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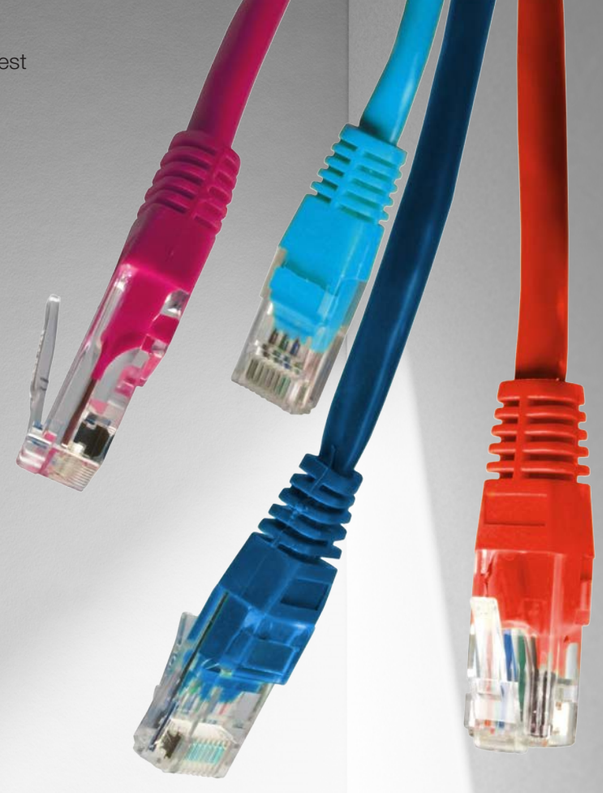
connect

Full Access

Our renowned Broadband and Fixed-Line Network Test is celebrating its fifteenth anniversary. And for the second time, we are conducting it on the basis of umlaut's crowdsourcing methodology.



Time flies – connect has been conducting its demanding Broadband and Fixed-Line Network Test alredy for 15 years now. Since 2023, we are relying on the crowdsourcing methodology of our test partner umlaut. connect readers are already familiar with these analysis methods which are also used as part of our mobile network test in the DACH region.

They allow us to measure and evaluate the performance and quality actually experienced by a large number of customers on their connections. On page 53, we explain in detail exactly how this works and what reliable statements we can make on this basis.

Better comparability

In addition, in our second "crowdsourcing year" the use of this methodology now allows us to make direct comparisons of the development of individual network operators. And the results of this investigation show that the providers' technology teams have not at all rested on their laurels.

Nevertheless, umlaut and connect are continuously working on the further development of their test procedures. In this context, we present a preview of another aspect which we expect to include in our evaluation next year: On page 54, please find a case study about network coverage.

As already mentioned before, thanks to the crowdsourcing-based test method the comparison with other countries also becomes easier. Therefore we will be taking another look at the fixed-line networks in Austria and Switzerland in our next issue using the same methodology. But for now, let's rise the curtains for this year's big Broadband and Fixed-Line Network Test in Germany.

Hannes Rügheimer

"Congratulations to Telekom for winning the test among the nationwide providers and to Deutsche Glasfaser for winning in the regional category. The other providers tested also performed very well across the board. It is particularly positive that many of them were able to improve significantly compared to the previous year."

Hakan Ekmen, Global Networks Lead - Comms Industry and CEO of umlaut

CROWDSOURCING FACTS

804	736 786	24
million samples	internet lines considered	weeks (mid-January until end of June 2024)

Picture: © Me dia, tr3gin - Shutterstock.de

Nationwide Providers

Fixed network providers that offer their services nationwide and have a correspondingly high market share are rated in a separate category.

We distinguish between two categories of providers: nationwide and regional fixed-line network operators. To be classified as a nationwide player, a provider must fulfill two criteria: Firstly, its lines must be available in all federal states of Germany. And secondly, according to the industry-wide recognized market study by the VATM (Verband der Anbieter von Telekommunikations- und Mehrwertdiensten; Association of Telecommunications and Value-Added Service Providers; https://www.vatm.de/marktstudien), the offer must have a market share of at least 4 percent in relation to the entire German federal territory.

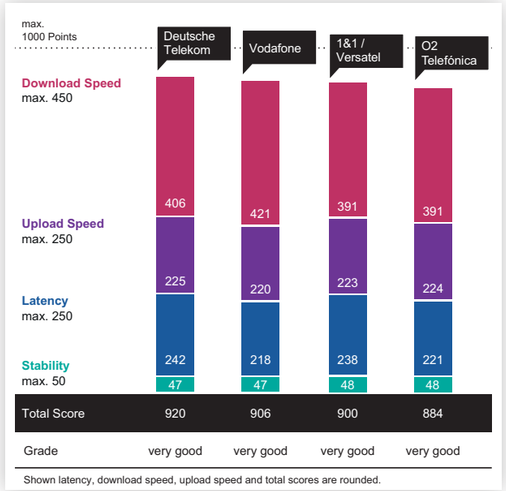
The reason: connect is convinced that regionally oriented fixed-line network connections are not comparable with nationwide offers for the sake of fairness – after all, it is far easier for an operator to supply only a regionally limited area with its Internet lines than to be present nationwide, also in smaller communities or in the countryside.

In addition, nationwide availability generally means that the total number of slow connections included in our analysis is higher, as a roll-out of faster lines is often not profitable in rural regions. This is also taken into account by our division into two categories.

Check available offers

However, even the nationwide providers cannot offer an Internet connection in every location – let alone in the technology preferred by the customer, such as (V)DSL, broadband cable or fiber optics. Anyone interested in a broadband connection must therefore check which options are available at their actual address.

In addition, the tariffs offered by the providers also play an important role for the choices of their customers – which our purely technical performance evaluation does not take into account. However, our test results provide a very good indication of the level of performance customers can expect from a given provider.



Shown latency, download speed, upload speed and total scores are rounded.

It is true that customers of some providers may book a larger proportion of slow lines than those of others. However, customers who choose a top-class product can usually expect above-average performance from those providers who achieve top results in our mixed survey across the entire German market.

Four times very good

All four nationwide providers achieve a "very good" rating in our evaluation. Deutsche Telekom is clearly ahead in the nationwide evaluation.

The market leader from Bonn once again achieves a clear test victory among the nationwide fixed-line network providers.

With 14.9 million fixed-line customers or 40.3% market share according to the VATM study, Deutsche Telekom is the clear market leader in the German fixed-line network.

DSL and VDSL lines continue to dominate its existing network, but the Bonn-based company is also stepping on the gas in terms of fiber expansion: it could already supply around 8.6 million households via FTTH, with a further 2.5 million households to be added each year over the next few years. However, the actual booking figures are much lower.

In our test, Telekom is ahead in terms of actively measured upload data rates – this is probably due in part to the recent update of these values in its DSL tariffs. The Bonn-based company also leads in terms of latency. In terms of actively measured download data rates, Telekom is narrowly beaten by Vodafone, but is ahead of the results from O2 and 1&1.

In terms of passively determined download and upload data rates, the four nationwide candidates are close together anyway. With the fastest downloads (high-speed, at least 50 Mbps), Telekom scores just behind 1&1, while it is just ahead with the fastest uploads (UHD class, at least 20 Mbps). O2 and 1&1 are slightly stronger when it comes to the success rate of Internet transactions ("stability").

Nevertheless, the Bonn-based company achieved the overall victory in the nationwide assessment. Compared to its results from the previous year, Telekom was able to improve once again.

connect VERDICT
VERY GOOD (920 Points)

vodafone

Thanks to its focus on gigabit cable connections, Vodafone is ahead in terms of download data rates – and takes second place overall.

With 10.5 million customers, which corresponds to a market share of 28.5 per cent according to VATM, Vodafone is the second-largest fixed-line provider in Germany.

The Düsseldorf-based company supplies the majority of its private landline customers via broadband or coaxial cable – even though it also offers VDSL connections (primarily via resale) as welll as fiber optic lines. Vodafone owes the high proportion of coaxial cable connections to the takeovers of its former competitors Unitymedia and Kabel Deutschland.

The provider benefits from this very high proportion of broadband cable lines above all in the actively determined download data rates – here, the average value and P10 (90% faster than) and P90 (10% faster than) range at the top of the test field. The increases in upload data rates recently implemented in the Vodafone cable network are already having a clear impact on the active measurements in this category.

In terms of the average value, however, Vodafone falls just behind Telekom with its high DSL share. The strong cable focus also causes Vodafone to lag slightly behind its competitors in terms of latency. In the standard gaming class (max. 50 ms ping time), however, the Düsseldorf-based company is still just ahead of O2, albeit behind Telekom and 1&1. The competition also scores slightly higher in terms of success rates, but the gaps are small.

Compared to the previous year, Vodafone was able to improve its result slightly.

connect VERDICT
VERY GOOD (906 Points)

1&1

The Montabaur-based network operator achieved a very good third place with its range of leased lines and its own fiber optic connections.

With around 4.1 million customers, 1&1 covers approximately 11.1 per cent of the German fixed broadband network market – making the Montabaur-based company the third-largest provider. Although, 1&1 also leases lines from Telekom, Vodafone and other network operators. However, the provider operates its own core network and its own „carrier interconnects“ and, since 2014, its own fiber optic network, which it also markets under the “Versatel“ brand. The data basis of the crowdsourcing analysis carried out by umlaut reflects this constellation.

In the actively conducted download measurements, the average value determined for 1&1 falls slightly behind that of the other nationwide providers. In terms of P90 and P10, however, the Montabaur-based company scores still ahead of O2. In terms of actively measured upload data rates, 1&1 ranks on fourth place for the average value and P90, but is ahead of Vodafone in terms of P10.

1&1 takes the lead in the passive download and upload measurements, but just slightly ahead of the rest of the test field in the upload category.

In the latency measurements, 1&1 is narrowly behind Telekom overall, but well ahead of O2 and Vodafone; this becomes particularly clear in the higher ultra-low latency (max. 10 ms) and high-end gaming (max. 20 ms) classes. In the stability ranking, 1&1 achieved second place after O2.

Compared to the previous year‘s result, this provider has made significant gains.

connect VERDICT
VERY GOOD (900 Points)

O2

Telefónica‘s fixed network offering also performs very well, with the score remaining stable compared to the previous year.

O2/Telefónica‘s fixed network offering counts 2.4 million customers, which, according to the VDMA study, corresponds to a market share of 6.5% and thus fourth place among the nationwide active providers in Germany.

Telefónica leases lines from supra-regional network operators such as Telekom and from regional providers to provide customer connections. This results in a colourful bouquet of access technologies, including fiber optic lines, behind which the Munich-based provider operates its own core network. This mix is also reflected in our database.

In terms of active download data rates, the O2 fixed network is roughly on a par with 1&1, but behind Vodafone and Telekom. In terms of active uploads, it even takes second place behind Telekom, the leader here.

In the passively observed download measurements, O2 beats its competitor Vodafone, while the Munich-based company‘s passively observed uploads rank in the same league as Telekom and Vodafone, just behind 1&1.

In the latency category, however, Telekom and 1&1 score higher, with O2 coming third ahead of Vodafone. This ranking becomes clear in the higher latency classes such as ultra-low latency (max. 10 ms) and high-end gaming (max. 20 ms). In comparison with the other nationwide providers, O2 is ahead in the stability category – albeit in an overall tight race.

Compared to its result from or previous year‘s test, O2 essentially keeps its performance level.

connect VERDICT
VERY GOOD (884 Points)

Detailed results **nationwide**

The comparison of the results in the individual disciplines shows differences in performance that can be explained to a large extent by the respective technology mix in the access networks.

The methodology of our test deliberately focuses on everyday performance. The upload and download measurements as well as the determination of latency and stability primarily show how well the tested networks meet the everyday requirements of their users. An additional look at peak performance beyond this then serves to differentiate further.

Differences at the top

Regarding the actively determined data rates, the average and P10 results (90% of all measured values above ...) show that there is a relevant number of connections in the analyzed data pool that only deliver relatively low speeds. The fastest connections in the respective portfolio only come into play when looking at the P90 value (10% above ...).

However, Vodafone, which relies heavily on gigabit cable, can clearly set itself apart from the other providers, most of which mainly use DSL. In the active upload measurements, the increase in upload bandwidths implemented some time ago in the Vodafone network is also bearing fruit: while the average value in the previous year was 26.2 Mbps, it has now risen to 29.7 Mbps. The P10 grew from 6.1 Mbps in the previous year to 7.6 Mbps. However, the predominantly DSL-based competitors are still slightly further ahead here. At the top, however, with the P90 value, the Düsseldorfers take the lead over the entire test field.

The values for passively recorded download and upload data rates are more similar between the four candidates – the bandwidth requirements of the applications used by their customers are obviously closer to each other, regardless of the access technology.

In the latency category, Telekom and 1&1 set themselves apart from O2 and Vodafone – the more demanding the ping class observed, the clearer the differences become. On the other hand, O2 is ahead in the stability category in an overall tight race. It is followed by 1&1, Telekom and Vodafone. All in all, the success rate of Internet transactions assessed here is well above 98% for all four nationwide providers.

KPI Values	Deutsche Telekom	Vodafone	1&1/ Versatel	O2 Telefónica
Download Speed Active [Mbps]				
Ø Datarate	78.7	125.4	69.9	73.4
P10 Datarate	24.7	25.3	24.2	23.3
P90 Datarate	146.8	291.1	113.7	110.4
Download Speed Passive [%]				
UHD Video Class	45.6	45.0	46.9	45.9
Bulk Download	11.4	10.8	11.8	11.1
Upload Speed Active [Mbps]				
Ø Datarate	31.4	29.7	25.2	25.4
P10 Datarate	12.0	7.6	10.1	11.0
P90 Datarate	46.4	53.9	43.5	45.9
Upload Speed Passive [%]				
HD Video Class	38.8	38.9	40.1	39.0
UHD Video Class	31.3	30.2	30.6	29.6
Latency [%]				
Standard Gaming Class	98.6	97.6	98.5	96.4
Highend Gaming Class	85.7	68.3	82.5	68.5
ULL Class	44.9	13.0	37.7	25.6
Stability [%]				
Transaction Success	98.5	98.4	98.6	98.8

The numerical values shown are rounded. The exact, non-rounded values were used for the calculation of points and totals.

Differentiation at top speed

The differences are smaller in the passively determined data rates, but they are more pronounced in the active measurements, which focus more on top data rates.

Reliability

1&1 and Telekom perform particularly well when it comes to separating the mandatory from the optional, followed at some distance by O2/Telefónica and Vodafone.

Reliability	max.	Deutsche Telekom	Vodafone	1&1/ Versatel	O2 Telefónica
Download data rates	247.5	231.9	232.1	232.0	231.3
Upload data rates	137.5	123.0	117.8	123.3	122.7
Latency	137.5	134.8	132.8	134.6	130.5
Stability	50.0	47.5	47.3	47.7	48.0
Total	573 P.	537	530	538	533

The numerical values shown are rounded. The exact, non-rounded values were used for the calculation of points and totals.

The “Reliability” chapter is not based on additional test criteria, but is rather a different look at the results of the various test categories. The analysis is based on the fact that umlaut distinguishes between “Qualifier KPIs” (mandatory, so to speak) and “Differentiator KPIs” (optional) for all KPIs – also see page 53.

Providers that perform well in the mandatory program deliver reliable services, regardless of any top performance in the optional program. In this evaluation, 1&1 manages to come in one point ahead of Deutsche Telekom. O2/Telefónica follows in third place, with Vodafone in fourth place in this category. For the most part, the observations from the overall ranking are confirmed here – Vodafone only loses a few points in the uploads.

Regional Providers

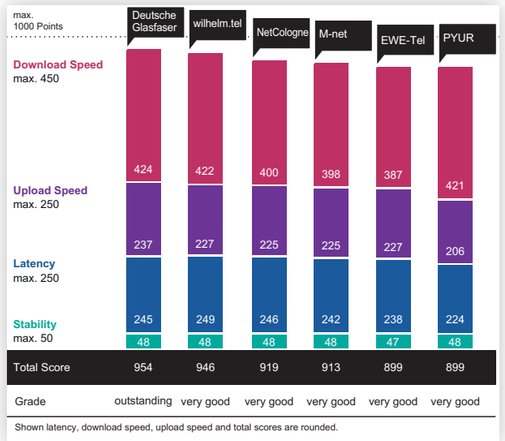
The fact that the regional providers tend to score higher than the nationwide operators can also be explained by network coverage and expansion strategies.

As explained on page 47, we believe that it is a matter of fairness to consider nationally active and regionally orientated providers separately. Even if a network operator is represented in most federal states, it does not necessarily roll out its network there across the board, but may only concentrate on lucrative regions and hotspots such as new construction or network expansion areas. This is why market share is also an important criterion.

Different strategies

The regional distribution of the samples is also clearly recognisable in the crowdsourcing analysis carried out by umlaut – see case study on page 54 in this context. For prospective customers, however, the decisive factor is of course which providers can provide a connection at all in the desired location. From the customer's point of view, it is therefore of secondary importance whether smaller providers concentrate on certain federal states or cities or whether their "roll-out islands" are spread more widely across Germany. Examples of the former category are Wilhelm.tel, NetCologne, M-net and EWE Tel, while examples of the latter focus are Deutsche Glasfaser and Pÿur.

The fact that these two in particular can be found at the respective ends of our evaluation scale shows that the roll-out strategy alone has no influence on the result.



Shown latency, download speed, upload speed and total scores are rounded.

Outstanding fiber optics

The rare grade of "outstanding" is awarded to Deutsche Glasfaser's network, which is based solely on fiber. However, the other regional providers also deliver very good performance – often because they concentrate on smaller areas.

Deutsche Glasfaser

Deutsche Glasfaser's clear focus on high-performance FTTH technology wins it the overall victory in our regional category.

Although Deutsche Glasfaser is represented in almost all federal states of Germany, the VATM study shows that it has 0.6 million customers and a 1.6% market share – therefore being a regional provider. The company plans to connect around 400,000 additional households every year, and even 800,000 per year from 2025. As the name suggests, the company only offers "Glasfaser" – fiber optic connections using FTTH technology.

This focus is also reflected in the test results – in our evaluation, Deutsche Glasfaser came out on top in the active and passive measurements of upload and download data rates. This becomes particularly evident in the average values and the P90 value focussed on peak performance. In the stability discipline, the provider also ranks among the top group, only being narrowly beaten by Wilhelm.tel and NetCologne in terms of latency.

Despite its outstanding result, Deutsche Glasfaser still managed to even improve a little compared to the previous year.

connect VERDICT
OUTSTANDING (954 Points)

wilhelm.tel

This year, the provider from Norderstedt only just missed out on the rare mark of "outstanding". Its services are convincing allround.

Wilhelm.tel is a brand of Stadtwerke Norderstedt and also has its headquarters in this Northern-German town.

The provider is also active in Hamburg and parts of Lower Saxony, North Rhine-Westphalia and Schleswig-Holstein. Its market share is not shown in the VATM study, which means that it is likely to be one per cent or less nationwide. The company also cooperates with local cable providers, but relies almost exclusively on fiber optics itself.

This also provides an explanation for Wilhelm.tel's test results. Although the provider falls slightly behind Deutsche Glasfaser in the download and upload measurements, it is ahead in the latency discipline.

This provider leads in terms of points for passively observed downloads and ranks in the very good midfield for passively observed uploads. Wilhelm.tel also scores among the top regional providers in our stability evaluation.

At the highest level, Wilhelm.tel scores only slightly behind its previous year's result.

connect VERDICT
VERY GOOD (946 Points)

NetCologne

With strong results in terms of latency, but a small shortfall in the download and upload disciplines, the Cologne-based company achieved third place in the regional ranking.

NetCologne has 0.5 million customers, giving it a market share of 1.4% cent according to VATM. The company was founded by RheinEnergie, Sparkasse Köln/Bonn and Kölner Verkehrsbetriebe. NetCologne has been a wholly owned subsidiary of the holding GEW Köln AG since 2004. The provider supplies fiber optic and VDSL lines primarily in the Cologne and Bonn region, but is also represented in Rhineland-Palatinate.

The fact that NetCologne even overtakes Deutsche Glasfaser in the latency discipline is an indication that the proportion of fiber in its line portfolio has also grown. The scores in the download and upload disciplines are correspondingly high – although they are slightly behind the two leaders in the regional rankings. This can be seen most clearly in the average and P90 values of the active measurements. In the stability evaluation, however, NetCologne is once again among the leaders. Overall, the Cologne-based company achieves the third place regionally – and thus ranks the same as in the previous year.

connect VERDICT
VERY GOOD (919 Points)

M-net

The Munich-based provider supplies its customers with very good services and in many cases fiber optic connections, placing it in the middle of the regional rankings.

With half a million fixed-line customers or a 1.4% market share, M-net is also a typical regional provider. It is backed by Stadtwerke München and Augsburg, Allgäuer Überlandwerk and other associates. M-net offers fiber optic as well as VDSL connections in the greater Munich, Augsburg, Ulm and Erlangen areas, many other regions in Bavaria as well as in the Main-Kinzig district of Hesse. In larger residential complexes, the provider also relies on the forwarding of FTTB lines via G.fast.

This technology mix may also explain why this provider falls slightly behind its higher-rated competitors in the download and latency measurements.

M-net ranks at the same high level as the other regional providers in the actively and passively observed upload data rates as well as in the latency and stability evaluation.

Overall, this leads to fourth place in the regional ranking, with M-net having significantly improved over its previous year's result.

connect VERDICT
VERY GOOD (913 Points)

EWE

Energieversorgung Weser-Ems achieves a very good result. The ongoing roll-out of fiber optics has led to a score increase compared to the previous year's result.

According to the VATM market analysis 2023, the EWE Group has 0.8 million customers and thus a market share of 2.2%.

The provider is primarily active in north-west Germany – between the rivers Ems and Elbe, in Bremen, parts of Brandenburg, Lower Saxony and North Rhine-Westphalia as well as on the island of Rügen, it offers both VDSL and fiber optic connections. Together with Telekom, it plans to connect up to 1.5 million households with fiber lines via the Glasfaser Nordwest joint venture. At the moment, however, VDSL and/or slower FTTH connections are still likely to dominate its portfolio – at least this is what our active download measurements and the latency score suggest.

In the passively observed download and upload disciplines, the provider ranks similar as most of its competitors.

In the stability evaluation, EWE Tel sores one point behind the rest of the regional test field.

Compared to the previous year, however, the provider has clearly improved.

connect VERDICT
VERY GOOD (899 Points)

PÿUR

The Berlin-based provider Tele Columbus, brand name Pÿur, is on a par with EWE Tel. It achieved a very good rating and clearly improved in comparison to the previous year.

This provider was formed from the merger of several regional cable providers. With 0.7 million broadband customers, it has a market share of 1.9% and is therefore classified as a regional provider – although its connections based on broadband cable and, in some cases, fiber optics are already represented in numerous German federal states.

Typically for cable connections in particular, the results of the active download measurements are quite high, while there is potential for improvement in the active upload measurements and in the more demanding classes of the latency rating – most pronounced in the ultra-low latency class (max. 10 ms).

In the passively observed download and upload measurements, Pÿur can keep up well with the other regional providers, and in the stability evaluation the provider ranks in the top range. In the overall ranking, Pÿur is on a par with EWE Tel.

Also, this provier has improved significantly compared to the previous year.

connect VERDICT
VERY GOOD (899 Points)

Detailed results **regional**

The higher the proportion of fiber optic lines, the better the performance at the top of our regional category.

The detailed results underline the superiority of fiber optic access technology: This is most evident with the leader of the regional ranking, Deutsche Glasfaser. This provider supplies its customers entirely or at least predominantly with FTTH connections (fiber to the home, i.e. all the way to the customer connection port). As in the previous year, Deutsche Glasfaser once again achieved the rarely awarded rating of “outstanding“. Wilhelm.tel and the providers following next in the regional ranking also have a high proportion of fiber optic lines in their product ranges.

Results reflect technology mix

The strengths of fiber technology become most evident in the active throughput measurements: When our test procedure utilises the data rates up to the technically possible limit, fast connections naturally provide a clear advantage. The more the respective access mix includes other connection technologies in addition to fiber optics – this can be (V)DSL, coaxial cable, but also, for example, the forwarding of fiber optic connections via copper twisted pair using standards such as G.fast – the more clearly the observed data rates fall behind. In the downlink direction, broadband cable connections can still keep up quite well, as can be seen in particular from Pÿur‘s good result in this discipline. On the other hand, providers with a high proportion of coax have a somwhat disadvantageous effect due to the comparatively lower achievable upload speed.

In the passively observed throughput measurements, the regionally focused candidates also converge more clearly – this suggests that the applications actually used by their customers place less demand on the lines than the measurements of the maximum possible data rates.

The latencies determined in the analysis largely follow this trend – here too, high proportions of fiber optic connections deliver better results than line portfolios which contain a high number of coaxial or broadband cable connections. This also is a little more pronounced at the provider Pÿur.

KPI Values	Deutsche Glasfaser	wilhelm.tel	Net Cologne	M-net	EWE-Tel	PYUR
Download Speed Active [Mbps]						
Ø Datarate	136.2	102.2	75.3	69.5	68.8	130.1
P10 Datarate	23.4	25.9	23.7	24.8	20.9	26.5
P90 Datarate	360.1	253.1	131.7	136.8	109.2	261.6
Download Speed Passive [%]						
UHD Video Class	46.5	48.3	47.4	45.7	46.4	45.8
Bulk Download	14.3	15.2	12.2	12.3	12.6	11.3
Upload Speed Active [Mbps]						
Ø Datarate	97.1	41.3	27.4	28.8	31.2	23.8
P10 Datarate	19.6	14.6	9.4	8.3	9.4	5.5
P90 Datarate	215.8	57.1	48.1	63.2	66.2	59.6
Upload Speed Passive [%]						
HD Video Class	49.1	39.6	40.5	39.1	43.3	43.7
UHD Video Class	41.8	34.8	32.5	35.9	32.5	33.2
Latency [%]						
Standard Gaming Class	98.8	99.5	99.1	98.9	98.1	97.6
Highend Gaming Class	90.1	96.1	90.4	86.8	78.1	71.0
ULL Class	60.3	82.2	58.4	43.9	43.5	19.2
Stability [%]						
Transaction Success	98.6	98.9	98.9	98.6	98.4	98.6

The numerical values shown are rounded. The exact, non-rounded values were used for the calculation of points and totals.

In the stability category, the six regional providers are largely on a par. Success rates of around 99% show that the fixed lines predominantly provide stable connections despite all the differences in performance. This is very good news for the customers of the regional providers, after all.

Strengths and weaknesses

Download data rates are high for providers that predominantly rely on coaxial cable connections, while there are limitations in terms of uploads and latency. Candidates with predominantly fiber optic lines are shwoing top results in all three disciplines.

Reliability

In our reliability ranking, Deutsche Glasfaser and Wilhelm.tel share the top position among the regional providers. But the other candidates are also convincing.

Reliability	max.	Deutsche Glasfaser	wilhelm.tel	Net Cologne	M-net	EWE-Tel	PYUR
Download data rates	247.5	231.5	233.4	231.8	232.0	229.9	233.0
Upload data rates	137.5	128.3	124.5	123.4	121.9	124.3	104.9
Latency	137.5	135.3	136.6	135.7	135.4	133.9	132.9
Stability	50.0	47.6	48.2	48.1	47.7	47.3	47.7
Total	573 P.	543	543	539	537	535	519

The numerical values shown are rounded. The exact, non-rounded values were used for the calculation of points and totals.

In the analysis focusing on basic services and the mandatory program so to speak (see also page 49), Deutsche Glasfaser and Wilhelm.tel are tied on points.

Wilhelm.Tel compensates for the slightly higher data rates of the fiber optic leader in terms of latency and stability. NetCologne, M-Net and EWE Tel form a strong midfield here, with NetCologne leading in latency and stability, M-Net in download data rates and EWE Tel in upload measurements.

Pÿur also achieves a very good result, albeit with a slight gap to the rest of the regional test field.

Methodology

umlaut Part of Accenture

umlaut is continuously developing its crowdsourcing methodology. We also use this basis to analyze the quality and performance of fixed-net landlines.

The results of this test are based on a comprehensive analysis of crowdsourcing data carried out by the Aachen-based network test expert umlaut

Fixed Line Crowdsourcing

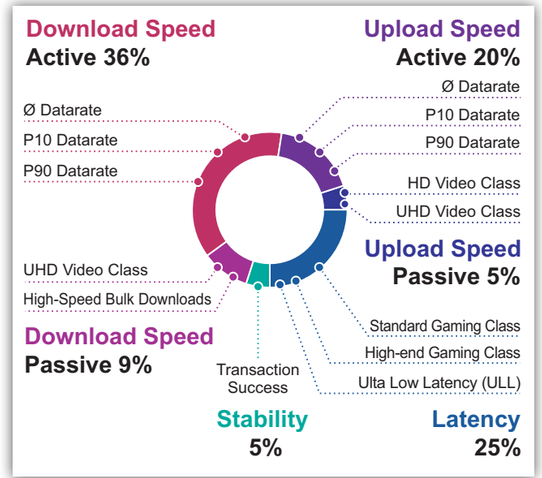
The data basis for the analyses is gathered on smartphones and tablets. When thousands of popular apps are used on them, the parameters described below are collected in the background – provided that the user has consented to completely anonymous data gathering. Samples are generated at specific intervals (from one second to 15 minutes) and sent daily to umlaut‘s cloud servers, where the data is further processed. By filtering the network access technology for samples collected during a Wi-Fi connection (as opposed to mobile network connections) and identifying the network operator, the samples can be limited to fixed network connections.

A complex set of rules and extensive checks then ensure the validity of the evaluations. For example, conspicuously slow connections are filtered out – the threshold value is derived from the average performance of all lines observed in a country. The analysis of Wi-fi connections takes into account the fact that most Internet connections today are used this way. Since the Wi-Fi speeds achievable with current smartphones are also usually significantly higher than the observed overall data rates, the influence of the Wi-Fi link speed on the measurement results is negligible.

Passive Data Rates

The passive collection of *data rates for downloads and uploads* takes place in the background while the user is using everyday applications such as web browsing, streaming or gaming on their device.

In order to classify the observed data rates, umlaut has defined application-related speed classes: *UHD Video* requires 20 Mbps and *High Speed Bulk Downloads* require 50 Mbps. In contrast, for the typically slower uploads, the speed classes *HD Video* (min. 5 Mbps) and *UHD Video* (min. 20 Mbps) are considered. *Passively observed download speeds* account for 9% of the overall result, while the according *upload speeds* contribute 5%.



Balanced requirements

The recorded key performance indicators (KPIs) take into account both day-to-day basic requirements as well as peak values focused on higher performance.

Active Data Rates

In addition to the passively gathered observations of the data rates requested by apps, *active measurements of the upload and download data rates* also take place once a month. They determine the amount of data that can be transferred in 3.5 seconds and derive the data rate from this.

Our scoring considers the *average data rate*, the *P10 value* (90% of the values are above the specified threshold, a good approximation of the typical minimum speed) and the *P90 value* (10% of the values are above this threshold, a look at the peak values) for the determined measurements. The determined active download speeds account for 36% of the overall result, and the active upload tests contribute 20% to it.

Latencies

Latency measurements are taken every 15 minutes – for this purpose, “pings“ are performed directly after the connection tests. The first “hop“, which is affected by Wi-Fi, is compensated and thus corrected.

umlaut also assigns the results of the latency determinations to an application-related class: Roundtrip times of less than 50 ms qualify a sample for *standard gaming* and less than 20 ms for *high-end gaming*. If the latency is shorter than 10 ms, the sample is counted as *Ultra Low Latency (ULL)*, which is sufficient for near-real-time applications. For each of the mentioned classes, our tables show the percentage of connections that reached the required thresholds or performed better. The latency score accounts for 25% of the result.

Stability

Based on the determined data rates and additional browsing and connection tests, umlaut also examines whenever a broadband connection is available at all. The averaged and weighted results define the percentage of the Internet transaction success rate, which accounts for 5% of the total score.

Reliability

umlaut divides all measured values into basic requirements (“Qualifier KPIs“) and values related to peak performance (“Differentiator KPIs“). The presentation of reliability takes only the “Qualifier KPIs“ into account and thus allows us to make a statement about how well a provider‘s network meets the purely basic requirements.

Case Study: Coverage

As part of the further development of our fixed-line network test, we also want to take network coverage into account in future.

The faster, the greener: The color scale represents the maximum data rates achieved in the maps below.

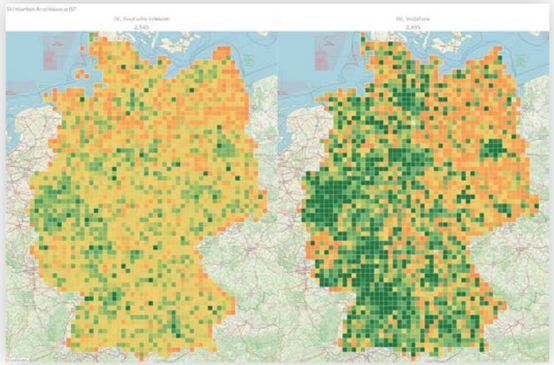
Geographical availability is an important factor when assessing fixed-line networks. On the one hand, the best network performance is of little use if interested parties cannot actually book the service in question. On the other hand, it makes a big difference in the operation of a network whether it is offered virtually nationwide or whether the connections are limited to a few lucrative centers. After all, the latter is also the reason why we differentiate between nationwide and regional providers.
In the future, we therefore plan to also take “coverage” into account in our evaluation. In order to show what results the analysis tools used for this purpose can deliver, we carried out a corresponding evaluation this year as a case study. How the results will be incorporated into the evaluation is part of our joint further development.

Super tiles as a basis

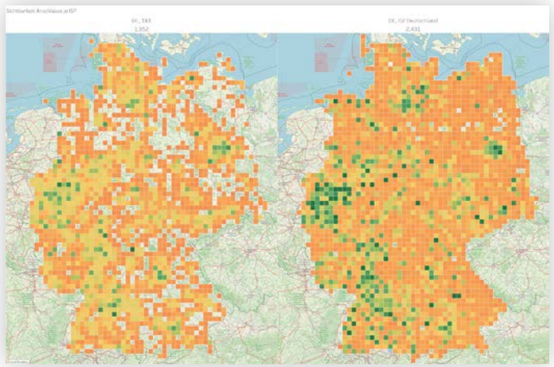
In the following, we would like to explain how the analysis is carried out: The basis is the 2x2 km tiles (“evaluation areas”) also known from our mobile network test. We combine 8x8 of these into a “super tile”.
Background: As a result of our crowdsourcing approach, providers with a small market share are also represented in smaller numbers among users. In order to achieve reliable results even with a small number of customers we have therefore chosen relatively large tiles. If there at least one subscriber connection of the respective provider can be found in the area of the super tile, it is shown on the map and included in the count.
The maxi-mum number of super tiles for the area of Germany is 2692. However, only 2546 of these are inhabited or built-up, so the latter value is used as a reference value for coverage.
For each subscriber connection, we also take into account the highest download data rate determined during the observation period. These maximum download data rates across all super tiles serve as an indicator of the degree of coverage and the availability of high-bit-rate services.

Clear differences

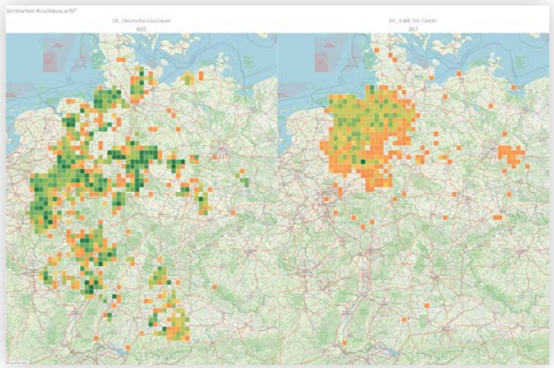
The adjacent maps opposite show examples of the results in the evaluation period of our test: Telekom and Vodafone have the highest geographical coverage, with Vodafone providing more fast lines overall due to its focus on cable connections.
As a reseller, Telefónica/O2 has a somewhat weaker geographical presence, while 1&1‘s own fiber optic offering from its business customer subsidiary Versatel provides regional bitrate hotspots.
Among the regional providers, the exemplary comparison between Deutsche Glasfaser and EWE Tel, which has a strong focus on Lower Saxony, shows their different approaches towards network expansion and adressing their respective customers.



The big players: Telekom (left) shows high data rates especially in city centers, Vodafone (right) achieves top data rates in more places thanks to broadband cable.



Resellers: Telefónica/O2 (left) is not represented everywhere with connections. 1&1 (right) benefits in terms of data rates from its fiber subsidiary Versatel.



Regional examples: Fast lines are available in the coverage area of Deutsche Glasfaser (left). EWE Tel (right) can mainly be found in Lower Saxony and Berlin.

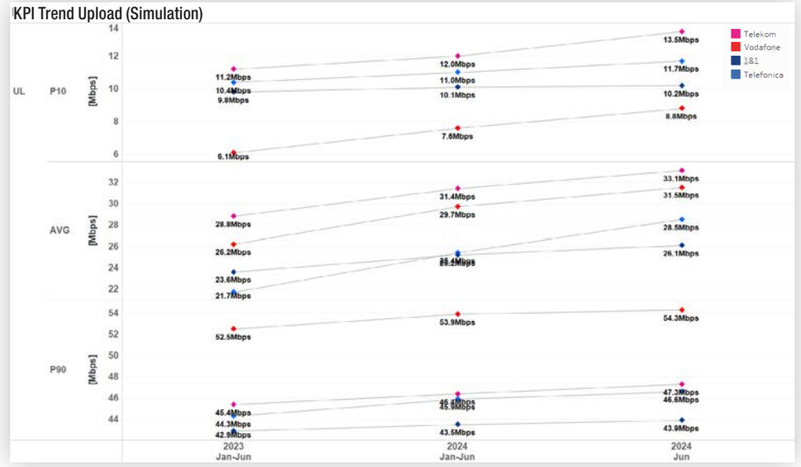
In detail: Uplink Trends

The upload direction is becoming increasingly important. A look at the development of our measured values shows that providers are making gains here.

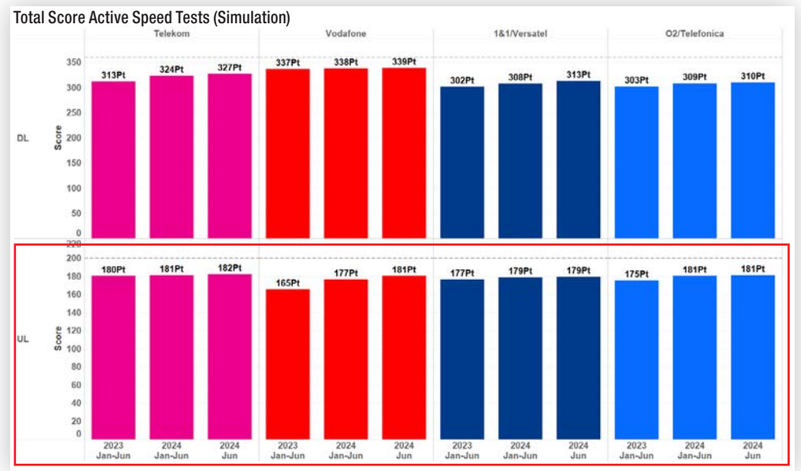
After years of focusing on the downlink direction, fixed network providers are increasingly turning their attention to uplink speed. This reflects current customer usage patterns – uplink is no longer just about uploading photo and video files, but for example also about good image quality in video conferences. As several providers have recently increased uplink data rates, we have taken a separate look at this trend.
Therefore we analysed the development of the KPIs between our 2023 test, the current 2024 test and again separately for the last four weeks of the current evaluation period (beginning to end of June 2024)

Distinct upwards trend

The trend is clearly pointing upwards for all nationwide providers in Germany. In the results of our active data rate measurements, Telekom as well as O2 and 1&1, which also focus on DSL, still lead in the absolute KPI values (in Mbps) – at least this applies to the average values and the P10 value, which comprises the majority of the measurement samples. However, Vodafone achieved the largest percentage increase here. And in the P90 value, which represents the 10 per cent best values in the distribution, the Düsseldorf-based company even took the lead. Above all, this shows potential for the future. Old tariffs, for example, are still slowing down the values to some extent – but this applies to all providers.
The effect becomes even more distinct when the KPI valies are converted into score points, as this correlation is not linear. This means that higher KPI values are capped, so to speak, in the evaluation. We are eagerly awaiting the further developments in this area in the future.

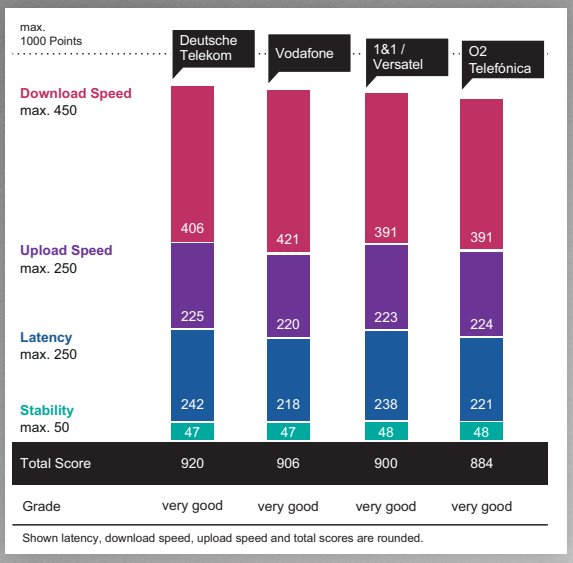


Clear heading: The data rate determined in the active upload tests shows an upward trend for all four nationwide providers. The trend comparison between the 2023 result, the 2024 result and the result of the last four weeks of our evaluation period alone (i.e. the four weeks of June 2024) shows distinct increases for Telekom and Vodafone. This corresponds to improvements in the network, but also adjustments to the upload data rates in the fixed network tariffs of these providers. The increase at Vodafone is also remarkable because high upload capacities are more difficult to realise in cable networks for technological reasons.



Even clearer: the trend is even more pronounced for the points achieved in the upload category. This is due to the fact that the conversion of KPI values into evaluation points is not linear. In particular, the relationship between the two values flattens at the top. The providers Telekom, 1&1 and O2/Telefónica, which are strongly focussed on DSL, therefore reach the “limiter“ earlier than Vodafone. The increase shown by Vodafone disproves to some extent the established view that broadband cable is at a disadvantage in the uplink. Thanks to the gigabit cable network, the Düsseldorf-based company was already clearly ahead in the downlink (top row of bars).

Nationwide

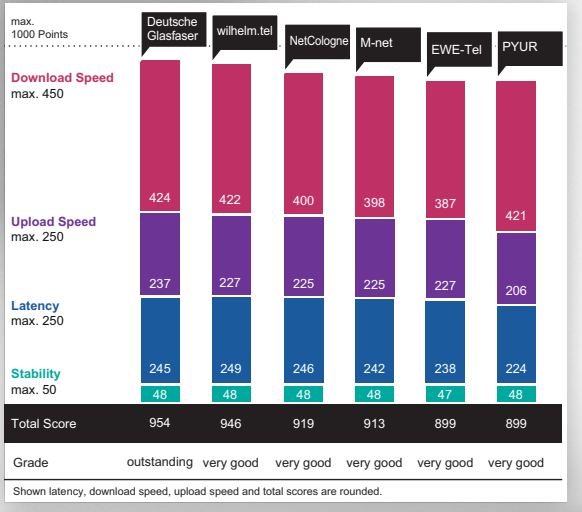


Shown latency, download speed, upload speed and total scores are rounded.

Overall Results	max.	Deutsche Telekom	Vodafone	1&1/ Versatel	O2 Telefónica
Download Speed	450	406	421	391	391
Upload Speed	250	225	220	223	224
Latency	250	242	218	238	221
Stability	50	47	47	48	48
Total	1000P.	920	906	900	884

The numerical values shown are rounded. The exact, non-rounded values were used for the calculation of points and totals.

Regional



Shown latency, download speed, upload speed and total scores are rounded.

Overall Results	max.	Deutsche Glasfaser	wilhelm.tel	Net Cologne	M-net	EWE-Tel	PYUR
Download Speed	450	424	422	400	398	387	421
Upload Speed	250	237	227	225	225	227	206
Latency	250	245	249	246	242	238	224
Stability	50	48	48	48	48	47	48
Total	1000P.	954	946	919	913	899	899

The numerical values shown are rounded. The exact, non-rounded values were used for the calculation of points and totals.

Hannes Rügheimer
connect
author

This is the second year in which we have used the crowdsourcing-based methodology developed by umlaut for our Broadband and Fixed-line Network Test. This allows us not only to evaluate the performance that is actually received by a large number of customers of the individual providers – but also to shed light on the development of the operators compared to their results in the previous year. With significant improvements compared to last year's score, Telekom once again came out on top among the nationwide providers – congratulations!

But Vodafone and 1&1 also improved their results compared to the previous year – which speaks for continuous network upgrades. O2/Telefónica was able to maintain its very good result from the previous year and was particularly convincing in terms of reliability, i.e. basic services. This is also in line with the positioning the Munich-based company presents itself with on the marketplace.

In our regional ranking, Deutsche Glasfaser is the clear winner this time – wherever it offers its fiber lines, it impresses with high data rates and high stability.The Hamburg-based provider Wilhelm.tel also achieved a high score and only just missed out on our rare rating of "outstanding". The results of the two regional champions NetCologne and M-net rank in the very good midfield – they also show that a growing proportion of fiber is conducive to the good overall result.

EWE Tel and Pÿur are tied at the bottom of the regional ranking.These two providers have improved considerably compared to their previous year's scores, although their test results show further potential for improvement.