Annual Report 2022/2023

Executive summary: fixed and mobile broadband connections

Objectives of the broadband speed tests

The Bundesnetzagentur's broadband speed checker ("Breitbandmessung") is a quick and easy way for end-users to check the speed of their internet connections and monitor the performance of their fixed and/or mobile broadband connections.

The speed tests are provider and technology neutral and can be carried out on fixed broadband connections using the free desktop app. There is a free broadband and dead spot checker app ("Breitbandmessung/Funkloch-App") for mobile connections.

This executive summary presents the overall results of fixed and mobile broadband speed tests carried out in the operational year 2022/2023. The full reports may be found (in German) at ↗ https://breitbandmessung.de/archiv-jahresberichte.

A detailed explanation of the methods is given in a separate document describing the measurement concept, sample selection method, and data evaluation and presentation methods.
It may be accessed (in German) on the broadband speed checker website at ↗ https://breitbandmessung.de/archiv-jahresberichte ("Material, Methoden und Datengrundlage").

The interactive graphs and tables at ↗ https://breitbandmessung.de/interaktive-darstellung provide further breakdowns, in particular with respect to providers and federal states.

Results for fixed broadband connections

A total of 305,035 valid tests were carried out in the reporting period from 1 October 2022 to 30 September 2023 by means of individual measurements (2021/2022: 398,747 valid tests). The proportion of users across all bandwidth categories and providers in the year under review whose connection had a download speed at least half their contractually agreed maximum speed was 85.5% (2021/2022: 84.4%); the proportion of users whose connection had a speed equivalent to or higher than their contractually agreed maximum speed was 43.5% (2021/2022: 42.3%) (see Figure 1). Overall, the curve for the year under review is slightly above the curve for the previous year.

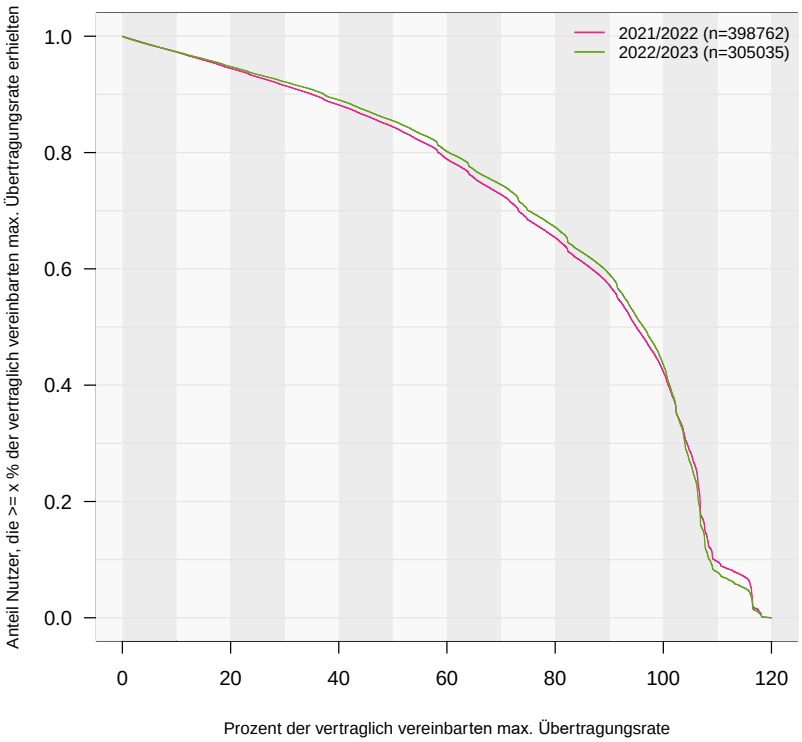

Figure 1: Empirical distribution function of the download speeds achieved as a percentage of the contractually agreed maximum for fixed broadband connections

There are clear differences between the broadband categories (see Figure 2). The proportions of end-users achieving at least 100% of their contractually agreed maximum speeds ranged from 10.5% to 61.5% in the individual bandwidth categories.

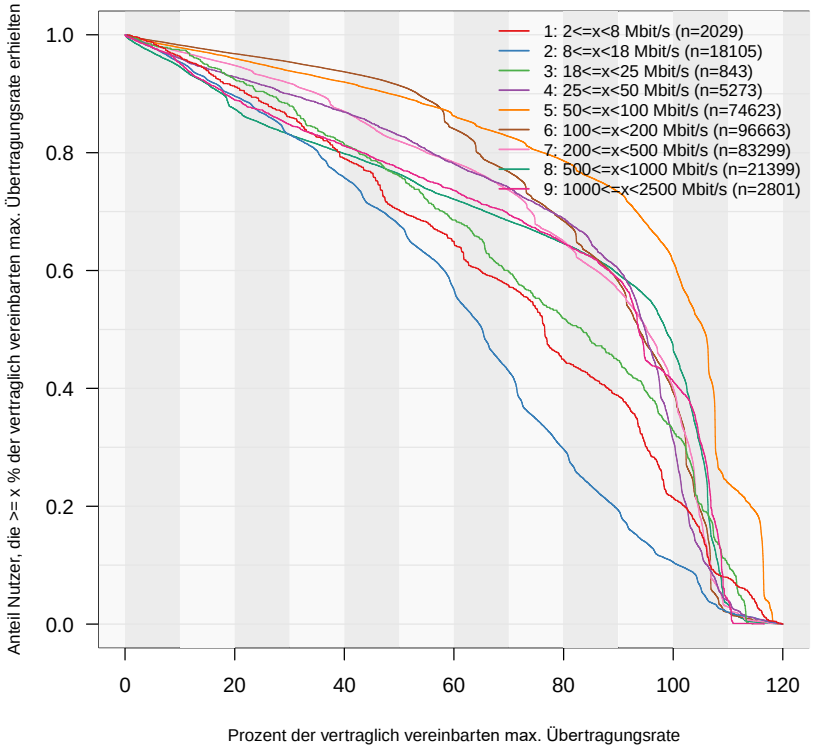

Figure 2: Empirical distribution function of the download speeds achieved as a percentage of the contractually agreed maximum broken down by broadband category for fixed broadband connections

The results for the 10 providers with the largest number of valid tests are shown in Figure 3. Here, too, some significant variation can be seen with respect to the achievement of at least 100% of the contractually agreed maximum speeds. The range for the providers shown is from 2.4% to 58.6% of end-users. There was an increase in the absolute speeds measured for all 10 providers; there was also a year-on-year increase in the speeds in percentage terms for the large majority of these providers.

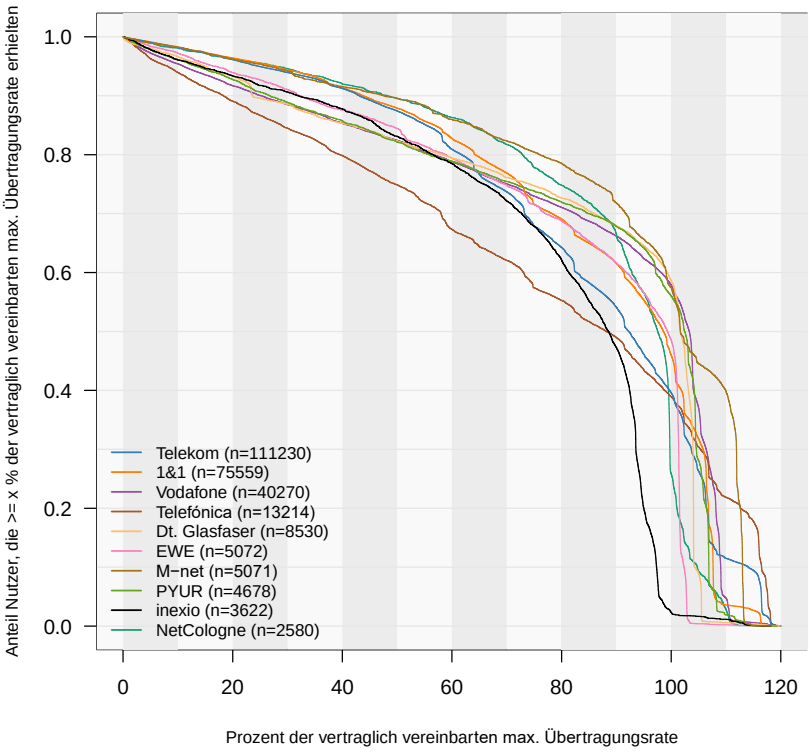

Figure 3: Empirical distribution function of the download speeds achieved as a percentage of the contractually agreed maximum for the 10 providers with the most valid tests for fixed broadband connections

Regarding the geographic areas, the speeds measured as a percentage of the contractually agreed maximum speeds were generally higher in urban areas than in semi-urban or rural areas. In urban areas, 61.9% of users achieved at least 90% of advertised speeds (2021/2022: 61.1%), while in semi-urban areas it was 57.1% (2021/2022: 54.3%) and in rural areas 54.9% (2021/2022: 51.2%).

The results for the individual bandwidth categories also vary over the course of the day. Some curves are relatively constant over the whole day.

In the year under review, most end-users (79.1%; 2021/2022: 78.2%) were again satisfied with the performance of their broadband connection (rating of 1 to 3 on a scale of 1 to 6, with 1 being the highest); 10.4% of end-users (2021/2022: 10.9%) gave their connection a rating of 5 or 6. These results show that

customer satisfaction was slightly higher than in the previous year. The actual speeds measured by satisfied end-users were closer to the contractually agreed maximum speeds.

The increased importance of working from home has also focused attention on upload performance. Based on the speeds measured as a percentage of the contractually agreed maximum speeds, upload performance was again generally similar to download performance. The proportion of users across all bandwidth categories and providers in the year under review whose connection had an upload speed at least half their contractually agreed maximum speed was 88.8% (2021/2022: 88.5%); the proportion of users whose connection had a speed equivalent to or higher than their contractually agreed maximum speed was 41.8% (2021/2022: 40.2%). These results were slightly better compared with the previous year.

End-users in the upper bandwidth categories tended to obtain the best results for latency times. In the year under review, 95.3% of users (2021/2022: 94.4%) achieved latency of 40 ms or less. 75.1% achieved latency of 20ms, representing a clear improvement on the previous year (2021/2022: 69.2%). Low latency plays an important role in performance for video calling and online gaming.

Results for mobile broadband connections

The report covers a total of 563,363 valid tests on mobile connections (2021/2022: 623,581). The proportion of users across all bandwidth categories and providers who had a speed at least half their contractually agreed estimated maximum speed was 25.5% (2021/2022: 23.2%); the proportion of users whose connection had a speed equivalent to or higher than their contractually agreed estimated maximum speed was 4.0% (2021/2022: 3.0%). Looking at the results in all eight reporting periods since the broadband speed tests started, the results in percentage terms have again improved on the previous year and the trend towards higher percentage speeds continues. This improvement is due to increases in the middle and upper bandwidth categories.

However, the curve of the latest year under review is again largely lower than that of 2015/2016, the first year in which data were recorded. The mobile providers started marketing "LTE Max" tariffs in 2016/2017 with much higher speeds in their contracts. It is striking that the increases in the range from 80% to 100% of the tariff maximum have led to some of the latest results exceeding the percentages from 2015/2016 for the first time.

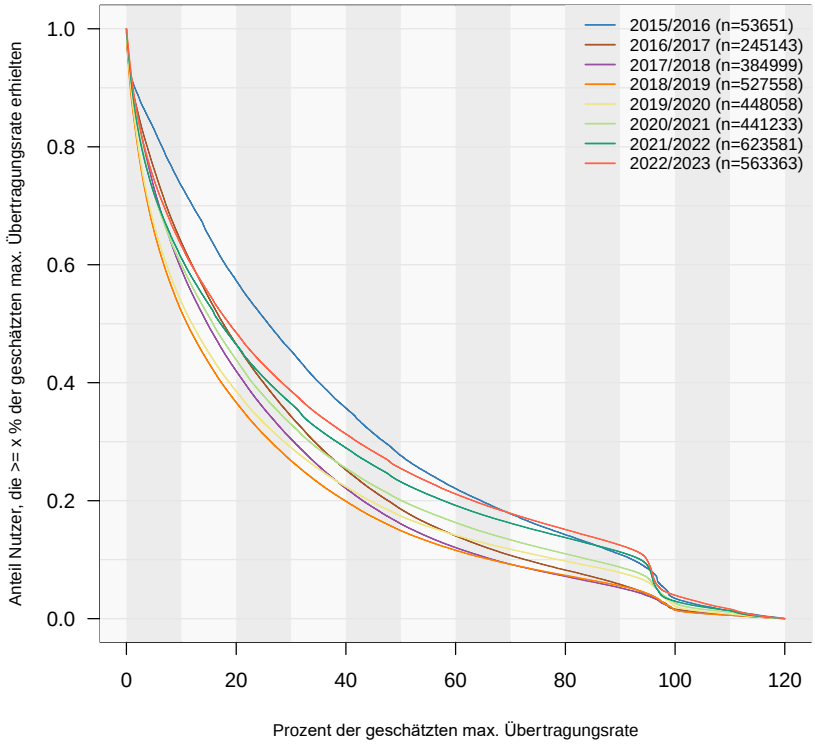

Figure 4: Empirical distribution function of the download speeds achieved as a percentage of the estimated maximum for tests of mobile connections in the different years

Mobile broadband connections are divided into eight broadband categories for the tests. Individual connections or the contracts they were based on were put into the categories according to the users' contractually agreed estimated maximum download speeds. The test results for the individual broadband categories are shown in Figure 5. There are clear differences between the broadband categories.

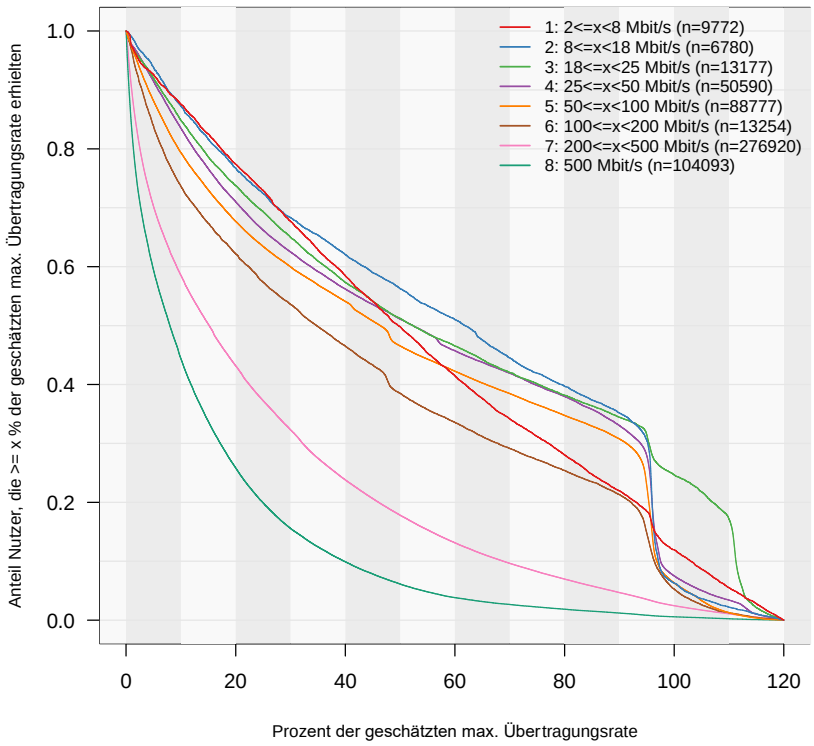

Figure 5: Empirical distribution function of the download speeds achieved as a percentage of the estimated maximum broken down by broadband category for mobile connections

Figure 6 shows the empirical distribution functions for all broadband categories for the 10 providers[1] with the largest number of valid tests. Together, they make up 88.7% of valid tests. There are clear differences between the curves of the 10 providers. The proportions of end-users receiving at least 100% of their contractually agreed estimated maximum speeds ranged from 0.9% to 11.2%. This range is 3.8 percentage points narrower than in the last reporting period due to shifts in the tariff structure of one provider.

[1] Independent brands of telecommunications companies are classed as providers.

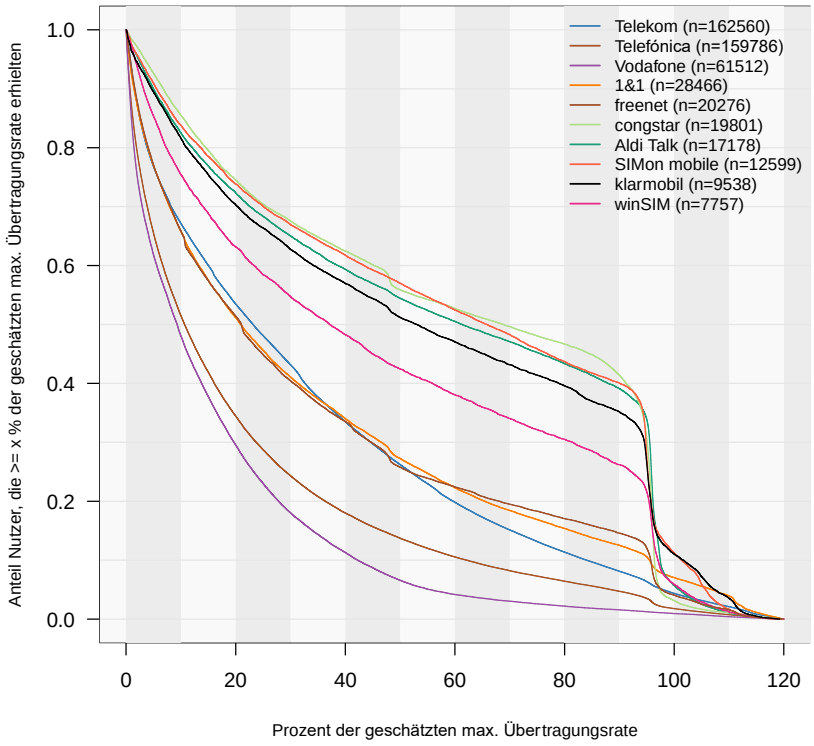

Figure 6: Empirical distribution function of the download speeds achieved as a percentage of the estimated maximum for the 10 providers with the most valid tests for mobile connections

There was again substantial progress in 5G network rollout during the latest reporting period. In the year under review, 28.5% of all the tests on mobile connections covered were carried out by end-users with 5G technology, compared with just 6.0% in 2020/2021 and 15.3% in 2021/2022. This again represents a nearly two-fold increase within a year.

It is possible to achieve very high speeds with 5G, which are sometimes well over the contractually agreed estimated maximum of the relevant tariff. The estimated maximum in the majority of the tariffs in the market is based on the speeds potentially achievable with 4G. This means that in the tariffs of the three network operators in particular, there is no limit on the speeds achievable with 5G but the speeds are "upwardly open".

In order to look more closely at the effects of this practice, a separate analysis was made specifically of 5G tests in bandwidth

categories 7 (200 Mbps to less than 500 Mbps) and 8 (500 Mbps) for the three network operators, who had results exceeding 120% of the estimated maximum of their tariffs. One network operator in particular had a high proportion of users who benefited from the "upwardly open" speeds for 5G. The results above all for this network operator are therefore considerably better than presented in the rest of this report.

The results both for the speeds in percentage terms and for the absolute speeds were better in urban than in semi-urban areas. The results in urban areas were worse, although the gap between rural and semi-urban areas is smaller than between semi-urban and urban areas. These tiers have been the same since the broadband speed tests were launched in 2015. The majority of the 5G tests that were covered in the separate analysis and that recorded very high speeds were also carried out in urban areas.

With regard to the performance throughout the day, there are generally hardly any differences between the curves of the reporting periods for speeds in percentage terms. However, there is a clear difference in the overall level; the percentages have increased steadily in the past five years under review but remain below the level from the first reporting period in 2015/2016. The trend for speeds in percentage terms to drop off throughout the day with a dip in the early evening has been confirmed once again in the latest year under review.

A large majority of end-users (70.4%) again gave their providers a rating of 1 to 3. This is just slightly lower than in the previous 12-month period (2021/2022: 70.8%). Across the past eight reporting years, the trend has been a negative one, only interrupted by better results in the 2020/2021 reporting year.

It has emerged that the actual speeds measured by satisfied end-users were closer to the contractually agreed estimated maximum speeds. However, the fact that the speeds measured as a percentage of the contractually agreed speeds were again generally very low suggests that mobile broadband users may rate mobility and absolute speeds higher than actually receiving their advertised speeds.

A similar percentage was recorded for upload as for download speeds. The proportion of users receiving at least 50% of their contractually agreed estimated maximum speeds improved slightly from 19.9% in the previous reporting period to 22.3%. A nearly unchanged proportion of 3.5% of users (2021/2022: 3.3%) received at least 100%.

There was another decrease in latency compared with the previous year, with clear improvements in particular for very low latency times. 14.0% of users achieved latency of 40 ms or less (2021/2022: 8.1%), while 91.0% of users recorded a latency lower than or equal to 100 ms (2021/2022: 91.0%).

Publisher's details

The report on broadband speed tests was commissioned from zafaco GmbH by the Bundesnetzagentur. The report covers the results of the tests carried out in the eighth operational year (1 October 2022 to 30 September 2023).

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