

India

State of Mobile Networks

February 2019

Analysis of Tutela crowdsourced data from over 268 billion mobile network measurements.

For further information about the methodology, data and tools used to create this report, please contact analysis@tutela.com.

TUTELA 

Executive Summary

The last three years have seen India's mobile networks undergo a dramatic transformation at a virtually unheralded pace. Thanks to widespread deployment of 4G technology, a growing thirst for mobile data, the entrance of a rapidly-growing new operator in the form of Jio, and a shift away from consumers using multiple SIMs, networks are faced with falling revenues while also needing to keep up with 4G investment - not to mention keeping an eye on 5G.

2019 promises more of the same disruption, particularly as the merger of two of India's biggest carriers (Vodafone and Idea) starts to deliver results. As the industry prepares for change, Tutela has delved into its crowdsourced dataset of billions of mobile network tests to evaluate how networks are coping with current demand, and discover which carrier is best positioned for future challenges.

To compile this report, over a 2 month period Tutela examined 268 billion network quality measurements, including 29.6 million speed tests and over 435 million latency tests, collected from over 9 million mobile devices to build a comprehensive picture of India's mobile networks. Our data was collected from 1st December 2018 to 30th January 2019.

"Tutela has delved into its crowdsourced dataset of billions of mobile network tests to evaluate how networks are coping with current demand"

Key numbers

268 billion measurements

29.6 million speed tests

435 million latency tests

9 million mobile devices

1st December 2018 -

30th January 2019

Meet with our team

Join us in Barcelona to learn more about the mobile experience in your markets.



[Book a meeting](#)

Measuring network quality

TUTELA 

Best performing networks – India 2019

Operator	Basic Consistent Quality	Excellent Consistent Quality	Avg. 4G Download speed	Avg. 4G Upload speed	Latency
					
					
					
					
					

Key findings

- ▶ Jio has the best overall consistent quality, with its customers having a good enough network connection for basic usage 95.7% of the time. However, Airtel's network was slightly better for more demanding use-cases; its customers experienced an excellent connection 48.1% of the time, compared to Jio's 45.5%
- ▶ Airtel has the fastest 4G download speeds by a considerable margin, but its 3G network is significantly slower than the competition's.
- ▶ Upload speeds are fast across the board: Idea and Vodafone had the best 4G upload speeds, of 4.7 Mbps and 4.5 Mbps respectively, but even last-place Jio had an average of 3.8 Mbps, more than good enough for the most demanding applications.
- ▶ The merger of Idea and Vodafone will significantly improve the network coverage for customers of both networks: Each network has some coverage holes that are covered by the other network, and customers can also expect to see a 4G connection more often once the networks are merged.

Consistent quality



What is Consistent Quality?

Download speed is most often used as a proxy for network quality, but while download throughput is important, it's just one of several crucial requirements for a "good" connection. At its simplest, a good connection is one that doesn't get in the way of users doing what they want to do. In the real world, smartphone users aren't running speed tests all day -- they're browsing the web, using apps, voice calling their friends, streaming Netflix and YouTube, or making video calls. To more objectively evaluate when networks are (and are not) enabling users to do those things, Tutela has developed a standard called consistent quality.

The design of the standard is explained in further detail [here](#). Simply put, the standard defines two sets of thresholds, called "excellent" and "basic". If a connection hits the "excellent" standard, it's sufficient for the most demanding mobile use-cases, like HD video calling or 1080p video streaming. A "basic" connection is good enough for simple web browsing, emails, and VOIP calling, but users will experience delays or buffering when trying to use more demanding apps.

Our key performance indicators

"Excellent" quality
Download speeds > 4 Mbps
Upload speeds > 2 Mbps
Latency < 50 ms
Jitter < 30 ms
Packet loss ~ 0%

Intended use cases: 1080p video streaming, HD group video calling

"Basic" quality
Download speeds > 512 Kbps
Upload speeds > 128 Kbps
Latency < 100 ms
Jitter < 50 ms
Packet loss < 5%

Intended use cases: Web browsing, simple applications (Facebook, WhatsApp, email clients), VOIP calling

Tutela's consistent quality score simply measures the percentage of time that users -- whether for one operator or a whole country -- can hit the thresholds. The higher the number, the more often users have a basic or excellent connection.

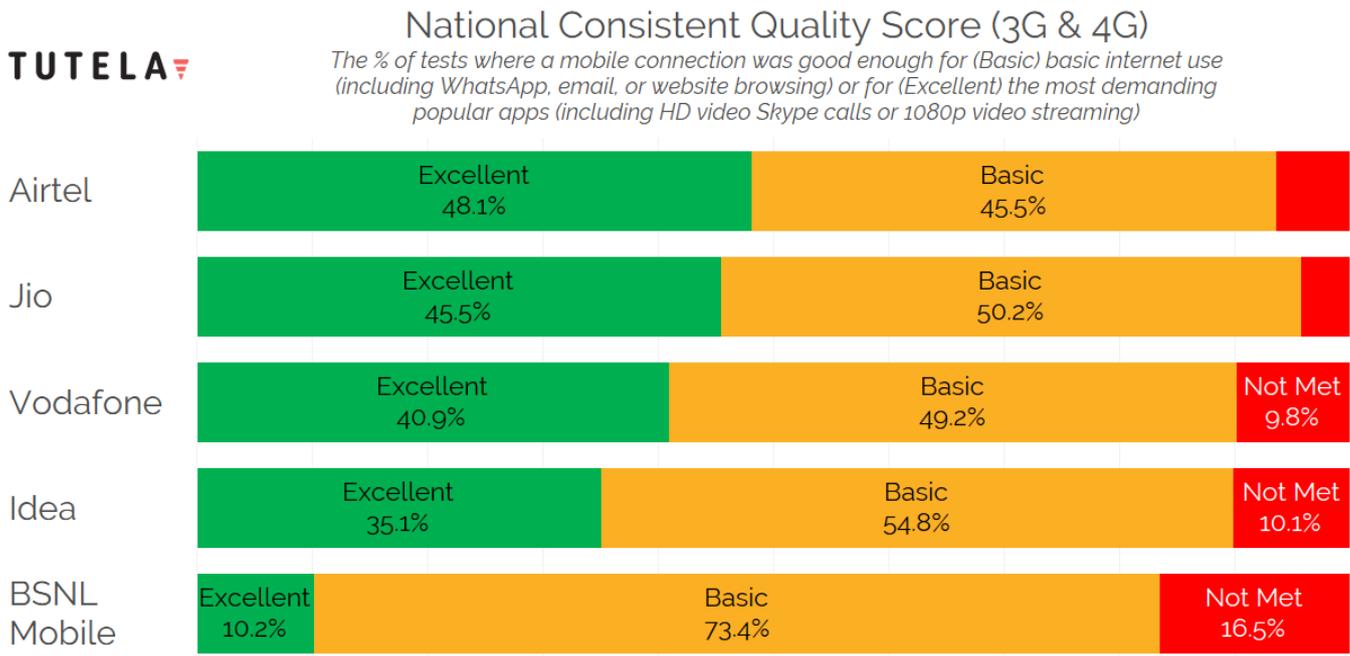
Consistent quality

Across the entire country, Jio had the best overall consistent quality, with 95.7% of all tests meeting the standards for either basic or excellent consistent quality. That means that Jio's users were able to make a VOIP call, check emails, or use most basic apps 19 times out of 20.

Airtel was in a close second place, with 93.6% of tests hitting one of the two thresholds. For excellent consistent quality, Airtel beat out Jio for first place, meaning that Airtel's users are the most likely to be able to stream HD video or make a video call over their mobile network connection.

Vodafone and Idea were third and fourth respectively, with Vodafone having marginally better excellent and basic quality than Idea.

BSNL was in last place, and its low excellent quality score -- just 10.2% of tests hit the more demanding thresholds -- is particularly notable. BSNL's network is almost entirely 3G, which goes a long way to explaining the difference: a 3G connection will always struggle to provide a good enough connection for the excellent score, even under perfect conditions.



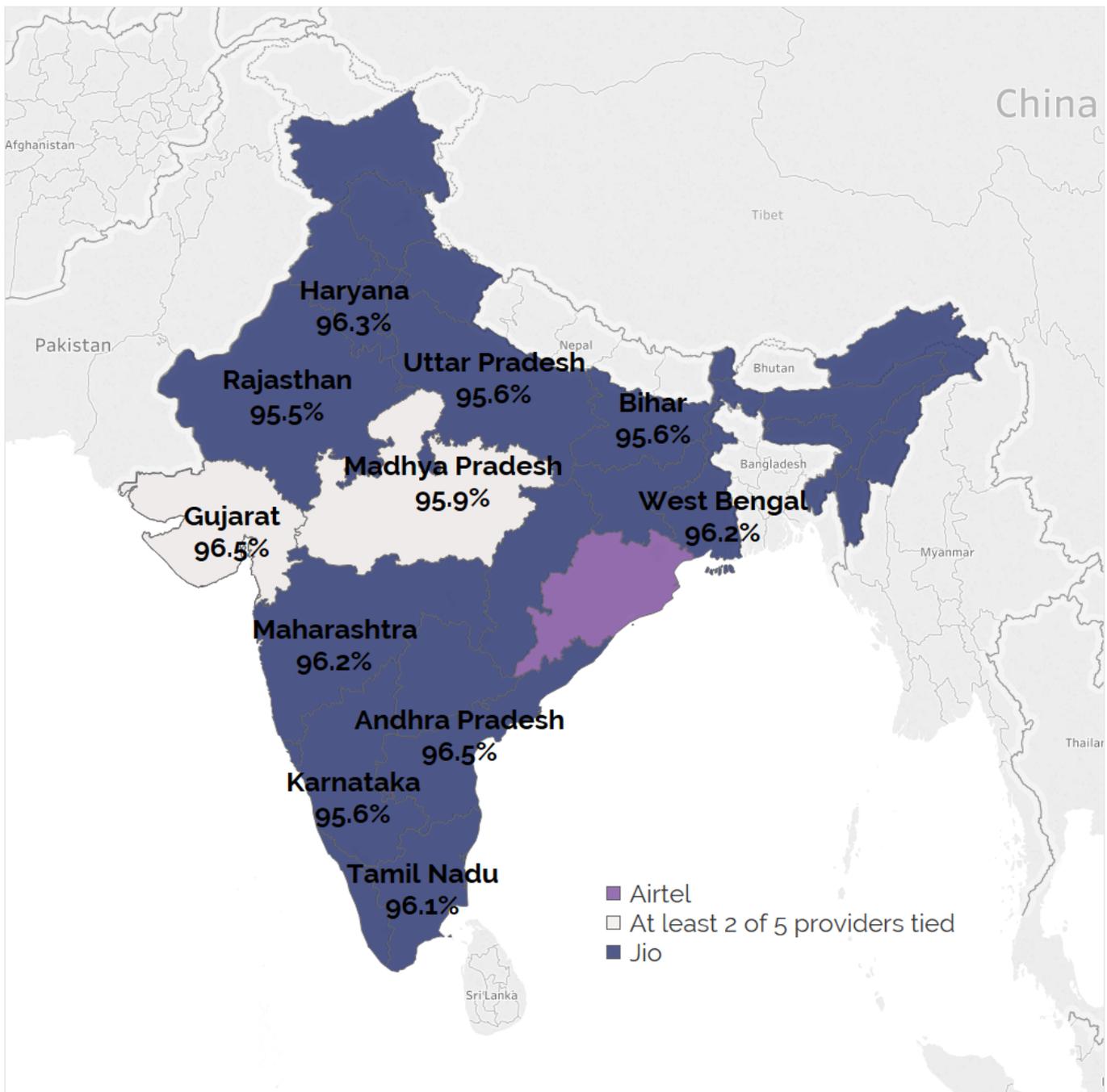
Consistent quality

Looking at basic consistent quality on a region-by-region basis, Jio's lead becomes clear. Jio was the best network in the vast majority of regions, tying with Airtel in just a handful of areas, and losing out entirely to Airtel only in Odisha.

TUTELA

Consistent Quality Score (Basic) Leading Operator

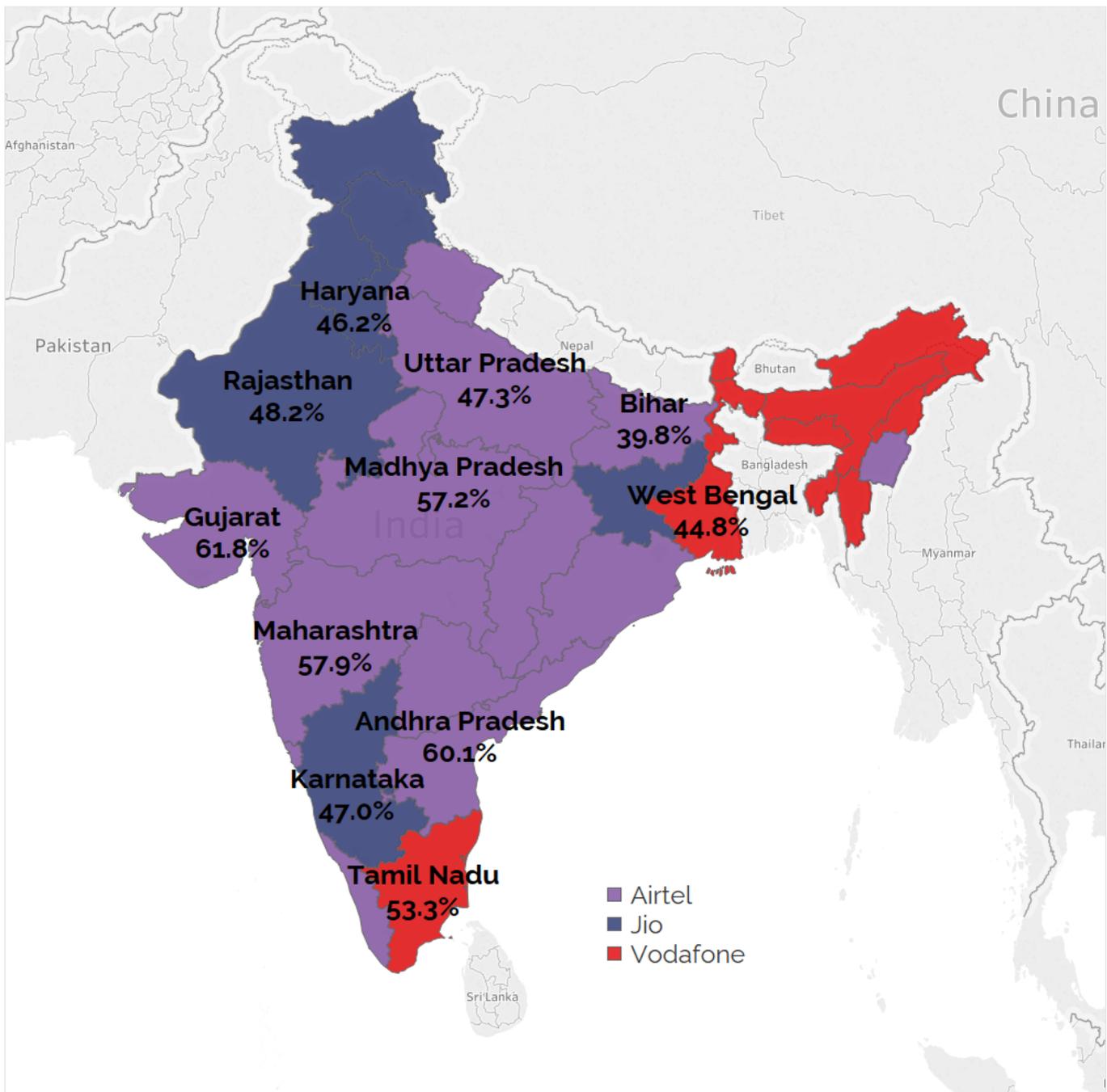
The % of tests where a mobile connection was good enough for basic internet use (including WhatsApp, email, or website browsing)



Consistent quality

When examining excellent consistent quality by region, the picture is quite different. Jio only takes first place in four regions, with Airtel winning the most regions, and Vodafone also picking up a handful of first places.

TUTELA Consistent Quality Score (Excellent) Leading Operator
The % of tests where a mobile connection was good enough for the most demanding popular apps (including HD video Skype calls or 1080p video streaming)



Download throughput

For Airtel, the download speed tests tell two very different stories depending on which generation of technology you're looking at. The network's 4G speed is head and shoulders above the competition, at an average 8.6 Mbps, over 2 Mbps faster than the closest nationwide 4G competitor, Vodafone. Its 3G network -- which still accounts for 16% of Airtel's test results -- is the slowest of any operator in the country, however.

Despite having the only 4G-only network, Jio has the slowest overall 4G download speed. That could be a result of less-favourable deployments: Other networks rely on 3G technology to cover the most remote and least-popular areas, which are likely to have the worst coverage, and therefore the slowest throughput tests.

BSNL and Vodafone are tied for the best average 3G download speed, at 3.3 Mbps. That score is well in excess of the basic quality threshold, but still significantly below the bar needed for excellent consistent quality.

Overall, Vodafone and Idea have very similar results for average 4G and 3G download speeds. That suggests that although the merger of their networks might prove beneficial for other reasons, customers are unlikely to see improved download speeds.

TUTELA ▾

Average Download Speed by Technology



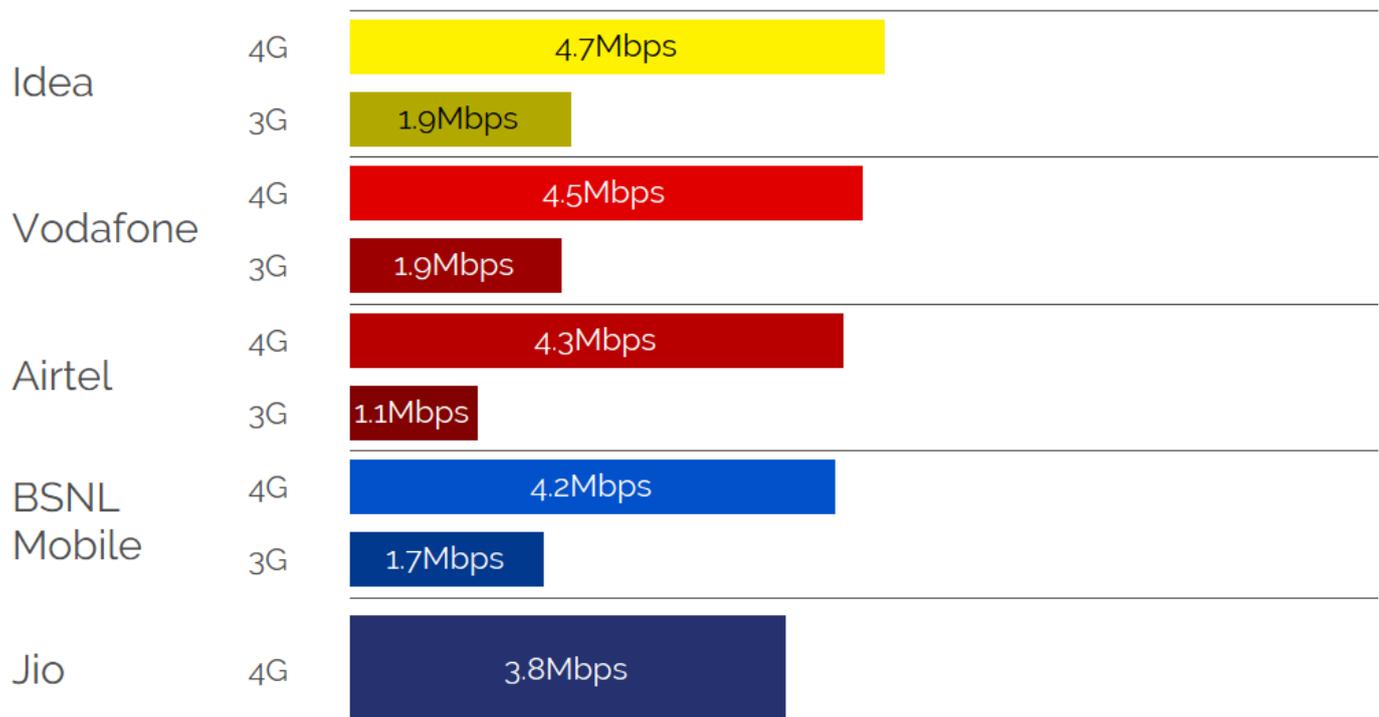
Upload throughput

When looking at upload speeds, Vodafone and Idea again deliver similar results -- but the difference is that both networks are on top of the pack. Idea has the best average 4G upload speed by some distance, at 4.7 Mbps, and Vodafone is in second place at 4.5 Mbps. Airtel is in third with 4.3 Mbps, while Jio is once again in last place for 4G download speeds.

Idea and Vodafone both have great 3G upload speeds, with an average of 1.9 Mbps. Considering that the threshold for excellent consistent quality is 2Mbps, that's a remarkable result, and means a significant number of 3G connections have upload speeds good enough to do things like conduct HD video calls. BSNL also had good 3G upload speeds -- 1.7 Mbps -- which is particularly important, since the majority of its network is built on 3G.

TUTELA ▾

Average Upload Speed by Technology



Latency

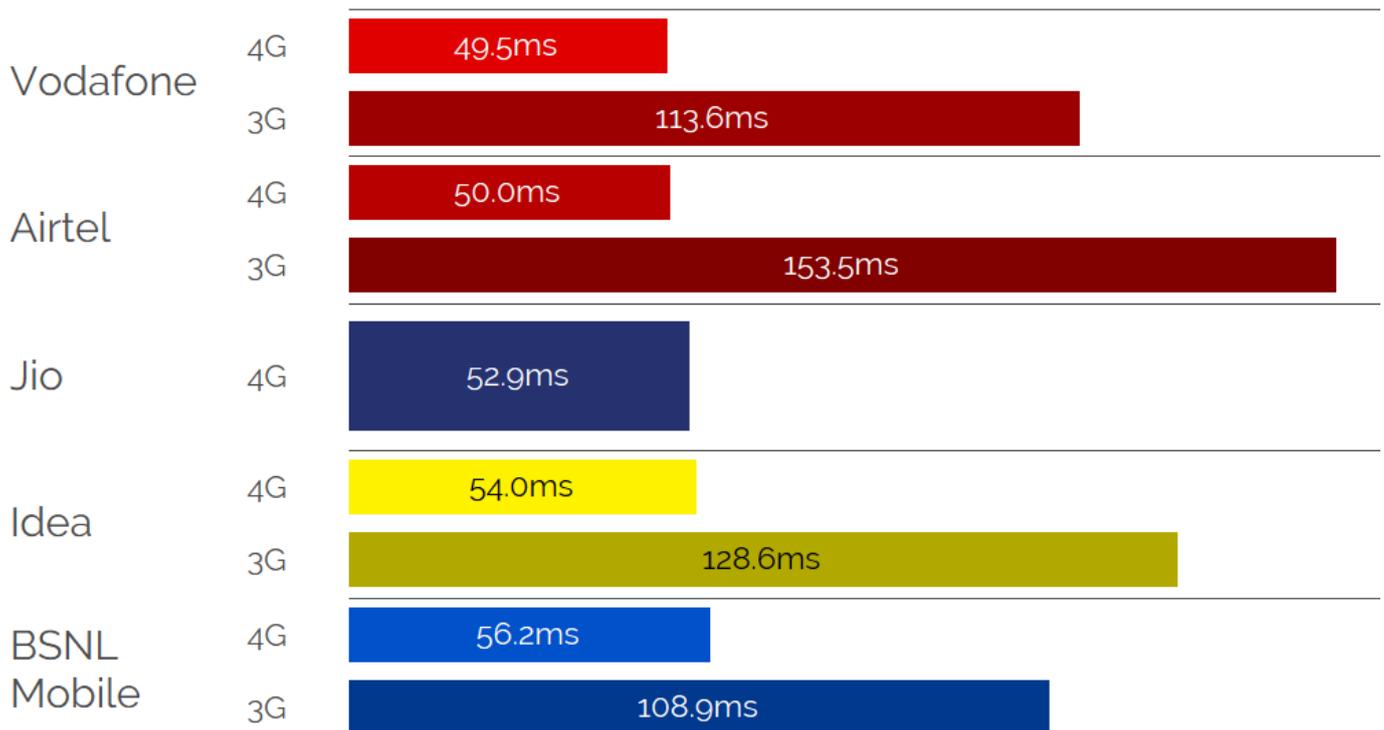
Vodafone was the best performer for 4G latency, with an average of 49.5 ms. Airtel, Jio, and Idea were all close, within a few milliseconds of Vodafone's average -- the kind of difference customers are unlikely to notice.

3G latency was much more variable. BSNL had the best 3G latency, with an average of 108.9 ms. Once again, BSNL's 3G superiority is particularly important, since the majority of BSNL's network runs on 3G.

The results also serve to highlight how latency has the greatest impact on users' Quality of Experience when moving between 3G and 4G networks. The best 3G results from some networks have upload and download speeds that would be sufficient to hit Tutela's excellent consistent quality threshold, but the huge difference in latency between 3G and 4G means that a 3G connection will never feel as responsive as a 4G connection for users.

TUTELA 

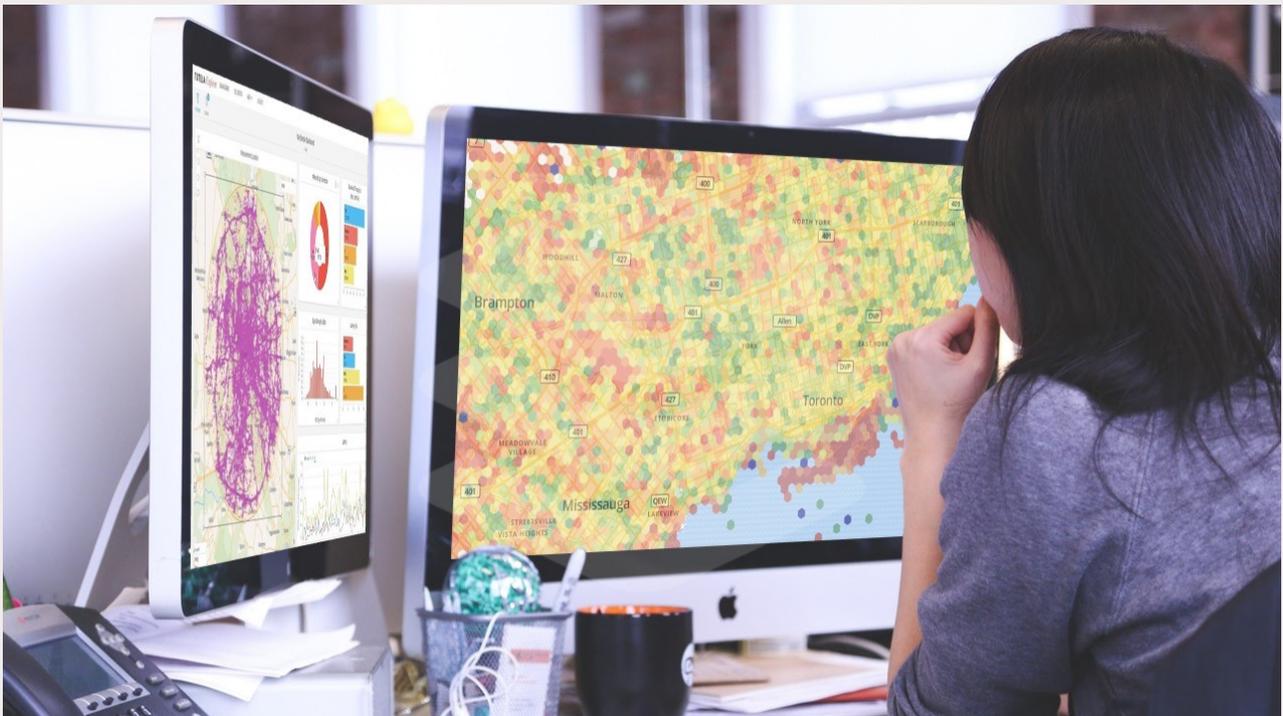
Average Latency by Technology



Discover Tutela Explorer

Tutela Explorer is a powerful cloud-based solution for real-time analysis of crowdsourced data. Using the platform, mobile operators can:

- Create coverage and quality maps
- Benchmark network quality and coverage across all operators
- Drill down to any KPI at city, street or even building level
- Analyse spectrum utilisation, performance and more



<https://www.tutela.com/explorer>

Coverage

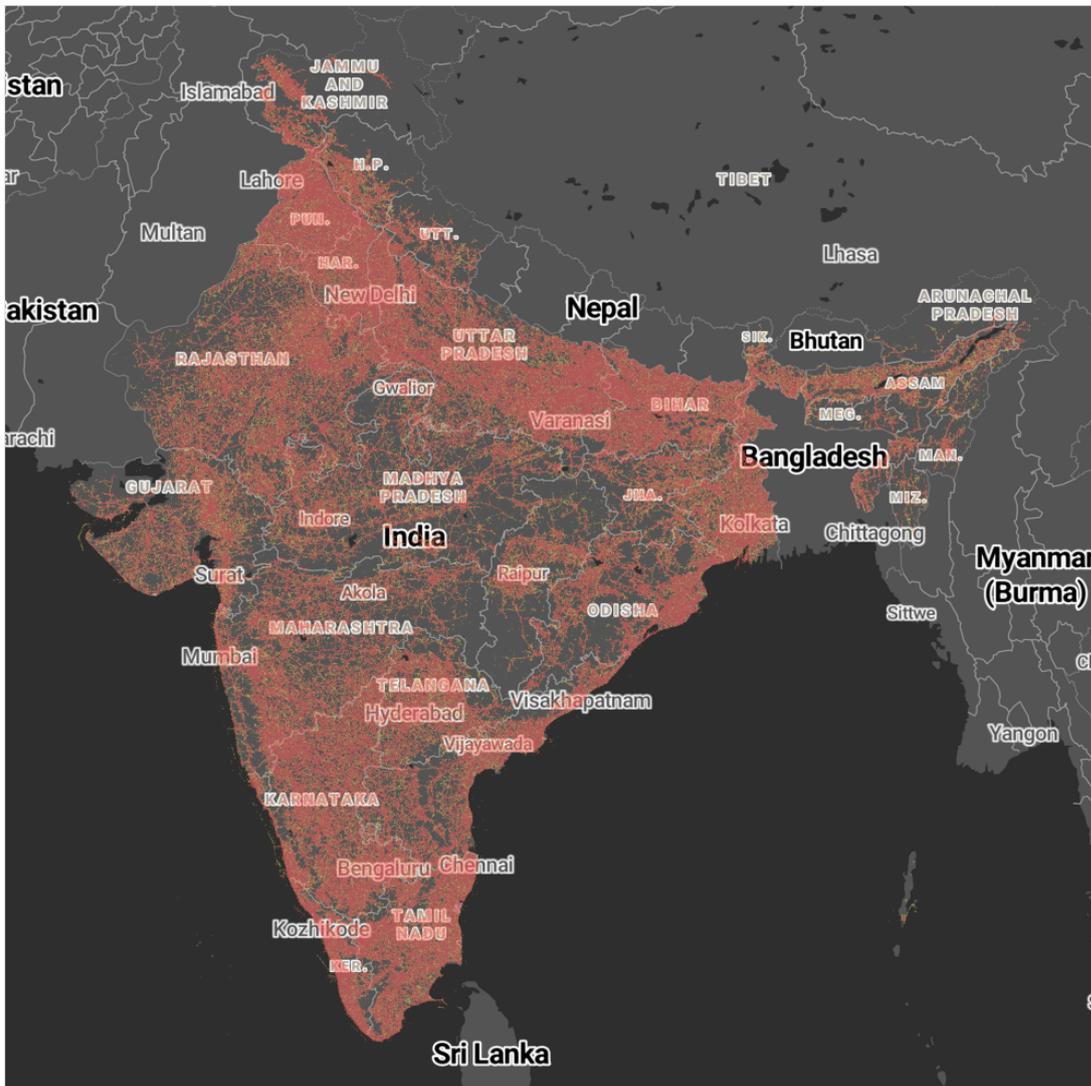
Airtel

Airtel has 4G coverage almost everywhere that it has any coverage, meaning that customers are only rarely stuck with a 3G connection. Although that's visible from the coverage map -- which shows a virtual wall of red 4G dots -- it also lines up with the data usage information, which shows that 79% of tests on Airtel's network happened on a 3G connection.

Airtel's coverage -- measured as places where Tutela has recorded a test on Airtel's 3G or 4G network -- extends across the majority of the country, with only a handful of regions having significant dark spots.

TUTELA

Airtel Coverage by Mobile Technology



3G 4G

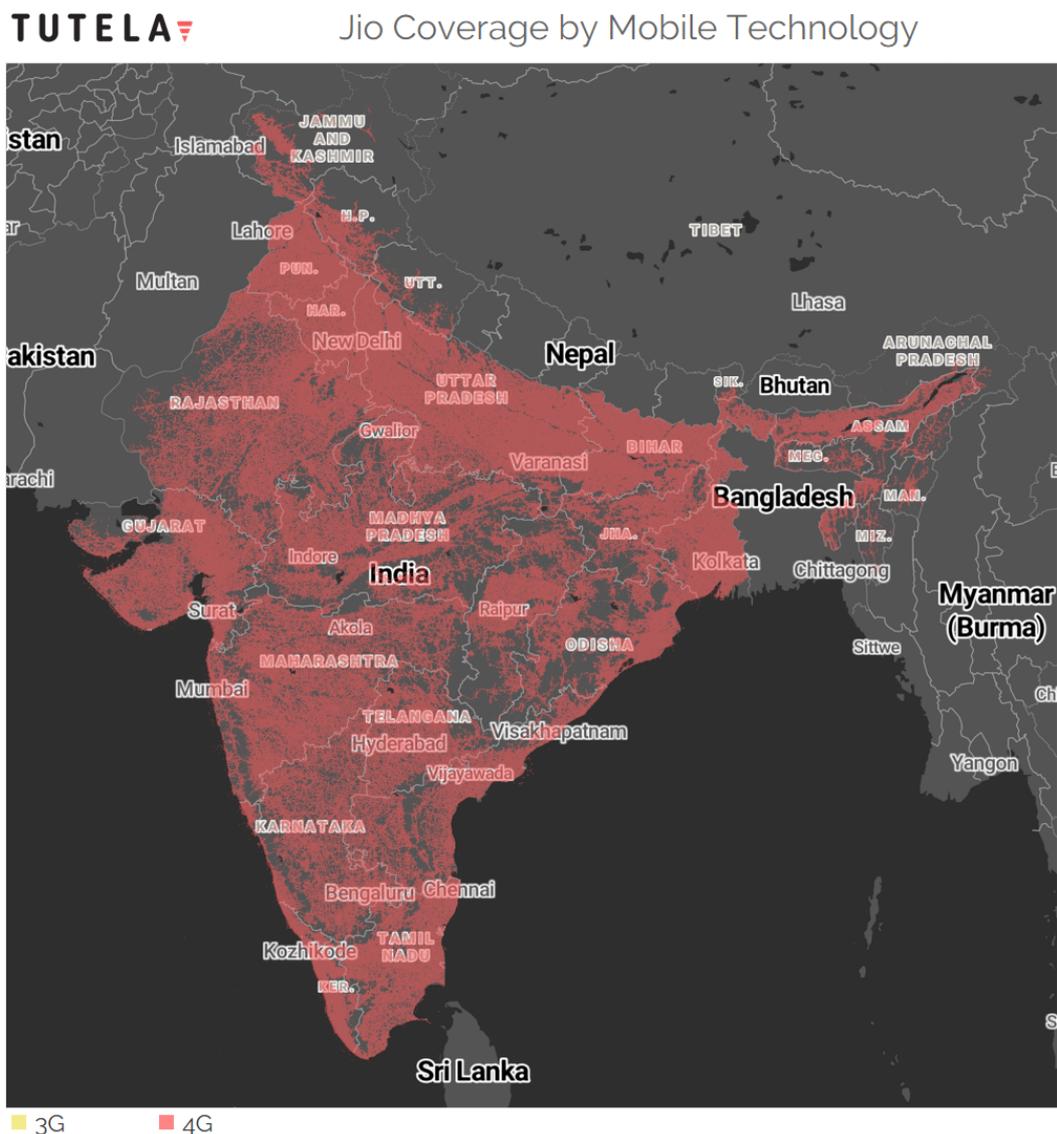
Coverage

Jio

Jio doesn't operate a 3G network, so its coverage map only shows 4G results. The expectation for a relatively new, 4G-only network might be for coverage to be focused in urban areas, but that's clearly not the case with Jio's network. The map above shows that tests were recorded on Jio's network across nearly the entire country, with dark spots mostly limited to the Chhattisgarh and Odisha regions.

The impressive coverage of Jio's 4G network, compared to other operators, can partly be attributed to its use of low-band spectrum. Jio owns almost all of the 850 MHz spectrum band, and it is the only operator to deploy 4G on any low-band spectrum. Low-band spectrum like 850 MHz travels further and penetrates obstacles (like the walls of buildings) better than the mid-band and high-band spectrum that other operators use for 4G.

Although Jio also makes good use of 1800 and 2300 MHz spectrum for its 4G network, the use of low-band spectrum for 4G gives it an advantage over other operators in terms of coverage.



Coverage

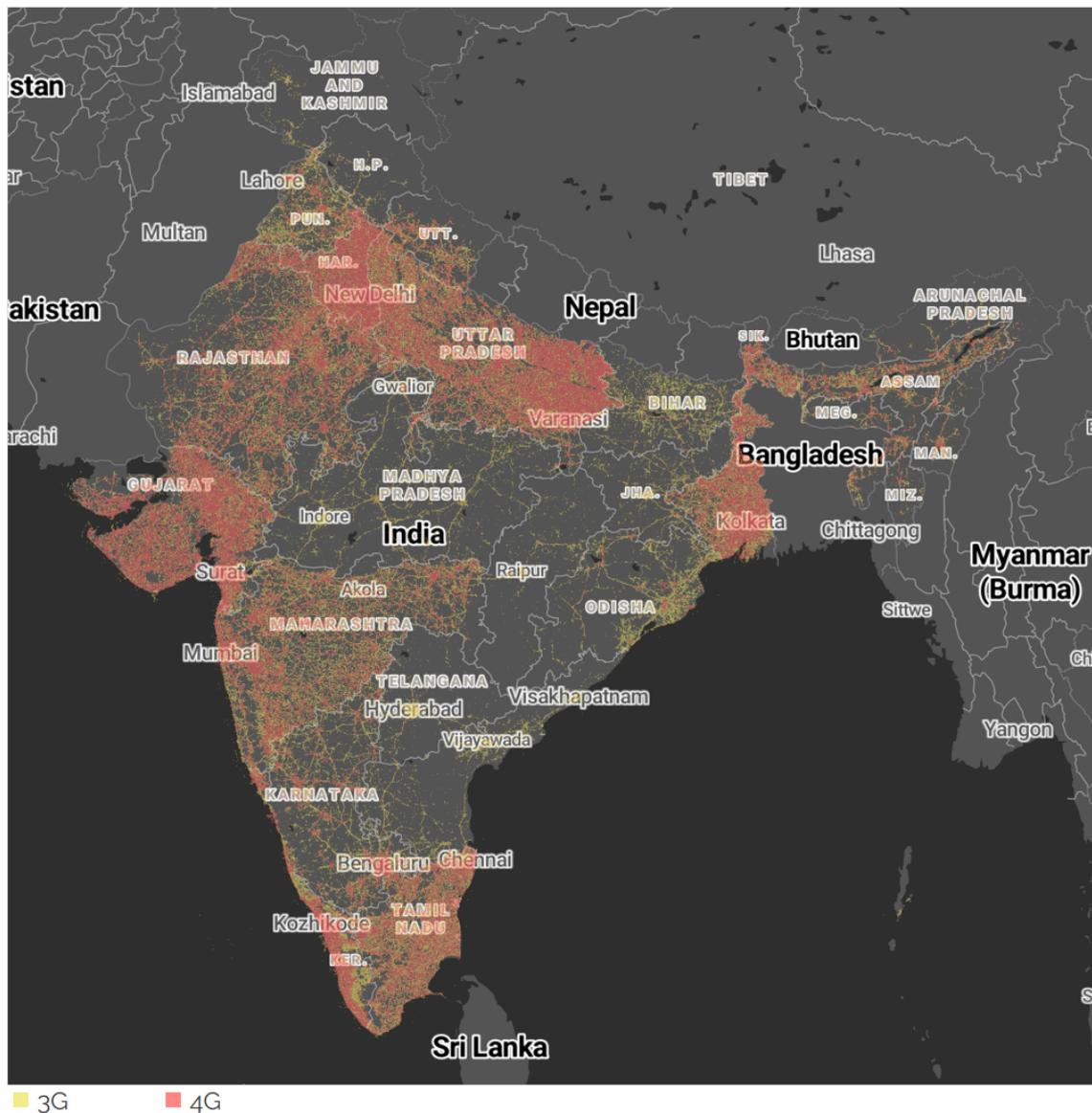
Vodafone

Compared to Airtel and Jio, Vodafone relies much more heavily on 3G for its coverage, particularly in rural areas. Although Vodafone covers India's largest urban areas with 4G, it falls back onto 3G for rural coverage, and 3G accounts for 35% of all tests on Vodafone's network.

Unlike Airtel or Jio, Vodafone is also left with significant gaps in coverage where neither 3G nor 4G is available.

TUTELA

Vodafone Coverage by Mobile Technology



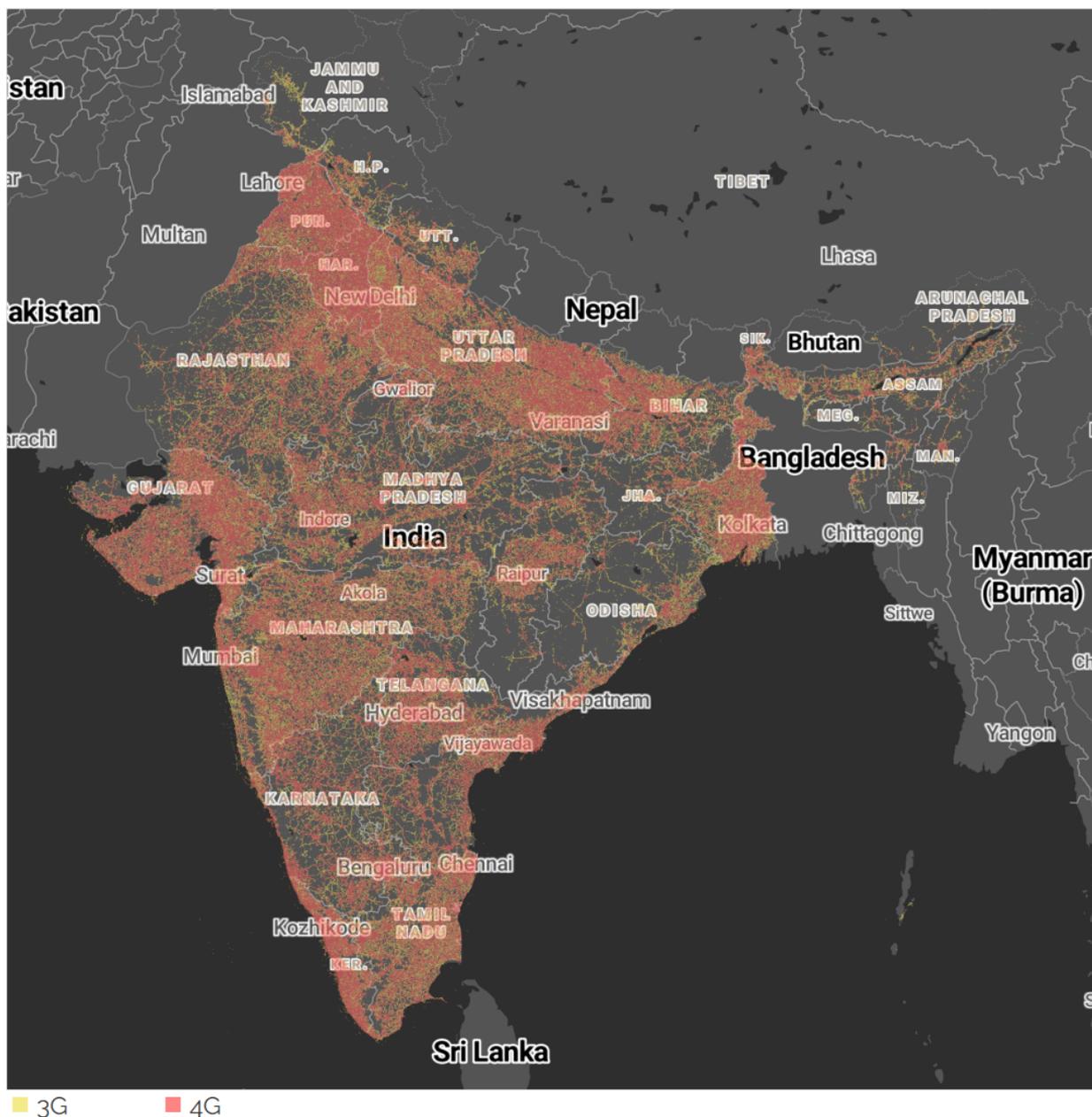
Coverage

Idea & Vodafone

That is significant, as the two companies have signed a merger agreement, and will integrate their networks in the future.

Tutela's data shows that a combined Idea + Vodafone network will have much better 4G availability and fewer dark spots compared to the two operators working alone, which will help the combined network compete with Reliance and Jio.

TUTELA Idea & Vodafone Coverage by Mobile Technology



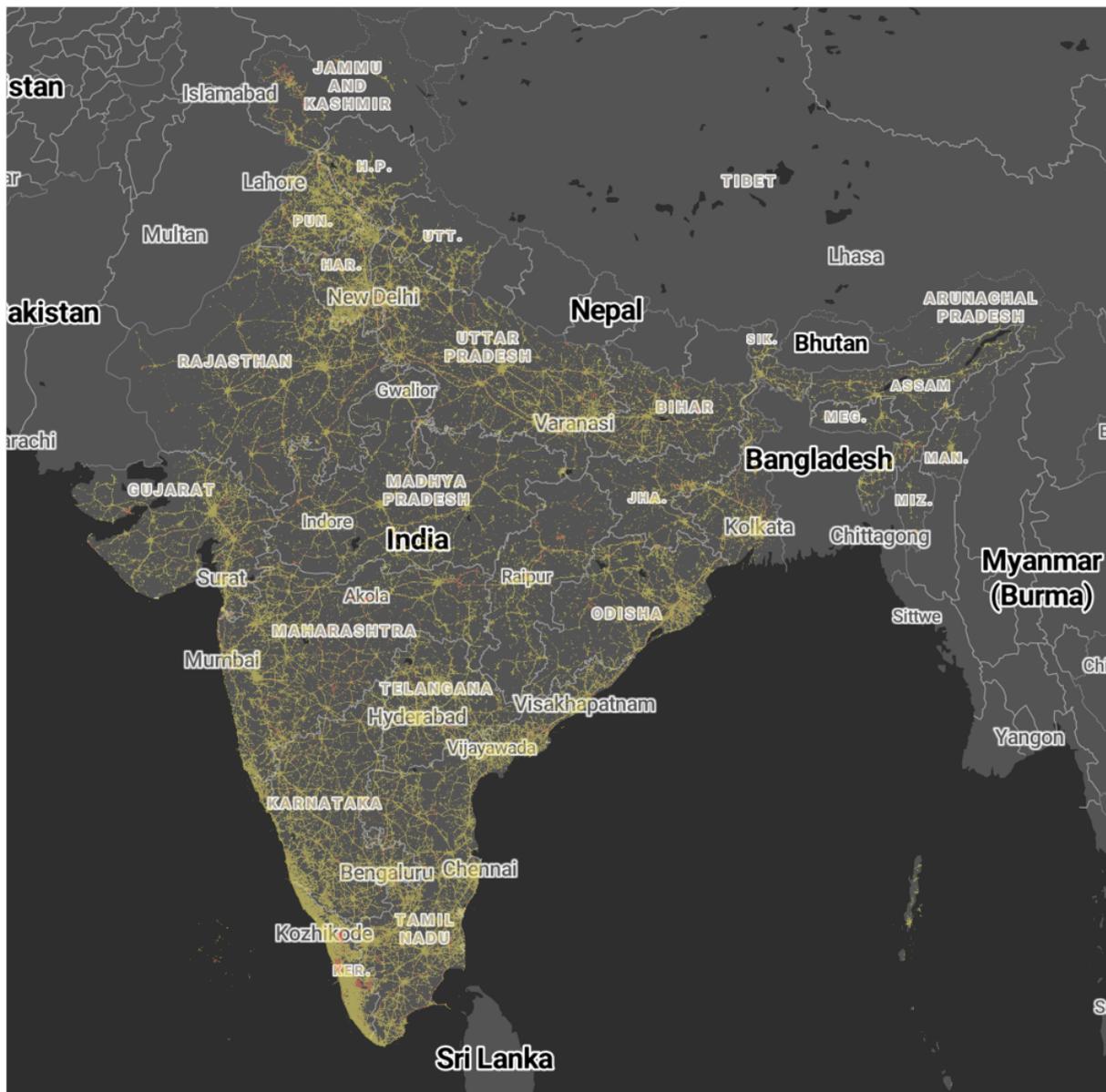
Coverage

BSNL

BSNL operates an almost-exclusively 3G network, with 4G only present in a handful of isolated locations. Although that 3G network does function well considering the age of the technology, as our performance metrics show, the network will have to accelerate its planned 4G rollout if it wishes to remain competitive.

TUTELA

BSNL Coverage by Mobile Technology



■ 3G ■ 4G

3G & 4G

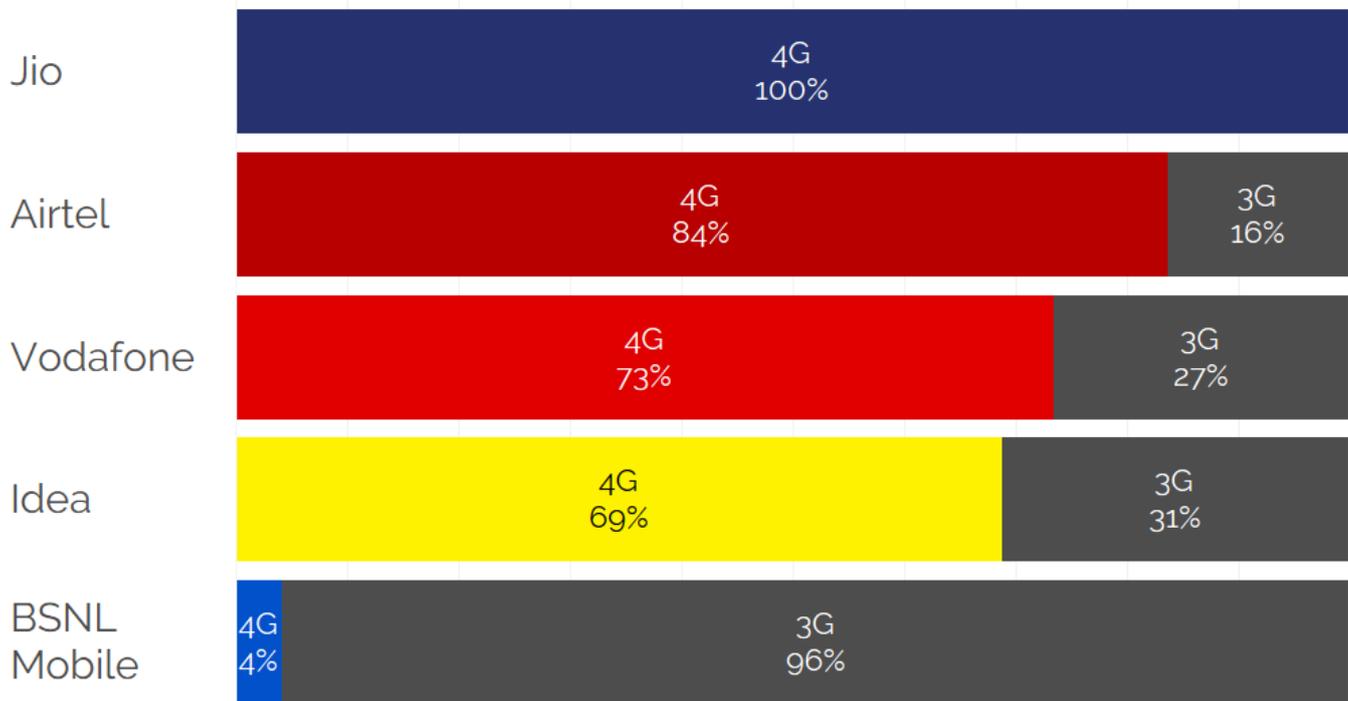
Although competition in India's mobile data market is heating up, wide gaps continue to exist between the operators when it comes to 4G deployment. Jio, as a 4G-only network, obviously leads the way, but its 4G advantage is diminishing as Airtel continues an aggressive 4G expansion plan. 16% of Airtel's connections are still made over the 3G network, but with more LTE sites coming online, and Airtel's deployment of 4G on low-band 900 MHz frequencies, that gap will continue to drop.

In the meantime, the merger of Vodafone and Idea should help drive nationwide 4G adoption. Both Vodafone and Idea are significantly behind Jio and Airtel when it comes to 4G availability, but merging the networks should help reduce the difference. The combined company will (theoretically) also have more capital to spend on 4G upgrades.

Last but not least, it appears that 2019 might finally be the year that BSNL starts deploying 4G in earnest. The data shows that BSNL's 4G network is still extremely limited, but government approval of BSNL's plan to deploy 4G on 2100 MHz should provide another viable competitor for 4G service -- in urban areas at least.

TUTELA ▾

Percentage of Tests Run by Technology



Methodology

Tutela measures network quality based on the real-world performance experienced by users in the field. Results in this report are based on a testing configuration to represent typical (not maximum) performance of mobile devices. We used a 2 MB file to perform our download testing and a 1 MB file to perform our upload testing. Tutela employs software installed on more than 3,000 partner apps to complete frequent tests.

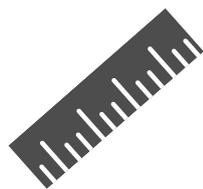
Our results differ from other network testing companies which measure the peak performance of networks under ideal conditions (such as downloading a 500MB file).

In total, Tutela's software operates on over 250 million Android and iPhone devices globally, collecting over 10 billion mobile data measurements every day. Our data scientists analyze results for each country every month, and our analytics platform, Tutela Explorer, lets operators chart, map, and filter over 80 key performance indicators into customized dashboards to help them better understand network performance and benchmark against competitors.

For this report, Tutela has treated Idea and Vodafone as two separate networks as the two companies have not yet merged their infrastructure, and customers still have to pick between the two networks. However, we have included analysis of how the merged network is likely to perform when the integration is complete, particularly with regard to coverage.

Report facts

The information in this report was taken from our crowdsourced data between 1st December 2018 and 30th January 2019.



268 billion
Measurements



29.6 million
speed tests



435 million
Latency tests



871 million
Jitter & Packet
Loss tests

Meet us at Mobile World Congress

Mobile World Congress is just around the corner, and we're back for another exciting event to showcase our latest crowdsourced solutions for the mobile industry.

Schedule a meeting with us where you can:

- See a live demonstration of Tutela's data and tools for your markets
- Discover our products and roadmap and learn how Tutela's data and insights can help your business
- Start a free trial of our tools and data for your evaluation purposes
- Meet with our team

Find out more: <https://tute.la/MWC2019>

Meet with our team

Join us in Barcelona to learn more about the mobile experience in your markets.



Book a meeting

About Tutela

Tutela is a mobile data and analytics company serving the mobile and telecommunications industry with software is embedded in over 3000 diverse mobile applications installed on over 250 million mobile Android and iOS handsets. Tutela continuously monitors network quality of experience all across the world. We collect more than 10 billion measurements every single day, and through our interactive toolset, enable our customers to turn those numbers into actionable intelligence for their businesses.

For more information, visit www.tutela.com or contact us at info@tutela.com
