UK Mobile Performance in review 1H 2021

Operator performance at UK-wide, nation, and metro levels, plus a high-level look at 5G.







EE leads the way in 1H 2021

EE remained the leading performer across the entire UK, within the nations, and in major cities. EE delivered consistently fast speeds and excellent reliability, and it provided the strongest combination of widespread Everyday 5G availability plus fast 5G speeds.

Three shows faster speeds, strong text results, and a growing 5G network

Three delivered better speed results than it did in 2H 2020, and its text results were particularly good across the board. The operator's 5G also showed nice growth, and with the most mid-band spectrum of any operator, Three users could see faster 5G speeds going forward.

Virgin Media O2 shows major improvements in 1H 2021

Virgin Media O2 improved in our UK-wide, nation, and metro testing in 1H 2021. The operator won its firstever RootScore Award at the UK-wide level and increased its tally of Nation and Metro Area RootScore Awards since 2H 2020. Virgin Media O2 also delivered improved speeds in major cities, and its Everyday 5G median download speeds were impressive.

To learn about Everyday 5G performance the UK, visit our latest <u>5G Scorecard</u>.

New 5G report coming soon: Stay tuned for our upcoming 1H 2021 5G summary report.

Vodafone performs well, with the second-most awards, fast speeds, and improving Everyday 5G results

Vodafone delivered a strong showing at the UK-wide level, increasing its award total by two since 2H 2020. Vodafone also improved its award tally in major cities and provided users with faster speeds, great reliability, as well as impressive 5G growth and fast Everyday 5G median download speeds.

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 1H 2021



UK-wide speeds



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

EE continues to lead in UK-wide testing: EE remained the operator to beat in our UK-wide testing, winning or sharing six out of seven UK RootScore Awards. In fact, 1H 2021 marked the eighth consecutive test period in which EE ranked first in the categories of overall performance, network reliability, network speed, as well as data, call, and text performance. Not only that, EE's aggregate median download speed of 58.8 Mbps marked an increase from 43.0 Mbps last time and was over twice as fast as that of any other operator. While EE's ranking for network accessibility dropped since 2H 2020, EE's RootScore of 92.9 in the category was quite good and just a bit behind those of Vodafone (93.6) and leader Virgin Media 02 (94.0).

Three's rankings remain nearly identical to those from 2H 2020, with strong scores for network reliability and text performance:

With one exception, Three's UK-wide rankings remained the same as those in 2H 2020; this time, though, the operator finished fourth in the text performance category, marking a drop from second in 2H 2020. That said, Three's UK Text RootScore of 97.8 was still guite high and not far behind those of the other networks. Three also posted a strong UK Network Reliability RootScore of 93.4.

categories: Virgin Media O2 earned its first-ever RootScore Award at the UK-wide level in 1H 2021, doing so in the Network Accessibility RootScore category. The operator also improved its rankings from fourth in 2H 2020 to third in 1H 2021 for overall performance, network reliability, and call performance. With Virgin Media O2 showing improvement in multiple areas in 1H 2021, along with impressive Everyday 5G median download speeds, we could be witnessing a sign of better performance to come.

Vodafone showed notable improvement in the first half of 2021, taking home three UK RootScore Awards, a marked increase from one in 2H 2020. The operator improved its rank for network reliability from second in 2H 2020 into a two-way tie for first, while also moving into first place (up from second) for call and text performance. While Vodafone's ranking for network accessibility dropped from first in 2H 2020 to second this time, its RootScore in the category of 93.6 was barely behind that of Virgin Media O2 (94.0). Vodafone also registered the second-fastest aggregate median download speed at 25.2 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.

Key takeaways (alphabetized by operator)

Virgin Media O2 shows strong progress, winning the UK Network Accessibility Award and improving in three other

Vodafone shows significant improvement since 2H 2020:

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 nation level.



Key takeaways (alphabetized by operator)

EE remains the top performer at the nation level, with the most awards and fastest speeds: EE earned an exceptional 24 nation-level RootScore Awards out of 28 total chances and swept the awards in Scotland for the third straight time. Impressively, EE took home the Overall RootScore Award in each nation, while delivering by far the fastest aggregate median download speeds across the board. In fact, EE's "slowest" aggregate median download speed of 46.3 Mbps in Northern Ireland was nearly twice as fast as the top speed of any other operator (Vodafone's 28.0 Mbps in Wales). At EE's fastest nation-level speed of 60.3 Mbps in England, EE users can download a 600MB film from Netflix in less than 90 seconds.

Three delivers good text results across the nations: While Three didn't win any nation-level awards for the second straight test period, the operator's text results remained strong in each nation, with Text RootScores of at least 92.7 across the board. Three performed particularly well in Wales, where the operator had its only secondplace finishes (network reliability and call performance).

Virgin Media O2 wins the most accessibility awards and delivers strong text results: Increasing its nation-level RootScore Award tally by one since 2H 2020, Virgin Media O2 won more awards for accessibility than any other operator with two (England and Wales), up from zero last time. The operator's text results were particularly strong, with three first-place rankings (Northern Ireland, Scotland, and Wales) and a close thirdplace finish in England.

Vodafone shines for network reliability and call performance: Vodafone took home Network Reliability and Call RootScore Awards in three out of four nations (England, Northern Ireland, and Scotland), while earning the Text RootScore Award in both England and Scotland. Vodafone also posted the second-fastest aggregate median download speed in all four nations. At Vodafone's top nation-level speed of 28.0 Mbps in Wales, Vodafone users can download a 600MB vide in roughly three minutes.

Nation RootScore Award tally - by category

	Overall	Reliability	Accessibility	Speed	Data	Call	Text	Total	Difference from 2H 2020
EE	4	4	1	4	4	3	4	24	-2
Three	0	0	0	0	0	0	0	0	0
Virgin Media O2	0	0	2	0	0	0	3	5	1
Vodafone	0	3	1	0	0	3	2	9	-1

Note: Award tallies include both outright wins and ties.

UK nation speeds

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



Virgin Media O2: 13.2

Three: 19.8

Virgin Media O2: 16.1 Vodafone: 25.5

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 5G continuing to expand and improve 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 (outright wins + ties)

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

EE remained the top performer at the metro level, with by far the highest tally of RootScore Awards, fast speeds, good reliability, and an impressive combination of broad Everyday 5G availability plus fast 5G speeds.

Three delivered improved speeds, good text results, and its 5G made strong progress in 1H 2021.

Virgin Media O2 increased its tally of Metro Area RootScore Awards by 10 since 2H 2020, the biggest improvement of any network. Virgin Media O2 also clocked faster speeds and delivered fast Everyday 5G median download speeds.

Vodafone had another strong showing in our metro area testing, taking home the second-most RootScore Awards, while providing good speeds, strong reliability, and an expanding and improving Everyday 5G experience.



EE remains the operator to beat, with the fastest speeds, the highest award total, and impressive combination of Everyday 5G availability plus performance.

Fastest in every city: Not only was EE the only operator that registered median download speeds
of at least 50 Mbps in each of the 16 cities we tested, EE topped 70 Mbps in 14 of those cities
and delivered the fastest median download speed in every city we tested. With generally high
Everyday 5G availability in every city we visited, EE's overall median download speeds were driven
in large part by 5G. At EE's consistently fast speeds, consumers in any city can enjoy incredibly
quick access to content, fast file downloads, and more.

The only operator to top 100 Mbps: EE's phenomenal median download speed of 104.2 Mbps in Birmingham was easily the fastest speed of any operator, and it also showed tremendous progress for EE. For perspective, EE's fastest speed in 2H 2020 was 82.8 Mbps in Hull. At 104.2 Mbps, consumers can download a 600MB video from Netflix in about 45 seconds.

By far the most RootScore Awards: EE earned an outstanding 98 RootScore Awards out of 112 total award chances. While EE performed well in general, EE stood out for winning or sharing awards for overall performance, network speed, data performance, and call performance in all 16 cities tested. To put this performance in context, EE took home nearly double the number of awards as its closest competitor (Vodafone with 52).

5G offers a strong combination of broad Everyday 5G availability and fast speeds: As shown in our series of 5G Scorecards, EE's Everyday 5G results were strong in general, with widespread Everyday 5G availability and fast speeds. With EE acquiring additional speedy mid-band spectrum as well as low-band spectrum at auction in 2021, EE 5G users could see faster speeds and even better availability going forward.

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 2020	0	0	0	1	3	12
1H 2021	0	0	0	0	0	16

Number of markets out of 16 in which EE delivered median download speeds at various intervals. Median download speeds from on the table above represent speeds recorded on all network technologies, including 5G, where available.

EE'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 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	1H 2021 total
Overall RootScore Award	12	4	16
Reliability RootScore Award	3	10	13
Accessibility RootScore Award	2	5	7
Speed RootScore Award	15	1	16
Data RootScore Award	15	1	16
Call RootScore Award	2	12	14
Text RootScore Award	0	16	16
Total awards	49	49	98

Slowest median download speed 54.8 Mbps 1.5 mins \triangleright

Three shows improved speeds and good text results, with encouraging 5G peformance.

Three's median download speed int Median download 0-10 Mbps 10-20 Mbps speed intervals 2H 2020 0 13 0 1H 2021 4

Number of markets out of 16 in which Three delivered median download speeds at various intervals. Median download speeds from 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 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	1H 2021 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	8	8
Total awards	0	10	10

Improved speeds: In 2H 2020, Three was the only operator that didn't register a median download speed above 30 Mbps. Fast forward to 1H 2021, however, and Three clocked speeds above 30 Mbps in three cities. Three also improved at the lower end of our intervals, delivering speeds below 20 Mbps in 4 cities in 1H 2021, a significant improvement from 13 last time. As Three's Everyday 5G median download speeds continue to improve over time, its overall speeds across all network technologies should likewise increase.

Strong text results: Among Three's total of 10 RootScore Awards, 8 came in the text performance category. While that total was lower than those of the other operators, Three users should see strong text performance in major cities, within the nations, and across the UK as a whole.

Expanding and improving 5G, with faster speeds on the horizon: Three's Everyday 5G availability expanded in nearly every city we visited compared to what we found in 2H 2020, and its Everyday 5G median download speeds showed improvement in over half the cities we tested. While Three's 5G speeds generally weren't as impressive as those of the other operators, its Everyday 5G median download speeds exceeded 100 Mbps in 6 cities and were above 70 Mbps in all 16 cities. It's worth noting that while those speeds are fast enough for users to access content quickly, Three has by far the most speedy mid-band spectrum of any operator at its disposal, so we could see faster speeds going forward.

ervals (all network technologies)					
30 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps		
3	0	0	0		
9	3	0	0		

Slowest median download speed



Virgin Media O2 delivers better speeds, a higher award tally, and impressive Everyday 5G download speeds.

Virgin Media 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 2020	3	7	5	1	0	0
1H 2021	1	5	7	3	0	0

Number of markets out of 16 in which Virgin Media O2 delivered median download speeds at various intervals Median download speeds from on the table above represent speeds recorded on all network technologies, including 5G, where available.

Virgin Media 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 Virgin Media 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).

Virgin Media O2 Metro Area RootScore Award tally

Virgin Media O2	Outright	Ties	1H 2021 total
Overall RootScore Award	0	1	1
Reliability RootScore Award	0	2	2
Accessibility RootScore Award	5	6	11
Speed RootScore Award	0	0	0
Data RootScore Award	0	0	0
Call RootScore Award	0	4	4
Text RootScore Award	0	15	15
Total awards	5	28	33

Faster speeds: Virgin Media O2 users should be pleased to learn that the operator's speeds improved since 2H 2020. While most of Virgin Media O2's speeds remained in the 10-20 Mbps and 20-30 Mbps ranges, Virgin Media O2 clocked median download speeds above 30 Mbps in three cities in 1H 2021, a jump from one last time. Virgin Media O2 also improved at the lower end of our intervals, registering median download speeds below 20 Mbps in 6 cities in 1H 2021 compared to 10 last time.

The most Network Accessibility RootScore Awards: Similar to what we saw at the UK-wide and nation levels, Virgin Media O2's network accessibility results were outstanding in our metro area testing. Virgin Media O2's 11 Network Accessibility RootScore Awards not only marked an improvement from 3 last time, it was also far more than that of any other operator. Virgin Media O2's closest competitor in the category was EE, with seven.

Great text results: Virgin Media O2 once again registered strong text results. The operator earned Text RootScore Awards in 15 out of 16 cities in 1H 2021, an increase from 11 last time and a total higher than that of Three (8), identical to that of Vodafone, but lower than that of EE (16).

Growing and speedy 5G: As noted in our July 5G Scorecard, Virgin Media O2's Everyday 5G median download speeds were very impressive. In fact, Virgin Media O2 clocked three of the five fastest Everyday 5G median download speeds we recorded in 1H 2021, with speeds ranging from 163.3 Mbps to 179.3 Mbps in Edinburgh, Glasgow, and Leicester. Just as importantly, Virgin Media O2 has also shown broader Everyday 5G availability in nearly every city since 2H 2020.



Vodafone delivers improved speeds, better reliability, a higher award tally, and strong 5G.

Vodafone's median download speed in Median download 0-10 Mbps 10-20 Mbps speed intervals 2H 2020 0 4 1H 2021 0 2

Number of markets out of 16 in which Vodafone delivered median download speeds at various intervals. Median download speeds from 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	1H 2021 total
Overall RootScore Award	0	4	4
Reliability RootScore Award	3	9	12
Accessibility RootScore Award	2	4	6
Speed RootScore Award	0	1	1
Data RootScore Award	0	1	1
Call RootScore Award	2	11	13
Text RootScore Award	0	15	15
Total awards	7	45	52

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 four cities, an increase from two last time. Vodafone's speeds at the lower end of our intervals also improved, with speeds below 20 Mbps in only two cities compared to four in 2H 2020. Vodafone's speeds were solid in general, allowing its users to access content quickly, and those speeds should improve going forward as Vodafone's 5G continues to get faster.

The second-highest award total, with outstanding reliability: One of two operators that increased its award total since 2H 2020 (along with Virgin Media O2), Vodafone's tally of awards grew by four since 2H 2020. Vodafone added three Network Reliability Awards to its ledger in 1H 2021, giving the operator reliability awards in 12 out of 16 cities, a tally far higher than that of either Virgin Media O2 (2) or Three (1) but not guite as many as that of EE (13). Vodafone also gained an additional three Call RootScore Awards and five more Text RootScore Awards. Overall, Vodafone's 52 RootScore Awards trailed EE's 98 but was far more than that of either Virgin Media O2 (33) or Three (10).

Impressive 5G growth and fast Everyday 5G median download speeds: Vodafone's 5G showed nice improvements since 2H 2020. Its Everyday 5G availability improved in all 13 of its cities with 5G, and its Everyday 5G median download speeds increased in 11 of those cities. The operator's Everyday 5G median download speeds were strong in general, and nowhere was that more true than in Glasgow, where Vodafone clocked the single fastest Everyday 5G median download speed of any operator in any city at 192.2 Mbps (with 29.5% availability). With Vodafone **bolstering its spectrum holdings at auction** (and refarming some of its LTE spectrum for 5G), we could see further improvements in relatively short order.

ntervals (all network technologies)					
30 Mbps	30-40 Mbps	40-50 Mbps	50+ Mbps		
6	1	3	2		
7	2	1	4		

Slowest median download speed



5G highlights

Availability plus performance: the key to the end-user 5G experience

The ideal Everyday 5G experience is marked by those times when an operator delivers a combination of both widespread availability plus strong performances for speed and reliability.

Our upcoming 1H 2021 5G report will provide detailed availability and speed metrics and insights to show how each operator is performing on that key combination of availability and performance. We'll also take a look at the types of spectrum the carriers are using for 5G, discuss performance trends, and more.

In the meantime, check the maps below to see each operator's top Everyday 5G availability and speed results, and for more 5G results, visit our July 5G Scorecard. To learn about the Everyday 5G experience, see page 12 below or check out our blog.

Each operator's highest Everyday 5G availability (%) Vodafone 192.2 Mbps Glasgow Virgin Three Media O2 51.1% 34.3% Hull Belfast Three 127.1 Mbps Belfast EE 64.6% Vodafone Birmingham 51.5% Liverpool

For more 5G results, visit our latest 5G scorecard, and to learn about the Everyday 5G experience, see the appendix or check out our **blog**.

New 5G report coming soon: Stay tuned for our upcoming 1H 2021 5G summary report.

Each operator's fastest Everyday 5G median download speed (Mbps)



Appendix

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 2021, we used the latest Samsung 5G-enabled smartphones purchased off the shelf from operator stores to test both 4G LTE and 5G performance on the networks of EE, Three, Virgin Media O2, and Vodafone. 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. All testing is focused on the activities for which consumers typically use their mobiles, including data, call, and text usage.

The 4 UK nations

To learn more about our testing, visit the **methodology page** of our website.

Testing facts & figures

The entire UK

635,917 Tests performed 27,507 Miles driven

16 Metro areas tested



The UK's 16 biggest metros

> Over 750 Total places visited

A note about Everyday 5G results

The Everyday 5G results in this scorecard include a combination of results recorded on both 5G-only and "5G mixed mode." 5G mixed mode is the user experience of switching between 5G and 4G LTE during the same data activity, an increasingly common user experience.

With 5G growing fast and users switching between 5G-only and 5G mixed mode more and more often, Everyday 5G results offer the most accurate picture of the daily 5G experience when connected to 5G at least a portion of the time.

To learn more about Everyday 5G results, check out our new **blog**.





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