mbps, which was the fastest average speed. AT&T's 3G speeds were a close second, with an average download speed of 1.3 Mbps.

As T-Mobile had both the fastest and 4G and 3G connections in our tests, it was the only carrier to have a 3G speed that surpassed its 4G speed. Sprint's 3G speed was the slowest of the three carriers, at 0.9 Mbps. Verizon's 3G speed was the second-slowest, at 1.0 Mbps. Verizon's 3G speed was also the second-slowest, at 1.0 Mbps. Because of its superior 4G signal availability Verizon customers rarely had to resort to sluggish CDMA networks.

The long arm of T-Mobile

Once again, Verizon remained in place at the top of our rankings when it came to providing a consistent LTE signal. But T-Mobile is increasingly aggressive challenger in network availability, and it's not Verizon's traditional west coast AT&T rival, it's Sprint.

Rather than measure geographical coverage, OpenSignal's availability category measures the percentage of time users spend connected to an active LTE connection. Verizon's LTE connections were the most reliable, receiving a connection, Our Verizon's network, OpenSignal users were able to tune into an LTE signal 90% of the time. T-Mobile's 4G/LTE speeds were faster than 3 percentage points behind Verizon. Our users were able to get an LTE connection 76% of the time on T-Mobile's 4G/LTE network. AT&T's 4G/LTE connections lagged behind, AT&T for which we measured availability at 60%.

T-Mobile's recent gains shouldn't come entirely as a shock. For the last year, T-Mobile has been dispensing with the notion that it's merely an upstart challenger to the Verizon and AT&T duopoly. Last October, the company was all rounds of recently acquired 700 MHz spectrum to improve its network coverage. Sprint's 700 MHz low frequencies means signals propagate further in rural areas and penetrate deeper into buildings in urban areas — two factors that help explain its long availability testing.

But T-Mobile's business units should of Sprint's 4G speeds, is a bit in regard to signal. In our regional analysis, we found Verizon clearly outpaced T-Mobile in 4G availability in 17 of the 20 metro areas we examined, and in the remaining 3 metros, Verizon dropped 3 in price with other T-Mobile or AT&T due to demand. Our data may show T-Mobile's 4G/LTE speeds to be more fast than 4G availability, but Verizon is still clearly the operator to beat.

As with 4G speed, Sprint was a distant last in 4G availability in our measurements. OpenSignal users could access the Sprint LTE network only 60% of the time. Sprint's 4G/LTE connections were the least available of the three carriers, which may explain why Sprint has been delivering better customer experiences when accessing mobile Internet services. A fast-but-intermittent connection may be better than a slow-but-always-on connection, but Sprint's 4G/LTE speeds are not fast enough to make up for its 4G/LTE and video chat. Sprint's 4G operation with the lowest band 4G/LTE latency (47 milliseconds) is now much faster than Sprint's 3G/HSPA network the most expensive 3G network, measuring in latency at 99ms.

Looking for a 4G edge

Where is a long-term fate for sprint, in fact? T-Mobile's challenging the established powers in the U.S. mobile market, putting its resources to bear in building both high-speed networks and highly-available mobile broadband networks. Whether T-Mobile can keep up the pressure remains to be seen, but the company has made it clear that it's willing to spend billions of dollars on LTE networks to improve its 4G availability, the other operators aren't resting standing still. Plans to increase spectrum referencing campaigns going on the U.S., as owners operators look to coverage and 3G and 3G increase to reach new capacity and reach into their 4G coverage.

One of the biggest new developments in the U.S. mobile market is being the deployment of Verizon's 5G network. Verizon's 5G Technology Consortium is coordinating all vendors, the 5G Infra of TV operators in mobile operators. Those 5G-ready LTE services will be the forward-frequency bands, and Verizon's 5G network will be the first to use the 28 GHz band for mobile operating systems. In addition, the new cooperation between will bring cell expansion based speeds and design powerful new LTE-Advanced systems like the new carrier aggregation between Europe and Asia. But the FCC has an ambitious project to focus amounts of $84.4 billion in 700 MHz spectrum, which will be used for 4G/LTE connections. Sprint's 700 MHz spectrum is very long-wavelength and offers its signal to be very deep in buildings, which is a big deal for Sprint, which has the biggest client.

METHODOLOGY NOTES

OpenSignal data is collected from regular users of our smartphone and recorded under conditions of normal usage. As opposed to drive test measurements, our data is not experienced by using the same devices to measure the same routes under a small number of locations, we take our measurements from millions of smartphones owned by normal people who have downloaded the OpenSignal app.

These measurements are taken whenever users happen to be in a mobile network, and are not affected by the assumptions underpinning performance tests were experienced. For more information on how we collect and analyze our data, see our methodology page.

For this particular report, 2.416.126 PH datapoints were collected from 150,386 users during the period, May 1st - Jul 10th 2016.

All data has been collected in the last 90 days, unless a longer period is specified.

For every metric we've calculated the statistical confidence in our reported results. We use the standard 95% confidence intervals overlap for a certain metric we can't actually be sure which of the two networks is the best performance.

For this reason some metrics have multiple operator winners where we've judged that the data is too close to call a winner.