RootMetrics®
By IHS Markit

5G is poised to change our connected world—and now is the time to measure the progress

More data in more places to answer more precise questions.

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Introduction and executive summary

How ready is a region for 5G and the growth of connected communities? More data in more places can answer critical questions.

5G is here and expanding rapidly. With countless efforts underway across the globe to create a fundamentally connected society in which everything from kitchen appliances to streetlights and even entire cities are connected, decisions regarding network infrastructure spending and the allocation of scarce resources are becoming more important than ever.

Indeed, lawmakers in the UK committed £5 billion for the expansion of its Digital UK initiative, which aims to bring super-fast broadband connectivity across the entire country by 2035. With billions on the line at a critical juncture for the future of connectivity, now is the time for governments, industries, and businesses alike—both in the UK and elsewhere—to monitor the progress of 5G and connectivity in general to determine how, where, when, and why to allocate those scarce resources.

Key questions must also be addressed at a regional level to determine readiness for implementing smart technologies that rely on 5G, such as e-health solutions, smart meters, and much more. Likewise, mobile operators must understand if they can meet the added demands placed on networks due to the increased usage of 5G via remote learning and working, retail and business connectivity, and the wide-scale deployment of IoT solutions that require the fast and consistent connectivity that 5G promises.

The best way to determine the readiness of 5G and smart technologies for regions and operators is through comprehensive and accurate testing of network performance.

As cities across the world move closer to becoming fully connected, consistent and seamless connectivity is no longer a luxury; it's an expectation that will quickly become a requirement. While mobile networks are one piece of a complicated but critically important puzzle that is connectivity at large, the RootMetrics unique science-plus-crowd approach to testing performance and coverage can help municipalities, vendors, governments, and businesses identify partnership opportunities across the entire connectivity ecosystem. Our data and intelligence can show organisations where and how mobile networks and fixed broadband providers can work together to provide seamless connectivity to more people in more places and in a more cost-effective manner.

RootMetrics took an important step in the process of addressing key questions surrounding connectivity by working with West Midlands 5G (WM5G), an organisation in the UK whose goals are to accelerate the benefits of 5G in the West Midlands region of England and test, prove, and scale new 5G projects and services. To measure the progress of 5G and help WM5G determine the availability of 5G to support test use cases, we partnered with Gaist, an international roadway data and mapping technology company, to test operator performance on a micro-level across the city of Sandwell, a borough of West Midlands.

The RootMetrics science-plus-crowd solution to testing network performance offers the accuracy and precision of scientific testing coupled with the real-time views of crowdsourced performance and coverage data for stakeholders across the interconnected industries that will continue to shape our connected world.

The objective of this report is to show how RootMetrics test results offer an invaluable combination of scientific and crowdsourced network performance data and insights to assess the progress of 5G and help grow our connected communities. To provide context for the state of 5G in particular and connectivity in general, this report discusses the value of network performance data from multiple angles and covers the following topics:

- The importance of accurate performance data for the growth of connected communities in dense urban areas and across underserved rural locations where coverage remains a challenge.
- The massive economic implications of 5G.
- How our unique science-plus-crowd approach to testing network performance can evaluate the progress of 5G and grow our connected communities with better data and actionable insights.
- The challenges to realising the potential of 5G and a look at where we are today.
- The value of partnering across the connectivity landscape and how those partnerships can fuel progress, reduce costs, and grow revenue.
- A case study showing the power of working with RootMetrics and using our science-plus-crowd approach to collect mobile performance data at an extraordinary level of test sample density in Sandwell, England.
- The importance of using actionable intelligence in the right places to help make the right decisions.

In short, this report shows how connectivity will continue to change the way business is conducted and how the RootMetrics combination of scientific and crowd data can not only measure the progress of our connected communities, but also help drive that progress forward, identify partnership opportunities, and ultimately unlock areas of financial growth.

5G is driving massive economic expansion

According to a 2019 paper authored by our parent company IHS Markit titled The 5G Economy, **5G will enable $13.2 trillion of global economic output in 2035.** For perspective, that number is effectively equivalent to the amount of **annual consumer spending in the US** ($13.9 trillion), as well as the **combined annual spending by consumers in China, France, Germany, Japan, and the UK** ($13.4 trillion).

In addition, the **5G value chain will invest an average of $235 billion per year** to continually expand and strengthen the 5G technology base within network and business application infrastructures.

The bottom line is that 5G is becoming—and will continue to become—a key part of connected life, and measuring its progress is a critical step in reducing costs, overcoming challenges, and unlocking its full potential.

The need for accurate performance data is critical as our connected communities continue to grow.

The importance of fast and consistent connectivity has never been greater. Whether at home, the office, or the increasingly common home office, businesses and consumers alike demand a fast and fully connected experience. It's important to keep in mind, however, that connectivity is not a one-size-fits all solution. Instead, it's comprised of a patchwork of different technologies, including existing 4G LTE networks, 5G deployments, and broadband internet solutions (home broadband and Fixed Wireless Access).

As today's connected communities continue to grow, the role of 5G is expected to expand. In this evolving landscape, accurate testing of network performance and coverage will play a critical role in helping fuel partnerships that will bring seamless connectivity to everyone. In the UK, for instance, countless organisations have joined forces in both rural and urban areas to bring the advantages of seamless connectivity to consumers, businesses, and industries across the entire country.

In today's connected society, there are few things more powerful than accurate data and actionable insights.

Our first-of-its-kind combination of scientific and crowdsourced data collection products provide millions of network performance data points and actionable insights for businesses across multiple interconnected industries. Information from RootMetrics can save money, time, and resources while adding key intelligence for planning the future of connectivity. Our science-plus-crowd data and intelligence solution can address key questions related to connectivity, including but not limited to:

- Where and how can connectivity benefit more people?
- Is 5G and/or internet service available in rural areas?
- Where is network coverage truly great or truly poor?
- Which operators offer 5G?
- Where and how much 5G is available?
- How fast and reliable is that 5G?
- Where and how quickly are 5G footprints expanding?
- What types of spectrum are operators using for 5G?

Factory/Office

Industries and use cases impacted by 5G

- **Digital economies:** retail and business connectivity and increased remote working.
- **Industries:** connected workforces and equipment, smart factories, and more.
- **Transportation:** traffic management (smart sensors and cameras), smart meters, and other connected elements of transportation.
- **Energy:** automated bin collection, controllable streetlights, and smart home applications.
- **Financial services:** remote bank tellers, wearable payment devices, and enhanced security measures.
- **E-health solutions:** remote health monitors, telemedicine, and sensors that guide surgery.

Always-on, seamless connectivity

Uninterrupted video

Driverless cars

Immersive entertainment and virtual reality with zero delay

Zero-lag video calls

Substantial increases in bandwidth

IoT growth and development of smart cities, smart homes, and smart industries

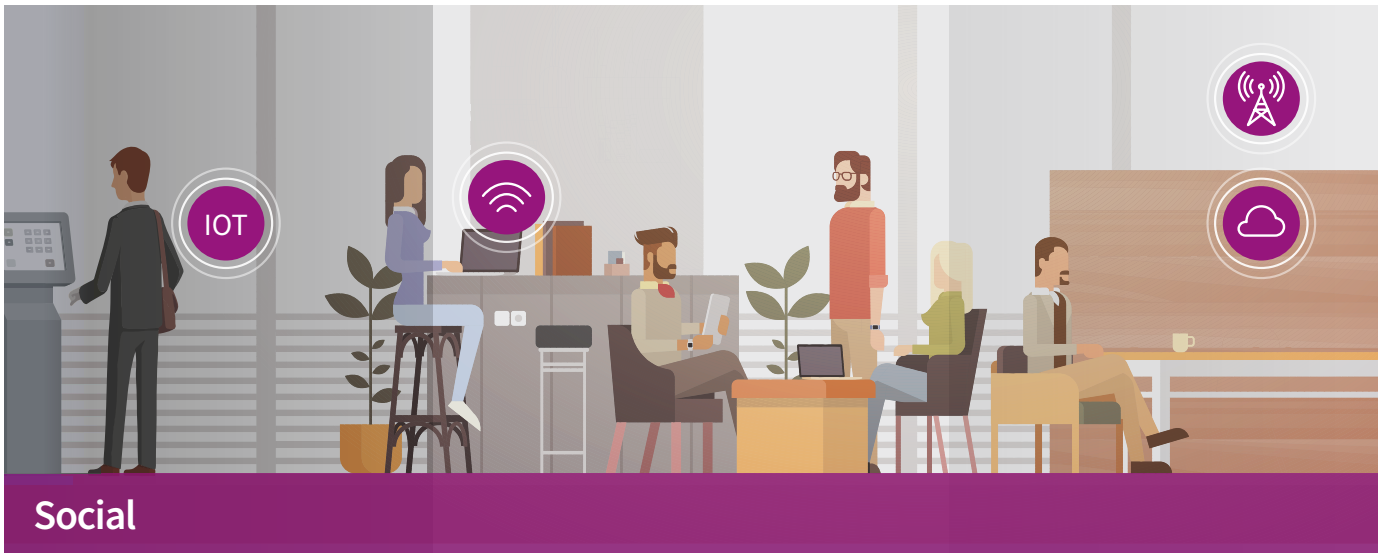
Zero-latency gaming

RootMetrics science-plus-crowd solution: measuring performance, coverage, and connected communities with better data, denser data, and actionable intelligence.

The RootMetrics scientific testing methodology has long been recognised as the industry standard for measuring network performance from nation to neighbourhood, and our crowdsourced data collection products, used in combination with our scientific results, offer a much broader level of sample collection and unprecedented sample density.

Unlike conventional crowd-only data solutions used by other companies, RootMetrics crowd data is enhanced by intelligence from our scientific results, data from our network of partners, advanced analytics, and machine learning models.

The end result is that our science-plus-crowd approach to testing network performance offers a ready-to-use solution that allows more precise questions to be answered by more organisations in more places.



Industries that can benefit from RootMetrics science-plus-crowd testing products


Internet service providers


Telecom (operator, infrastructure, and tower companies)


Cloud providers


Transportation


IoT applications

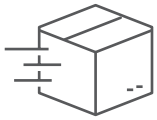

Automotive


Healthcare


Financial services


Smart homes


Emergency services


Logistics


Physical fitness

The Rootmetrics difference: crowd data backed by good science

The key differentiator between our crowdsourced data products and those offered by many other network testing companies is that our crowd results are informed and enriched by our scientific test results. Our science-plus-crowd approach provides statistical rigour, crucial context, and actionable insights that cannot be achieved by crowd data alone.

The value of crowd data lies in its ability to offer a high-level look at performance, point out potential network anomalies, identify where and when new technologies appear, and show performance and coverage at a granular level. However, the problems inherent to crowd-only solutions render crowd data difficult to trust fully, especially with critical and costly decisions at stake.

Indeed, crowd-only data can often be “noisy,” with results submitted from different devices under vastly different network and geographical conditions. Crowd-only data is also often fraught with selection bias, with people submitting crowd results only when conditions are terrible or excellent, which paints an inaccurate picture of typical, everyday network performance, rendering fair cross-network comparisons nearly impossible.

While crowd data alone isn’t perfect, scientifically collected data also has limitations. Using a scientific methodology to test network performance is both costly and time consuming, and the random sampling required means that even though the data is accurate, statistically rigorous, and contains important context, it can be difficult to measure performance on a particular street or at the neighbourhood level.

Results from our scientific testing combined with advanced analytics and machine learning models can mitigate the issues inherent to both crowd- and scientific-only network data collection, bringing together the best of both worlds in our next-generation science-plus-crowd data products.

Always-on mobile users are excited for 5G and want fast speeds above all else

We recently conducted a survey of always-on mobile users, and 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:

- 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.
- 79% believe 5G will allow for more flexible work hours.

Science plus crowd for better data, denser data, and actionable insights.

Everything we do begins with science and reflects the real-world end-user experience. We start with our scientific RootScore results, which are based on testing performance across entire countries, nations, states, and metropolitan cities. Utilising advanced analytics techniques, we use our scientific results to build machine learning models which we apply to our own crowd results, as well as those from our network of partners.

In short, our combination of scientific and crowd data allows us to draw accurate, precise, and statistically significant conclusions that can't be done with crowd-only data products.

Our science-plus-crowd approach to measuring network performance and coverage offers several important advantages that other conventional crowd solutions and crowd testing companies lack:

It's more than just a raw data feed; our crowd data offers **actionable insights and critical context backed by good science**.

It helps uncover insights other solutions miss and **unlocks the value hidden within crowd data**.

It offers **more data, more precision, and more density**, with less effort and cost.

It's the only crowd solution that uses **machine learning models and advanced analytics to enhance crowd data with scientific test results**.

It's cleaned and filtered internally, saving organisations time and resources.

It allows users to customise and slice the data to pinpoint indoor results, specific times, and particular geographic areas, down to the street level.

What's more, our science-plus-crowd approach offers several critical enhancements over conventional crowd solutions:

Allows for accurate comparisons of signal strength metrics across networks and locations (i.e., how do signal strength metrics for networks A and B compare in North Sandwell versus South Sandwell?).

Determines the **probability that network conditions were truly great or poor** (or somewhere in between) in a particular area.

Determines the **probability of whether a sample was submitted from an indoor or outdoor** location.

Of equal importance, our advanced analytics and machine leaning models also add context that crowd-only data lacks, allowing us to determine whether a user might face an issue with, for example, call failures (blocked or dropped calls) in a certain area. Taken a step further, we can also determine the probability of whether those call failures were the result of a user's device, his or her network, or because of the topography of the area, among other factors.

Conclusions from crowd data alone simply cannot reach that level of specificity or offer valuable context for making important decisions. In effect, our science-plus-crowd approach helps alleviate the issues intrinsic to either scientific-only and crowd-only testing, allowing us to measure and analyse performance at both macro and micro levels that wasn't possible until now.

The single most important benefit of our science-plus-crowd approach is that our ready-to-use products offer results and insights that are actionable, not just anecdotal.

Data and insights from a diverse set of crowd users and partners across the globe.

The RootMetrics crowd solution, built from our own app plus our global network of partners from industries as diverse as logistics, mapping, and more, allows us to collect crowd test samples across more than 100 million devices, with a monthly active user base of more than 600,000 and counting.

Our broad mix of partners and the range of applications they use to collect network performance data helps expand the breadth of our sample collection while also ensuring that our performance and coverage data comes from different segments of users across a vast range of geographical areas, including rural and other underserved locations where providing coverage can be challenging.

Interested in partnering with RootMetrics?

Contact us to find out how to partner with RootMetrics to measure performance anywhere on the planet.

"The unique combination of comprehensive driving surveys of Gaist with the network performance collection tools of RootMetrics provides a level of coverage and capacity analysis for operators, users, and other stakeholders never seen before and gives real insight into mobile connectivity in the area. We are looking forward to working with RootMetrics to provide additional data across the UK to answer precise coverage questions in the future."

Steve Birdsall – CEO – Gaist

With both mobility and connectivity becoming critical elements of daily life, our network testing products, whether scientifically based or sourced by the crowd—or both—can help overcome the challenges to realising a connected world and ultimately help operators, businesses, and governments unlock the full potential of 5G and connectivity in general.

Our science-plus-crowd approach to measuring performance creates a powerful blend of data sources for unmatched, actionable insights for a host of businesses and industries.

5G testbeds: trials for 5G and 5G-specfic applications across the UK

The UK government has allocated £200 million from the National Productivity Investment Fund (NPIF) to the 5G Programme, which launched in late 2017 and will run until the end of March 2022. Projects from the programme include six use case trials, covering sectors and use cases such as healthcare, tourism, and manufacturing. The Rural Connected Communities (RCC) Project is funding seven 5G research and development projects in rural areas across the UK and will invest £30 million over two years. The Industrial 5G Testbeds and Trials projects will focus on developing and understanding the deployment of 5G in industrial settings, starting with manufacturing.

The Programme also selected West Midlands Combined Authority as lead partner for the Urban Connected Communities (UCC) Project back in 2018, now known as WM5G. The 5G Programme will invest over £20 million (October 2018 to March 2022).

Reaching the potential of 5G and building a connected world: the challenges and a look at where we are today.

It's clear that 5G and connectivity in general are making great strides in the UK and elsewhere, but with billions at stake for the Digital UK and other initiatives, it's equally clear that businesses, municipalities, and mobile operators need a trusted source of information and a ready-to-use solution to evaluate the presence, performance, and progress of connectivity before the goals of a hyper-connected world can be achieved.

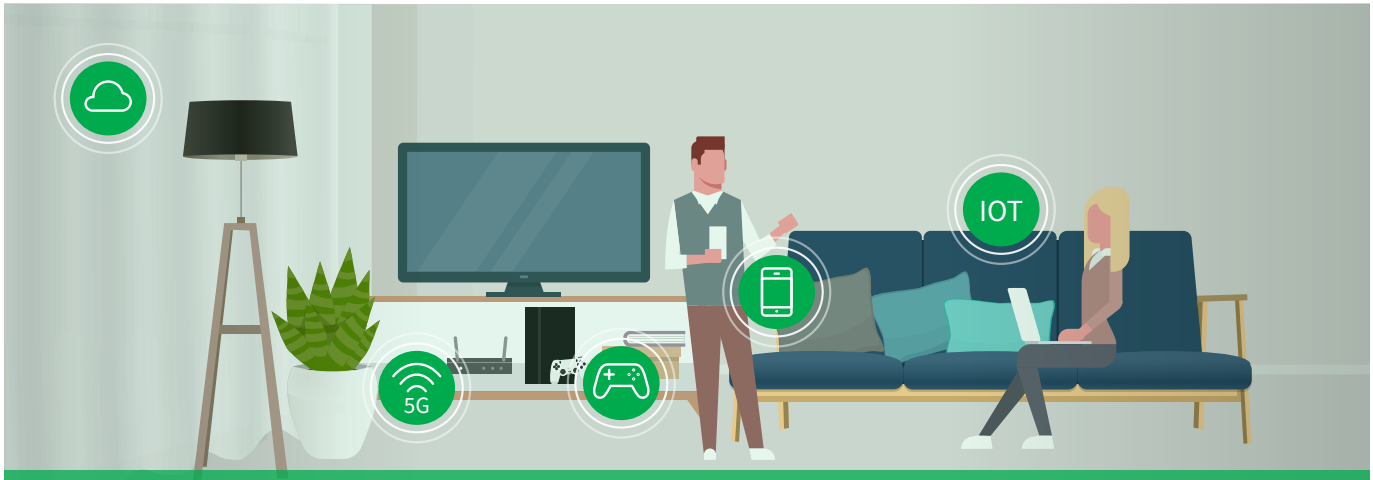
The power of partnering across the connectivity landscape

The RootMetrics science-plus-crowd approach to testing connectivity can not only provide the intelligence that businesses, industries, and governments need to grow our connected communities, it can also help foster partnerships across the connectivity ecosystem, bringing together businesses from a wide range of connected industries, from broadband providers to mobile network operators to infrastructure vendors and many more.

Our global network of partners allows us to expand our sample collection so that we can provide more data in more places in order to reduce costs, drive progress, and improve revenue. Contact us to learn how our science-plus-crowd data solution can help your organisation take connectivity to the next level.

While mobile operators have been rapidly adding capacity to meet the demands of new users, some new housing estates have been built without access to the latest high-speed fibre connectivity, even though internet access is considered an essential utility, similar to water, gas, and electricity. In an article published by The Guardian, the Department for Digital, Culture, Media and Sport (DCMS) was quoted as stating: "Modern homes should have modern broadband, and too many are still built without thought of including this essential utility. That's why we have set ambitious targets to have nationwide full fibre broadband coverage and are consulting on plans to ensure all new homes can access gigabit-capable connections that are fit for the future."

A key step in the arduous process of reaching those ambitious targets and making sure regions and even individual buildings are ready to move toward a fully connected society is to constantly measure and quantify coverage and performance.



Home

While progress is certainly being made as we transition toward a connected future, important questions still remain about how we can make that future a reality in an efficient and effective manner. Mobile operators, tower companies, and even home manufacturers must learn the location of cellular dead zones—areas where connectivity is limited or even nonexistent—in order to provide or expand coverage to the places where people need it most. Operators in particular need to know where those dead zones are so they can either add coverage or explore alternative solutions such as using satellites for connectivity.

Understanding where connectivity needs to expand (or where expansion isn't yet required) can also help organisations avoid the troublesome situation discussed above in which some homes are being built without the requisite internet connectivity in place.

The bottom line is that accurate data is critically important and can help organisations save money, invest wisely, and drive revenue.

Network performance testing in practice: the value of partnering with Gaist in Sandwell, England.

West Midlands 5G (WM5G) is a multi-million pound programme that both the West Midlands Combined Authority (WMCA) and the Department for Digital, Culture, Media and Sport (DCMS) have established to develop the UK's first region-wide 5G testbed, with one of its key objectives to accelerate 5G across the region of West Midlands, England. The primary purpose of the RootMetrics performance data is to determine the availability of 5G to support test use cases.

> "The detailed 5G coverage data received from the Sandwell trial allowed WM5G to successfully assess the feasibility of important use case trials in the area. Coverage information is vital to inform not only use cases but to really understand the impact of deployment of 5G in the region. One of WM5G's key objectives is to accelerate the roll out of 5G in the West Midlands, and this innovative solution provided by Rootmetrics really helps to inform our success."
>
> **Rhys Enfield - Director of Infrastructure Acceleration at WM5G**

West Midlands is home to nearly six million residents and is comprised of seven major metropolitan markets, including Birmingham and Coventry, as well as several neighbouring towns and boroughs. RootMetrics and Gaist combined efforts to measure connectivity in Sandwell, a borough in West Midlands.

Gaist is an award-winning international road and highway technology mapping company that uses digital processes to provide deep insights into the state of roadways to organisations across the world. The RootMetrics partnership with Gaist helped address several key connectivity questions in Sandwell by conducting scientifically based data performance tests while driving over 434 kilometres across the area, collecting test samples over 86 square kilometres, and conducing nearly 21,000 total tests over a 12-day period, from 6 April to 17 April 2020.

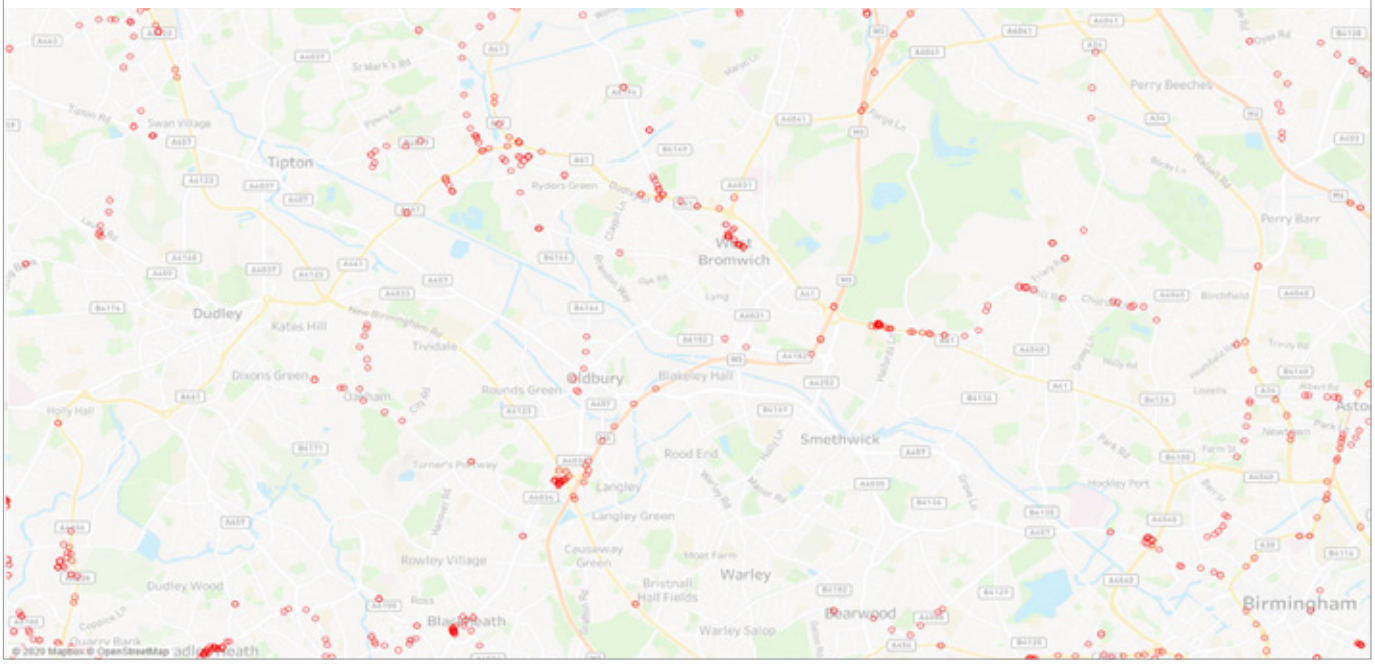
Key conclusions and metrics from our partnership with Gaist.

Test sample density taken to a new level.

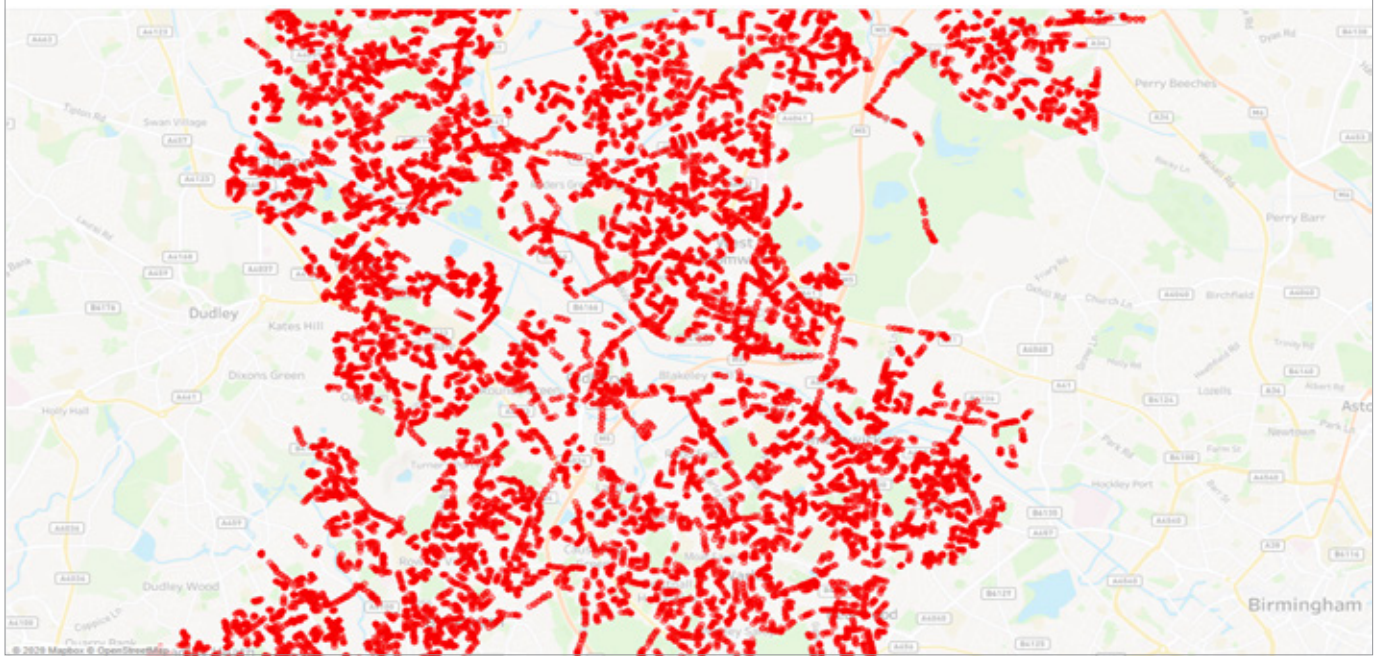
The density of our test sample collection in Sandwell reached a level that had never been seen before, with tests conducted on literally every road in Sandwell, providing organisations in the area with key insights and data on each operator's network down to the street level. Indeed, the power of our approach is on full display in the maps below, which shows where we conducted tests both before and after we partnered with Gaist to measure performance in Sandwell. The difference in sample density is stark.

Test sample density before and after our partnership with Gaist

Data collected by RootMetrics in Sandwell (2H 2019)



Data collected by RootMetrics and Gaist in Sandwell (1H 2020)

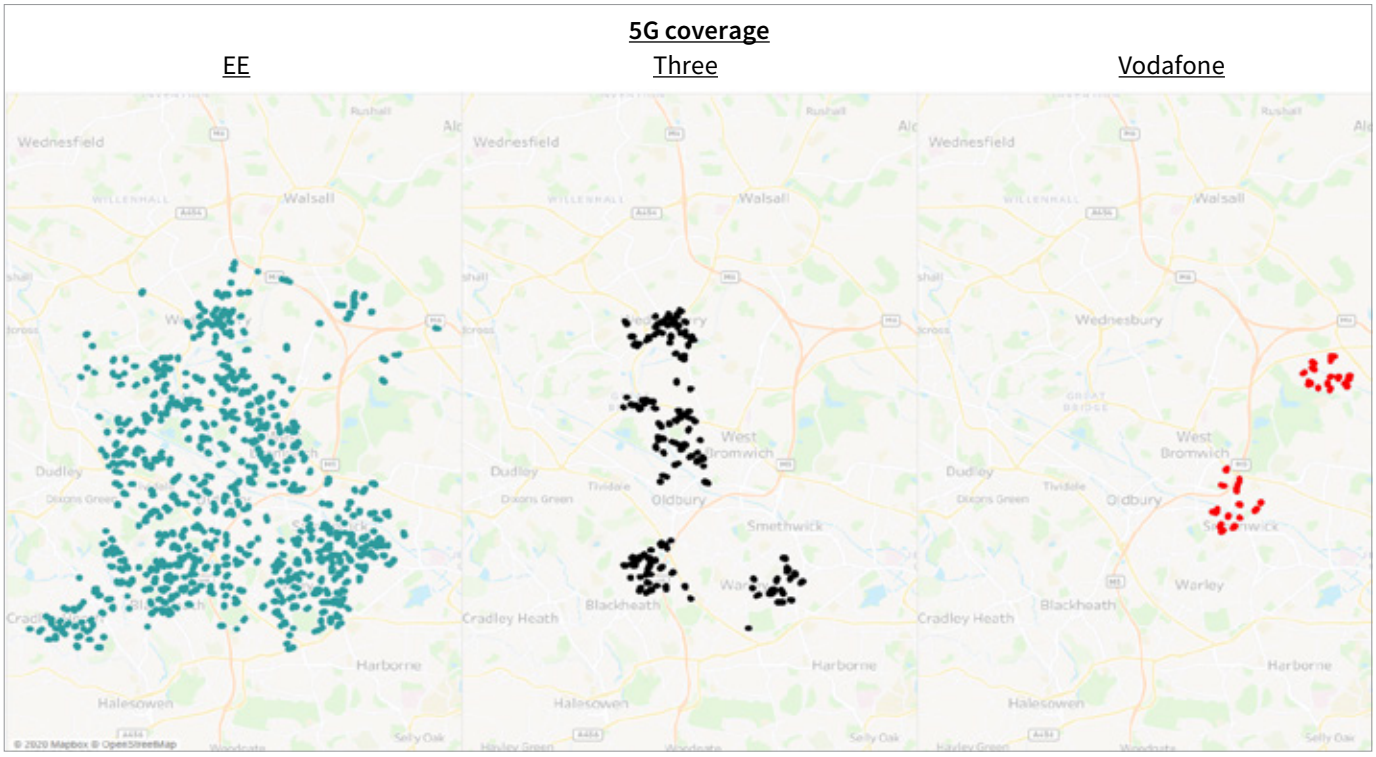


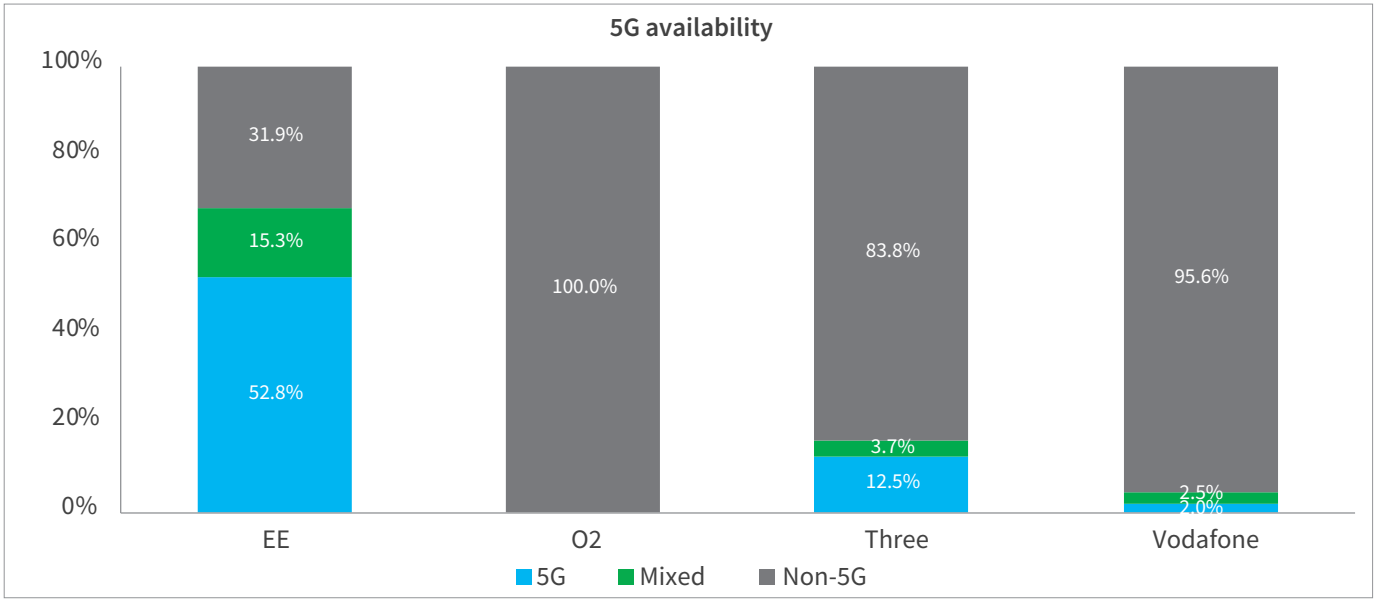
The coverage data is highly valuable in the assessment of coverage for WM5G use cases.

EE offers by far the most 5G in Sandwell.

While 5G is clearly showing much faster speeds than those on 4G LTE, those fast 5G speeds are only useful if mobile users can access 5G on a consistent basis. To that end, our testing showed that EE offered by far the most 5G in the area, with 5G availability of 52.8%.

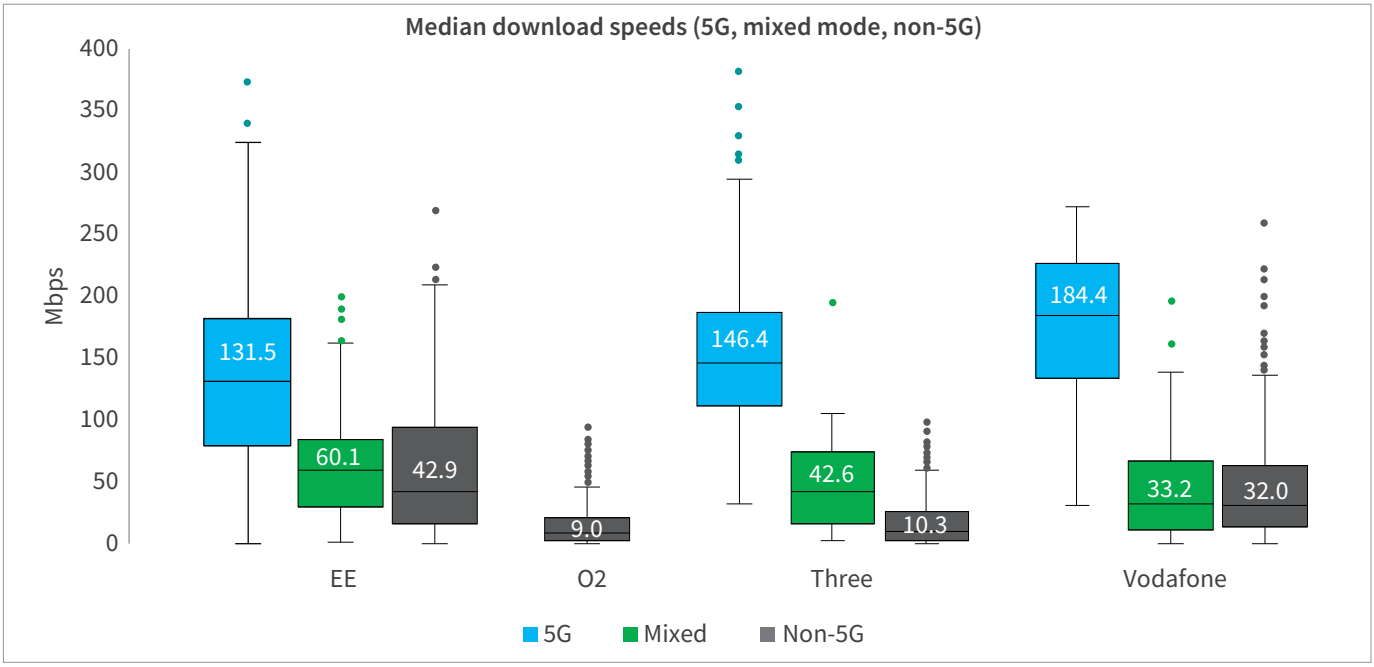
For perspective, the next-highest 5G availability was that of Three, at 12.5%. We recorded 5G results on Vodafone's network during 2.0% of our tests in Sandwell, while O2 didn't offer 5G at the time of testing.





Vodafone clocks the fastest 5G median download speed.

While Vodafone's 5G coverage wasn't nearly as widespread as that of EE or Three in Sandwell, Vodafone registered the fastest 5G median download speed among all operators at a blazing-fast 184.4 Mbps. Vodafone did, however, face strong competition from both EE and Three, with EE delivering an impressive 5G median download speed of 131.5 Mbps and Three clocking an even faster speed of 146.4 Mbps.

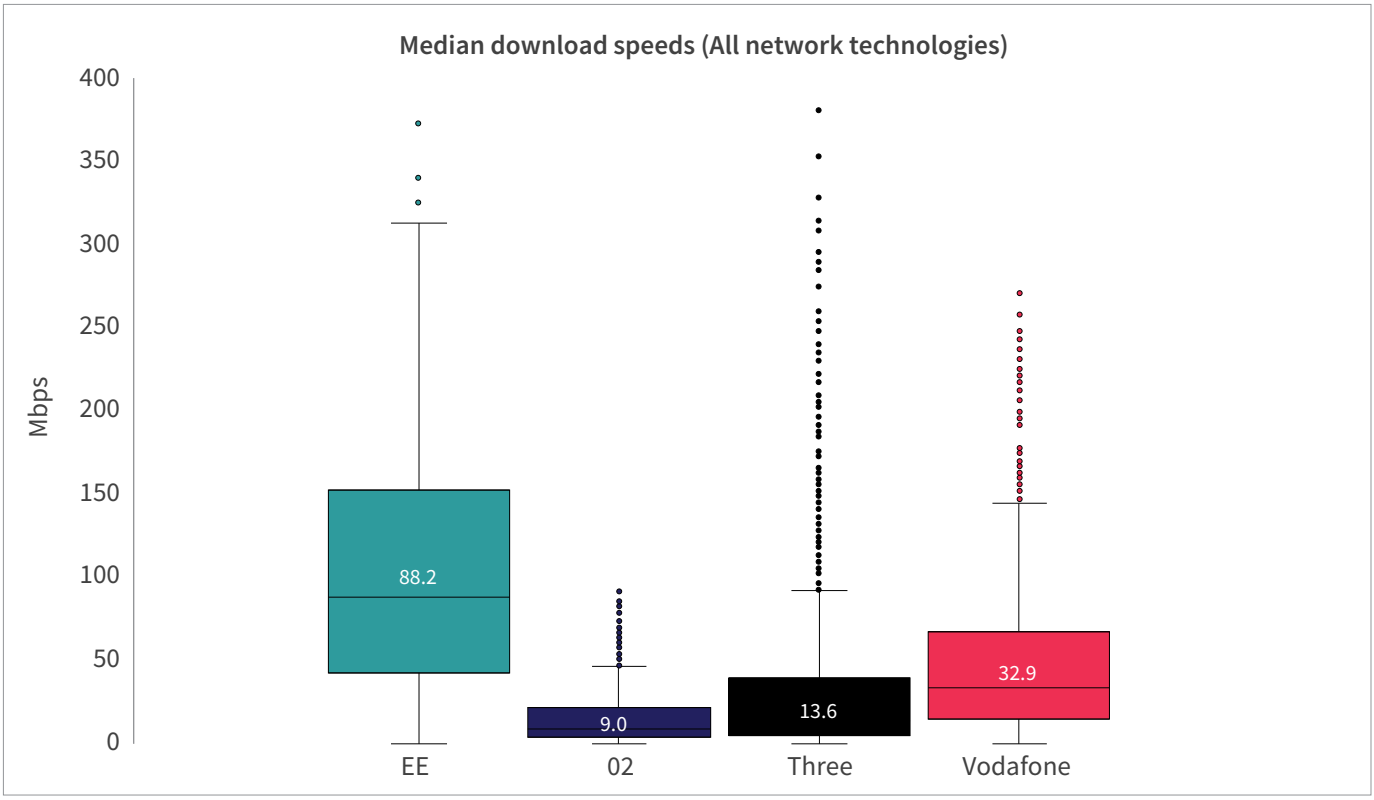


EE leads the way when looking at speeds across all network technologies.

With 5G still in its early stages in the UK, mobile users in Sandwell (and elsewhere) will likely switch from 5G to 4G LTE (or vice versa) for a significant portion of the time while using their mobiles. While we do measure and report results recorded entirely on 5G, we also show speeds recorded across all technologies, including 5G, 4G LTE, and mixed technologies, which reflects the end-user experience of switching to and from 5G and 4G LTE in the same data activity.

The chart below shows the median download speeds we recorded on 5G (where available), 4G LTE, as well as any sub-4G LTE technologies. EE registered the fastest median download speed in Sandwell at a strong 88.2 Mbps. Given EE's relatively widespread 5G coverage, the operator's speed was influenced considerably by its 5G network.

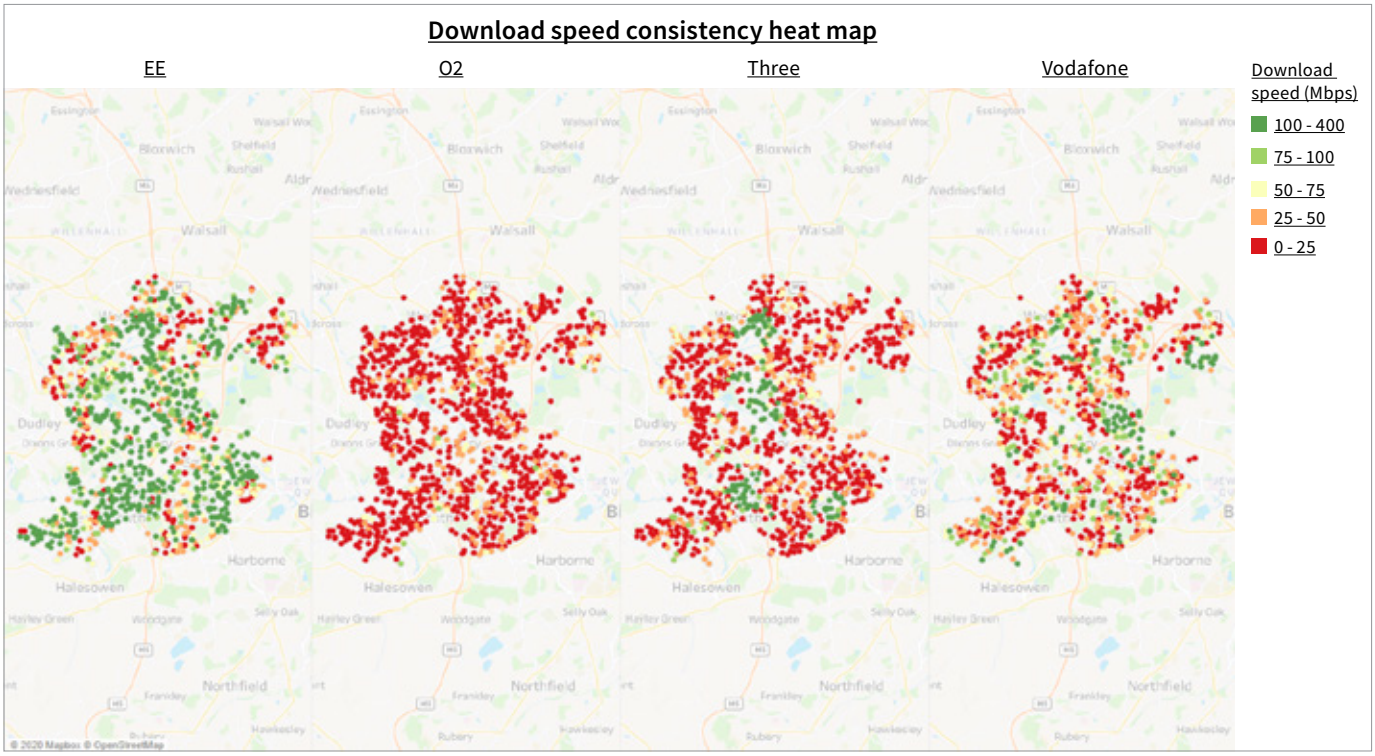
Vodafone's median download speed, while much slower than that of EE, was still good at 32.9 Mbps, with the majority of the operator's results recorded on 4G LTE. Meanwhile, O2 and Three trailed, registering relatively pedestrian median download speeds of 9.0 Mbps and 13.6 Mbps, respectively. It's worth noting that Three's speed of 13.6 Mbps was a bit surprising considering that the operator was on 5G for over 12% of our tests, while Vodafone was on 5G just 2% of the time. The difference between the speeds of Three and Vodafone speaks to the strength of Vodafone's robust 4G LTE network, which has earned a well-deserved reputation for providing fast speeds.



EE delivers unmatched consistency of fast speeds.

At the end of the day, the consistency of a network's speed results has the greatest impact on the end-user experience, and EE's consistency of delivering fast speeds (50 Mbps or faster) was second to none. On the heat map below, speeds above 50 Mbps are marked in yellow, speeds in light green are between 75-100 Mbps, while those in dark green range from 100-400 Mbps. EE's map is marked with a heavy yellow/green tint.

While Vodafone recorded the fastest 5G median download speed of any operator, Vodafone wasn't quite as strong as EE when it comes to speed consistency. O2 and Three, meanwhile, generally provided median download speeds at the lower end of the scale.



RootMetrics and Gaist: the bottom line.

Our partnership with Gaist has helped create a more robust, accurate view of performance across Sandwell and the West Midlands region. This data can be used by organisations and partnerships to help bring the benefits of 5G and connectivity to more people in more places. As more and more use cases are evaluated in testbeds across the UK, our combination of science-plus-crowd data can continue to provide critical coverage and performance insights that can allow organisations to make more informed decisions on how those use cases evolve and are ultimately deployed.

Data from this study, and from RootMetrics continued testing in general, can also identify 5G “yes and not spots,” showing where 5G coverage is problematic, nonexistent, or thriving. Understanding precisely where connectivity is lacking can help operators add coverage to specific areas and save time, money, and resources.

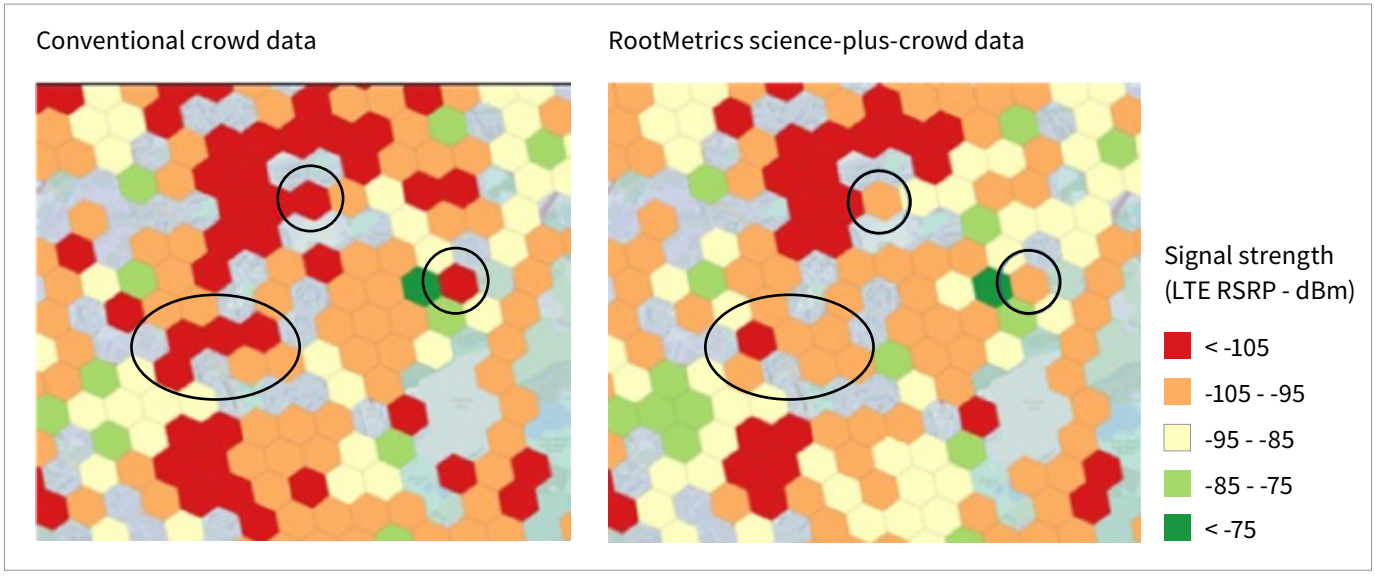
Science-plus-crowd in action: combining multiple data sources to unlock the potential of crowd data in Sandwell.

Partnering with Gaist allowed us to provide WM5G with accurate network coverage and performance insights down to the street level in Sandwell, but our analysis didn't stop there. Having access to the rich, controlled data set collected with Gaist allowed us to unlock insights from crowd data in the area that other approaches might miss. The key to that process is context: understanding where, when, and how a sample is collected matters.

With our scientifically collected results as a foundation, we utilised advanced analytics and machine learning models to evaluate and fine-tune crowd samples in the area to create a data set that is more trustworthy than crowd sampling alone. Our combination of scientific-plus-crowd data creates like-to-like comparisons that can help organisations confidently evaluate the competitive landscape more often and in more places.

Consider, as one example, the difference in signal strength metrics from crowd-only data and our more reliable results after crowd data has been informed by our scientific samples in the maps below. The map on the left indicates several areas as having poor signal strength. However, when corrected with scientific data, the same areas actually reported fair to good signal quality.

Unlocking the potential of raw crowd data with RootMetrics science-plus crowd approach



Our crowd results in Sandwell, when informed and enriched by our scientific results, allow us to offer a science-plus-crowd picture of performance that's more reliable and actionable than results from crowd testing alone.

Conclusion: the importance of measuring the growth of connected communities with the right data in the right places.

In today's digital society, where everything from retail payment terminals to routers to even our clothes are connected, it's imperative to have access to the right data and the right insights in the right places. As connected communities continue to grow and the expansion of 5G furthers that growth, data and intelligence from RootMetrics science-plus-crowd network performance testing products can help inform decisions both locally and globally.

Whether a town is deciding where to add a new smart meter on a particular street or a government agency is monitoring the progress of a project as widespread as the Digital UK, our data can help answer several key questions:

- How ready is a city for the implementation of connected IoT applications?
- How should businesses, industries, and operators prioritise issues and improvements that matter most to users?
- How much 5G is present in a given area?
- How fast and reliable is the 5G that's available?
- How and where can networks expand their 5G footprints as they continue to power our connected communities?
- How do the networks compare in terms of speed, latency, or reliability?
- How has performance trended over time?
- Which operator should consumers choose for their particular mobile needs?
- Which companies across the ecosystem should form partnerships, and where?

Ultimately, expanding connectivity efficiently and effectively requires understanding current coverage and performance in specific locations. But since connectivity isn't a single technology managed by a single organisation, partnerships will prove critical as our connected communities continue to grow. Data and intelligence from the RootMetrics science-plus-crowd approach to measuring performance can serve as the centrepiece of partnerships, helping businesses, cities, infrastructure providers, and more identify where areas of expansion and partnership opportunities make the most sense.

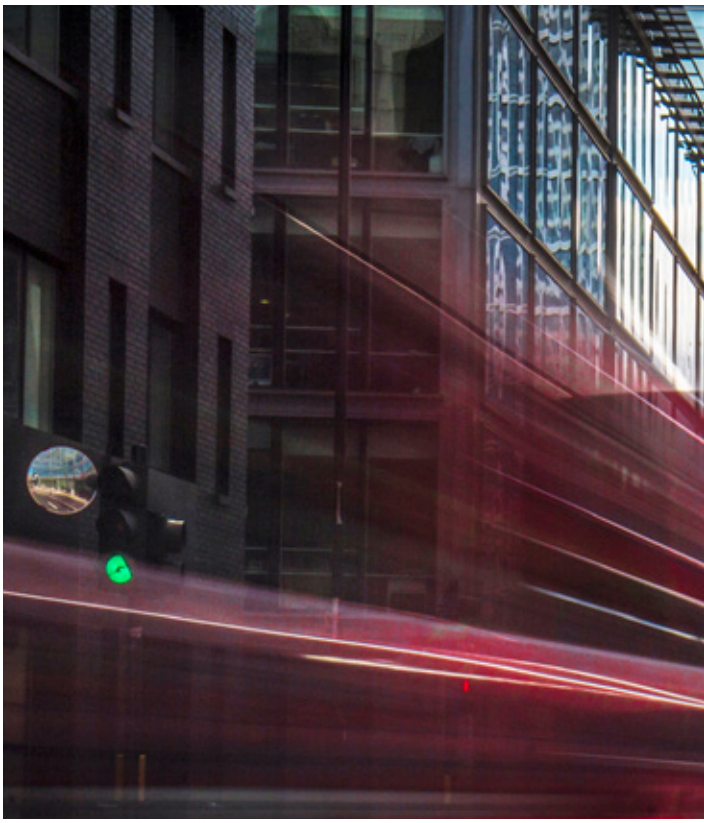
To take connectivity to a place where the technologies of the future become a part of everyday life today, businesses, industries, and governments need the right data, and they need it now.

Ready to learn more?

Contact us today to learn more about our suite of scientific and crowdsourced network testing products and find out how they can help your organisation take the next step toward reaching the potential of 5G and creating a truly connected world.

You can also email us at info@rootmetrics.com to discuss partnership opportunities or to find out more about how we measure connectivity globally and locally.

Contact us:
info@rootmetrics.com



About RootMetrics by IHS Markit

The standard for mobile performance measurement, RootMetrics by IHS Markit is an independent mobile analytics firm offering insights into how users experience networks under real-world conditions. RootMetrics data helps networks improve and gives consumers an end-to-end look at their real-world connected experience. To ensure that RootMetrics results reflect real-world consumer mobile usage, testing and results are based on where, when, and how consumers use their smartphones most often.

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