UK Mobile Performance in Review 1H 2020

Operator performance at UK-wide, nation, and metro levels, plus a look at how 5G is changing your connected experience

RootMetrics®
By IHS Markit

The importance of fast and reliable mobile connectivity has never been greater. As our connected communities continue to grow, mobile users expect always-on connectivity and strong network performance anywhere and everywhere they go. As the 5G era in the UK continues to expand, demands for a flawless mobile experience will only become more important.

We recently conducted an extensive study of always-on mobile users to understand what consumers truly want from their mobile experience and to learn more about consumer pain points. With fast speeds topping the list of what users want and expect, it wasn't surprising to learn that they're also incredibly excited about the potential of 5G:

5G is gaining importance in the UK:

85%

believe 5G will ultimately help them or their company make more money.

84%

believe 5G will allow them to share more content on social media.

83%

believe 5G will allow them to work more flexibly from different locations.

80%

believe 5G will significantly reduce travel time and free up more time to be productive.

Connected insights for your connected lives

Our test results show you how the major operators in the UK performed across all the spaces in which you use your mobile, from the UK's 16 most populated metro areas to each of the four UK nations, and across the UK as whole.

We've also taken a look at how 5G can change (and improve) your daily connected experience in cities across the UK. Read on to see how the operators performed in the first half of 2020.

We tested:

The entire UK (UK-wide)

The 4 UK nations

The UK's 16 biggest metros

Testing highlights and stats at a glance

537,780
Tests performed

22,082
Miles driven

16
Metro areas tested

Over 750
Total places visited

In response to the COVID-19 pandemic, RootMetrics temporarily suspended scouting operations starting in March 2020 to ensure the safety of our employees and our communities. In early June, we resumed testing using a modified scouting approach that included extensive safety measures and strict adherence to local and national COVID-19 guidelines and best practices.

To accommodate safety restrictions while still following RootMetrics scientific testing methodologies under the extraordinary circumstances brought about by the COVID-19 pandemic, we suspended indoor test collection when testing restarted in June. This summary report therefore includes indoor results for any market tested in early 2020 and no indoor results for markets tested in June. In addition, due to our modified testing in 1H 2020, some metropolitan markets do not include RootScore Awards. For a complete list of markets with and without indoor results, as well as cities that do and do not have RootScore Awards, please see the appendix.

UK-wide performance

Providing strong service across the entirety of the UK is a tall order. To earn our UK RootScore Awards, an operator needs to offer outstanding performance across all the different spaces where consumers use their mobiles, from cities and villages of all sizes, to roadways, rural areas, and all the places in between.

Note that with all four major UK operators now having deployed 5G, 1H 2020 marks the first test period in which we're including 5G results (where available) in our testing, and it's also the first time we've used 5G-enabled devices to measure performance on both 4G LTE and 5G.

UK-wide RootScores 1H 2020

Rank	Overall	Reliability	Accessibility	Speed	Data	Call	Text
1	95.2	97.2	95.1	83.3	92.9	95.4	99.4 98.5
2	90.0	95.4	94.2	49.8	80.6	92.5	
3	86.5	94.1	91.5	35.5	74.7	90.5	97.7 97.6
4	85.2	92.6	88.7	33.4	74.3	86.7	

EE O2 Three Vodafone

Note: Our Accessibility RootScore Award was first introduced in 1H 2020.
Note: Due to shifting end-user expectations and performance, we've fine-tuned the way we measure network speed. See page 14 for more details.

UK-wide speeds

EE	O2	Three	Vodafone
42.6 Mbps	13.3 Mbps	14.1 Mbps	19.0 Mbps

The speeds above show each operator's aggregate median download speed across the entirety of the UK.

Key takeaways

EE continues dominance in UK-wide testing: EE continued its run of excellence in our UK-wide testing, clocking the fastest aggregate median download speed among all networks at an impressive 42.6 Mbps, while winning or sharing all seven UK RootScore Awards for the sixth consecutive test period.

O2 delivers strong text results: While O2's UK-wide RootScore rankings declined from third to fourth in four categories since 2H 2019, O2 performed very well during text testing, registering an impressive Text RootScore of 97.7.

Three shows improvement, registering strong text results: Three ranked third or fourth in every category for the second straight test period, but the operator improved its rankings in the categories of network speed, data performance, and text performance. Three's Text RootScore of 97.6 was particularly strong.

Vodafone remains a strong performer: Vodafone performed well across the board, ranking second in six out of seven categories while earning a share of the UK Text RootScore Award for the third consecutive test period. Vodafone also registered the second-fastest aggregate median download speed among all operators at 19.0 Mbps.

Keep in mind that if an operator's ranking(s) declines in a given test period, it doesn't necessarily mean that the operator's performance was worse compared to the previous test period. Rather, a strong performance from another operator(s) can correspond with lower rankings for others.

Nation performance: England, Northern Ireland, Scotland, and Wales

Providing strong service across an entire nation isn't an easy task. Excelling in metropolitan markets or big cities doesn't necessarily mean that strong service will translate to success in other areas of a nation. Our Nation RootScore Reports balance performance from dense urban areas, smaller villages, rural spaces, and roadways to paint a complete picture of the consumer mobile experience at the UK-nation level.

Nation RootScore Award tally - by category

	Overall	Reliability	Accessibility	Speed	Data	Call	Text	Total
EE	4	3	2	4	4	4	4	25
O2	0	0	0	0	0	0	1	1
Three	0	0	0	0	0	1	1	2
Vodafone	1	2	2	1	1	2	3	12

Note that since the Accessibility RootScore Award was first introduced in 1H 2020, we are not including award tally comparisons to 2H 2019 as it wouldn't be an apples-to-apples comparison.

Key takeaways

EE delivers another brilliant performance in nation testing: EE earned an astounding 25 nation-level RootScore Awards out of 28 total award chances and swept the awards in England and Scotland. What's more, EE's aggregate median download speed in each nation was the fastest among all operators, including a top speed of 44.1 Mbps in England. For context, at 44.1 Mbps, end-users can download a 600MB movie from Netflix in less than two minutes.

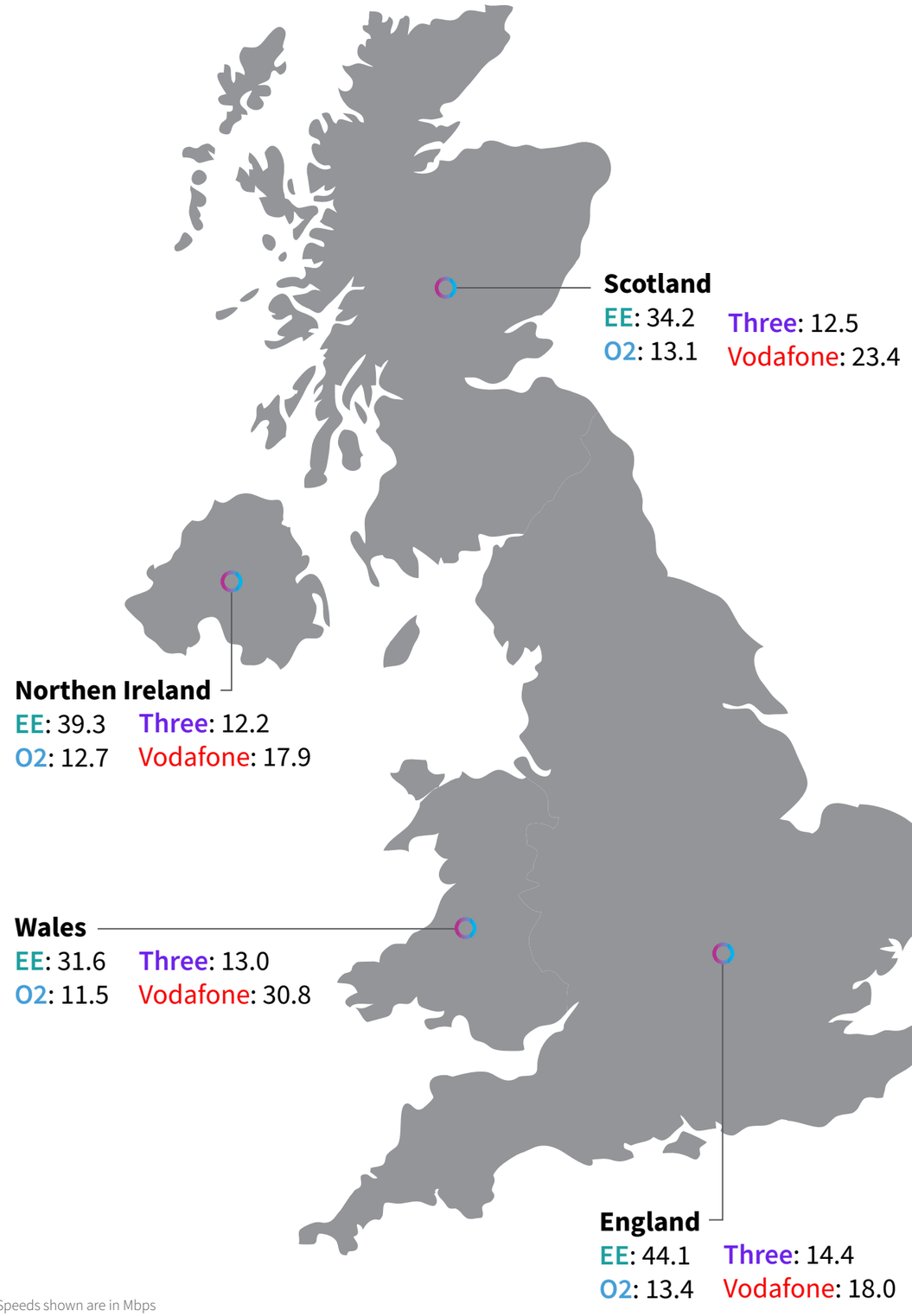
O2 performs well in Wales and shows strong text results elsewhere: O2 delivered its best performance in Wales, sharing the Wales Text RootScore Award and ranking second in the network accessibility category. While O2 ranked third or fourth in most categories across the nations, O2's text results were strong across the board, with Text RootScores of at least 97.3 in each nation.

Threes shows improvement, registering solid text results across the board: In 2H 2019, Three finished third or fourth in every category in each nation, but this time, Three shared the Call and Text RootScore Awards in Wales. Three's text results in England, Northern Ireland, and Scotland were also quite good, with Text RootScores ranging from 96.3 to 98.3.

Vodafone shines in Wales and performs well in general: Vodafone won or shared all seven RootScore Awards in Wales and earned a total of 12 nation-level RootScore Awards, a tally much higher than those of either O2 (1) or Three (2) but lower than that of EE (25). With first- or second-place rankings in every category across the nations, Vodafone's nation-level results were strong in general. The operator's aggregate median download speed of 30.8 Mbps in Wales was particularly impressive.

UK nation speeds

The speeds on the map represent each operator's aggregate median download speed across each of the four UK nations.



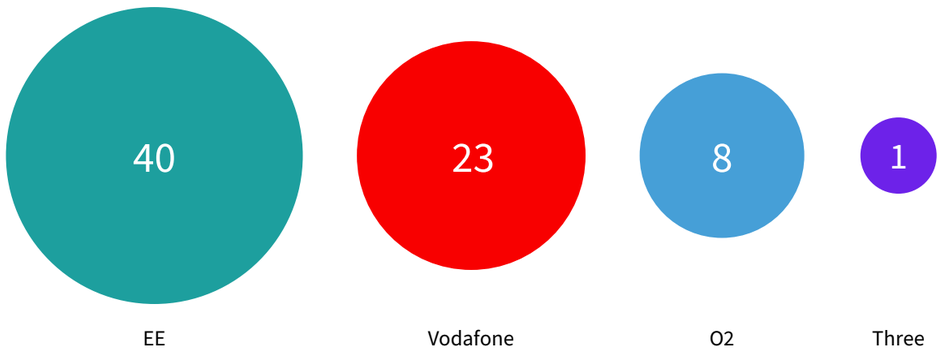
Speeds shown are in Mbps

Metro area performance

Major metropolitan markets are much more than just city centres. They also include the suburbs, business districts, tourist areas, and the roadways that connect them. With the 5G era having started in the UK, end users expect fast and reliable mobile performance across all of these spaces, whether they live and work in a metropolitan market or are visiting on holiday.

This section of our report provides an operator-by-operator overview of performance across the 16 most populated metro areas in the UK, as well as a high-level look at how each operator's 5G network has performed as deployments continue.

Metro Area RootScore Award tally (7 cities)



Note that because of changes in our scouting due to the COVID-19 pandemic, 7 of the 16 metropolitan markets we tested in the UK have RootScore Award winners, while the other nine do not. Therefore, this tally of awards factors in awards from seven cities. For a list of the cities that do (and do not) have RootScore Awards, see the appendix.

Metro performance in a nutshell:

EE remained a top performer at the metro level, with fast speeds, excellent reliability, and by far the highest tally of RootScore Awards among all operators.

O2 delivered strong data reliability and excellent text results.

Three showed moderately better data reliability results in 1H 2020 along with slightly improved speeds.

Vodafone performed well in our metro area testing, recording fast speeds, strong reliability, and the second-highest award count among all operators.

EE remains the operator to beat, with fast speeds, excellent reliability, and the highest award total.

EE delivers fast speeds: EE was once again the only operator that registered median download speeds of at least 30 Mbps in all 16 cities tested. Even more impressively, EE surpassed the 50 Mbps mark in eight of those cities, with its fastest speed clocking in at an impressive 73.0 Mbps in Manchester.

EE offers broad 5G availability and strong 5G speeds: EE was the only operator with 5G in each of the 16 cities we tested in 1H 2020, and the operator's 5G coverage was relatively broad, with 5G availability above 21% in 12 markets. EE's 5G network was also consistently fast, clocking impressive 5G median download speeds of at least 103.9 Mbps in all 16 cities.

EE improves high-end speed results: EE improved the number of markets in which it delivered median download speeds of at least 50 Mbps, jumping from two in 2H 2019 to eight this time.

EE registers excellent call and accessibility results: Among the seven cities that had RootScore Awards in 1H 2020, EE earned the Call RootScore Award in six of those markets. EE also won or shared our new Network Accessibility RootScore Award in six out of seven cities.

EE's median download speed intervals (all network technologies)

Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps
2H 2019	0	0	0	5	9	2
1H 2020	0	0	0	3	5	8

- Number of markets out of 16 in which EE delivered median download speeds at various intervals.
- Median download speeds from 1H 2020 represent speeds on all network technologies, including 5G, where available.
- Speeds from 2H 2019 did not include 5G results.

EE's fastest and slowest median download speeds
(and how long it takes to download a 5MB song)

Speeds above show the markets in which EE recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

EE Metro Area RootScore Award tally (7 cities)

EE	Outright	Ties	1H 2020 total
Overall RootScore Award	6	0	6
Reliability RootScore Award	2	1	3
Accessibility RootScore Award	3	3	6
Speed RootScore Award	6	0	6
Data RootScore Award	6	0	6
Call RootScore Award	2	4	6
Text RootScore Award	0	7	7
Total awards	25	15	40

Note that this award tally factors in awards from 7 out of 16 cities tested. For a list of the cities that do (and do not) have RootScore Awards, see the appendix.

O2 shows strong reliability, consistent speeds, and excellent text results.

Strong reliability: O2 delivered outstanding data and call reliability in nearly every metro area we tested.

Consistent speeds: O2's median download speed results in 1H 2020 were relatively similar to those from 2H 2019. The majority of O2's speeds remained in the 10-20 Mbps and 20-30 Mbps ranges. At those speeds, O2 users should be able to perform the vast majority of typical mobile activities without much trouble.

Outstanding text results: Among the seven cities in which we had RootScore Awards in 1H 2020, O2 shared Text RootScore Awards in six of those markets.

O2 offers limited 5G availability in four UK cities: We recorded 5G results for O2 in 4 of the 16 cities we tested in 1H 2020, and the operator's 5G availability was quite low in each market. O2's highest 5G availability was just 0.6% (in Belfast). In the other three cities in which O2 registered 5G results, we didn't collect enough test samples to accurately characterise its 5G median download speeds. That said, we expect O2's 5G network to expand over time.

O2's median download speed intervals (all network technologies)						
Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps
2H 2019	2	9	4	1	0	0
1H 2020	1	10	5	0	0	0

- Number of markets out of 16 in which O2 delivered median download speeds at various intervals.
- Median download speeds from 1H 2020 represent speeds on all network technologies, including 5G, where available.
- Speeds from 2H 2019 did not include 5G results.

O2's fastest and slowest median download speeds
(and how long it takes to download a 5MB song)

Speeds above show the markets in which O2 recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

O2 Metro Area RootScore Award tally (7 cities)

O2	Outright	Ties	1H 2020 total
Overall RootScore Award	0	0	0
Reliability RootScore Award	0	1	1
Accessibility RootScore Award	0	0	0
Speed RootScore Award	0	0	0
Data RootScore Award	0	0	0
Call RootScore Award	0	1	1
Text RootScore Award	0	6	6
Total awards	0	8	8

Note that this award tally factors in awards from 7out of 16 cities tested. For a list of the cities that do (and do not) have RootScore Awards, see the appendix.

Three shows moderate speed gains, improved reliability, and impressive 5G speeds.

Consistent (but relatively slow) speed results: Three continued to register median download speeds between 10-20 Mbps in the vast majority of cities tested, but the operator did show minor speed improvements in the 0-10 Mbps and 20-30 Mbps intervals.

Strong data and call reliability results: Three recorded outstanding reliability results in nearly every market we tested in 1H 2020, and the operator showed improved blocked call and data reliability compared to what we found 2H 2019.

Three shows impressive 5G speeds: We recorded 5G results on Three's network in 11 out of 16 cities, and the operator recorded very impressive speeds in several markets. Three clocked the fastest 5G median download speed of any operator at 193.7 Mbps in Leicester, while also registering the fastest 5G maximum download speed at 478.1 Mbps in Liverpool. That said, Three's 5G availability was relatively limited, ranging from 1.0% to 15.4%. As a result, the operator's 5G speeds haven't made a notable impact on its speed interval results or to the speeds that Three users will likely experience on an everyday basis.

Three's median download speed intervals (all network technologies)						
Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps
2H 2019	1	15	0	0	0	0
1H 2020	0	14	2	0	0	0

- Number of markets out of 16 in which Three delivered median download speeds at various intervals.
- Median download speeds from 1H 2020 represent speeds on all network technologies, including 5G, where available.
- Speeds from 2H 2019 did not include 5G results.

Three's fastest and slowest median download speeds
(and how long it takes to download a 5MB song)

Speeds above show the markets in which Three recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

Three Metro Area RootScore Award tally (7 cities)

Three	Outright	Ties	1H 2020 total
Overall RootScore Award	0	0	0
Reliability RootScore Award	0	0	0
Accessibility RootScore Award	0	0	0
Speed RootScore Award	0	0	0
Data RootScore Award	0	0	0
Call RootScore Award	0	1	1
Text RootScore Award	0	0	0
Total awards	0	1	1

Note that this award tally factors in awards from 7 out of 16 cities tested. For a list of the cities that do (and do not) have RootScore Awards, see the appendix.

Vodafone provides fast speeds, excellent reliability, and the second-highest award total.

Vodafone remains a strong performer in general: Vodafone registered good results across the board, providing fast speeds and strong reliability in most of the cities we tested. Vodafone also earned the second-highest number of RootScore Awards at 23.

Impressive speeds: Vodafone was one of two operators that delivered median download speeds faster than 50 Mbps, and the operator also increased the number of cities in which it recorded speeds between 40-50 Mbps. While Vodafone did record median download speeds below 20 Mbps in eight cities, the operator's speeds were generally quite good.

Outstanding reliability and excellent call results: Vodafone's data and call reliability results were superb in nearly every market we tested, and the operator's call performance in major cities was particularly good. Vodafone earned the Call RootScore Award in five of the seven cities that had RootScore Awards in 1H 2020, a tally far higher than those of either O2 (1) or Three (1) but a bit lower than that of EE (6).

Vodafone's 5G shows impressive speeds but limited 5G coverage: We recorded 5G results on Vodafone's network in 10 of the 16 cities we tested, and the operator's median download speeds were faster than 112 Mbps in 9 of those markets. While Vodafone's 5G availability was relatively limited, the operator's performance in London was noteworthy. Keeping in mind that Vodafone's 5G availability in London was just 5.2%, the operator delivered the fastest 5G median download speed in the city at 181.8 Mbps.

Vodafone's median download speed intervals (all network technologies)

Median download speed intervals	0-10 Mbps	10-20 Mbps	20-30 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps
2H 2019	0	7	3	4	2	0
1H 2020	0	8	2	1	4	1

- Number of markets out of 16 in which Vodafone delivered median download speeds at various intervals.
- Median download speeds from 1H 2020 represent speeds on all network technologies, including 5G, where available.
- Speeds from 2H 2019 did not include 5G results.

Vodafone's fastest and slowest median download speeds
(and how long it takes to download a 5MB song)

Speeds above show the markets in which Vodafone recorded its fastest and slowest median download speeds (Mbps), and the times indicate how long it typically takes to download a 5MB song at each speed (times in seconds).

Vodafone Metro Area RootScore Award tally (7 cities)

Vodafone	Outright	Ties	1H 2020 total
Overall RootScore Award	1	0	1
Reliability RootScore Award	4	0	4
Accessibility RootScore Award	1	3	4
Speed RootScore Award	1	0	1
Data RootScore Award	1	0	1
Call RootScore Award	1	4	5
Text RootScore Award	0	7	7
Total awards	9	14	23

Note that this award tally factors in awards from 7out of 16 cities tested. For a list of the cities that do (and do not) have RootScore Awards, see the appendix.

5G is poised to change the game for users and grow our connected communities.

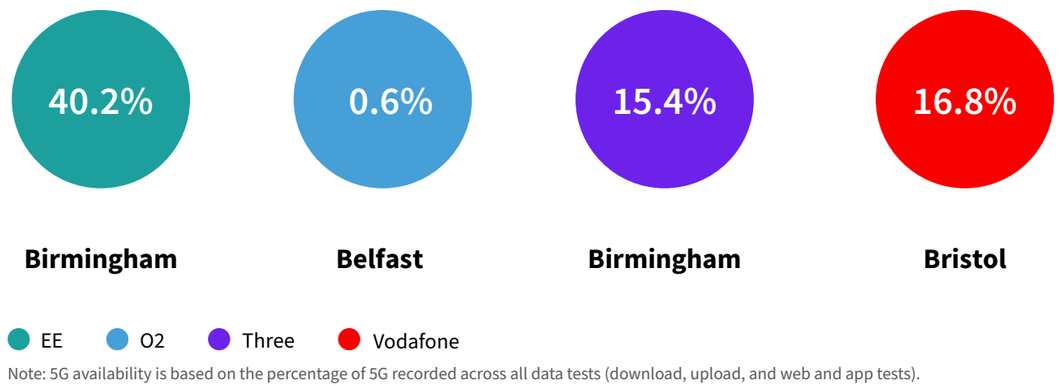
Why 5G matters

5G is here (in some UK cities), and our testing has shown impressive results. While 5G will eventually empower applications that hold the potential to transform everyday life, from remote surgery to driverless cars and much more, those changes won't happen overnight. That said, we're seeing strong results on 5G that should only improve as 5G continues to expand and mature.

Consider, for example, the highest 5G availability we recorded for each operator in 1H 2020, as well as each network's fastest 5G median download speed. These fast speeds could provide a game-changing experience for end users, particularly when it comes to streaming or downloading movies and other large files. While 5G coverage remains relatively limited, EE has shown comparatively broad 5G availability, and we expect 5G access for all operators to expand over time.

As 5G continues to expand, the fast speeds, improved latency, and greater capacity of 5G will serve as the backbone of our connected communities and spur exciting new use cases that will have a transformative effect on the end-user mobile experience.

Highest 5G availability (%) - by operator



Note: 5G availability is based on the percentage of 5G recorded across all data tests (download, upload, and web and app tests).

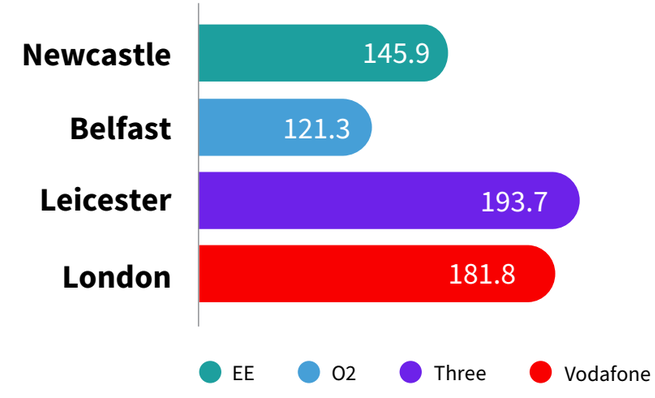
5G offers incredibly fast speeds, but 5G coverage is still growing in the UK.

EE's 5G offers the best combination of fast speeds and broad coverage: The only operator with 5G in all 16 cities tested, EE's median download speeds were consistently fast—and much faster than those on 4G LTE—in every one of them, with EE's "slowest" 5G speed of 103.9 Mbps in Nottingham and its fastest 5G speed of 145.9 Mbps in Newcastle. EE's 5G coverage was also quite broad relative to other operators. In fact, EE had the highest 5G availability in each of the 16 markets we tested.

O2 and Vodafone provide limited 5G coverage, but Vodafone's 5G was consistently fast: While O2 and Vodafone each offered generally limited coverage, O2's 5G availability was the lowest among all networks, and we were only able to collect enough test samples to accurately characterise O2's 5G median download speed in one city (Belfast, at 121.3 Mbps). Vodafone's 5G, meanwhile, was also relatively limited, but Vodafone's 5G speeds were excellent—and consistent—in most markets, with 5G median download speeds of at least 112 Mbps in 9 of the 10 markets in which Vodafone had 5G.

Three shows impressive speeds on 5G but limited availability: Three earned distinction for clocking the single fastest 5G median and maximum download speeds among all operators at 193.7 Mbps and 478.1 Mbps, respectively. However, Three's 5G coverage was limited in most cities, with Three's highest 5G availability at 15.4%.

Fastest 5G median download speeds (Mbps) - by operator



A note on 5G availability rates: During the early stages of 5G deployments, connecting to 5G at relatively low percentages isn't surprising. Operators often choose to launch 5G only in certain areas of a city and/or may target very specific audience segments, such as enterprise customers. That said, we do expect 5G service to become more widespread as the networks mature over time.

5G in London: a look at 5G results in the UK's biggest city

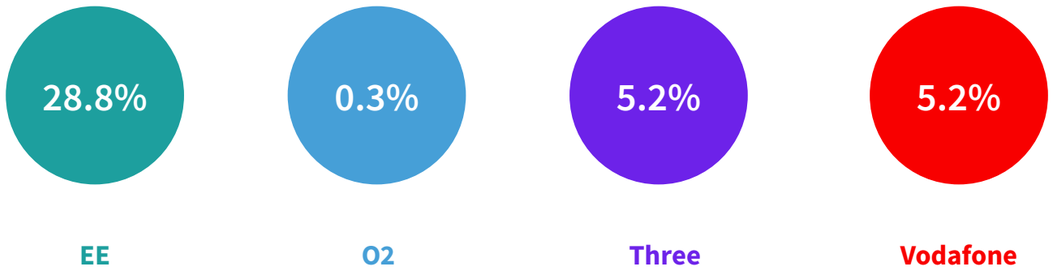
London is one of the world's largest and busiest cities, and seamless connectivity is paramount for residents and visitors alike. The good news is that 5G has arrived and we've seen impressive speeds in the UK's most populated city.

Take a look at the charts to see each operator's 5G availability in London, as well as each operator's median and maximum download speeds on both 5G and 4G LTE. Median download speeds represent typical, everyday speeds, while maximum speeds show the potential of an operator's 5G network.

To put the speeds of 5G in perspective, we've compared 5G median and maximum download speeds to those purely on 4G LTE, rather than speeds recorded across all network technologies.

We'll soon release a more detailed report looking at 5G performance in the UK, so stay tuned to RootMetrics.com/UK.

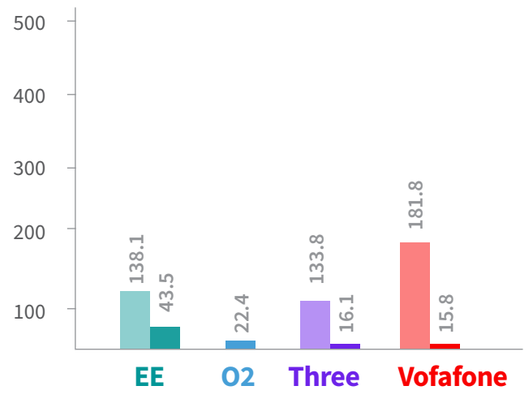
London 5G availability (%)



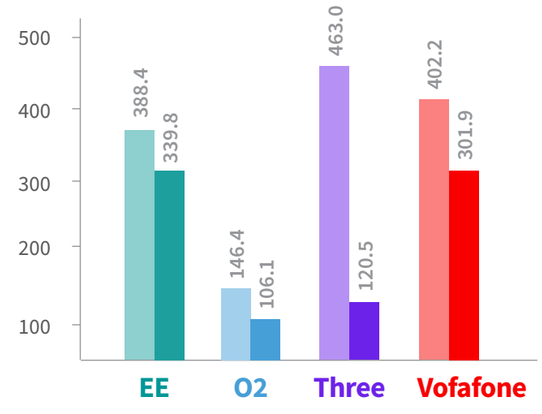
Note: 5G availability is based on the percentage of 5G recorded across all data tests (download, upload, and web and app tests).

5G 4G

London 5G & 4G LTE median download speeds (Mbps)



London 5G & 4G LTE maximum download speeds (Mbps)



Note: We didn't collect enough test samples to accurately characterise O2's 5G median download speed in London.

London 5G, in short

5G much faster than 4G LTE in London: EE, Three, and Vodafone all registered incredibly fast 5G median download speeds in excess of 133 Mbps, and each operator's 5G median download speed was at least three times faster than its speed on 4G LTE. Vodafone's 5G median download speed was over 11 times faster than that on 4G LTE.

Limited 5G coverage in London, but EE stands out: EE offered generally broad 5G availability in London at 28.8%, but EE was the exception. In fact, EE's 5G availability was over five times greater than that of either Three or Vodafone, with both operators registering relatively low 5G availability of 5.2%. That said, the good news is that the operators' speeds on 4G LTE were generally good, so even if users can't access 5G in London, they should still experience decent speeds, especially on EE's network. We also expect 5G coverage to expand as the networks continue to mature.

5G maximum download speeds suggest a promising future for 5G in London: The 5G maximum download speeds we recorded in London were extremely impressive. Three was the standout, clocking the fastest 5G maximum download speed among all operators in London at 463.0 Mbps. EE and Vodafone also impressed, with 5G maximum download speeds much faster than those on 4G LTE. While Three clearly led the way with the fastest 5G maximum download speed in London, it's worth noting that with Three's generally low 5G availability in London (and elsewhere), Three users will likely spend most of their time on 4G LTE, and Three's 4G LTE speeds were much slower than those on 5G.

How we test

We believe that real-world results come from real-world testing. All RootMetrics testing is conducted from the consumer's point of view. For UK-wide, nation, and metro testing in 1H 2020, we used Samsung Note 10+ 5G smartphones purchased off the shelf from operator stores to test both 4G LTE and 5G performance, and tests were conducted during the day and night while walking and driving. We utilise random sampling techniques to ensure our results offer a robust characterisation of performance in the places consumers most often use their mobiles, and all testing is focused on the activities for which consumers typically use their mobiles, including data, call, and text usage.

To ensure our results are current and reflect shifting consumer behaviours and emerging technologies, we've made two notable changes to our methodology in 2020. We introduced our new Network Accessibility RootScore Award, which offers a holistic look at accessibility performance across data, call, and text testing and includes latency results during data testing, as well as speed results during call and text testing. We also fine-tuned our Network Speed RootScore category in 2020; we've updated various speed thresholds to capture the most accurate possible picture of when users experience diminishing returns based on changing end-user expectations and performance. As a result, Network Speed RootScores from 2020 cannot be compared to those from 2019 or earlier. To learn more about our testing, visit the methodology page of our website.

A note about our 5G results in the UK

With all four operators having launched 5G in the UK, 1H 2020 marks the first test period in which we've used 5G-enabled smartphones to test operator performance on both 5G and other network technologies, such as 4G LTE or sub-4G LTE technologies. Because 5G users will likely switch from 5G to 4G LTE (or vice versa) during a typical mobile activity, the metrics in this report, unless explicitly stated as 5G or 4G LTE, reflect performance across all network technologies, including 5G where available.

The 5G metrics in this report were collected during our scientific Metro Area RootScore testing across the UK's 16 largest metropolitan cities, as defined by the Eurostat's Larger Urban Zone (LUZ). Our scientific metro area testing is designed to characterise network performance as a whole across an entire metropolitan market. In contrast, during our 5G First Look testing in 2019, we tested 5G performance shortly after EE and Vodafone had launched 5G in Birmingham, Cardiff, and London. During that study, tests were largely conducted in known areas of 5G deployment, and a large portion of our tests were done while walking and were concentrated on densely populated city centres in each market, rather than across the entirety of each city. As a result of the differences in testing methodologies, comparisons between 5G results in this report cannot be made to those in our 5G First Look Reports for Birmingham, Cardiff, or London.

Appendix

Cities with Indoor Results

- Belfast
- Bristol
- Cardiff
- Edinburgh
- Glasgow
- Newcastle

Cities without Indoor Results

- Birmingham
- Coventry
- Hull
- Leeds
- Leicester
- Liverpool
- London*
- Manchester
- Nottingham
- Sheffield

Cities with RootScore Awards

- Belfast
- Bristol
- Cardiff
- Edinburgh
- Glasgow
- London
- Newcastle

* With the exception of London, cities without indoor results do not have RootScore Awards.

RootMetrics®
By IHS Markit

For press inquiries, contact
Patrick.Linder@ihsmarkit.com

To learn more about how our testing is performed
and can benefit your business, contact
info@rootmetrics.com

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