The State of LTE (June 2017)

The mobile industry may now be turning its attention to 5G, but as OpenSignal's latest analysis of global LTE performance shows there is still plenty of activity surrounding 4G. As new LTE networks come online and old networks gain new life through LTE-Advanced upgrades, 4G signals are making their way into new niches across the globe and operators are pushing the boundaries of 4G speeds.

Report Facts

19,556,514,365
Measurements

558,260
Test Devices

Jan 1st - Mar 31st 2017
Sample Period

Global
Report Location

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Highlights

LTE's reach continues to spread

Our measurements for 4G availability, which tracks how often 4G subscribers in a country have access to an LTE signal, is gradually improving around the world. In some countries in East Asia LTE signals are as ubiquitous as 2G and 3G signals, while in the vast majority of countries we examined, our testers were able to connect to LTE more than 60% of the time.

The fast keep getting faster

The best performers in our speed rankings continue to push LTE to its technological limits. 15 countries now deliver typical downloads in excess of 30 Mbps. OpenSignal's average measured LTE speed globally, however, is dropping as more countries bring lower capacity networks online.

South Korea shows up the world

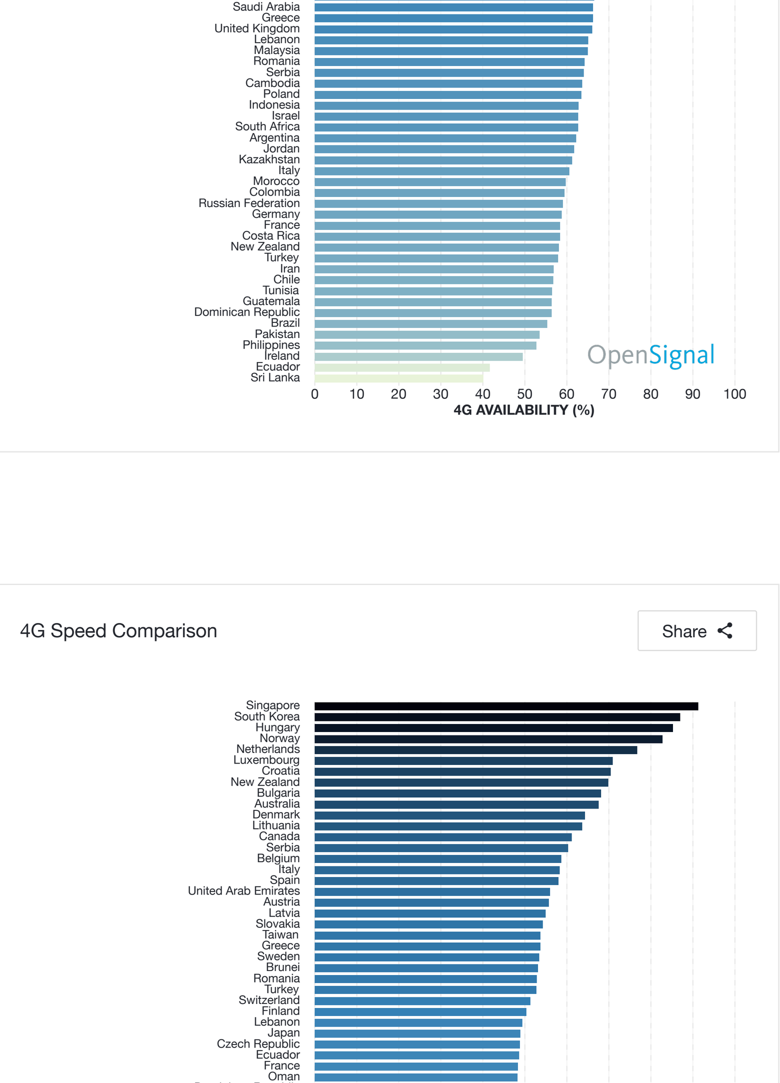
Once again we single out South Korea for its exceptional LTE service. The country scored highest in 4G availability and second highest in 4G speed in our tests. Hungary, the Netherlands, Norway and Singapore also performed exceptionally in both categories.

India makes a big 4G splash

India shot up our LTE availability rankings, reflecting a rare instance in which a single operator can have an outsized impact on a mobile market in just a short time. Jio's nationwide 4G launch in September attracted 100 million LTE subscribers, making 4G services far more accessible in India but at the expense of lower average speeds.

4G Availability

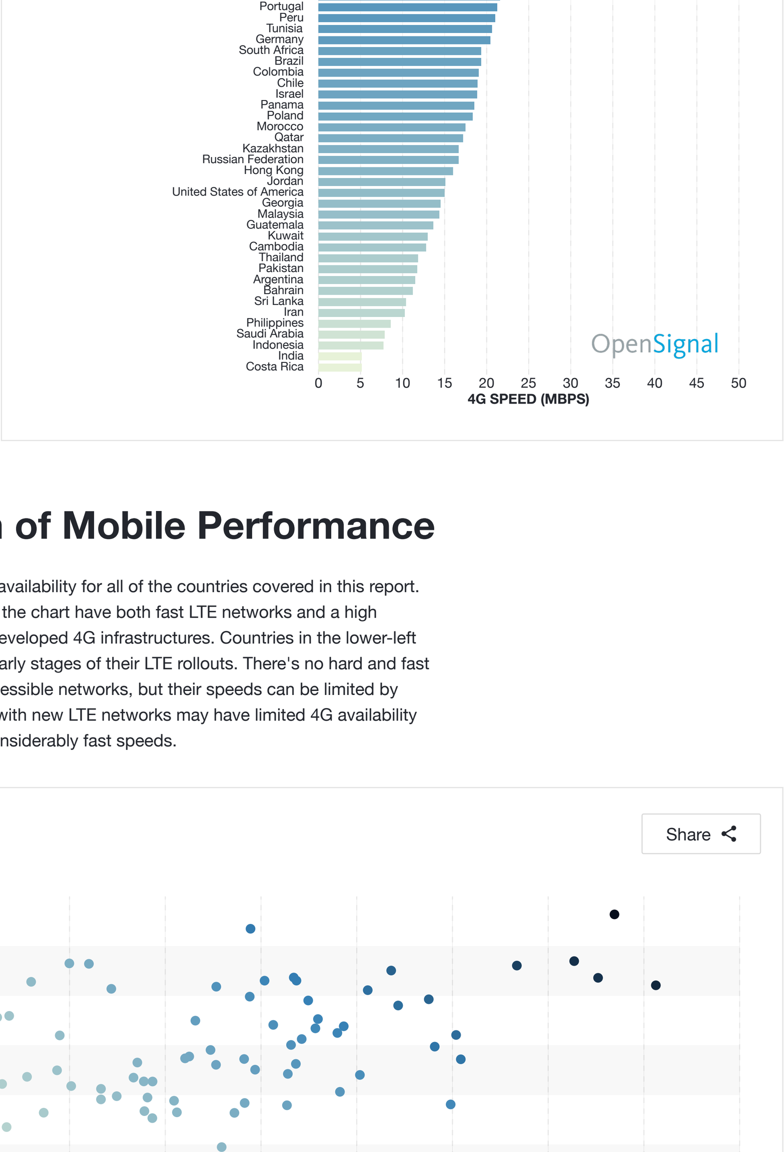
This chart shows how consistently accessible 4G networks are in each country. Rather than measure geographic coverage, OpenSignal's availability metric tracks the proportion of time users have access to a particular network.



4G Speed

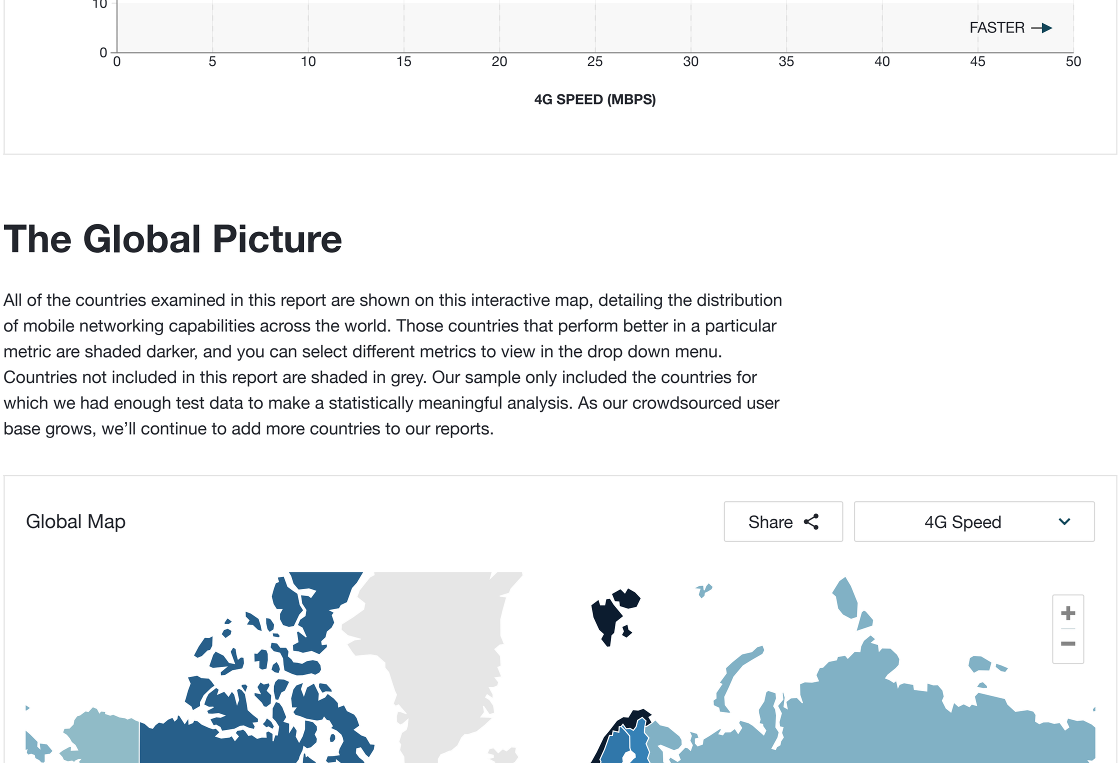
This chart shows the average download connection speed that users in each country see when connecting to LTE networks. Though some operators sometimes refer to HSPA or other technologies as 4G, we only count LTE connections in our 4G speed tests.

How fast a country's 4G speed is can depend on many factors: how much spectrum is devoted to LTE, whether it has adopted new 4G technologies like LTE Advanced, how densely networks are built and how much congestion is on those networks. In general, though, the countries with the fastest speeds tend to be the ones that have built LTE-Advanced networks and have a large proportion of LTE-Advanced capable devices.



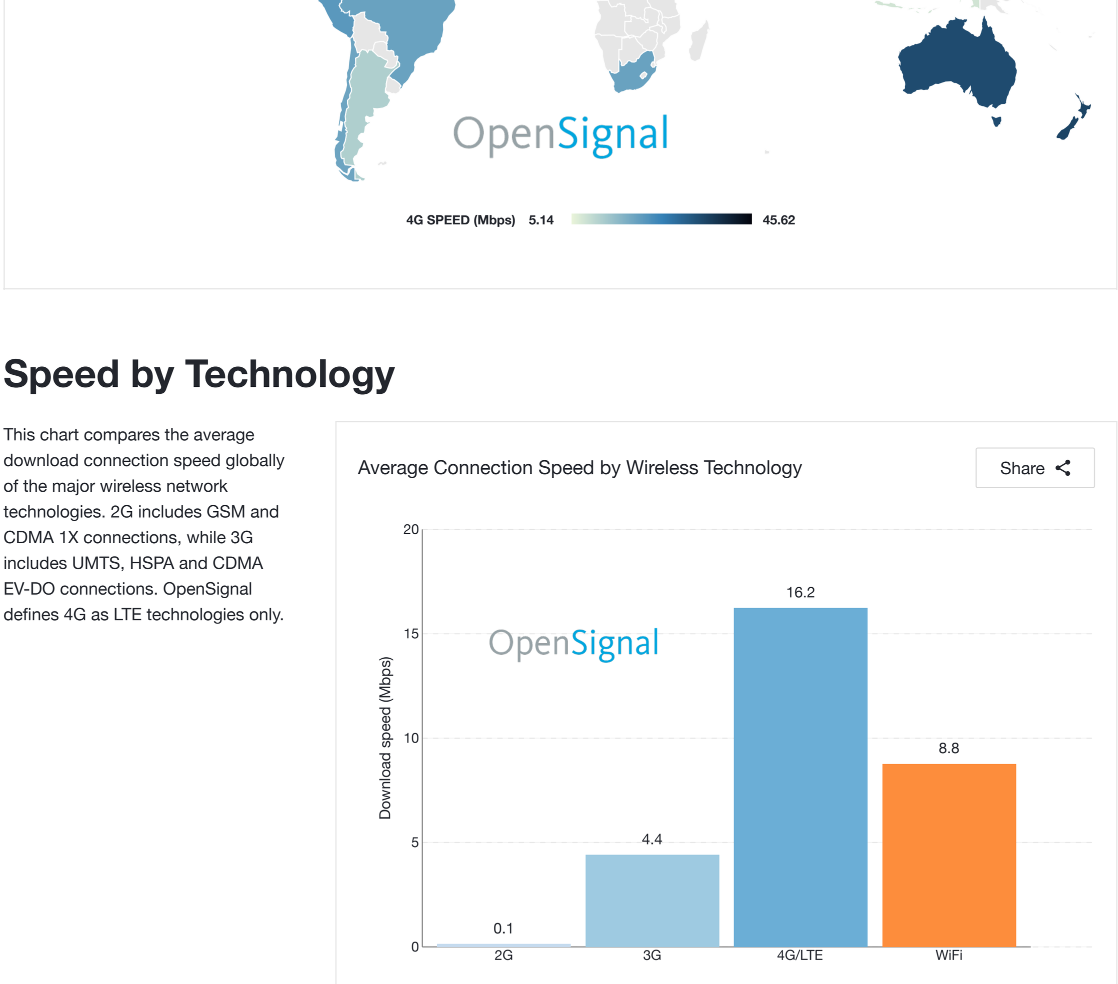
The Full Spectrum of Mobile Performance

This chart compares 4G speed against 4G availability for all of the countries covered in this report. Countries higher up and toward the right in the chart have both fast LTE networks and a high proportion of LTE signals, reflecting more developed 4G infrastructures. Countries in the lower-left hand side of the graph are typically in the early stages of their LTE rollouts. There's no hard and fast rule, though. Countries can have highly accessible networks, but their speeds can be limited by capacity constraints. Meanwhile countries with new LTE networks may have limited 4G availability but, due to their light loads, can support considerably fast speeds.



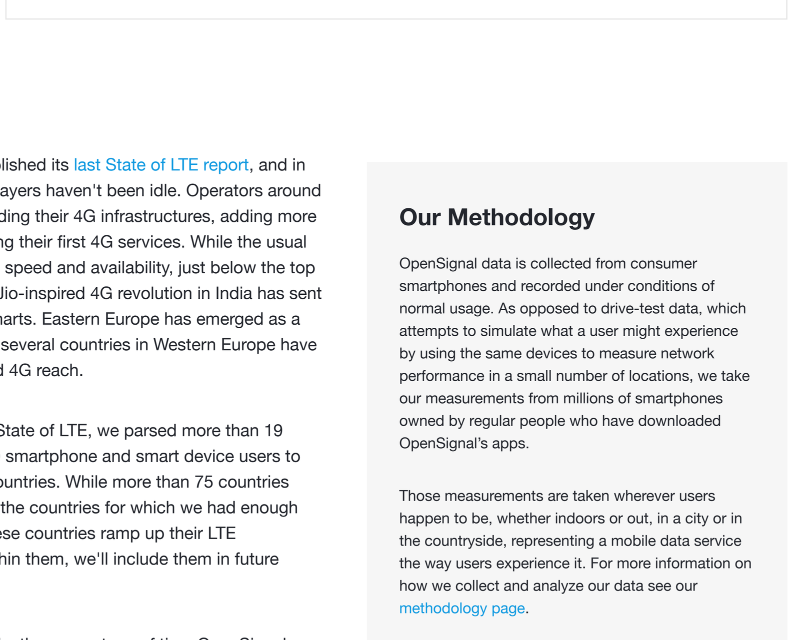
The Global Picture

All of the countries examined in this report are shown on this interactive map, detailing the distribution of mobile networking capabilities across the world. Those countries that perform better in a particular metric are shaded darker, and you can select different metrics to view in the drop down menu. Countries not included in this report are shaded in grey. Our sample only included the countries for which we had enough test data to make a statistically meaningful analysis. As our crowdsourced user base grows, we'll continue to add more countries to our reports.



Speed by Technology

This chart compares the average download connection speed globally of the major wireless network technologies. 2G includes GSM and CDMA 1X connections, while 3G includes UMTS, HSPA and CDMA EV-DO connections. OpenSignal defines 4G as LTE technologies only.



Analysis

It's been six months since OpenSignal published its last State of LTE report, and in those half-dozen months the world's 4G players haven't been idle. Operators around the world have been expanding and upgrading their 4G infrastructures, adding more LTE customers and in some cases launching their first 4G services. While the usual suspects still dominate our rankings in LTE speed and availability, just below the top tier we see several interesting trends. The Jio-inspired 4G revolution in India has sent that country rocketing up our availability charts. Eastern Europe has emerged as a hotbed for powerful LTE connections. And several countries in Western Europe have started shedding their reputation for limited 4G reach.

For our latest installment of OpenSignal's State of LTE, we parsed more than 19 billion measurements collected by 558,260 smartphone and smart device users to compare 4G speed and availability in 75 countries. While more than 75 countries have LTE services today, we only included the countries for which we had enough data to provide meaningful analysis. As these countries ramp up their LTE deployments and we collect more data within them, we'll include them in future reports.

First let's look at 4G availability, which tracks the percentage of time OpenSignal users were able to latch onto an LTE signal. The top two slots in our 4G availability chart haven't changed. South Korea and Japan are still the only two countries able to provide LTE connectivity more than 90% of the time in our tests. But there was quite a bit of movement in the rest of our 10. The U.S. landed in the 4th spot, up from 10th in our last report. As U.S. operators continued to expand their already extensive 4G reach, national LTE availability increased from 81.3% to 86.5% — an impressive feat considering the huge physical size of the U.S. compared to the smaller geographies of its 4G peers. Meanwhile Taiwan and Hungary debuted in our top 10 with availability scores just over 83%.

In general we're seeing steady improvement in LTE reach from all of the countries in our 75-nation analysis. In our November State of LTE report, only 11 countries had exceeded the 80% availability threshold. Now that tally is 16 countries. It's not merely the top countries that are improving, however. Six months ago, 31 countries fell below the 60% bar for 4G availability, which is generally a good benchmark for a maturing 4G market. Our current data shows only 19 of the countries in our report missed that mark.

As you might expect, many of the countries in the lower half of our chart are developing economies or relatively new LTE entrants, but there are several countries that buck that trend. Operators in Western European countries traditionally have been slower to extend their LTE reach as they are able to rely on extensive 3G infrastructures to handle the mobile data load. Countries like Spain, Portugal and the U.K., however, have started reversing that trend, marching steadily up our availability chart. But other European giants like Germany, France and Ireland still languish at the bottom of the rankings with availability scores below 60%.

There also were some surprises in the developing world. India jumped into our top 20 with a 4G availability rating of 81.6%. In India, we have a very unique case of a single operator having an enormous impact on the local 4G market. While we measured 4G availability for most Indian 4G operators at around 60% in our recent India report, new entrant Reliance Jio provided an enormous boost to India's overall availability with the launch of a nationwide LTE network that attracted 100 million subscribers in the space of six months.

Our Methodology

OpenSignal data is collected from consumer smartphones and recorded under conditions of normal usage. As opposed to drive-test data, which attempts to simulate what a user might experience by using the same devices to measure network performance in a small number of locations, we take our measurements from millions of smartphones owned by regular people who have downloaded OpenSignal's apps.

Those measurements are taken wherever users happen to be, whether indoors or out, in a city or in the countryside, representing a mobile data service the way users experience it. For more information on how we collect and analyze our data see our methodology page.

For this particular report, 19,556,514,365 datapoints were collected from 558,260 users during the period: Jan 1st - Mar 31st 2017.

All data has been collected from users of the OpenSignal mobile app for Android or iOS.

Chasing 50 Mbps

Now that we've explored which countries have the most accessible 4G signals, let's look at which have the most *powerful* signals. Singapore, South Korea and Hungary again top our LTE speed charts. Norway joins those three in the list of countries that average LTE download connections of 40 Mbps or greater — speeds that rival wired broadband connections in most countries. The top average speed we measured, Singapore's, held steady at around 46 Mbps, but we see speeds rising throughout the top tier of nations. 15 countries now average LTE speeds 30 Mbps, compared to 11 countries in our last report. We're still waiting, though, for the first country to cross the 50 Mbps threshold.

Many of LTE's earliest adopters dominate the speed list. Singapore, South Korea, Australia, Norway and the Netherlands have had the better part of six years to fully deploy, optimize and upgrade their original LTE networks. But not all of LTE's pioneers are among the top performers in LTE speeds. The U.S., and to a lesser extent Japan, lag well behind their 4G peers when it comes to high-performance connections.

A particularly notable region for fast 4G speeds is Eastern Europe. Hungary, Romania, Latvia and Lithuania have long stood out in LTE speed measurements thanks to their early pursuit of LTE-Advanced technologies, but Bulgaria, Croatia and Serbia are now joining them in the top tier of our speed chart with powerful networks of their own. Western Europe also had a few states with cause to brag. Spain and Italy have begun to set themselves apart from their neighbors with high-bandwidth LTE-Advanced services.

While the most high performing countries keep improving their 4G speeds, we're not seeing a similar boost in the middle or bottom of the table. The number of countries with LTE speeds faster than 20 Mbps totaled 45, about three fewer than in our last analysis, and we see a pretty steep drop off in speeds as we descend toward the bottom of the chart. While LTE is making its way into more countries, many of these new networks in developing markets lack the capacity of their developed-world counterparts. That trend is particularly apparent in Costa Rica and India, where average 4G speeds are only marginally faster than the average global 3G connection. And as these countries ramp up their 4G services they're bringing hundreds of millions of new LTE subscriptions online. That's one of the reasons we saw a drop off in average global LTE speed. We measured the typical LTE connection worldwide at 17.4 Mbps in November, but in our latest test period that average fell to 16.2 Mbps.

Power vs. reach

The countries with the fastest LTE speeds aren't necessarily the ones with the most accessible 4G networks and vice versa. In the Full Spectrum of Mobile Performance chart, OpenSignal compared speed against availability for the 75 countries in this report. We think it provides a snapshot of the 4G situation across the globe. States that fall in the upper righthand quadrant of the plot have both fast 4G speeds and widespread 4G availability, while those with limited availability and slower speeds fall into the lower and lefthand regions of the chart.

You'll notice a cluster of countries set apart from the rest of the field in the upper right made up of Hungary, the Netherlands, Norway, Singapore and South Korea. These are the countries that, according to our measurements, offer exceptional 4G services, earning the highest marks in both availability and speed. We don't see a similar distinct cluster of low performing countries in our plot, however. Instead we see a more even distribution across the chart with the majority of countries falling in the 50% to 75% availability and 10 Mbps to 30 Mbps range.

The most interesting countries in this plot, though, are the outliers. On one extreme, there is New Zealand, which has clearly built some of the highest performing LTE networks in the world but has difficulty delivering those powerful signals to consumers on a consistent basis. On the opposite extreme is India. The South Asian giant has moved into the upper echelons of 4G availability thanks largely to Jio's nationwide LTE rollout. But while signals may be plentiful in India, capacity isn't. India has some of the slowest LTE speeds in the world. That's not a problem confined to India, though. Two of the first countries to adopt 4G, the U.S. and Hong Kong, have built extensive LTE footprints, but support average speeds lower than the global average. Japan's LTE infrastructure has the furthest reach of any country outside of South Korea, but its average download speed is the same as Ecuador's, a country with half of Japan's 4G reach.

These examples demonstrate that where a country falls in this chart isn't necessarily an indication of its 4G progress; rather performance is determined by a number of economic, regulatory and technological factors unique to each country. For instance, you might draw the conclusion that Japan and Ecuador's mobile networks are on the same technical footing as they both average download speeds of 24 Mbps. But that's not the case. Japan was one of LTE's earliest champions and has since deployed powerful LTE-Advanced networks nationwide, but Japan also reached a point where 4G has almost entirely displaced 3G technologies. Meanwhile Ecuador has only recently started down its LTE path and still leans heavily on its legacy 2G and 3G networks. While the vast majority of Japan's population is vying for LTE capacity, Ecuador's low 4G device penetration means less competition for 4G bandwidth. The end result is that our users in both countries experience the same average LTE speeds.

Every country may face a different set of 4G conditions today, but those conditions are constantly changing. Operators are expanding their LTE footprints, upgrading their networks and finding more spectrum to plow into their 4G services. As 4G device and service costs drop in particular countries, demand for 4G capacity and coverage increases. Any of these factors can cause significant shifts in our data. In most cases those are shifts forward, reflecting improving 4G services and new network investment, but every once in a while, we see a country regress as its operators fail to keep up with the trends in their market or the demands of their customers. By the time OpenSignal publishes its next State of LTE report we could be looking at very different global LTE landscape.

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