

Your response

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Section 2: The quality of mobile connectivity we want to see - What are your views on the use of the Map Your Mobile good performance metric and how should the measure evolve over time? What are your views on the usefulness of: - the 90% figure as a benchmark applicable across geographies and based on crowdsourced data?, and - Whether the 90% benchmark is realistic and sufficiently ambitious?	Confidential? – N OFCOM should be commended for commissioning and publishing four excellent studies: ‘Connectivity you can count on’, ‘Consumer Experiences and understanding of mobile network quality’, ‘A report on connectivity in Greater Manchester’ and ‘Connectivity on Trains Measurement Study’. Our views on the Map Your Mobile ‘good’ performance metric are that it is not ambitious enough. The UK currently scores 33rd out of 38 OECD Members for Mobile Network performance, and unless it sets its sights higher than 5Mbps download, 1.5Mbps upload and latency of less than 50ms it will continue to under perform the rest of the OECD members. As a G7 nation we should aim to be higher up the OECD ranking than the top third. For fixed broadband connections, download speeds of less than 10Mbps would not meet the Broadband Universal Service Obligation (USO), and would fall into the category of ‘Digital Exclusion’. So it is hard to justify mobile performance at half this level as ‘Good’. We would urge further work to set a benchmark for ‘Good’ performance, involving real-world users in a trial with connection performance varied and user feedback gathered, with the benchmark for ‘Good’ being set at a level deemed ‘Good’ by the majority of users. We would also suggest a published methodology for keeping this metric current with growing customer expectations, as what will be judged ‘Good’ in 2026 will not be so in 2030. We would anticipate that a user-led study such as this would result in a ‘good’ definition being somewhere of the order of ≥ 20Mbps download, ≥ 5Mbps upload and ≤ 30ms latency. Clearly it would be unrealistic and unaffordable to achieve this level of performance currently across the whole 100% of the UK’s landmass. There are strong arguments for tackling the remaining ‘not spots’ to avoid people in very rural areas being unable to call for help, and to enable very rural businesses to operate in a connected world.

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	But we feel there could be a case for setting two thresholds – ‘Acceptable’ and ‘Good’, with the ‘Good’ areas prioritised to align with the areas most likely to promote economic growth. Furthermore, people’s wish to ‘use’ data will depend on the setting and location, and so will the effect on national productivity. The level of mobile performance that could be completely acceptable to support someone use a mobile mapping app, send a short message or email and perform basic web-based tasks such as booking a table at a restaurant when walking along a city centre pavement is going to be much less acceptable for a person seated at a desk in an office building, or seated for a 2 hour train journey. Network performance demands for these scenarios are likely to much higher – as the use cases are very different. In these settings people are likely to want to be able to participate in video calls, access large files from remote company servers and cloud storage, stream videos and music etc. Please see our response to Sections 5 and 6.
Section 3: Market-led improvements in mobile network quality • What information do customers need about network quality to choose the best network for their needs, and where are the main gaps in current provision of that information? • How well does Map Your Mobile currently meet customer and stakeholder needs, and what specific improvements would make it more useful?	Confidential? – N We feel that customers would appreciate actual measured network performance data rather than information based primarily on signal strength. We note that the Map Your Mobile data includes crowd-sourced real-world user experience data, and this is to be welcomed. But greater transparency on the process used to incorporate this data would be useful. The ‘Connectivity on Trains Measurement Study’ prepared for OFCOM by Streetwave is excellent, and we would urge more measured survey information like this should be included in the Map Your Mobile database. The following sentence from page 27 of this report is especially pertinent: <u>‘The correlation between signal strength (RSRP) and throughput remains weak on both 4G and 5G, indicating bandwidth and how the network allocates capacity between users have a greater effect on throughput than radio considerations alone’</u>. This aligns with our own experience of the Map Your Mobile data for specific rural areas in south, mid and north Wales where we do

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	regular work. In each of these areas the Map Your Mobile predictions flatter actual mobile network performance observed. We have seen considerable reductions in network performance when holiday makers descend onto a seaside village which is sparsely populated for the rest of the year. Signal strength is displayed as good in most outdoor areas, but the network slows down so much it becomes virtually unusable. Map Your Mobile does not predict this, but a measured survey at different times of the year would. Basing network performance predictions on predicted or even measured signal strength masks problems with a lack of cell density and inadequate backhaul performance. The 'Buffering Britain' network performance measurement app is worthy of further investigation by OFCOM. Maybe there would be merit in OFCOM either drawing on this data or commissioning its own independent app for widespread deployment amongst users – with data collected and analysed centrally.
Section 4: Connectivity in busy areas • What do you think are the biggest barriers to achieving better mobile performance in town and city centres and why? • What do you think should be Ofcom's main priorities for our future work in this area? • What information would stakeholders, especially local authorities / planning authorities find useful for Ofcom to provide further insights on and why?	Confidential? – N OFCOM's 'Connectivity you can count on' Section 4 details all the key barriers – primarily planning restrictions and the need for greater cell density and capacity. We are not able to comment on how these barriers rank in priority order. We are unable to comment on this. We are unable to comment on this.
Section 5: Connectivity in indoor, shared public places • What do you think are the biggest barriers to achieving better mobile performance indoors and why?	Confidential? – N We fully agree with OFCOM's findings at paragraphs 5.9 and 5.10 in the 'Connectivity you can count on' report, and agree that the only realistic and affordable way to

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Section 6: Connectivity on trains What do you think are the biggest barriers, technical and commercial, to achieving better mobile performance on trains? Which are most significant and why?	Confidential? – N We agree with the barriers detailed in section 6 of OFCOM's 'connectivity you can count on' paper. The technical challenges are: 1. The train carriage 'vehicle penetration loss' (3-28dB) and crowding loss (0-60dB) results in lower received signal strengths and signal-to-noise ratios in carriages, even in areas where good network coverage exists. Changes to carriage window design and retro-treatment options reduce penetration loss, but the rest of the carriage structure still represents a partial Faraday Cage. Network performance inside trains will therefore always be worse than for someone standing outside adjacent to the railway. 2. MNO network performance across the UK underperforms most other OECD countries, and is especially poor outside urban areas due to lower cell density, and lower cell and backhaul performance for rural networks – which struggle to connect several hundred train passengers with good performance for the short time they are within cell before moving to the next. 3. Mobile users travelling on trains move between mobile cells at a rapid pace, introducing additional handover overhead. As a result a mobile user on a train will always experience poorer network throughput and latency than a static user outside. As noted in OFCOM's 'connectivity you can count on' paper section 6, the commercial barriers to solving this problem are very significant, as MNOs have very limited incentive to invest. We believe that this problem will not be solved without market intervention from OFCOM and Government. Of all the scenarios covered by 'connectivity you can count on', improving network performance on trains has the potential to trigger the greatest economic advantage for the UK, so the UK Government and the devolved administrations have an incentive to facilitate cost-effective solutions. For the reasons outlined above, external 5G networks alone are fundamentally unsuited to the

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Do you agree with our proposal to work with government to support improvements in train connectivity?	Railway use case. We believe that improving the performance of external 5G networks along rail corridors is the least cost effective technical solution to this problem. In terms of cost versus unit increase in network performance per mobile user (across the various measures – download speed, upload speed, latency, jitter) dedicated trackside networks offer the most cost-effective and ‘future proof’ solution. Passenger mobile users connect to one internal network (which could be WiFi, although there could be a number of commercial advantages to this being a form of travelling private 5G network) for the duration of their journey. The external trackside-train network, regardless of vendor, will have been designed to achieve low latency and minimise the impact of handovers between trackside antennas. We believe the most significant challenges are commercial, and would welcome the opportunity to engage further on this. Yes very much. As noted elsewhere in our response, we believe that there is no ‘one size fits all’ definition of ‘good’ network performance. What is perceived as ‘good’ depends on where the user is and what they want to do. A mobile user walking along a city centre pavement is likely to be entirely happy with a 5Mbps download, 1.5Mbps upload and latency ≤ 50ms level of performance. But a business or commuter train Passenger with laptop on, sat at a table for a 2 hour train journey has the potential to be far more productive if he/she can connect in the way they would at home or in the office. For this kind of use, 5Mbps is wholly inadequate if GDP growth is a driver – and would be classed as digital exclusion if measured at home or in the office. Similarly for leisure passengers who have no desire to work, but want to enjoy their journey a 5Mbps/1.5Mbps/50ms connection will not enable them to enjoy the same level connectivity performance as they would get at home. Anything less than their home broadband performance will feel frustrating and slow. Research in Scandinavia has shown that well-connected rail passengers perceive lower than actual journey times,

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What information would you find useful for Ofcom to provide further insights on in relation to connectivity on trains and why?	and are more likely to travel again by rail. This could help us reduce the annual operational subsidy the UK taxpayer gives the railways – which for 2025 was £11.9 billion. OFCOM's 'connectivity you can count on' paper paragraph 6.17 notes that millimetre wave trackside networks can provide high capacity and a seamless experience for passengers. We firmly agree with this. It then goes on to state 'but they are often expensive compared with other options, meaning that they are unlikely to scalable across other parts of the rail network'. If 'expensive' is taken to include value for money rather than absolute cost, then the most expensive way to improve connectivity for rail passengers would be to invest in 5G network improvements along the rail corridor. Where such improvements can be justified by other means – e.g. to improve connectivity for rural communities, or to improve network capacity in stretched urban areas they make sense. But when network infrastructure is being invested in purely for the rail corridor, Low Earth Orbit (LEO) satellite connectivity and millimetre wave trackside-train networks offer the best value for money in terms of improvement per unit performance measure per pound invested. LEO satellite connectivity is a 'quick fix', and the £57M of Government Money announced is welcomed. The LEO satellite solution is likely to be a long term solution for very rural, lightly used railway lines as the number of passengers sharing a single 200-300Mbps connection is likely to be low. Initially the passenger experience is likely to be good for the heavily-used trunk routes as well. But once passengers realise there has been a step-change in onboard WiFi performance, the proportion of the (say) 600 passengers on a busy train using the service will increase. Even with two LEO connections per train, a dismal 1Mbps connection per passenger will be approached quite quickly. But LEO Satellite offerings are unlikely to remain static in terms of performance. 1Gbps connections have been rumoured. Two such connections to a train offering an aggregate throughput for passengers of 2Gbps with no

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	trackside infrastructure required makes a trackside network with similar performance (a good solution today) start to appear poor value for money in the longer term. <u>The UK's security interests are also likely to be best served with a Sovereign UK network solution.</u> We see the trackside- train connectivity challenge as one of carrier grade backhaul, and would welcome revision to OFCOM rules allowing the use of E-Band fixed point-to-point backhaul spectrum (71-76 and 81-86GHz) for railway backhaul purposed. We are having a very helpful separate dialogue with OFCOM on this, and fully agree that very robust measures need to be in place to reduce the risk of interference with other users in the band to an absolute minimum. To help solve the problem of poor connectivity on trains we would therefore urge OFCOM to continue to consider making such additional spectrum available. But probably the most challenging hurdles to overcome are commercial. In many ways the problem for trains is similar to the problem in buildings – but more acute, as most office buildings nowadays have fibre connections which can be used to connect WiFi, DAS and Private 5G solutions. All the same arguments for treating buildings differently and recognising that the MNOs cannot solve the problem alone apply to ‘moving buildings’ – i.e. trains. To make railway solutions commercially feasible, we would urge market intervention from OFCOM, UK Government and the devolved administrations to create goal alignment and incentivise other infrastructure providers to work with MNOs and be financially rewarded for doing so. We can see three possible models, and there may well be others: 1. Direct Government investment in order to realise the substantial productivity gains and rail subsidy reductions. 2. MNO funding (encouraged by the regulator and Government) where their customers roam to an

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	onboard private 5G or WiFi network because their own 5G network is unavailable or performing poorly 3. Government intervention to encourage the use of LEO satellite and mmWave trackside networks as alternate FRMCS bearers for the specific parts of the rail network where, taken in the round, they make better economic sense than using rail 5G FRMCS spectrum as the bearer.
Section 7: Connectivity in rural areas • What do you think are the biggest barriers to achieving better mobile performance in rural locations and why? • What do you think should be Ofcom's main priorities for our future work in rural locations and what outcomes should we aim to achieve? • What solutions (technical, commercial, policy or delivery) could improve rural mobile performance? • What information would you find useful for Ofcom to provide further insights on in relation to rural connectivity and why?	We agree with the causes listed in Section 7 of OFCOM's 'Connectivity you can count on' paper. We believe that the priorities should be safety, followed by economic benefit. There are areas of the country where people cannot use their mobile devices to call for help (e.g. the emergency services), and this needs to be fixed. But it does not necessarily need to be fixed with a very high capacity solution. We have sympathy for those trying to run businesses in areas served by poor network performance, but ubiquitous 'good' mobile network coverage is not an affordable solution. There will be areas of the country where increased roll out of FTTP networks will be a more cost effective solution than lots of additional mobile network capacity, as long as – for the mobile user – the transition between external 5G coverage and local private 5G or WiFi connectivity is seamless and commercially incentivised. As for the other sections, we would urge the publication of measured network performance data such as the Streetwave surveys rather than data based largely on predicted signal strength – as such data tends to flatter MNO performance, and does not show the (often very significant) reductions in performance at peak times due to infrastructure overload.

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