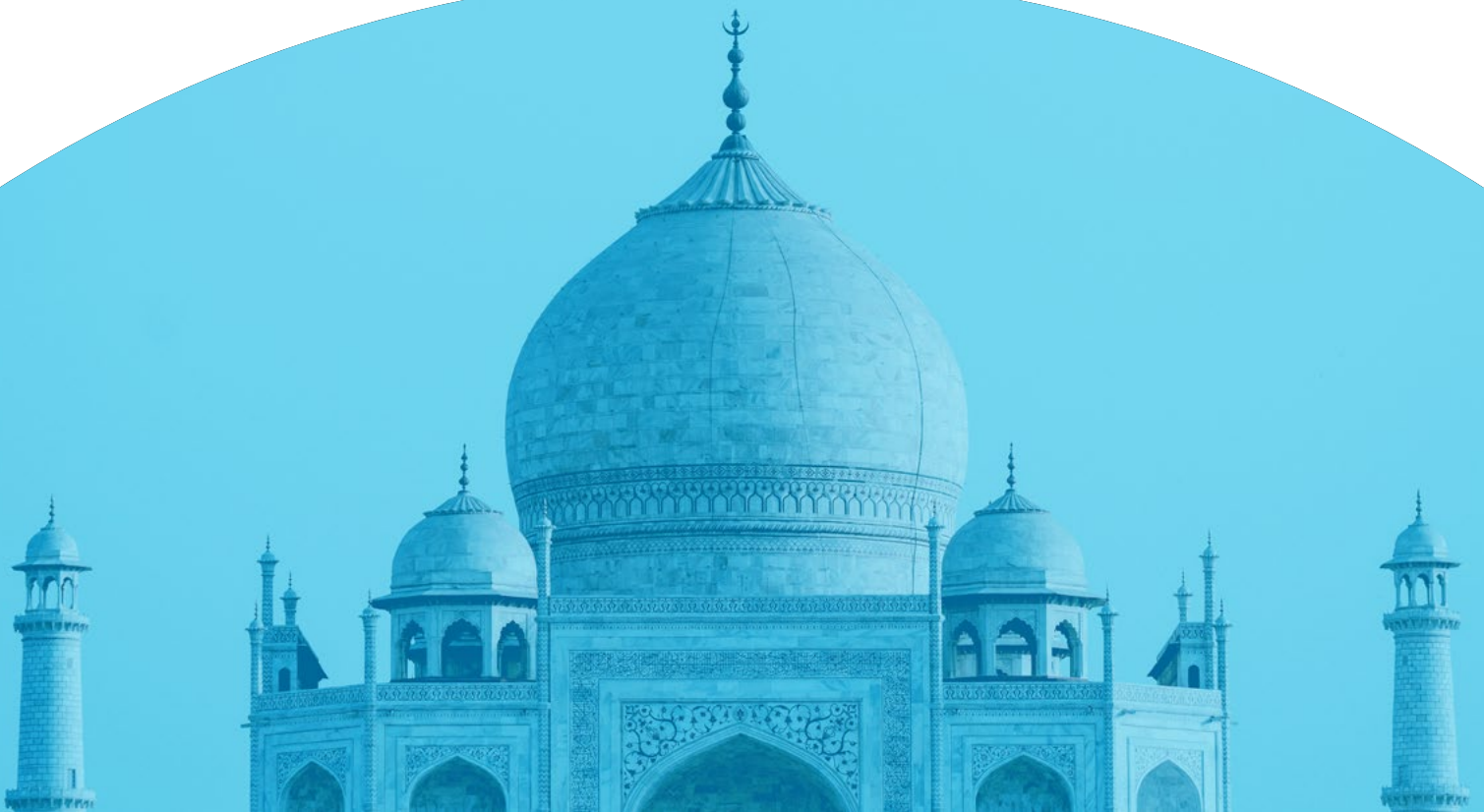


# OpenSignal

The independent global standard for measuring  
real-world mobile network experience

## Mobile Network Experience Report November 2018

# INDIA



## Introduction

## Report Facts



Report Location

**India**

Sample Period

**Jun1 – Aug 29, 2018**

Measurements

**10,509,371,943**

Unique Devices

**1,769,711**

## OpenSignal Mobile Experience Awards for India

OpenSignal Awards	 Airtel	 BSNL	 Idea	 Jio	 Vodafone
Video Experience					
4G Availability					
Latency Experience					
Download Speed Experience					
Upload Speed Experience					

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# INDIA

India is a unique mobile market, in terms of sheer size, speed of development and competition.

The country covers over 1.2 million square miles and is home to over 1.3 billion people. A third of its population live in some of the world's busiest cities, while huge rural areas still remain. India's first LTE network launched in 2012, and in the country we are now seeing some of the highest 4G Availability scores of any of the markets we analyze. The Indian mobile industry is currently emerging from a ferocious round of mergers and acquisitions (M&A) which will see four major national operators emerge. OpenSignal is publishing this report in a bespoke, first-of-its-kind format to allow us to dive into the level of analysis we think this unique market deserves.

In this report, we have introduced a new series of top-level award metrics for the first time, including analysis of mobile Video Experience. And these awards have been spread across the country's big operators, with a few surprises. We have awarded winners for 4G Availability, Download Speed Experience, Upload Speed Experience, Latency Experience and Video Experience, as well as analyzing all the supporting metrics for these categories. We have also included awards for the five operators across all 22 of India's telecoms circle regions for the first time.



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# Key Findings

There was a three-way tie in our brand new mobile video experience analysis, as Airtel, Jio and Vodafone all came within a point of each other.

As India's mobile networks get faster and faster, consumer habits are changing — and the thirst for video content is now shaping operator strategy.

## Jio

Jio continues to impress in our 4G Availability analysis, as the operator's score continues to grow from 96.4% to 96.7% — remarkable in a relatively new LTE market like India.

Jio also won our Latency Experience award, although it was Airtel who came top of our 4G-only latency table after edging ahead of Vodafone, who led in this category six months ago.

## Airtel

Airtel kept its Download Speed Experience crown, surging further ahead with over 25% growth in our measurements in the past six months.

Airtel has traditionally won the lion's share of OpenSignal's mobile experience awards, and the operator tied for our top spot in Video Experience and came in second place in our 4G Availability analysis.

## Vodafone Idea

Idea won our new Upload Speed Experience category fairly comfortably, averaging speeds of 2.88 Mbps, while it won outright in upload in 10 of India's regions and drew in a further six.

The merger of Vodafone and Idea means India will be paired down to four operators once the companies combine operations. But there is still a lot of potential for growth in the market, and competition remains fierce as Jio continues to disrupt.

## The price war subsides

Fierce levels of competition and free data offerings have led to unsustainable drops in mobile revenues and average revenue per users (ARPU) in India, and OpenSignal now expects operators to move towards the tiered paid data models familiar in the rest of the mobile world.

As the price war begins to subside in this maturing market, India's operators should have more breathing space to focus on other ways to differentiate such as service quality and bundling, as opposed to a race to the bottom on price.

# Market Analysis

## India's operator strategy is adapting to meet the video explosion

### The Indian telecoms world is completely unique

Never before have we seen a market of such magnitude, regional and cultural diversity, and growth potential. This brings enormous opportunity but also considerable challenges for the operators fighting to succeed. The Indian market is constantly evolving, with the last 10 years marked by new entrants, operators exiting and a plethora of M&A. And as [demand for data](#) keeps ramping up, the India mobile market doesn't look like going quiet anytime soon.

For this OpenSignal State of Mobile Networks report, we've analyzed more than 10.5 billion measurements from 1.7 million devices in the 90 days from 01 June 2018. We've ranked India's five main operators Airtel, BSNL, Idea, Jio and Vodafone at a national level using our latest top-level metrics: 4G Availability, Download Speed Experience, Upload Speed Experience, Latency Experience and overall Video Experience. And for the first time we've also included a comprehensive analysis of all five operators in four metrics across all 22 of India's telecoms circles.

### India mobile Video Experience: a close-run race

In September 2018, OpenSignal launched its new, first-of-its-kind [Video Experience metric](#), which analyzes how consumers experience video over mobile networks, ranking operators on a scale of 0-100, taking into account video load time, stalling rates during video playback and picture quality. OpenSignal's innovative mobile Video Experience measure enables consumers and operators to assess the real-world experience of watching mobile video. To succeed with a high score, operators must ensure there are no weak links anywhere in their infrastructure which could affect mobile video delivery to smartphone users.

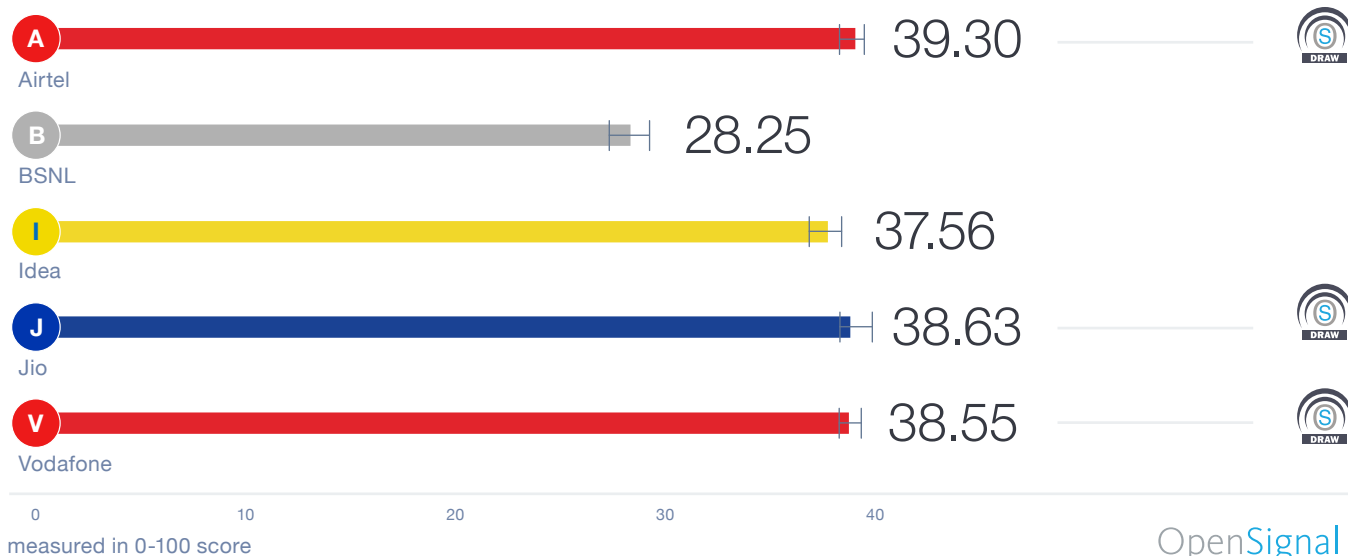
Our measurements show there was a three-way tie in our mobile Video Experience analysis between Airtel, Jio and Vodafone, as all three came within a point of each other. The winners all scored around 39 points in our analysis, while Idea was very close behind the top three.

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## Market Analysis

## India Video Experience

Jun1 – Aug 29, 2018



High 4G Availability scores don't automatically translate to a great mobile Video Experience for smartphone users, as we concluded in a recent [blog post](#) analyzing the performance of India's operators and regions. We discovered there is no link, or correlation, between the time Indian smartphone users spend on 4G (4G Availability) and the quality of the mobile Video Experience they enjoy.

We expect the Indian mobile Video Experience to become just as important as more traditional speed and coverage metrics as the market matures and consumer habits change. As India's mobile networks get faster and more reliable, users are adopting more data-hungry activities, in particular video streaming. Jio recently stated that its users are consuming an [average of 17.5 hours](#) of mobile video per month.

A recent study showed Indians spending [more time watching videos online](#) than TV, while a [Bollywood music channel](#) looks set to become the largest on YouTube globally.

And these changes in consumer behavior are changing operator strategy. Airtel has recently began bundling in [access to Netflix](#) for higher-spending customers, while Jio is signing similar deals with [ZEE and Viacom18](#). A new report from [Strategy Analytics](#) has called into question Jio's strategy as it moves from free content to a "freemium" model. Any large price rises could prove prohibitive for millions of its subscribers, meaning they cannot afford Jio's high-end content bundles. But nevertheless, the operator has changed the face of Indian telecoms with its headline-grabbing disruptive strategy.

## Jio continues to disrupt with its aggressive growth strategy

It's impossible to analyze recent developments in Indian mobile without talking about Jio. Coined the world's first "super-disruptor", the Reliance Industries

operator charged into an already-crowded market with a commercial launch in 2016, and shook the mobile world with its revolutionary free data offerings,

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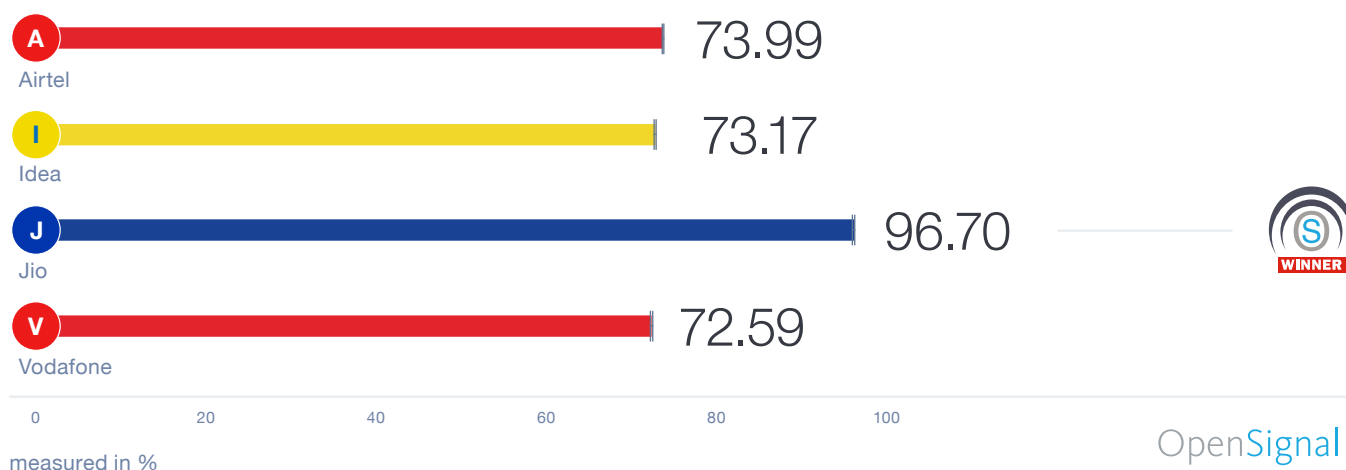
## Market Analysis

amassing over 100 million subscribers in less than 6 months and [launching its own range of handsets](#) to huge success. But from OpenSignal's point of view, one of Jio's most impressive achievements has been in 4G Availability. The operator has managed to achieve availability scores of over 95% in all of India's regions, despite huge variations in topography, and in the face of massive increases in subscribers and data consumption.

Our 4G Availability winner Jio continues to grow from 96.4% to 96.7% in our analysis — hugely impressive since 4G Availability scores of over 95% are very rare — particularly remarkable in a relatively new LTE market like India. All three other operators continue to increase their scores, passing the 70% mark with rises of well over 3 percentage points each in our measurements. Second-placed Airtel registered the largest rise of over 7 percentage points to reach 74% in our 4G Availability metric.

### India 4G Availability

Jun1 – Aug 29, 2018



Jio stunned in its first appearance in our inaugural [State of Mobile Networks: India report](#) in April 2017 with a 4G Availability score of 91.5% — well over 30 percentage points ahead of its rivals. For Jio to lead in this category is perhaps no surprise since it launched as an LTE-only operator. And Jio's 4G Availability keeps improving, increasing in our analysis in the six months since [our last report](#).

Jio's outstanding 4G Availability has helped push average scores over the 80% mark in our [recent analysis of average LTE availability](#) across all four operators in India's telecoms circles. Without 4G, even

the most basic of mobile data functions such as web browsing become challenging, and activities such as music and video streaming are high-on impossible. The accelerated growth of 4G Availability is playing an immeasurable role not just in connecting the country, but in shaping the mobile habits of hundreds of millions of India's mobile users. Jio has recently [secured infrastructure assets](#) from now-defunct rival RCOM, while it is now turning its attention to the [fixed-line sector](#), meaning we expect to see no let-up in the Jio success story.

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## Market Analysis

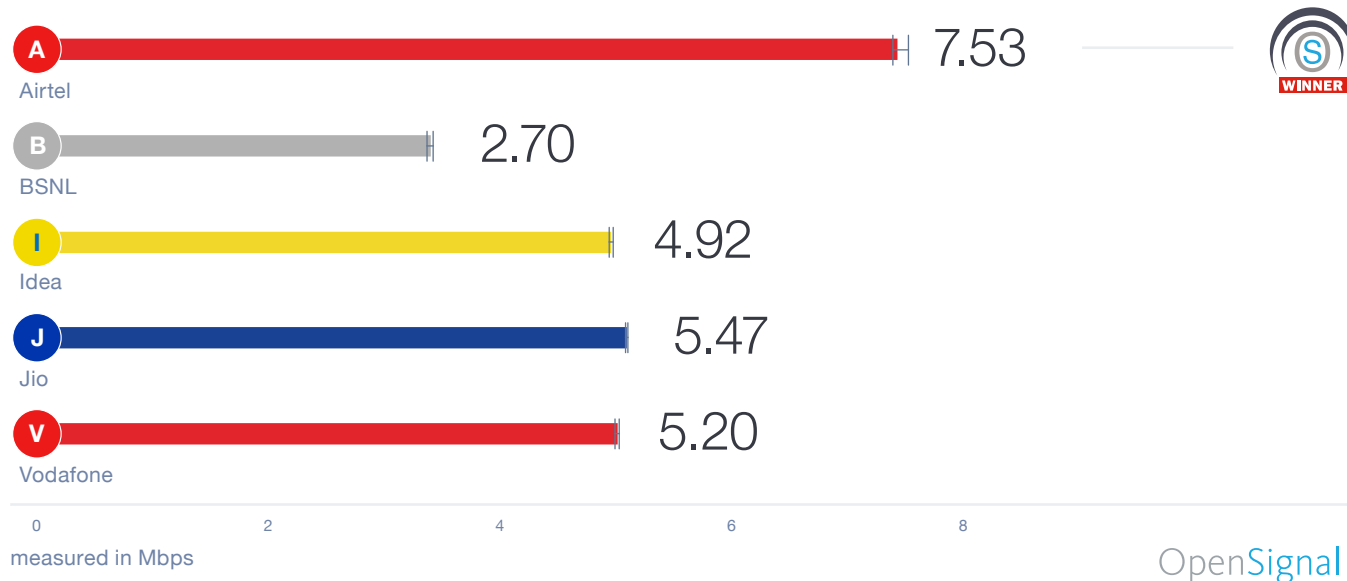
## Airtel remains one of India's strongest performers in OpenSignal's awards

Airtel kept hold of our coveted Download Speed Experience award, which measures the combined speeds of operators' 3G and 4G connections and the level of access to each technology. In fact the operator is going from strength to strength in Download Speed Experience with growth of over 25% in the past 6 months to reach 7.53 Mbps in our measurements.

While Jio may grab the headlines with huge 4G subscriber and availability growth, the new entrant has not performed so glowingly in our analysis of mobile network speeds. Jio, Idea and Vodafone all scored close to the 5 Mbps mark in our Download Speed Experience analysis – over 2 Mbps slower than Airtel. Meanwhile 3G-only operator BSNL remains in last place, but the operator is closing the gap with growth of over 23% in our measurements.

### India Download Speed Experience

Jun1 – Aug 29, 2018



Airtel has traditionally won the lion's share of OpenSignal's mobile experience awards, and as well as winning Download Speed Experience crown, it tied for the top spot in Video Experience, came in second place in our 4G Availability analysis and third in Upload Speed Experience and Latency Experience. And the operator continues to raise the stakes through extensive network

investment, recently unveiling some [wide-ranging expansion plans](#) in Karnataka, the Uttar Pradesh East and West telecoms regions, and [Rajasthan](#), as well as deploying [massive MIMO](#) mobile technology in urban Kolkata. Competition in India's mobile market remains at fever pitch, and Airtel seems determined to remain a serious contender.

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## Market Analysis






### A close race for second place in download speeds

Airtel came top in our analysis of Download Speed Experience with a score close to a third faster than its rivals. But the next three operators were fairly closely grouped, with less than 0.6 of a megabit separating Jio, Vodafone and Idea. And this close grouping becomes more interesting when you examine the 4G-only download speeds for the three operators. Jio's 4G

download speed is the same as its Download Speed Experience score, since it only operates on LTE. But Vodafone and Idea's 4G download speeds were faster than Jio's. Despite Jio coming second in Download Speed Experience, it fell behind the other two in 4G download (once their slower 3G download speeds were stripped out).

### Comparison of Download Speed Experience across India

Jun1 – Aug 29, 2018

OpenSignal	 <b>A</b> Airtel	 <b>B</b> BSNL	 <b>I</b> Idea	 <b>J</b> Jio	 <b>V</b> Vodafone
Overall	7.53	2.70	4.92	5.47	5.20
4G	9.96	–	6.29	5.47	6.59
3G	2.53	2.70	2.47	–	2.31

measured in Mbps

### Vodafone Idea merger brings another giant to Indian mobile

The Indian mobile competitive landscape is set for further upheaval with the merger of Idea and Vodafone. The impending marriage of [Vodafone and Idea](#) was first announced in early 2017, but these things can take time, and the two were still operating separate consumer brands in October 2018, which is why we have chosen to continue to treat them as separate operators in this report. But the merged Vodafone Idea will be India's [largest operator](#) in terms of subscriber

share, and the company's combined customer bases, and network and infrastructure assets, will undoubtedly make it a force to be reckoned with.

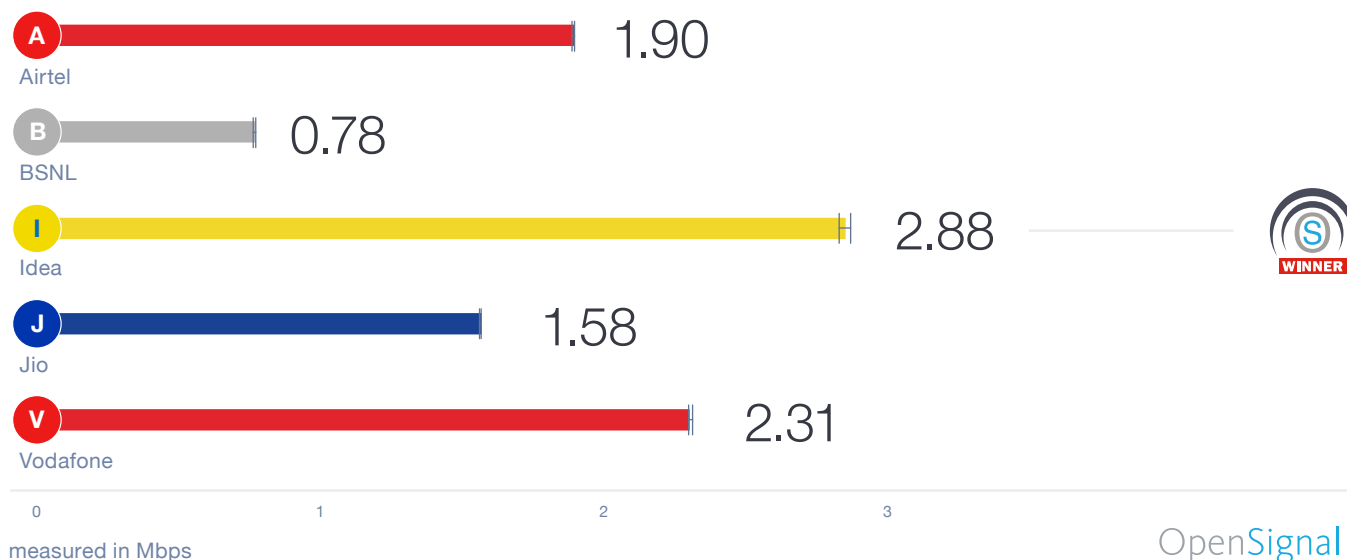
Idea won our Upload Speed Experience category fairly comfortably, scoring an average speed of 2.9 Mbps. Closest rival Vodafone was over half-a-megabit behind, while the others were all under the 2 Mbps mark in our measurements.

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## Market Analysis

## India Upload Speed Experience

Jun1 – Aug 29, 2018



Upload speeds are typically slower than download speeds, as current mobile broadband technologies tend to be focused on providing the best possible download speed for users consuming content. But as mobile internet trends move away from downloading and

consuming to uploading and creating content, upload speeds are becoming more and more important. Idea also topped both our 3G upload and 4G upload speed tables, with average scores 15% faster than its closest rival Vodafone in 3G and 30% faster in 4G.

## Comparison of Upload Speed Experience across India

Jun1 – Aug 29, 2018

OpenSignal	A Airtel	B BSNL	I Idea	J Jio	V Vodafone
Overall	1.90	0.76	2.88	1.58	2.31
4G	2.56	–	3.97	1.58	3.03
3G	0.55	0.76	0.92	–	0.80

measured in Mbps

Meanwhile, BSNL appears some way behind its rivals in many of our overall metrics, since the government-owned operator is currently in the early days of its 4G

rollout in only a few regions. But Indian regulator DoT has given BSNL the [regulatory green light](#) to proceed with a nationwide LTE rollout via an allocation of extra

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## Market Analysis

spectrum in the 2100 MHz band, meaning the state-run company could soon launch pan-India 4G services in all regions (except the Mumbai and Delhi urban circles). While it is likely to take BSNL some time to catch up with its established LTE rivals, we expect to see the operator feature in our India 4G analysis soon.

Extreme levels of competition have meant consolidation and M&A have become an important feature of Indian mobile market, with some major national operators

including RCOM, Aircel and Telenor all exiting the market in the past year alone. But the merger of Vodafone and Idea means the market has now effectively been paired down to four major national players. Relatively [low smartphone penetration](#) and an enormous customer base mean that there is still a lot of potential for growth in India, and we expect the current wave of M&A will now come to an end.

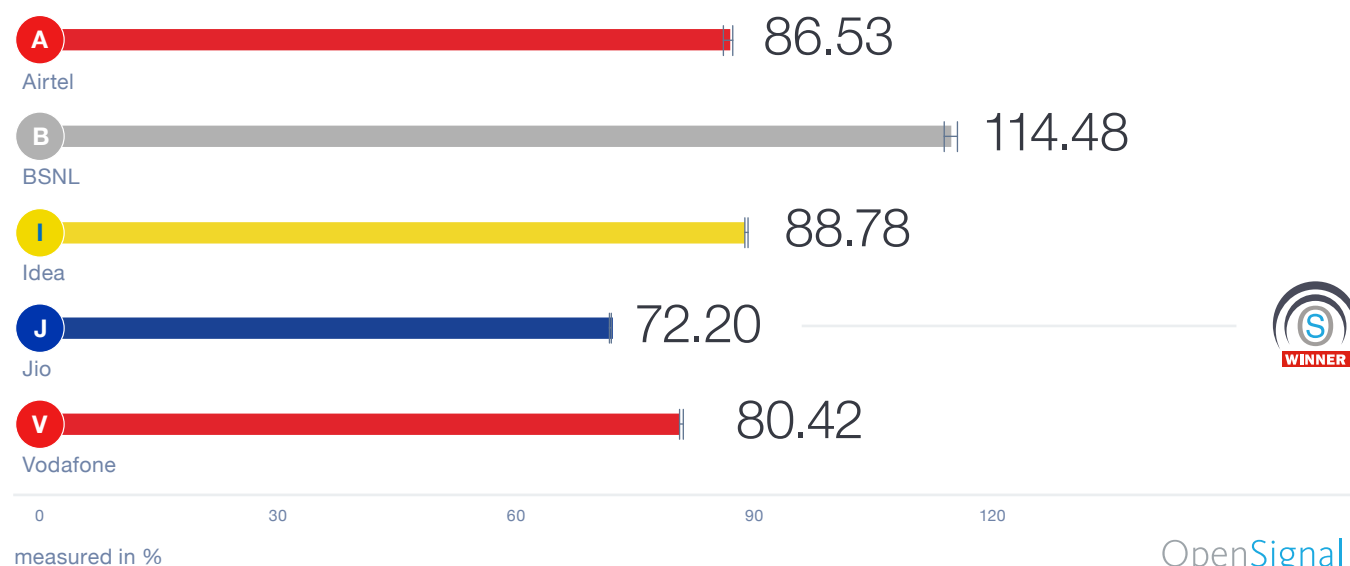
## Jio wins a close race in latency

Jio won our Latency Experience award with an average score of 72.2 milliseconds (ms), a 8ms improvement on its closest rival. Latency refers to the delay users experience as data makes a round trip through the network: If the latency of your network is high, you'll experience a lot more lag time. [Lower latency scores](#)

mean webpages begin loading more quickly and real-time communications apps and online games experience less lag. In our Indian analysis, Vodafone, Airtel and Idea weren't far behind the leader Jio though, with the three operators in a fairly tight group just over the 80ms mark in our measurements.

## India Latency Experience

Jun1 – Aug 29, 2018



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## Market Analysis

While Jio won our overall Latency Experience award, Airtel came top of our 4G latency table, whereas Vodafone led in our 3G latency analysis. In our 4G latency analysis there was a very tight grouping at the top with less than 4ms separating Airtel, Jio and

Vodafone's scores — although Airtel has managed to edge ahead of Vodafone, who came top in this category six months ago. However Vodafone's 3G latency score was over 20ms better than Airtel's — and it was this difference which saw Airtel sink to third place in our overall Latency Experience table.

## Comparison of Latency Experience across India

Jun1 – Aug 29, 2018

OpenSignal	 Airtel	 BSNL	 Idea	 Jio	 Vodafone
Overall	86.53	114.48	88.78	72.20	80.42
4G	68.33	—	76.88	72.20	70.19
3G	123.99	114.48	110.13	—	101.70

measured in %

## Early signs suggest the India mobile price war is easing

The India mobile market has experienced unprecedented growth over the past decade. And the fact that many consumers have jumped straight into 4G and the data age (without going through the more gradual transition to data use that we have seen in more mature markets) is putting extreme pressure on India's mobile networks. This, coupled with fierce levels of competition and the ongoing costs of continued network development, are leading to questions [from analysts](#) over the sustainability of the aggressive offerings of Jio and its rivals as operator [revenues and ARPU continue to fall](#). And with a major [5G spectrum auction](#) expected within the next couple of years, India's mobile operators face some tough decisions about where to focus their investment.

In other markets we have seen similar pressures mitigated by M&A, but India has already seen a savage round of mergers and exits in the past few years, and competition does not appear to be subsiding. Quite simply put, something has to give. And Jio is signalling the beginning of the end with its move away from unsustainable free offerings towards [tiered paid data models](#) that are more familiar in the rest of the mobile world. This will hopefully take some of the pressure off operator margins, and as fierce competition and subscriber growth begins to plateau as the market matures, India's operators will have more breathing space to focus on other ways to differentiate, such as bundling and service quality, as opposed to a race to the bottom on price.

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# Regional Summary

## Jio rules the regions in 4G Availability

- Jio swept the board in our 4G Availability analysis, coming top in all 22 telecoms circles.
- The operator scored over 95% in our 4G Availability measurements in all regions, and topped 97% in 10 of them, including the Kolkata metro circle.
- Jio's average 4G Availability score across all 22 circles we analyzed was 96.7%.
- Of India's other operators, Idea managed to score over 80% in 4G Availability in three regions, while Airtel and Vodafone managed this in two each.

## Latency Experience dominated by Jio

- Jio was the standout operator in our analysis of Latency Experience in India's regions, winning in 17 circles and drawing in a further two.
- Jio's best average Latency Experience score was 54.7ms among our users in Mumbai, over 10ms better than its closest rival in that circle, Idea.
- Of the other operators, Vodafone won two circles and drew in three others. The operator drew with Jio in Kolkata, with Idea in the North East, while we saw a three-way tie in Maharashtra.

## Airtel comes out top in Download Speed Experience

- Airtel dominated our Download Speed Experience regional awards, coming top in 16 circles and drawing in two others. Airtel's highest score was in Orissa where we measured its average speed at 9.9 Mbps.
- Airtel tied with Jio in Himachal Pradesh and with Idea in West Bengal.
- Elsewhere Vodafone won our Download Speed Experience crown in Gujarat, Jio came top in Jammu and Kashmir as well as in Uttar Pradesh (East), while Jio drew with Idea in Uttar Pradesh (West).

## Upload Speed Experience: a close-run race

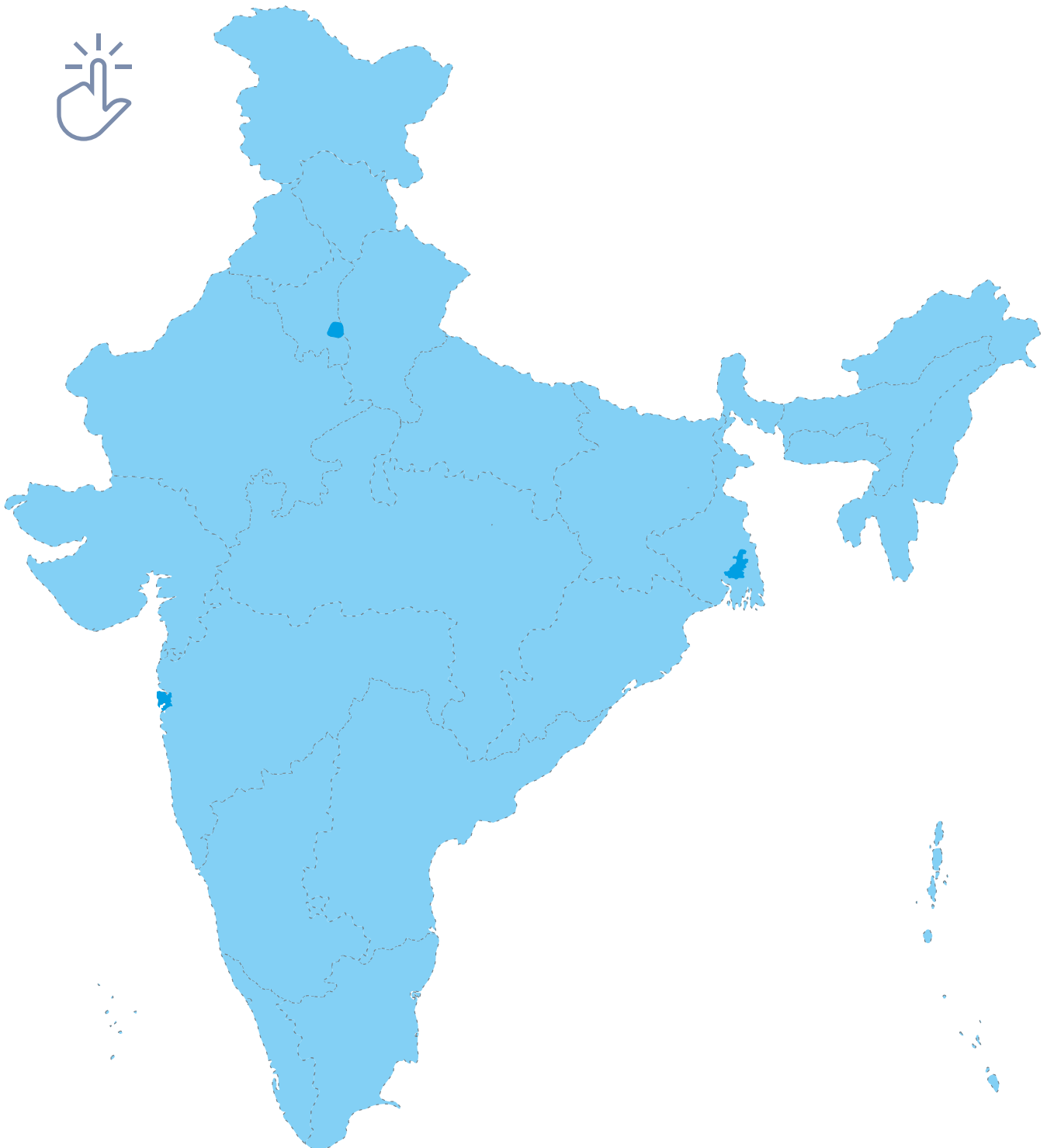
- Idea was the leading operator in our analysis of Upload Speed Experience in India's regions, winning outright in 10 circles and drawing in a further six.
- Idea achieved its best average score of 3.9 Mbps in our measurements in Punjab, but no operator was able to pass the 4 Mbps mark.
- Competition was high in this category, with Vodafone winning in three regions including the Delhi and Kolkata metro circles and drawing in two others. Of the other operators, Airtel won two regions and drew in a third, while Jio managed a draw in two circles.

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## Regional Summary

As part of our most extensive analysis of the Indian mobile market to date, we have included awards in all 22 telecoms circles for 4G Availability, Download Speed Experience, Upload Speed Experience and Latency Experience.

Please [click on the map](#) below to see our winners and analysis in each region.



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# Our Methodology

OpenSignal measures the real-world experience of consumers on mobile networks as they go about their daily lives.

We collect over 3 billion individual measurements every day from tens of millions of smartphones worldwide. Our measurements are collected at all hours of the day, every day of the year, under conditions of normal usage, including inside buildings and outdoors, in cities and the countryside, and everywhere in between. By analyzing on-device measurements recorded in the places where subscribers actually live, work and travel, we report on mobile network service the way users truly experience it.

We continually adapt our methodology to best represent the changing experience of consumers on mobile networks and, therefore, comparisons of the results to past reports should be considered indicative only. For

more information on how we collect and analyze our data, see our [methodology page](#).

For this particular report, 10,509,371,943 data points were collected from 1,769,711 users during the period: June 1 - August 29, 2018.

For every metric we've calculated statistical confidence intervals and plotted them on all of the graphs. When confidence intervals overlap for a certain metric, our measured results are too close to declare a winner in a particular category. In those cases, we show a statistical draw. For this reason, some metrics have multiple operator winners.

## More reading on our website

[Our Methodology](#)   [Our Insights](#)

# Our Award Metrics

Here is a brief description of OpenSignal's new set of award metrics, explaining what they mean and what their roles are in measuring our users' mobile network experience.

For more on how we collect and analyze our data, see our [methodology page](#).

## Video Experience

This metric quantifies the quality of experience for mobile video by measuring real-world video streams from end-user devices. The quality of experience is derived using an International Telecommunication Union (ITU)-based method. This approach is built upon on detailed studies which have derived a relationship between technical parameters, including picture quality, video loading time and stall rate, with the perceived Video Experience as reported by real people. To calculate the Video Experience we are directly measuring video streams from end-user devices and using this ITU approach to quantify the overall Video Experience for each operator on a scale from 0 to 100.

## 4G Availability

This metric shows the proportion of time OpenSignal users have an LTE connection available to them on each operator's network. It's a measure of how often users can access a 4G network rather than a measure of geographic or population coverage.

Availability is not a measure of coverage or the geographic extent of a network. Instead, it measures what proportion of time people have a network connection, in the places they most commonly frequent, something often missed by traditional coverage metrics.

## Latency Experience

Latency refers to the delay users experience as data makes a round trip through the network. If the latency

of your network is high, you'll experience a lot more lag time. We measure our latency metrics in milliseconds for both 3G, 4G and overall – the lower the latency value, the more responsive the network.

Latency Experience is calculated as a weighted average of the individual 3G and 4G latencies based on the proportion of time typical users spend connected to each network type.

## Download Speed Experience

This metric shows the average download speed experienced by OpenSignal users across all of an operator's 3G and 4G networks. Download Speed Experience doesn't just factor in 3G and LTE speeds, but also the availability of each network technology. Operators with lower LTE availability tend to have lower Overall download speeds because their customers spend more time connected to slower 3G networks.

## Upload Speed Experience

Our Upload Speed Experience metric measures the average upload speeds for each operator on 4G and 3G. Just as with our download speed metrics, 4G & 3G upload speed is measured in Mbps and reflects the average uplink speeds our users experience over the course of the data collection period.

Upload Speed Experience represent the typical everyday speeds a user experience when uploading content to the operator's mobile network.