

Methodology

Here are some things to consider when understanding speed test data in general, and some concerning this data set in particular.

Speed test data in general

A single speed test (of which there are over a quarter of a billion included in this study) is not a direct measure of the maximum speed available to a household router. Rather, it is the speed available to a **device via the router**. This is an important distinction because...

1. A speed test conducted over wifi, due to local signal interference and/or the capabilities of the router and/or the capabilities of the device being used to take the measurement, can be significantly slower than the same connection directly over a LAN cable. Speed test data tends to consist primarily of measurements made over wifi, reflecting real-world use. This is why the country averages will appear lower than you might expect when compared to first-hand experience. However, since every country's average will suffer this flaw – innate to speed tests – the comparative placement in the global league is relatively sound. And that is, after all, the aim of the study: To provide a table of countries based on relative broadband speeds. The aim of the study is not to provide absolute measures of bandwidth – something broadband speed test data simply cannot do
2. Speed test data tends to suffer from a negativity bias – people are more likely to measure their speed if there is something wrong or if they aren't getting the speed they need. This also helps to explain why speed test averages are lower than people might expect. To mitigate this, we filter out tests where a fault or problem is evident

Ofcom, the UK telecoms regulator, as well as many regulatory and governmental bodies around the world, use physical equipment to constantly measure the maximum speed available on particular lines across a long period of time, and it is from this it will derive its average. This is very different to the way a regular speed test

‘snapshot’ is captured, and explains why Ofcom’s average speeds measured in the UK, for example, are higher than those measured in our tests.

Likewise, some speed test providers such as Ookla, which collects speed test data similarly to our open-source partners M-Lab, use a compensatory algorithm to offset effects one and two (above). Part of what Ookla does when presenting speed test averages, for example, is to disregard the slowest 30% and the fastest 10% of slices taken in each test. We do not do this.

The M-Lab data, and therefore the national averages presented in this report, should be regarded as a realistic reflection of real-world user experience rather than an absolute measurement of available bandwidth.

This data set in particular

With this being the third consecutive year we have compiled this research, we have been able to show how speeds are changing year-on-year by country, region and globally. Please note that...

1. As one would expect, the average global broadband speed has risen between the measurements taken in 2017-2018 and those taken in 2018-2019, from 9.14Mbps to 11.03Mbps. However, in some countries the average speed measured has fallen. In most cases, these drops in speed can be put down to natural variation between two different samples/measurements – especially likely in cases where the sample is small. Once we have 10+ years of data, such variations can be and will be smoothed, but with this being year three we still have a long way to go to get there. Taiwan and Cuba (for example) have seen their average speeds change significantly since the previous year. For now we will only report the measurements, and shall leave it to those most familiar with the precise situation in these countries to identify what exactly has happened year on year. Our report is not the result of detailed investigation in each country, but a starting point for such investigation
2. Speed rises can in many cases be put down to the ongoing

rollout of improved infrastructure, yet we would stop short of saying so in any particular case without further analysis – which is likewise beyond the remit of this report

3. Some year-on-year speed changes could potentially be down to factors not connected to speeds in real terms. For example, if new M-Lab test servers were activated closer to or inside of the country being measured (where they had not existed previously), this could show as a speed rise, yet the speeds experienced by citizens may not have subjectively changed
4. We have significantly increased the number of speed tests this year once again, which has grown the sample in some countries previously excluded to a size we feel can produce a useful number. There are 8 new entries this year in all, as well as one drop-out, bringing the total count of included countries and territories to 207. New entries are: San Marino, Bonaire/ Sint Eustatius/Saba, Greenland, Anguilla, Saint-Barthélemy, Saint Martin, Comoros and Equatorial Guinea

The tests themselves

The download part of Measurement Lab's NDT application measures the throughput of a single TCP connection, attempting to transfer as much data as possible for a period of at least ten seconds. This data set has been queried for tests run in the year to 7 May 2019, in order to compile a league table of download speeds for countries tests have been performed by at least 100 unique IP addresses.

Any tests that have not managed to 'stress' the connection by creating congestion between the client and server machines have been excluded from our analysis. Likewise any tests that ran for less than nine seconds, or lasted over fifteen seconds, have been excluded. Any tests that transferred less than 8 KB of data, or that did not properly establish a connection between server and client were also excluded.

Where multiple tests have been run by a single IP address, the average speed has been used for that address.

Reasons for tests being excluded

- Transmission of < 8 KB of data
- Test duration of < 9 seconds
- Test duration of > 15 seconds
- TCP congestion has not been reported
- TCP three-way handshake has not been completed
- Test has been in a congestion limited state for less than 80% of the test duration
- Congestion has been caused by the client device for more than 20% of the test duration
- Test has been run between 8 May 2018 and 7 May 2019

Reasons for countries being excluded

- Tests have been performed by less than 100 unique IP addresses