Response to Department for Digital, Culture, Media and Sport & Department for Transport:
Call for Evidence on Commercial options for delivering mobile connectivity on trains:

BSG
Broadband
Stakeholder
Group

January 2018

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Response to the DCMS and DfT consultation: Commercial options for delivering mobile connectivity on trains: Call for Evidence

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> The Broadband Stakeholder Group (BSG) is the UK government's leading advisory group on broadband. It provides a neutral forum for organisations across the converging broadband value-chain to discuss and resolve key policy, regulatory and commercial issues, with the ultimate aim of helping to create a strong and competitive UK knowledge economy.

The Broadband Stakeholder Group welcomes the Government's commitment to improving mobile connectivity on trains. A digital infrastructure that works for the UK necessitates a fixed and mobile network that is not just resilient and able to support the next generation of access technologies, but does it in a seamless way. The prevalence of total and partial not spots have resulted in a mobile user experience that can be less than satisfactory and fall short of passenger expectations.

Indeed, a study carried out by YouGov on behalf of Cobham Wireless[1] revealed the extent of commuters' frustrations with just over half unable to work some of the time during the journey. This study further reported that even where WiFi was available, 51% preferred to connect to the internet using their mobile service rather than a public WiFi network, predominantly owing to security concerns.

Providing satisfactory connectivity to consumers, as well as for the rail sector itself, involves technical challenges but is feasible with proven technology. Addressing the lack of reliable coverage therefore is a goal where success will depend on effective coordination between industry collaboration and government. This will necessitate decisions to be made, particularly around the ability to access trackside infrastructure in a timely and cost efficient manner.

Recent reports, such as the RSSB's *Connected Train and Customer Communications,* have shone a light onto the obstacles that remain about delivering connectivity as well as pointing the way forward towards a hybrid approach involving a neutral host solution in partnership with Network Rail Telecom. Statements have been made before about resolving the challenges of increasing connectivity on our railways[2], if we are to move towards world-class connectivity in the UK then they now need to be delivered upon.

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[1] http://cobhamwireless.com/press-and-events/press-releases/mobile-reception-not-scratch-uk-trains/
[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4216/reforming-our-railways.pdf

Q1. What do you see as the benefits of deploying trackside infrastructure for rail passengers, the rail industry, and beyond the rail corridor? How can those impacts be quantified?

Rather than just looking the benefits of deploying trackside infrastructure, the Government could perhaps look at the costs of doing nothing.

As technology becomes increasingly pervasive across the nation, the general public are expecting more and better seamless connectivity from their mobile devices. The CBI's 2015 Infrastructure Survey revealed that 81% of firms see more reliable mobile connectivity as essential[3]. Rail passengers unable to reliably connect to the internet result in hours of lost productivity. The importance of the ability to work on the go is further highlighted in the CBI 2016 Infrastructure Study[4] which saw 75% of respondents stating that their top rail infrastructure priority is better digital connectivity on board trains. Over 2.2 billion hours are spent on trains a year[5] - the benefits of those hours being productive ones would be huge for the UK economy – not just from a labour efficiency perspective but also taking into account the benefits of leisure and entertainment.

The rail sector itself also requires world-class connectivity in order to deliver on its Digital Railway vision[6]. This will help deliver more capacity to lines, result in better asset management – from the trains themselves to disabled toilets being out of use – and lead to new and more efficient routes for freight transport. This requires a larger digital transformation but clearly connectivity is a foundation for it.

January 2018 saw the publication of The Rail Safety and Standards Board Connected Train and Customer Communications: Rail and Digital Industry Roadmap[7] looking into what wireless broadband connectivity for the GB railways could look like in 3 – 5 years. It was concluded that continuing with the status quo would see little improvement in mobile train connectivity whilst the incentives for mobile network operators are low and the challenges steep. Whilst there is some evidence that rail passengers would be willing to pay for an uplift in connectivity, this is somewhat dependant on the purpose and duration of the rail journey[8] and the willingness is limited to paying for something more than the current (effectively) nothing currently on offer, with little desire to go beyond the basic service. Whilst the BSG is neither advocating nor discarding the option of seeking addition revenue from rail passengers this does indicate at least the value that they ascribe to improvements in connectivity.

The Government's ambition to be a global leader in 5G deployment will require addressing how to ensure that roll out does not cover the same footprint as 4G, resulting in the same not

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[3] http://www.cbi.org.uk/news/infrastructure-survey-2015/infrastructure-survey-2015/

[4] http://www.cbi.org.uk/news/uk-s-infrastructure-on-the-up-but-now-it-s-all-about-delivery-cbi-aecom/

[5] https://www.rssb.co.uk/Library/research-development-and-innovation/2018-01-T1138-Connected-Train-Customer-Communications.pdf

[6] See: http://digitalrailway.co.uk/benefits/

[7] https://www.rssb.co.uk/Library/research-development-and-innovation/2018-01-T1138-Connected-Train-Customer-Communications.pdf

[8] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/518976/mobile-connectivity-research-study_SDG-report-with-appendices.pdf

spots in coverage. The success of future 5G services and products may well be undermined by poor coverage along rail corridors.

The National Infrastructure Commission's *Connected Future* report found that improved trackside connectivity could bring very large rewards and would likely result in "passenger efficiency, productivity and recreation and providing the connectivity required to enable a digital railway to function effectively"[9]. The potential benefits to "UK plc" and the economy as a whole by improved connectivity on trains therefore would be both significant and real, but to deliver them Government, government agencies, the mobile industry and infrastructure owners must work together to ensure that a low cost/ high quality solution is delivered.

Q2. To what extent would Network Rail's existing assets be a useful contribution, and what commercial arrangements could be established to encourage this?

The challenges of providing connectivity to trains are largely due to topography and population density. Whilst modern trains can inadvertently create Faraday cages this can be mitigated through the use of boosters and feeders. The topography of train lines, particularly in urban or semi-urban is defined by deep cuttings and tunnels which are naturally challenging areas for providing mobile connectivity. The solution to this is positioning antennae as close to the rail lines as possible as well as through the use of technical solutions such as leaky feeders in tunnels.

In rural areas, coverage tends to be intermittent and is more affected by the lack of network coverage in areas of low population density given the lack of a return on investment that operators see in such areas.

Network Rail's assets – including gantries and fibre - can be part of the solution in both areas. The current GSM-R network provides connectivity between drivers and signallers to over 15,000km+ of track and is supported by 2,500 telecoms masts[10]. Whilst not a silver bullet – the characteristics of the 2G GSM-R network are different to what a data rich network such as 4G or 5G would be whilst there are still questions as to the ability of the GSM-R masts to bear additional antennae – it is undoubted that these existing assets would be essential in helping to solve both challenges. Firstly, these assets are trackside which allows antennae to pointed be along rail corridors, providing good line of site even in cuttings or other natural obstacles[11]. Secondly, access to Network Rail land and assets could help to make a more positive business case for investing in mobile infrastructure – providing coverage to the rail network and beyond.

Should gaining access to the necessary infrastructure prove too arduous, the commercial case for investment would become irrelevant. This could lead to potentially less than optimal

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[9]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/577906/CONNECTED_FUTURE_ACCESSIBLE.pdf
[10] https://www.networkrail.co.uk/running-the-railway/gsm-r/
[11] More than 10 million trees are within 60 metres of the rail network;
https://www.networkrail.co.uk/communities/environment/sharing-railway-wildlife/trees-and-the-railway/

alternatives being pursued - such as traditional cells sited just off the trackside - resulting in few of the benefits that could be made available from an integrated low cost solution with effective access to trackside assets.

Q3. Do you have a preferred radio link solution? Please outline it with details of its likely performance and costs, including mast height and spacing and the radio frequencies it would operate at, and say why you think it is a realistic, future-proofed solution. What other infrastructure would you require?

The BSG's individual sponsors will provide their own assessment to this question.

Q4. What do you think is the appropriate level of connectivity to meet passenger expectations for high quality, reliable voice and data services on busy trains over time? Do you have evidence of this?

Q5. What sources of revenue should the Government consider in developing a commercial case for investment in trackside connectivity?

The Government needs to be clear in what it is seeking to do. Efforts that have aimed to primarily utilise trackside infrastructure as a source of revenue, particularly via a single end-to-end supplier model have been tried and failed. The BSG is supportive of efforts to deliver rail connectivity commercially but the emphasis must be on which model will result in the most investment and ultimately best connectivity for rail passengers and sector as a whole.

As stated in the response to Question 1, there are very real benefits to the UK economy as a whole from better connectivity on trains yet the risk is that these benefits will be lost should granting access to infrastructure be viewed as a revenue generator for the infrastructure owners. The role of Government and government agencies therefore is to ensure that the costs of access to the relevant assets are kept low and not primarily seen as a money spinner.

Q6. What evidence do you have of the likely scale (relative or absolute) of these revenue streams?

Q7. What commercial models would best suit the cost-effective delivery of appropriate technical and operational solutions? Please give reasons for your view.

We support the findings of the RSSB commissioned report *Connected Train and Customer Communications* which found that either a neutral host or a hybrid solution between third parties and Network Rail Telecom would deliver the most effective outcome.

Q8. What are the current barriers or dependencies of a commercial roll-out, and how could these be mitigated?

Q9. Do you have a view on whether a national solution or concessions would be the best approach? What is the likely payback period for investors? How could routes be divided into concessions to maximise commercial investment?

Q10. What measures could the Government take to de-risk a commercial model?

As always predictability is a key driver for business models. Government can play a large role in help to drive collaboration and coordination between the variety of players involved in deliver connectivity to the rail sector (Mobile infrastructure owners and operators, Train manufacturers, ROSCOs, franchisees etc). A single point of accountability – be that in the DfT or DCMS – needs to be established to help drive this policy.

Ensuring that the connectivity requirements for new rail franchises are aligned is an important and practical example of how this can be done. Failure to do so could lead to a fragmented model with varying investment horizons.

Q11. How would we ensure ongoing investment into the infrastructure and on-train equipment to continue to meet passengers' connectivity requirements? How will the technologies deployed be upgraded in the future?

As referenced above, the model adopted must prioritise connectivity to the transport corridor over a desire to generate revenue to Network Rail. Focusing on this will unlock capital from the private sector and deliver the communication network that commuters and the train sector want.