

Executive Summary

Cardiff Council welcomes the opportunity to respond to Ofcom's discussion paper, *Connectivity You Can Count On*. Cardiff strongly supports Ofcom's focus on moving beyond traditional coverage measures towards greater emphasis on real-world mobile performance, capacity and resilience. Ofcom's discussion paper recognises that mobile connectivity underpins how people live, work and travel, and that better mobile connectivity is critical to economic growth and digital inclusion. Cardiff's experience as a capital, regional economic centre and major events city demonstrates that the principal challenge in dense urban areas is increasingly not basic signal coverage, but insufficient network capacity during predictable periods of exceptionally high demand.

Cardiff considers that greater emphasis is needed on mobile performance during such periods of high demand, granular network capacity data, dynamic and localised spectrum utilisation, and regulatory measures that support shared infrastructure, outdoor small cells, neutral-host solutions and future 5G Standalone capabilities. This aligns with the UK Government's Wireless Infrastructure Strategy, which sets an ambition for high-quality standalone 5G in all populated areas and recognises advanced wireless connectivity as a foundation for economic growth, public services and transport innovation. It is also consistent with the Welsh Government's Digital Strategy for Wales, which emphasises the role of digital, data and technology in improving people's lives, strengthening public services, supporting businesses and enabling participation in modern society. Reliable mobile connectivity during major events should therefore be treated as a matter of public safety, urban resilience, emergency coordination, transport management, visitor experience and economic continuity, not solely as a consumer service issue. A framework that focuses only on whether an area is nominally covered risks overlooking the places and moments where networks are most heavily relied upon and where poor performance has the greatest practical consequences.

Cardiff plays a central role in generating economic activity for South Wales. Major events, tourism, hospitality, retail, transport and cultural activity in the city draw visitors, workers and businesses from across the region and beyond. Reliable mobile connectivity is therefore not only important for Cardiff residents and visitors, but also for the wider South Wales economy that depends on the city's ability to host large-scale events, accommodate major visitor flows, support business activity and maintain a safe, accessible and attractive city-centre experience.

Cardiff's Major-Event Connectivity Challenge

Cardiff hosts some of the UK's largest sporting, cultural and entertainment events, centred around the Principality Stadium, Cardiff Castle, Blackweir and the wider city centre. International rugby fixtures, stadium concerts, outdoor music events and other major occasions bring tens of thousands of visitors into a concentrated geographic area within short time periods, supporting hospitality, retail, tourism, transport, accommodation, cultural venues and wider supply chains across South Wales. Recent reporting on Cardiff's summer music programme has highlighted large-scale events, with significant visitor numbers, substantial spend outside venues and clear benefits for city-centre businesses.

These events generate substantial and predictable surges in mobile demand as attendees access digital tickets, arrange onward travel, make cashless payments, use navigation applications, communicate with family and friends, and share images and video online. The timing of this demand is often highly concentrated, particularly during arrival, departure and post-event dispersal. This creates pressure not only around venues, but also across streets, public spaces, transport interchanges, hospitality areas and routes between venues and the city centre.

While mobile networks generally perform adequately during business-as-usual operating conditions, the city regularly experiences congestion during event ingress and egress periods, when demand exceeds available capacity. This issue is most acute in the public realm surrounding major venues, as well as transport hubs and city-centre routes, rather than solely inside venues themselves. It is therefore important that Ofcom's approach to mobile performance reflects the user experience in the wider urban environment before, during and after major events, where users may be trying to access essential information, complete transactions, contact others or follow travel instructions.

Why Capacity, Not Coverage, Is the Key Issue

The distinction between coverage and capacity is critical. Traditional macro-cell infrastructure is typically designed around average daily demand and may not be sufficient to support the density of users present during large-scale events. A location may appear well served according to coverage maps while still delivering poor user experience during peak periods because available network capacity is constrained. For users, the practical outcome is the same as poor coverage: messages fail to send, webpages do not load, digital tickets and travel information become difficult to access, and transactions can be delayed or interrupted.

Cardiff considers that the principal barriers to improved event-day connectivity include limited deployment of temporary capacity infrastructure, difficulty securing suitable locations for temporary or permanent small cells, challenges coordinating activity between operators, venue owners and local authorities, constraints around backhaul and power, and commercial incentives that prioritise average demand rather than infrequent but highly concentrated peaks. These issues are not unique to Cardiff, but Cardiff's scale of events, compact city-centre geography and role as a regional destination make them particularly visible.

Ofcom's future approach should therefore recognise predictable congestion as a distinct category of connectivity challenge. Where demand peaks are known in advance, there is an opportunity for better planning, more transparent data sharing, targeted deployment, flexible spectrum arrangements and clearer accountability between stakeholders. This would support UK Government policy objectives to improve the quality, availability and adoption of advanced wireless connectivity, while helping Wales deliver digital services and economic participation in line with the Welsh Government's digital strategy. Treating major-event congestion as an unavoidable feature of urban life would risk missing an important opportunity to improve resilience, user experience and economic outcomes.

Operational Impacts

The reliability of mobile connectivity during major events has implications beyond consumer convenience and should be considered a public safety issue. Mobile congestion can affect crowd management, emergency coordination, transport operations, visitor experience, digital ticketing,

cashless payments, business continuity and the economic benefits generated by major events. During such events, local authority teams, transport operators, event organisers, emergency services and public safety partners rely on timely communications to manage crowd flows, road closures, public transport changes, emergency messaging, vulnerable person incidents, medical assistance, lost children, and wider incident response.

When networks are congested, members of the public may also find it harder to contact others, access safety information, receive travel updates, share their location or seek assistance. This is particularly important during event dispersal, when large crowds move through constrained streets, public spaces and transport nodes at the same time. Reliable mobile performance should therefore be understood as part of the wider safety infrastructure that supports a well-managed city during periods of exceptional demand.

Reduced mobile performance can delay the sharing of important operational information, limit access to digital systems and increase reliance on alternative, less efficient communication methods. It can also undermine visitor confidence, disrupt transactions and reduce the ability of local businesses and transport providers to benefit fully from major-event footfall. In a city where major events support hospitality, retail, taxis, public transport, hotels, visitor attractions and late-night economy businesses, connectivity failures can have wider commercial impacts that extend beyond the event venue.

Reliable mobile connectivity should therefore be regarded as a key component of urban resilience, event management and regional economic enablement, particularly for cities that host nationally significant events. Cardiff's position as a capital city means that the benefits of successful major events are felt across South Wales, while the costs of poor connectivity can affect visitors, businesses, transport providers and public services across a wider regional footprint.

Recommendations for Ofcom

Cardiff Council recommends that Ofcom take the following actions to support reliable mobile connectivity in high-density urban environments and major-event locations. These recommendations are intended to help translate Ofcom's performance-based approach into practical improvements that local authorities, operators, infrastructure providers and venue owners can work together to deliver.

1. Improve measurement of event-day performance

Current performance measures do not always capture the experience of users during major events. Ofcom should develop methodologies that assess event-day mobile performance, crowd-density impacts, peak demand periods, and performance immediately before and after events when transport hubs and public spaces are at their busiest. This should include consideration of upload performance, latency, service consistency, the ability to access commonly used services, and the ability of users and operational partners to access safety-critical information, not only headline download speeds. This would provide a more realistic assessment of whether mobile connectivity is genuinely reliable when users, public services and public safety partners need it most.

Cardiff would also support event-focused performance testing or monitoring in locations where high demand is predictable, including venue districts, outdoor event spaces, transport hubs and major pedestrian routes. This would help ensure that regulatory assessment reflects real-world conditions rather than average performance across wider areas.

2. Increase transparency of network capacity performance

Local authorities would benefit from access to more granular network performance datasets, including recurring congestion hotspots, street-level and venue-level performance information, city-to-city benchmarking, and tools that distinguish between coverage deficiencies and capacity constraints. Mobile capacity gap analysis would help identify where local authority support, access to public assets, planning facilitation, power availability, fibre backhaul or infrastructure upgrades may be required.

Improved transparency would also support more effective collaboration between local authorities, mobile operators and infrastructure providers. By understanding where and when congestion occurs, stakeholders can prioritise targeted solutions such as small cells, neutral-host infrastructure, enhanced backhaul connectivity and temporary event-day capacity measures. Transparent data would also help local authorities make better decisions about street works, public asset use, planning facilitation and the prioritisation of digital infrastructure alongside other public realm demands.

Whilst the document highlights the proposed approach for assessing network performance, predominantly focussed on defining a standard for good mobile and setting out a benchmark for the frequency expected. Further measures could also be taken:

- 1) Publish more granular performance data (eg. including average and peak-hour download/upload speeds, latency, packet loss and network availability metrics, postcode, street-level or grid-square performance data, distinguishing between indoor and outdoor performance).
- 2) Monitor network capacity and congestion by require reporting by operators of cell-level utilisation and congestion metrics, publish performance during peak periods, provide information on spectrum utilisation efficiency, identify congestion hotspots and capacity constraints.
- 3) Expand independent testing in order to move away from reliance on operator-reported data using sources such as larger-scale testing programmes, independent benchmarking by accredited third parties and continuous monitoring sensors in urban and rural areas to provide greater confidence in reported performance and helps validate operator claims
- 4) Improve real-time performance visibility via public dashboards showing network status, live reporting of outages and degradation, real-time congestion indicators, historic trend analysis to track improvements over time.
- 5) Greater utilisation of emerging technologies could provide richer insights into network performance for example, AI-driven network analytics, digital twin modelling of networks, predictive congestion forecasting, automated anomaly detection, integration of network and user experience data.

Effective mobile performance monitoring should evolve from simply measuring where coverage exists to understanding how networks perform under real-world conditions. Greater transparency, independent testing, congestion monitoring, and access to granular local data would enable Ofcom, operators and local authorities to identify problem areas more accurately, target investment more effectively, and improve the overall quality and resilience of mobile services.

3. Support more flexible and dynamic spectrum utilisation

Spectrum policy has an important role to play in addressing congestion during major events. While additional physical infrastructure such as small cells, distributed antenna systems and fibre backhaul will remain essential, Ofcom can support improved performance by ensuring that spectrum is used as efficiently and flexibly as possible. This is particularly relevant where demand is temporary, localised and predictable, and where additional spectrum capacity could complement targeted infrastructure deployment. Such an approach would be consistent with the UK Wireless Infrastructure Strategy's emphasis on strengthening the investment environment, improving spectrum utilisation and supporting the deployment and adoption of advanced wireless networks.

Cardiff would welcome further development of dynamic spectrum sharing approaches that allow spectrum resources to be used more efficiently in locations experiencing temporary but extreme demand. Ofcom could support trials of event-specific spectrum management arrangements, including temporary spectrum assignments, local licensing models, spectrum sandboxes and dynamic allocation mechanisms that allow additional wireless capacity to be activated when and where it is most needed. Such trials could be particularly valuable in cities with recurring major events, where lessons could be applied across other urban centres.

4. Promote shared infrastructure and neutral-host models

Ofcom should continue to encourage spectrum sharing and shared infrastructure models between operators and neutral-host providers. Shared infrastructure, coupled with shared or localised spectrum access, can reduce deployment costs, improve utilisation of scarce spectrum resources and accelerate the rollout of capacity-enhancing solutions such as outdoor small cells. This would also support the UK Government's objective of reducing barriers to wireless deployment and creating the conditions for investment in advanced connectivity. It is particularly relevant in dense urban environments where multiple operators may otherwise seek separate infrastructure solutions while users continue to experience congestion. A more coordinated model could help deliver better outcomes for all network users while reducing duplication in the public realm.

Cardiff would support further guidance from Ofcom on how local authorities can work effectively with operators and neutral-host providers to enable shared solutions. This could include clearer expectations around data sharing, deployment planning, access to public assets and the practical steps needed to support multi-operator service improvements in high-demand locations.

5. Prioritise public realm connectivity as well as venue connectivity

Connectivity improvements must extend beyond venue walls into the surrounding public realm, where many operational challenges occur. This is particularly important for city-centre venues and outdoor event locations such as Cardiff Castle and Blackweir, where large visitor numbers can place pressure on nearby streets, gathering areas, transport corridors and public spaces. Ofcom should support policies and guidance that promote outdoor small cells, neutral-host infrastructure, outdoor distributed antenna systems and temporary event-day capacity solutions in streets, transport corridors, gathering areas and other public spaces affected by major-event demand.

Cardiff is working with operators to support improved deployment by identifying opportunities to use street furniture, public assets and simplified deployment routes. However, greater coordination between operators, venue owners, local authorities and infrastructure providers is required to deliver meaningful and consistent improvements. Ofcom can play an important enabling role by

reinforcing the importance of local collaboration and by ensuring that regulatory frameworks recognise the public value of resilient connectivity in busy urban and event environments.

Cardiff has undertaken significant preparatory work to support the deployment of small cells and other capacity-enhancing mobile infrastructure across the city centre. This has included engagement with mobile operators and infrastructure providers, assessment of potential street furniture locations, review of structural, electrical, fibre backhaul, planning, warranty and operational requirements, and development of an agreement to govern access to Council-owned assets. Site work has considered locations with high-footfall routes where small cells could help relieve congestion from existing macro sites and improve user experience. Cardiff has also explored open-access and neutral-host approaches, recognising that shared infrastructure can reduce duplication, support multiple operators and make better use of public assets. This practical work demonstrates that local authorities can play an important enabling role, but also highlights the complexity of deployment, including power availability, fibre access, asset loading, street works restrictions, conservation considerations, public realm constraints and the need for clear coordination between operators, infrastructure providers and Council services.

Cardiff's approach has been to encourage operators to work together wherever possible, rather than pursuing separate, duplicated infrastructure on the same streets or public assets. In practical terms, this means promoting shared deployment models, neutral-host solutions and multi-operator equipment that can support improved service across more than one mobile network operator from a single asset or location. This approach is particularly important in constrained city-centre environments, where space, power availability, fibre backhaul, street works coordination and visual impact all need to be carefully managed. By encouraging collaborative use of Council-owned assets and multi-operator solutions, Cardiff aims to reduce unnecessary street clutter, make deployment more efficient, improve outcomes for residents, businesses and visitors across all networks, and ensure that public assets are used in a way that delivers the greatest public value.

6. Enable future 5G Standalone capabilities for operational resilience

Future spectrum and regulatory frameworks should support the deployment of 5G Standalone capabilities, network slicing, quality-of-service prioritisation and enhanced congestion management. These capabilities align with UK Government policy ambitions for standalone 5G to reach all populated areas by 2030 and could help maintain critical operational communications during periods of severe congestion, supporting emergency services, public safety partners, transport operators and local authority services managing large-scale events. They may also support new use cases for crowd management, real-time transport information, digital wayfinding, emergency messaging, location-based alerts and event operations.

While these technologies will not remove the need for additional infrastructure, they should form part of a longer-term strategy for supporting the connectivity requirements of major-event cities. Cardiff would welcome further work by Ofcom to explore how such capabilities could be deployed in complex urban environments where public safety, transport operations, visitor experience and economic activity depend on reliable mobile connectivity.

Conclusion

Cardiff Council supports Ofcom's move towards a more practical and performance-based understanding of mobile connectivity. In major-event cities such as Cardiff, reliable mobile service

cannot be assessed by coverage alone. It must also account for whether networks have sufficient capacity to support users, public services, emergency coordination, operational partners and the wider economic activity generated for South Wales during predictable periods of extreme demand.

Cardiff's ability to host nationally significant events is an important driver of economic activity across South Wales, supporting hospitality, retail, tourism, transport, cultural venues, local employment and wider supply chains. Evidence from recent Cardiff music events has highlighted substantial visitor numbers, significant expenditure outside venues, increased demand for accommodation, additional visits to eating and drinking establishments, retail activity and taxi journeys. When mobile networks become congested at the very moments of highest footfall, the impact is not limited to individual user inconvenience; it can affect digital transactions, visitor confidence, operational coordination and the ability of businesses and public services to capture the full economic value of major events.

Ofcom can assist by improving event-day performance measurement, increasing transparency of network capacity data, enabling more flexible spectrum utilisation, encouraging shared infrastructure and neutral-host models, and supporting future 5G capabilities that improve resilience during congestion. This would directly support UK Government policy objectives for high-quality standalone 5G, improved wireless infrastructure and stronger adoption of advanced connectivity, while also reinforcing the Welsh Government's wider digital ambitions for inclusive, effective public services, business resilience and economic participation. Such an approach would help ensure that mobile connectivity is genuinely dependable in the places and moments where it matters most, while strengthening Cardiff's capacity to maintain public safety, continue attracting visitors, enabling business activity and supporting economic growth across the wider region. Cardiff therefore urges Ofcom to recognise major-event connectivity as a strategic public safety, economic and resilience issue, and to lead the collaboration with local authorities, operators, infrastructure providers, venues and government to turn this recognition into practical improvements for cities across the UK.

In answer to the questions asked throughout the document:

2. The quality of mobile connectivity we want to see

What are your views on the use of Map your Mobile good performance metric and how should the measure evolve over time?

The Map Your Mobile "good performance" metric is a useful step forward because it moves beyond simple coverage reporting and begins to reflect the quality of service users actually experience. However, as currently conceived, it risks oversimplifying mobile performance by providing a single pass/fail indicator that may not fully capture congestion, reliability, or variations in performance throughout the day.

Key considerations for future evolution include:

- Retain a simple, user-friendly metric that allows consumers to easily compare networks and locations.
- Incorporate capacity and congestion measures, recognising that networks may meet performance thresholds at quiet times but perform poorly during peak demand.

- Include additional indicators such as latency, reliability, call success rates and service availability, not just download speeds.
- Report performance across different times of day, particularly during peak periods and major events.
- Provide greater geographic granularity, enabling users and local authorities to identify street-level or neighbourhood-level variations.
- Differentiate between indoor and outdoor performance, reflecting how people actually use mobile services.
- Develop separate measures for 4G and 5G performance, recognising their different capabilities and use cases.
- Enable trend reporting so users can see whether network performance is improving or deteriorating over time.

Overall, the good performance metric should evolve from a basic coverage-quality indicator into a broader measure of real-world user experience, combining speed, reliability, responsiveness and consistency. This would provide consumers, regulators and local authorities with a more meaningful assessment of mobile network performance and help target investment where it is most needed.

What are your views on the usefulness of:

> The 90% figure as a benchmark applicable across geographies and based on crowdsourced data,

- A 90% good performance benchmark provides a clear, simple and easily understood measure of mobile network quality that can be applied consistently across the UK.
- Using crowdsourced data is valuable because it captures the real-world experience of users rather than relying solely on operator predictions or modelled coverage.
- A common benchmark supports comparisons between operators, locations and over time, helping consumers, regulators and local authorities identify areas of poor performance.
- However, a single national benchmark may not fully reflect the differing challenges of urban, suburban and rural geographies, where user density, terrain and network demand vary significantly.
- Crowdsourced data can also be less reliable in areas with lower user activity, potentially resulting in gaps in the evidence base.

> Whether the 90% benchmark is realistic and sufficiently ambitious?

- The 90% threshold appears to be a realistic and achievable starting point for assessing good network performance across the UK.
- It strikes a reasonable balance between recognising existing network limitations and encouraging operators to improve service quality.
- However, there is a risk that operators may focus on meeting the minimum threshold rather than striving for higher levels of performance and resilience.

- As network capabilities improve, particularly with wider 5G deployment, the benchmark should be reviewed periodically and increased over time to drive continuous improvement.
- Consideration should also be given to adopting different performance thresholds for different environments or introducing additional measures for reliability, latency and peak-time performance.
- Ultimately, the benchmark should be viewed as a minimum expectation rather than an end goal, with a longer-term ambition to deliver consistently high-quality mobile connectivity across all communities.

3. Market-led improvements

What information do customers need about network quality to choose the network that best meets their needs, and where are the main gaps in current provision of that information?

- Customers need access to accurate, location-specific information on mobile network quality, including coverage, download and upload speeds, latency, reliability, call success rates and performance during peak periods.
 - Information should reflect the real-world user experience, rather than theoretical coverage predictions, and differentiate between indoor and outdoor coverage.
 - Customers would benefit from being able to compare network performance at the locations that matter most to them, such as their home, workplace, commuting routes and frequently visited destinations.
 - Greater transparency around network congestion, service availability and outage history would help customers understand how networks perform under varying demand conditions.
- ☐ Information should also distinguish between 4G and 5G performance and provide confidence levels where data is based on modelled or crowdsourced information.

Current gaps in provision include:

- Coverage maps often show where a signal is available but provide limited information on the quality and consistency of service.
- There is insufficient visibility of peak-time performance and network congestion, particularly in city centres, transport hubs and large event venues.
- Data is often not available at a sufficiently granular geographic level to support informed decision-making.
- Limited information is available on reliability, latency and service continuity, despite these factors having a significant impact on user experience.
- Local authorities and consumers would benefit from more transparent, independently verified and regularly updated performance data to better understand network quality and identify areas requiring improvement.

How well does Map Your Mobile currently meet customer and stakeholder needs, and what specific improvements would make it more useful?

- Map Your Mobile is a positive development as it provides a more user-focused view of mobile performance than traditional coverage maps and helps consumers compare networks using real-world crowdsourced data.
- The platform has the potential to support not only consumers but also local authorities, regulators and operators by improving transparency and highlighting areas of poor performance.
- However, its usefulness is currently limited by the lack of information on network capacity, congestion, reliability and peak-time performance, which often have a greater impact on user experience than coverage alone.
- The platform would be more valuable if it provided greater geographic granularity, allowing users to assess performance at street, neighbourhood or postcode level.
- Performance information should distinguish between indoor and outdoor coverage, as well as between 4G and 5G services.
- Additional metrics such as latency, call success rates, outage history and service availability would provide a more complete picture of network quality.
- Users would benefit from the ability to view performance at different times of day, particularly in areas prone to congestion such as city centres, transport hubs and major event venues.
- For local authorities and other stakeholders, access to more detailed performance and capacity data, including downloadable datasets and GIS-compatible information, would support evidence-based planning and targeted infrastructure investment.
- Greater transparency around data sources, sample sizes and confidence levels would also improve trust in the information presented.

Overall, Map Your Mobile provides a useful foundation, but its value would be significantly enhanced by incorporating measures of real-world network quality, capacity and reliability, alongside more granular and actionable location-based information.

4. Connectivity in busy areas

4.23 highlights that the Government has launched a review of the planning framework for telecoms developments in England however, planning is a devolved responsibility, and the outcomes will not automatically apply in Wales. Nevertheless, the findings may provide useful evidence of measures that could support the more efficient deployment of digital infrastructure. We would encourage continued collaboration between the UK and Welsh Governments to ensure that best practice is shared and that any successful reforms which facilitate improved mobile connectivity can be considered within the Welsh planning framework.

What do you think are the biggest barriers to achieving better mobile performance in town and city centres and why?

- Network capacity and congestion in high-demand areas: Cardiff experiences significant fluctuations in mobile demand, particularly in the city centre, Cardiff Bay, transport hubs, and during major

events at venues such as the Principality Stadium. While coverage may be available, network performance can deteriorate significantly at peak times due to insufficient capacity.

- Insufficient network densification: As data consumption continues to grow, providing good performance increasingly requires additional infrastructure such as small cells, street works equipment and upgraded mast sites. In dense urban areas, existing macro sites alone are often insufficient to meet growing demand.
- Challenges securing suitable sites and power: Operators can face difficulties identifying and deploying infrastructure in the most effective locations, particularly where space is limited, power supplies require upgrading, or equipment must be integrated into existing streetscapes and public assets.
- Planning and deployment timescales: Although efforts have been made to streamline deployment, obtaining the necessary consents and coordinating works across multiple stakeholders can still slow network upgrades and the rollout of new technologies.
- Limited visibility of network performance and congestion data: Current public coverage information does not always provide sufficient insight into real-world performance, capacity constraints or congestion hotspots. This can make it difficult for local authorities and regulators to identify where interventions or investment are most needed.
- Growing demand for mobile data: Increased use of video streaming, cloud services, digital public services, hybrid working and emerging technologies is placing continual pressure on network capacity, requiring ongoing investment in both spectrum and infrastructure.
- Complex urban environment: Cardiff's mix of modern developments, dense city centre buildings, historic areas and varying topography can affect signal propagation and make consistent indoor and outdoor mobile performance more challenging to achieve.

In summary, the greatest challenge in Cardiff is no longer basic coverage but ensuring sufficient network capacity and resilience to deliver consistent performance where and when demand is highest. Addressing this will require greater network densification, better use of public assets, improved access to performance data, and continued collaboration between operators, Ofcom, the Welsh Government and local authorities to support timely infrastructure deployment.

What information would stakeholders, especially local authorities / planning authorities find useful for Ofcom to provide further insights on and why?

- More granular mobile performance data at postcode, street or neighbourhood level, including speeds, latency, reliability and service availability. This would help local authorities identify areas experiencing poor user experience despite nominal coverage.
- Network capacity and congestion data, particularly during peak periods and major events. Understanding where networks are approaching capacity limits would enable authorities to support targeted infrastructure deployment and future planning.

- Indoor versus outdoor performance information, as many residents and businesses experience connectivity issues indoors that are not reflected in standard coverage maps.
- Coverage and performance data for individual technologies (4G, 5G and future mobile technologies), helping authorities understand where upgrades are required and where digital disparities exist.
- Performance trends and future demand forecasts, allowing local authorities to anticipate areas where increasing population growth, regeneration projects or major developments may require enhanced mobile infrastructure.
- Operator investment and rollout plans, where commercially appropriate, to provide greater visibility of planned network upgrades and support coordination with local development and infrastructure projects.
- GIS-compatible datasets and mapping tools, enabling mobile network information to be incorporated directly into local authority planning systems and digital mapping platforms.
- Information on network performance at strategic locations, including city centres, transport corridors, hospitals, schools, business parks and major event venues, where reliable connectivity is critical for economic activity and public services.
- Independent benchmarking and comparative performance data between operators to improve transparency and support evidence-based decision making.
- Coverage and performance information for disadvantaged or underserved communities, helping local authorities target interventions and support digital inclusion objectives.

Why This Information Is Important:

Providing more detailed and transparent network performance information would enable local authorities and planning authorities to make better-informed decisions on planning policy, asset utilisation, regeneration programmes and digital infrastructure investment. It would also help identify congestion hotspots, support the deployment of small cells and other network infrastructure, and facilitate closer collaboration between local authorities, Ofcom and mobile network operators to improve mobile performance in areas of greatest need. For cities such as Cardiff, this would be particularly valuable in understanding and addressing network pressures in dense urban areas, transport hubs and major event locations.

6. Connectivity on Trains

We concur with Ofcom's approach to improving the provision of mobile connectivity on rail networks and recognise the unique challenges associated with delivering consistent and reliable service to passengers. Mobile connectivity on trains is influenced by a combination of factors, including coverage gaps along rail corridors, signal attenuation caused by carriage design, the speed of moving users between cells, and significant fluctuations in passenger demand. Addressing these challenges will require continued collaboration between mobile network operators, rail operators, infrastructure owners and government bodies to support targeted investment in trackside

infrastructure and onboard connectivity solutions. Given the increasing reliance on mobile connectivity for work, access to public services and passenger information, improving connectivity on rail routes should remain a priority. Consideration should also be given to monitoring performance across complete journeys rather than coverage alone, ensuring that measures reflect the actual experience of passengers travelling on the network.

What do you think are the biggest barriers, technical and commercial, to achieving better mobile performance on trains? Which are most significant and why?

The biggest barriers to achieving better mobile performance on trains are a combination of technical challenges associated with the rail environment and commercial challenges relating to the cost and complexity of deployment.

From a technical perspective, one of the most significant barriers is the difficulty of maintaining a consistent mobile connection along an entire rail corridor. Trains travel at high speed through a variety of environments, including urban areas, cuttings, tunnels, rural locations and stations, resulting in frequent handovers between mobile cells and varying signal strength. Modern train carriages can also significantly attenuate mobile signals due to metal construction and energy-efficient window coatings, reducing the quality of service experienced by passengers even where external coverage exists. In addition, peak passenger volumes can place substantial demand on available network capacity, particularly on busy commuter routes and at major stations.

From a commercial perspective, the cost of deploying and maintaining infrastructure alongside rail corridors can be considerable, particularly in less densely populated areas where the commercial return on investment may be limited. Delivering seamless connectivity often requires collaboration between multiple parties, including mobile network operators, Network Rail, train operating companies and infrastructure providers, which can add complexity and extend deployment timescales. Access to railway land, power supplies, backhaul connectivity and infrastructure sharing arrangements can also present challenges.

The most significant barrier is arguably network capacity and infrastructure deployment along rail routes, as addressing this challenge underpins many of the other issues. Even where coverage exists, passengers may continue to experience poor performance if networks lack sufficient capacity to cope with demand or if infrastructure is not positioned to provide continuous service along the route. A coordinated approach involving targeted investment in trackside infrastructure, improved in-train signal solutions, infrastructure sharing and better performance monitoring will be essential to deliver a consistently high-quality mobile experience for rail passengers.

Do you agree with our proposal to work with government to support improvements in train connectivity?

Yes, we agree with Ofcom's proposal to work with government and industry stakeholders to support improvements in mobile connectivity on trains. The challenges associated with rail connectivity extend beyond the remit of any single organisation and require coordinated action between government, regulators, mobile network operators, infrastructure providers, Network Rail and train operating companies. A collaborative approach is therefore essential to address barriers relating to trackside infrastructure deployment, access to railway land, power availability, spectrum utilisation and onboard connectivity solutions.

We particularly support measures that encourage investment in continuous coverage and capacity along rail corridors, recognising that passengers increasingly rely on mobile connectivity for work, access to public services and communication while travelling. Improving connectivity on trains can deliver wider economic and social benefits by supporting productivity, enhancing passenger experience and enabling more reliable access to digital services. Consideration should also be given to establishing clear performance metrics based on the end-to-end passenger experience, including reliability, continuity of service and performance throughout entire journeys, rather than focusing solely on geographic coverage. Continued collaboration and information sharing between stakeholders will be critical to identifying priority routes, addressing infrastructure constraints and delivering meaningful improvements to mobile connectivity across the rail network.

What information would you find useful for Ofcom to provide further insights on in relation to connectivity on trains and why?

Ofcom could provide additional insight into train connectivity through the publication of more detailed, route-specific performance data that reflects the real experience of passengers throughout a journey. This should include information on network availability, download and upload speeds, latency, call success rates, and service continuity by operator across individual rail corridors. Of particular value would be data identifying persistent coverage gaps, congestion hotspots, tunnels, stations and other locations where connectivity regularly deteriorates.

It would also be beneficial for Ofcom to publish comparative performance data during different times of day, particularly on busy commuter routes where network capacity constraints may be most apparent. Information on the causes of poor performance, whether related to signal propagation, train carriage design, infrastructure limitations or network congestion, would help stakeholders better understand the challenges involved and target interventions accordingly.

For local authorities, transport bodies and infrastructure planners, access to GIS-compatible datasets, route-level performance maps and future demand forecasts would support more effective planning and investment decisions. Greater transparency around planned infrastructure upgrades, trackside deployment opportunities and best practice examples from successful rail connectivity programmes would also help inform collaborative approaches to improving mobile connectivity across the rail network.

Ultimately, the most useful insight would be a shift from measuring coverage alone to assessing the end-to-end passenger experience, enabling stakeholders to identify where improvements are needed most and track progress over time.