UK Mobile Performance in Review 2H 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 today's connected communities continue to grow, strong mobile performance is no longer a luxury. It's an expectation that will quickly become a requirement for businesses and consumers alike as we move closer to realising the promises of a fundamentally connected society. And as 5G continues to expand in the midst of the COVID-19 pandemic that has led to unprecedented levels of remote learning and working, the need for a flawless mobile experience has only become more important.

Seamless connectivity is more critical than ever

We recently conducted an extensive study of high-intensity mobile users—both enterprise users and general consumers—to understand the factors people consider when switching networks or making purchasing decisions. Our study showed that the importance of connectivity continues to grow when users consider future purchasing decisions.



High-intensity users, those who use at least eight mobile apps per day, also stood out in our survey. As fast speeds, improved reliability, and 5G continue to grow, our study showed that high-intensity users are far more likely to switch operators than other users, and this rapidly growing segment is also likely to consider independent network performance information (like this report) when considering purchasing decisions. Whether you're one of those high-intensity users considering a change or not, read on for detailed summaries and insights into all four operators' performances in the second half of 2020.



Connectivity insights across all the spaces of 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 metropolitan markets 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



644,546 Tests performed



16 Metro areas tested



25,856 Miles driven



Over 750 Total places visited In response to the COVID-19 pandemic, RootMetrics testing included extensive safety measures and strict adherence to local and national COVID-19 guidelines and best practices. To accommodate all safety restrictions while still following RootMetrics scientific testing methodologies under the extraordinary circumstances brought about by the COVID-19 pandemic, we did not collect test samples indoors in the UK in 2H 2020.



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.

UK-wide RootScores 2H 2020



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 details.

UK-wide speeds



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

Key takeaways (alphabetized by operator)

EE continues its run of excellence in UK-wide testing:

EE remained the top-performing operator in our UK-wide testing, clocking the fastest aggregate median download speed at an impressive 43.0 Mbps, while winning or sharing every UK RootScore Award for the seventh consecutive test period. At EE's speed of 43.0 Mbps, users can download a 600MB video from Netflix in about 1.9 minutes.

O2 delivers strong and improved text results:

O2's rankings were generally consistent with those from 1H 2020, with one notable exception: the operator's ranking in the UK Text RootScore category improved from third in 1H 2020 to second this time, tying with Three and Vodafone.

Vodafone

Three

Vodafone shared the Network Accessibility RootScore Award with EE and posted second-place finishes in every other category. Distancing itself from O2 and Three, Vodafone also clocked the second-fastest aggregate median download speed among all operators at 21.1 Mbps, which would allow consumers to download a 600MB video in about 3.8 minutes.

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.

Three also shows improvement in the text category:

While Three ranked third in most categories in 2H 2020, the operator's ranking in the text category improved from third in the first half of 2020 into a three-way tie for second in 2H 2020.

Vodafone delivers another strong performance:

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.



Key takeaways (alphabetized by operator)

EE remains the top performer at the nation level: EE earned a remarkable 26 nation-level RootScore Awards out of 28 total award chances and swept the awards in England and Scotland for the second straight time. EE also delivered the fastest aggregate median download speed in each of the four nations, with its top speed of 44.3 Mbps recorded in England. At 44.3 Mbps, end-users can download a 600MB movie in less than two minutes and expect quick access to content in general.

O2 performs well in Northern Ireland and registers strong text results

in general: O2 delivered its best performance in Northern Ireland, sharing RootScore Awards for network reliability, call, and text performance. O2 also earned a share of the Wales Text RootScore Award. O2's text results were good across the board, with first- or second-place rankings in all four nations.

Three registers solid text results across the board: While Three's tally of nation-level RootScore Awards declined by two since 1H 2020, the operator's text results remained strong in each nation. Three's Text RootScores ranged from 95.1 to 98.0, and the operator's text performance was particularly strong in England, where Three ranked second behind only EE.

Vodafone shines in the categories of network reliability, network

accessibility, and call performance: Vodafone took home the Network Accessibility RootScore Award in all four nations while earning awards for reliability and call performance in Northern Ireland, Scotland, and Wales. Vodafone finished second behind EE in nearly every other category in each nation and delivered the second-fastest aggregate median download speed in all four nations. At Vodafone's fastest nation-level speed of 26.5 Mbps in Scotland, consumers can download a 600MB video in roughly three minutes.

Nation RootScore Award tally - by category

	Overall	Reliability	Accessibility	Speed	Data	Call	Text	Total	Difference from 1H 2020
EE	4	4	2	4	4	4	4	26	1
02	0	1	0	0	0	1	2	4	3
Three	0	0	0	0	0	0	0	0	-2
Vodafone	0	3	4	0	0	3	0	10	-2

UK nation speeds

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



Northen Ireland EE: 33.9 **Three**: 11.0 **02**: 12.4 Vodafone: 18.6

Wales Three: 11.6 EE: 31.0 Vodafone: 20.3 **02**: 7.0

Speeds shown are in Mbps



EE: 39.0

Three: 13.4 **02**: 11.5 Vodafone: 26.5

England -**EE**: 44.3 Three: 14.1 Vodafone: 20.6 02: 13.3

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 metropolitan markets 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

Metro performance in a nutshell (takeaways alphabetized by operator):

EE remained the top performer at the metro level, with fast speeds, great reliability, impressive 5G results, and by far the highest tally of RootScore Awards.

02 showed strong text results and an expanded 5G footprint.

Three delivered consistent speeds, good text results, and impressive speeds on 5G.

Vodafone again registered strong results in general, with fast speeds, excellent reliability, and impressive 5G speeds.



EE remains the operator to beat, with fast speeds, the highest award total, and impressive 5G results.

EE clocks impressive speeds in every city: EE was once again the only operator that registered median download speeds of at least 30 Mbps in each of the 16 cities we tested, allowing users in any market to access content and entertainment guickly. What's more, EE topped the 50 Mbps mark in 12 of those cities, marking an improvement from eight such markets in 1H 2020.

EE delivers the single fastest median download speed in 2H 2020: EE's outstanding median download speed of 82.8 Mbps in Hull was the fastest speed of any operator in 2H 2020. At 82.8 Mbps, consumers can download a 600MB video from Netflix in about one minute.

EE takes home a phenomenal number of RootScore Awards: EE earned an incredible 100 RootScore Awards out of 112 total award chances. To put that number in perspective, EE's closest competitor at the award level was Vodafone, which earned less than half as many awards as EE with 48.

EE offers generally broad 5G availability and consistently fast 5G speeds:

EE's 5G performance was strong across the board, with the most 5G in 15 of the 16 cities we tested along with consistently fast 5G speeds. In fact, EE was the only operator whose 5G median download speeds were above 100 Mbps in all 16 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	
1H 2020	0	0	0	3	5	8	
2H 2020	0	0	0	1	3	12	

Number of markets out of 16 in which EE delivered median download speeds at various intervals.

Median download speeds on the table above represent speeds recorded on all network technologies, including 5G, where available.



Fastest median download speed



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 600MB video at each speed (times in minutes).

EE Metro Area RootScore Award tally

EE	Outright	Ties	2H 2020 total
Overall RootScore Award	13	3	16
Reliability RootScore Award	6	9	15
Accessibility RootScore Award	2	5	7
Speed RootScore Award	14	2	16
Data RootScore Award	15	1	16
Call RootScore Award	5	9	14
Text RootScore Award	3	13	16
Total awards	58	42	100

Slowest median download speed Leeds 37.7 Mbps \triangleright 2.2 mins

O2 registers strong text results, outstanding data reliability, and an expanded 5G footprint.

O2 provides generally consistent speeds: O2's median download speed results in 2H 2020 were generally similar to those in the first half of the year. While the majority of its speeds remained in the 10-20 Mbps and 20-30 Mbps ranges, O2 did clock a median download speed above 30 Mbps for the first time, doing so in Leicester at 32.0 Mbps. On the other hand, O2 registered speeds between 0-10 Mbps in two more markets than it did in 1H 2020.

O2 records strong text results: O2 once again registered strong text results, earning Text RootScore Awards in 11 out of 16 cities in 2H 2020, a total higher than that of either Three (10) or Vodafone (10).

O2 delivers outstanding data reliability: While O2's call reliability results weren't quite as strong as those of EE or Vodafone—and were relatively similar to those of Three-the operator registered near-perfect data reliability results in nearly every city we tested.

O2 shows expanded 5G footprint since 1H 2020: In the first half of 2020, we recorded 5G results for O2 in four cities. In 2H 2020, on the other hand, that number jumped to 11. While O2's 5G availability was comparatively low in most markets (no higher than 17.1% in any city), its 5G speeds were impressive across the board, with O2 delivering 5G median download speeds of at least 85.2 Mbps in each of its cities with 5G.

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	
1H 2020	1	10	5	0	0	0	
2H 2020	3	7	5	1	0	0	

Number of markets out of 16 in which O2 delivered median download speeds at various intervals.

Median download speeds on the table above represent speeds recorded on all network technologies, including 5G, where available.



O2's fastest and slowest median download speeds

(and how long it takes to download a 600MB video)

Fastest median download speed



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 600MB video at each speed (times in minutes).

O2 Metro Area RootScore Award tally

02	Outright	Ties	2H 2020 total
Overall RootScore Award	0	0	0
Reliability RootScore Award	0	4	4
Accessibility RootScore Award	1	2	3
Speed RootScore Award	0	0	0
Data RootScore Award	0	0	0
Call RootScore Award	0	5	5
Text RootScore Award	0	11	11
Total awards	1	22	23

Slowest median download speed Bristol 7.5 Mbps **10.6 mins** \triangleright

Three shows consistent speed results, strong text performance, and promising 5G speeds.

Three registers consistent (but relatively slow) speed interval results: Three continued to deliver median download speeds between 10-20 Mbps in the vast majority of cities tested, but the operator did show minor improvement, registering a speed above 20 Mbps in one more city than it did last time. That said, Three was the only operator that didn't record a median download speed of at least 30 Mbps in any city.

Three delivers strong text results: Three earned a total of 15 Metro Area RootScore Awards, and 10 of those awards were for text performance. Three's tally of text awards matched that of Vodafone but wasn't as high as that of either O2 (11) or EE (16).

Three shows broader 5G footprint and strong 5G speeds: In the first half of the year, Three's 5G availability was guite limited in the 11 cities in which it offered 5G, with Three's 5G availability reaching a high 15.4%. In 2H 2020, however, the operator registered 5G in all 16 cities, and its highest 5G availability was 29.6%. Three also clocked impressive speeds on 5G, recording 5G median download speeds of at least 100.0 Mbps in 7 cities, with its "slowest" 5G speed coming in at a strong 79.1 Mbps. As Three's 5G continues to expand and mature, its users should see faster speeds on 5G along with faster overall speeds across all network technologies.

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	
1H 2020	0	14	2	0	0	0	
2H 2020	0	13	3	0	0	0	

Number of markets out of 16 in which Three delivered median download speeds at various intervals.

Median download speeds on the table above represent speeds recorded on all network technologies, including 5G, where available.



Three 's fastest and slowest median download speeds

(and how long it takes to download a 600MB video)

Fastest median download speed



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 600MB video at each speed (times in minutes).

Three Metro Area RootScore Award tally

Three	Outright	Ties	2H 2020 total
Overall RootScore Award	0	0	0
Reliability RootScore Award	0	2	2
Accessibility RootScore Award	0	0	0
Speed RootScore Award	0	0	0
Data RootScore Award	0	0	0
Call RootScore Award	0	3	3
Text RootScore Award	0	10	10
Total awards	0	15	15

Slowest median download speed



Vodafone remains a strong performer in major cities and provides impressive 5G results.

Vodafone delivers strong and improved speeds: Vodafone was once again one of only two operators that delivered median download speeds faster than 50 Mbps, doing so in two markets in 2H 2020, a jump from one last time. Vodafone also showed improvement at the lower end of our speed intervals, registering speeds below 20 Mbps in four fewer markets since 1H 2020. In short, Vodafone's speeds were strong in general, allowing its subscribers to get content quickly.

Vodafone delivers outstanding reliability, accessibility, and call results:

Vodafone earned by far the most Network Accessibility RootScore Awards at 13. Vodafone's top competitor in the accessibility category was EE, which earned seven such awards. Vodafone's data and call reliability results were also superb in nearly every market we tested. Vodafone earned 10 Call RootScore Awards and 9 Network Reliability RootScore Awards, trailing only EE in both categories.

Vodafone shows impressive 5G speeds but generally limited availability: We recorded 5G results on Vodafone's network in 12 of the 16 cities we tested.

and while Vodafone's 5G availability was relatively limited in most cities, the operator's 5G median download speeds were at least 103 Mbps in 10 of its cities with 5G, providing users with quick file downloads.

Vodafone's median download speed in Median download 0-10 Mbps 10-20 Mbps speed intervals 1H 2020 0 8 2H 2020 ٥ 4

Number of markets out of 16 in which Vodafone delivered median download speeds at various intervals.

Median download speeds on the table above represent speeds recorded on all network technologies, including 5G, where available.



Fastest median download speed



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 600MB video at each speed (times in minutes).

Vodafone Metro Area RootScore Award tally

Vodafone	Outright	Ties	2H 2020 total
Overall RootScore Award	0	3	3
Reliability RootScore Award	1	8	9
Accessibility RootScore Award	7	6	13
Speed RootScore Award	0	2	2
Data RootScore Award	0	1	1
Call RootScore Award	1	9	10
Text RootScore Award	0	10	10
Total awards	9	39	48

ntervals (all network technologies)						
0 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps			
2	1	4	1			
6	1	3	2			

Slowest median download speed Coventry 15.0 Mbps



5G is poised to grow our connected communities and change the end-user connected experience

The importance of 5G

5G is fast and it's getting even faster and more widespread in major cities across the UK. While transformative use cases like driverless cars and remote surgery are likely several years away from becoming the new normal, the good news is that we're seeing strong results on 5G that should only improve over time.

Consider, for example, the highest 5G availability we recorded for each operator in 2H 2020, as well as each network's fastest 5G median download speed. While 5G availability remains relatively limited for most operators in UK cities, EE has shown comparatively broad 5G availability, and all four networks clocked impressive speeds on 5G. Those fast speeds could provide a game-changing experience for end users, particularly when it comes to streaming or downloading movies and playing video games on mobile devices.

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.

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

EE offers a strong combination of fast 5G speeds plus broad 5G availability: EE's 5G median download speeds were consistently fast in every city we tested—and much faster than those on 4G LTE—ranging from a speedy 106.5 Mbps in Sheffield to an excellent 143.6 Mbps in Hull. EE's 5G availability was also impressive in general and broad compared to the other operators. Indeed, EE had the highest 5G availability in 15 of the 16 cities we tested, and EE's lowest 5G availability of 19.6% in Edinburgh was higher than O2's highest 5G availability of 17.1% in Hull. The bottom line is that EE's 5G users should find relatively widespread access to 5G in nearly every city we tested along with guick access to content and entertainment.

O2 delivers consistently fast speeds but generally low 5G availability: O2 clocked 5G median download speeds of at least 117.6 Mbps in 10 of the 11 cities in which we recorded 5G results for the operator, and O2's 5G speed of 178.9 Mbps in Belfast was particularly impressive. That said, O2 was the only operator that didn't register 5G availability of at least 20% in any city, with its 5G availability maxing out at 17.1%.

Three clocks fast speeds but availability shows room for improvement: While Three (and others) offered generally low 5G availability in most cities (Three topped out at 29.6%), its 5G speeds were a different story. Three's 5G median download speeds ranged from a strong 79.1 Mbps in Sheffield to super-fast 137.2 Mbps in Belfast. Even though Three's 5G users may not be able to access 5G all the time, the good news is that its 5G availability should continue to grow, and when users do connect to 5G, they should find quick access to content.

Vodafone shows fast but relatively limited 5G: Similar to what we observed for O2 and Three, Vodafone's 5G availability was generally low, but its 5G speeds were impressive. While Vodafone's 5G availability exceeded 20% in only two cities, with 24.9% in Bristol and a solid 44.0% in Liverpool (the highest in the city), the operator's availability was below 15.3% in its other 10 cities with 5G. Vodafone's 5G speeds, meanwhile, were fast, ranging from a strong 81.6 Mbps to a remarkable 216.6 Mbps, the fastest 5G median download speed of any operator.

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



Highest 5G availability (%) - by operator

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 we're seeing impressive 5G results in the UK's capital, with particularly strong results from EE.

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).

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



London 5G, in short:

5G availability was generally low in London, but EE was the exception: EE registered generally broad 5G availability in London at 39.9%--up from 28.8% in 1H 2020—but EE was an outlier. In fact, EE's 5G availability was well over twice as high as that of any other operator in the city. The good news, however, is that we expect 5G availability to improve going forward in London and in other major cities.

5G in London is FAST: Even though 5G availability was generally limited for most networks in London, 5G speeds in the city were outstanding, with each operator delivering a 5G median download speed of at least 114.7 Mbps, providing users on any network with incredibly fast access to content. Vodafone was the speed standout, delivering the fastest 5G median and maximum download speeds in the city.

5G speeds were way faster than those on 4G LTE in London: Vodafone's 5G median download speed of 216.6 Mbps in London was over 11 times faster than its speed on 4G LTE. In fact, each operator's 5G median download speed in London was at least 3.7 times faster than that its speed on 4G LTE.

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

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 in 1H 2020, 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 1H 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, we used 5G-enabled smartphones to test 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.

Our 5G metrics 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.





For more information, visit

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