TUTELA

South Africa

State of Mobile Networks

Analysts

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Annual Report

JANUARY 2020

www.tutela.com

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Introduction

With 2019 now firmly in the rear-view mirror, mobile operators across the world are looking back and reflecting on what was achieved in a year dominated by a race towards 5G deployment. For South Africa, this has been less about being swept up in the 5G craze and more about staying alive in a tough market.

The battle for survival has been evidenced by two mobile networks signing a roaming agreement to expand Cell C's 4G network coverage(1), whilst in the same breath Cell C rejected a takeover bid by Telkom(2). Vodacom extended its 4G network to over 16 million people living in rural areas(3), and an inquiry by the Competition Commission of South Africa released its findings on the country having some of the most expensive mobile prepaid data prices in comparison to other countries within and outside of Africa(4).

In this State of Mobile Networks report, Tutela has collected and analyzed over 7 million speed tests, 117 million latency tests, and 831 million total mobile records between June 1st and November 30th 2019 to build a complete picture of mobile network experience across the country, and see how the operators stack up as they move towards widespread 5G deployments.

(1) Telecompaper, MTN South Africa signs expanded network deal with Cell C
https://www.telecompaper.com/news/mtn-south-africa-signs-expanded-network-deal-with-cell-c--1316518
Retrieved 08 January 2020

(2) Telecompaper, Cell C rejects Telkom South Africa's takeover bid
https://www.telecompaper.com/news/cell-c-rejects-telkom-south-africas-takeover-bid--1318092
Retrieved 08 January 2020

(3) Telecompaper, Vodacom South Africa extends 4G coverage to over 16 mln people in rural areas
https://www.telecompaper.com/news/vodacom-south-africa-extends-4g-coverage-to-over-16-mln-people-in-rural-areas--1304790
Retrieved 08 January 2020

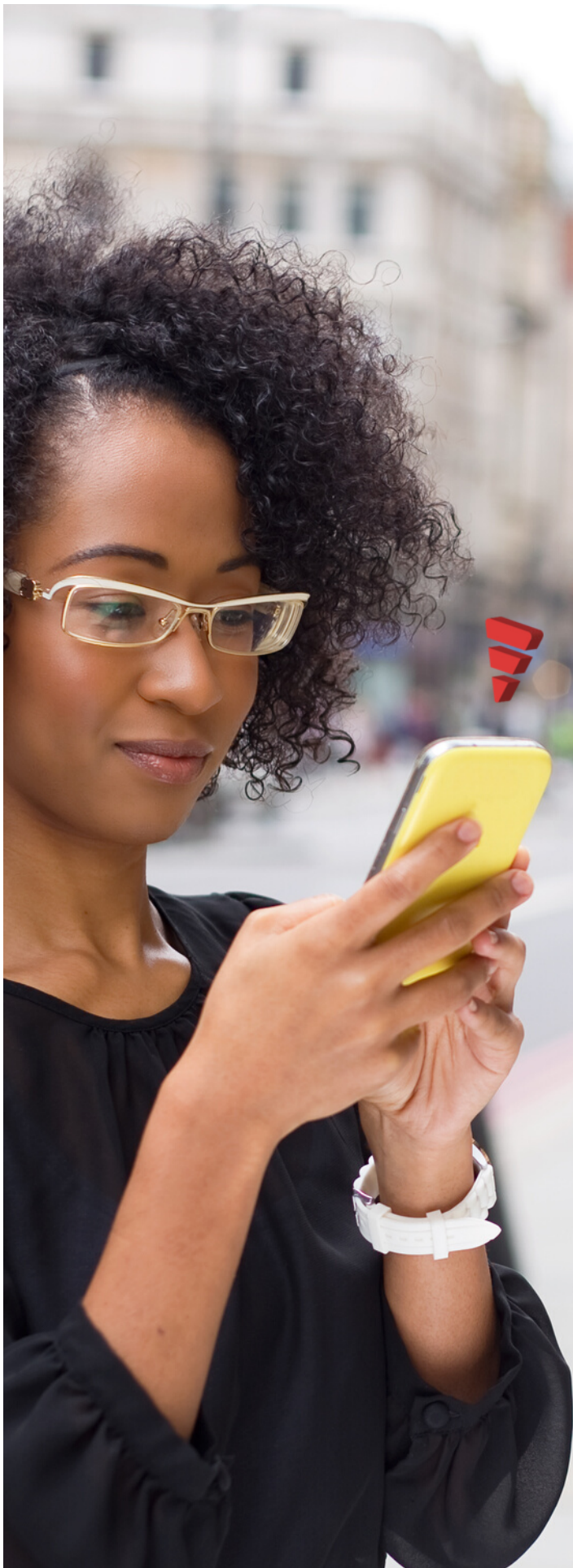
(4) Competition Commission South Africa, Data Services Market Inquiry, Final Report
https://www.adams.africa/wp-content/uploads/2019/12/80825_data_market_inquiry_summary.pdf
Retrieved 08 January 2020

Key findings

- MTN delivered the best Excellent Consistent Quality for South Africa with 80.6%, Tutela's most demanding metric for measuring user experience. MTN also took first place in all other metrics including Core Consistent Quality, download/upload throughput, and latency.

- Vodacom came in a healthy second place to MTN with only a 3.9% difference in Excellent Consistent Quality and a 0.8% difference in Core Consistent Quality for Common Coverage Areas in South Africa.

- All operators reached the threshold of 90% for Core Consistent Quality, with MTN setting the benchmark at 95.9% CQ.



Results overview

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Mobile experience results

South Africa, January 2020

	MTN	vodacom	Telkom	Cell C
Excellent Consistent Quality	★ Winner			
Core Consistent Quality	★ Winner			
Download throughput	★ Winner			
Upload throughput	★ Winner			
Latency	★ Winner			

Results from 64,536,688,973 measurements taken in Common Coverage Areas between June 1st to November 30th 2019.

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

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Best Mobile Network Experience

JANUARY 2020

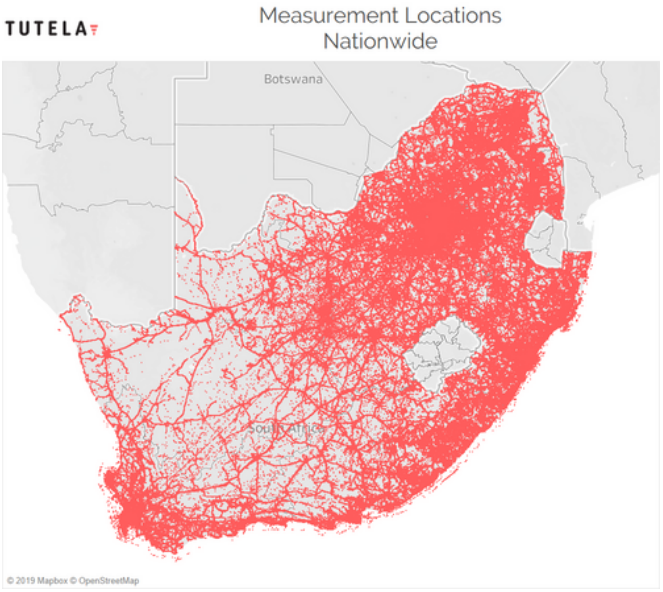
Based on the highest Excellent Consistent Quality in Common Coverage Areas.

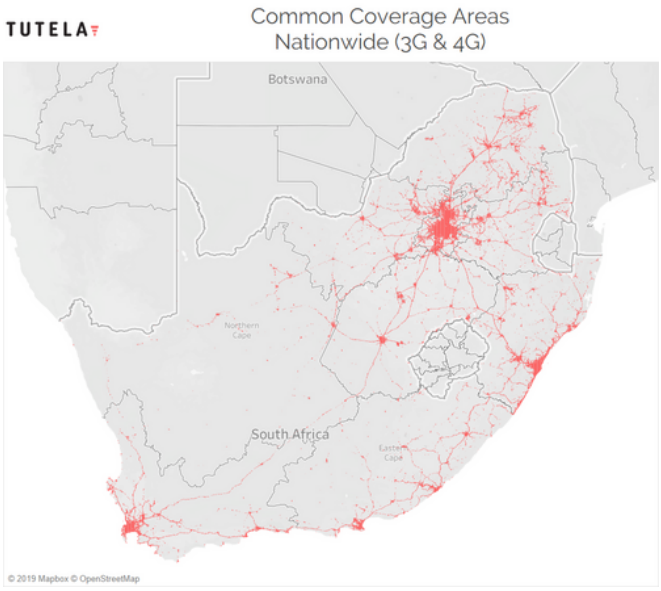
Understanding this report

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 networks are (and are not) enabling users to do almost everything that they want to do on their smartphones.

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. These were most recently re-assessed and updated September 1st, 2019.

Common Coverage Areas are parts of the country where the majority of operators offer service. In this report, we present results nationally and from Common Coverage Areas, which helps present both a full national picture, as well as highlighting network conditions wherever operators are directly in competition.

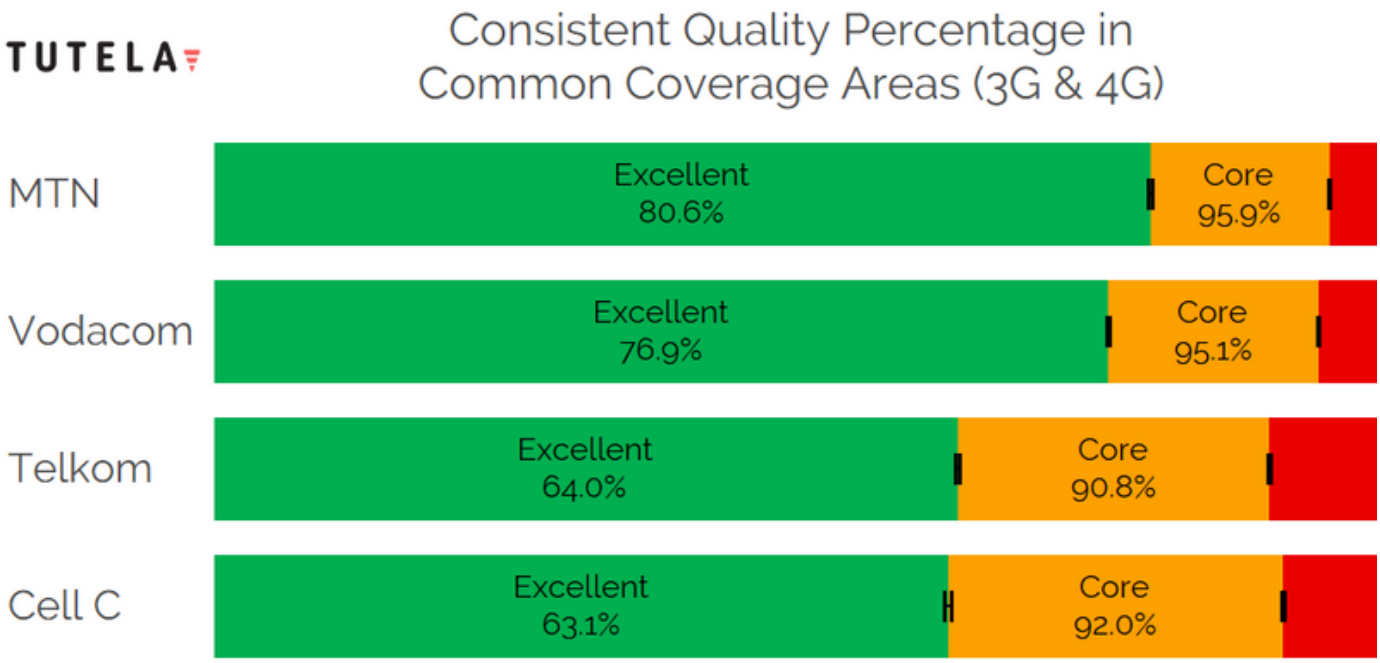




Consistent Quality

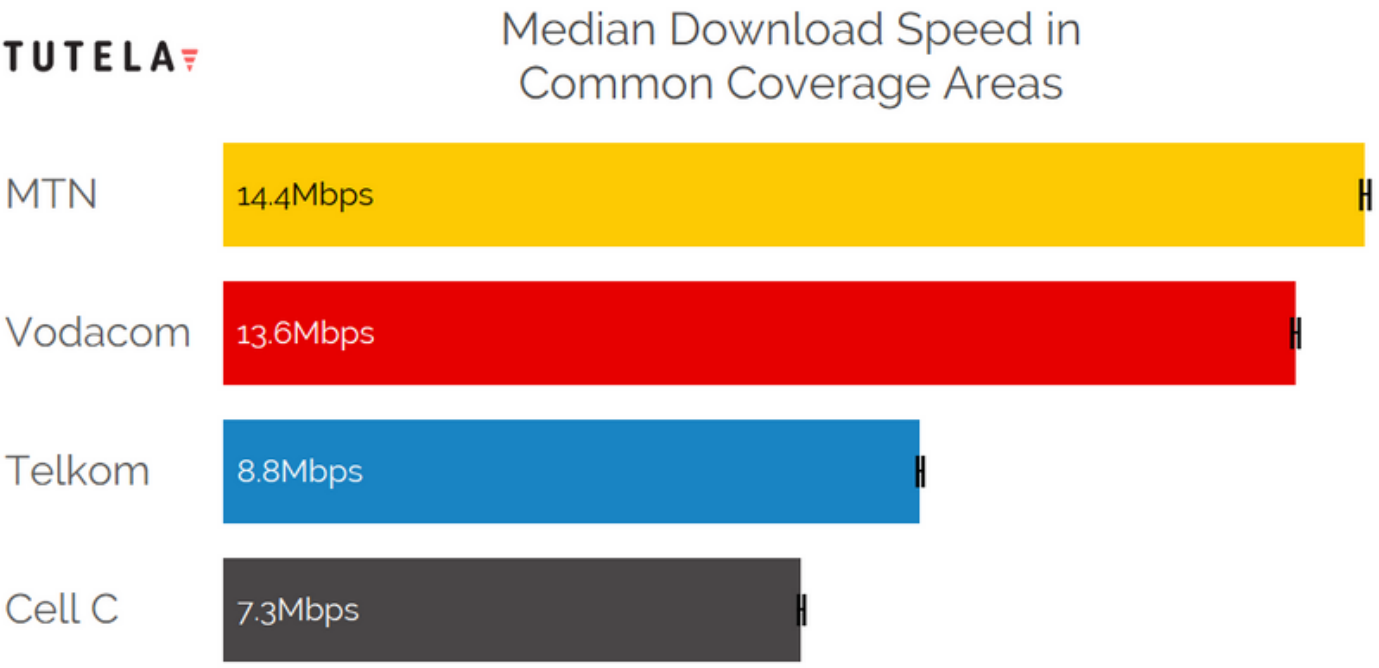
In the Common Coverage Areas of South Africa, MTN is in first place for Consistent Quality with 80.6% Excellent and 95.9% Core. Vodacom is in second place with 76.9% Excellent Consistent Quality and 95.1% Core. Telkom is in third place with 64.0% Excellent Consistent Quality. For Core, Telkom narrowly makes the 90% threshold with 90.8%.

Cell C, with a difference of 17.5% between first place MTN and rounding out the top four, has an Excellent Consistent Quality percentage of 63.1%. The difference is less for Core with Cell C on 92.0%. Looking at the Nationwide coverage of South Africa, there is little change between Common and Nationwide. MTN is in first place with an Excellent Consistent Quality percentage of 80.0% and a Core percentage of 95.8%. Vodacom is again in second place with an Excellent percentage of 76.0% and Core percentage of 94.8%. Telkom is in third with an Excellent percentage of 63.8% and Core percentage of 90.7%. And rounding out the top four, Cell has an Excellent percentage of 62.8% and Core percentage of 91.9%.



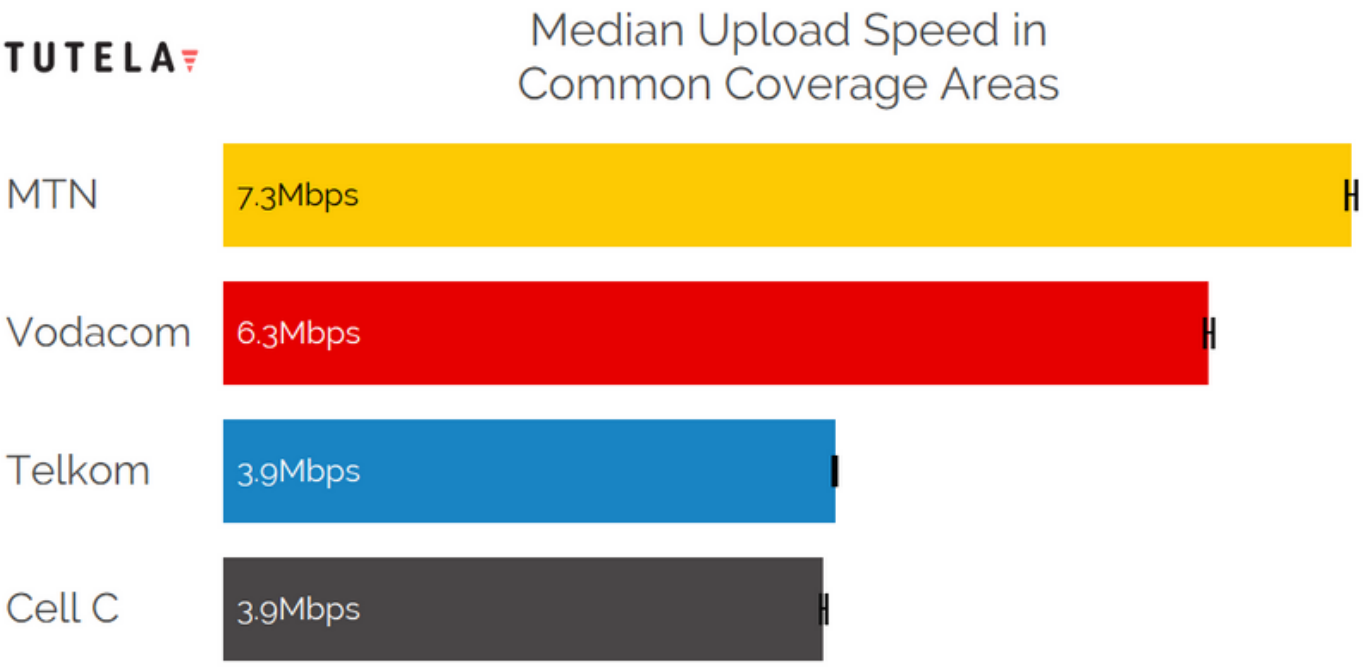
Download throughput

When it comes to download throughput,MTN has the fastest median download at 14.4 Mbps. Vodacom narrowly misses out on the top spot by 0.8 Mbps and holds a strong 13.6 Mbps median download speed in South Africa. With a 5.6 Mbps difference between first and third place, Telkom has a median download speed of 8.8 Mbps and Cell C is in fourth with the slowest median download speed at 7.3 Mbps -- nearly half the download throughput of first-place MTN. In regards to Nationwide results, we see slight slight changes between the two charts but the ranking stays the same. With a 0.3 Mbps drop between Common Coverage Areas and Nationwide, MTN is in first place with a median download speed of 14.1 Mbps. Vodacom drops by 0.5 Mbps in Nationwide results with a median download speed of 13.1 Mbps. Telkom is in third place with only a 0.1 Mbps drop in Nationwide for a median download speed of 8.7 Mbps, and Cell C also drops by 0.1 Mbps to a Nationwide result of 7.2 Mbps.



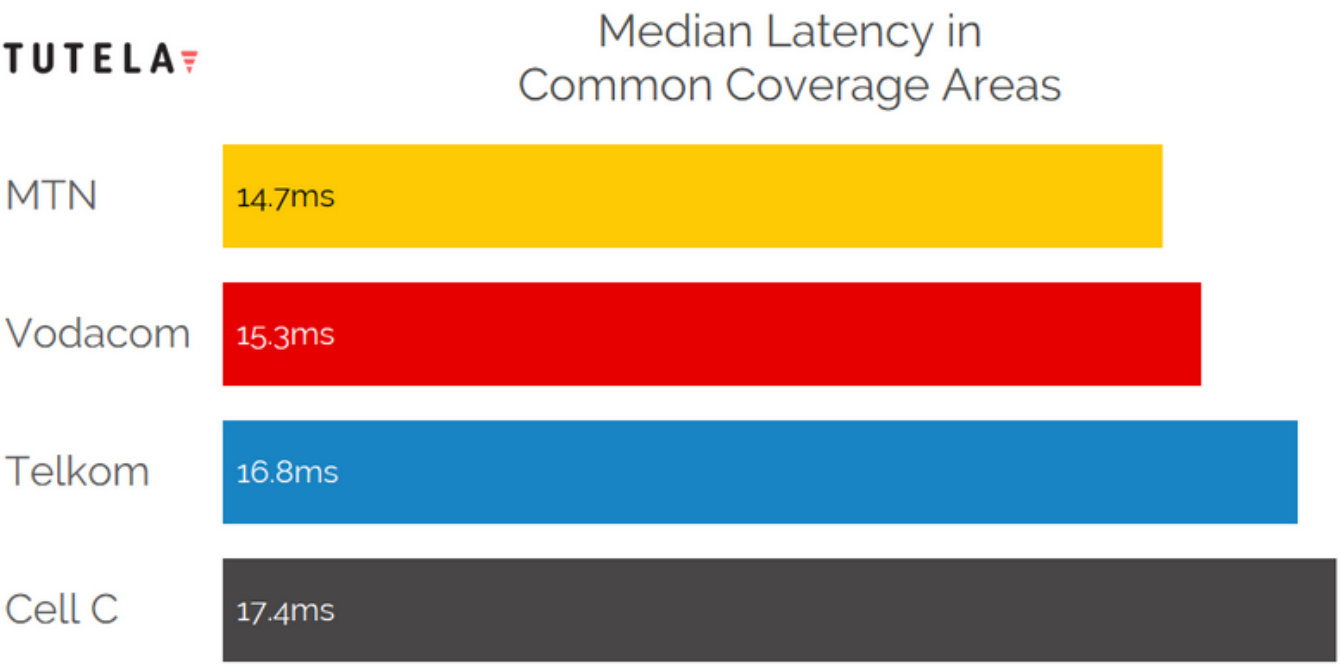
Upload throughput

Across the board, upload speeds are nearly half those of download speed, but the overall ranking of operators remains unchanged.For Common Coverage Areas, MTN is in first place with a median upload speed of 7.3 Mbps. Compared to MTN's download speed, this a 7.1 Mbps difference in performance. Vodacom is in second place with a median upload speed of 6.3 Mbps in Common Coverage Areas. For Telkom and Cell, both operators have a median upload speed of 3.9 Mbps. In regards to Nationwide results, MTN is in first place with the fastest median upload speed of 7.0 Mbps. Vodacom has a median upload speed of 6.0 Mbps, Telkom stays the same at 3.9 Mbps, and Cell C has the slowest median upload speed at 3.8 Mbps for Nationwide coverage.



Latency

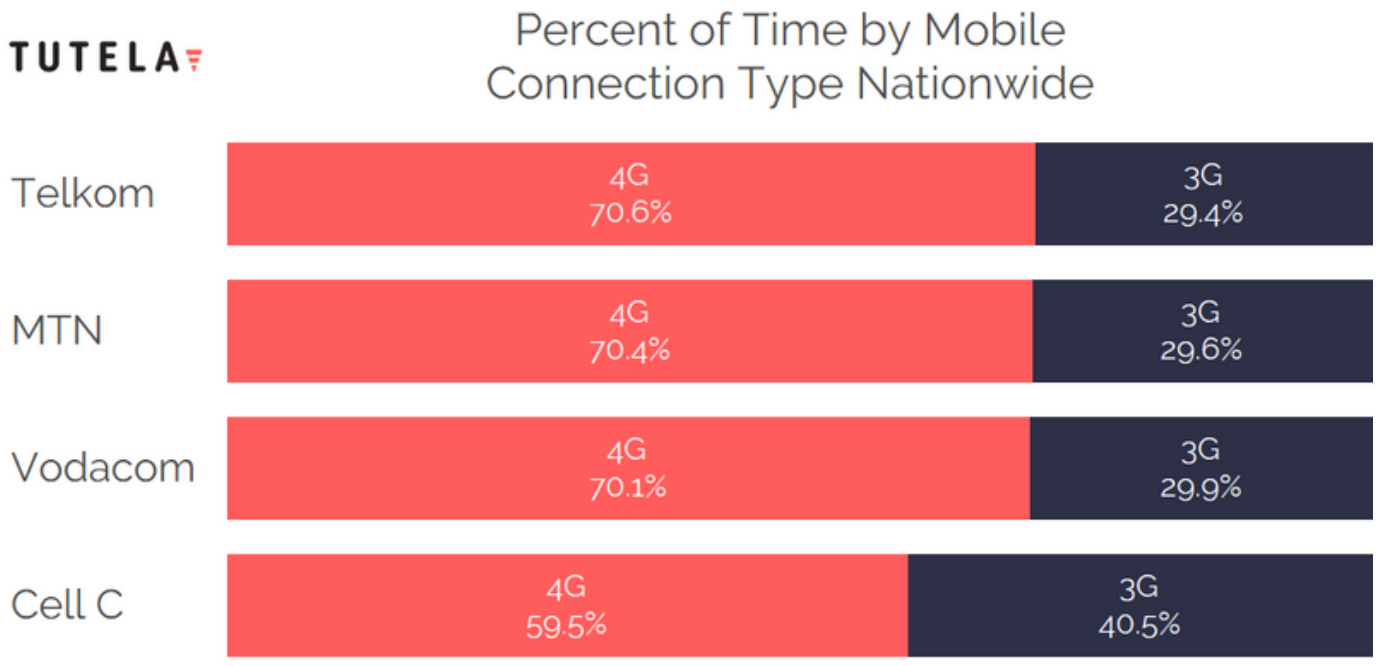
In Common Coverage Areas of South Africa, MTN users had the fastest one-way latency of 14.7 ms. Vodacom is close behind with a latency of 15.3 ms, Telkom in third with 16.8 ms and Cell C in fourth with 17.4 ms. The difference in latency rankings for first and fourth place is relatively low at only 2.7 ms. In Nationwide results for South Africa, we see the same thing. MTN is in first place with 14.9 ms, Vodacom in second place with 15.5 ms, Telkom is in third place with 16.8 ms, and Cell C with 17.5 ms. All operators except for Telkom had a 0.2 ms lift between Common and Nationwide results, and the difference between first and fourth place for Nationwide is 2.6 ms.



Technology usage

Another factor in determining the mobile experience is which mobile connection type a user is on for a percentage of time. If a user is on a 4G network, they will generally have a better experience with faster speeds and lower latency than those on a 3G network. Interestingly, Telkom for the first time ranks top of the charts with its users connecting to a 4G network 70.6% of the time, and 29.4% of the time on a 3G network. This will be attributed to Telkom being the only operator to use 2300 Mhz (Band 40) spectrum but has significantly less volume in the 1800 Mhz (Band 3) compared to its biggest competitors MTN and Vodacom.

"Telkom for the first time ranks top of the charts with its users connecting to a 4G network 70.6% of the time"

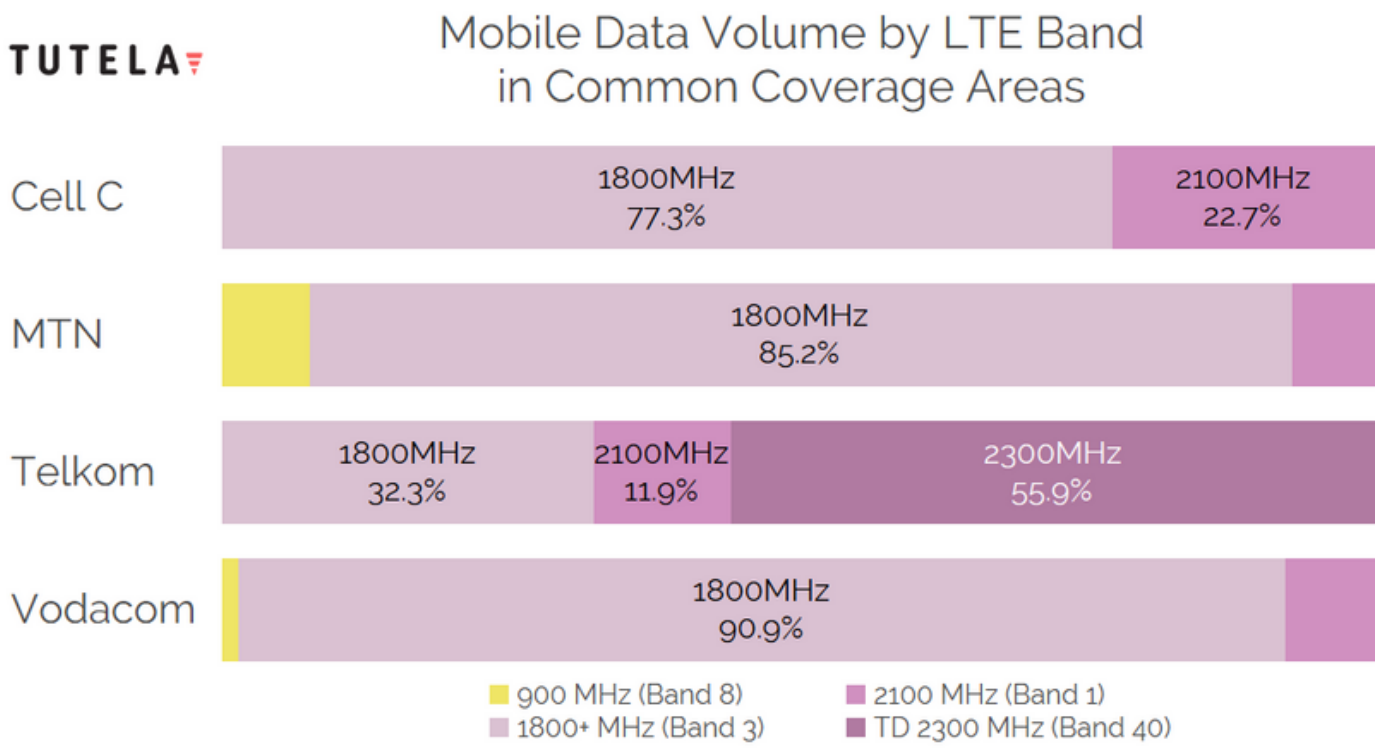


MTN users are on the 4G network 70.4% of the time and only 29.6% of the time on the 3G network, and Vodacom is close behind with its users on a 4G network 70.1% of the time and on a 3G network 29.9% of the time.

For Cell C, the low percentages of mobile connection types paints a picture of why the operator came last for every metric tested - Cell C users are on a 4G network only 59.5% of the time, an 11.1% difference in experience compared to Telkom users, and are on a 3G network 40.5% of the time.

However, despite coming in last, Cell C still achieved relatively good results which will be helped by an allocation of 1800 Mhz and 2100 Mhz

What South Africa needs to look towards now is whether rolling out 5G is feasible in the near future, and when. Right now, this may be difficult without allocating more spectrum and making it a fair process in a market dominated by MTN and Vodacom who have in the past been able to successfully refarm the 2G and 3G spectrum to better roll out 4G(5).



(5) MyBroadband, Here it is – the spectrum breakdown for MTN and Vodacom in African countries
https://mybroadband.co.za/news/cellular/293210-here-it-is-the-spectrum-breakdown-for-mtn-and-vodacom-in-african-countries.html
Retrieved 08 January 2020

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 organisations in the mobile industry to understand and improve the world's networks.

Tutela collects data and runs network tests via software embedded in a diverse range of over 3000 consumer applications, which enable the measurement of real-world quality of experience for mobile users, 24/7. For this report, Tutela has conducted over 7 million speed tests, 117 million latency tests, and collected over 831 million total mobile records in South Africa, with records gathered from June 1st to November 30th, 2019.

Tutela measures network quality based on the real-world performance of actual network subscribers, 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 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 to LTE-Advanced 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.

Consistent Quality

To more objectively evaluate when networks 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 bases the threshold values on the minimum performance requirements published by popular apps. We most recently updated our Consistent Quality thresholds on September 1st, 2019.

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
Minimum acceptable value	5 Mbps	1.5 Mbps	50 ms	30 ms	1%

Core Quality

KPI	Download throughput	Upload throughput	Latency	Jitter	Packet loss
Minimum acceptable value	1.5 Mbps	500 Kbps	100 ms	50 ms	5%

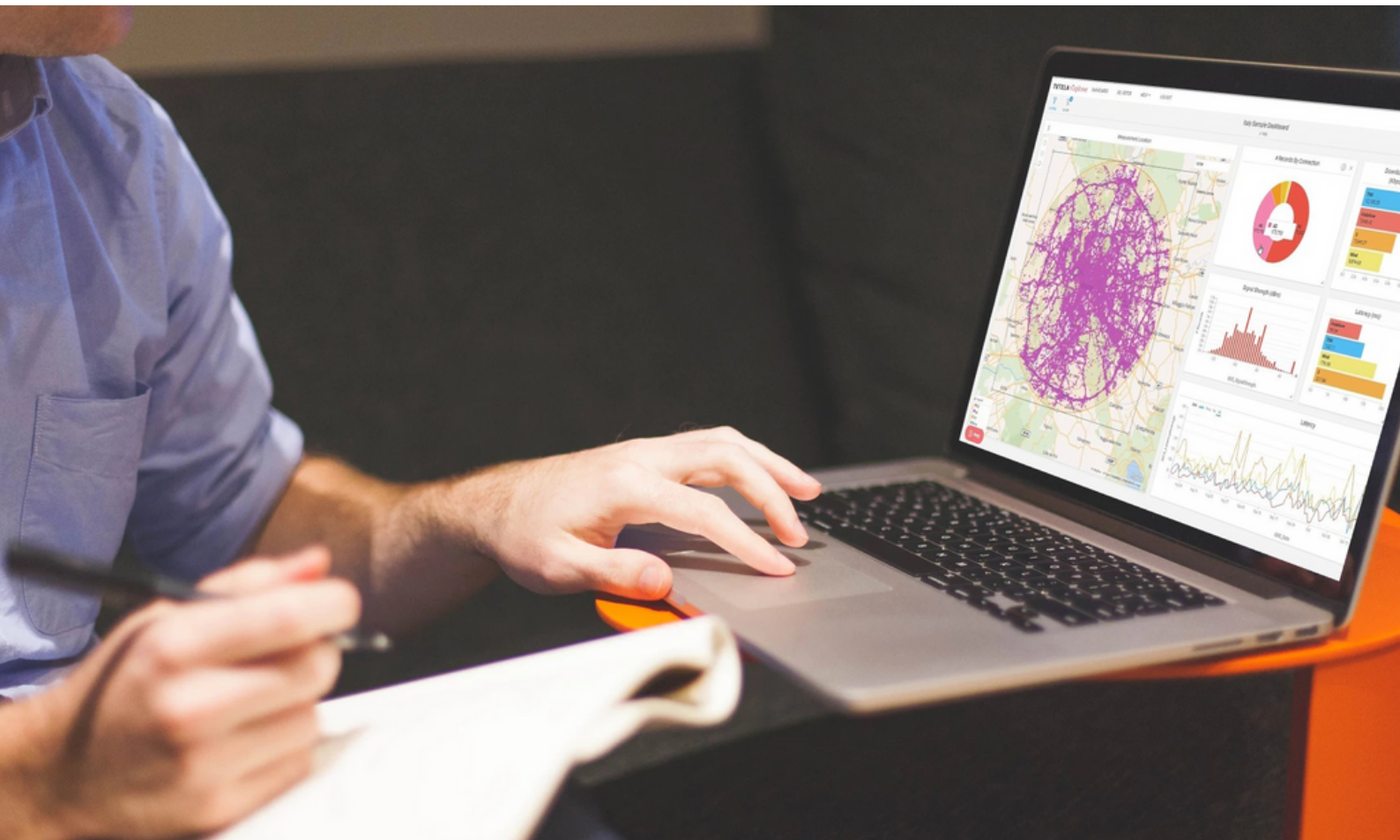
Discover Tutela Explorer

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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Error Margins

		Download Median	Upload Median	Latency Median	Excellent CQ	Core CQ
Common Coverage Areas	Cell C	±0.04Mbps	±0.02Mbps	±0.01ms	±0.3%	±0.1%
	MTN	±0.05Mbps	±0.03Mbps	±0.01ms	±0.1%	±0.1%
	Telkom	±0.04Mbps	±0.01Mbps	±0.00ms	±0.2%	±0.1%
	Vodacom	±0.05Mbps	±0.02Mbps	±0.00ms	±0.1%	±0.1%
National	Cell C	±0.04Mbps	±0.02Mbps	±0.01ms	±0.3%	±0.1%
	MTN	±0.05Mbps	±0.03Mbps	±0.01ms	±0.1%	±0.1%
	Telkom	±0.03Mbps	±0.01Mbps	±0.00ms	±0.2%	±0.1%
	Vodacom	±0.04Mbps	±0.02Mbps	±0.00ms	±0.1%	±0.1%

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 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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