Canada

State of Mobile Networks

March 2019

Analysis of Tutela crowdsourced data from over 1.8 billion mobile network measurements.

For further information about the methodology, data and tools used to create this report, please contact analysis@tutela.com.

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Executive Summary

When it comes to mobile data, Canada exists in a different league to most other countries. Canadians pay the highest price in the developed world for their LTE data, but in return, benefit from networks that cover the country coast-to-coast with reliable, high-speed mobile data.

However, just looking at networks' average download speed doesn't tell the whole story. While fast top speeds are indicative of a strong network, reliable network quality is equally, if not more, important. After all, who cares whether you can occasionally hit gigabit download speeds if half the time you're struggling to load a Google search result?

That's why, to properly evaluate the kind of experience that Canada's networks are delivering to customers, Tutela uses a different metric: consistent quality.

Tutela uses network and device data collected from millions of mobile device owners every day to analyze which carriers reliably provide fast enough speeds to perform routine mobile tasks, like streaming a video on YouTube or using Google Maps.

To compile this report, Tutela examined over 1.8 billion total records taken from 1st August 2018 to 31st January 2019. They include 13.4 million speed tests and 153 million latency tests, collected from more than 1 million mobile devices.

"Canadians pay the highest price in the developed world for their LTE data, but in return, benefit from networks that cover the country coast-to-coast with reliable, high-speed mobile data."

Key numbers

1.8 billion measurements
13.4 million speed tests
153 million latency tests
> 1 million mobile devices

1st August 2018 -
31st January 2019

Measuring network quality

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Best performing national networks – Canada 2019

Operator	Consistent Quality	Download speed	Upload speed	Latency
TELUS	🏆			🏆
Bell	🏆	🏆	🏆	
ROGERS				

Key findings

- Despite Bell's clear advantage in download speeds, Bell and Telus deliver virtually identical consistent quality to their customers.
- Across the whole country, Rogers' excellent consistent quality score was nine percentage points lower than the other two national operators. Overall, in one out of four tests, Rogers customers' network connection did not meet Tutela's threshold for excellent consistent quality, which may translate to an inferior experience with demanding use-cases like HD video streaming and real-time group video calling.
- Regional operators have a clear home-field advantage: Videotron beat out all other operators in Quebec, and Sasktel and Freedom Mobile recorded strong results in their home provinces.
- Network quality across Canada was notably excellent, especially compared to the United States. Only Manitoba failed to see consistent quality on any operator exceed 75%.

Consistent quality

What is 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. At its simplest, 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 networks are (and are not) enabling users to do those things, Tutela has developed a standard called consistent quality. The design of the standard is explained in further detail here. Simply put, the standard defines two sets of thresholds, called "excellent" and "basic". If a connection hits the "excellent" standard, it's sufficient for the most demanding mobile use-cases, like HD video calling or 1080p video streaming. A "basic" connection is good enough for simple web browsing, emails, and VOIP calling, but users will experience delays or buffering when trying to use more demanding apps.

Our key performance indicators

"Excellent" quality
Download speeds > 4 Mbps
Upload speeds > 2 Mbps
Latency < 50 ms
Jitter < 30 ms
Packet loss ~ 0%

Intended use cases: 1080p video streaming, HD group video calling

"Basic" quality
Download speeds > 512 Kbps
Upload speeds > 128 Kbps
Latency < 100 ms
Jitter < 50 ms
Packet loss < 5%

Intended use cases: Web browsing, simple applications (Facebook, WhatsApp, email clients), VOIP calling

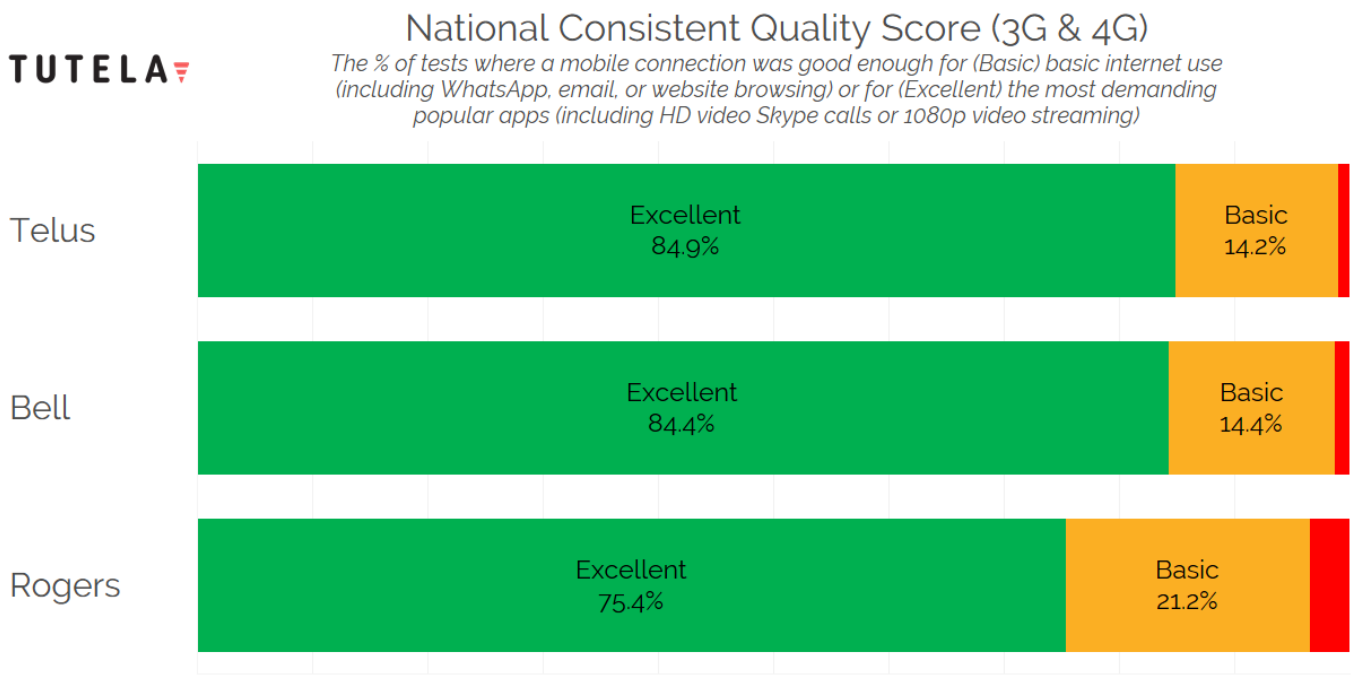
Tutela's consistent quality score simply measures the percentage of time that users -- whether for one operator or a whole country -- can hit the thresholds. The higher the number, the more often users have a basic or excellent connection.

Consistent quality

National operators

Nationwide, Bell and Telus have virtually identical scores for consistent quality, close enough to be a statistical tie. The parity between Telus and Bell is to be expected, as the two operators share the wireless elements of their networks, but it's still a remarkable score compared to other countries; 17 times out of 20, when Telus and Bell customers have signal, the quality is good enough for an HD FaceTime call.

Rogers, Canada's largest operator by subscriber count, is behind its competitors on excellent consistent quality by nearly 10%. Put in context, that means one time out of 10, a Telus or Bell customer has a notably better connection. However, it's also worth noting that when it comes to overall basic consistent quality -- making a voice call, web browsing, or checking email -- Rogers is almost as good as Bell or Telus.

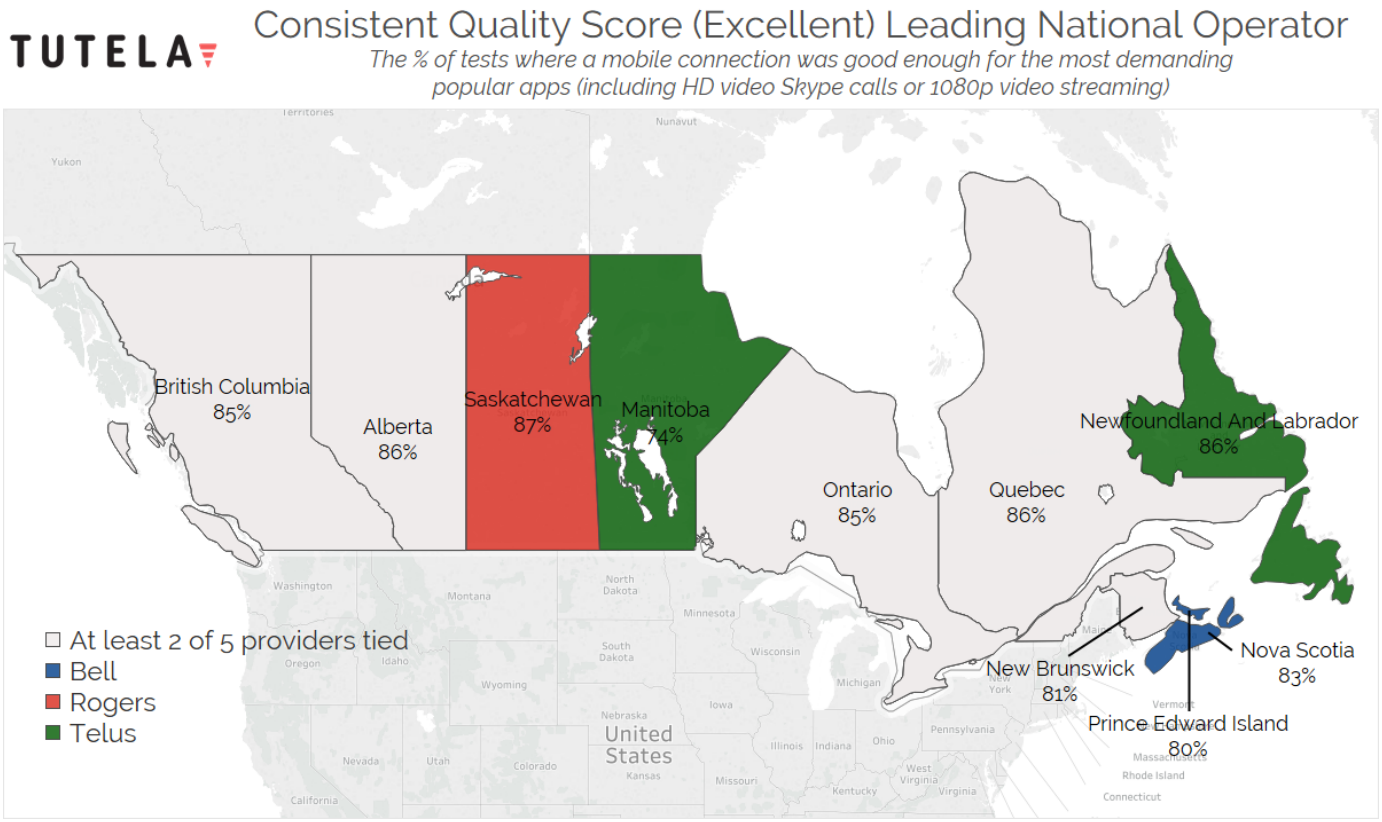


Consistent quality

National operators

Examining the results geographically, the parity between networks becomes even more clear. Telus and Bell are tied for first place in excellent quality in most provinces. Telus has an edge in Manitoba and Newfoundland and Labrador, while Bell has an advantage on PEI and Nova Scotia. Rogers' only edge over the competition is in Saskatchewan.

The map also reveals that good network service isn't just limited to Canada's biggest cities. Excellent consistent quality is above 80% in every province except Manitoba, which shows how Canada's national operators have worked to ensure coverage coast to coast, rather than just in urban areas.



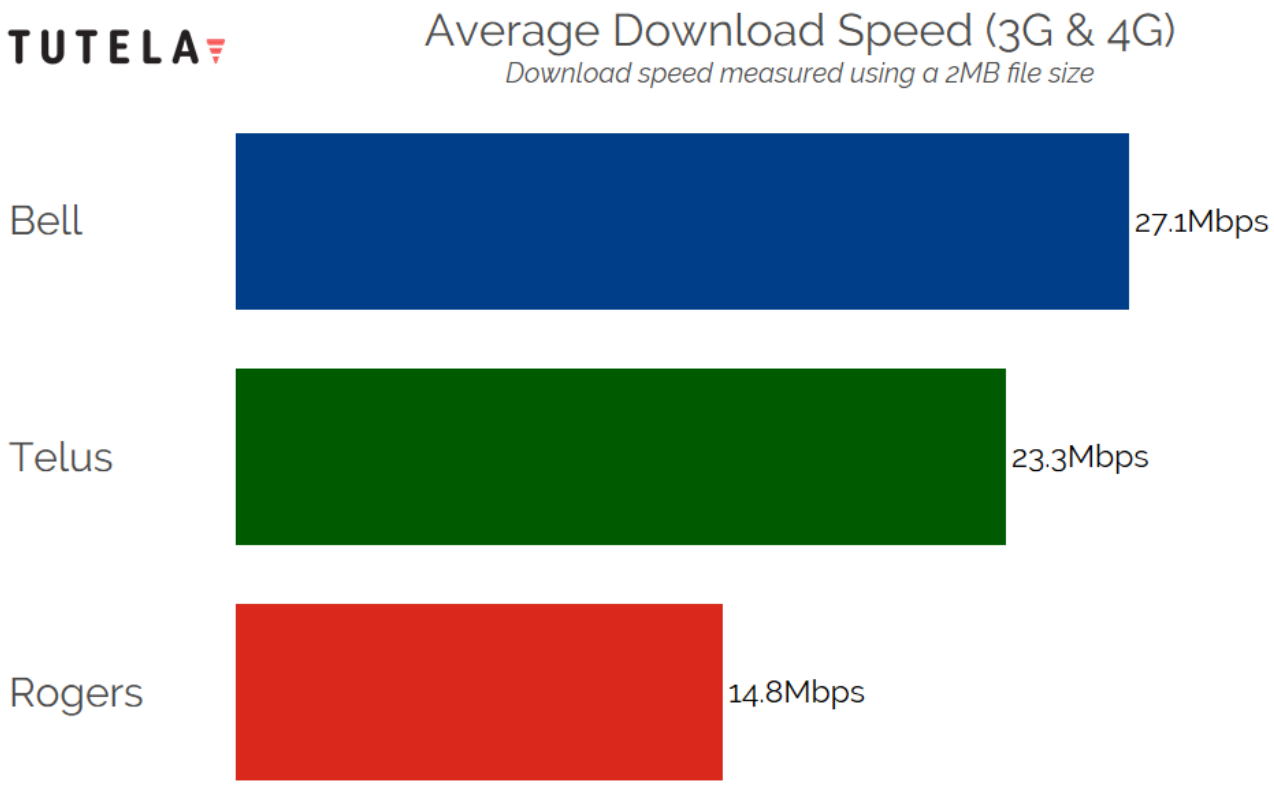
Download speeds

National operators

Things are a little less equal when it comes to download speed. Bell ekes out a distinct advantage over its competitors, with an average download speed of 27.1 Mbps, compared to 23.3 Mbps for Telus, and 14.8 Mbps for Rogers.

However, one element worth noting is that Bell's advantage in download speed over Telus doesn't translate to gains in consistent quality. Rogers' average download speed might be 50% of what customers on Bell would typically see, but 14.8 Mbps still far exceeds the excellent consistent quality threshold, and is fast enough that customers should rarely notice download speed being the bottleneck. Instead, other network performance factors (such as latency) and the availability of LTE coverage is to blame for Rogers' last-place finish in consistent quality.

More than anything else, the download speed results show that Canada's national operators have done an outstanding job of ensuring that when Canadians have a cell signal, speeds are almost always in excess of what they need for the majority of use cases.

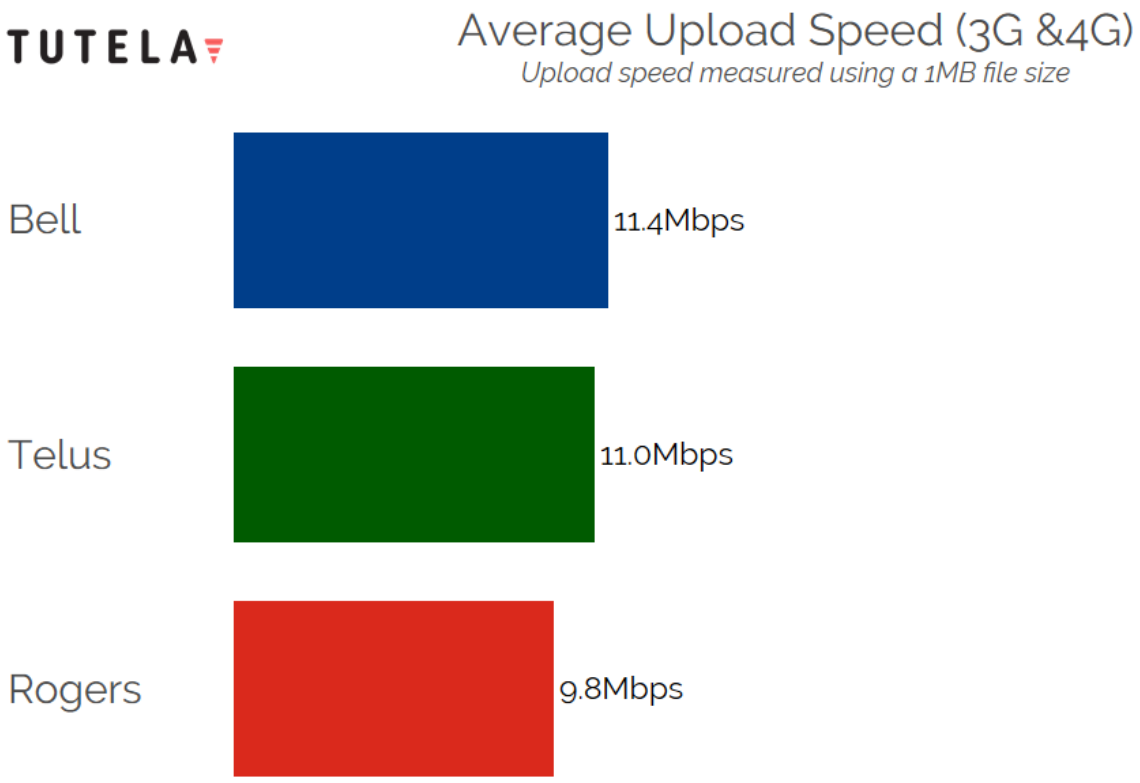


Upload speeds

National operators

Large gaps between national operators are nowhere to be seen when it comes to upload speeds. Once again, Bell leads the other operators, with an average upload speed of 11.4 Mbps. However, Telus and Rogers are close behind, with just 1.6 Mbps separating Bell's first-place finish and Rogers' last-place result.

Just as for download speeds, all three operators recorded average results well in excess of the excellent consistent quality threshold.



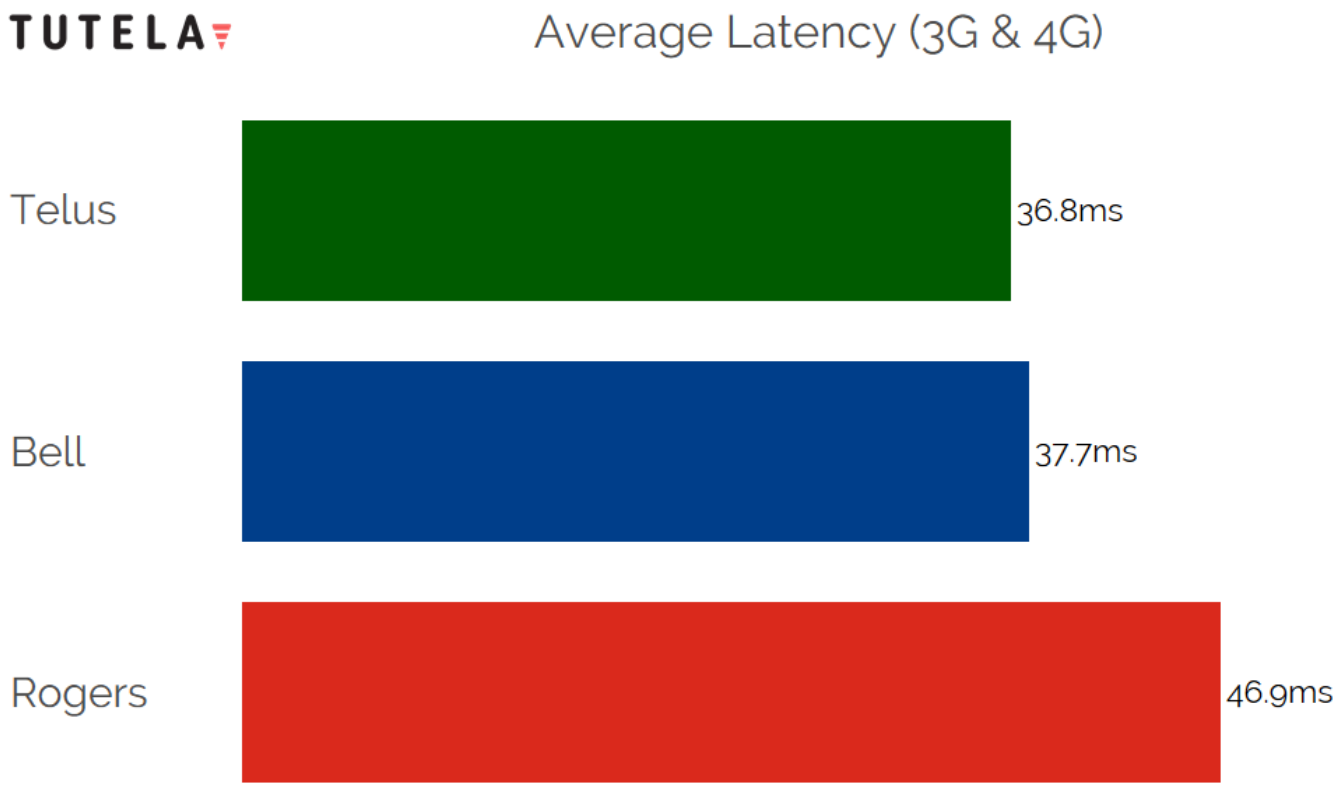
Latency

National operators

Latency, the measure of how long it takes a small packet to travel from a customers' device to the server owned by Facebook or Amazon (or whichever service they're using), proves to be more of a challenge for Canada's operators. A low latency is vital to ensuring that things like web browsing feel responsive and "snappy," and it's particularly important for real-time applications like video calling.

In a country as big as Canada, however, requests are sent to servers that are physically far away, and ensuring that latency stays low is more of a challenge that it is for operators in more compact countries.

In our latency tests, Bell and Telus performed nearly identically, with Telus edging out Bell by less than one millisecond. The step downto Rogers might seem small -- the 10 ms difference between first and last place is less than the average human reaction time to a loud noise -- but it puts Rogers close to 50 ms, the point where users will start to notice a lag, particularly in use cases like video calling.



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

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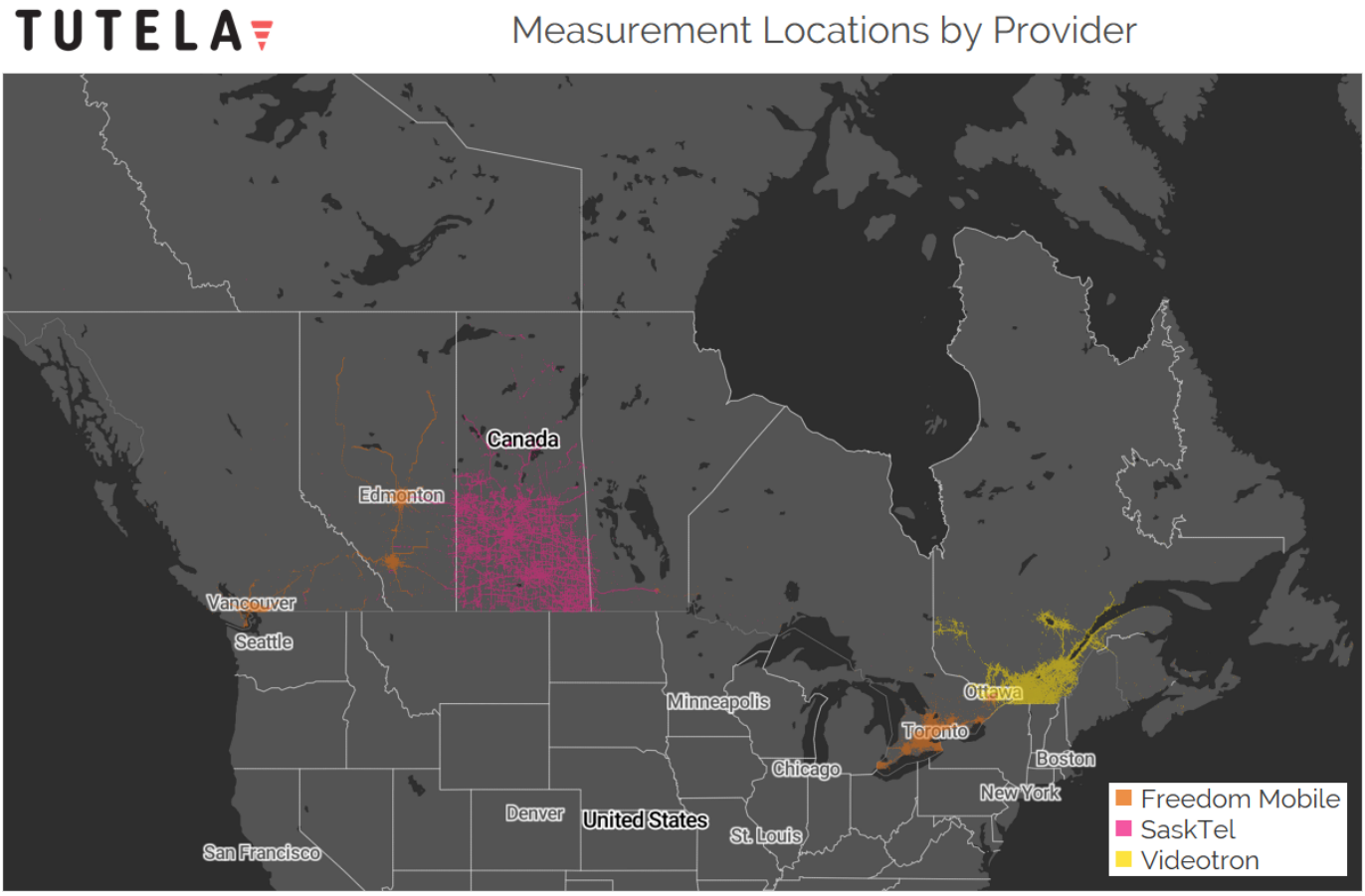
Regional operators

In addition to the three national operators, Tutela also collected data on three wireless operators that only maintain their own network in particular regions: Freedom Mobile, SaskTel, and Videotron. All three cover different areas: Freedom Mobile has service in large metro areas on the west coast and the Greater Toronto Area; SaskTel has comprehensive coverage across Saskatchewan; Videotron has service through the majority of Quebec and Ottawa. All three also allow subscribers to roam on a national carrier when out of the home service area, albeit with limitations.



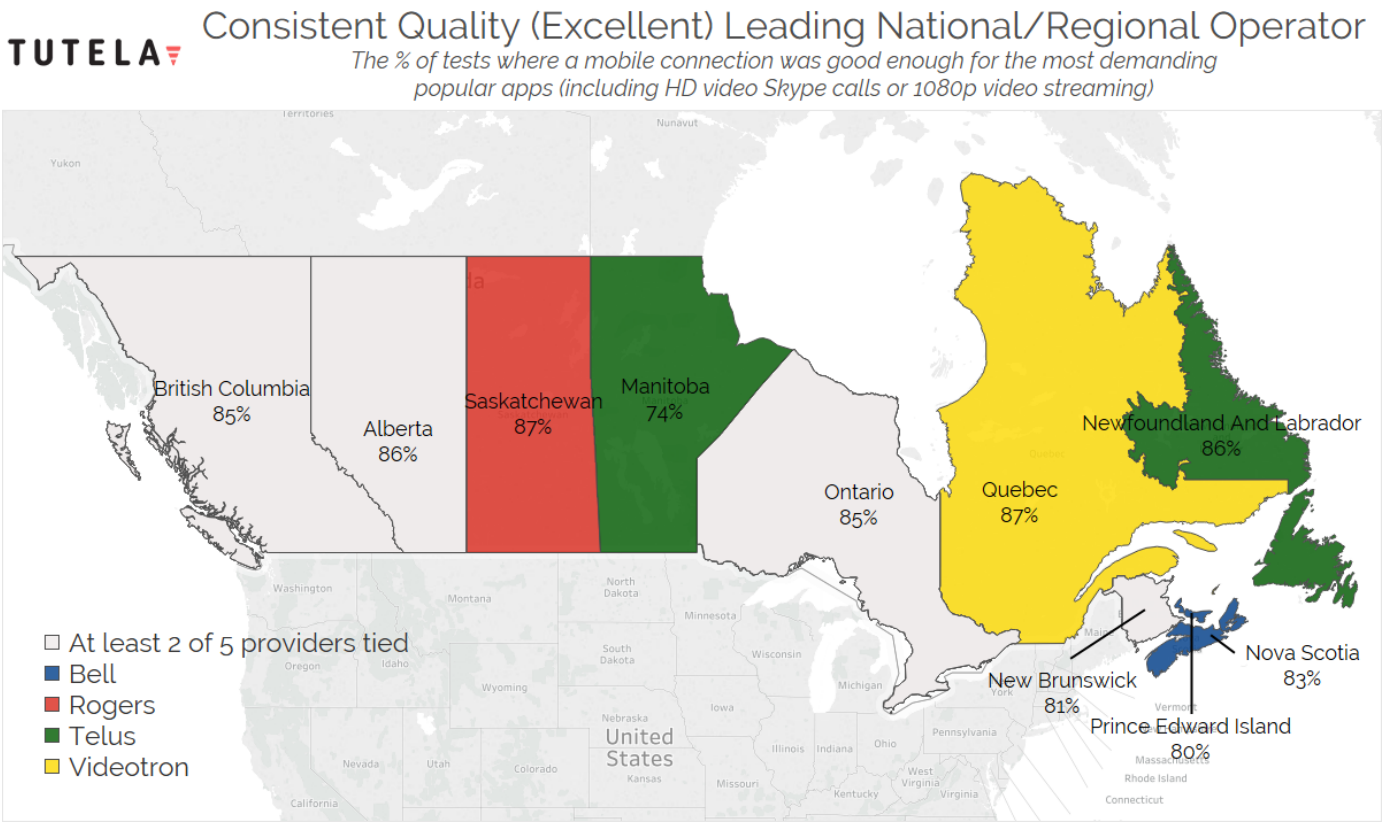
Locations where regional operators maintain their own networks

Consistent quality

Regional operators

For consumers who spend the majority of their time in one city or province, regional operators can offer a cheap alternative to the national carriers. Despite being relatively new entrants to the wireless market, the regional operators had a strong showing in Tutela's data, providing consistent quality and download speeds comparable to the national operators.

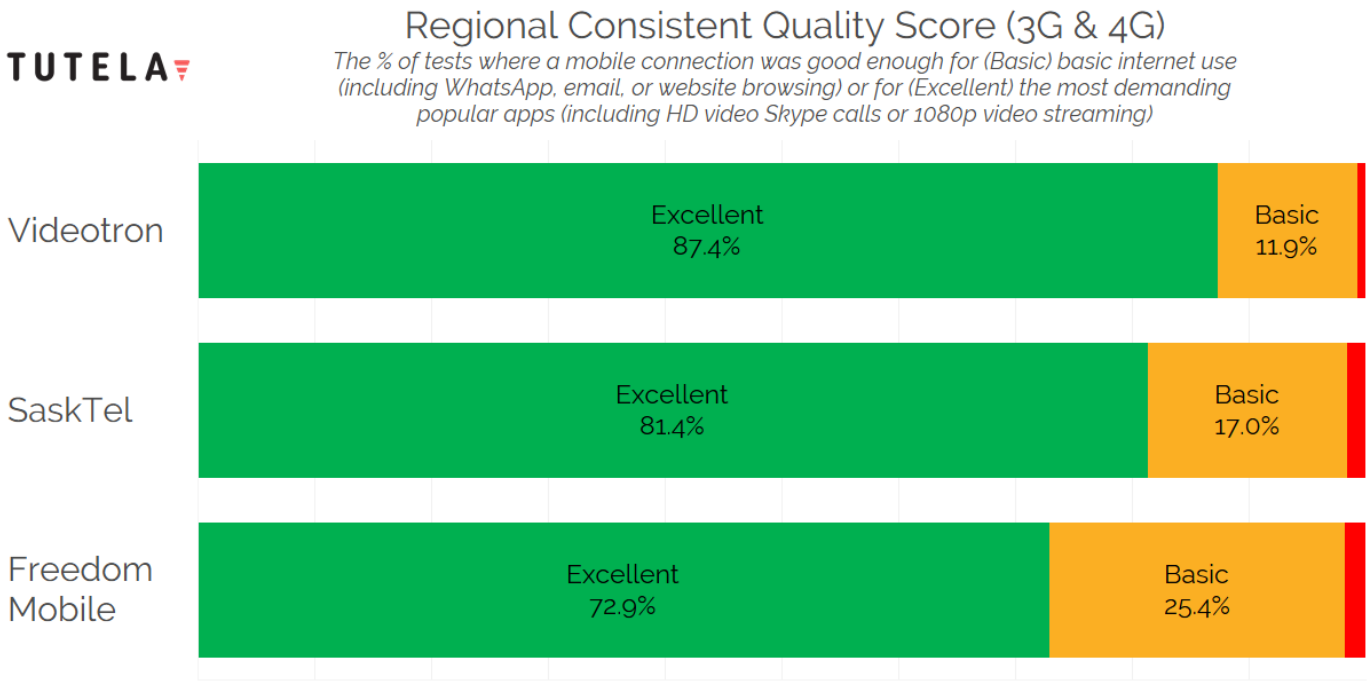
As the coverage map demonstrates, the regional operators are more focused on urban areas, which is reflected in their spectrum usage; the majority of data is transmitted and received over the 1700 MHz and 1800 MHz bands that are best suited to urban use, with only SaskTel relying heavily on low-band spectrum for more rural areas.



Consistent quality

Regional operators

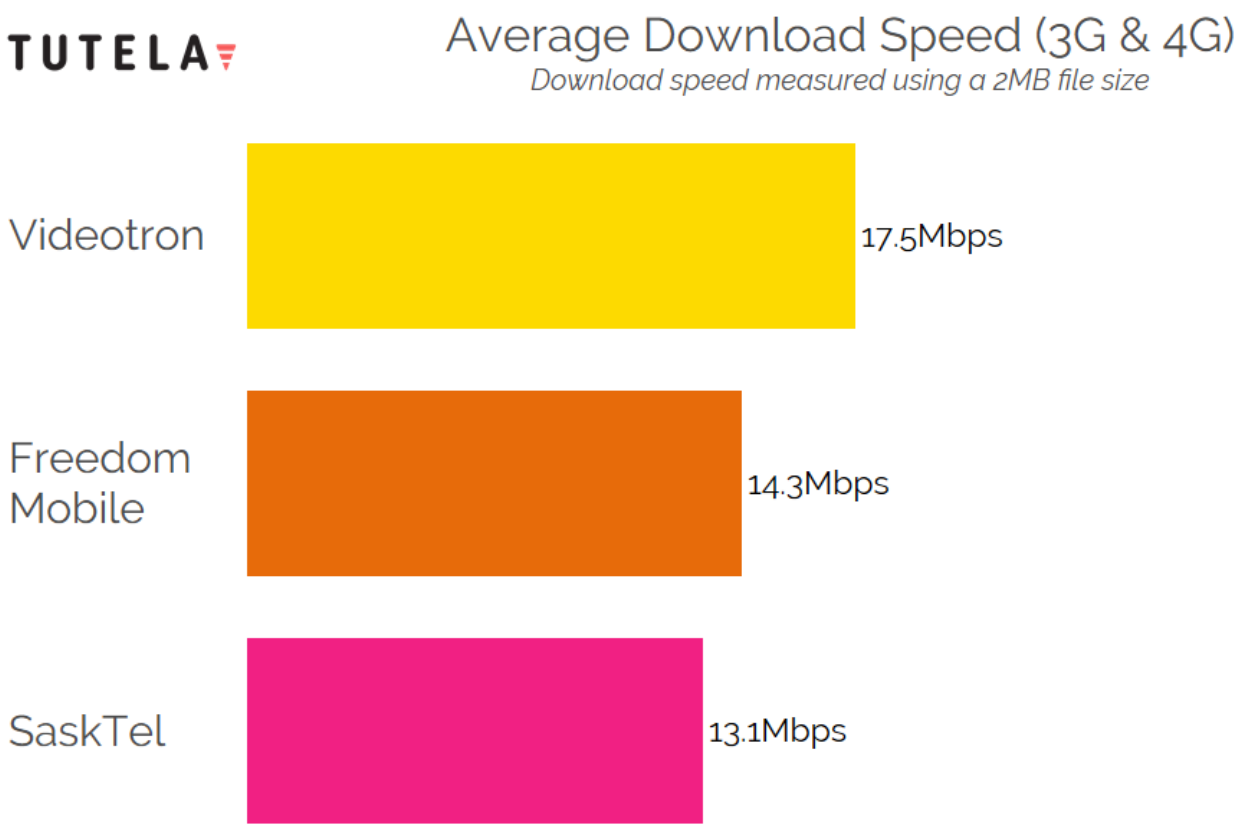
Within the areas that the regional operators do offer coverage, the excellent consistent quality scores were outstanding. Videotron exceeded the thresholds for a satisfactory connection nearly 90% of the time, while even SaskTel was at 83.2%, which is impressive given how much of its coverage (and subscriber base) is rural.



Download speeds

Regional operators

Looking at the underlying metrics, all three regional operators recorded average download speeds comparable to Rogers, although Bell's 27 Mbps remains well out of reach.

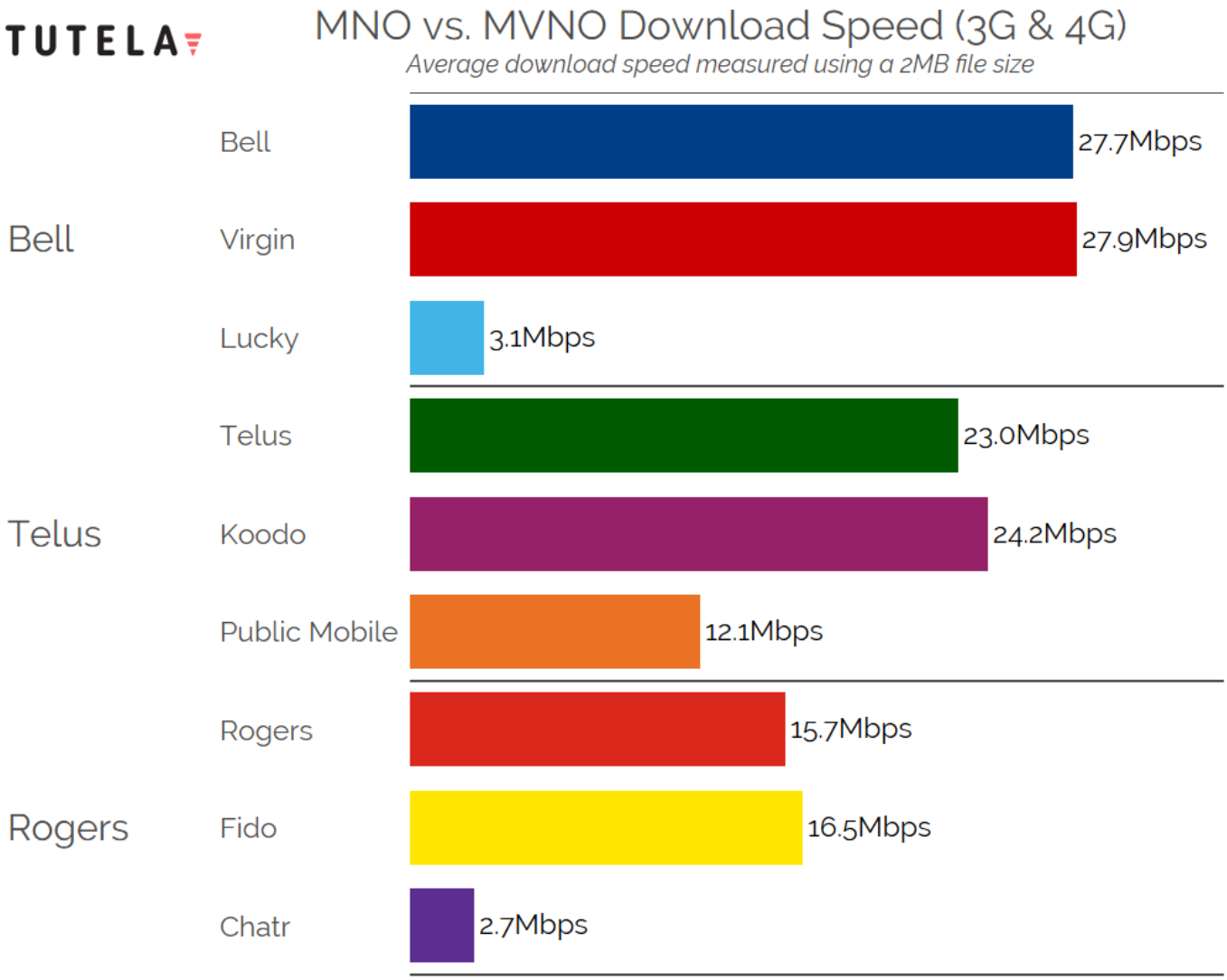


Mobile Virtual Network Operators

Canadians don't just buy their wireless services from one of the three national carriers or the regional players. A collection of smaller prepaid brands, which piggyback on the networks of the national operators, offer an alternative to buying straight from the big carriers.

Mobile Virtual Network Operators (MVNOs) typically target their services at a lower price point, offering more bare-bones network performance at lower prices. In Canada, all six major MVNOs are brands fully owned and operated by the national operators. Bell owns Virgin Mobile and Lucky Mobile, Telus has Koodo and Public Mobile, and Rogers has Fido and Chatr.

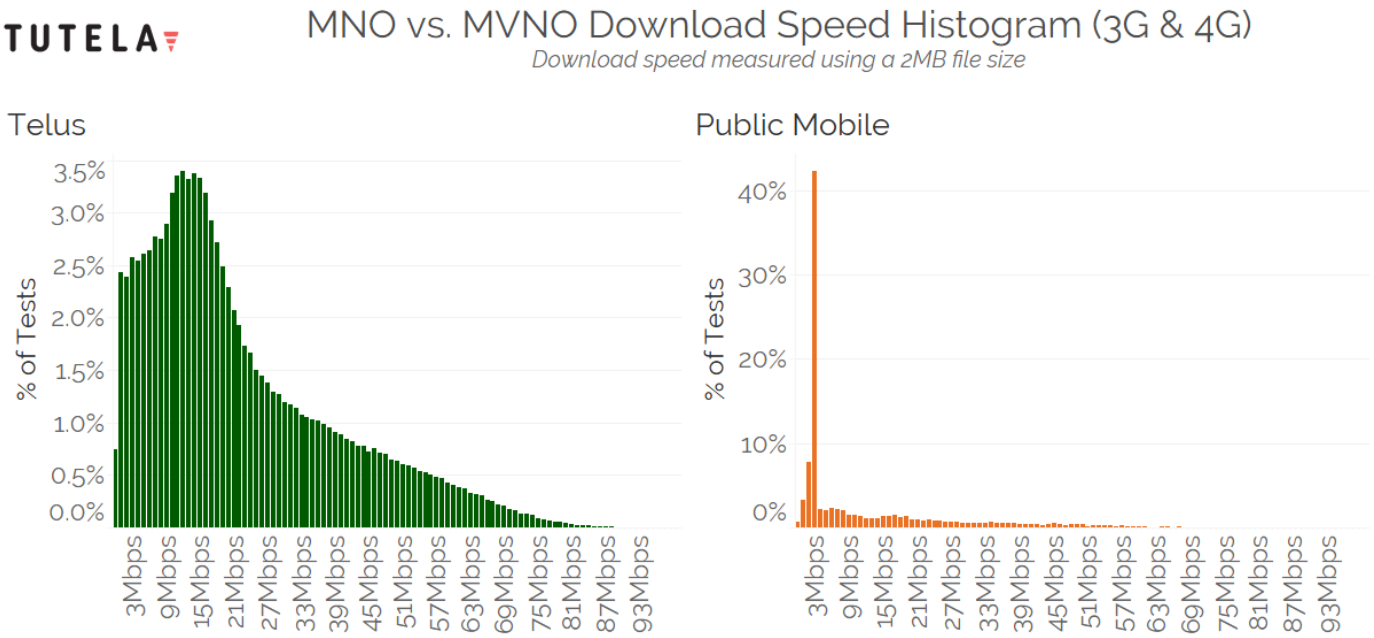
Although the MVNOs run on their parent operators' networks, the service experienced by users isn't always identical. To see how the level of service differs, Tutela has broken out download speeds by the different MVNOs to see how they stack up.



Mobile Virtual Network Operators

A clear pattern is evident: customers on Virgin, Koodo, and Fido -- the "premium" MVNOs -- get almost exactly the same level of service as customers on the postpaid networks. In every case, average download speeds are slightly higher on the premium MVNOs, which is likely attributable to demographic differences: MVNO subscribers are more likely to be in urban areas, where overall download speeds are higher.

While the premium MVNOs offer access to exactly the same network quality as the national operators, the cheaper MVNOs -- Lucky, Public, and Chatr -- offer a limited network experience in return for their cheaper plans. All three predominantly offer data plans using "3G" data, which is capped at 3 Mbps for downloads. That shows up starkly in Tutela's dataset. The vast majority of speed tests on the cheaper MVNOs are at or below 3 Mbps:



Mobile Virtual Network Operators

The histograms show that customers are getting what they pay for, namely the advertised 3 Mbps speeds. Although the cap at 3 Mbps means that almost every single test on the cheaper MVNOs falls short of Tutela's excellent quality benchmarks, the plans are adequate for users with less demanding use cases.

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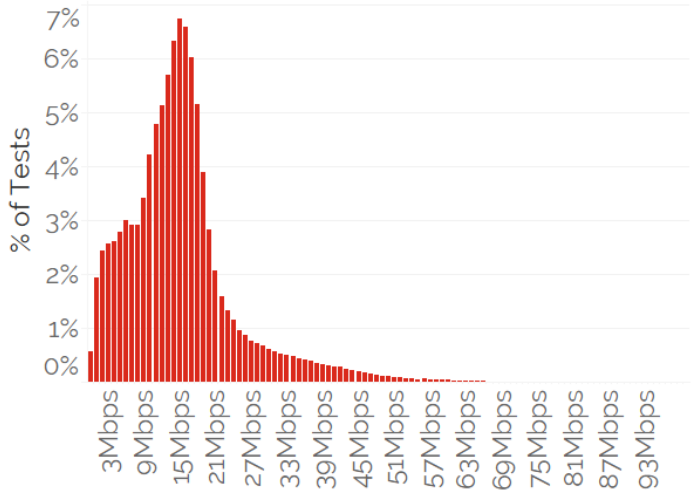
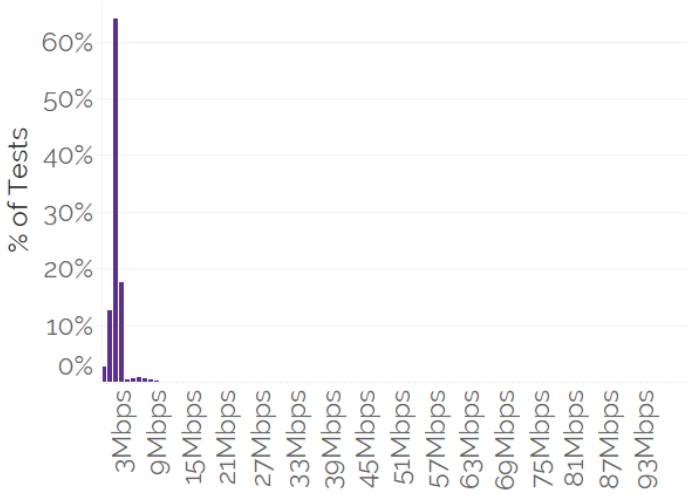
MNO vs. MVNO Download Speed Histogram (3G & 4G)

Download speed measured using a 2MB file size

Rogers



Chatr



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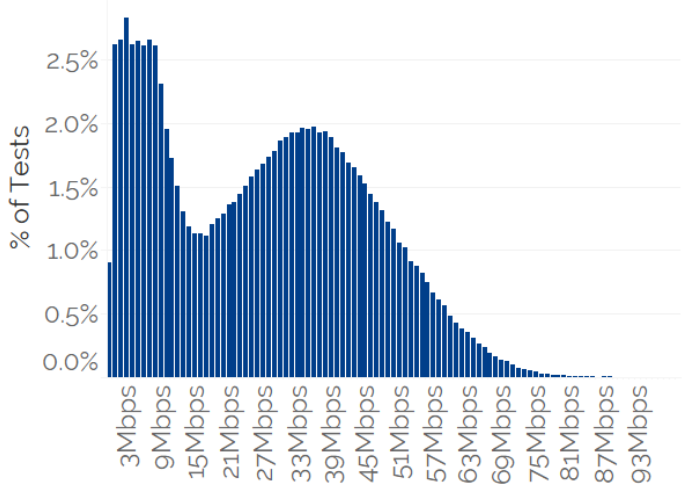
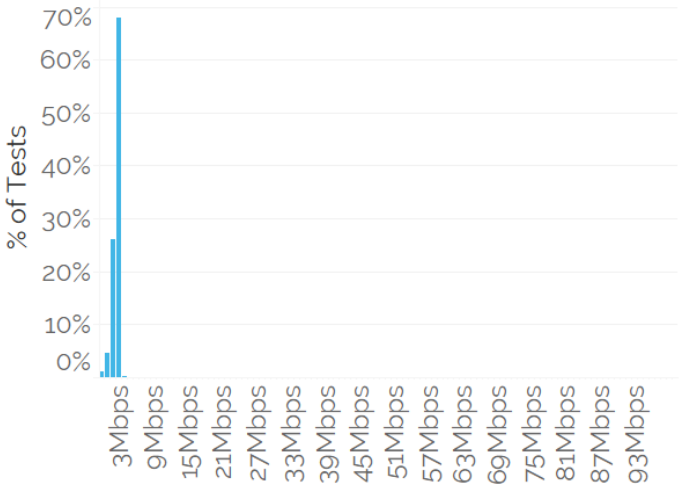
Bell



Lucky



Methodology

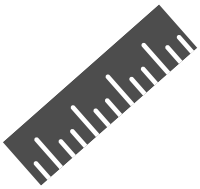
Tutela measures network quality based on the real-world performance of users in the field. Results in this report are based on a testing configuration to represent typical (not maximum) performance of users. We used a 2 MB file to perform our download testing and a 1 MB file to perform our upload testing. Tutela employs software installed on more than 3,000 partner apps to complete frequent, lightweight tests using 2 MB files.

Our results differ from other network testing companies which measure the peak performance of networks under ideal conditions (such as downloading a 200 MB file).

In total, Tutela's software operates on over 250 million Android and iPhone devices globally, collecting over 10 billion mobile data measurements every day. Our data scientists analyze results for each country every month, and our analytics platform, Tutela Explorer, lets operators chart, map, and filter over 80 key performance indicators into customized dashboards to help them better understand industry performance and benchmark against competitors.

Report facts

The information in this report was taken from our crowdsourced data between 1st August 2018 and 31st January 2019.



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About Tutela

Tutela is a mobile data and analytics company serving the mobile and telecommunications industry with software is embedded in over 3000 diverse mobile applications installed on over 250 million mobile Android and iOS handsets. Tutela continuously monitors network quality of experience all across the world. We collect more than 10 billion measurements every single day, and through our interactive toolset, enable our customers to turn those numbers into actionable intelligence for their businesses.

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