Rail Delivery Group

Response to:

Department for Digital, Culture, Media and Sport and Department for Transport

Commercial options for delivering mobile connectivity on trains: Call for Evidence

Date: 7th February 2018

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Department for Digital, Culture, Media and Sport and Department for Transport

Commercial options for delivering mobile connectivity on trains:

Organisation: Rail Delivery Group
Address: 200 Aldersgate Street, London EC1A 4HD
Type: Business representative organisation

The Rail Delivery Group (RDG) brings together passenger train operators, freight train operators, as well as Network Rail together with the rail supply chain. The rail industry is working in partnership for Britain's prosperity to change, improve and secure prosperity in Britain now and in the future.[1] RDG provides services to enable its members to succeed in transforming and delivering a successful railway to the benefit of customers, the taxpayer and the UK economy. In addition, RDG provides support and gives a voice to passenger and freight operators, as well as delivering important national ticketing, information and reservation services for passengers and staff.

For enquiries regarding this consultation response, please contact:

Femi Ogunbiyi
Policy Manager
femi.ogunbiyi@raildeliverygroup.com

Rail Delivery Group
2nd Floor
200 Aldersgate Street
London
EC1A 4HD

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[1] *In Partnership for Britain's Prosperity,* RDG (October 2017): http://www.britainrunsonrail.co.uk/files/docs/one-plan.pdf.

1. Overview

RDG welcomes the opportunity to respond to this joint Department for Digital, Culture, Media and Sport (DCMS) and Department for Transport (DfT) call for evidence on commercial options for delivering mobile connectivity on trains. We have responded selectively to those questions where we can provide evidence and therefore add the most value; these are questions 1, 2, 4, 7, 8, 9, 10 and 11. In addition we have set out some broader points related to the key themes of the consultation that we believe both departments should consider.

Our response is largely informed by the RSSB report, *Connected Train and Customer Communications: Rail and Digital Industry Roadmap.*[2] This study was jointly commissioned and sponsored by RDG and the Future Communications and Position Systems (FCandPS) Advisory Group. It sets out a short-term three to five-year technology roadmap to deliver wireless broadband connectivity for GB railways (see annex 1). Through this group we are currently investigating next steps and look forward to working with relevant departments to trial and advance the mobile connectivity offer to the customer.

Benefits of mobile connectivity on trains

The rail industry recognises that the deployment of mobile connectivity on board trains requires technological and potentially infrastructure interventions. This will be of benefit to the customer and enhance the passenger experience; but could also have wider benefits which include improving the operational performance of the railway, as well as unlocking broader economic benefits beyond the railway, i.e. delivering rural broadband and boosting productivity.

The utilisation of Network Rail's current assets will enable the deployment of trackside infrastructure, but sufficient investment and planning is needed in order to realise the government's vision for ubiquitous connectivity.

Connectivity requirements

From our research we would suggest that 100 mbps is a sufficient level of connectivity to meet passenger demand and 20 mbps would be adequate to match the industry requirements for on-board and train systems in the near-term. Given the speed of change in connectivity options, we are not in a position to comment on longer-term aspirations (beyond 5 years). This is a challenge for policy makers, one which can be overcome by ensuring sufficient flexibility in contracts and futureproofing of requirements to ensure the future environment matches future demand.

Sustainable commercial arrangements

The government has two levers to facilitate the implementation and wider roll out of mobile connectivity on rail and track side infrastructure. One is to procure the infrastructure manager to undertake this provision, particularly as Network Rail Telecoms is one of the larger telecoms companies in the country. The other lever is the specification of rail franchises. The current contractual arrangements for rail franchises focus TOC expertise and responsibilities on the management and operation of train services. Government could use TOC project management and procurement skills by procuring enhanced mobile connectivity requirements through rail franchises and by exploring alternative approaches to delivery, such as using a target price model for this element of the procurement. For example, the TOC would buy mobile connectivity as a service from a third party. However, on the basis of assigning risks to the party most appropriate to manage them, we believe that it is inappropriate to assign infrastructure delivery risk which could include prohibitive capital expenditure to organisations with inappropriate financial structures. The delivery of mobile connectivity can only work if the delivery risk resides with the most appropriate player i.e. the connectivity provider takes delivery risk for the service they provide and are suitably incentivised to evolve that level of service as demand changes.

Client bodies need to be clear about the outcome they are trying to achieve with increased mobile connectivity, as the level and type of service to meet that outcome could be scaled to meet the funding level.

For the commercial case to be sustainable in the long-term, TOCs require certainty against significant cost fluctuations that may result from volume demand for connectivity, regulatory action or reduction in

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[2] *Connected Train and Customer Communications: Rail and Digital Industry Roadmap*, RSSB (January 2018). https://www.rssb.co.uk/Library/research-development-and-innovation/2018-01-T1138-Connected-Train-Customer-Communications.pdf.

competition in the wholesale third party wireless and backhaul data markets. To protect against any such cost increase, we would advocate contractual flexibility for all parties.

2. Benefits of trackside infrastructure

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?

Benefits of deploying trackside infrastructure

One of the main benefits of deploying trackside infrastructure to enable mobile connectivity is that it delivers a better quality of customer experience. A broad range of customer benefits could flow from a full deployment including: customers making assisted journeys, improved passenger information, greater information during times of disruption; and enabling real time information for multi-modal journeys.[3] A full deployment will equip customers with the resources they need to make their journeys. This in turn will improve overall customer satisfaction with rail journeys, making rail a more attractive means of travelling, encouraging modal shift and boosting passenger numbers.

The operation of the railway could also benefit from any future deployment in terms of better efficiency and performance. According to the RSSB report, *Connected Train and Customer Communications*, *"improved connectivity that serves all routes, tunnels, stations and depots will bring a range of benefits to the train and freight operating companies and Network Rail, outside of passenger connectivity"*. Connectivity is an enabler to unlock these potential benefits and additional services:

- Enhanced passenger and operational productivity
- Just in time engineering
- Preventative maintenance
- Remote condition monitoring
- Driver advisory
- Track monitoring
- CCTV provision (forward facing and potentially real-time)
- Support staff operations
- Retail/ticketing support
- Freight tracking
- Advertising
- Minimise signaling disruption
- Minimise train failure[4]

Ubiquitous connectivity is key to the railway's digital transformation. The Digital Railway programme being led by Network Rail is the rail industry's plan for utilising digital systems to increase rail capacity and improve network performance.[5]

The RSSB *Connected Customer* report also identifies benefits of enhanced connectivity beyond the railways: *"Besides the connectivity requirements for passengers that are currently built into the franchises, there is also a wider government opportunity to unlock national telecommunications assets for use of enabling other policy commitments such as rural broadband or connecting the highways or utilities. This wider industry drive… could deliver significant benefits (in national productivity) in addition to those for rail passengers, train and freight operating companies."[6]*

RDG recognises the benefits of ubiquitous connectivity to the UK economy and society, and is well-placed to help bring together those parties from within and outside the rail industry to deliver it. The rail industry is positioned, working with stakeholders and partners, to be able to offer future local, wireless high-speed connectivity to, at, and in the neighbourhood of local railway stations. The rail industry could be used as an opportunity to deliver rural broadband commitments.

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[3] *Ibid*, p10.
[4] *Ibid*, p10-11.
[5] http://digitalrailway.co.uk/our-role/industry-programme/.
[6] *Connected Train,* RSSB (January 2018), p2.

Quantifying Impacts

There are a number of metrics currently available to quantify the benefits of mobile connectivity enabled by full trackside deployment. For passengers, the National Rail Passenger Survey (NRPS), provides a clear and consistent way of assessing customer satisfaction over time. According to Transport Focus, 'no added charge for Wi-Fi' on trains ranks within the top 10 priorities for rail passengers[7] and 30% of customers are satisfied with the 'reliability of the internet connection' on trains.[8] This is underlined by the RDG Customer Heartbeat™, which maps 108 segments or touchpoints of a rail journey to improve our understanding of where the service provision does not yet meet customer expectations. It shows that the availability of onboard Wi-Fi is only slightly below customer expectations at present but this gap is likely to grow as customer expectation develops, driven largely by the level of mobile connectivity provision in other retail sectors and the wider urban realm.

The rail industry handbook on forecasting passenger demand (Passenger Demand Forecasting Handbook v6.0) quantifies a positive demand impact from "internet connectivity" improvements made to rolling stock. This is best viewed as a relatively small impact that is also included within bundles of other improvements to rolling stock, implemented simultaneously.

The wider industry benefits could be quantified in terms of reduced maintenance costs, greater safety performance, avoided or delayed capital investment due to increased use of existing capacity and customer benefits from increased train frequency.

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

RDG considers access to Network Rail's assets to be critical to the industry's ability to roll out ubiquitous connectivity. As set out by RSSB, *"the digital transformation of the rail industry starts with connectivity, which starts with access to the infrastructure."*[9] Network Rail Telecoms (NRT) currently owns and operates the GSM-R network as well as a national fibre network (FTN-X).

Access to trackside assets is a "*prerequisite for deployment of wireless infrastructure to address connectivity including in cuttings and tunnels ... Recent technical trials have unequivocally shown that equipment deployed trackside can provide the ubiquitous connectivity that's needed."*[10] Without NRT fibre and lineside infrastructure, connectivity roll-out will only develop organically and we will not be able to access the benefits and cost savings otherwise available because Mobile Network Operators (MNOs), the connectivity providers, will be unable to deploy their solutions in tunnels and cuttings, where they are most needed.

However, NRT's existing assets on their own are insufficient to deliver the desired service provision (see our answer to question 4 below) or for example to fulfill its functions in terms of providing the communications infrastructure to support several schemes under the Digital Railway initiative. Capital investment in hardware and connectivity infrastructure will be additionally required. We would encourage consideration of open standards and where possible open architecture to ensure competition and fewer barriers to entry.

Please refer to our answer to question 7 which addresses the second part of this question regarding commercial arrangements.

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[7] *Rail passengers' priorities for improvement*, Transport Focus (November 2017). http://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2017/11/23150043/Rail-passenger-priorities-for-improvement-Nov-2017.pdf
[88] *National Rail Passenger Survey Autumn 2017*, Transport Focus, p7. http://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2018/01/29201549/National-Rail-Passenger-Survey-%E2%80%93-NRPS-%E2%80%93-Autumn-2017-%E2%80%93-Main-Report.pdf.
[9] *Connected Train,* RSSB (January 2018), p49.
[10] *Ibid*, i.

3. Track to train connectivity

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?

Short to medium term requirements

RDG believes that currently and for the near-term future, 100 mbps is a sufficient level of connectivity to meet passenger usage requirements and 20 mbps provides appropriate connectivity to meet most of the rail industry's requirements. We have identified that rail freight may require additional requirements beyond the 20 mbps, although further work is needed to understand this. The size and speed are driven by the expected demands created by the delivery of the outputs of the Rail Technical Strategy.[11] The RSSB *Connected Train* report identified four key connectivity requirements for passengers and the rail industry:

- 100% reliable and available coverage across the entire route
- Minimum capacity to be available to support all current and potential rail applications
- CCTV is the application which requires the largest amount of bandwidth for train operations, all other applications are low bandwidth (sub 2 mbps)
- Passenger connectivity aspirations range from basic browsing (10's kbps) to video conferencing (2+ mbps)

The report also finds that this level of connectivity would enable Network Rail to support the majority of its non-safety critical applications.[12]

Longer-term requirements

The industry recognises that 100 mbps for passenger connectivity is unlikely to be sufficient in the long-term. The government's desire for 1 Gbps speeds on the busiest trains is recognised as an approach to future-proof a solution given passenger demand but it is very ambitious and will be challenging to deliver with the appropriate commercial arrangements.

Technology trials taking place in the UK indicate that rates of 1 Gbps at vehicle speeds of 90mph could be achievable but is dependent upon the appropriate technology mix as well as demand and strength of the business case on each rail route.[13] We would encourage the government to work with the rail and digital industries to develop and deploy solutions to fulfil long-term connectivity requirements in collaboration rather than relying on individual procurements.

4. Commercial funding

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

As set out in the *Connected Train* report a neutral host/hybrid model would best suit the cost-effective delivery of appropriate technical and operational solutions. Under this model NRT infrastructure would be operated by private infrastructure specialists with NRT retaining the necessary management and control from a safety, security and experience point of view and the commerciality, practicality and cost efficiency being driven by the private sector.[14]

The report outlines the potential benefits of this model: *"A neutral host option… deliver[s] benefits to train operators, rail users, neighbours, rural towns and villages, highways, and the public sector. As a physically separate national telecoms network, it also offers diversity for other critical national infrastructure. In addition to serving the needs of the railway community, a neutral host managed solution could also provide connectivity for rural broadband, remote monitoring, construction, private and public-sector organisations using fibre or wireless connectivity either from the trackside or from stations.*

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[11] *Rail Technical Strategy*, RSSB (2017). https://www.rssb.co.uk/rail-technical-strategy.
[12] *Connected Train,* RSSB (January 2018), p7.
[13] *Ibid*, p22, p34.
[14] *Ibid*, iv.

"Independent infrastructure providers provide not only operational expertise and business development for existing passive infrastructure they are also able to deliver much needed private funding to maintain and build additional assets."[15]

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

The barriers to a commercial roll-out of ubiquitous trackside connectivity can be grouped in the following way:

- Structural diversity of the rail industry
- Topography of the rail network
- Stipulations within the planning process
- State aid concerns

Structural diversity of the rail industry

The rail industry consists of a range of stakeholders with different obligations to different authorities. Network Rail is the long-term infrastructure manager. Most train operating companies operate under a Franchise Agreement with government and freight operators have no contractual obligations to government. All train operators operate under licence from ORR and have a contractual relationship with Network Rail to gain access to the network. Historically this diversity resulted in misaligned incentives and lack of coordination in mobile connectivity deployment. Such misalignment includes costs being incurred by one part of the industry and benefits accruing to other parts of it.

Therefore, the provision of ubiquitous connectivity along all rail corridors lies *"in aligning incentives and benefits amongst the various stakeholders: train operating companies, Network Rail, passengers, mobile operators and suppliers within a sustainable and beneficial commercial environment…. Any form of public/private partnership… will require strong and clear leadership, ideally with a single person/department taking ownership of delivering a positive outcome."[16]*

Topography of the rail network

An obvious barrier to the commercial roll-out of trackside connectivity is the topography of the rail network. Cuttings and tunnels present a physical barrier and limited access to rail infrastructure leaves MNOs reliant on existing infrastructure outside of the network. The fact that this is poor at present is a challenge to the traditional MNO business model especially given that there is limited investment in areas of low population and demand.[17] Providing access to MNOs and other infrastructure providers under the neutral host model would mitigate against this issue.

Stipulations with the planning process

An additional barrier is that, under current arrangements, planning consent allowing Network Rail to deploy infrastructure is granted on the basis that it is used for the operational purposes of the railway only. This would inhibit its use beyond the rail corridor. An exemption for Network Rail under planning regulations would therefore be required to enable this.

State aid concerns

The *Connect Train* report determines that *"both upgrade to existing infrastructure and new trackside infrastructure is needed for the purposes of a commercial network which potentially creates State Aid concerns. There are a number of regulatory and legal tools that can be used to address any potential barriers."[18]*

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?

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[15] *Ibid*, iii.
[16] *Ibid*, iv, p1.
[17] *Ibid*, p2.
[18] *Ibid*, p52.

The industry would advocate the government consider letting a small number of long-term connectivity concessions which could be bundled to achieve economies of scale, whilst balancing sufficient competition in the market.

In terms of the scope of the concession, the key priorities for industry are that any solution should be substantially or fully mapped to TOC service patterns and should also offer a customer proposition which is simple and consistent. The solution will need to accommodate current and anticipated future needs. Given the geography of franchises and the different customer needs, the solution will need to take into account differences across the various routes and user requirements.

The payback period will be likely be between 15 and 25 years but will be dependent on the range of input variables primarily lineside infrastructure and back haul infrastructure investment costs.

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

The industry believes a long-term concession would help to de-risk the commercial model for mobile connectivity. For example, a 25-year concession arrangement would be long enough to accommodate up to four technology refreshes. This would require the concession with responsibility for operating the model to have a reasonable degree of legal and cost certainty over the course of the concession. Given the nature of such an enterprise, it would likely require some form of regulatory oversight.

According to the *Connected Trains*, report, *"the regulations that are relevant to the deployment of telecommunications infrastructure on the trackside fall into the remit of Office of Rail and Road, Ofcom and Competition and Markets Authority. There are few regulations linked to telecommunications within ORR and therefore Ofcom and the Competition and Markets Authority would be the regulators to address any fresh challenges from deployment of equipment on the trackside."*[19]

5. Sustainability

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?

The industry believes that ongoing investment can be ensured through the conception of the connectivity concession with appropriate commercial arrangements. Technology has a much shorter life cycle and this will need to be built into the design of the concession; for instance, with targets and flexibility over a regulatory period.

The appropriate commercial arrangements will need to be built into the rail industry contractual framework which will need to take account of both the franchise process and the various infrastructure funding and regulatory processes that exist. This must include flexibility for train and connectivity operators to deliver outcomes rather than outputs-based solutions.

The *Connected Train* report finds that *"there are private organisations ready and willing to invest sufficiently to achieve nationwide deployment"*. It also finds that neutral host operators are usually well funded with longer term investment horizons.[20] The report highlights how market competitions will sustain investment and realise technology upgrades:

"Commercial innovation will occur naturally once access to infrastructure has been unlocked. Competition between Mobile Network Operators to supply Train Operating Companies with connectivity for franchise periods, technology vendors competing to analyse operating data centrally to deliver efficiencies, enhanced, personalised travel information via apps and APIs will all become possible once ubiquitous connectivity is in place along the rail corridors."[21]

We are therefore satisfied that the long-term concession model would ensure long-term investment to meet passenger connectivity requirements and enable future technology upgrades.

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[19] *Ibid*, p52.
[20] *Ibid*, p46.
[21] *Ibid,* iv.