



TUTELA 

Italy

State of Mobile Experience

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Annual Report

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www.tutela.com

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Introduction

As the end of year wind-down commences, the mobile industry must continue to push forward with its 2021 plans but also allow itself to reevaluate on what has been one eventful year for all. With the spotlight on Italy and all things 5G, TIM and cell tower company INWIT have partnered up to install at least 100 small cells in large cities such as Milan and Genoa that will be able to support 5G technologies, with the aim for 120 cities to have 5G at their disposal by 2021(1).

Progress in Italian mobile deployments has continued despite the challenges of increased lockdowns and market uncertainty. Back in February, the Iliad group partnered with Nokia to roll out 5G to its 17 million subscribers across France and Italy(2), and

with the Italian side of the business only just over two years old the operator reported that an extra 580,000 mobile subscribers were added in Q3 2020 alone showing its impact in the market, even in challenging times(3).

Outside of the industry's continued focus on 5G, telecoms businesses have also taken steps to address the challenges of the current situation. For example, students who are subscribed to either TIM, Vodafone and WindTre will have access to distance learning resources free of data charges, thus allowing them to continue studying from a safe distance without it cutting into their usual data package deal(4). Meanwhile, WindTre completed its merger with the launch of a new joint brand in March 2020(5).

(1) RCR Wireless, TIM, INWIT to deploy small cells to boost 5G coverage in Italian cities

<https://www.rcrwireless.com/20201106/5g/tim-inwi-small-cells-boost-5g-coverage-italian-cities>

(2) Light Reading, Eurobites: Iliad chooses Nokia for 5G rollout in France, Italy

<https://www.lightreading.com/5g/eurobites-iliad-chooses-nokia-for-5g-rollout-in-france-italy/d/d-id/757503>

(3) Telecoms.com, Iliad raises funding for 5G as mobile business upticks

<https://telecoms.com/507540/iliad-raises-funding-for-5g-as-mobile-business-upticks/>

(4) Telecompaper, TIM, Vodafone and WindTre to provide data-free distance learning access

<https://www.telecompaper.com/news/tim-vodafone-and-windtre-to-provide-data-free-distance-learning-access--1362331>

(5) WindTre, The single brand is born, the beginning of the beginning

https://www.windtregroup.it/EN/Press-&-Events/press-releases/Istituzionale-Press-Releases/2020/WINDTRE_SINGLE_BRAND_BORN.aspx?

However, despite the pace of innovation and deployment, Italy still has some work cut out for it to keep up with some of its other European counterparts. In the latest Global Mobile Experience Report(6) by Tutela, Italy was ranked 35th for Excellent Consistent Quality along with Serbia, tied 34th for Core Consistent Quality along with Finland, Spain, Poland, and Uruguay, and 32nd for download speeds.

Tutela has analyzed over 5 billion total records taken from real-world smartphone users, including more than 27 million speed and latency tests, taken between May 1st and October 31st 2020.

(6) Tutela, Global Mobile Experience Report
<https://www.tutela.com/blog/global-mobile-experience-2020>





Key findings

- Vodafone won in three out of the six metrics tested, with particular success in delivering the best subscriber mobile experience - the operator had both the highest Excellent Consistent Quality at 78.9% and Core Consistent Quality at 93.8%, and best latency result at 18.9 ms one way.
- However, TIM also won in three out of the six metrics tests, with a first place tie for fastest download speed along with Wind Tre (21.6 Mbps), the fastest upload speed, and best overall coverage.
- Wind Tre made it onto the leaderboard once with its first place tie with TIM for fastest download speed, and was close behind TIM for upload speed, falling behind by only 1.2 Mbps.

Results overview

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Mobile experience results

Italy, December 2020



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

Results from over 5 billion total records taken from real-world smartphone users, including more than 27 million speed and latency tests, taken between May 1st and October 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.



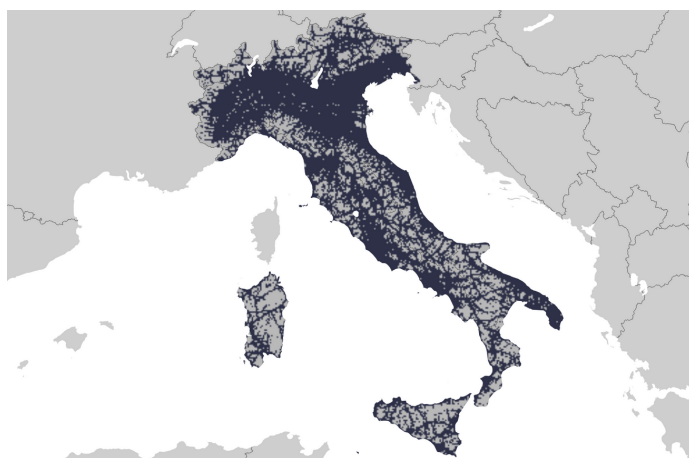
The methodology is covered in detail at the end of this report and [on our website](#), but simply put, there are two sets of thresholds, Excellent and Core. A connection that hits the Excellent threshold is sufficient for use-cases like 1080p video streaming or multiplayer gaming, while a Core connection 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.

Measurement locations



Common Coverage Areas

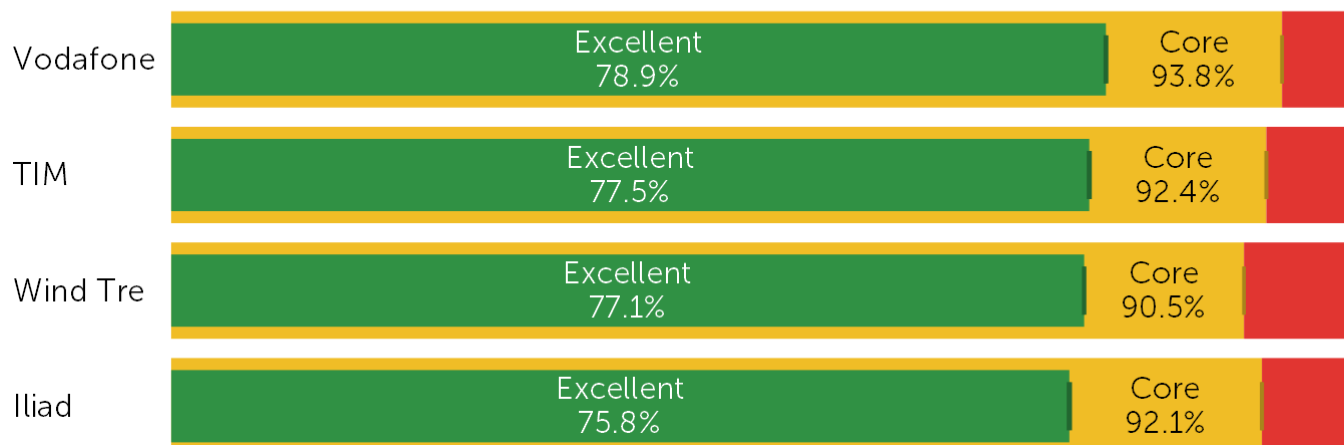


Consistent Quality

In Common Coverage Areas across Italy, Vodafone had the highest Excellent Consistent Quality with 78.9% of subscribers' connections suitable for use-cases like 1080p video streaming, real-time mobile gaming or HD video calling. The competition was unusually tight, with last place Iliad only 3.1% behind first place Vodafone. This indicates that network experience in Italy is incredibly competitive between the four big players and customers will need to also consider regional differences and coverage when making a decision about which provider works best for them.

All four major operators in Italy also managed to reach the 90% threshold for Core Consistent Quality, with Vodafone in first place with 93.8% of subscribers having a network experience suitable for use-cases like SD video streaming, social media sharing and web browsing. Again, the competition was tight with last place Wind Tre only 3.3% behind first place Vodafone. As a result, the vast majority of occasions when a user is in a Common Coverage Area, they should experience a network connection good enough for many of the most popular day-to-day applications.

TUTELA Consistent Quality percentages in Common Coverage Areas



Download throughput

Even though TIM and Wind Tre ranked lower than Vodafone in the Consistent Quality metric, both tied for first place in the download speed test with a median transfer speed of 21.6 Mbps in Common Coverage Areas across Italy. In similar fashion to the Consistent Quality metric, the competition was very tight between all operators, with the

gap between the two first place winners and second place Vodafone being only 0.7 Mbps, whilst Iliad, still a relatively newcomer to the Italian mobile market, had a slight step-back from the competition as it was 3.3 Mbps slower than TIM / Wind Tre and 2.6 Mbps slower than Vodafone.

TUTELA Median download speed in Common Coverage Areas



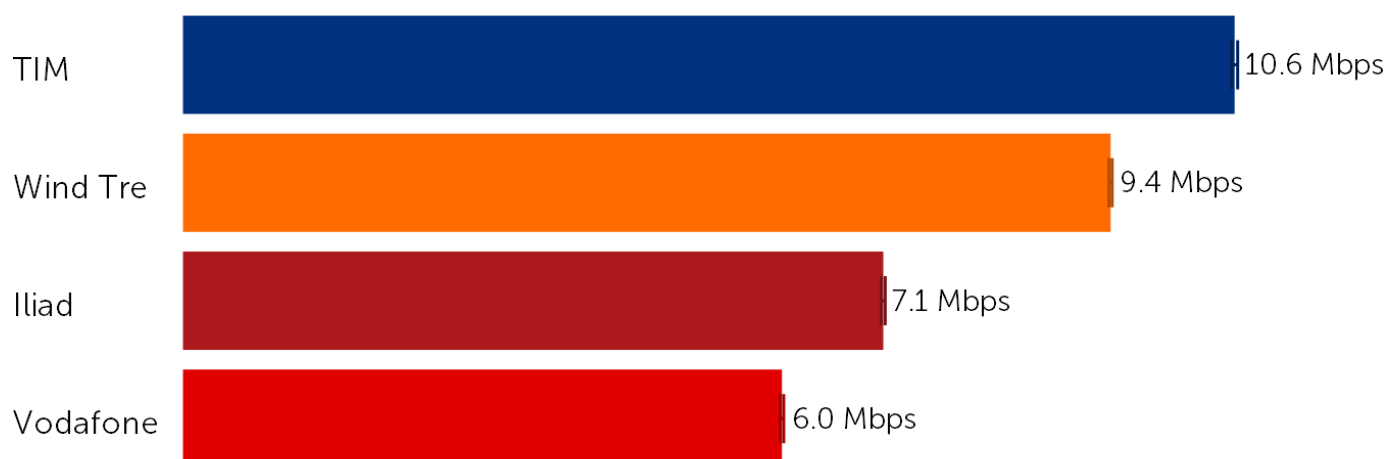
Upload throughput

Despite how closely competitive each operator was to one other in the Consistent Quality metric and download speed test, there were apparent differences in the upload speed test: In Common Coverage Areas across Italy, TIM had the fastest median upload speed at 10.6 Mbps, while Wind Tre was 1.2 Mbps slower than TIM,

despite its ability to keep up with the operator in the download speed test. The most noticeable change in the rankings was Vodafone: the operator fell from third place for download throughput to last place with a median upload speed of 6.0 Mbps, 4.6 Mbps slower than first place TIM and 14.9 Mbps slower than its download speed result.

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Median upload speed in Common Coverage Areas



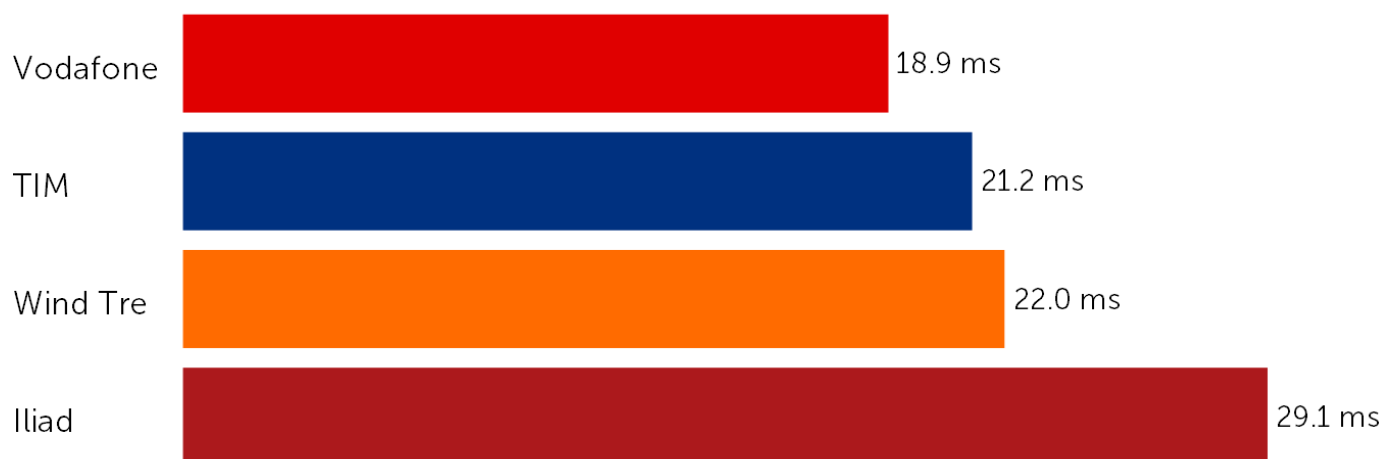
Latency

Despite Vodafone's performance in the download and upload speed tests, the operator was in first place with the most responsive network in Common Coverage Areas across Italy at 18.9 ms one-way. Both Tim and Wind Tre were in close second and third place by only 2.3 ms and 3.1 ms, respectively; however the most noticeable

difference was the operator Iliad in last place with a median latency result of 29.1 ms, 10.2 ms less responsive than first place Vodafone. This may be due to Iliad's infrastructure sharing agreement with Wind Tre, leading to a longer route for traffic to reach its destination.

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Median latency in Common Coverage Areas



Coverage

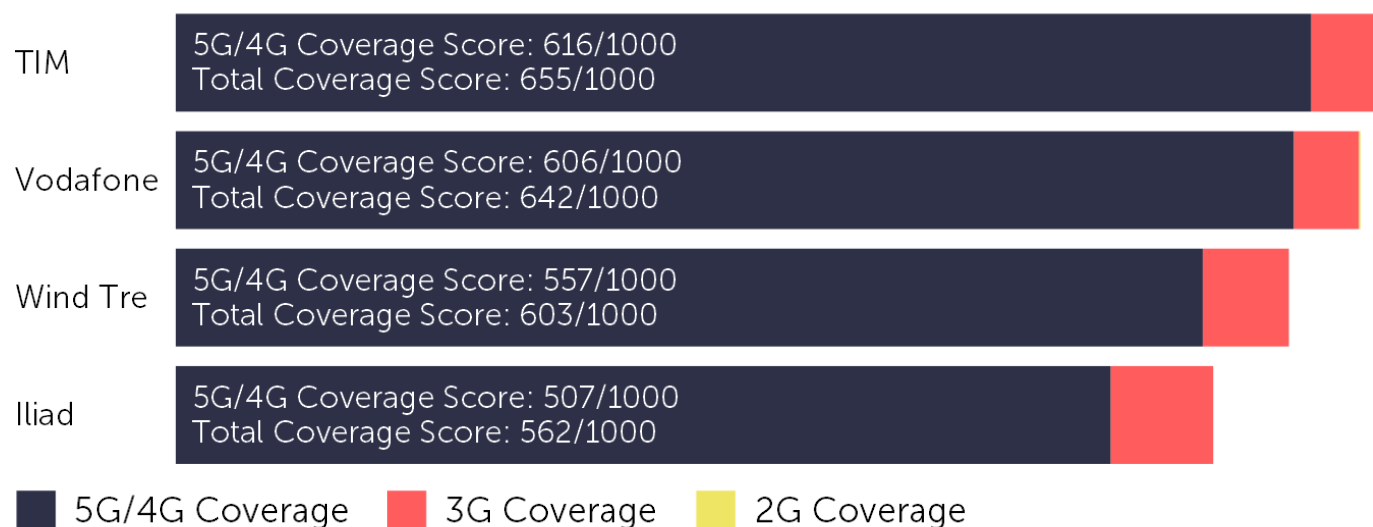
TIM demonstrated the greatest relative geographic coverage across Italy, both for 5G/4G coverage, and total coverage. It achieved a 5G/4G coverage score of 616 and a total coverage score of 655.

There were only 10 points difference between TIM and second-place Vodafone in the 5G/4G coverage, and just 13 points separated the two when it came to the total coverage score. However, there was a notable step down between second and third place. Wind Tre was 52 points behind TIM when it came to total coverage, and

again Iliad had the least amount of coverage, 93 points behind TIM. It was also important to note that Italian operators are not relying heavily on the 3G networks to deliver rural coverage, and have instead embraced 4G networks for the most part. This bodes well for its eventual 5G deployments. Only 39 points difference between total coverage score and 5G/4G coverage score for TIM, and even Iliad, whose network had the most reliance on 3G for coverage, had only 55 points between total and 5G/4G.

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Relative Area Coverage Score

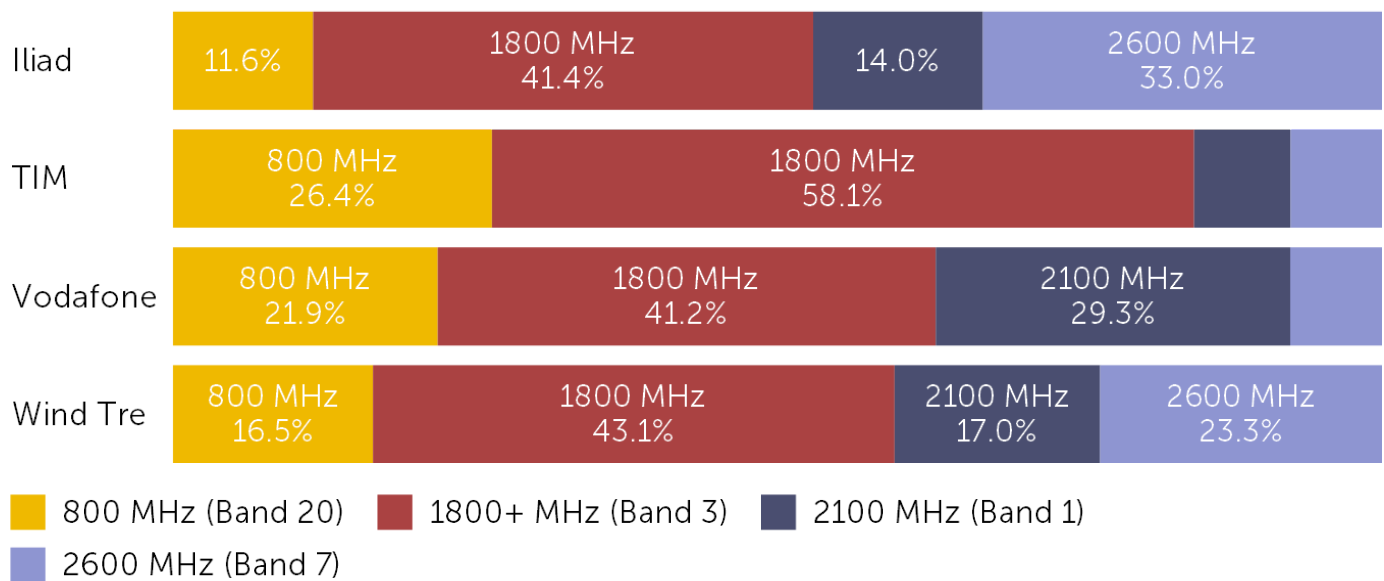


Technology usage

All four operators in Italy rely heavily on the LTE 1800 MHz spectrum band to cater to their subscribers, with TIM subscribers using this as their primary band for 58.1% of data usage. TIM's single widest spectrum holding is in 1800 MHz, so it stands to reason that their subscribers rely on it the most heavily. For the other operators, higher-frequency spectrum (2100 MHz and 2600 MHz) are used more commonly to add capacity. Iliad,

in particular, uses high-band spectrum for nearly half of its data traffic, despite the fact that it owns just 20 MHz for downlink across those two bands. Iliad users also clearly still benefit from Iliad's agreement with Wind Tre, which provides access to more towers as well as low-band 800 MHz spectrum, which is critical for providing widespread coverage.

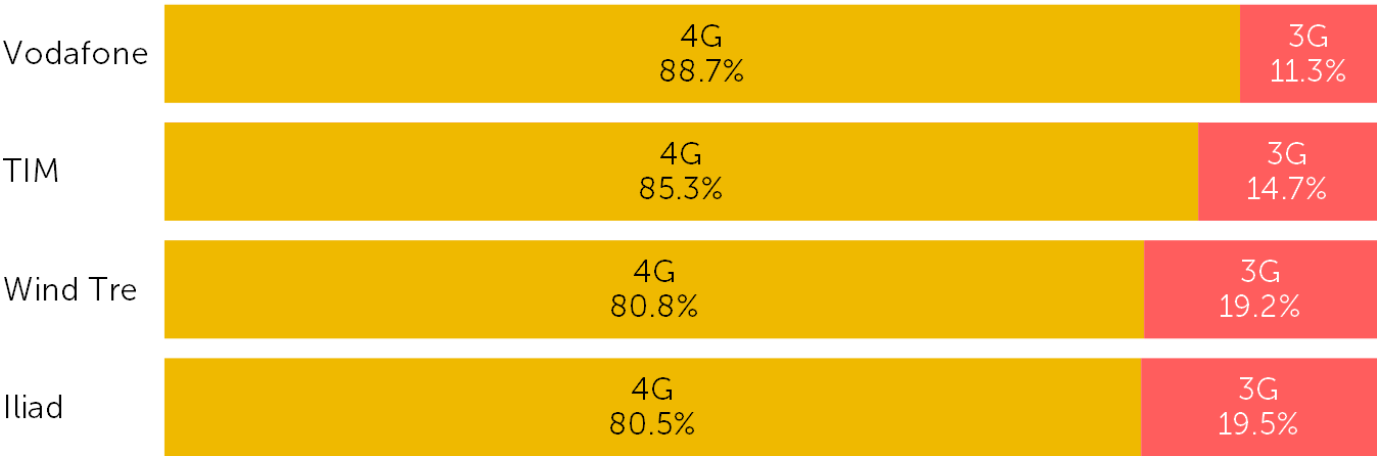
TUTELA Mobile Data Volume by LTE Band Nationwide



As noted in the coverage score section, subscribers across all four operators in Italy will spend a majority of the time on a 4G network, with Vodafone users spending the most time on 4G at 88.7% of the time and Iliad users the least at 80.5% of the time. That said, Wind Tre and Iliad subscribers may find

themselves on a 3G network almost 20% of the time, and both operators have some work to do to make up some of the difference found in the 5G/4G coverage score section to better reach their subscribers.

TUTELA Percentage of Time by Mobile Connection Type Nationwide





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 5 billion total records between May 1st and October 31st 2020.

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

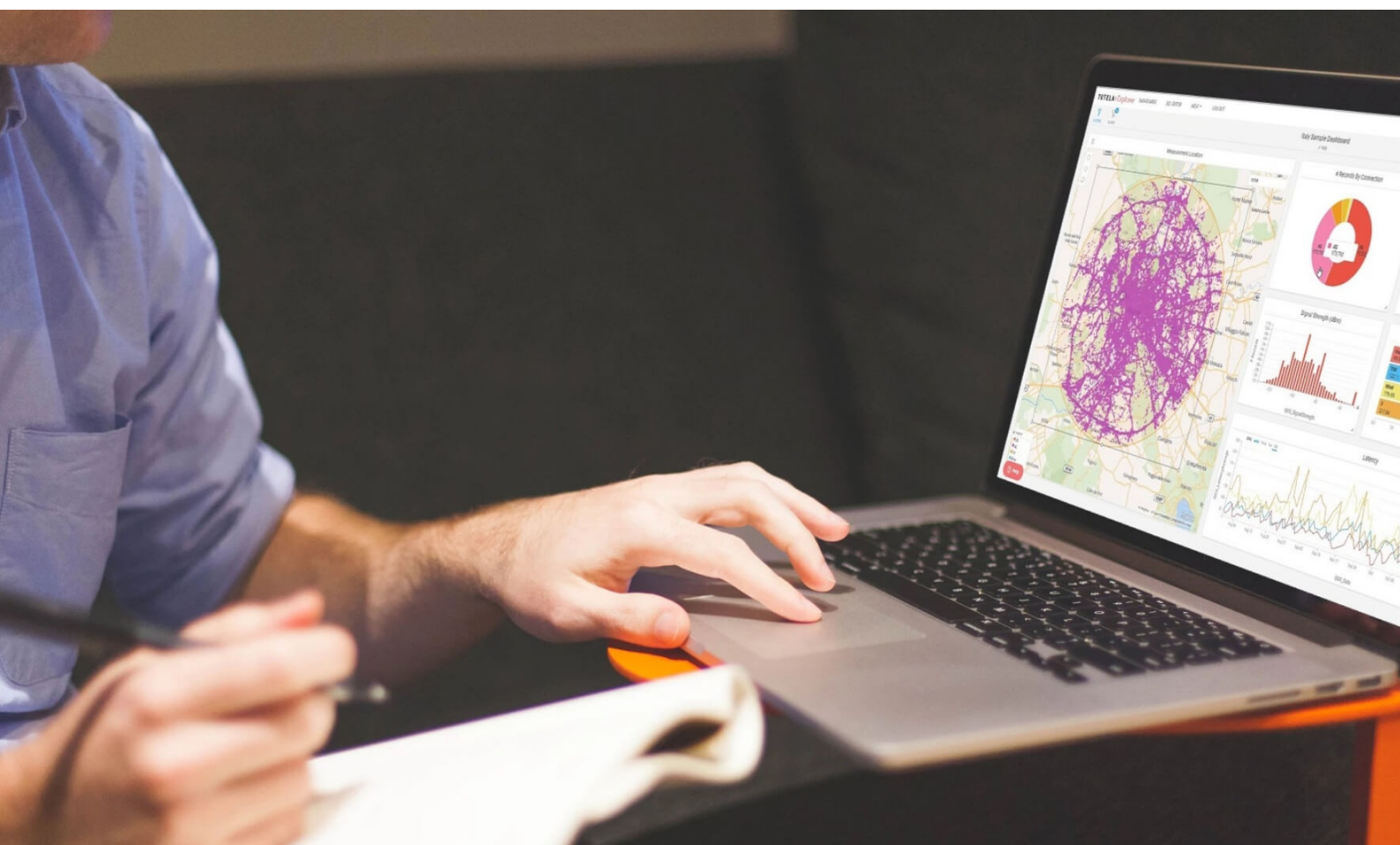
Discover Tutela Explorer

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
Iliad	18.3 Mbps \pm 0.04 Mbps	7.1 Mbps \pm 0.02 Mbps	29.1 ms \pm 0.019 ms	75.81% \pm 0.10%	92.06% \pm 0.05%
TIM	21.6 Mbps \pm 0.06 Mbps	10.6 Mbps \pm 0.03 Mbps	21.2 ms \pm 0.021 ms	77.49% \pm 0.09%	92.43% \pm 0.04%
Vodafone	20.9 Mbps \pm 0.05 Mbps	6.0 Mbps \pm 0.02 Mbps	18.9 ms \pm 0.011 ms	78.90% \pm 0.08%	93.76% \pm 0.03%
Wind Tre	21.6 Mbps \pm 0.04 Mbps	9.4 Mbps \pm 0.02 Mbps	22.0 ms \pm 0.015 ms	77.06% \pm 0.06%	90.55% \pm 0.03%

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Results Overview Nationwide

	Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
Iliad	18.3 Mbps \pm 0.04 Mbps	6.9 Mbps \pm 0.02 Mbps	29.4 ms \pm 0.018 ms	74.78% \pm 0.09%	91.46% \pm 0.04%
TIM	20.3 Mbps \pm 0.05 Mbps	9.8 Mbps \pm 0.03 Mbps	21.6 ms \pm 0.019 ms	75.50% \pm 0.08%	91.55% \pm 0.04%
Vodafone	20.2 Mbps \pm 0.05 Mbps	5.7 Mbps \pm 0.02 Mbps	19.2 ms \pm 0.012 ms	77.07% \pm 0.07%	92.99% \pm 0.03%
Wind Tre	21.2 Mbps \pm 0.04 Mbps	8.9 Mbps \pm 0.01 Mbps	22.5 ms \pm 0.014 ms	75.86% \pm 0.05%	89.95% \pm 0.03%

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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