

# Methodology

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

## Speed test data in general

A speed test 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 of the device being used to take the measurements, can be significantly slower than the same connection over a LAN cable. Speed test data tends to consist primarily of measurements made over wifi, reflecting real-world use
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

Ofcom, the UK telecoms regulator, as well as many regulatory and governmental bodies around the world, [uses physical equipment to constantly measure the maximum speed available](#) on particular lines across a long period of time, and it is from this they will derive their 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 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. The M-Lab data doesn't 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 second consecutive year we have compiled this research, we have been able to show how speeds have changed year-on-year, along with their rankings on the global stage. Please note that...

1. As one would expect, the average global broadband speed has risen between the measurements taken in 2016-2017 and those taken in 2017-2018, from 6.96Mbps to 9.10Mbps. However, in some countries the average speed measured has fallen. In most cases these drops, much like many of the insignificant gains, can be put down

to natural variation between two different samples/measurements. However, Taiwan and Monaco (for example) have seen their average speeds drop significantly. These **could** be caused by nationwide outages or systemic failures. However, we shall leave it to those familiar with the precise situation in these countries to identify what exactly has happened. In short: It is beyond the remit of this report to qualify each country's specific narrative and explain specific rises and falls in the average measured speed, but rather only to report what has been measured

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 would show as a speed rise, yet the speeds experienced by citizens may not have changed
4. We have nearly tripled the number of speed tests this year compared to last, which has grown the sample in some countries previously excluded to a size we feel can produce a useful number. There are 12 new entries this year in all, bringing the total count of included countries to exactly 200. They are: Kosovo, Cuba, Saint Vincent and the Grenadines, Burundi, Grenada, Sierra Leone, Gambia, Swaziland, São Tomé and Príncipe, Mayotte, Niger and East Timor

## **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 29 May 2018, 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 29 May 2018 and 28 May 2018

### **Reasons for countries being excluded**

- Tests have been performed by less than 100 unique IP addresses in the year to 28 May 2018