connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

For the eleventh time, we – umlaut and connect – have conducted our comprehensive benchmark of the UK's mobile networks. This year, the results show a very good winner, and three contenders achieving the grade good – albeit with distinct gaps between them.

The carefully designed methodology of our 2026 benchmark in the United Kingdom represents a holistic approach to network benchmarking. It combines drive tests and walk tests for executing detailed voice and data measurements under controlled circumstances combined with a sophisticated crowdsourcing methodology. The drive tests and walk tests allow for the maximum capabilities of the networks to be evaluated. crowdsourcing provides profound insights into the overall coverage of voice, data and 5G services as well as realworld User Download Speeds and Latencies. We have thoroughly weighed these components in order to give a realistic and conclusive assessment of the rated networks' true potential and performance.

Scope

The 2026 umlaut connect Mobile Network Test in the UK consists of drive tests and walk tests conducted from October 27th to November 8th, 2025. Four drive test cars together covered approx. 10,170 kilometres, visiting 16 cities and 24 smaller towns. Additionally, two walk test teams visited ten cities and travelled on trains between them as well as to more remote destinations. The test areas account for 16.7 million people, or approx. 24.9 percent of the total population of the UK. In addition, the results of extensive crowdsourcing analyses, considering 24 weeks from end of May (calendar week 22) to early November 2025 (CW 45) are included in the score. Our detailed methodology is described on pages 12/13.

DRIVE TEST AND WALK TEST FACTS

16.7 million people covered	**10,170** km drive test	**264,016** data samples	**29,611** voice samples

CROWDSOURCING FACTS

5,702 million samples	**24** weeks (end of May to early November 2025)	**99.7%** of built-up area covered	**99.9%** of population covered

The UK Mobile Operators

Following the merger of Virgin Media and O2 in June 2021, the joint operator started moving all former Virgin Media mobile customers to O2 in early 2023. Currently counting 46.6 million mobile connections (including MVNOs etc.), VMO2 is the largest mobile network operator in the UK.
Formerly a subsidiary of British Telecom, O2 plc was purchased by the Spanish telecommunications company Telefónica in 2006. In 2021, O2 entered a 50:50 joint venture with Liberty Global, combining Liberty's brand Virgin Media and O2. The joint company also owns half of the mobile virtual network operator Tesco Mobile which operates on the VMO2 network in the UK.
The operator claims to cover approx. 99 percent of the UK population with 4G and states a 5G outdoor coverage of over 70 percent of the population. The company plans to cover all populated areas of the UK with 5G by the end of 2030. At the end of 2025, Virgin Media O2's 5G Standalone network is available in over 500 towns and cities across the UK. ■

Since 2016, EE has been a part of BT Group. With approximately 26 million customers, it was the second largest mobile network operator in the UK until the merger of Vodafone and Three (see right-hand columns).
13.9 million of its mobile customers are 5G-ready.
EE started offering its 4G service in 2012. Today, the operator reports 4G coverage of more than 99% of the UK population and over 90% of its geography. EE's 5G network has a population coverage of about 89%.
Its 5G standalone network (5GSA or „5G+") has been deployed sind September 2024 and is at the time of writing available to over 44 million people, equivalent to 66% of the UK population. In addition, further network improvements such as Advanced RAN Coordination (ARC) are targeted deliver faster speeds to its customers.
EE has stated the goal of achieving 99% 5G standalone coverage for the UK population by 2030. ■

Vodafone UK was part of the international Vodafone Group which is also headquartered in the UK. The Vodafone Group owns and operates networks in 15 countries, and is partnering with mobile networks in 26 further countries.
Vodafone UK launched 4G/LTE in 2013. Reporting more than 18 million mobile subscribers in 2025, Vodafone is the third largest mobile network in the UK. Vodafone UK claims to cover more than 99 percent of the UK population with 4G/LTE offering up to 1 Gbps and approx. 60 percent of the population with 5G.
In 2023, Vodafone UK started to offer "5G Ultra" – 5G with over 1 Gbps, based on 5G carrier aggregation – in a growing number of locations, including but not limited to London, Manchester, Glasgow, and Cardiff. ■

Three UK was a subsidiary of CK Hutchison and launched its mobile service in the UK in 2003. As a relatively young operator Three started as a 3G-only network supplemented by 2G via national roaming. In December 2013, Three began to roll out its 4G/LTE service and expanded it rapidly all over the UK. With 10.4 million customers at the end of 2024, Three was the smallest mobile network operator in the UK. The company reported a 4G coverage of 99 percent and a 5G coverage of 62 percent of the UK population. The operator also claims to offer more spectrum for its 5G service than any other UK network operator. Three UK reports that all of its 5G services are provided on the so-called C-band (i.e. around 3.6 GHz). ■

In June 2023, Three and Vodafone announced that they would initiate a merger in order "to create one of Europe's leading 5G networks". This merger was finalized in May 2025 in economic terms. The new company "VodafoneThree" is a joint venture with Vodafone holding 51% and CK Hutchison (Three's parent company) holding 49%. VodafoneThree announced to invest £11 billion over the next 10 years. The new entity counts over 28 million subscribers which makes it the second largest mobile network in the UK.
However, at the time of testing, the two networks still operated separately with the technical integration still pending. So in the 2026 Mobile Network Test in the UK, we still treat Vodafone and Three as two separate networks. ■

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut Part of Accenture

Results at a Glance

For the eleventh time in a row, the BT brand is the winner (in 2016 together with Vodafone). EE achieves the grade "very good" and scores an impressive 112 point ahead of the second-ranking operator. EE's lead is manifested in all three test categories, voice, data and crowdsourcing. Compared to the previous year, EE managed to improve its score by seven points. The operator is also making good progress in its 5G roll-out.

Vodafone achieves a good second place and receives the overall grade "good", basically maintaing its performance from our previous year's test. The operator scores on a par with EE in the voice evaluation determined in the walk tests in cities and achieves also convincing results in the overall voice and data disciplines tested in the larger cities. In its 5G roll-out, Vodafone also shows good progress.

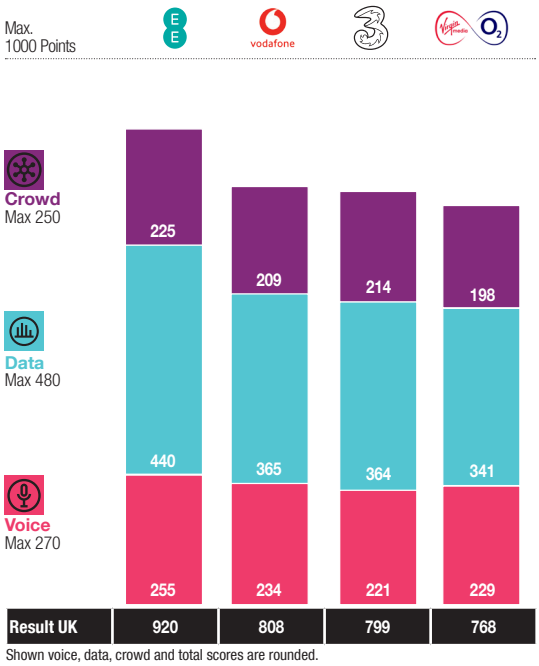
Three achieves a good third rank, reaching the grade "good" and scoring only nine points behind the second-placed operator. Compared to last year's performance, Three manages to improve by an impressive 34 points. In the data discipline, Three scores only one point behind second-ranking Vodafone, and in the crowdsourcing it even achieves the second highest score of all operators. Three also shows relatively high 5G shares.

The combined brand ranks fourth with the overall grade "good". In comparison to its score from our previous year's test, VMO2 improves by 39 points which is the highest improvement in all countires in our current benchmarking season so far. The considerable improvement can also be seen in London. In the voice category, VMO2 scores ahead of third-ranking Three. The operator also shows relatively high 5G shares in cities and on railways.

umlaut Part of Accenture connect
BEST IN TEST
EE
12/2025
MOBILE NETWORK TEST
UNITED KINGDOM
www.connect-testlab.com

Overall results		UK			
Voice, Data and Crowd		**EE**	**Vodafone**	**Three**	**VMO2**
VOICE	max. 270 Points	255	234	221	229
Cities Drive test	121,50 P.	97%	90%	85%	88%
Cities Walk test	40,50 P.	97%	97%	87%	95%
Towns Drive test	54,00 P.	96%	79%	81%	79%
Roads Drive test	33,75 P.	91%	85%	78%	86%
Railways Walk test	20,25 P.	74%	67%	61%	60%
DATA	max. 480 Points	440	365	364	341
Cities Drive test	216,00 P.	93%	82%	81%	81%
Cities Walk test	72,00 P.	96%	72%	74%	75%
Towns Drive test	96,00 P.	90%	72%	75%	56%
Roads Drive test	60,00 P.	91%	78%	72%	69%
Railways Walk test	36,00 P.	81%	56%	60%	46%
CROWD	max 250 Points	225	209	214	198
Crowd	250,00 P.	90%	84%	86%	79%
connect	Rating max. 1000 Points	920 very good	808 good	799 good	768 good

All values rounded to whole numbers. Points and percentages were calculated internally to three decimal places. Interim results may therefore differ slightly from the values given.



Shown voice, data, crowd and total scores are rounded.

"Congratulations to British Telecom for its brand EE winning our Mobile Network Test in the UK for the eleventh time in a row, achieving the highest scores in all test disciplines and scoring at a gap of more than 100 points ahead of the other operators. Vodafone achieves a good second place. Three manages to clearly improve compared to its result from the previous year. The biggest score improvement, achieved up to now in our current benchmarking season, is however obtained by VMO2 – nationwide, and also in London."

Maziar Kianzad, Global Network Benchmarking Lead umlaut

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

Voice

CITIES DRIVE TEST
EE

EE LEADS IN BIG CITIES VOICE DRIVE TESTS, VODAFONE AND VMO2 FOLLOW AT SOME DISTANCE

In the voice tests conducted by umlaut's test cars while driving in the UK's big cities, EE takes the overall lead. Vodafone and VMO2 follow at a distance of seven (or nine, respectively) percentage points behind EE, with a gap of two percentage points between each other. Three follows on fourth place with a gap of three percentage points behind VMO2. As in the other scenarios, EE maintains its lead with particularly short call times and slightly higher success ratios.

CITIES WALK TEST
EE AND VODAFONE

EE AND VODAFONE TOGETHER AHEAD IN BIG CITIES VOICE WALK TESTS, VMO2 FOLLOWS CLOSE BEHIND

In the walk tests, conducted in Belfast, Birmingham, Bristol, Cardiff, Edinburgh, Glasgow, Leeds, Liverpool, London and Manchester, EE and Vodafone share the top position, with VMO2 following at a narrow gap. Three also achieves a very good score. In terms of success ratios, Vodafone is slightly ahead of overall winner EE, call setup times and speech quality are on the same high level as in the drive test or even better.

TOWNS DRIVE TEST
EE

EE AHEAD IN SMALLER TOWN VOICE DRIVE TESTS, FOLLOWED BY THREE

In the voice tests conducted by umlaut's test cars while visiting 24 smaller towns of the UK (see route map on page 1), EE takes the lead. Three follows on second place, two percentage points ahead of Vodafone and VMO2, who score on a par in this scenario. The KPIs of EE are almost at the same level than in the larger cities, while those of the other contenders fall a little behind.

ROADS DRIVE TEST
EE

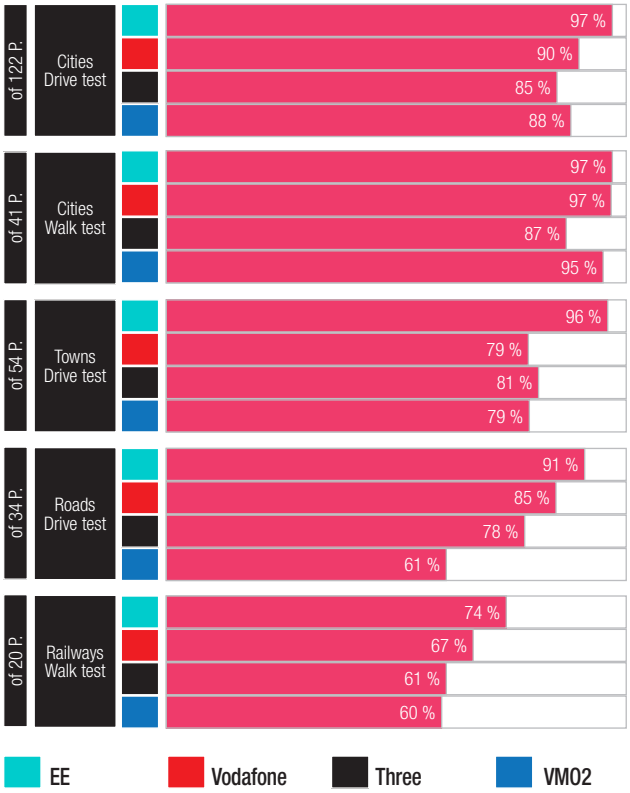
EE AHEAD IN VOICE TESTS ON ROADS, FOLLOWED BY VODAFONE AND THEN THREE

When it comes to the results of the voice tests performed while driving on British roads, EE again takes the lead with the highest success ratios, the shortest call setup times and the highest speech quality. Vodafone follows at a distinct gap. Three and even more pronounced VMO2 fall behind the other operators and rank third and fourth. All in all, British drivers must expect some limitations in terms of mobile telephony on the roads, particularly in the networks of Three and VMO2.

RAILWAYS WALK TEST
EE

EE AHEAD IN VOICE TESTS ON RAILWAYS

In the voice tests performed by the test teams while travelling in trains through the UK, all operators fall clearly behind their scores in the other scenarios. EE still manages to achieve relatively good results, while the other operators fall behind significantly. Three and VMO2 perform lowest and rank relatively close to each other. Voice telephony on railways is clearly an area where all four UK operators show some need for improvements.



Voice (Telephony)				
Operator	**EE**	**Voda-fone**	**Three**	**VMO2**
VOICE CITIES (DRIVE TEST)				
Success Ratio (%)	99.7	99.1	98.2	98.7
Call Setup Time 10% faster than (P90, s)	1.5	2.7	1.8	1.6
Speech Quality 90% better than (P10, MOS-LQO)	4.5	4.4	4.4	4.4
VOICE CITIES (WALK TEST)				
Success Ratio (%)	99.7	99.9	98.5	99.5
Call Setup Time 10% faster than (P90, s)	1.4	2.6	1.6	1.5
Speech Quality 90% better than (P10, MOS-LQO)	4.6	4.6	4.5	4.6
VOICE TOWNS (DRIVE TEST)				
Success Ratio (%)	99.7	97.8	97.8	97.5
Call Setup Time 10% faster than (P90, s)	1.5	3.0	1.8	1.7
Speech Quality 90% better than (P10, MOS-LQO)	4.5	4.3	4.3	4.3
VOICE ROADS (DRIVE TEST)				
Success Ratio (%)	98.2	97.6	95.4	97.1
Call Setup Time 10% faster than (P90, s)	1.6	3.2	1.9	2.0
Speech Quality 90% better than (P10, MOS-LQO)	4.3	4.2	4.1	4.2
VOICE RAILWAYS (WALK TEST)				
Success Ratio (%)	92.2	90.5	87.9	87.7
Call Setup Time 10% faster than (P90, s)	1.7	3.2	1.8	2.2
Speech Quality 90% better than (P10, MOS-LQO)	4.2	4.1	4.2	4.0

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut Part of Accenture

Data

CITIES DRIVETEST

EE

EE AHEAD IN BIG CITIES DATA DRIVETESTS

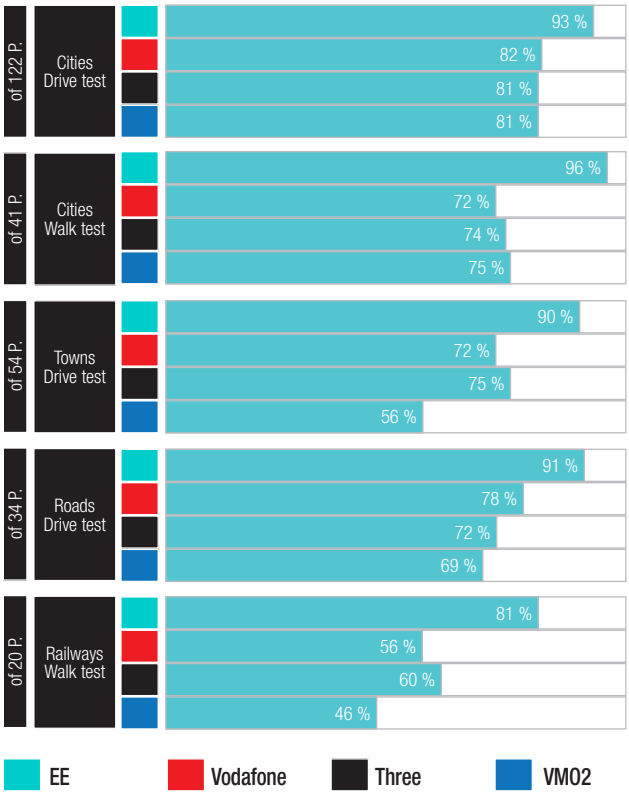
In the data drivetests conducted in big UK cities, EE clearly takes the lead. The rest of the field follows almost equally strong at some distance – with Vodafone one percentage point ahead of Three and VMO2, who score on a par. In a more detailed analysis, EE benefits from using LTE-5CA (aggregation of five carrier frequencies), which this operator utilizes above 50 percent in the cities together with 5GNR-2CA. The latter (5GNR on two aggregated frequencies), however, is used by all four UK operators in all tested scenarios.

CITIES WALKTEST

EE

EE ALSO LEADS IN BIG CITIES DATA WALKTESTS, VMO2 COMES IN SECOND AND THREE THIRD

In the data walktests conducted in the UK's bigger cities, EE also ranks first with a considerable lead ahead of the other three operators. However, VMO2 ranks second in this scenario, one percentage point ahead of the third-ranking Three. Vodafone follows on fourth place at a small gap of two percentage points behind Three. All in all, VMO2 ,Three and Vodafone perform close together in this scenario, but the advance of EE is even more pronounced than in the big city drivetests. It becomes evident in almost all considered KPIs, particularly in the data rates of the file downloads, but also in the Youtube playbacks and that in most of the success ratios of the individual test points.



Data (Cities; Drive test)				
Operator	**EE**	**Vodafone**	**Three**	**VMO2**
WEB PAGE DOWNLOAD				
Success Ratio / Avg. Session Time (%/s)	99.9/1.2	99.4/1.7	98.8/1.3	99.0/1.4
FILE DOWNLOAD (10MB)				
Success Ratio/Avg. Session Time (%/s)	99.9/1.2	99.5/2.4	99.8/3.0	99.8/2.9
90%/10% faster than (Mbit/s)	45.4/243.2	18.2/179.9	13.7/310.1	12.7/208.9
FILE UPLOAD (5MB)				
Success Ratio/Avg. Session Time (%/s)	99.8/3.1	99.7/4.7	99.7/4.4	99.2/6.1
90%/10% faster than (Mbit/s)	6.4/51.5	3.7/50.2	3.9/69.7	2.9/36.8
FILE DOWNLOAD (7 SECONDS)				
Success Ratio (%)	99.7	98.9	99.4	99.3
10% faster than (Mbit/s)	622.1	455.1	573.9	307.6
Speed > 20Mbit/s / 100Mbit/s (%)	98.2/82.9	90.7/67.2	88.4/55.9	90.3/63.6
FILE UPLOAD (7 SECONDS)				
Success Ratio (%)	99.9	99.0	99.3	98.9
10% faster than (Mbit/s)	69.9	71.7	105.4	60.8
Speed > 2Mbit/s / 5Mbit/s (%)	98.4/95.1	97.5/91.2	96.8/89.5	97.0/88.9
YOUTUBE VIDEO				
Success Ratio/Start Time (%/s)	99.7/1.7	98.2/2.5	97.3/2.0	97.7/2.1
Average Video Resolution (p)	1080	1079	1079	1080
YOUTUBE LIVE				
Success Ratio/Start Time (%/s)	99.4/2.3	97.3/2.9	96.4/2.6	97.3/2.7
Average Video Resolution (p)	1079	1075	1073	1075
CONVERSATIONAL APP				
Success Ratio / Speech Quality P10 (%/MOS-LQO)	99.9/3.9	99.6/3.6	99.5/3.5	99.0/3.6
INTERACTIVITY E-GAMING				
Success Ratio / Interactivity E-Gaming (%)	97.5/79.4	90.1/68.8	90.5/71.1	91.6/74.4
INTERACTIVITY VIDEO CHAT				
Success Ratio / Interactivity Videochat (%)	95.2/86.9	88.5/83.9	85.6/83.0	90.0/85.9

Data (Cities; Walk test)				
Operator	**EE**	**Vodafone**	**Three**	**VMO2**
WEB PAGE DOWNLOAD				
Success Ratio / Avg. Session Time (%/s)	99.9/1.2	98.6/2.0	98.5/1.5	98.8/1.5
FILE DOWNLOAD (10MB)				
Success Ratio/Avg. Session Time (%/s)	100.0/1.2	99.5/4.1	99.2/4.2	100.0/4.1
90%/10% faster than (Mbit/s)	40.2/229.9	8.9/138.1	10.3/273.0	8.3/178.9
FILE UPLOAD (5MB)				
Success Ratio/Avg. Session Time (%/s)	100.0/2.5	99.1/5.3	98.5/5.2	97.7/6.6
90%/10% faster than (Mbit/s)	9.6/52.6	3.4/45.3	2.9/57.1	3.0/36.2
FILE DOWNLOAD (7 SECONDS)				
Success Ratio (%)	100.0	98.9	98.6	98.5
10% faster than (Mbit/s)	544.4	327.4	467.5	237.5
Speed > 20Mbit/s / 100Mbit/s (%)	99.0/79.9	83.6/51.1	81.6/48.5	86.8/49.4
FILE UPLOAD (7 SECONDS)				
Success Ratio (%)	100.0	99.4	98.3	97.9
10% faster than (Mbit/s)	74.8	63.5	82.4	49.2
Speed > 2Mbit/s / 5Mbit/s (%)	99.7/98.7	97.3/91.0	94.7/88.2	95.3/86.0
YOUTUBE VIDEO				
Success Ratio/Start Time (%/s)	99.9/1.7	95.2/2.7	96.7/2.2	97.4/2.2
Average Video Resolution (p)	1080	1078	1075	1074
YOUTUBE LIVE				
Success Ratio/Start Time (%/s)	99.4/2.2	92.3/3.2	95.1/2.8	94.8/2.8
Average Video Resolution (p)	1080	1073	1071	1075
CONVERSATIONAL APP				
Success Ratio / Speech Quality P10 (%/MOS-LQO)	100.0/4.1	99.9/3.7	99.9/3.8	99.4/4.0
INTERACTIVITY E-GAMING				
Success Ratio / Interactivity E-Gaming (%)	99.3/80.3	84.8/62.6	87.9/68.7	90.2/69.7
INTERACTIVITY VIDEO CHAT				
Success Ratio / Interactivity Videochat (%)	98.7/89.3	84.8/81.4	85.2/83.0	88.9/84.8

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

Data

TOWNS DRIVETEST

EE

EE LEADS IN DATA DRIVE TESTS IN TOWNS. THREE COMES IN SECOND, VODAFONE FOLLOWS AT A SMALL GAP

As in the big cities, EE also leads in the data drive tests performed in 24 smaller towns of the UK. Three comes in second, clearly behind EE, but three percentage points ahead of Vodafone. VMO2 falls behind at a pronounced gap, but maintaining its performance in this category from the previous year. This ranking can be observed in a number of KPIs, but particularly clear in the data rates of file downloads.

ROADS DRIVETEST

EE

EE AHEAD IN DATA DRIVETESTS ON THE UK'S ROADS, FOLLOWED BY VODAFONE, THREE AND VMO2 IN THIS RANKING ORDER

The data measurements performed by umlaut's test cars on the UK's roads are of particular interest for motorists. In this category, we see the same ranking order as in the overall result: EE once again leads the field. Vodafone follows on second place, with Three coming in third and VMO2 fourth. Most of the KPIs follow this order as well.

Photo: William Perugini - shutterstock

Data (Towns; Drive test)				
Operator	**EE**	**Vodafone**	**Three**	**VMO2**
WEB PAGE DOWNLOAD				
Success Ratio / Avg. Session Time (%/s)	99.9/1.3	98.4/1.8	98.7/1.5	97.1/1.9
FILE DOWNLOAD (10MB)				
Success Ratio/Avg. Session Time (%/s)	100.0/2.1	99.2/5.1	99.8/3.9	99.0/6.8
90%/10% faster than (Mbit/s)	22.4/198.2	7.1/138.1	9.4/248.4	4.7/168.5
FILE UPLOAD (5MB)				
Success Ratio/Avg. Session Time (%/s)	100.0/4.9	99.7/5.4	99.0/7.1	96.4/9.2
90%/10% faster than (Mbit/s)	3.7/44.2	3.5/37.4	2.6/40.3	1.5/30.1
FILE DOWNLOAD (7 SECONDS)				
Success Ratio (%)	100.0	98.7	98.9	96.6
10% faster than (Mbit/s)	461.4	271.7	419.1	224.2
Speed > 20Mbit/s / 100Mbit/s (%)	93.7/54.5	70.3/24.4	83.3/38.1	66.5/34.9
FILE UPLOAD (7 SECONDS)				
Success Ratio (%)	99.7	98.5	98.3	96.8
10% faster than (Mbit/s)	63.6	56.8	54.8	40.4
Speed > 2Mbit/s / 5Mbit/s (%)	97.6/90.5	95.6/85.3	93.6/79.9	93.1/78.0
YOUTUBE VIDEO				
Success Ratio/Start Time (%/s)	100.0/1.9	96.5/2.6	97.1/2.2	93.7/2.5
Average Video Resolution (p)	1080	1077	1078	1076
YOUTUBE LIVE				
Success Ratio/Start Time (%/s)	99.8/2.5	95.8/3.2	97.1/2.8	89.4/3.4
Average Video Resolution (p)	1079	1069	1074	1064
CONVERSATIONAL APP				
Success Ratio / Speech Quality P10 (%/MOS-LQO)	99.6/3.8	98.6/3.8	99.2/3.4	97.3/3.4
INTERACTIVITY E-GAMING				
Success Ratio / Interactivity E-Gaming (%)	95.4/74.6	90.9/61.3	89.9/62.6	83.4/65.2
INTERACTIVITY VIDEO CHAT				
Success Ratio / Interactivity Videochat (%)	92.9/83.0	86.6/81.3	84.3/81.1	84.1/81.7

Data (Roads; Drive test)				
Operator	**EE**	**Vodafone**	**Three**	**VMO2**
WEB PAGE DOWNLOAD				
Success Ratio / Avg. Session Time (%/s)	99.6/1.4	97.8/1.8	97.9/1.8	96.3/1.9
FILE DOWNLOAD (10MB)				
Success Ratio/Avg. Session Time (%/s)	100.0/2.5	99.6/5.7	99.6/6.8	98.0/8.4
90%/10% faster than (Mbit/s)	18.4/143.8	6.2/122.9	4.5/123.6	4.1/90.7
FILE UPLOAD (5MB)				
Success Ratio/Avg. Session Time (%/s)	99.3/6.4	98.5/6.0	97.0/8.4	98.3/6.6
90%/10% faster than (Mbit/s)	2.4/43.8	3.7/29.6	1.9/39.3	2.8/33.4
FILE DOWNLOAD (7 SECONDS)				
Success Ratio (%)	99.5	96.9	97.4	96.0
10% faster than (Mbit/s)	209.7	224.6	163.7	113.2
Speed > 20Mbit/s / 100Mbit/s (%)	92.9/31.5	61.9/21.4	72.4/21.0	53.8/12.2
FILE UPLOAD (7 SECONDS)				
Success Ratio (%)	99.8	98.9	96.2	97.6
10% faster than (Mbit/s)	52.3	46.2	55.8	37.6
Speed > 2Mbit/s / 5Mbit/s (%)	97.4/91.7	94.9/87.2	90.8/76.8	94.5/83.6
YOUTUBE VIDEO				
Success Ratio/Start Time (%/s)	99.1/2.0	97.0/2.6	95.3/2.4	92.8/2.6
Average Video Resolution (p)	1080	1077	1077	1076
YOUTUBE LIVE				
Success Ratio/Start Time (%/s)	98.9/2.6	94.0/3.2	92.9/3.2	89.9/3.4
Average Video Resolution (p)	1079	1066	1067	1062
CONVERSATIONAL APP				
Success Ratio / Speech Quality P10 (%/MOS-LQO)	99.6/3.6	98.7/3.5	99.2/3.2	97.8/3.3
INTERACTIVITY E-GAMING				
Success Ratio / Interactivity E-Gaming (%)	95.4/70.2	89.3/62.8	84.9/56.7	87.4/61.9
INTERACTIVITY VIDEO CHAT				
Success Ratio / Interactivity Videochat (%)	93.3/81.5	86.4/83.9	77.4/78.6	85.0/83.8

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

Data

RAILWAYS WALKTEST

EE

EE AHEAD IN RAILWAYS DATA TESTS. THREE TAKES SECOND PLACE AND VODAFONE THIRD

In the walktests that were specifically conducted on British trains, all operators show some room for improvements. But EE is still ahead in this assessment. Three comes in second, at a distinct gap to EE, but showing the biggest score improvement compared to its result from the previous year. Vodafone follows on third rank at a score gap of four percentage points to Three. VMO2 achieves the least points in this scenario. Overall, data connectivity on the tested trains is still limited, with the only exception of EE's network.

Photo: Peteri - shutterstock

Data (Railways; Walk test)				
Operator	**EE**	**Vodafone**	**Three**	**VMO2**
WEB PAGE DOWNLOAD				
Success Ratio / Avg. Session Time (%/s)	97.6/1.7	91.6/2.4	92.9/1.9	86.5/2.3
FILE DOWNLOAD (10MB)				
Success Ratio/Avg. Session Time (%/s)	99.8/4.2	96.9/8.6	98.9/7.7	96.4/9.8
90%/10% faster than (Mbit/s)	9.4/197.8	3.4/140.8	3.9/238.1	3.1/160.6
FILE UPLOAD (5MB)				
Success Ratio/Avg. Session Time (%/s)	99.3/7.5	95.2/11.4	93.6/11.9	90.3/14.4
90%/10% faster than (Mbit/s)	2.2/40.0	1.5/32.2	1.2/44.4	0.9/25.8
FILE DOWNLOAD (7 SECONDS)				
Success Ratio (%)	97.6	90.4	95.6	86.3
10% faster than (Mbit/s)	427.8	287.4	360.3	232.4
Speed > 20Mbit/s / 100Mbit/s (%)	82.8/46.2	59.5/29.0	70.8/35.4	59.3/33.0
FILE UPLOAD (7 SECONDS)				
Success Ratio (%)	98.1	94.3	92.5	89.9
10% faster than (Mbit/s)	51.5	45.7	53.4	33.4
Speed > 2Mbit/s / 5Mbit/s (%)	95.9/88.3	91.3/70.8	82.3/65.7	84.0/66.2
YOUTUBE VIDEO				
Success Ratio/Start Time (%/s)	95.0/2.3	84.6/3.0	85.6/2.6	74.5/2.9
Average Video Resolution (p)	1079	1066	1075	1071
YOUTUBE LIVE				
Success Ratio/Start Time (%/s)	91.2/2.7	77.3/3.7	85.0/3.2	67.4/3.5
Average Video Resolution (p)	1072	1054	1063	1050
CONVERSATIONAL APP				
Success Ratio / Speech Quality P10 (%/MOS-LQO)	98.1/3.4	96.8/3.3	96.2/3.3	95.1/3.2
INTERACTIVITY E-GAMING				
Success Ratio / Interactivity E-Gaming (%)	83.3/68.7	70.6/58.9	71.2/58.8	63.9/62.8
INTERACTIVITY VIDEO CHAT				
Success Ratio / Interactivity Videochat (%)	82.7/80.7	66.5/78.8	64.5/78.7	64.9/79.9

5G

EE FASTEST IN CITIES AND RAILWAYS, VODAFONE DELIVERS HIGHEST 5G DATA RATES IN TOWNS AND ON ROADS, THREE OFTEN IN SECOND PLACE

5G is the standard setting in our measurements. But to shed light on the progress of the 5G roll-out, we look at the results of the KPI "Data rates of the 7 second Download tests". This gives a good indication of the data rates which are delivered by this technology. However, as this assessment does not consider other aspects such as 5G coverage or the latencies of 5G-only connections, we do not identify a separate 5G winner.

That said, in this assessment, EE shows the highest average 5G data rates in the cities and on the railways, while Vodafone takes the lead in towns and on roads. Three comes in second place behind the respective leader, except in the trains, where the ranking is EE – Vodafone – Three –VMO2. VMO2 takes the fourth place in all scenarios.

In the cities, all operators show a strong 5G penetration, with more than 80 percent of the tests carried out using 5G or 5G-DSS technology. EE makes most use of Dynamic Spectrum Sharing (DSS) in the countryside, while Vodafone employs it predominently in the cities. At VMO2, the DSS shares are overall low, and in Three's network only miniscule.

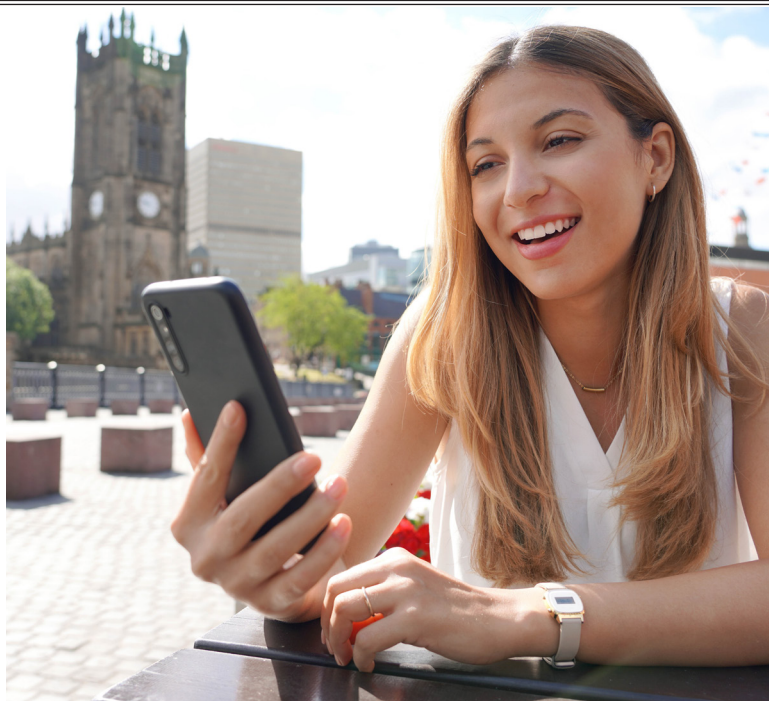
Data Rates 7s Download	EE			Vodafone			Three			VMO2		
Samples with 5G	Share	Ø (Mbps)	10% faster than (Mbps)	Share	Ø (Mbps)	10% faster than (Mbps)	Share	Ø (Mbps)	10% faster than (Mbps)	Share	Ø (Mbps)	10% faster than (Mbps)
Cities Drive test	81.8%	355.1	643.9	60.1%	267.9	513.3	79.6%	272.6	640.0	89.6%	168.0	318.4
Cities Walk test	80.1%	327.0	575.0	51.4%	198.0	375.1	76.6%	219.9	522.0	85.2%	126.1	249.6
Towns Drive test	68.1%	224.0	522.5	24.6%	254.8	531.2	57.6%	227.0	562.8	63.3%	131.2	272.7
Roads Drive test	60.3%	110.5	236.3	17.3%	250.2	487.3	41.5%	143.8	387.2	47.9%	66.1	166.9
Railways Walk test	61.0%	229.4	497.5	34.3%	207.1	434.1	61.1%	183.4	448.2	66.7%	112.6	266.5
Samples with 5G-DSS	Share	Ø (Mbps)	10% faster than (Mbps)	Share	Ø (Mbps)	10% faster than (Mbps)	Share	Ø (Mbps)	10% faster than (Mbps)	Share	Ø (Mbps)	10% faster than (Mbps)
Cities Drive test	6.7%	125.6	255.1	23.6%	180.0	372.4	0.6%	123.8	228.6	4.5%	124.1	270.3
Cities Walk test	1.6%	174.0	307.5	23.2%	126.4	257.8	0.3%	300.8	314.2	8.9%	92.5	180.8
Towns Drive test	17.2%	102.6	214.3	1.9%	116.0	273.8	0.3%	88.9	137.2	2.0%	70.1	167.8
Roads Drive test	15.1%	83.9	162.5	6.1%	111.4	232.6	0.2%	13.6	13.6	1.7%	13.4	23.3
Railways Walk test	18.2%	84.5	190.5	11.5%	103.7	269.0	–	–	–	2.8%	38.6	71.8

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

Crowd



BROADBAND COVERAGE

EE

EE LEADS IN BROADBAND COVERAGE, FOLLOWED BY THREE AND THEN VODAFONE

In the Coverage Quality assessment (see definitions on pages 13), EE is ahead, followed by Three and then Vodafone. In Coverage Reach, VMO2 is slightly ahead of EE, but this is made up for by EE in Time on Broadband. Here, Three ranks second, scoring behind EE but ahead of Vodafone and VMO2.

DOWNLOADS BY SPEED CLASSES

EE

EE LEADS IN DOWNLOAD ANALYSIS BY SPEED CLASSES, FOLLOWED BY THREE

In the analysis of download data rates by speed classes, EE again shows the best results. Here, Three follows on second place, Vodafone on third and VMO2 on fourth. This ranking order can be observed for all three speed classes, Basic Internet class (minimum of 2 Mbps), HD Video class (at least 5 Mbps) and the particularly demanding UHD Video class (at least 20 Mbps).

UPLOADS BY SPEED CLASSES

EE

EE AND VODAFONE ALMOST ON A PAR IN UPLOAD ANALYSIS BY SPEED CLASSES, BUT EE SLIGHTLY AHEAD

In the upload assessment by speed classes, Vodafone shows a slightly higher share in the Basic Internet class (minimum of 2 Mbps), but this is countered by EE in the more demanding HD Video class (at least 5 Mbps). Three ranks third and VMO2 fourth in this category.

DOWNLOADS BY DATA RATES

THREE

THREE SHOWS HIGHEST DATA RATES IN ACTIVE DOWNLOAD TESTS, FOLLOWED BY EE

In the category of download performance by data rates, Three achieves considerably higher average and P90 (10 percent of the measured values faster than) data rates, EE comes in second here. Vodafone follows on third rank and VMO2 on fourth. While we see some differences in the average data rates, the latter three contenders rank quite close together in the P90 values.

UPLOADS BY DATA RATES

EE

EE DELIVERS HIGHEST DATA RATES IN ACTIVE UPLOAD TESTS, FOLLOWED BY THREE AND VODAFONE

In the actively measured upload data rates, EE takes the lead again, showing the highest values in the average, P10 (90 percent faster than) and P90 (10 percent faster than) KPIs. Three achieves the second best results in the average and P90 assessments, while Vodafone ranks second and closely behind EE in the P10 KPI. VMO2 is on fourth place in all three assessments.

LATENCY

EE

EE PROVIDES SHORTEST LATENCIES, FOLLOWED BY THREE AND THEN VODAFONE

EE also shows the best results in the latency category. In the OTT Voice class (roundtrip times up to 100 ms) however, EE and Vodafone score on a par. Three shows the highest share of samples in the most demanding class, High End Gaming (up to 20 ms), but is outperformed by EE in the Gaming class (up to 50 ms). Overall, Vodafone ranks third in the latency category, and VMO2 fourth.

VOICE

EE

EE LEADS IN HD VOICE AVAILABILITY, THREE RANKS SECOND, FOLLOWED BY VODAFONE

In the analysis of the availability of HD voice connections (i.e. Voice over LTE), EE takes the first place. In this assessment, Three scores second best, relatively closely behind EE. Vodafone and then VMO2 follow at some distance.

STABILITY

EE

EE AHEAD IN CROWDSOURCED ASSESSMENT OF TRANSACTION STABILITY, FOLLOWED BY VODAFONE AND THEN THREE

In the Stability category, which looks at the success rates of regular transaction tests, the overall ranking is once more confirmed: EE takes the lead, while Vodafone, Three and VMO2 follow in this order. The gaps between EE and Vodafone as well as Three and VMO2 are distinct, while second-placed Vodafone and third-ranking Three score quite close together.

crowdsourcing				
Operator	**EE**	**Vodafone**	**Three**	**VMO2**
BROADBAND COVERAGE				
Coverage Reach (%)	97.1	96.1	94.9	97.4
Time on Broadband (%)	99.1	97.4	98.5	94.4
DOWNLOADS BY SPEED CLASSES (ACTIVE)				
Basic Internet Class (%)	97.4	96.8	97.0	96.1
HD Video Class / UHD Video Class (%)	91.5/71.9	87.3/59.0	89.5/66.9	85.5/54.9
UPLOADS BY SPEED CLASSES (ACTIVE)				
Basic Internet Class (%)	91.5	91.8	90.3	88.8
HD Video Class (%)	76.7	72.8	70.3	66.5
DOWNLOADS BY DATA RATES (ACTIVE)				
Avg. Throughput (Mbps)	80.4	63.4	108.7	58.1
90%/10% faster than (Mbps)	6.5/165.0	4.3/163.3	5.1/302.5	3.9/159.7
UPLOADS BY DATA RATES (ACTIVE)				
Avg. Throughput (Mbps)	21.1	15.2	18.3	12.7
90%/10% faster than (Mbps)	2.4/49.3	2.3/34.7	2.1/45.1	1.9/28.4
LATENCY				
Gaming Class / OTT Voice Class (%)	82.1/95.2	63.7/95.2	70.1/94.8	61.0/93.6
Highend Gaming Class (%)	6.8	0.4	7.3	2.0
VOICE				
HD Voice (%)	99.1	94.6	98.7	93.7
STABILITY				
Transaction Success (%)	95.1	93.5	93.1	90.8

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut Part of Accenture

Reliability

Reliability is not an additional category of our tests, but rather a diffent angle of looking at the results: For each KPI, our scoring distinguishes between "Qualifiers" (the expected basic performance) and "Differentiators" (the additional performance that exceeds the expected basics). The view at Reliability limits itself to most of the Qualifiers and to the basic KPIs of the crowdsourcing – thus conveying an impression of the standard performance a user can reasonably expect from a mobile network. The reference values in this representation are therefore only the subset of score points which we assigned to the Qualifiers. The resulting scores state the reliabiltiy with which an operator offers its network services. This approach concentrates on the compulsory basics instead of the highest peaks of a network's performance.

VOICE

EE

EE LEADS IN VOICE RELIABILITY, FOLLOWED BY VODAFONE AND THEN VMO2

In the overall assessment of the Reliability of voice connections, EE achieves the highest score, with Vodafone ranking second and VMO2 on third place. In this view, Three comes in fourth. In the voice results of the walktests, EE and Vodafone score on a par, otherwise the described ranking can be seen in both the drivetests as well as the walktests.

DATA

EE

EE LEADS IN DATA RELIABILITY. FOLLOWED BY VODAFONE AND THEN THREE

Looking at Reliability in the Data tests, EE also leads – based both on the results of the drive tests as well as on the results of the walk tests. The gap to the runners-up is distinct. The drivetest results show the overall ranking. In the walk-tests, EE also ranks first, but Three scores a little higher than Vodafone. VMO2 ranks fourth both in the drivetest and walktest results.

CROWD

EE

EE ALSO AHEAD IN CROWDSOUR-CING, FOLLOWED BY THREE, THEN VODAFONE AND THEN VMO2

In the crowdsourced Reliability KPIs, EE once more takes the lead with a clear distance ahead of the other contenders. Here, Three follows on second rank, one score point ahead of Vodafone. The fact that both achieve a fulfillment rate of 87 percent can be explained by rounding effects. VMO2 follows on fourth place at a distinct gap.

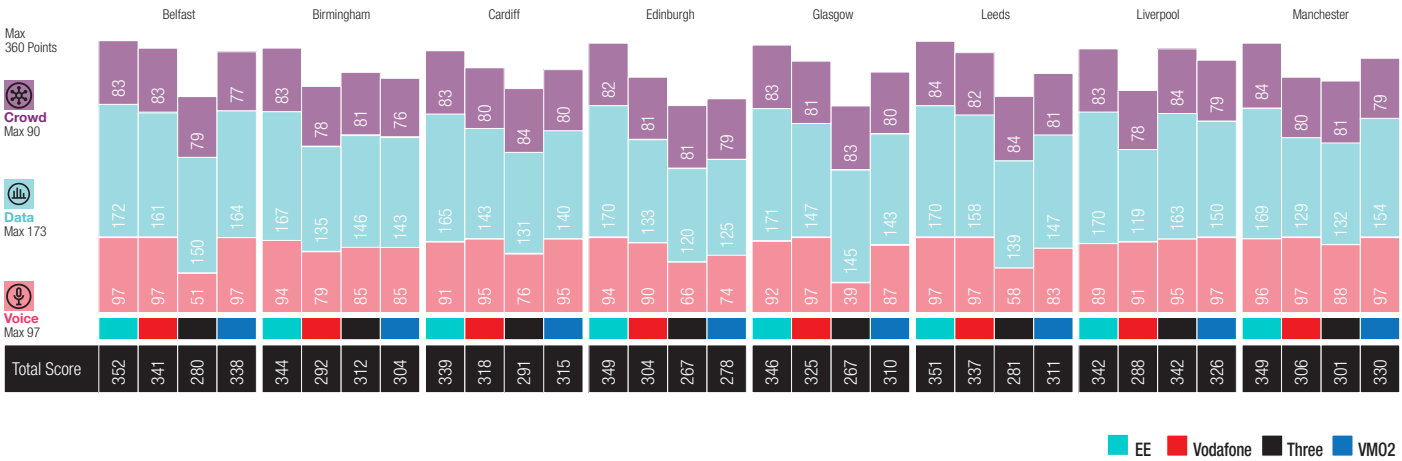
Reliability					
Operator		**EE**	**Vodafone**	**Three**	**VMO2**
VOICE	max. 162 Points	150	136	119	127
Drive test	126	95%	84%	75%	79%
Walk test	36	84%	84%	67%	75%
DATA	max. 288 Points	276	229	226	208
Drive test	223	96%	83%	81%	75%
Walk test	65	94%	67%	70%	65%
CROWD	max. 150 Points	135	130	131	121
Crowd	150	90%	87%	87%	81%
Sum	**600**	**561 very good**	**495 good**	**476 good**	**456 good**

All values rounded to whole numbers. Points and percentages were calculated internally to three decimal places. Interim results may therefore differ slightly from the values given.

RELIABILITY IN CITY SCORES

EE ALSO AHEAD IN THE RELIABILITY CITY SCORES – IN LIVERPOOL ON A PAR WITH THREE.

The Reliability Assessment of the UK's largest cities (also see page 13), basically confirms the overall results in these cities. EE maintains its strong lead, but has to share the top position with Three in Liverpool. Generally, the gaps to the runners-up skrink somewhat, due to the con-centration on basic performance. Vodafone shows strong results and achieves second place in Belfast, Cardiff, Edinburgh, Glasgow and Leeds. Three is co-winner in Liverpool and fights its way up to the second rank in Birmingham, relatively closely ahead of VMO2 there. VMO2 achieves the second rank in Manchester and ranks third ahead of Three in Belfast, Cardiff, Edinburgh, Glasgow and Leeds.



connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

City Score London

Traditionally, umlaut and connect take a closer look at London to see how the countries' mobile operators cover the UK's capital. This is not only of great interest for the approximately nine million inhabitants of this lively centre of business, politics and culture, but not least for the roughly 19 million visitors per year who frequent Londons' streets, squares and attractions. In this focused assessment, EE and Vodafone achieve the grade "very good", while Three and VMO2 achieve the grade "good".

VOICE
EE

IN THE VOICE SCORE FOR LONDON, EE IS AHEAD, VODAFONE FOLLOWS, WHILE THREE AND VMO2 SHARE THE THIRD PLACE
EE achieves the highest score in the voice category in London. Vodafone ranks second. Three and VMO2 achieve the same voice score in London and thus share the third place in this category.

DATA
EE

EE AHEAD IN DATA CATEGORY IN LONDON, VODAFONE COMES IN SECOND AND VMO2 THIRD AHEAD OF THREE
In the data category, the lead of EE is pronounced, and Vodafone follows on a strong second place. VMO2 comes in third and Three fourth in the data KPIs broken down to the London area.

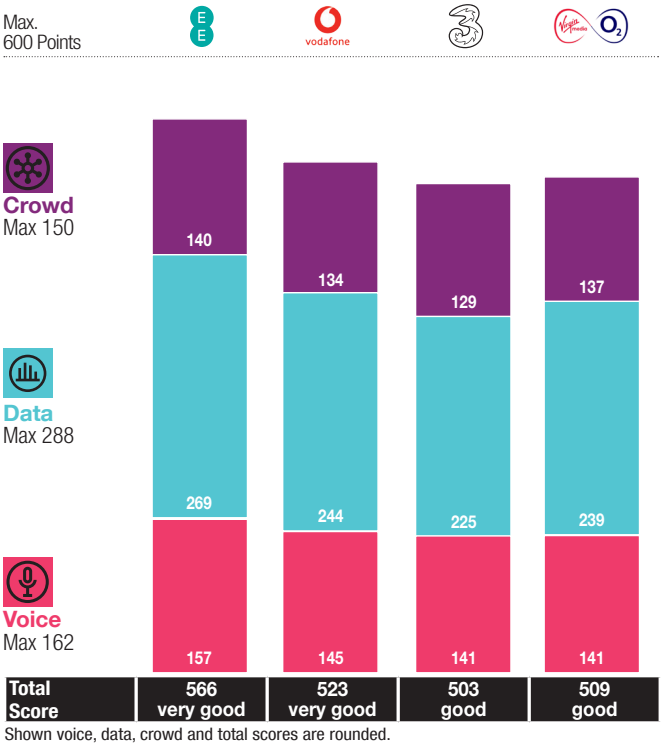
CROWD
EE

EE LEADS IN CROWD ASSESSMENT IN LONDON, FOLLOWED BY VMO2, THEN VODAFONE AND THEN THREE
In the crowdsourcing concentrated on the London city area, EE is also ahead. But in these analyses, VMO2 follows on a strong second place, with Vodafone relatively closely behind on third rank. Three follows on fouth rank.

RELIABILITY
EE

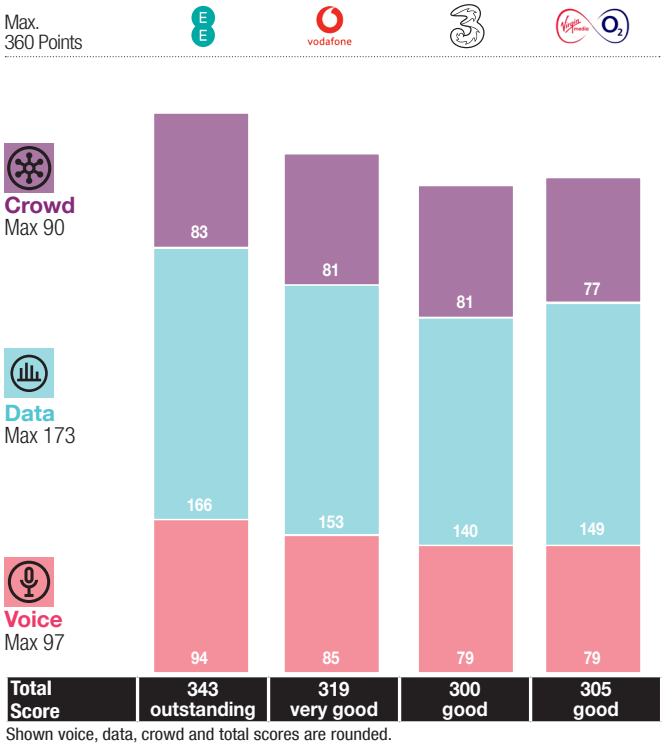
EE OUTSTANDING IN RELIABILITY ASSESSMENT FOR LONDON, VMO2 RANKS THIRD BEHIND VODAFONE, THREE FOURTH
In the view at only basic requirements EE also leads the field and even achieves the grade outstanding. Vodafone comes in second with a very good overall result. In the voice category, Three and VMO2 score on a par, while the same applies for Vodafone and VMO2 in the crowdsourcing.

CITY SCORE – LONDON



Shown voice, data, crowd and total scores are rounded.

CITY SCORE RELIABILITY – LONDON



Shown voice, data, crowd and total scores are rounded.

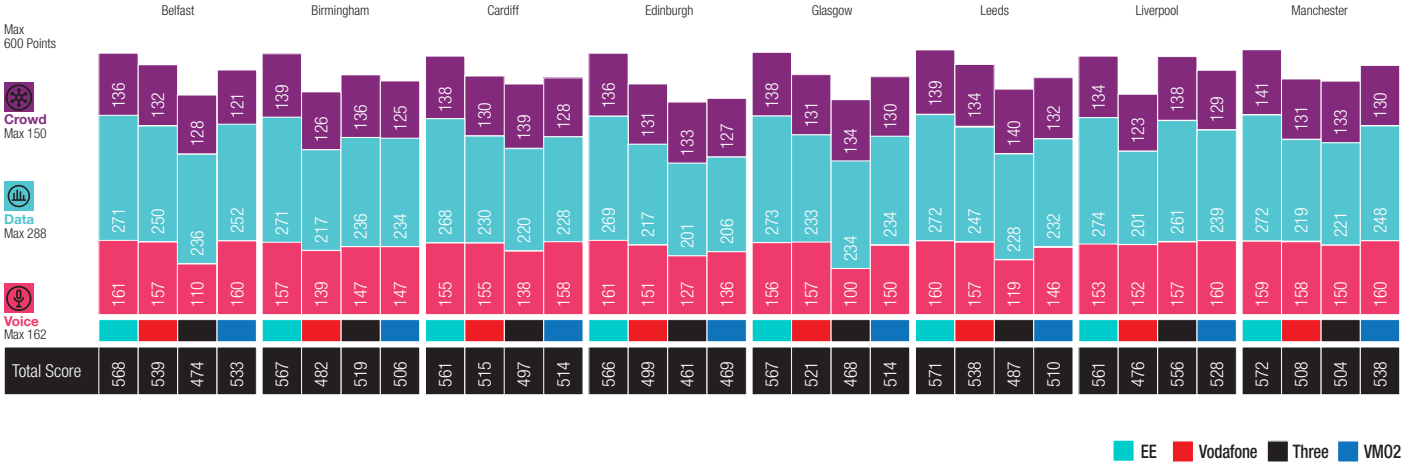
connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

The UK‘s Largest Cities

In addition to London, umlaut and connect also analyse the local performance in the eight other largest cities of the UK. After all, for their inhabitants and visitors it is also interesting to see how the different operators perform in their areas. With a maximum score of 600 points in this assessment, the grade “very good“ starts at 510 points, “good“ at 450 points and “outstanding“ at 570. Thus, EE achieves outstanding results in Manchester and Leeds, as well as very good results in the other six considered cities. Vodafone is “very good“ in Belfast, Cardiff, Glasgow, and Leeds, Three in Birmingham and Liverpool, and VMO2 in Belfast, Cardiff, Glasgow, Leeds, Liverpool and Manchester.



BELFAST

EE

EE LEADS IN BELFAST, VODAFONE RANKS SECOND, CLOSELY FOLLOWED BY VMO2, WHICH IS CLEARLY AHEAD OF THREE

In the capital of Northern Ireland, EE takes the lead due to strong results in all disciplines. Vodafone ranks second overall. However, VMO2 is only six score points behind Vodafone, showing slightly stronger voice and data scores but falling behind in the crowdsourcing. Three falls behind distincly, but achieves the third place in the crowdsourcing results.

BIRMINGHAM

EE

EE AHEAD IN BIRMINGHAM, FOLLOWED BY THREE AND THEN VMO2. VODAFONE A LITTLE FURTHER BEHIND HERE

In the West Midlands city, the lead of EE is undisputed – the BT brand achieves the highest scores in all three disciplines. However, here Three takes the second place due to particularly strong data and crowdsourcing scores. The third rank is achieved by VMO2 which scores on a par with Three in the voice category and is only two points behind in the data results. Vodafone ranks fourth, but is one point ahead of VMO2 in the crowdsourcing.

CARDIFF

EE

EE AHEAD IN CARDIFF, VODAFONE TAKES SECOND PLACE, WITH VMO2 JUST ONE POINT BEHIND

In the capital of Wales, EE takes the lead, and Vodafone takes second place. In the voice category, EE and Vodafone score equally strong. VMO2 scores only one point behind Vodafone overall and is three points stronger than the top duo in the voice assessment. Three holds up well and achieves the highest score of all four operators in the crowdsourcing.

EDINBURGH

EE

EE LEADS IN EDINBURGH, FOLLOWED BY VODAFONE. VMO2 RANKS THIRD HERE, AHEAD OF THREE

In the capital of Scotland, EE is ahead overall with the highest scores in all test disciplines. Vodafone ranks second with good data and crowdsourcing scores. VMO2 achieves third place. The fourth-ranking Three follows at a relatively close distance, showing a higher crowdsourcing score than Vodafone and VMO2.

GLASGOW

EE

EE LEADING IN GLASGOW, FOLLOWED BY VODAFONE AND THEN VMO2. THREE RANKS FOURTH

In the scottish lowland harbour city, the ranking is the same as in the capital of Scotland, but all four operators perform a little stronger here. EE ist clearly ahead, Vodafone ranks second with a higher voice score than EE. VMO2 follows on third place. Three ranks last with a particular opportunity for improvement in the voice discipline, but with the second highest crowdsourcing score.

LEEDS

EE

EE WINS IN LEEDS, VODAFONE RANKS SECOND, AND VMO2 THIRD, CLEARLY AHEAD OF THREE

In the Yorkshire city, EE leads the field and achieves an outstanding result, with Vodafone following on second rank. VMO2 comes in third and Three fourth. This ranking order is confirmed both in the voice as well as in the data category. In the crowdsourced assessment, however, Three takes the lead, scoring one point higher than EE and well ahead of Vodafone and VMO2.

LIVERPOOL

EE

EE LEEDS IN LIVERPOOL, AHEAD OF A STRONG THREE. VMO2 RANKS THIRD, AND VODAFONE FOURTH

In the northwest English city, EE once more takes the overall lead. But here, the second rank is achieved by Three that shows the second best voice and data results and the highest crowdsourcing score in this city. VMO2 leads the field in the voice assessment. Vodafone ranks fourth here with an opportunity for improvement particularly in the data category.

MANCHESTER

EE

EE IS AHEAD IN MANCHESTER, VMO2 TAKES SECOND PLACE AND VODAFONE THIRD. THREE CLOSELY BEHIND VODAFONE

In northwest Englands industrial center, EE even achieves an outstanding result in the city assessment, due to strong results in all categories and the highest scores in data and crowdsourcing. VMO2 ranks second and outperforms EE in voice by one point. Vodafone takes third place, but Three is almost equally strong at a score gap of overall four points.

connect

The 2026 Mobile Network Test in the United Kingdom

umlaut
Part of Accenture

Methodology

The umlaut connect Mobile Network Test is the result of extensive drivetests and walktests, combined with a sophisticated crowdsourcing analysis.

Logistics

connect's network test partner umlaut sent four measurement vehicles through the country, each equipped with twelve smartphones. For each network operator, a Samsung Galaxy S24 Ultra took the voice measurements, and another S24 Ultra established the connections for the test case "conversational app" (see section "Data connections" below). For the actual data test, we used a third Samsung Galaxy S24 Ultra per operator. For all measurements, the smartphones were set to "5G preferred" – so wherever supported by the network, the data tests took place via 5G.

In addition to the drive tests, two walk test teams carried out measurements on foot in each country, in zones with heavy public traffic such as railway station concourses, airport terminals, cafés, public transport and museums. The walk test programme also included journeys on long-distance railway lines. For the walk tests, the same three smartphone types were used per network operator for the same measurements as in the drive tests. The walk test teams transport the smartphones in backpacks or trolleys equipped with powerful batteries. The firmware of the test smartphones corresponded to the original network operator version in each case.

The drive and walk tests took place between 8 am and 10 pm. For the drive tests, two vehicles were in the same city, but not in the same place, so that one car would not falsify the measurements of the other. On the connecting roads, two vehicles each drove the same routes, but one after the other with some time and distance between them. For the selection of the test routes, umlaut created four different suggestions for each country, from which connect blindly selected a route.

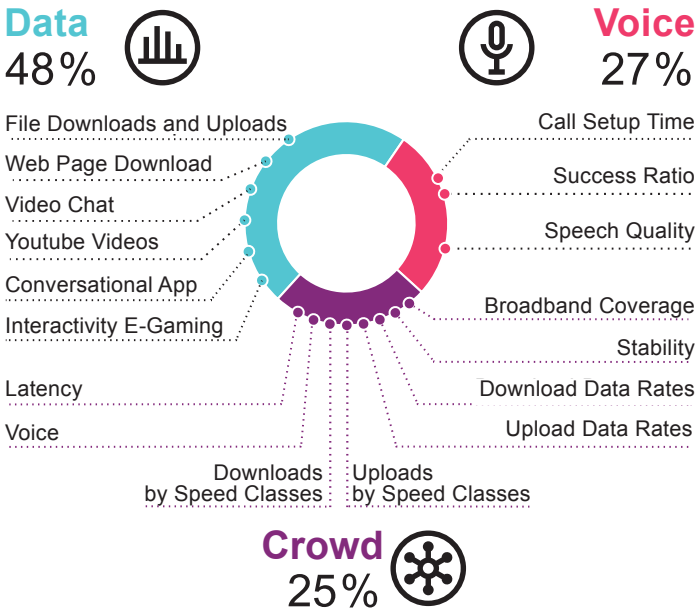
Voice connections

Voice connections account for 27% of the overall result. To this end, mobile-to-mobile telephone connections were established and their *success rates*, *call set-up times* and *voice quality* were measured. The smartphones of the walk test teams made calls to a stationary (smartphone) remote station for the voice tests.

To ensure realistic conditions, data traffic took place in the background at the same time. The transmission quality was evaluated using the POLQA (Perceptual Objective Listening Quality Analysis) wideband method, which is suitable for HD voice. With the exception of Drei in Austria, voice telephony was handled exclusively via VoLTE.

Data connections

The data measurements account for 48% of the result. To evaluate *website downloads*, several popular live sites (dynamic) and the ETSI reference site known as the Kepler site (static) were accessed.



In addition, there is a preliminary version of its designated successor (working title: „Newton") developed by umlaut, which ETSI is currently assessing.

Furthermore, *10 and 5 MB files* were *downloaded and uploaded*, respectively, to determine the performance of smaller data transfers. We also determined the data rate over a *7-second period* when *uploading and downloading* large files. Since Youtube dynamically adjusts the playback resolution to the available bandwidth, our Youtube evaluation takes into account the *average image resolution* of the videos as well as the *success rate* and the *time until playback starts*.

An over-the-top voice connection (OTT) is represented by the *conversational app* test case. To do this, we set up a voice channel using the SIP and STUN protocols with the OPUS codec and determined the *success rate* and *voice quality*.

In addition, our measurements simulated a highly interactive UDP multiplayer session to determine the latency of the connection and any packet loss using the *e-gaming interactivity* test point. A *video chat* was also included in the test scope. It measures latency, packet delay and data rates in both directions. The e-gaming and video chat tests follow the ITU-T G.1051 recommendation.

>>

Methodology

crowdsourcing
crowdsourcing results account for 25 percent of the overall rating. They show which network performance actually arrives at the user – however, the end devices and tariffs used also have an impact on these results.

To obtain the data basis for the analyses, a large number of popular apps collect the parameters described below in the background – provided that users have agreed to the completely anonymous data collection.

At specific intervals (from one second to 15 minutes), samples are collected and sent daily to umlaut's cloud servers, where the data is then processed. These reports contain only a few bytes, so they have little impact on the user's data volume.

Broadband Coverage

To determine the quality of broadband coverage, umlaut laid out a grid of approximately 2 x 2 km tiles ("evaluation areas", EAs) over the test area.

For the determination of *coverage reach*, umlaut awarded one point per EA if the network under consideration offered 3G coverage. Three points were awarded if 4G or 5G was available in the EA. The score achieved in this way was divided by the maximum number of points achievable (three points per EA in the "union footprint" – the area of the respective country measured by all participants with their smartphones).

We also looked at the *time on broadband* – the proportion of time with broadband coverage. This indicates how often a user had 4G or 5G reception during the observation period – regardless of the EAs in which the samples were collected. To do this, umlaut compares the samples that have 4G/5G coverage to the total number of samples.

Important: The percentages determined for these parameters reflect the respective degree of fulfilment of these KPIs – not the percentage of 4G/5G coverage of area or population.

Data rates and Latency

The measurements of *download and upload data rates* and *latency* were carried out independently of the EAs and focused on the individual experience of each user. Samples that were collected via Wi-Fi or with flight mode activated, for example, were filtered out by umlaut prior to the analysis.

To check the maximum possible throughput, umlaut carried out active measurements of upload and download data rates several times a month. These measurements determine the *amount of data transferred within 3.5 seconds*. For these values, we consider the average data rate, the P10 value (90% of the measured values faster than – a good approximation of the typical minimum speed) and the P90 (a look at the peak values).

To take into account the fact that many mobile phone tariffs throttle the data rate, umlaut also defined three different application-related speed classes: for *basic internet*, at least 2 Mbps must be achieved, *HD video* requires 5 Mbps and *UHD video* requires 20 Mbps.

Similarly, the latency of data packets is also assigned to an application-related class: round-trip times of up to 100 ms are sufficient for the *OTT voice* class, less than 50 ms qualifies a sample for *gaming* and less than 20 ms for *high-end gaming*.

Telephony

The *HD voice* parameter shows the proportion of the user's voice connections that were established using Voice over LTE (VoLTE) or Voice over WiFi (VoWiFi) and thus support HD quality.

Stability

Based on the success rates of the download, upload and browsing tests, as well as additional connection tests, umlaut also calculates the percentage of *successful transactions*.

Reliability

The reliability assessment is not a separate category, but rather an additional consideration of the previous results. To this end, umlaut divides all measured values into basic or everyday requirements ("qualifier KPIs") and values related to peak performance ("differentiator KPIs").

The reliability rating only takes into account the qualifier KPIs from the voice and data category and the basic crowdsourcing results. This makes it possible to determine how well the network meets everyday requirements.