



TUTELA 

Spain & Portugal

State of Mobile Experience

Analysts

Montana Jennings



OCTOBER 2020

Annual Report

www.tutela.com

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Introduction

While it's been a year full of uncertainty for industries across the globe, it has been an eventful 12 months for the mobile industry — something that's particularly true for the mobile industry in Spain and Portugal. Although people were told to stay indoors and continue work and school from home for the better half of this year, Telefonica was busy trying to kick off the deployment of 5G in Spain, with a promise to have 75% of the country accessing this new network by the end of 2020(1). For the Yoigo brand, its parent Masmovil is also offering 5G services in Spain with a deal carved out back in October 2019 to access and share its infrastructure with the competitor Orange(2). In Portugal, the movement towards deploying 5G has been a slow-burn, as the country has been in its six month of

postponement for 5G spectrum auctions, with discussions meant to start back up in October(3). The president of the National Communications Authority, Anacom, did recently outline at least one condition for the 5G license which is a need for the winner to expand the 4G network to 90% of rural parishes by 2025(4). Portugal also recently ranked 29th in the world for Excellent Consistent Quality and 25th for Core Consistent Quality in Tutela's 2020 Global Mobile Experience report(5).

Tutela has analyzed over 7 billion total records taken from real-world smartphone users, including more than 59 million speed and latency tests, taken between March 1st and August 31st 2020.

(1) RCRWireless, Telefónica kicks off 5G services in Spain

<https://www.rcrwireless.com/20200902/5g/telefonica-kicks-off-5g-services-spain>

(2) RCRWireless, Masmovil launches 5G in 15 Spanish cities

<https://www.rcrwireless.com/20200909/5g/masmovil-launches-5g-in-15-spanish-cities>

(3) The Guardian, Portugal telcos won't use Huawei for core 5G networks though no government ban

<https://www.theguardian.pe.ca/business/reuters/exclusive-portugal-telcos-wont-use-huawei-for-5g-networks-though-no-government-ban-479324/>

(4) Telecompaper, Portugal eyes 90% 4G coverage in rural areas by 2025

<https://www.telecompaper.com/news/portugal-eyes-90-4g-coverage-in-rural-areas-by-2025-1355084>

(5) Tutela, Global Mobile Experience

<https://www.tutela.com/blog/global-mobile-experience-2020>



Key findings

- Movistar consistently offered the best mobile experience in Spain, with the operator taking first place with the highest Excellent Consistent Quality, the highest Core Consistent Quality, fastest median download and upload speed, and best coverage.
- Despite its last-place ranking in all other metrics tested, Vodafone came first for best latency result in Spain.
- In Portugal, the story for Vodafone was the opposite: it won in five of the six metrics tested, including highest Excellent and Core Consistent Quality, fastest download and upload speed, and best coverage.
- Portugal also had the highest Excellent Consistent Quality over Spain by 3.1%, for an Excellent Consistent Quality of 77.9%. For download speed and latency, Spain ranked first whilst Portugal took out the win for upload speed.

Results overview

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Mobile experience results

Spain, October 2020



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

Results from over 7 billion total records taken from real-world smartphone users, including more than 59 million speed and latency tests, taken between March 1st and August 31st 2020.

"Movistar 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

Portugal, October 2020



Excellent Consistent Quality	★ Winner		
Core Consistent Quality	★ Winner		
Download throughput	★ Winner		
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Results from over 7 billion total records taken from real-world smartphone users, including more than 59 million speed and latency tests, taken between March 1st and August 31st 2020.

"Vodafone 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

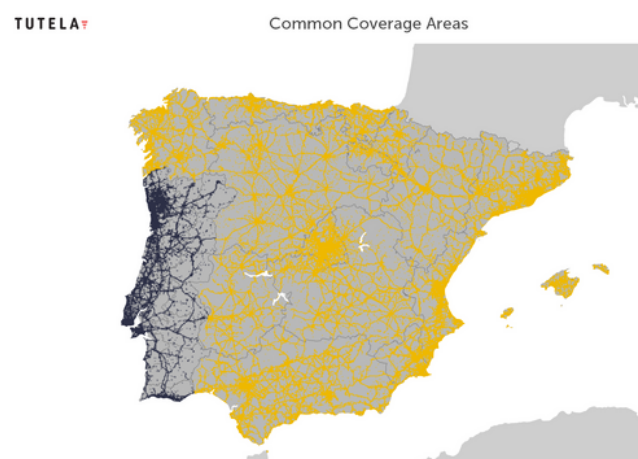
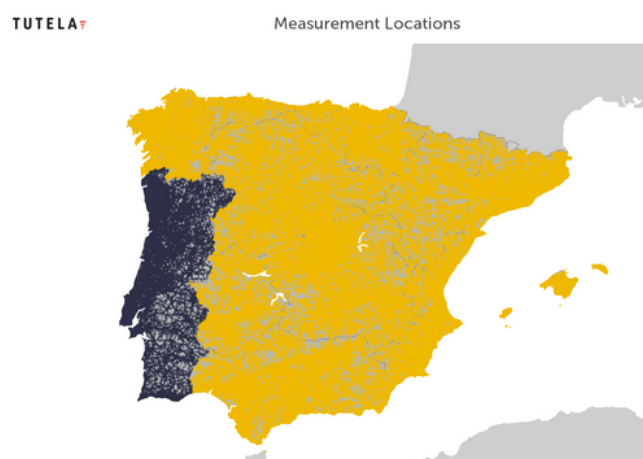
Tutela uses two key methodological components to best compare user experience across operators: Consistent Quality and Common Coverage Areas. Consistent Quality is a set of metrics that Tutela has developed to objectively evaluate when connections networks are (and are not) enabling users to do almost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

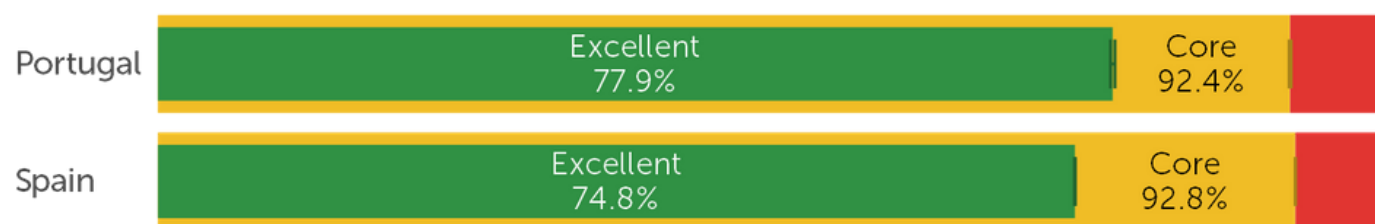
Country comparison

Portugal achieved the highest Excellent Consistent Quality over Spain with 77.9% of subscribers in Common Coverage Areas across Portugal having a network experience suitable for use-cases like 1080p video streaming, real-time mobile gaming or HD video calling. For Core Consistent Quality,

meaning when a mobile connection meets the requirements for use-cases like SD video streaming, social media sharing and web browsing, Spain had the highest Core Consistent Quality at 92.8%, only 0.4% ahead of Portugal.

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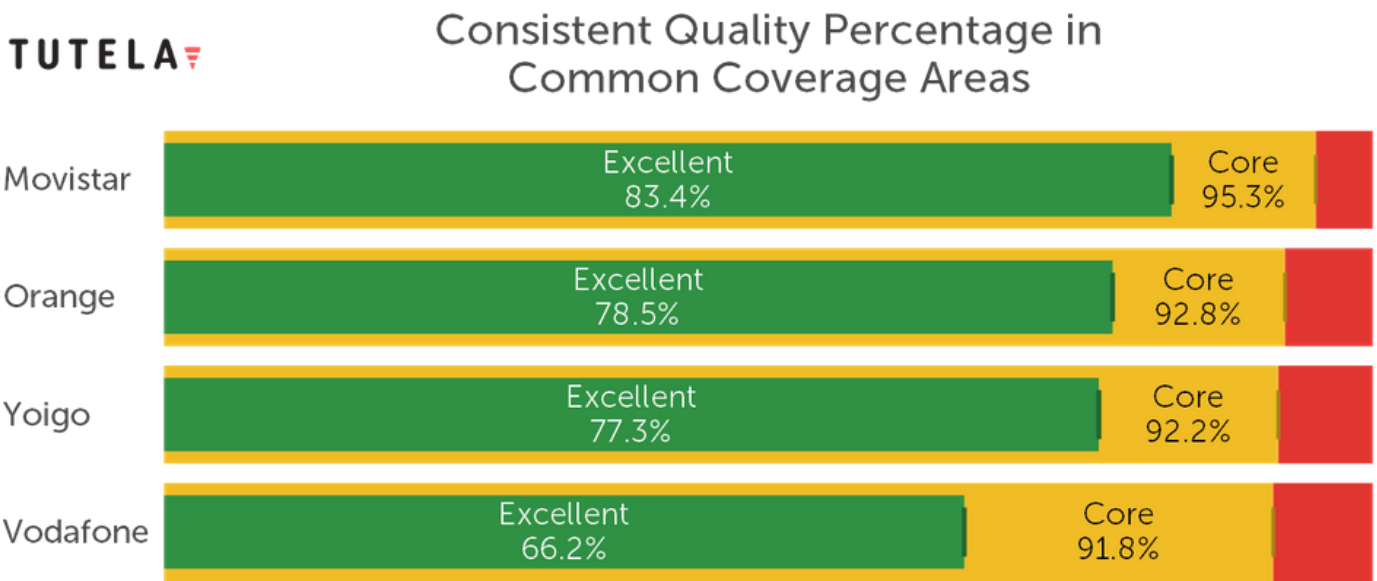
Consistent Quality Percentage in Common Coverage Areas



Spain Common Coverage Areas (CCAs)

In Common Coverage Areas across Spain, Movistar had the highest Excellent Consistent Quality at 83.4%. Orange and Yoigo were close behind, with a gap of only 4.9% and 6.1%, respectively; however, Vodafone had the lowest Excellent Consistent Quality in the country with 66.2%, 17.2% behind first place Movistar. For Core Consistent Quality, all four operators

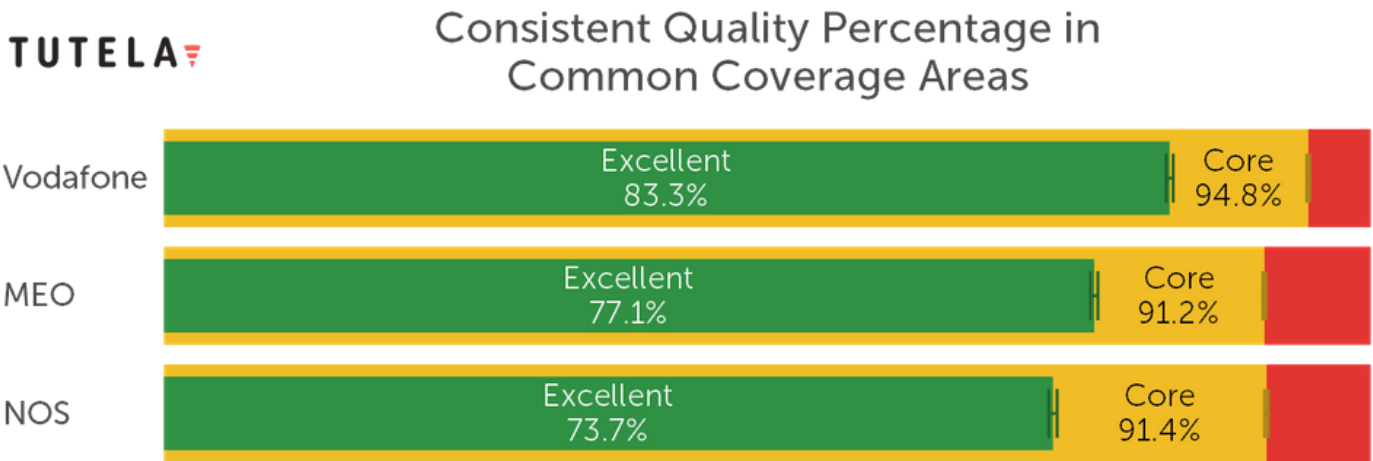
reached the 90% threshold meaning that a majority of the time, subscribers to either one of these operators had a good enough mobile connection for everyday smartphone applications. The ranking stayed the same as Excellent but the difference in performance was much tighter, with Vodafone only behind first place Movistar by 3.5%.



Portugal Common Coverage Areas (CCAs)

In Common Coverage Areas across Portugal, Vodafone had the highest Excellent Consistent Quality at 83.3%, with MEO in second place by 6.2%, and NOS in third place by 9.6%. For Core Consistent Quality,

all three operators reached the 90% threshold and the difference in performance was much smaller, with NOS and MEO behind first place Vodafone by only 3.4% and 3.6%, respectively.



Download throughput

Country comparison

Spain narrowly took first place over Portugal for fastest median download speed: Spain

was at 21.1 Mbps, and Portugal just behind at 19.4 Mbps.

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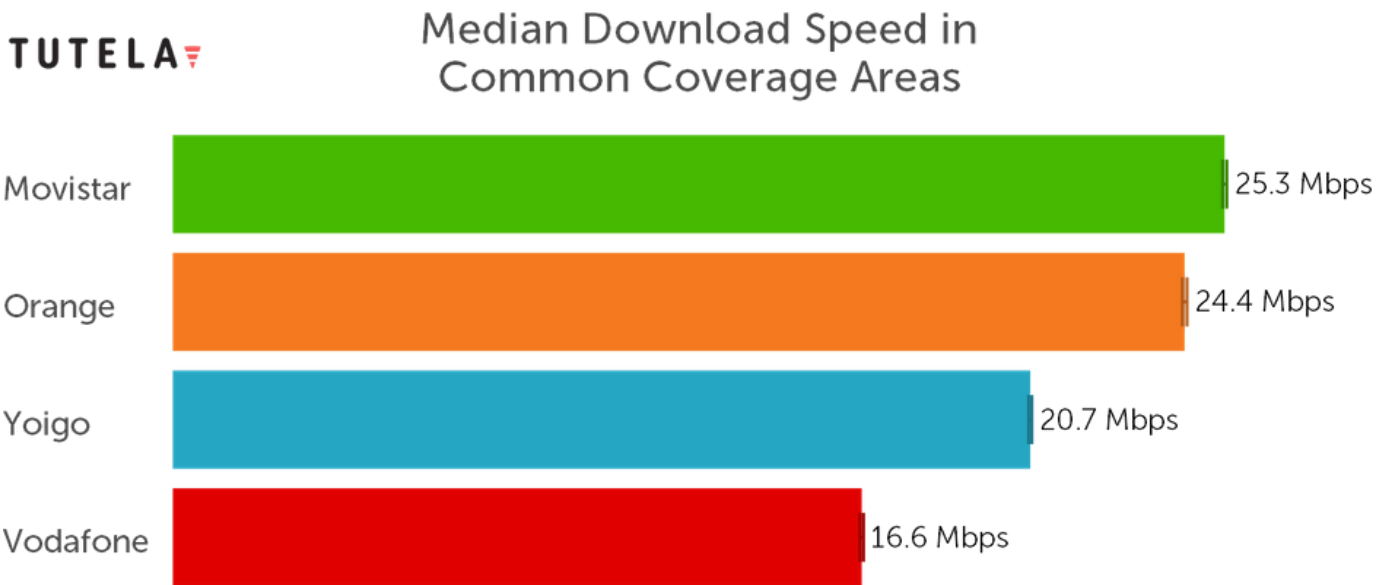
Median Download Speed in Common Coverage Areas



Spain Common Coverage Areas (CCAs)

In Common Coverage Areas across Spain, Movistar had the fastest median download speed at 25.3 Mbps, with Orange at 24.4 Mbps and Yoigo at 20.7 Mbps. Vodafone

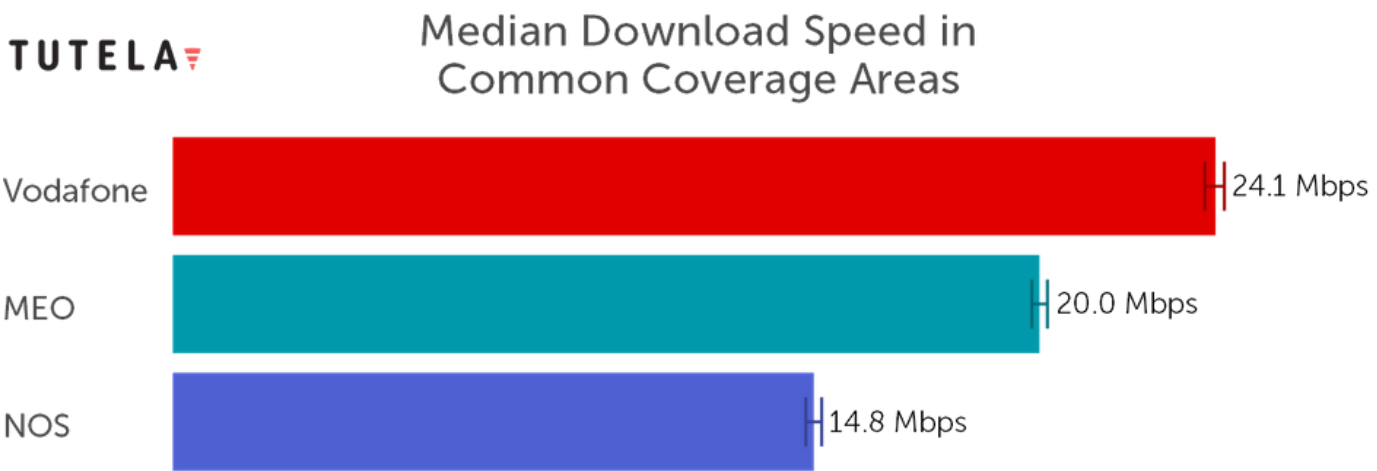
placed last with a median download speed of 16.6 Mbps, 8.7 Mbps slower than first place Movistar.



Portugal Common Coverage Areas (CCAs)

In Common Coverage Areas across Portugal, Vodafone had the fastest median download speed at 24.1 Mbps, followed closely by MEO at 20.0 Mbps. NOS fell away from the

competition with a median download speed of 14.8 Mbps, 9.3 Mbps slower than first place Vodafone.



Upload throughput

Country comparison

Despite Spain taking top spot for download speeds, Portugal had the fastest median upload speed at 9.6 Mbps. However Spain

was not letting go without a fight, with there only being a 1.5 Mbps difference in performance.

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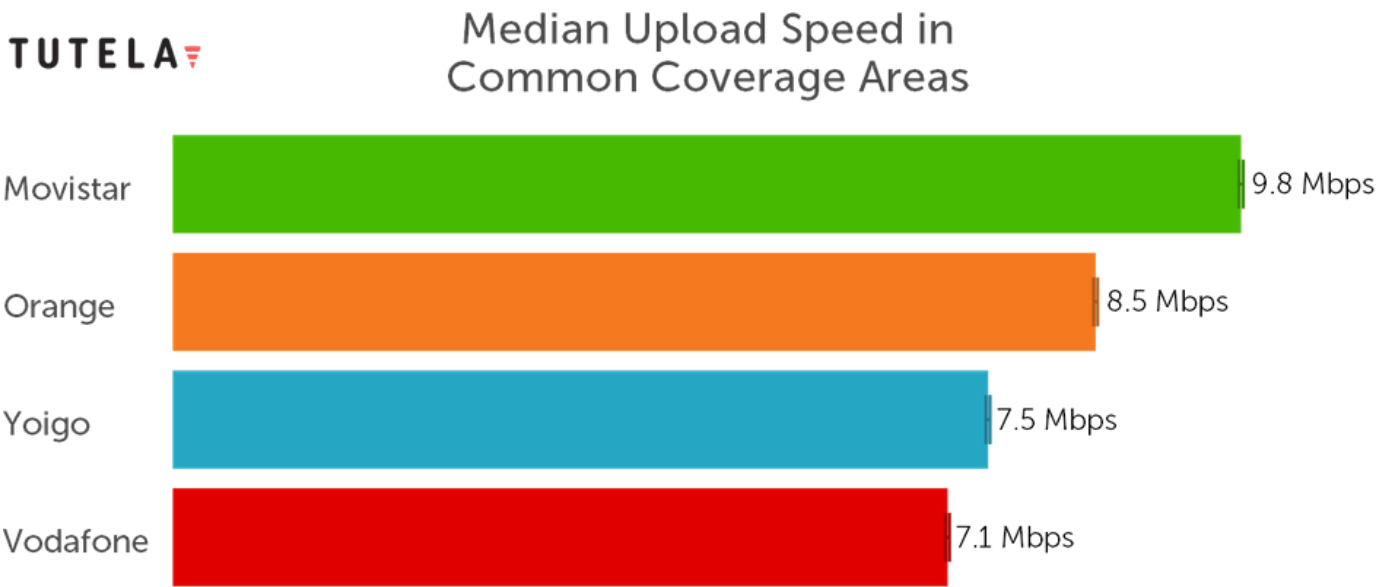
Median Upload Speed in Common Coverage Areas



Spain Common Coverage Areas (CCAs)

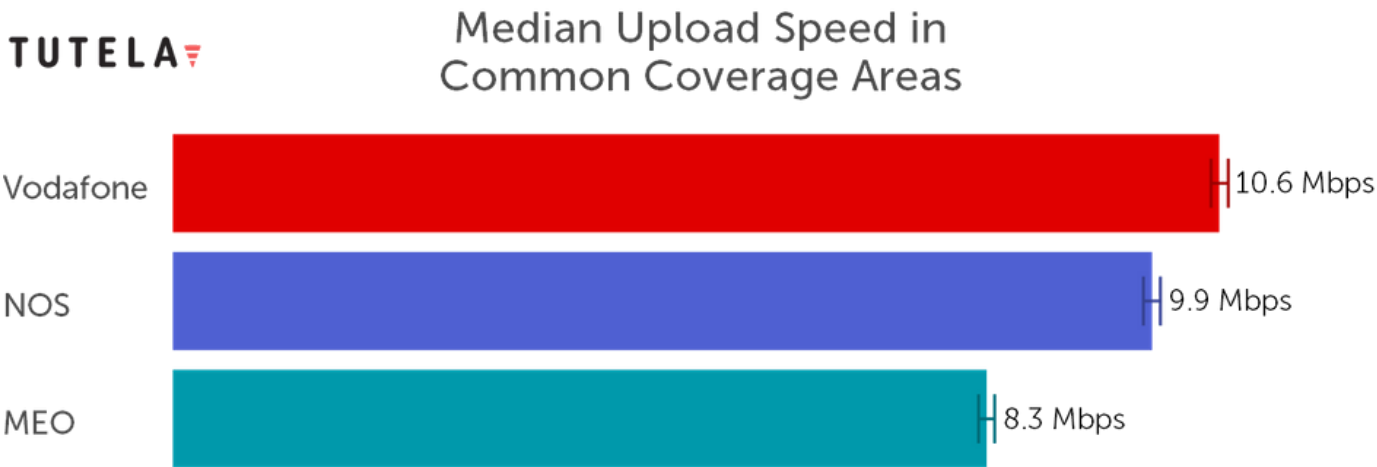
In Common Coverage Areas across Spain, Movistar had the fastest median upload speed at 9.8 Mbps, followed by Orange at 8.5 Mbps, Yoigo at 7.5 Mbps, and Vodafone at 7.1 Mbps. It's notable that only 2.7 Mbps

separated last place Vodafone from first place Movistar for upload speed, compared to 8.7 Mbps difference between the same two operators but for download speed.



Portugal Common Coverage Areas (CCAs)

In Common Coverage Areas across Portugal, Vodafone had the fastest median upload speed at 10.6 Mbps, with a difference in performance of only 0.7 Mbps between Vodafone and NOS, and a 2.3 Mbps difference between Vodafone and MEO.



Latency

Country comparison



Subscribers in Spain experienced a slightly more responsive network than subscribers in Portugal, with a median one-way latency

of 24.4 ms, 4.1 ms better than Portugal's result at 28.5 ms.

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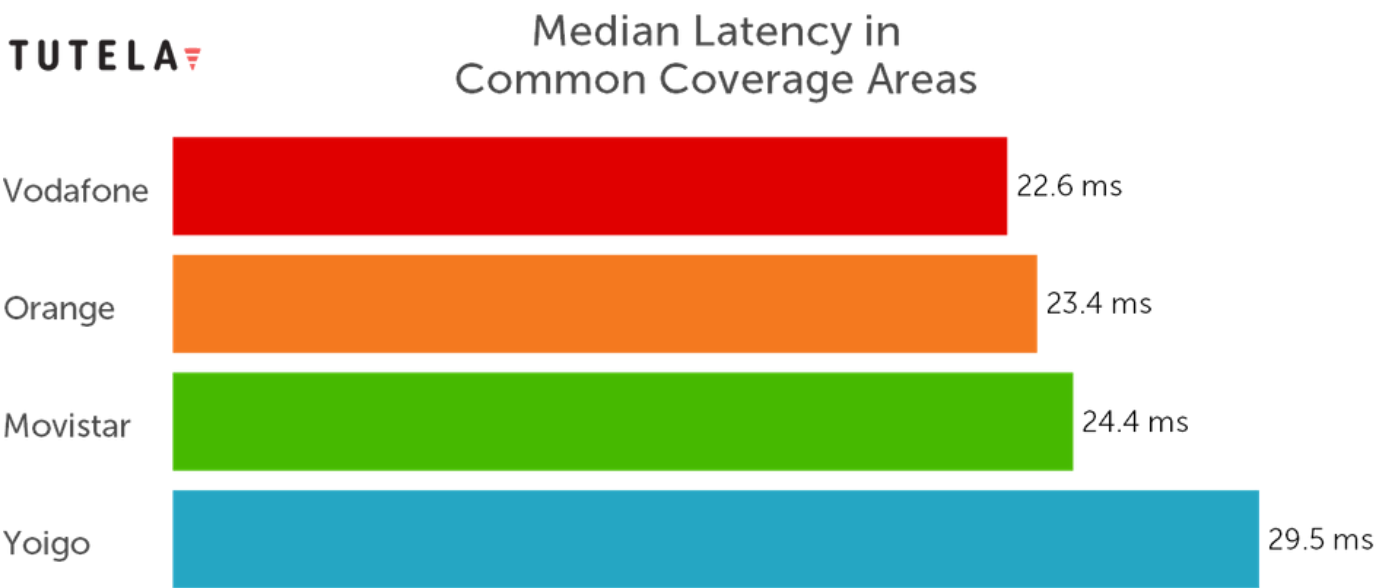
Median Latency in Common Coverage Areas



Spain Common Coverage Areas (CCAs)

In Common Coverage Areas across Spain, Vodafone had the best one-way latency result at 22.6 ms, however both Orange and Movistar were only behind by 0.8 ms and 1.8

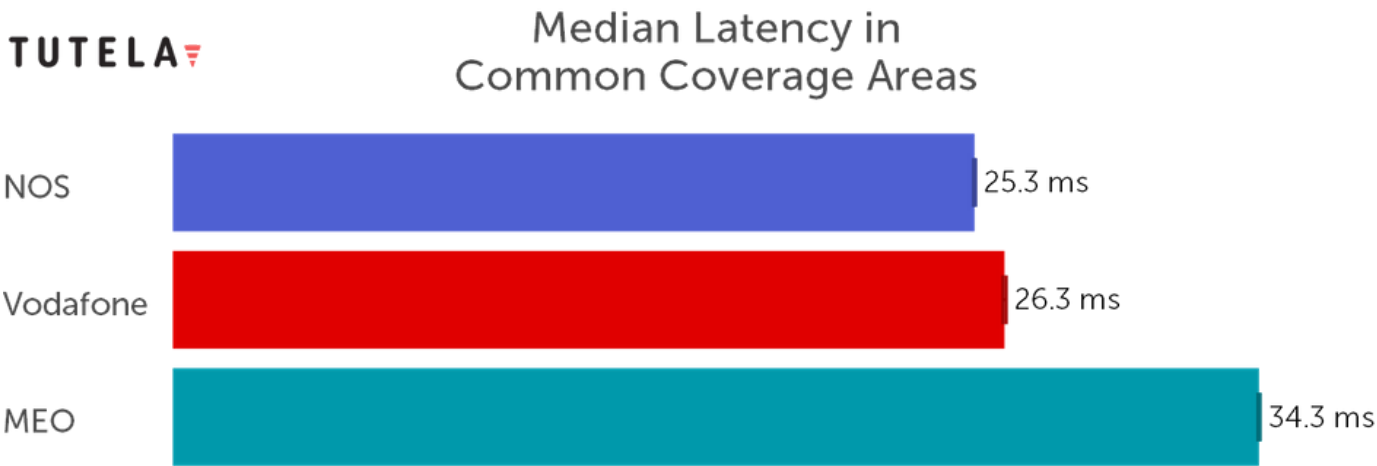
ms, respectively. Yoigo was in last place with a median latency result of 29.5 ms, 6.9 ms slower than Vodafone.



Portugal Common Coverage Areas (CCAs)

NOS had the best latency result at 25.3 ms in Common Coverage Areas across Portugal, but Vodafone was only 1 ms behind NOS.

MEO was in last place at 34.3 ms, 9 ms slower than first place NOS.



Coverage

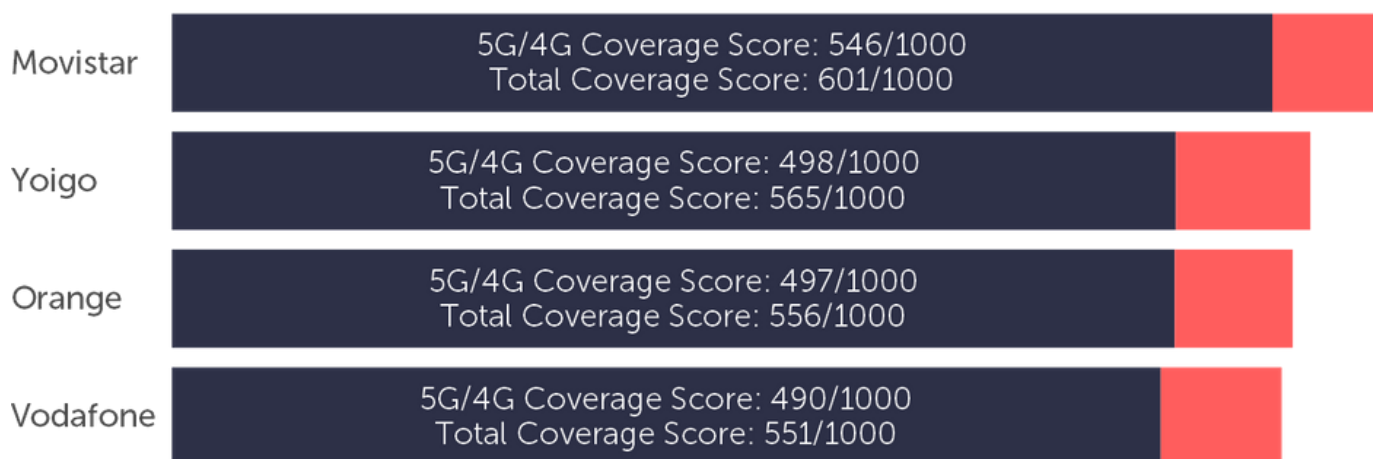
Spain Common Coverage Areas (CCAs)

In Spain, Movistar demonstrated the greatest overall geographic coverage, with 546 on a 4G/5G network, 56 points more than last

place Vodafone, and a total coverage score of 601, 50 points more than last place Vodafone.

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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.

Portugal Common Coverage Areas (CCAs)

In Portugal, Vodafone demonstrated the greatest relative geographic coverage, with a coverage score of 596 on a 4G/5G connection, and 662 overall. MEO and NOS were close behind for a total coverage score

of 627 and 595, respectively. NOS had the least noticeable coverage on a 4G/5G network in comparison to Vodafone with a 65 point difference.



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.

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Technology usage

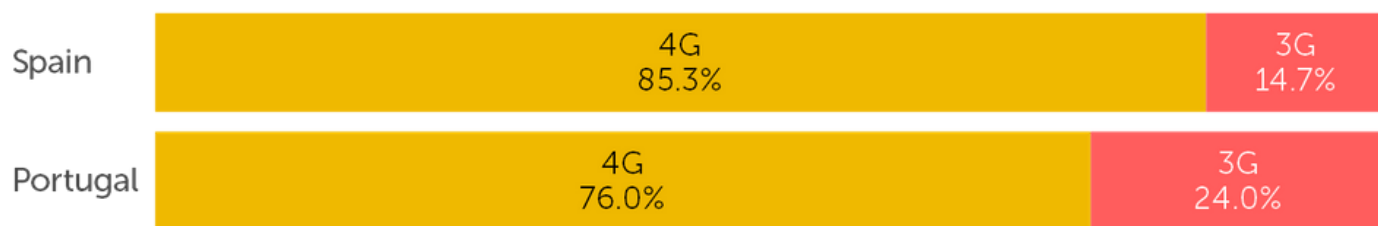
Country comparison

Spain had a noticeable lead over Portugal when it comes to subscribers connecting to a 4G network, with subscribers spending 85.3% of the time on this network compared to 76.0% of Portugal subscribers.

This switched when testing on a 3G network, with subscribers in Portugal spending 24.0% of the time on 3G, compared to 14.7% for Spain subscribers.

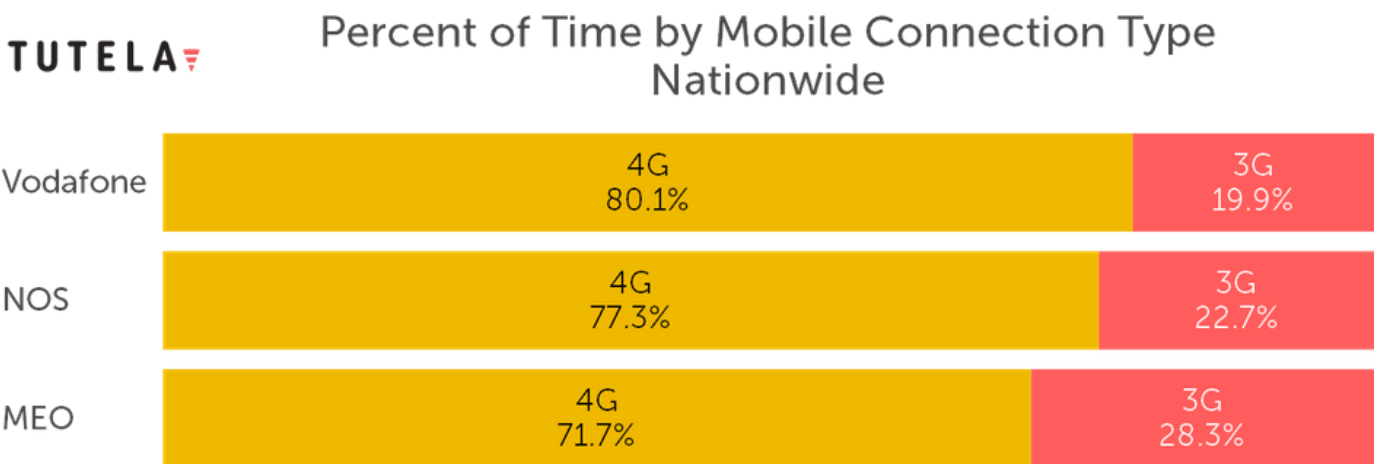
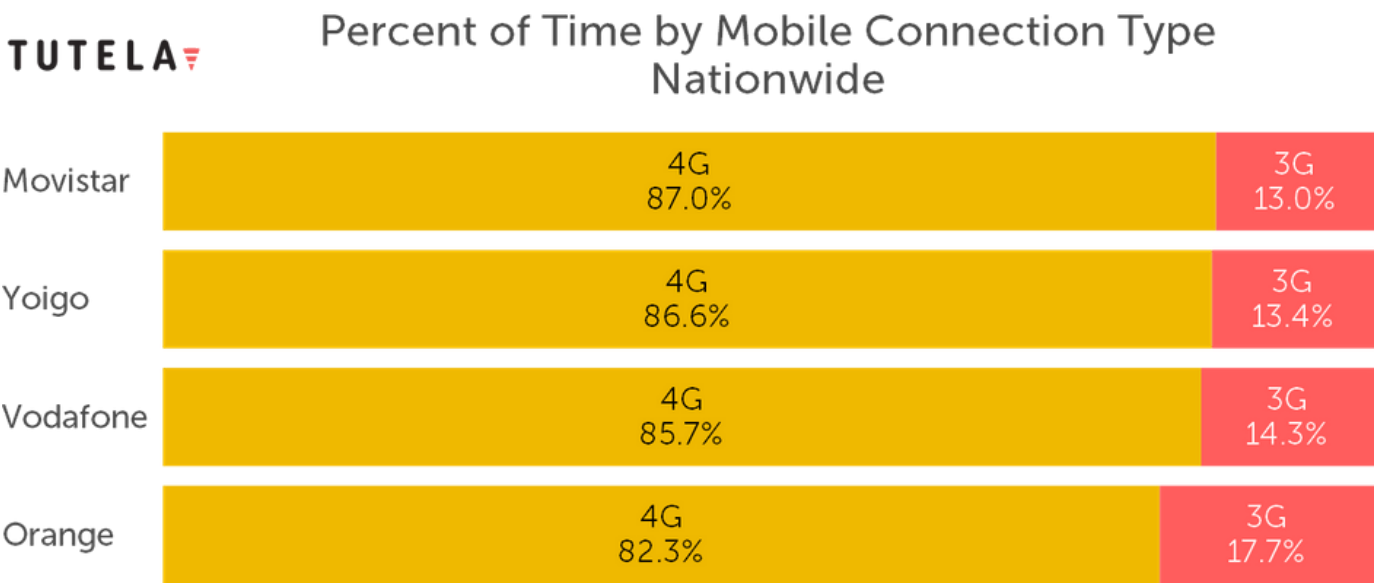
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Percent of Time by Mobile Connection Type Nationwide



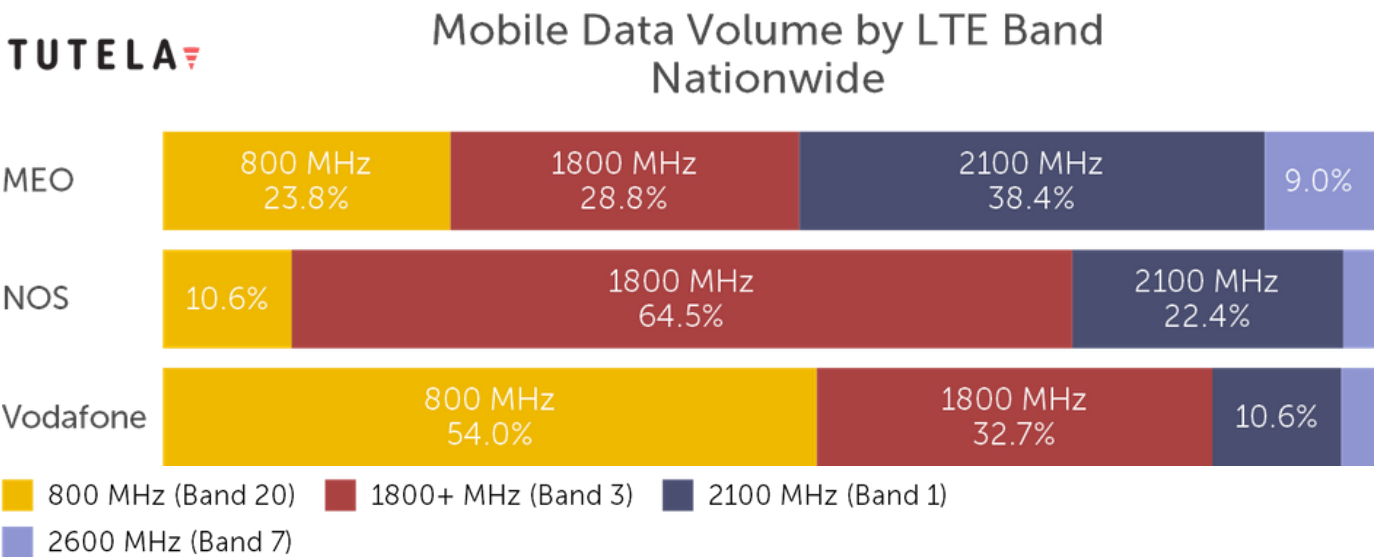
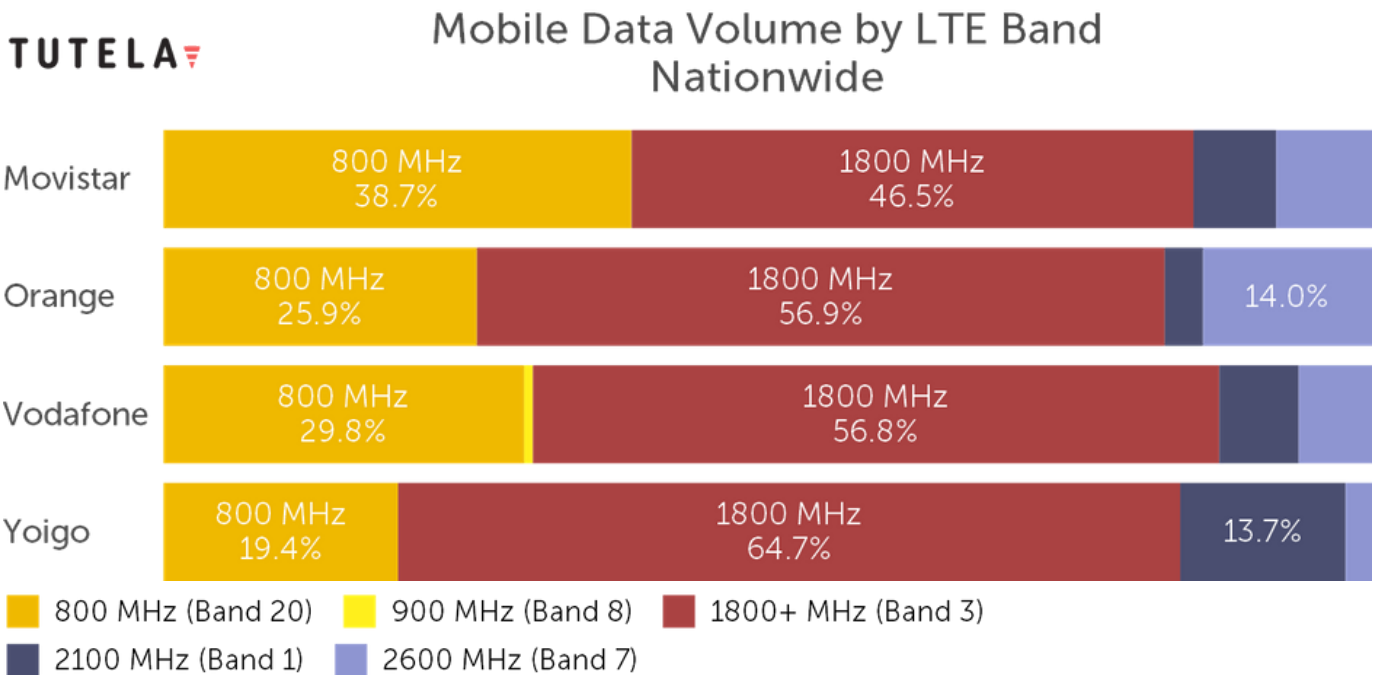
In Spain, mobile subscribers with Movistar spend 87.0% of the time on a 4G network, with Yoigo close behind with 86.6%, Vodafone in third place with 85.7%, and Orange in last place with users spending 82.3% of the time on a 4G network, compared to 17.7% of the time on a 3G network. For mobile subscribers in Portugal,

Vodafone users spend the most time on a 4G network at 80.1% of the time. However, subscribers for all three operators spend a decent amount of time on a 3G network - especially MEO subscribers who would find themselves on 3G 28.3% of the time and 71.7% of the time on a 4G network.



When it comes to spectrum optimization, operators in both Portugal and Spain use a mix of 800 MHz and 1800 MHz for the vast majority of their data traffic. MEO is the stand-out exception, as its 2100 MHz and 2600 MHz high-band spectrum combines to carry nearly half of subscriber data traffic. In Spain, there is much more parity between operators, as 800 and 1800 MHz spectrum

carries the overwhelming majority of data traffic. Vodafone also stands out as the only operator to be using the legacy 900 MHz Band 8 for any noticeable amount of LTE traffic; going forwards, spectrum refarming — particularly of valuable low-band spectrum — is likely to be an important tool for operators.





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 7 billion total records, including more than 59 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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Total Results Overview in Common Coverage Areas

		Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
Portugal	MEO	20.0 Mbps \pm 0.18 Mbps	8.3 Mbps \pm 0.08 Mbps	34.3 ms \pm 0.041 ms	77.10% \pm 0.31%	91.20% \pm 0.14%
	NOS	14.8 Mbps \pm 0.18 Mbps	9.9 Mbps \pm 0.09 Mbps	25.3 ms \pm 0.035 ms	73.68% \pm 0.35%	91.37% \pm 0.16%
	Vodafone	24.1 Mbps \pm 0.25 Mbps	10.6 Mbps \pm 0.09 Mbps	26.3 ms \pm 0.055 ms	83.35% \pm 0.29%	94.83% \pm 0.12%
Spain	Movistar	25.3 Mbps \pm 0.05 Mbps	9.8 Mbps \pm 0.02 Mbps	24.4 ms \pm 0.010 ms	83.37% \pm 0.07%	95.30% \pm 0.03%
	Orange	24.4 Mbps \pm 0.06 Mbps	8.5 Mbps \pm 0.02 Mbps	23.4 ms \pm 0.013 ms	78.48% \pm 0.07%	92.76% \pm 0.03%
	Vodafone	16.6 Mbps \pm 0.04 Mbps	7.1 Mbps \pm 0.02 Mbps	22.6 ms \pm 0.010 ms	66.21% \pm 0.07%	91.78% \pm 0.03%
	Yoigo	20.7 Mbps \pm 0.04 Mbps	7.5 Mbps \pm 0.02 Mbps	29.5 ms \pm 0.018 ms	77.35% \pm 0.08%	92.20% \pm 0.04%

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Total Results Overview Nationwide

		Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
Portugal	MEO	18.9 Mbps \pm 0.18 Mbps	7.5 Mbps \pm 0.08 Mbps	34.6 ms \pm 0.036 ms	73.92% \pm 0.28%	89.73% \pm 0.13%
	NOS	13.8 Mbps \pm 0.15 Mbps	9.2 Mbps \pm 0.07 Mbps	25.6 ms \pm 0.034 ms	71.21% \pm 0.32%	90.09% \pm 0.15%
	Vodafone	21.1 Mbps \pm 0.23 Mbps	9.5 Mbps \pm 0.07 Mbps	27.0 ms \pm 0.043 ms	79.81% \pm 0.27%	93.39% \pm 0.12%
Spain	Movistar	24.5 Mbps \pm 0.05 Mbps	9.5 Mbps \pm 0.02 Mbps	24.6 ms \pm 0.009 ms	82.18% \pm 0.07%	94.88% \pm 0.03%
	Orange	23.6 Mbps \pm 0.06 Mbps	8.2 Mbps \pm 0.02 Mbps	23.6 ms \pm 0.012 ms	77.38% \pm 0.07%	92.26% \pm 0.03%
	Vodafone	16.1 Mbps \pm 0.04 Mbps	6.9 Mbps \pm 0.02 Mbps	22.8 ms \pm 0.009 ms	65.41% \pm 0.07%	91.36% \pm 0.03%
	Yoigo	20.2 Mbps \pm 0.04 Mbps	7.2 Mbps \pm 0.02 Mbps	29.8 ms \pm 0.016 ms	76.15% \pm 0.08%	91.68% \pm 0.04%

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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