TUTELA

Argentina

State of Mobile Networks

Annual Report

OCTOBER 2019

Introduction

Argentina is at the forefront of mobile communications in South America, recently placing 1st in South America and 44th globally in Tutela's recent Global Mobile Experience report. The market for mobile subscriptions continues to grow - totalling 61.3 million by the end of 2019, and expected to grow to 66.3 million by the end of 2024(1).

Meanwhile, Argentinian operators continue to keep their eye on the 5G horizon, with early 5G trials in progress and a trial from Personal and Huawei in June of this year reaching download speeds of 700 Mbps, which the companies involved claim is the fastest download speed demonstrated in South America to date(2).

(1) Verdict, Spectrum auctions will promote 5G and 4G LTE network expansion in Argentina
https://www.verdict.co.uk/argentina-broadband/
Retrieved 25 September 2019

(2) TeleGeography, Personal, Huawei trial 5G in Buenos Aires
https://www.telegeography.com/products/commsupdate/articles/2019/06/04/personal-huawei-trial-5g-in-buenos-aires/
Retrieved 25 September 2019

The pressure is also on from regulators to boost 4G connectivity across the country. Regulator ENACOM has set a target of 93% 4G coverage by the end of 2019(3), while further spectrum auctions are planned to support this later in the year(4), with specifics to be decided at the ITU WRC-19 conference in October.

At the same time, consumer expectations are increasing; Cisco anticipates a seven-fold growth in mobile data traffic between 2017 and 2022(5), while there is a global trend towards higher intensity use cases such as HD video streaming, group video calling and online multiplayer mobile gaming. How operators choose to utilize the new spectrum as it's made available will have a critical impact on how users across the country experience their mobile connectivity over the year, and years to come.

To see how the different national providers compared, Tutela analyzed more than 3.5 billion records, crowdsourced from more than 630 thousand iOS and Android devices across the country. These records included over 15 million speed tests and 285 million latency tests, collected between March 1st and August 31st, 2019.

(3) TeleGeography, Argentina spectrum sale imminent; 93% 4G coverage targeted by 2019
https://www.telegeography.com/products/commsupdate/articles/2019/07/05/argentina-spectrum-sale-imminent-93-4g-coverage-targeted-by-end-2019/
Retrieved 25 September 2019

(4) BNAmericas, Argentina targets 4G spectrum auctions this year
https://www.bnamericas.com/en/news/argentina-targets-4g-spectrum-auction-this-year
Retrieved 25 September 2019

(5) Cisco, Argentina 2022 forecast highlights
https://www.cisco.com/c/dam/assets/sol/sp/vni/forecast_highlights_mobile/pdf/Argentina_2022_Forecast_Highlights.pdf
Retrieved 25 September 2019

Key findings

- Personal dominated across the board, taking the top spot for Excellent Consistent Quality, Core Consistent Quality, and both median download and upload throughput.

- Movistar had the lowest overall latency across its combined 3G and 4G mobile networks, and also had the most diverse spectrum breakdown, with less reliance on the 1700 MHz and 700 MHz spectrum compared to the other operators

- Time spent on 4G varies significantly by operator; users on Claro spent the least time on a 4G connection (68.6% of the time), while on Personal, 79.5% of the time a user had a signal, they were using a 4G connection. This suggests that operators are on track, but still somewhat short of the 93% 4G coverage target that the Argentinian government has set for the end of 2019.
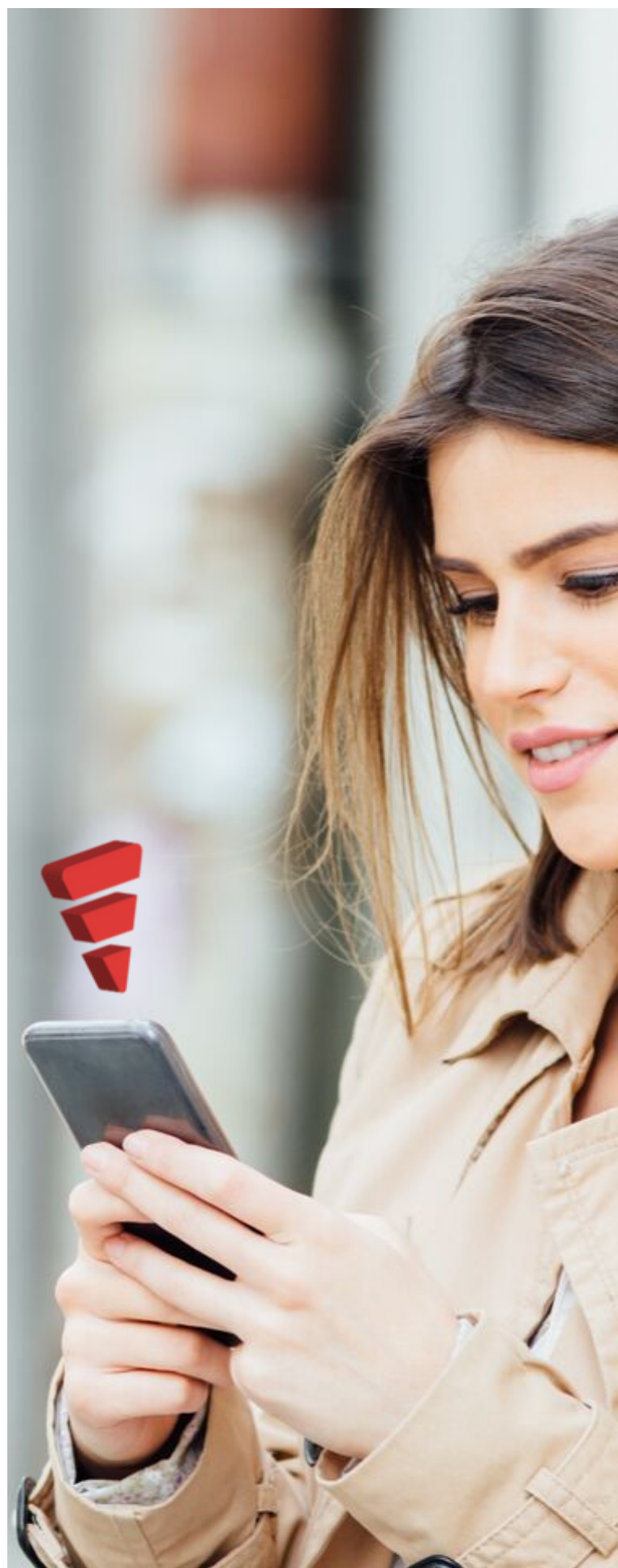
Results overview

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Mobile experience results
Argentina, October 2019

	Personal	Movistar	Claro
Excellent Consistent Quality	⭐ Winner		
Core Consistent Quality	⭐ Winner		
Download throughput	⭐ Winner		
Upload throughput	⭐ Winner		
Latency		⭐ Winner	

Results from 132,502,645,302 measurements taken in Common Coverage Areas between March 1st to August 31st 2019.

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

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Best Mobile Network Experience
OCTOBER 2019

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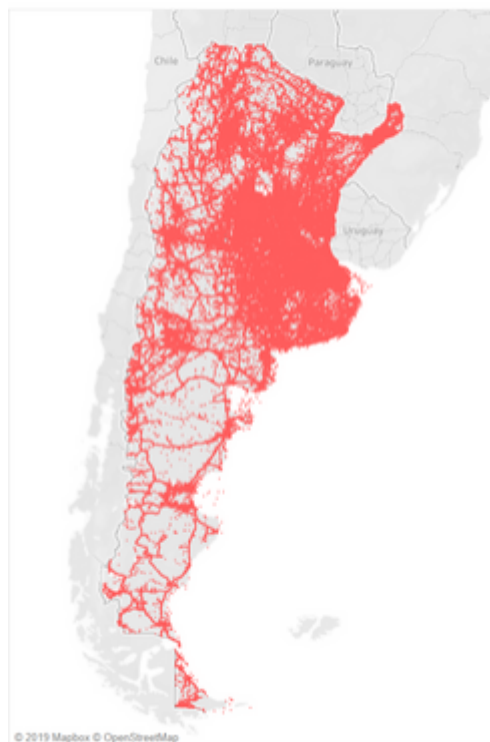
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Understanding this report

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 or 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, taken when a user has signal. 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.

TUTELA   Measurement Locations

© 2019 Mapbox © OpenStreetMap

TUTELA   Common Coverage Areas
(3G & 4G)

© 2019 Mapbox © OpenStreetMap

Consistent Quality

Personal's Excellent and Core Consistent Quality both outpace Movistar and Claro in Common Coverage Areas. On Excellent Consistent Quality, Personal leads by 11 percentage points, while Movistar and Claro are much closer in second and third with just over 1 percent between them. The gap is very slightly less pronounced at a national level, where Personal's Excellent Consistent Quality is slightly lower at 77.2%

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Consistent Quality Percentage in Common Coverage Areas

Personal	Excellent 77.5%	Core 95.8%	
Movistar	Excellent 66.5%	Core 93.0%	
Claro	Excellent 65.4%	Core 91.4%	

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Consistent Quality Percentage Nationwide

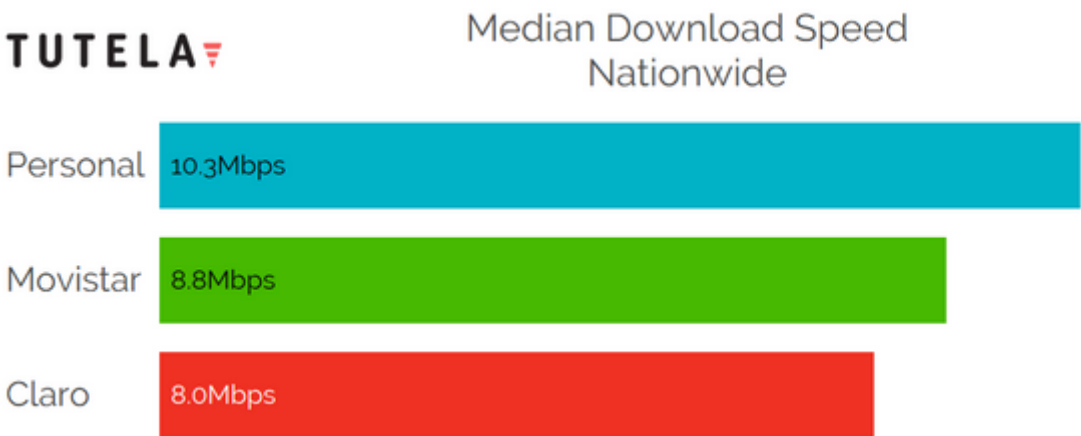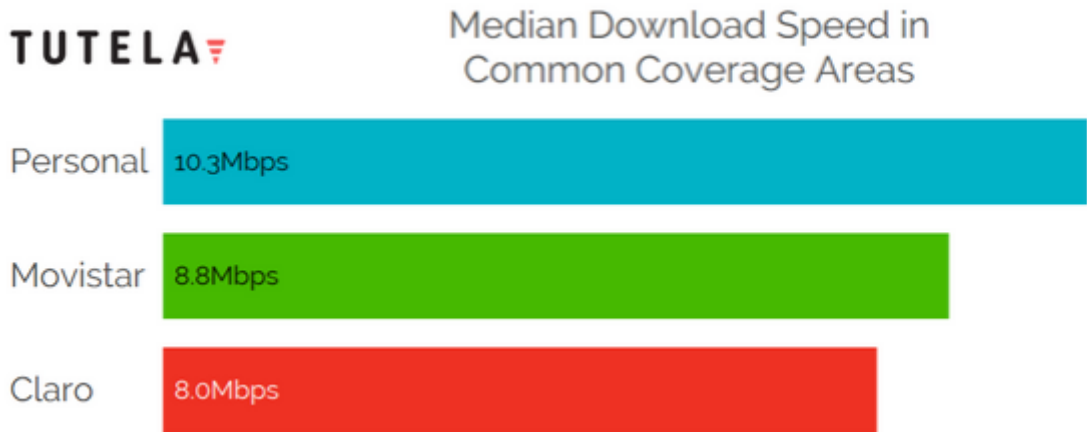| Personal | Excellent 77.2% | Core 95.7% | |
| Movistar | Excellent 66.5% | Core 93.0% | |
| Claro | Excellent 65.3% | Core 91.4% | |

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Download throughput

Personal also leads in median download speeds in Common Coverage Areas across Argentina, although its lead is relatively slight - just 2.3 Mbps separate it and Claro in third place.

Unlike for Consistent Quality, median download speeds do not change outside of common coverage areas. This indicates a level of consistency between network performance in urban and sub-urban areas. Download speed is one of the most often-cited measures of network success -- faster speeds are considered analogous to better experience, however this is not always the case. Faster download speeds are useful for, say, downloading a large file on a mobile device, but above a certain threshold the impact of these faster speeds is unlikely to be felt by most users for most use cases, including things like HD video streaming. All three operators were comfortably above the 5 Mbps threshold on average, that Tutela uses for its Excellent Consistent Quality metric.

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Median Download Speed in Common Coverage Areas

Personal	10.3Mbps
Movistar	8.8Mbps
Claro	8.0Mbps

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Median Download Speed Nationwide

Personal	10.3Mbps
Movistar	8.8Mbps
Claro	8.0Mbps

Upload throughput

As with median download speeds, median upload speeds are an incredibly tight-run contest. Just 0.6 Mbps separates Personal from third-place Movistar, both in Common Coverage Areas and when looking at a national level. The median upload speed for all operators is significantly above Tutela's Excellent Consistent Quality threshold, particularly important for HD video calling or media-heavy applications such as photo sharing over Instagram or snapchat.

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Median Upload Speed in Common Coverage Areas

Personal	5.0Mbps
Claro	4.6Mbps
Movistar	4.4Mbps

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Median Upload Speed Nationwide

Personal	5.0Mbps
Claro	4.6Mbps
Movistar	4.4Mbps

Latency

Movistar had the lowest median latency in both Common Coverage Areas and nationwide at 29.8 ms for one-way average latency. While Personal was relatively close behind at 31.0 ms in Common Coverage Areas, this was a significant lead over Claro where median one-way latency was 35.4 ms.

This is in part due to the percentage of time users on each carrier spend on 4G compared to 3G. Claro users spend over 30% of their time on 3G, which has a higher latency than 4G. Latency is an often overlooked measure of network quality that is particularly important for any real-time applications such as VOIP or video calling, when lags between connections become noticeable.

As data processing for mobile applications is handled in a cloud environment, ensuring low latency can be the difference between a service that feels "snappy" and one that feels slow.

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Median Latency in Common Coverage Areas

Movistar	29.7ms
Personal	31.0ms
Claro	35.4ms

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Median Latency Nationwide

|	
Movistar	29.8ms
Personal	31.2ms
Claro	35.4ms

Data and spectrum usage

A significant part of why Personal performs so well on Excellent Consistent Quality compared to Movistar and Claro is due to the higher percentage of time users spend on 4G networks –– in general, 3G networks do not tend to meet the thresholds for Excellent Consistent Quality.

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Percent of Time by Mobile Connection Type Nationwide

Operator	4G	3G
Personal	4G 79.5%	3G 20.5%
Movistar	4G 74.7%	3G 25.3%
Claro	4G 68.6%	3G 31.4%
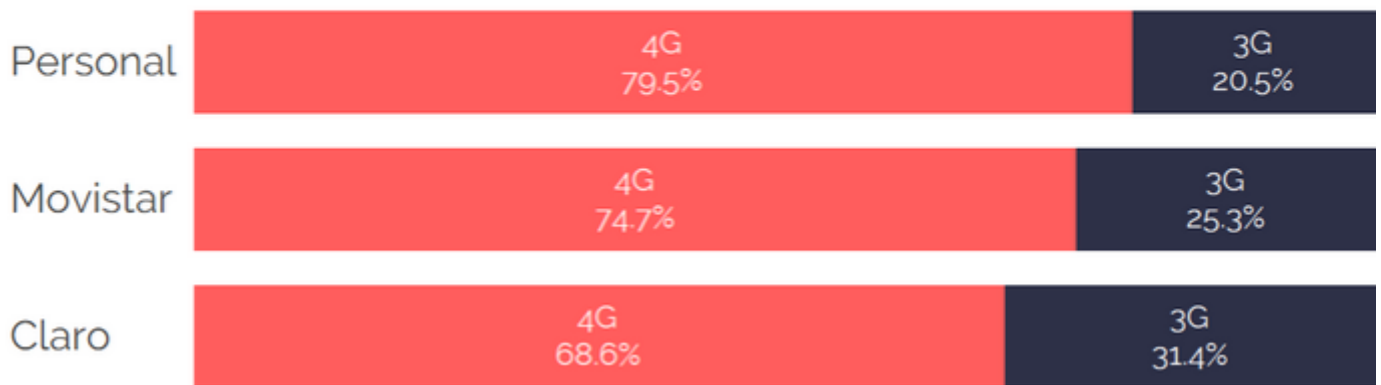
Looking at the data volume by band by operator, it is clear that all operators have a significant reliance on higher band spectrum. In particular, 1700 MHz forms the workhorse, with the highest percentage of traffic going over Band 4 out of any single band for each operator.
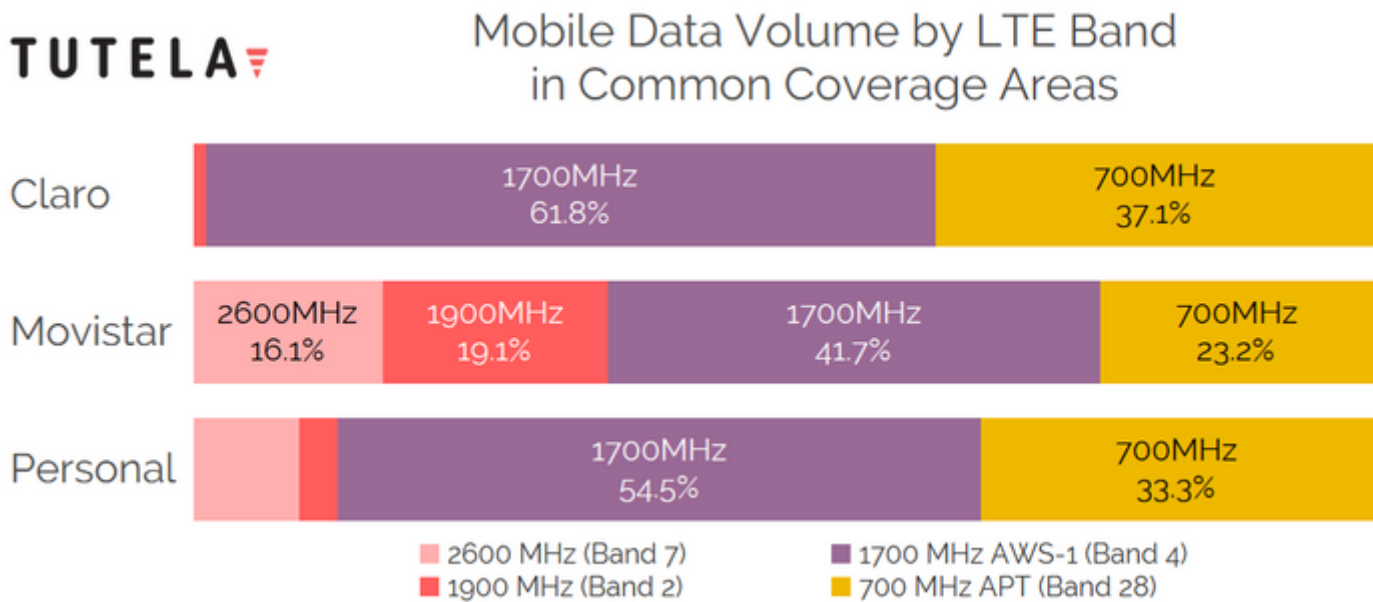
However, while both Claro and Personal use 1700 MHz and 700 MHz almost to the exclusion of other spectrum, Movistar has also seen its refarm of the 1900 MHz spectrum from 3G to 4G provide a significant support to its existing LTE infrastructure, offloading just short of 20% of data volume onto Band 2.

Based on Tutela's data, it appears that Personal may also be looking to do the same. Having previously used its 1900 MHz spectrum for 3G connections, we can see a growing amount of LTE connections on Band 2 around the Buenos Aires and northern area of Argentina.

This will increase network capacity and offer additional carrier aggregation potential, which will help Personal to maintain its impressive lead both in median download throughput and Excellent Consistent Quality.

Very little LTE traffic currently runs over lower-band spectrum; in fact, the 700 MHz spectrum is all that is currently being actively deployed for Argentinian users. Lower band spectrum tends to do well for increasing network coverage, particularly in areas with significant physical obstacles such as buildings or geographical features.

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Mobile Data Volume by LTE Band in Common Coverage Areas

Operator				
Claro		1700MHz 61.8%		700MHz 37.1%
Movistar	2600MHz 16.1%	1900MHz 19.1%	1700MHz 41.7%	700MHz 23.2%
Personal		1700MHz 54.5%		700MHz 33.3%

■ 2600 MHz (Band 7) ■ 1700 MHz AWS-1 (Band 4)
■ 1900 MHz (Band 2) ■ 700 MHz APT (Band 28)

It's also notable that this spectrum runs the risk of becoming congested with increasing data load; Movistar and Personal both have 20 MHz of Band 28 each, while Claro has slightly more at 30 MHz. All operators also have holdings of 850 MHz, although this is currently being used for 3G, but could be an invaluable resource to refarm and boost 4G capacity.

Meanwhile, the auctioning of a further 20 MHz of spectrum in the 700 MHz range, as well as a broader portfolio of higher band spectrum potentially on offer later in the year could be useful assets as operators look to continue providing high quality 4G services as data and user load increase in future.

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 3,000 consumer applications, which enable the measurement of real-world quality of experience for mobile users, 24/7. For this report, we gathered 132 billion measurements, including over 15 million speed tests and 285 million latency tests between March 1st and August 31st 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
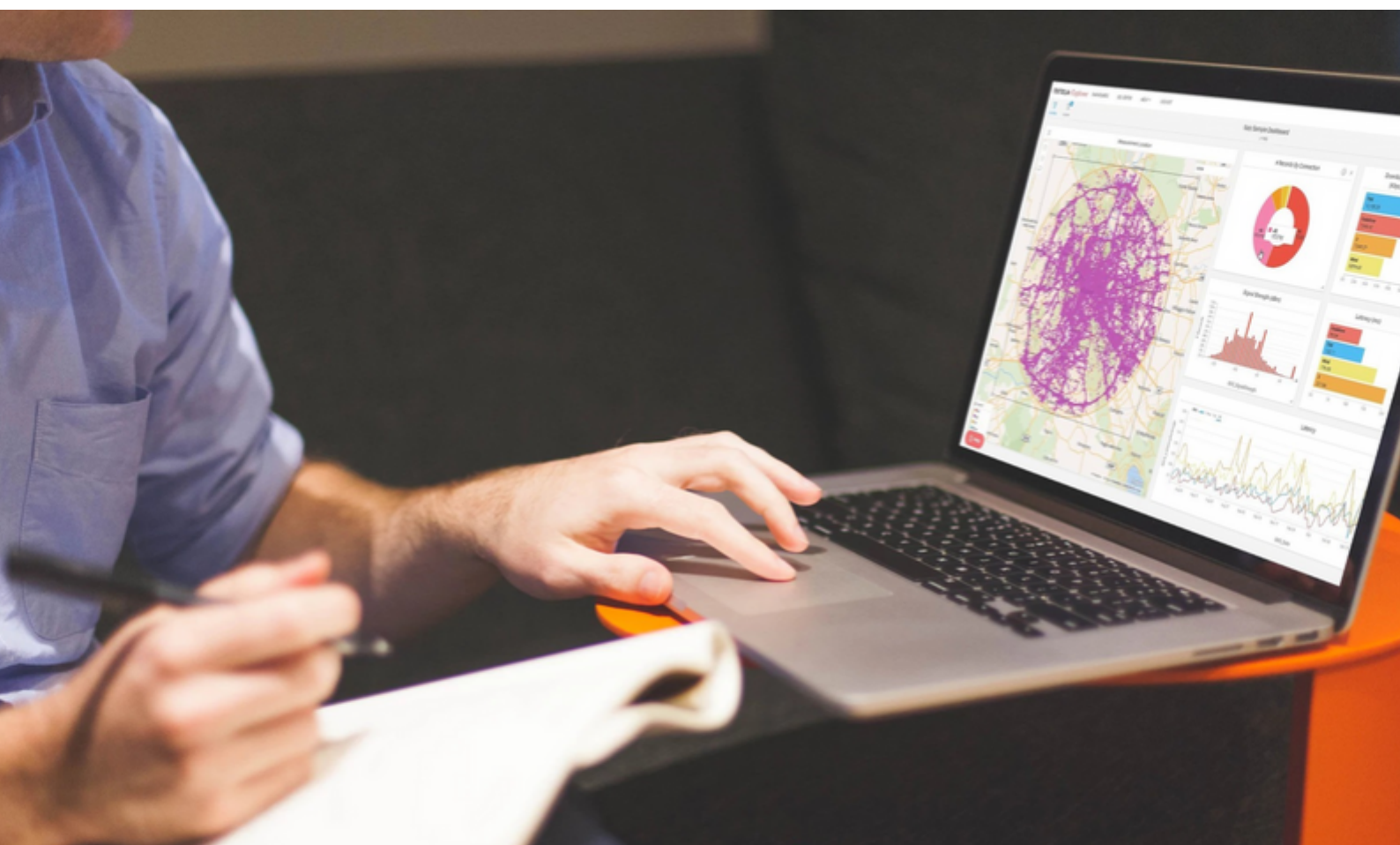
Appendix

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Error Margins

		Download Median	Upload Median	Latency Median	Excellent CQ	Core CQ
Common Coverage Areas	Movistar	±0.02Mbps	±0.01Mbps	±0.0ms	±0.1%	±0.0%
	Personal	±0.02Mbps	±0.01Mbps	±0.0ms	±0.1%	±0.0%
	Claro	±0.02Mbps	±0.01Mbps	±0.0ms	±0.1%	±0.0%
Nationwide	Movistar	±0.02Mbps	±0.01Mbps	±0.0ms	±0.1%	±0.0%
	Personal	±0.02Mbps	±0.01Mbps	±0.0ms	±0.1%	±0.0%
	Claro	±0.02Mbps	±0.01Mbps	±0.0ms	±0.1%	±0.0%

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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