TUTELA

France

State of Mobile Experience

Analysts

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Annual Report

MARCH 2021

www.tutela.com

Table of contents

Key findings 5

Results overview 6

Understanding this report 7

Consistent Quality 9

Download throughput 10

Upload throughput 11

Latency 12

Coverage 13

Technology usage 14

Methodology 16

Introduction

While many operators across the globe had both auction and deployment of 5G in action by mid-year 2020, all within a pandemic, France only completed its auctions a couple months shy of 2020 ending[1], with the sale of 310 MHz in the 3.4 - 3.8 GHz frequency band[2]. With that completed, Orange France has made a strong start in 2021 with at least 160 cities now covered with the new network[3], and Bouygues Telecom has set its sights on the Bordeaux metropolitan area first with 5G services now available to at least 800,000 people[4], in addition to the more than 1000 French municipalities the operator claims to cover.

Meanwhile, in a potential move to speed up the implementation of 5G the French spectrum agency ANFR recently authorized almost 20,000 5G sites in the country, all of which are existing and used for 2G, 3G, and 4G[5]. In other news not centered around 5G, Bouygues Telecom recently released its five year plan with the ambitious goal to become the second largest mobile operator in France, behind Orange which continues to dominate the market space. The operator, which acquired EIT in 2020 thus adding an extra 2 million customers to its database, still put itself slightly ahead of Iliad and into third place.

[1] RCR Wireless, France completes 5G spectrum auction
https://www.rcrwireless.com/20201002/5g/france-completes-5g-spectrum-auction
Retrieved 10/03/21

[2] Telecoms.com, France's big four showed some restraint in the latest 5G spectrum auction
https://telecoms.com/506754/frances-big-four-showed-some-restraint-in-the-latest-5g-spectrum-auction/
Retrieved 10/03/21

[3] RCR Wireless, Orange's 5G network reaches 160 cities across France: report
https://www.rcrwireless.com/20210111/5g/orange-5g-network-reaches-160-cities-across-france-report
Retrieved 10/03/21

[4] Telecompaper, Bouygues Telecom expands 5G coverage to Bordeaux
https://www.telecompaper.com/news/bouygues-telecom-expands-5g-coverage-to-bordeaux--1371505
Retrieved 10/03/21

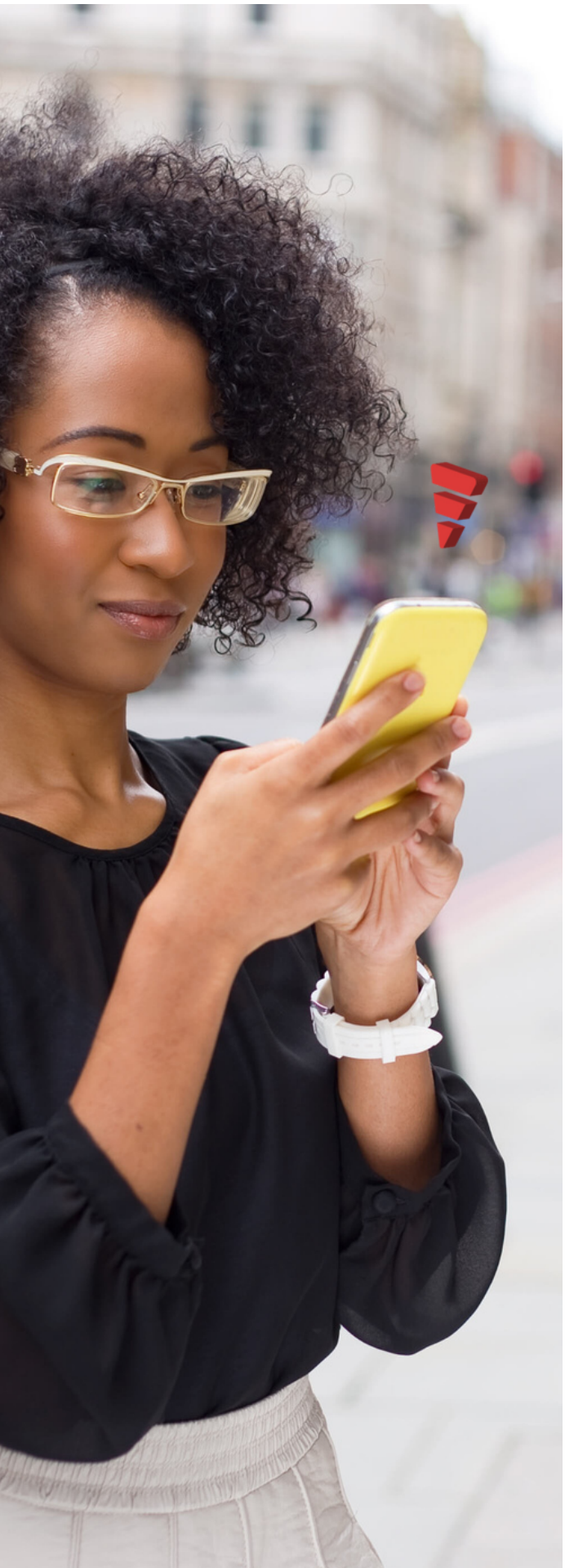
[5] RCR Wireless, France authorizes almost 20,000 5G sites nationwide
https://www.rcrwireless.com/20210210/5g/france-authorizes-almost-2000-5g-sites-nationwide
Retrieved 10/03/21

The moves French operators make in the coming months will be pivotal to how it ranks on the global stage, both as they deploy 5G and strengthen existing 4G services. In Tutela's 2020 Global Experience Report, which looks at our metric of Excellent and Core Consistent Quality at a country level across the globe, France placed 28th in the Excellent Consistent Quality ranking and 31st for Core Consistent Quality. This was a ranking of 22nd among operators in Europe, and highlights that while France is highly competitive in the telecom space, there is more to be done before it can challenge the established strongholds of telecoms juggernauts like the Nordics.

In order to benchmark mobile experience over the last six months, Tutela has evaluated over 9 million speed and latency tests, conducted on the smartphones of real-world users of national mobile operators within Common Coverage Areas, between August 1st 2020 and January 31st 2021.

[6] Telecoms.com, Bouygues throws down the gauntlet to SFR
https://telecoms.com/508257/bouygues-throws-down-the-gauntlet-to-sfr/
Retrieved 10/03/21

[7] Tutela, Global Mobile Experience
https://www.tutela.com/blog/global-mobile-experience-2020
Retrieved 10/03/21



Key findings

- Orange was the dominant figure in at least four of the six metrics tested, with a win for highest Excellent Consistent Quality, Tutela's metric for subscribers' mobile experience for demanding applications, in Common Coverage Areas across France at 85.1%, and both the fastest median download and upload speeds in the country.

- Both Orange and Bouygues tied for the highest Core Consistent Quality, which Tutela uses to measure when a connection is good enough for web browsing, social media sharing and SD video streaming. On both operators, more than 93% of tests were good enough for these applications.

- Free Mobile found itself on the leaderboard with the best one-way latency result at 12.2 ms, however it didn't come easily with only 2.1 ms separating last place SFR from the operator.

Results overview

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Mobile experience results

France, March 2021

	orange	bouygues	SFR	free
Excellent Consistent Quality	★ Winner			
Core Consistent Quality	★ Draw	★ Draw		
Download throughput	★ Winner			
Upload throughput	★ Winner			
Latency				★ Winner
Coverage	★ Winner			

Results from over 9 million speed and latency tests within Common Coverage Areas, between August 1st 2020 and January 31st 2021.

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

TUTELA
Best Mobile Network Experience
MARCH 2021

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.

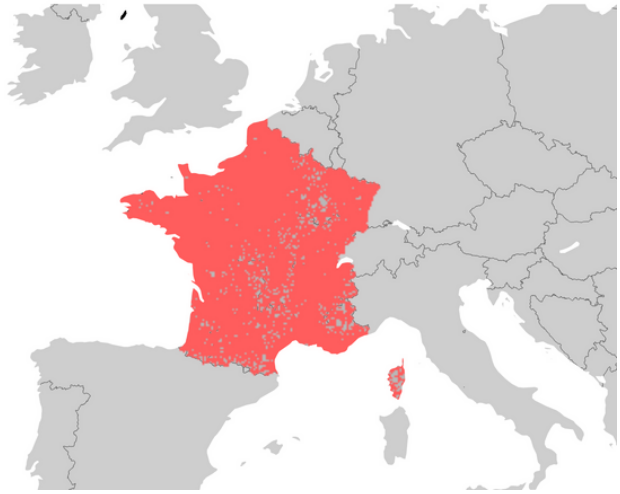
To best serve Tutela's goal to accurately measure and represent the real-world, end-to-end experience of actual users, our methodology is subject to ongoing improvements, which allow us to update the methodology in line with changes in network technology, measurement capabilities, and the realities of 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.

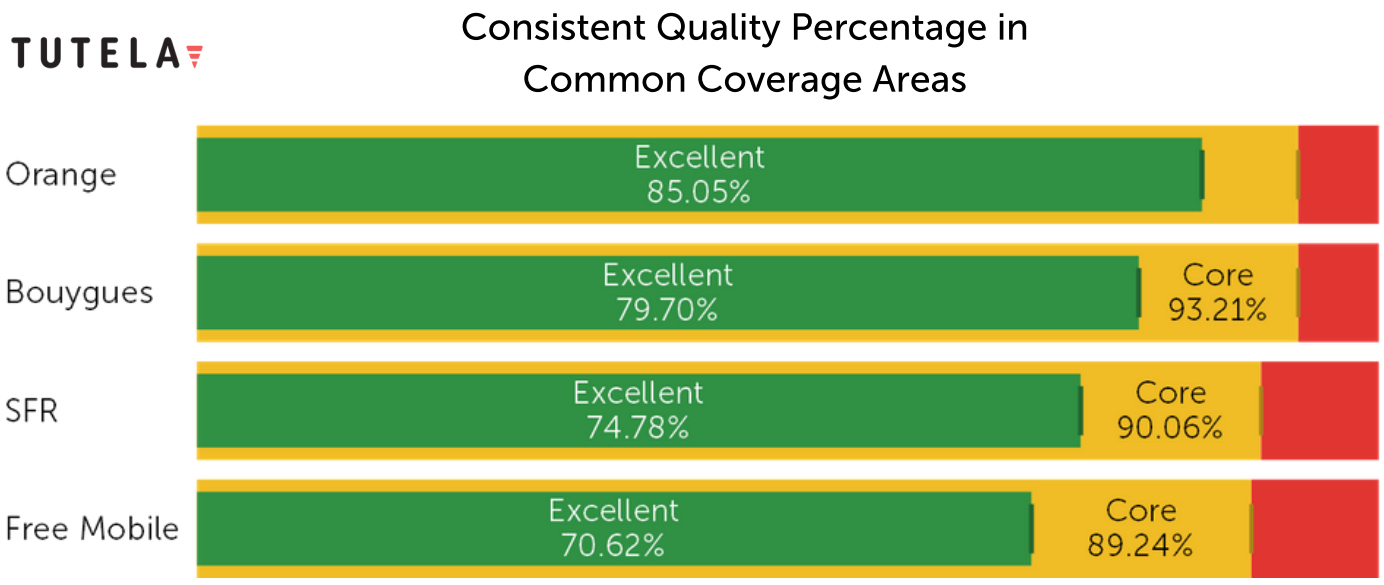
Measurement locations

Common Coverage Areas



Consistent Quality

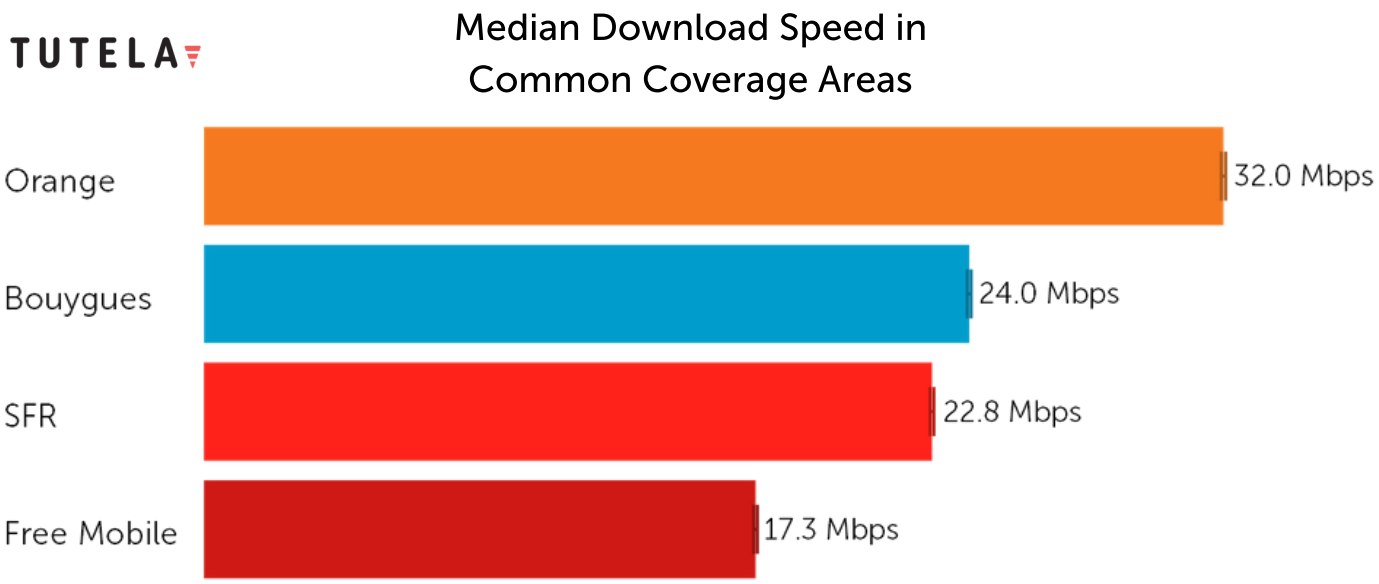
In Common Coverage Areas across France, Orange had the highest Excellent Consistent Quality, with 85.1% of connections having a network experience suitable for use-cases like 1080p video streaming, real-time mobile gaming and HD video calling. Bouygues was close behind with 79.7%, SFR at 74.8% and Free Mobile in fourth place at 70.6%. Orange and Bouygues were statistically tied for first place in Core Consistent Quality, Tutela's metric for when a connection is good enough for web browsing, social media sharing and SD video streaming, while SFR narrowly reached the 90% threshold. Free Mobile may have trailed behind in the Excellent Consistent Quality metric, but was able to keep up with the operators for a Core Consistent Quality of 89.2%.



Download throughput

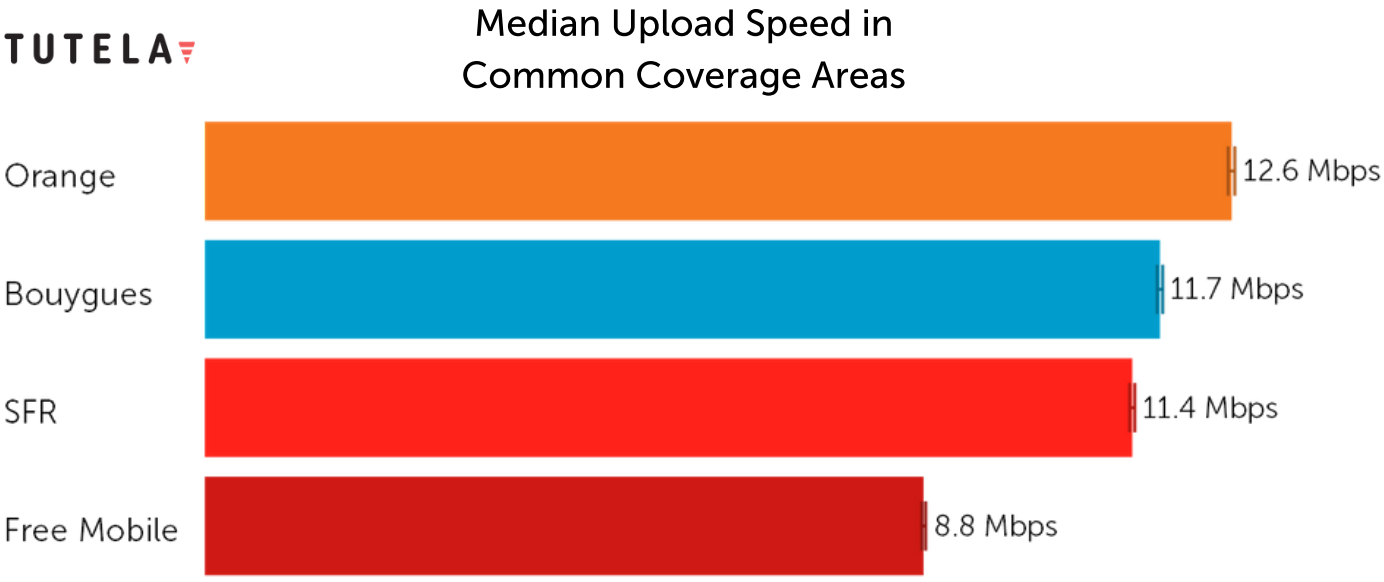
Orange outperformed in the download speed test with a median transfer speed of 32.0 Mbps, more than 8 Mbps faster than second-place Bouygues. SFR came in third place with a median download speed of 22.8 Mbps, while Free Mobile was 14.7 Mbps slower than first-place Orange with a median download speed of 17.3 Mbps.

For all operators, the median download speed offered was well in excess of the 5 Mbps that Tutela uses as part of Excellent Consistent Quality – suggesting that, in most cases, the networks are providing a good enough Quality of Service in this area for most demanding but common applications like HD video streaming.



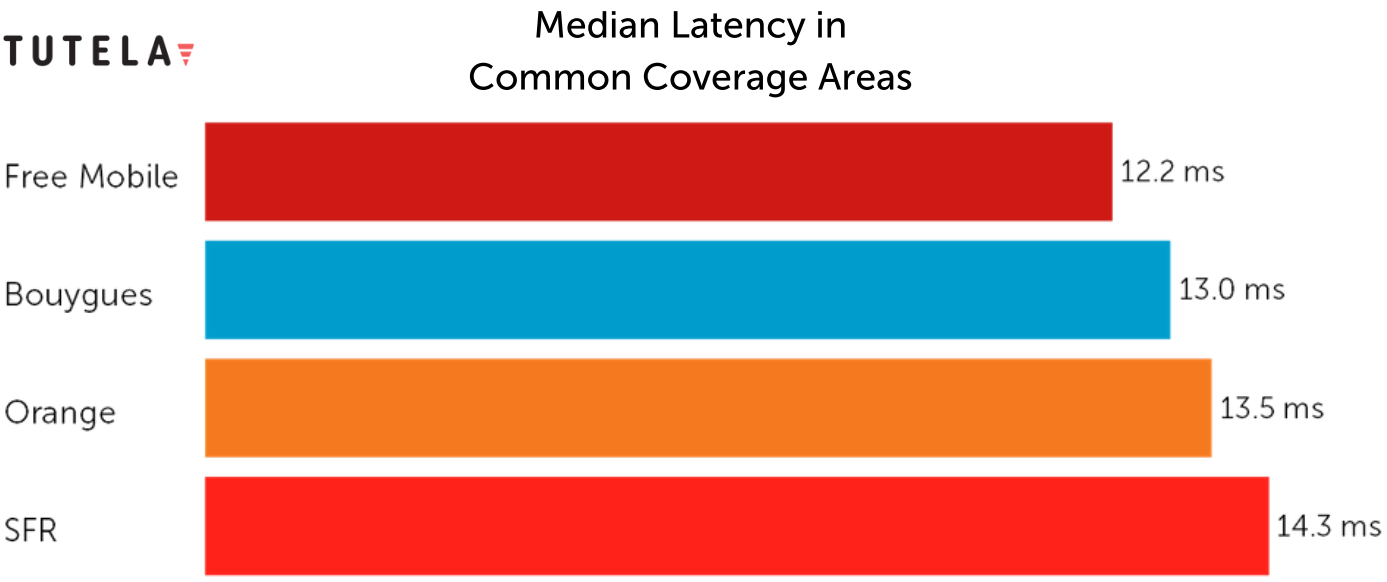
Upload throughput

In the upload speed test, Orange was again in first place with the fastest median transfer speed in Common Coverage Areas across France with 12.6 Mbps. The pressure was on with both Bouygues and SFR only 0.9 Mbps and 1.2 Mbps behind Orange for upload throughput. Free Mobile continued to trail behind the rest, with a median upload speed of 8.8 Mbps, 3.8 Mbps slower than Orange, and 8.5 Mbps slower than its download speed result. While all operators offered upload speeds well in excess of the 1.5 Mbps Tutela uses in its Excellent Consistent Quality metric, it is worth noting that median upload speeds were approximately half that of the download speeds. For the most part this is to be expected as prioritizing download throughput makes sense for the majority of use cases, however, as more of us expect to be able to make video calls from our devices, ensuring a consistent and reliable upload speed is now more important than ever.



Latency

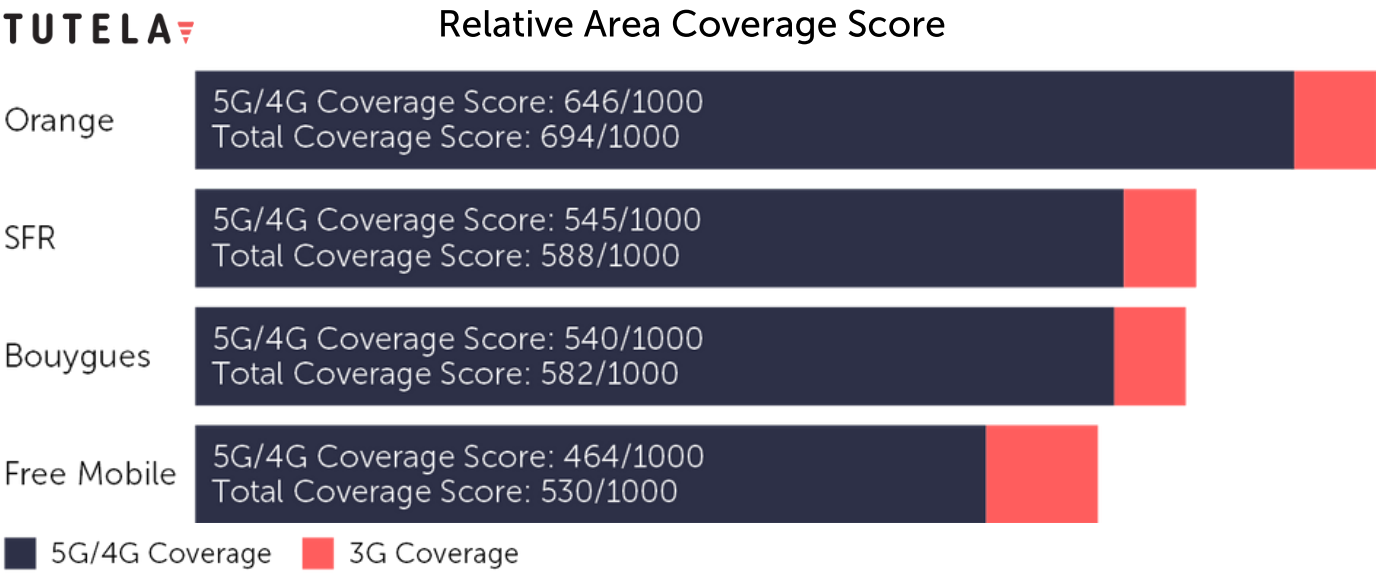
Despite its last place ranking in all other metrics tested, Free Mobile demonstrated the best one-way latency in Common Coverage Areas across France at 12.2 ms. However, only 2.1 ms separated last-place SFR from the winner. Orange, which dominated in the Consistent Quality metric and had by far the fastest median download speed, found itself falling to third place in the latency test with 13.5 ms, which demonstrates how important responsiveness is and not just down to which operator has the fastest speeds. Nonetheless, its latency was extremely competitive.



Coverage

Orange demonstrated the greatest relative area coverage across France for both 5G/4G and total coverage score. The operator achieved a 5G/4G coverage score of 646, and a score of 694 for total mobile coverage.

There was a 101 point difference between Orange and second-place SFR for the 5G/4G coverage score, and 106 points in the total coverage score. Bouygues was close behind SFR with only 5 points separating the two operators for 5G/4G, and 6 points in the total coverage. The most notable difference was with fourth-placed Free Mobile: 182 points separated the operator from first place Orange, and 164 points for total coverage. There were also 76 points between third place Bouygues as well for 5G/4G and slightly less of a gap for total coverage with 52 points 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.

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

All four operators in France utilize the high-band 2600 MHz heavily, however Free Mobile strongly favours it as the primary band for its 4G traffic - with 52.2% of measured data being transceived over this frequency. Meanwhile, Orange and SFR appear to balance their 2600 Mhz use with 2100 MHz, with these greater than 2000 Mhz frequencies accounting for 28.8% and 38.4% of 4G data use respectively. Bouygues uses the least high-band spectrum overall with just 22.8% of data using 2600 Mhz as the primary band.

In the 1000-2000 MHz range, all four operators also use a high amount of mid-band 1800 MHz, with Bouygues making it its primary band with 51.1%. Meanwhile, in the low-band, sub-1000 MHz space, the 700 MHz band continues to be used mostly by Free Mobile, with the other operators prefering to use the 800 Mhz spectrum likely due to their larger holdings in this area. Free Mobile, notably, utilizes these lower-band frequencies the least, with less than 20% of 4G traffic using the 700 Mhz spectrum.

In regards to time spent on 3G/4G, it is encouraging to see that customers for all four national operators are spending a majority of the time on a 4G network, with Bouygues customers finding themselves on a 4G network 91.6% of the time. SFR customers spend 89.0% of the time on a 4G network, followed by Orange subscribers at 87.3% of the time, while customers with Free Mobile are on 4G only 80.3% of the time. As operators look to enter the 5G era, making smart strategic decisions about where and when to sunset 3G will be critical for ensuring a baseline of consistent, high-quality mobile connectivity.

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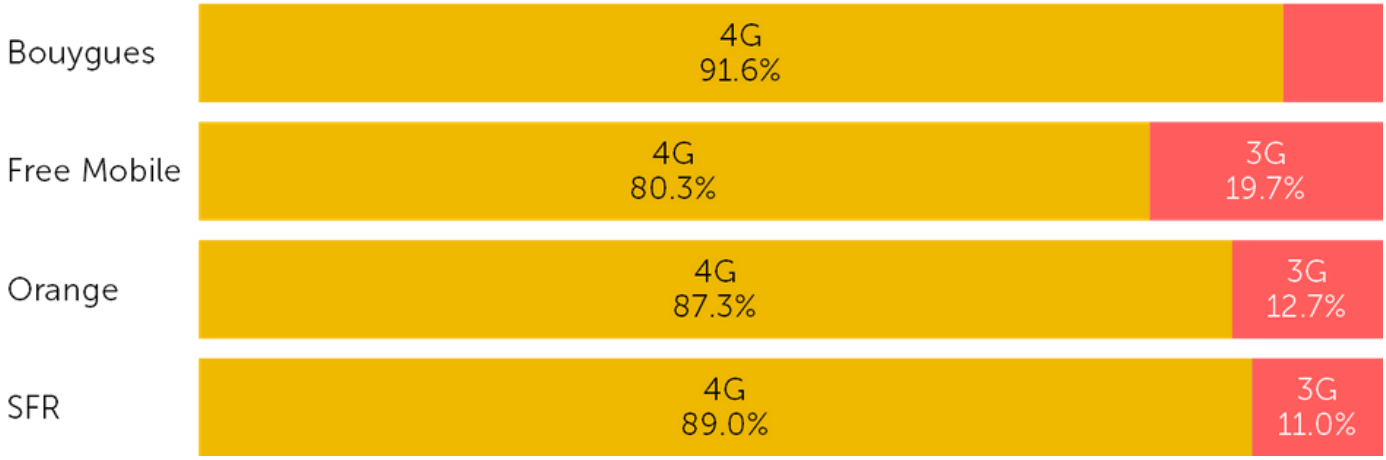
Percent of Time by Mobile Connection Type Nationwide



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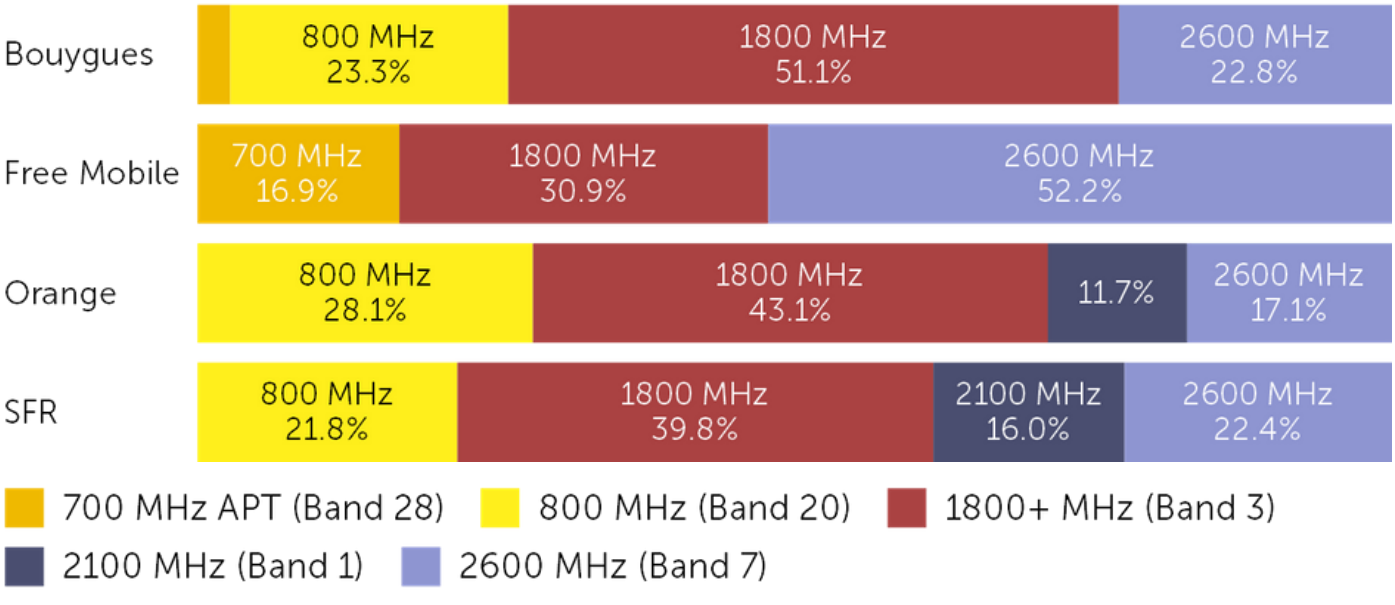
Mobile Data Volume by LTE Band Nationwide



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 9 million speed and latency tests, between August 1st 2020 and January 31st 2021.

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

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Results Overview in Common Coverage Areas

	Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
Bouygues	24.0 Mbps ± 0.06 Mbps	11.7 Mbps ± 0.03 Mbps	13.0 ms ± 0.018 ms	79.70% ± 0.09%	93.21% ± 0.04%
Free Mobile	17.3 Mbps ± 0.06 Mbps	8.8 Mbps ± 0.03 Mbps	12.2 ms ± 0.013 ms	70.62% ± 0.08%	89.24% ± 0.05%
Orange	32.0 Mbps ± 0.07 Mbps	12.6 Mbps ± 0.04 Mbps	13.5 ms ± 0.017 ms	85.05% ± 0.09%	93.20% ± 0.05%
SFR	22.8 Mbps ± 0.06 Mbps	11.4 Mbps ± 0.03 Mbps	14.3 ms ± 0.010 ms	74.78% ± 0.09%	90.06% ± 0.05%

IP addressing protocol measurements

IPv4	IPv6
60%	40%

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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