



TUTELA 

Australia & New Zealand

State of Mobile Experience

Analysts

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NOVEMBER 2020

Annual Report

www.tutela.com

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Introduction

Despite a few thousand kilometres of ocean between the two, Australia and New Zealand are forever mistaken as one country or with similar characteristics, leading to many rivalry moments over the years. From sport, to famous actors, and even dessert, both countries are always trying to be seen as the separate country they are. But just like any sporting event, in the mobile industry world it's of great interest to see these two go head to head. With regards to 5G, Australia has gone full steam ahead with deployment, with Telstra reporting coverage of 41% of the

population already and a target established of 75% coverage by June 2021(1); the Australian operators will also focus their attention on a 5G high-band auction set for March 2021(2). In New Zealand, there has been a different approach to 5G deployments: earlier this year, a decision was made to release the 3.5 GHz rights to those operators that expressed interest as a direct offer rather than the initial auction-style format, thus reducing one obstacle to 5G deployment that has thwarted other countries' plans due to the pandemic(3).

(1) RCRWireless, Telstra reaches over 40% of Australia's population with 5G

<https://www.rcrwireless.com/20201012/5g/telstra-reaches-over-40-australia-population-5g>

Retrieved 22nd October

(2) RCRWireless, Australia sets allocation limit for upcoming 5G spectrum auction

<https://www.rcrwireless.com/20200817/5g/australia-sets-allocation-limit-upcoming-5g-spectrum-auction>

Retrieved 22nd October

(3) GSMA, New Zealand leads the way with direct approach to 5G spectrum access

<https://www.gsma.com/spectrum/new-zealand-leads-the-way-with-direct-approach-to-5g-spectrum-access/>

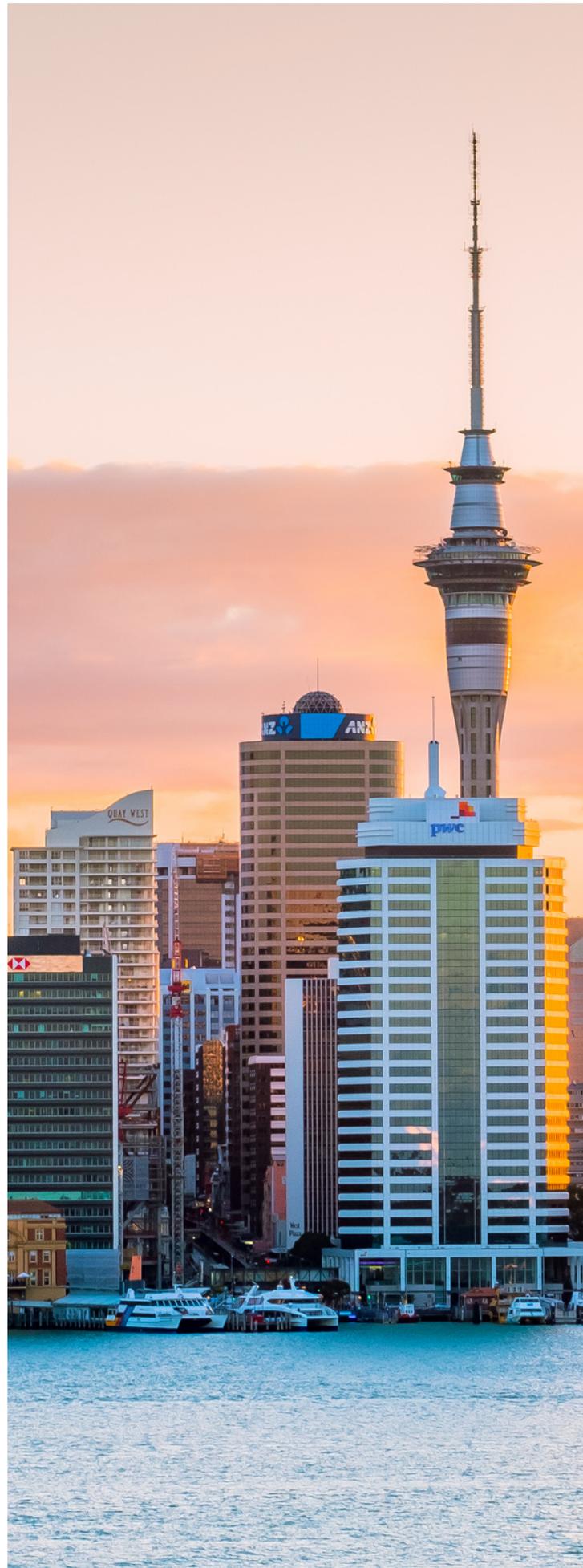
Retrieved 22nd October

While current commercial deployments in New Zealand may be far less widespread than Australia, there are still commercial deployments available. Vodafone has launched 5G in parts of Auckland, Wellington, Christchurch and Queenstown, while Spark has mobile 5G launched in Palmerston North, downtown Auckland and Takapuna.

In Tutela's latest Global Mobile Experience Report, Australia was in 15th place for Excellent Consistent Quality, whilst New Zealand was not far behind at 20th. For Core Consistent Quality, Australia and New Zealand tied for 17th place(4).

Tutela has analyzed over 1 billion total records taken from real-world smartphone users, including more than 17 million speed and latency tests, taken between April 1st and September 30th 2020.

(4) Tutela, Global Mobile Experience
<https://www.tutela.com/blog/global-mobile-experience-2020>
Retrieved 22nd October





Key findings

- Telstra consistently offered the best mobile experience in Australia, with the operator taking first place with the highest Excellent Consistent Quality, the highest Core Consistent Quality, fastest download speed, and best coverage.
- However, it wasn't a Telstra clean sweep: Vodafone took first place for the fastest upload speed in Australia and the best latency result.
- In New Zealand, Spark won in three of the six metrics tested, including highest highest Excellent and Core Consistent Quality in the country and best coverage. Vodafone had the fastest download and upload speed, and 2degrees had the best latency result.

Results overview

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Mobile experience results

Australia, November 2020

Telstra

vodafone

OPTUS

Excellent Consistent Quality	★ Winner		
Core Consistent Quality	★ Winner		
Download throughput	★ Winner		
Upload throughput		★ Winner	
Latency		★ Winner	
Coverage	★ Winner		

Results from 1,684,707,336 total records taken from real-world smartphone users in Common Coverage Areas between April 1st and September 30th 2020.

"Telstra delivered the highest percentage of Excellent Consistent Quality in Tutela's tests"



Based on the highest Excellent Consistent Quality in Common Coverage Areas.

Results overview

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Mobile experience results

New Zealand, November 2020



Spark^{nz}

vodafone



Excellent Consistent Quality	★ Winner		
Core Consistent Quality	★ Winner		
Download throughput		★ Winner	
Upload throughput		★ Winner	
Latency			★ Winner
Coverage	★ Winner		

Results from 186,418,361 total records taken from real-world smartphone users in Common Coverage Areas between April 1st and September 30th 2020.

"Spark delivered the highest percentage of Excellent Consistent Quality in Tutela's tests"



Based on the highest Excellent Consistent Quality in Common Coverage Areas.

Understanding this report

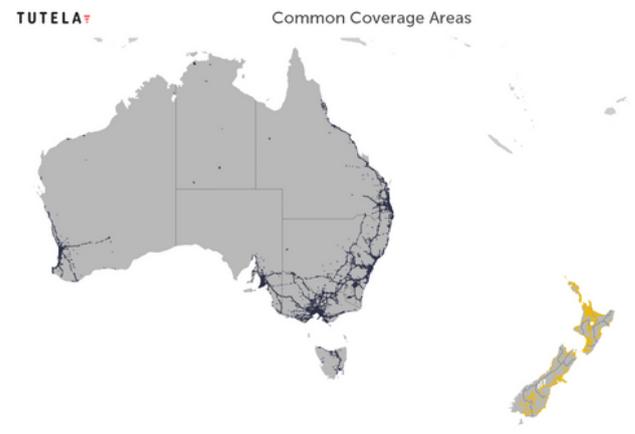
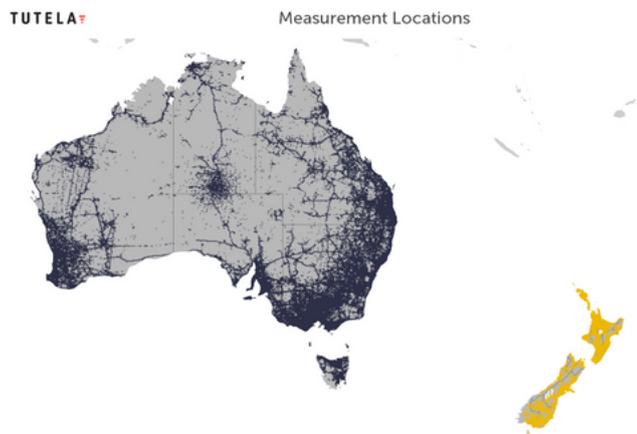
Tutela uses two key methodological components to best compare user experience across operators: Consistent Quality and Common Coverage Areas. Consistent Quality is a set of metrics that Tutela has developed to objectively evaluate when connections networks are (and are not) enabling users to do almost everything that they want to do on their smartphones.

To best serve Tutela's goal to accurately measure and represent the real-world, end-to-end experience of actual users, our methodology is subject to ongoing improvements, which allow us to update the methodology in line with changes in network technology, measurement capabilities, and the realities of how people use their smartphones. As of this report, the methodology includes an updated version of Consistent Quality that better accounts for reliability, an area-based Coverage Score, a more granular Common Coverage Areas definition, and the separation out of users on MVNO or flanker brands. As a result, changes in the numeric values in this report compared to 2019 are not necessarily representative of year-on-year changes in the end-to-end user experience.



The methodology is covered in detail at the end of this report and [on our website](#), but simply put, there are two sets of thresholds, Excellent and Core. A connection that hits the Excellent threshold is sufficient for use-cases like 1080p video streaming or multiplayer gaming, while a Core connection will stream standard-definition video or handle things like web browsing or uploading photos to social media. The percentages you see in this report represent the percentage of tests on a given operator that were above the Excellent or Core thresholds.

Common Coverage Areas are parts of the country where all national operators offer service, either on their own network or through a domestic roaming agreement. Comparing performance within common coverage areas ensures that user experience is being compared in places where networks are competing head-to-head, and ensures that operators with more diverse coverage are not being penalized. In this report, all performance metrics are taken from tests conducted in Common Coverage Areas only.



Consistent Quality

Country comparison

Australia achieved the highest Excellent Consistent Quality over New Zealand with 83.9% of subscribers in Common Coverage Areas across Australia having a network experience suitable for use-cases like 1080p video streaming, real-time mobile gaming or HD video calling. New Zealand was close behind by only 2.3% for an Excellent Consistent Quality of 81.6%. Australia also

had the highest Core Consistent Quality over New Zealand with 94.9% of subscribers in the country having a network experience suitable for use-cases like SD video streaming, social media sharing and web browsing; however, New Zealand was only 2.9% behind Australia for a Core Consistent Quality of 92.0%.



Australia Common Coverage Areas (CCAs)

In Common Coverage Areas across Australia, Telstra had the highest Excellent Consistent Quality at 86.1%, with Vodafone only 1.6% behind Telstra and Optus in third place with a difference in performance of 4.6% behind

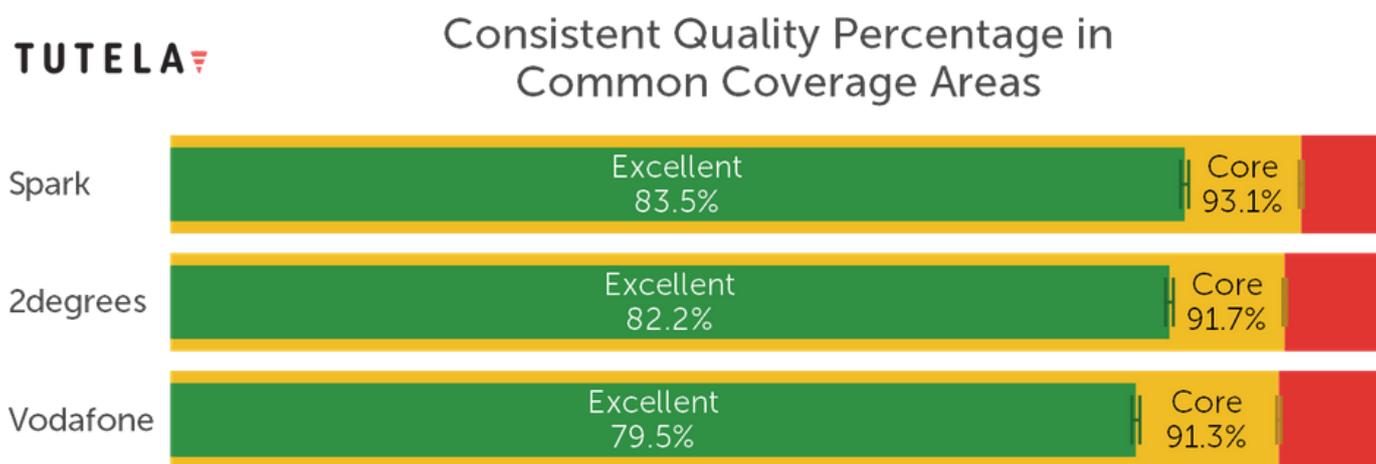
first place Telstra. All three operators were comfortably above 90% for Core Consistent Quality and Telstra was in first place with 95.6% and Optus in third with only 1.2% separating the two.



New Zealand Common Coverage Areas (CCAs)

In Common Coverage Areas across New Zealand, Spark had the highest Excellent Consistent Quality at 83.5%, followed by 2degrees at 82.2% and Vodafone in third place at 79.5%, 4.0% behind first place Spark.

For Core Consistent Quality, all three operators recorded results above 90%, and only a difference in performance of 1.8% separated third place Vodafone from first place Spark.



Download throughput

Country comparison

As with download throughput, Australia came out on top, although the gap between the two countries wasn't particularly significant.

Australia had the fastest median download speed at 24.9 Mbps with New Zealand only behind by 2.3 Mbps.

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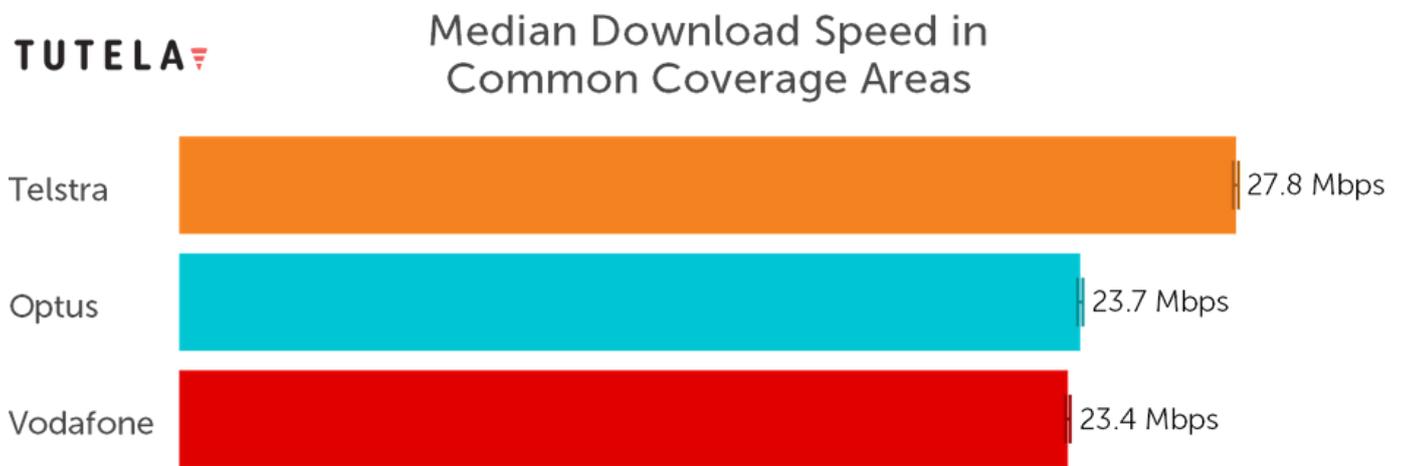
Median Download Speed in Common Coverage Areas



Australia Common Coverage Areas (CCAs)

In Common Coverage Areas across Australia, Telstra had the fastest median download speed at 27.8 Mbps. With a difference in performance of 4.1 Mbps, Optus was in

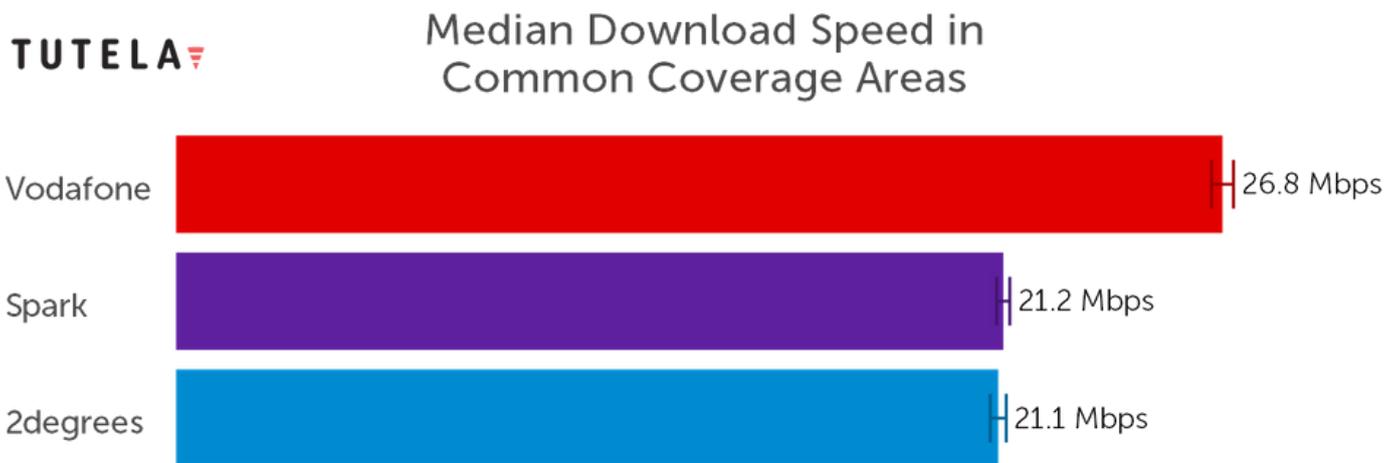
second place with a median download speed of 23.7 Mbps, and Vodafone was in third with 23.4 Mbps, 4.4 Mbps slower than Telstra.



New Zealand Common Coverage Areas (CCAs)

In Common Coverage Areas across New Zealand, Vodafone had the fastest median download speed at 26.8 Mbps. Spark and

2degrees were statistically tied for second place for download throughput, with both just over 5 Mbps slower than Vodafone.

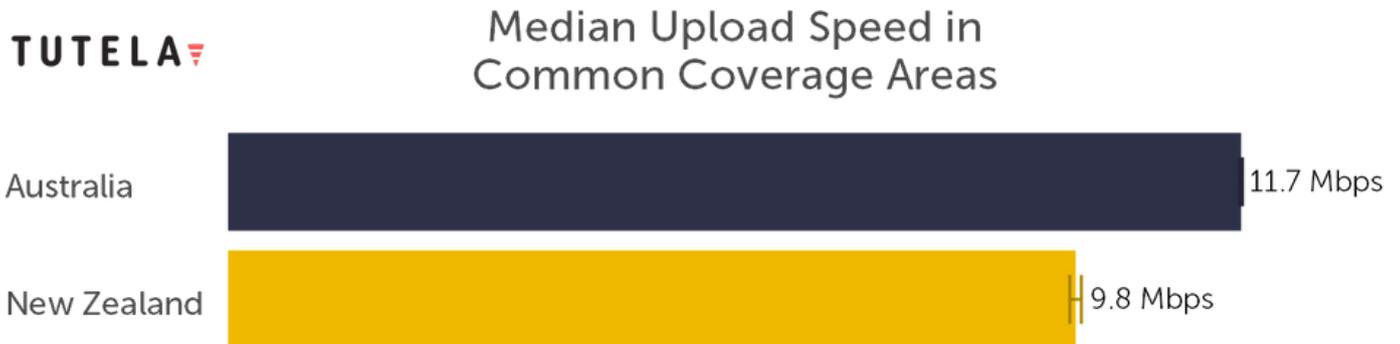


Upload throughput

Country comparison

Australia also had the fastest median upload speed out of the two countries at 11.7 Mbps, with New Zealand behind by only 1.9 Mbps. However, Australia's upload was 13.2 Mbps

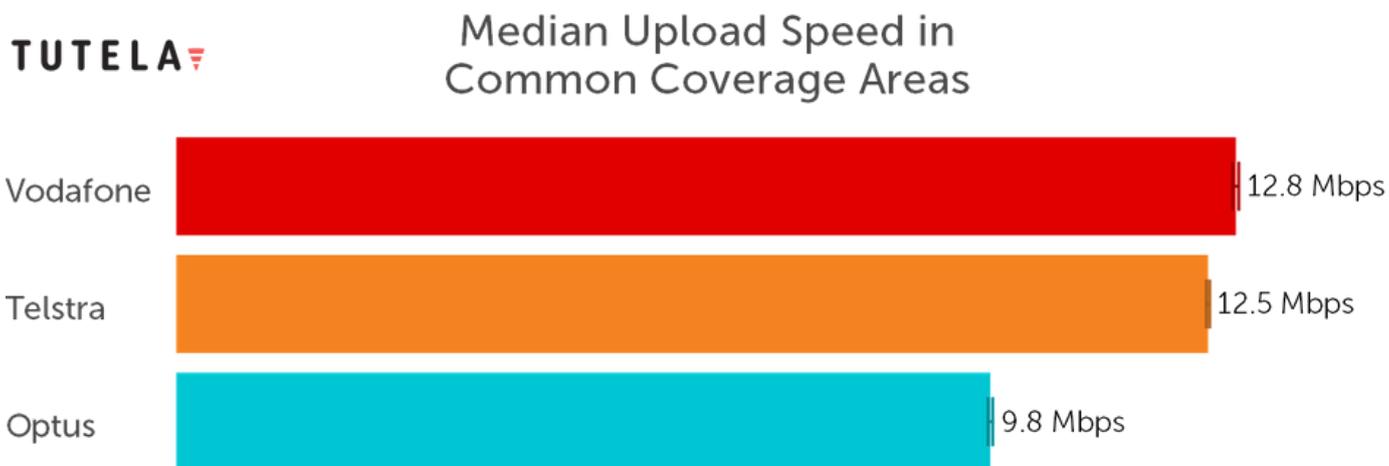
less than its download speed, and New Zealand also had a decrease of 12.8 Mbps compared to its download speed.



Australia Common Coverage Areas (CCAs)

In Common Coverage Areas across Australia, Vodafone had the fastest median upload speed at 12.8 Mbps, despite its last place ranking in the download speed test. Telstra was in second place by only 0.3 Mbps; however, Telstra’s upload speed was 15.3 Mbps less than its download speed, while Optus was only 3 Mbps slower than first place Vodafone. It is notable that Optus slips to third place for upload throughput, and is also the only operator to use time-division duplex (TDD) spectrum widely for 4G. TDD

spectrum can be configured to favour download throughput at the expense of upload throughput – a typical configuration(5), since subscribers tend to download more than they upload – resulting in slower median upload throughputs. This phenomenon is observable in other operators that lean more heavily on TDD spectrum, such as Sprint in the US(6), and could be behind Optus’s lower median upload throughput.



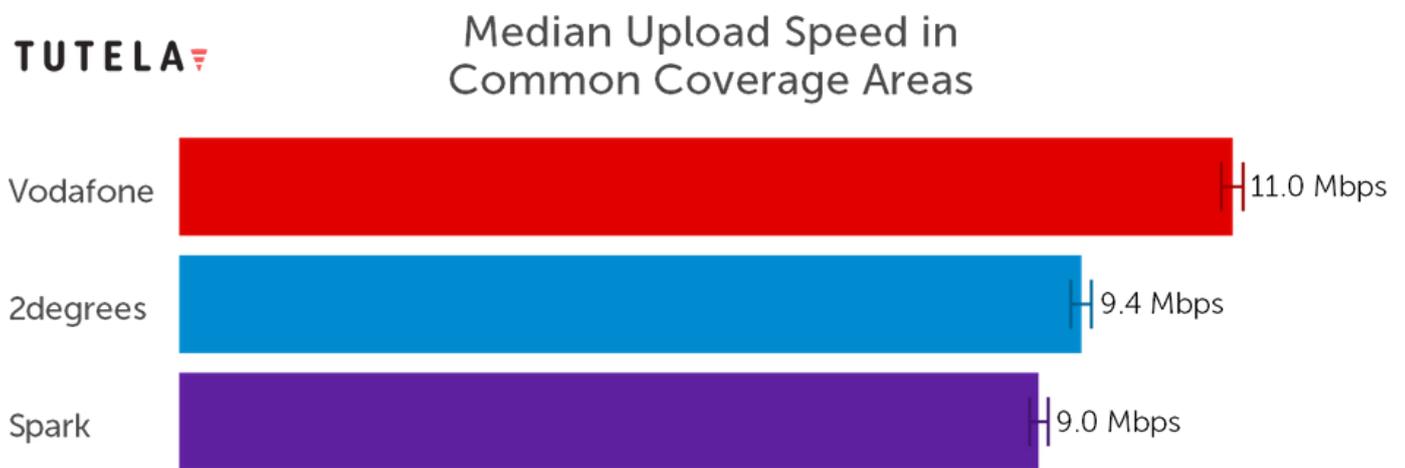
(5) FierceWireless, On path to gigabit LTE, Sprint moving download/upload configuration to 3-1 to support 12-1 traffic ratio <https://www.fiercewireless.com/tech/path-to-gigabit-lte-sprint-moving-upload-download-configuration-closer-to-12-1-traffic-ratio>
Retrieved 22nd October

(6) Tutela, USA State of Mobile Experience 2020 <https://www.tutela.com/hubfs/Blog%20Images/USA%20State%20of%20Mobile%20Experience%20Report%20-%20September%202020.pdf>
Retrieved 22nd October

New Zealand Common Coverage Areas (CCAs)

In Common Coverage Areas across New Zealand, Vodafone had the fastest median upload speed at 11.0 Mbps, 15.8 Mbps slower than its download speed. 2degrees and Spark were also only 1.6 Mbps and 2 Mbps

slower than first place Vodafone in the upload speed test. 2degrees managed to beat out Spark for second place by 0.4 Mbps, whilst Spark won over 2degrees by only 0.1 Mbps in the download speed test.



Latency

Country comparison



The most significant difference in performance against the two countries was in the latency test with Australian

subscribers experiencing a more responsive network than subscribers in New Zealand by 11.2 ms.

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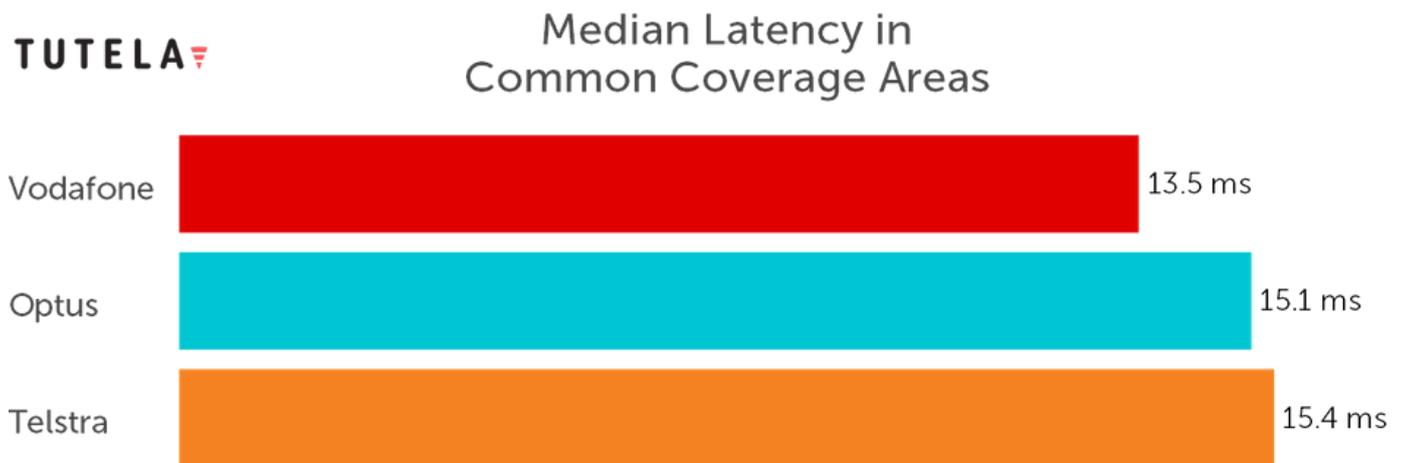
Median Latency in Common Coverage Areas



Australia Common Coverage Areas (CCAs)

Despite the fact that Vodafone Australia placed second behind Telstra in most categories tested and trailed behind by 4.4 Mbps in the download speed test, the operator in Common Coverage Areas across

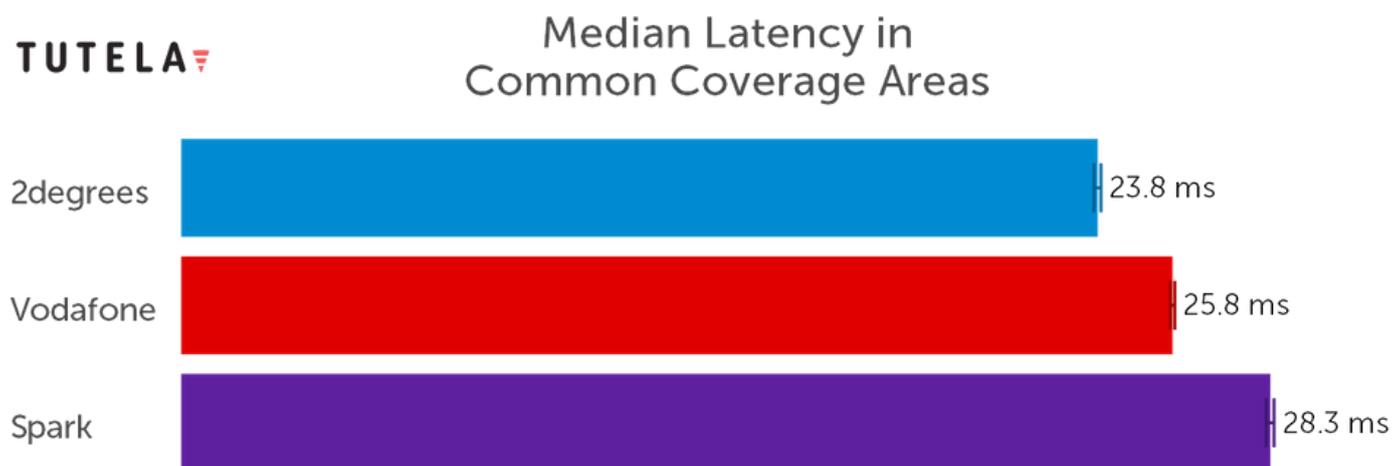
Australia had the most responsive network at 13.5 ms which sheds more light on its ability to keep up with its competitor. Both Optus and Telstra were behind first place Vodafone by only 1.6 ms and 1.9 ms, respectively.



New Zealand Common Coverage Areas (CCAs)

In a similar fashion to Australia, in Common Coverage Areas across New Zealand 2degrees had the most responsive network at 23.8 ms, 4.5 ms more responsive than

Spark. 2degrees managed to stick close to Spark throughout each category tested, with a win over Spark in the upload speed test by 0.4 Mbps as well.

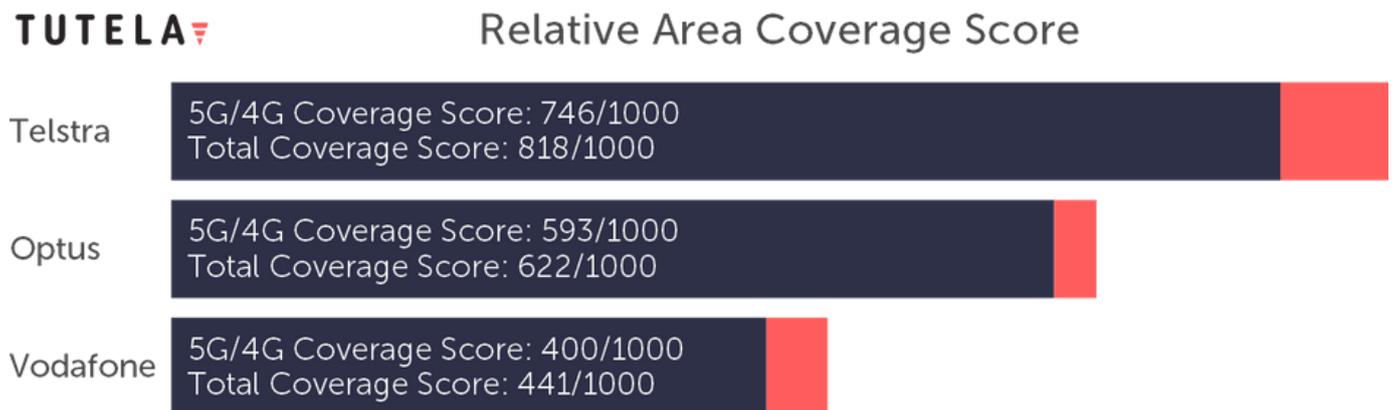


Coverage

Australia Common Coverage Areas (CCAs)

In Australia, Telstra demonstrated the greatest relative geographic coverage, with a coverage score of 746 on a 4G/5G connection, and 818 overall. Optus was in second place with a total 196 less coverage

than Telstra in total and 153 less coverage on 5G/4G. Vodafone had the least coverage with 400 on a 4G/5G network, 346 less coverage than first place Telstra, and a total coverage score of 441.



Tutela measures relative coverage between providers in a country by looking at the geographic area that an operator's subscribers have seen coverage, compared to the total area of the country where the subscribers of any operator can get a mobile connection. The geographic area covered by each operator, relative to the total covered area of the country, is presented as a score out of 1,000.

Tutela measures this coverage from the perspective of end users – that is to say, inclusive of times when coverage is provided as part of a domestic roaming agreement or shared infrastructure program. An equal number of representative samples are considered from each operator in a country to determine coverage. Coverage is assessed over the preceding 12 months to ensure any effects of seasonality are appropriately included.

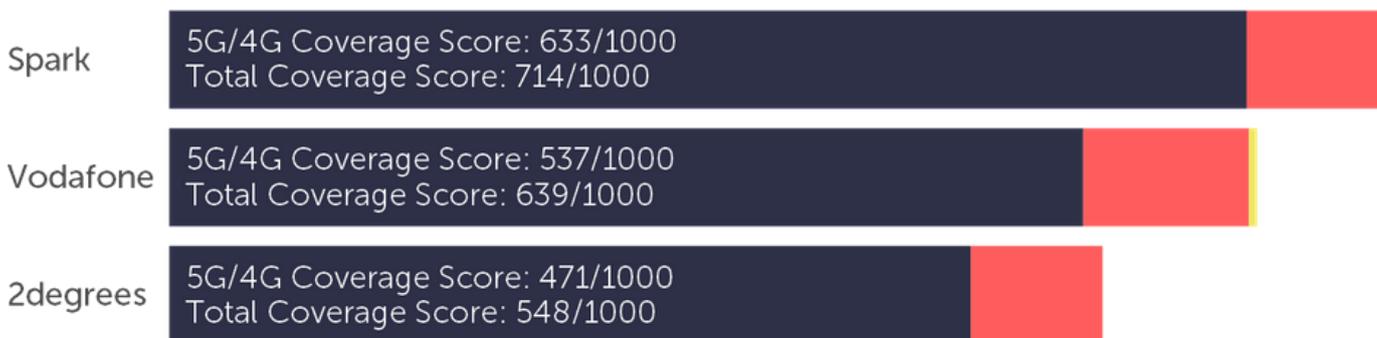
New Zealand Common Coverage Areas (CCAs)

In New Zealand, Spark demonstrated the greatest relative geographic coverage, with a coverage score of 633 on a 4G/5G connection, and 714 overall. Vodafone was relatively close behind Spark with a 5G/4G

coverage score of 537, only 96 less than Spark, and a total coverage score of 639. In third place, 2degrees had the least coverage with a score of 471 on a 4G/5G connection, and 548 overall.

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Relative Area Coverage Score



Tutela measures relative coverage between providers in a country by looking at the geographic area that an operator’s subscribers have seen coverage, compared to the total area of the country where the subscribers of any operator can get a mobile connection. The geographic area covered by each operator, relative to the total covered area of the country, is presented as a score out of 1,000.

Tutela measures this coverage from the perspective of end users – that is to say, inclusive of times when coverage is provided as part of a domestic roaming agreement or shared infrastructure program. An equal number of representative samples are considered from each operator in a country to determine coverage. Coverage is assessed over the preceding 12 months to ensure any effects of seasonality are appropriately included.

Technology usage

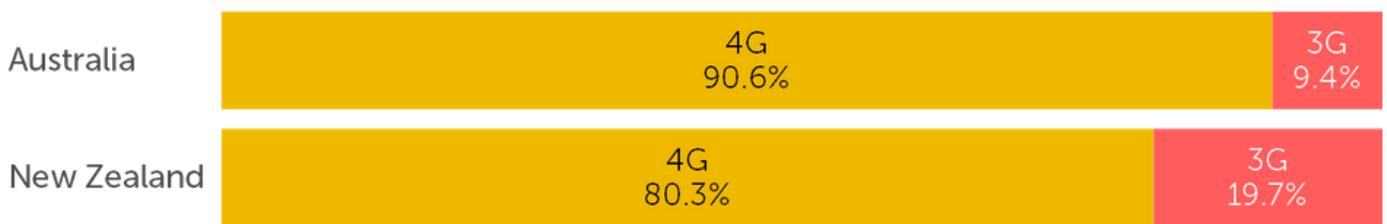
Country comparison

Subscribers in Australia are spending 10.3% more time on 4G than New Zealand subscribers, with 90.6% spent on this

network compared to 80.3%. In New Zealand, subscribers may find themselves on a 3G network 19.7% of the time.

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Percent of Time by Mobile Connection Type Nationwide

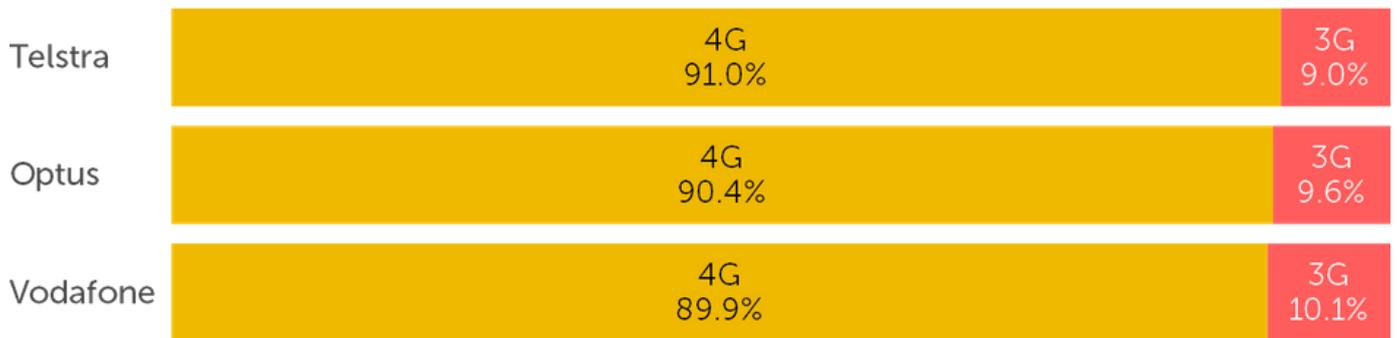


When looking at the operators in Australia, subscribers across all three are spending a majority of the time on a 4G network, with Telstra at 91.0% of the time, Optus at 90.4%, and Vodafone at 89.9%. In New Zealand, Spark subscribers are finding themselves on

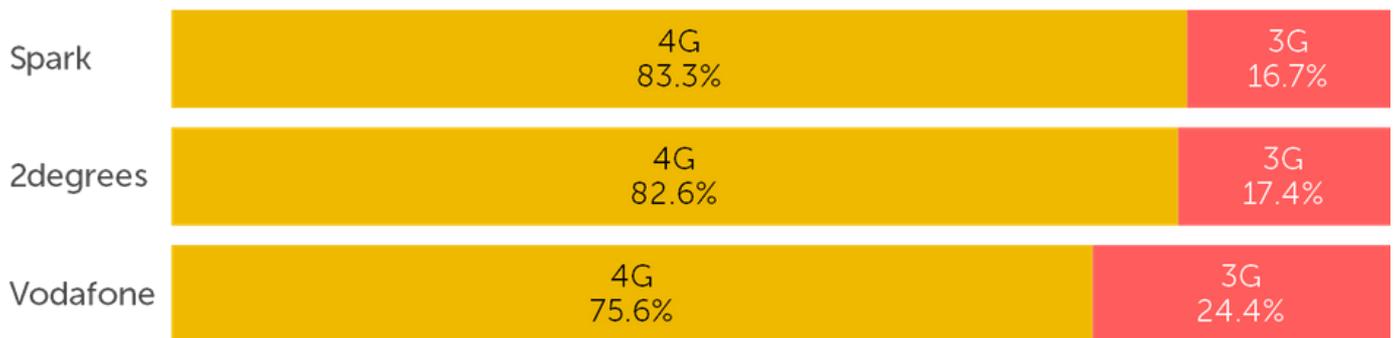
a 4G network 83.3% of the time, followed by 2degrees at 82.4%, and Vodafone at only 75.6% of the time. Vodafone subscribers may find themselves on a 3G network 24.4% of the time.



Percent of Time by Mobile Connection Type Nationwide

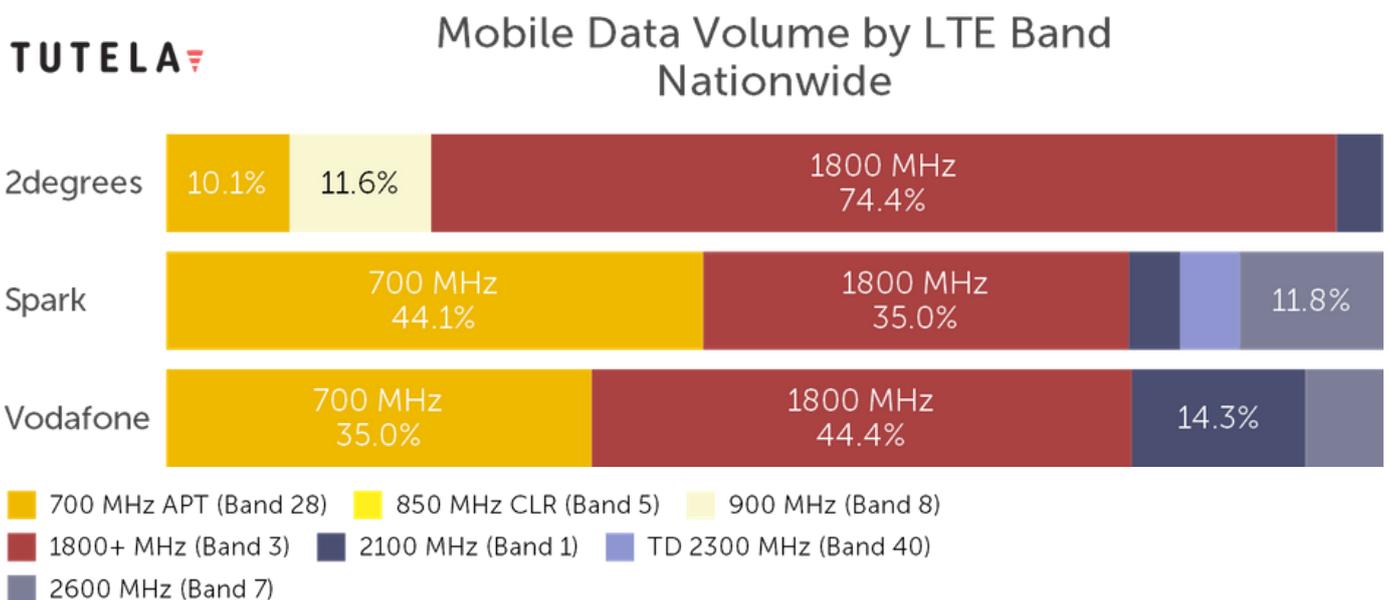
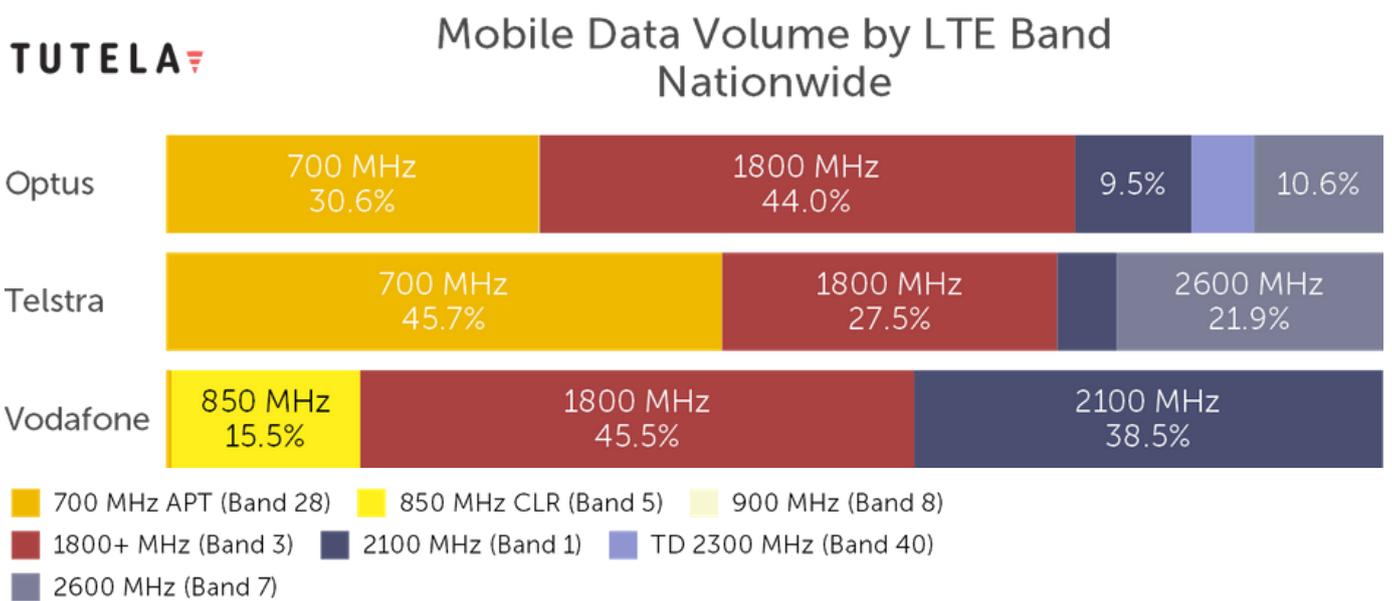


Percent of Time by Mobile Connection Type Nationwide



With the likes of Telstra in Australia and Spark in New Zealand, operators in the southern hemisphere continue to rely heavily on the low-band 700 MHz, with Telstra using this for the vast majority of its data traffic. In each country there was a mixture of both 700 MHz and 1800 MHz occurring, except for 2degrees with an

allocation of 74.4% of 1800 MHz. Vodafone in Australia was the only operator to utilize the 850 MHz spectrum with 15.5% allocated along with 38.5% allocation of 2100 MHz. Vodafone in New Zealand also utilized the 2100 MHz spectrum with 14.3% allocated along with 44.4% allocation of 1800 MHz and 35.0% allocated to 700 MHz.





Methodology

Tutela is an independent crowdsourced data company with a global panel of over 300 million smartphone users. We gather information on mobile infrastructure and test wireless experience, helping organizations in the mobile industry to understand and improve the world's networks. Tutela is a member of the Comlinkdata family.

Tutela collects data and runs network tests via software embedded in a diverse range of consumer applications, which enable the measurement of real-world quality of experience for mobile users, 24/7. For this report, Tutela has collected over 1 billion total records, including more than 17 million speed and latency tests.

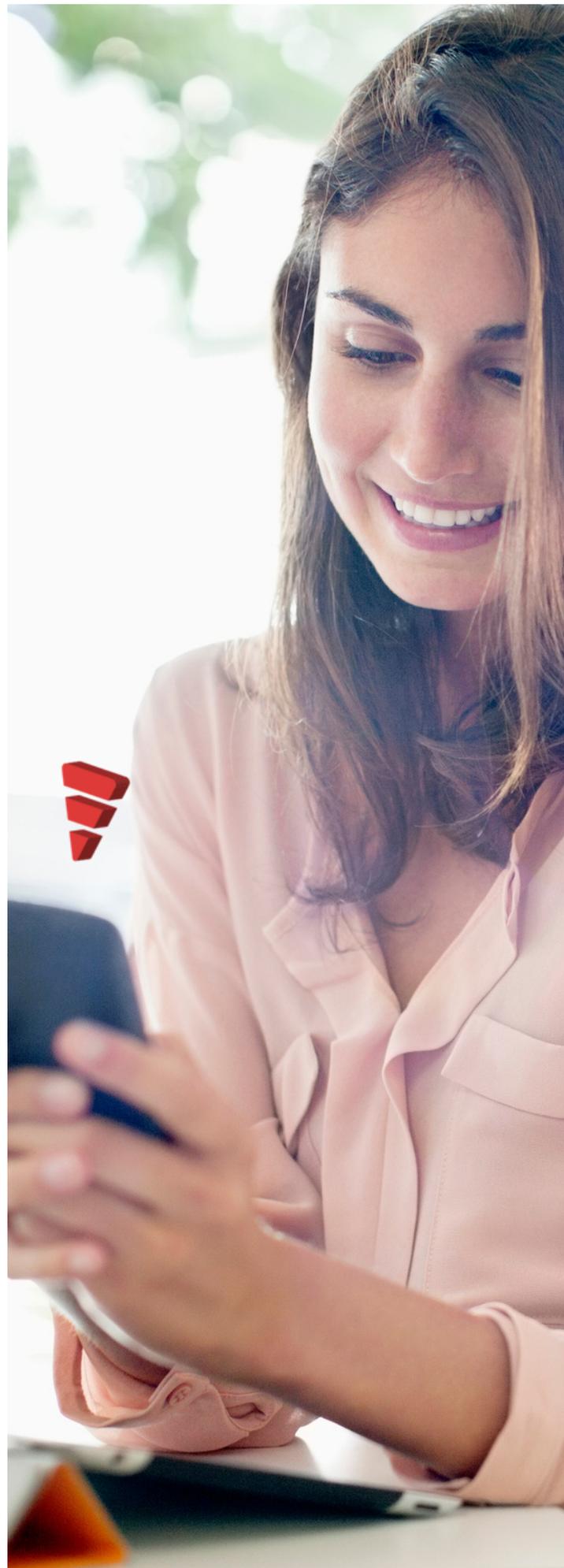
Tutela measures mobile experience based on the real-world performance of actual network subscribers for a given brand, inclusive of occasions when a network or tariff may be throttled or congested. Results in this report are based on a testing configuration designed to represent the typical (rather than maximum) performance that users experience. We use a 2 MB file to perform our download testing and a 1 MB file to perform our upload testing. Latency performance in this report reflects one-way UDP latency. Tests are conducted against the same content delivery networks that power many of the world's most popular consumer applications and websites, and as such reflect the end-to-end performance of the network.

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.

As operators have upgraded 3G networks through to the latest 5G technology, theoretical (and even real-world) peak throughput speeds have increased to where they vastly outstrip the maximum needed for any current use-case. Real-world speeds above 100 Mbps are now common in parts of the world, and with a 4K video stream — which itself is rarely something smartphone users need — using a fifth of that, average download speed has lost some of its relevance as the dominant statistic used to measure the quality of wireless networks.

At its most basic, 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 connections are (and are not) enabling users to do those things, Tutela has developed a standard called Consistent Quality.



Simply put, it's two sets of thresholds, called Excellent and Core. If a connection hits the Excellent standard, it's sufficient for the most demanding mobile use-cases, like HD group video calling or 1080p video streaming. A Core connection is good enough for SD video streaming, web browsing, emails, and VOIP calling, but users are more likely to experience delays or buffering when trying to use more demanding apps. Tutela also considers times when a Consistent Quality style test was attempted, but subsequently failed for distinguishable connectivity issues

on the download or server response component, towards the total percentage of "failed" tests against both sets of thresholds. Tutela bases the threshold values on the minimum performance requirements published by popular apps. We most recently updated our Consistent Quality thresholds on September 1st, 2020. Tutela's consistent quality metric, as used in our reports, simply measures the percentage of time that users can hit the thresholds. The higher the number, the more often users have a Core or Excellent quality connection.

Excellent Quality

KPI	Download throughput	Upload throughput	Latency	Jitter	Packet loss	Time to first byte
Minimum acceptable value	5 Mbps	1.5 Mbps	50 ms	30 ms	1%	3.2 s

Core Quality

KPI	Download throughput	Upload throughput	Latency	Jitter	Packet loss	Time to first byte
Minimum acceptable value	1.5 Mbps	500 Kbps	100 ms	50 ms	5%	10.67 s

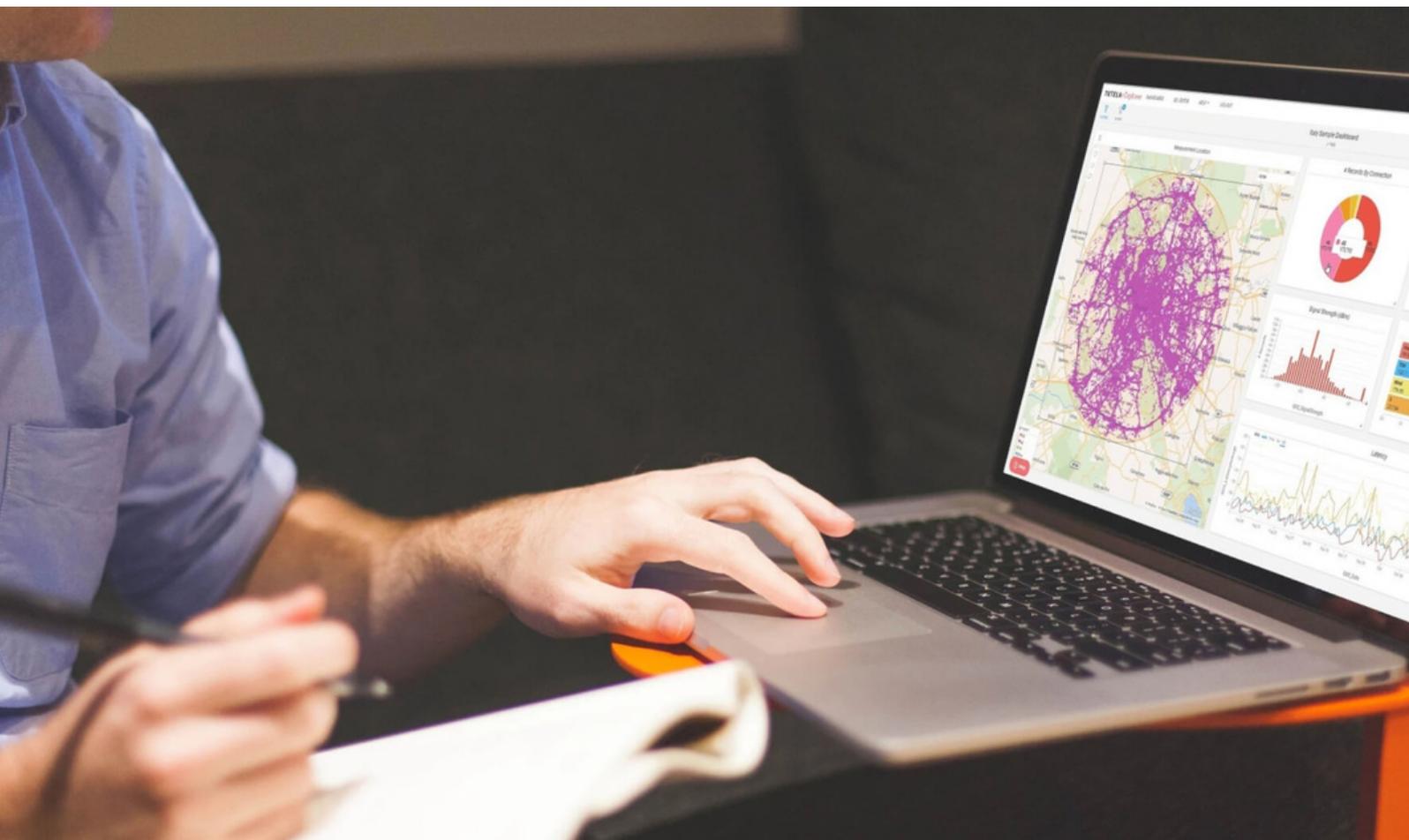
Discover Tutela Explorer

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

Visit www.tutela.com/explorer to learn more

Learn more



Appendix

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Results Overview in Common Coverage Areas

	Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
Optus	23.7 Mbps \pm 0.07 Mbps	9.8 Mbps \pm 0.03 Mbps	15.1 ms \pm 0.013 ms	81.49% \pm 0.09%	94.36% \pm 0.04%
Telstra	27.8 Mbps \pm 0.07 Mbps	12.5 Mbps \pm 0.02 Mbps	15.4 ms \pm 0.017 ms	86.15% \pm 0.08%	95.62% \pm 0.04%
Vodafone	23.4 Mbps \pm 0.06 Mbps	12.8 Mbps \pm 0.04 Mbps	13.5 ms \pm 0.019 ms	84.46% \pm 0.09%	94.87% \pm 0.04%

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Results Overview in Common Coverage Areas

	Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
2degrees	21.1 Mbps \pm 0.21 Mbps	9.4 Mbps \pm 0.11 Mbps	23.8 ms \pm 0.096 ms	82.25% \pm 0.32%	91.74% \pm 0.15%
Spark	21.2 Mbps \pm 0.17 Mbps	9.0 Mbps \pm 0.10 Mbps	28.3 ms \pm 0.105 ms	83.50% \pm 0.33%	93.10% \pm 0.17%
Vodafone	26.8 Mbps \pm 0.28 Mbps	11.0 Mbps \pm 0.12 Mbps	25.8 ms \pm 0.063 ms	79.48% \pm 0.33%	91.26% \pm 0.18%

About Tutela

Tutela Technologies, Ltd., is an independent crowdsourced data company with a global panel of over 300 million smartphone users. It gathers information on mobile infrastructure and tests wireless experience, helping organizations in the mobile industry to understand and improve the world's networks. Data and insights provided by Tutela are trusted by the engineering teams at mobile network operators and network equipment manufacturers around the world and used to compare operators as well as inform decisions in network and infrastructure planning and optimisation. The organization is headquartered in Victoria, British Columbia.

Tutela does not collect any sensitive personal data and is compliant with international privacy regulations including CCPA and GDPR.

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

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