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Mexico

State of Mobile Experience

Analysts
Montana Jennings
Fi Armstrong

Annual Report

www.tutela.com

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Introduction

2020 and the pandemic highlighted the need for consistency in mobile connectivity across Mexico. Adapting to this requires a shift in focus from beating out the rest with new technological advancements, to ensuring that people have a reliable connection to the internet at all times, especially for those who may have found themselves working or learning from home. It is a shift that the Mexican telecommunications industry are clearly taking seriously - for example, all three leading operators have recently been granted access into the country's 4.5G shared network, delivering connectivity to localities with 5,000 or less people[1].

The year has also been one of consolidation to maintain a competitive dynamic in challenging times. Movistar signed an eight year agreement in 2019 for the operator to gain access to AT&T's 3G and 4G network, with the first stage of migration completed in the first quarter of 2021[2].

[1] Telecompaper, Telcel, AT&T and Movistar connect to Mexico's 4.5G shared network
https://www.telecompaper.com/news/telcel-atandt-and-movistar-connect-to-mexicos-45g-shared-network--1372818
Retrieved 24/03/21

[2] Telecompaper, Telefonica completes first stage of migration to AT&T Mexico network
https://www.telecompaper.com/news/telefonica-completes-first-stage-of-migration-to-atandt-mexico-access-network--1367780
Retrieved 24/03/21

This puts Movistar in a unique position with these shared agreements where it can relinquish much of its spectrum holdings[3], while still delivering service and keeping operational control over the brand. AT&T has also followed in a similar direction to Movistar, returning some 800 MHz spectrum, citing concerns that the spectrum was too expensive for operators to invest in[4].

However in an era of consolidation and resource optimization, there is still room for improvement: In Tutela's latest Global Mobile Experience report[5] Mexico found itself in 68th place out of 172 countries analyzed for Excellent Consistent Quality, Tutela's metric for when a connection is good enough for use-cases like 1080p video streaming, real-time mobile gaming and HD video calling. The country also placed 71st for Core Consistent Quality, and did slightly better in the median download speed test with a placement of 57th, along with South Africa and Romania. While partnership and effective resource optimization will be pivotal to delivering short term improvements, the next adoption of the generation of mobile connectivity will also be critical to shaping Mexico's telecoms future. 5G has been a slow-burn in Mexico, with delays to its next spectrum auction (a common phenomenon in 2020) however the Mexican regulator IFT has now approved the tender of 41 blocks of spectrum for September this year[6].

How Mexico's operators choose to use this additional resource will be pivotal for how the country compares on the regional and international stage in the years ahead. In order to benchmark mobile experience over the last six months, Tutela has evaluated over 7 million speed and latency tests, conducted on the smartphones of real-world users of national mobile operators within Common Coverage Areas, between September 1st 2020 and February 28th, 2021.

[3] El Economista, Telefónica renuncia a sus concesiones mexicanas en las bandas de 800 MHz y PCS
https://www.eleconomista.com.mx/empresas/Telefonica-renuncia-a-concesiones-de-espectro-en-las-bandas-de-800-MHz-y-PCS-20200101-0012.html
Retrieved 24/03/21

[4] Telecompaper, AT&T hands back Mexico spectrum assets in ongoing price row
https://www.telecompaper.com/news/atandt-hands-back-mexico-spectrum-assets-in-ongoing-price-row--1359320
Retrieved 24/03/21

[5] Tutela, Global Mobile Experience
https://www.tutela.com/blog/global-mobile-experience-2020
Retrieved 24/03/21

[6] Telecompaper, Mexico to tender 41 blocks in September multi-band spectrum auction
https://www.telecompaper.com/news/mexico-to-tender-41-blocks-in-september-multi-band-spectrum-auction--1369959
Retrieved 24/03/21

Key findings

- Telcel dominated in five of the six metrics tested, most importantly the operator achieved the highest Excellent Consistent Quality at 68.5%, Tutela's metric for subscribers' mobile experience for demanding applications. The operator also achieved the highest Core Consistent Quality, both the fastest download and upload speeds, and the highest coverage score.

- AT&T was a leader in one category, with the most responsive network in Common Coverage Areas across Mexico, with a median one-way latency of 27.3 ms. The operator was also a close second behind Telcel in the upload speeds category with only 0.2 ms separating the two.

- Movistar may not have made it onto the leaderboard this time, however the operator was never far behind. Just 5.4% separated first place Telcel and the operator in the Core Consistent Quality metric, and there was only 4.4 Mbps difference in the download speed test. This indicates that, despite its reduced capacity on its own network services, its partnership arrangements are continuing to provide steady connectivity for its customers.

Results overview

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Mobile experience results

Mexico, March 2021

	telcel	AT&T	M
Excellent Consistent Quality	⭐ Winner		
Core Consistent Quality	⭐ Winner		
Download throughput	⭐ Winner		
Upload throughput	⭐ Winner		
Latency		⭐ Winner	
Coverage	⭐ Winner		

Results from over 7 million speed and latency tests within Common Coverage Areas, between September 1st 2020 and February 28th, 2021.

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

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Best Mobile Network Experience

MARCH 2021

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 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 the previous year 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 Mexico, Telcel had the highest Excellent Consistent Quality, with 68.5% of connections having a network experience suitable for use-cases like 1080p video streaming, real-time mobile gaming and HD video calling. The operator dominated in this metric with Movistar trailing behind by 14.5% and AT&T in third place by 18.5%. For Core Consistent Quality, Tutela's metric for how often a

connection is good enough for web browsing, social media sharing and SD video streaming, no operator reached the 90% threshold. However, Telcel was the closest with a Core Consistent Quality of 83.1%. The competition was much tighter here than for Excellent Consistent Quality, with Movistar and AT&T 5.4% and 8.3% behind respectively.

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Consistent Quality Percentage in Common Coverage Areas

|	Excellent	Core	Not Met
Telcel	68.5%	83.1%	Not Met
Movistar	54.0%	77.7%	Not Met
AT&T	50.0%	74.8%	Not Met
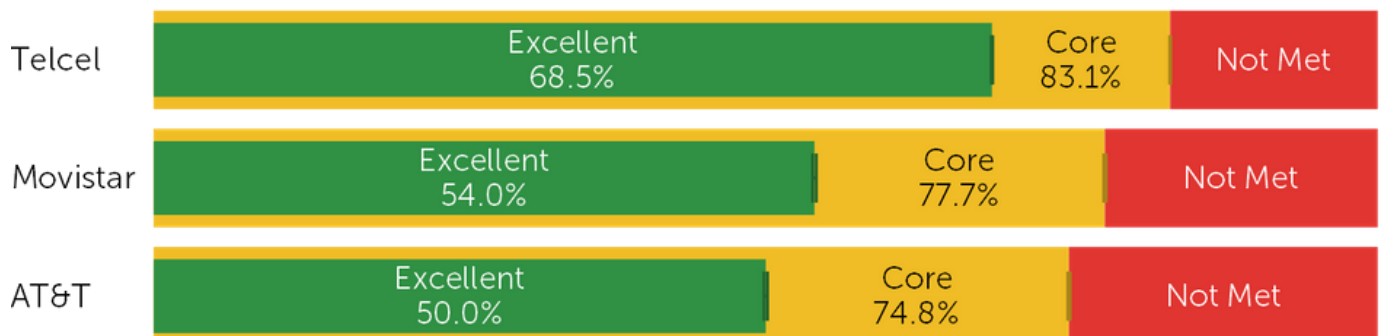
Download throughput

Telcel was a clear winner for median download speeds, with a result of 17.7 Mbps. Movistar found itself in second place by only 4.4 Mbps behind Telcel, while AT&T was in third place with a median download speed of 10.0 Mbps.

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Median Download Speed in Common Coverage Areas

Carrier	Speed
Telcel	17.7 Mbps
Movistar	13.3 Mbps
AT&T	10.0 Mbps

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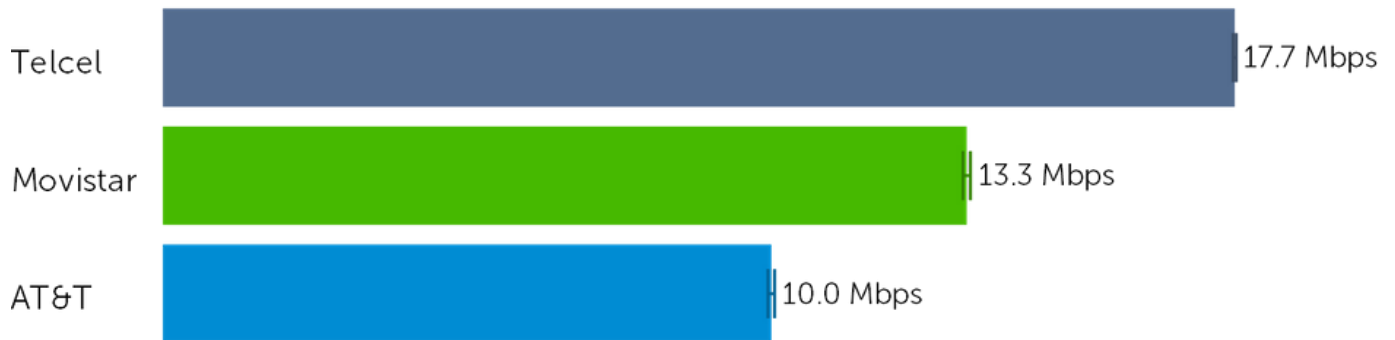
Upload throughput

Despite its clear advantages in both the Consistent Quality metric and download speeds, Telcel did not excel to the same degree for uploads. Nonetheless, it was still the leader – though a mere 0.2 Mbps ahead of AT&T which had a median upload speed of 7.9 Mbps. Meanwhile, Movistar had a median upload speed of 5.5 Mbps, 2.4 Mbps behind first place Telcel.

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Median Upload Speed in Common Coverage Areas

Telcel	7.9 Mbps
AT&T	7.7 Mbps
Movistar	5.5 Mbps
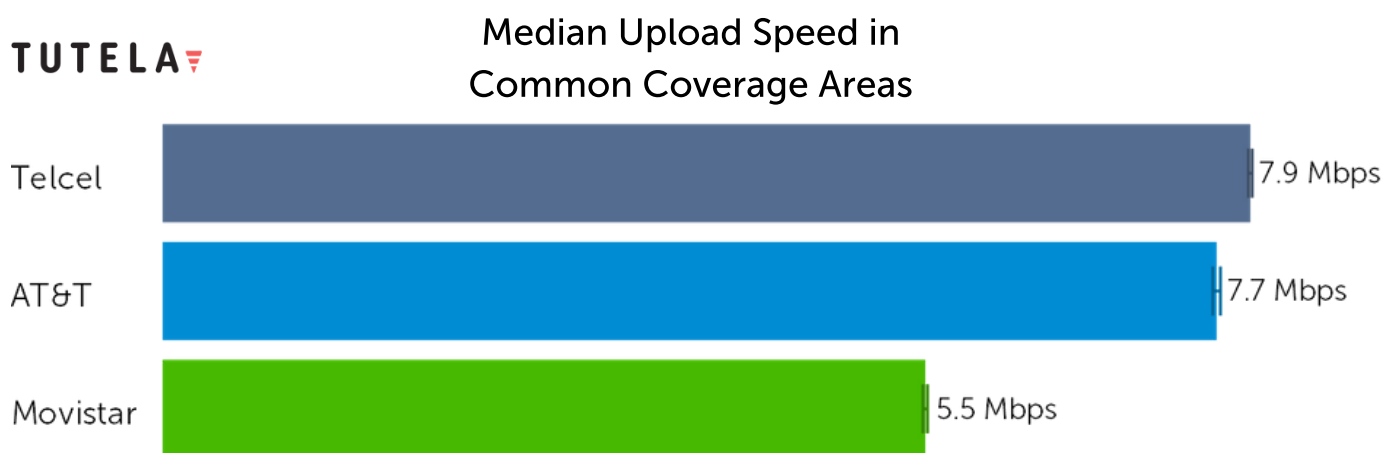
Latency

AT&T demonstrated the best median one-way latency in Common Coverage Areas across Mexico at 27.3 ms. This is likely an important feature for latency-sensitive applications like realtime mobile gaming or HD video calling, where lags can be noticeable and problematic. Telcel, which dominated in a majority of the metrics tested, fell to third place with a latency result of 37.5 ms, 10.2 ms less responsive than AT&T – however, just 0.2 ms less responsive than Movistar.

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Median Latency in Common Coverage Areas

Operator	Latency
AT&T	27.3 ms
Movistar	37.3 ms
Telcel	37.5 ms
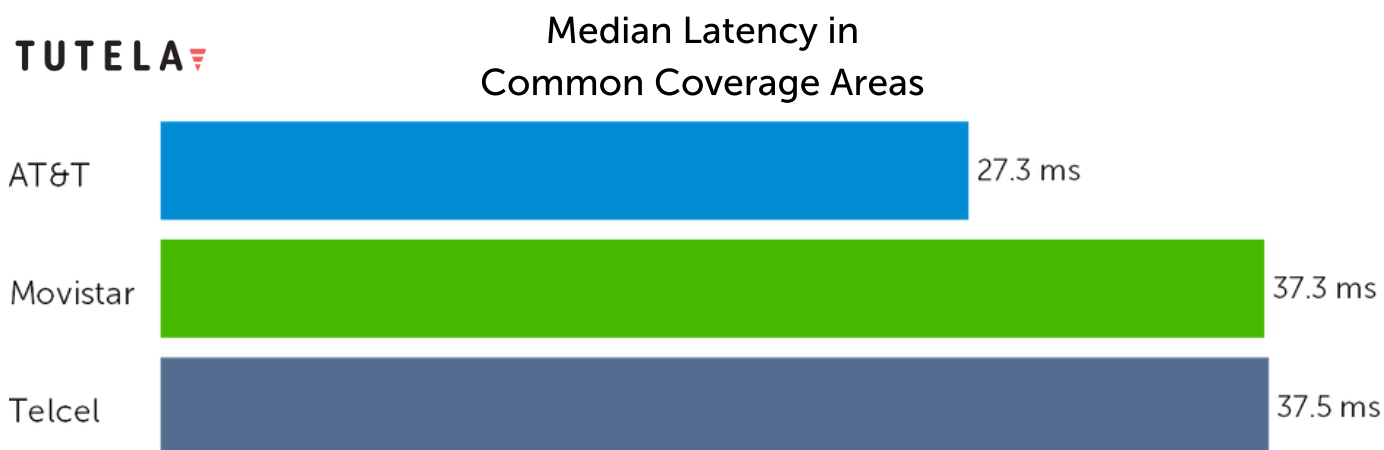
Coverage

In Tutela's newest metric, Telcel demonstrated the greatest relative area coverage across Mexico for both 5G/4G[7] combined coverage and total coverage. The operator achieved a 5G/4G coverage score of 700, and a score of 819 for total coverage.

There was a 159 point difference between Telcel and second place AT&T for 5G/4G coverage. The difference was much more prominent for Movistar, with a 236 point difference between the operator and AT&T, and 395 point difference between the operator and first place Telcel for 5G/4G. This echoes the time spent on 3G analysis, with Movistar subscribers being more reliant on older connection technologies for their connectivity.

[7] Tutela combines these two categories together in its standardised reporting to account for the initial rollout of non stand-alone 5G networks. Where 5G networks do not exist, this score represents the relative 4G area coverage.
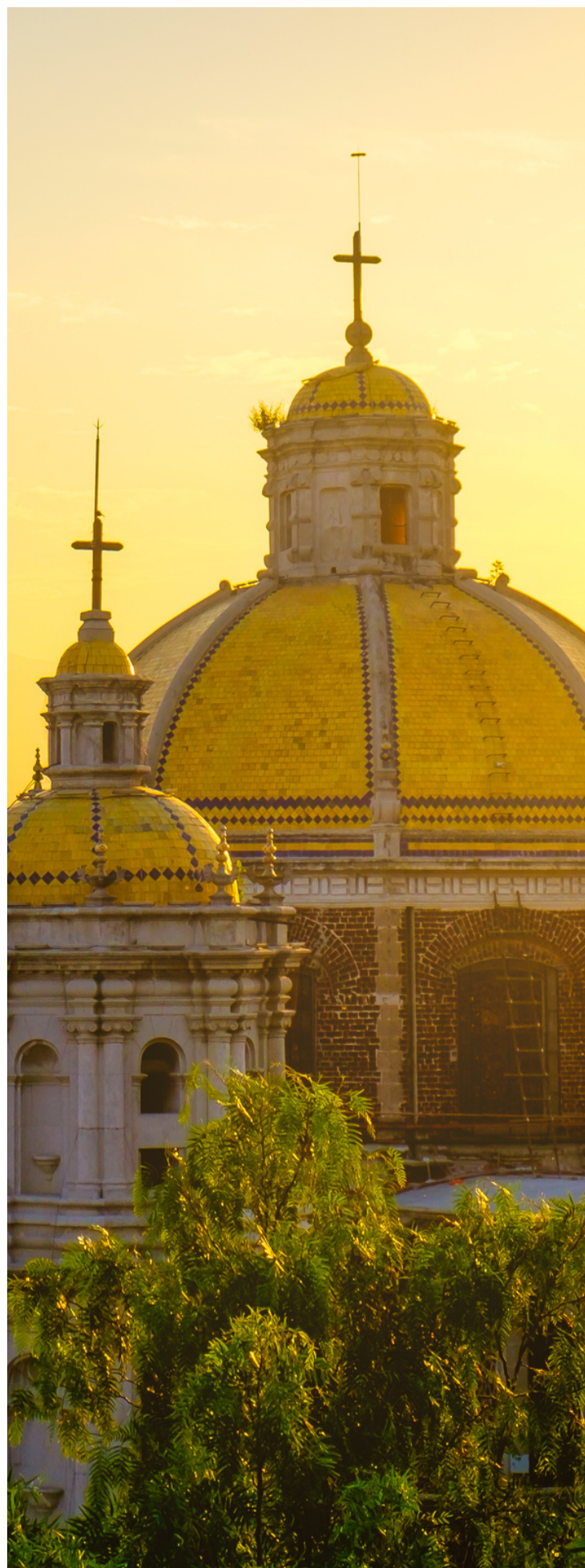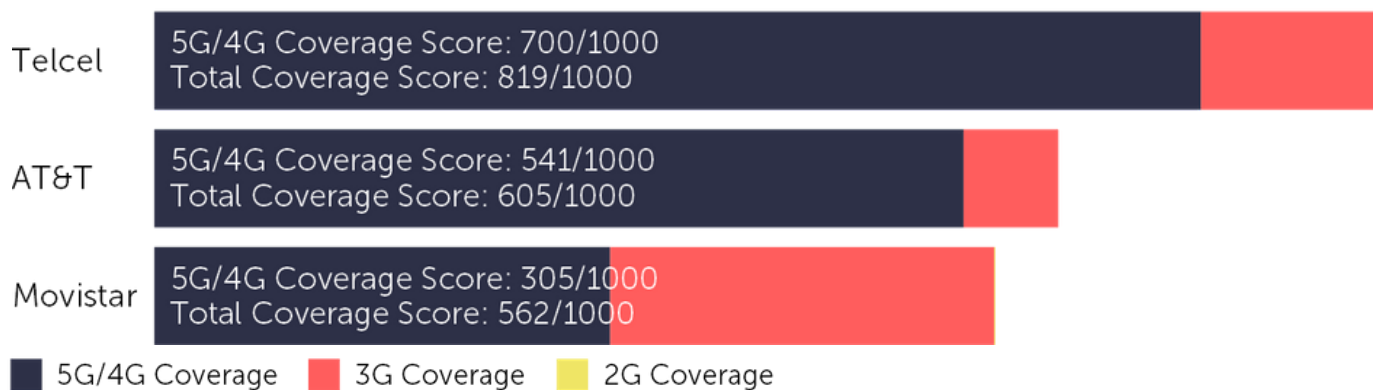
For total coverage, AT&T was in second place behind Telcel, with 214 points separating the two. Third placed Movistar was 257 points behind Telcel, while the difference between Movistar and AT&T was considerably smaller, only 43 points between the two.

Relative Area Coverage Score

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Telcel	5G/4G Coverage Score: 700/1000 / Total Coverage Score: 819/1000
AT&T	5G/4G Coverage Score: 541/1000 / Total Coverage Score: 605/1000
Movistar	5G/4G Coverage Score: 305/1000 / Total Coverage Score: 562/1000

■ 5G/4G Coverage   ■ 3G Coverage   ■ 2G Coverage

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 three operators utilize mid-band 1700 MHz; both AT&T and Telcel rely on it heavily with 81.5% and 72.4% of measured LTE data being transceived using this frequency as the primary band respectively. Telcel balances this use with the high-band 2600 MHz, being the only operator to do so in a significant way, accounting for 25.2% of LTE data. For Movistar, 1900 MHz is primarily used, accounting for 63.4% of LTE data transceived, with 33.2% then using the 1700 MHz spectrum. This is symptomatic of its new business approach – Movistar is in the process now of handing back spectrum to the Mexican regulator, and utilizing a network sharing agreement with AT&T[8].

[8] El Economista, Telefónica renuncia a sus concesiones mexicanas en las bandas de 800 MHz y PCS
https://www.eleconomista.com.mx/empresas/Telefonica-renuncia-a-sus-concesiones-mexicanas-en-las-bandas-de-800-MHz-y-PCS-20200101-0012.html
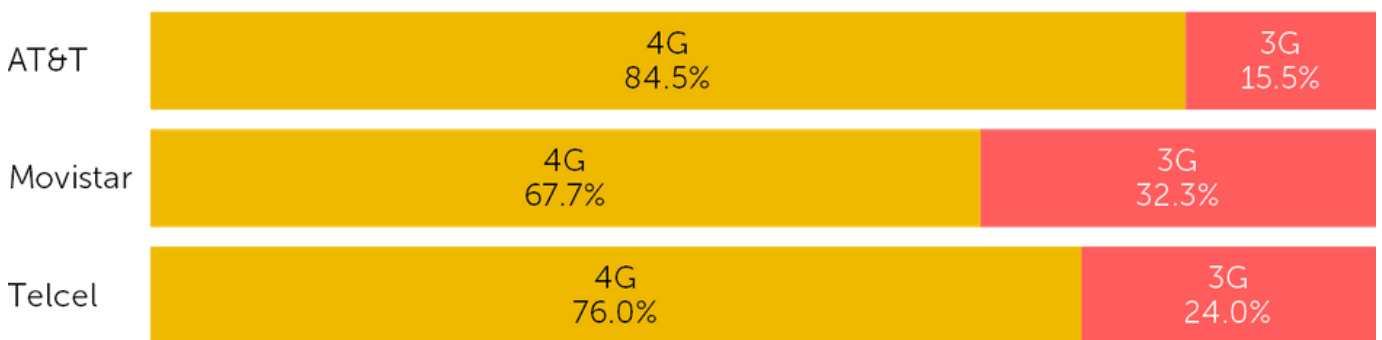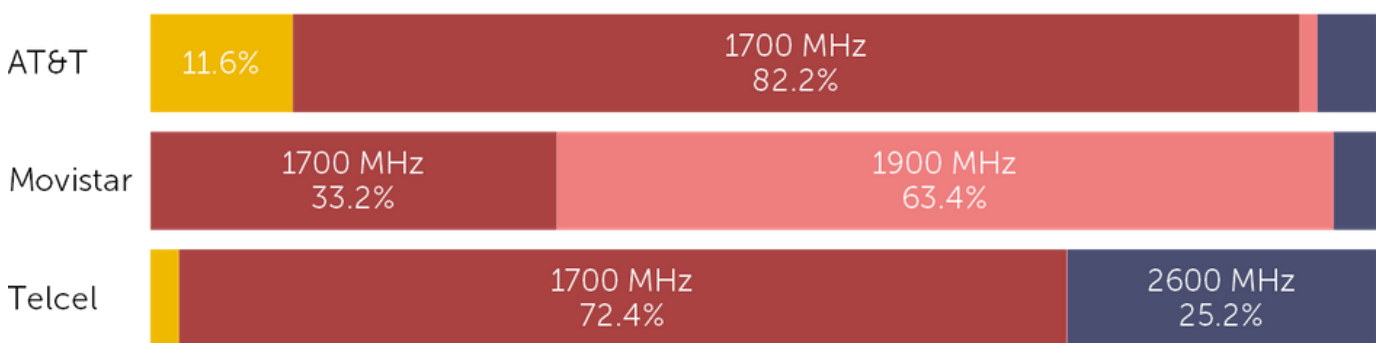Retrieved 24/03/21

In regards to time spent on 3G/4G, customers in Mexico are spending a majority of the time on a 4G network, with AT&T customers finding themselves on the network 84.5% of the time. Telcel customers spend 76.0% of the time on 4G, while customers with Movistar spend the highest amount of time on 3G 32.3% of the time. Through Movistar's partnerships with AT&T and the Red Compartida, we would expect this to increase over the year ahead.

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Percent of Time by Mobile Connection Type Nationwide

	4G	3G
AT&T	4G 84.5%	3G 15.5%
Movistar	4G 67.7%	3G 32.3%
Telcel	4G 76.0%	3G 24.0%

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Mobile Data Volume by LTE Band Nationwide

AT&T	11.6%	1700 MHz 82.2%	
Movistar	1700 MHz 33.2%	1900 MHz 63.4%	
Telcel		1700 MHz 72.4%	2600 MHz 25.2%

🟨 850 MHz CLR (Band 5) 🟥 1700 MHz AWS-1 (Band 4)
🟧 1900 MHz (Band 2) 🟦 2600 MHz (Band 7)

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 million speed and latency tests, between September 1st 2020 and February 28th, 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

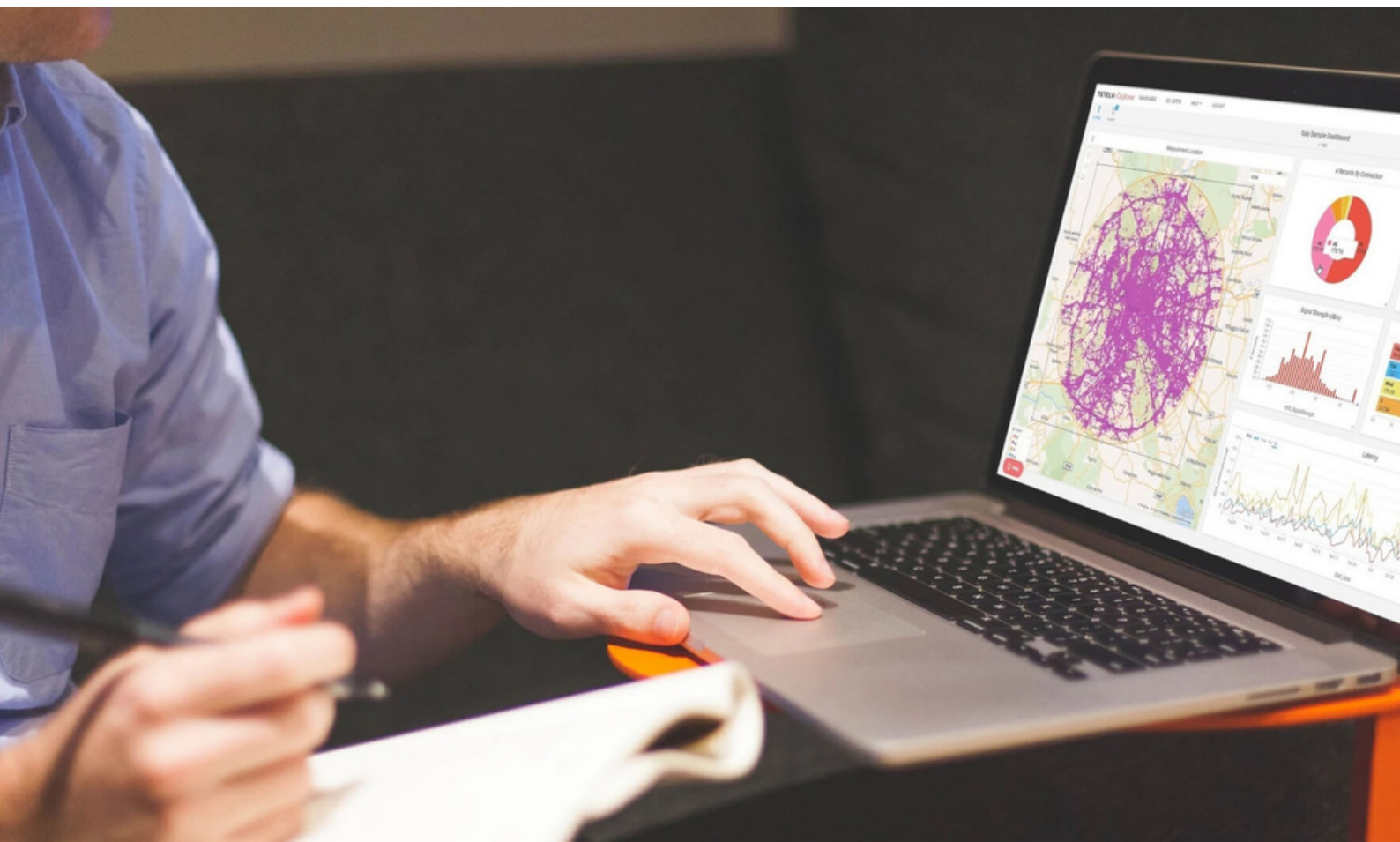| KPI	Download throughput	Upload throughput	Latency	Jitter	Packet loss	Time to first byte
Minimum acceptable value	1.5 Mbps	500 Kbps	100 ms	50 ms	5%	10.67 s

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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

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Learn more

Appendix

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**Results Overview in
Common Coverage Areas**

	Download Throughput	Upload Throughput	Latency	Excellent CQ	Core CQ
AT&T	10.0 Mbps ± 0.05 Mbps	7.7 Mbps ± 0.03 Mbps	27.3 ms ± 0.026 ms	50.01% ± 0.14%	74.79% ± 0.10%
Movistar	13.3 Mbps ± 0.06 Mbps	5.5 Mbps ± 0.02 Mbps	37.3 ms ± 0.034 ms	53.99% ± 0.15%	77.72% ± 0.10%
Telcel	17.7 Mbps ± 0.02 Mbps	7.9 Mbps ± 0.01 Mbps	37.5 ms ± 0.023 ms	68.49% ± 0.06%	83.05% ± 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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