Notification of supplier event for

T1204: Economic benefits of having a rail connected corridor[[1]](#footnote-1)

Purpose

This notification is to invite interested parties to attend a supplier event on **16** December **2019** on a new research project RSSB plan to commission.

The aim of the project is to provide the rail industry with a set of tangible economic and financial metrics for potential improvement to rail passenger and freight operations enabled by better connectivity. A rail connected corridor providing track to train telecoms should unlock investment and promote innovation.

The supplier event will offer more detail on the research idea and the challenges it intends to tackle. It will also be an opportunity to understand:

* In-scope and out-of-scope areas of research
* Project support and governance
* Structure and deliverables
* Project timeline

Finally, the event will serve as an opportunity to register interest in the research.

1. RSSB overview

RSSB is a membership organisation that supports the GB rail industry by:

**Understanding risk** – Using safety intelligence with the latest risk modelling to inform members and support safe decision making.

**Guiding standards** – Creating, reviewing and simplifying GB standards; managing the Rule Book and making it easier for the railway to deliver efficiently and safely**.**

**Collaborating to improve** – As an independent cross-industry body, supporting activities which require collaboration such as supplier assurance schemes, confidential reporting and developing industry strategies.

**Managing research, development and innovation** – Undertaking, commissioning and managing research and innovation programmes to address current and future needs and provide knowledge for decision making; supporting implementation and promoting step changes to deliver industry strategies.

1. Background

While the prospect of digital transformation has gained momentum in the transport sector, digital connectivity along GB rail corridors remains a problem despite efforts to support improvements. Part of the challenge can be attributed to a lack of ownership and misalignment of incentives/interests between rail and mobile network operators, Network Rail, users and suppliers. Furthermore, while cars and trucks are renewed regularly, train fleets have a long service life[[2]](#footnote-2). This has a twofold, complementary effect:

* many in-service trains are not ready for modern connectivity – meaning significant investment is required to retrofit them;
* there is a strong interest in keeping them in service for as long as possible to achieve a significant return on the initial investment. This means that technologies promising a reduction in operational costs could be very attractive.

For these reasons, the business case on enabling a connected corridor for rail is a complex one and there is need for a better understanding of how to quantify the benefits in order to stimulate investments in this area.

Several studies[[3]](#footnote-3) have already focused on the value of WiFi and mobile connectivity for passengers during their trip, investigating the impact on journey experience and on the transport modal choice. The Department for Transport (DfT) published a report[[4]](#footnote-4) surveying the specific needs of leisure travellers and related leisure/social activities, the importance of quality of such on-board connections, etc.

These studies present a case for investing in connectivity both for the benefit of passengers and to generate new revenue streams, but exploitation of connectivity for operational, security and safety requirements could potentially outweigh these. However, there is a lack of case studies that quantify the tangible and economic benefits stemming from a rail connected corridor.

Therefore, this research aims to provide a framework for the assessment of tangible and intangible operational, security and safety benefits of connectivity based on a set of representative economic and financial metrics. This will enable the rail industry to make informed decisions and coordinate investments targeted at improving connectivity on the rail corridor.

This research project builds upon the findings of previous research projects carried out at RSSB.

In particular, T911[[5]](#footnote-5) found that the major challenges for the development of a business case was in the cost-benefit analysis that represented the system level of the rail industry and in quantifying benefits. The report concluded that future cross-industry cases would be greatly helped if potential benefits that the rail industry and its constituents deliver were centrally defined, documented, and approaches to their measurement specified.

T964[[6]](#footnote-6) established the cost of installation of equipment on trains to deliver train-to-shore connectivity with current technologies; figures produced in 2012 will need to be updated but the project methodology and findings will provide a useful background.

T1138[[7]](#footnote-7) is a useful study to understand the availability of technologies. The study concluded that currently available technologies have the potential to offer a high-bandwidth solution for train connectivity and that these technologies are largely available ‘off the shelf’. The study found the main barrier to deploying the technology for passenger connectivity to be access to the masts and other passive infrastructure along the rail corridor.

The research also fits in a wider spectrum of projects currently being undertaken by RSSB and Network Rail to improve rail performance and safety under the Data Sandbox+[[8]](#footnote-8) call.

This project also aligns with some of the objectives of Network Rail’s “Digital Railway Programme”[[9]](#footnote-9) and Department for Transport’s “Connecting people: a strategic vision for rail” [[10]](#footnote-10) policy.

1. Project objectives

This research aims to establish how better connectivity can lead to improved operations and safety, and to achieve this will need to establish what the current issues are that connectivity could help tackle.

The alignment of stakeholder interests across the rail industry is a major factor in stimulating and securing investment for connected rail solutions. For this to be successful there is a need for identifying and developing, through engagement with stakeholders, use cases able to show cross-industry benefits of integrated and interoperable connectivity systems. The key use cases will serve as input to a quantification of the tangible financial and economic value, following DfT’s Transport Analysis Guidance (TAG) requirements[[11]](#footnote-11).

The involvement of a broad range of participants from the rail industry, including TOCs, ROSCOs, FOCs, NR, RDG and DfT to identify and develop the range of use cases is expected to be key. The Future Communications and Positioning Systems Advisory Group (FC&PS AG), whose membership includes rail and telecoms experts, have offered to support a workshop to gather ideas for developing use cases.

Furthermore, this research should be aligned with the National Infrastructure Commission target of having network infrastructure in place on key rail routes by 2025[[12]](#footnote-12). Hence, the focus should be on technologies that are ready or that will be available within the next 5 years.

The case for each technology identified should include the economic benefits including commercial income, rail performance, security, safety and other non-tangible benefits.

The outputs of the research will be published on RSSB’s research website in order to enable the industry to understand the benefits. This may also encourage third parties to invest along the rail corridor by understanding the underlining economic benefits as well as influence future technology developments. The report will be aligned with TAG requirements based on HM Treasury’s Green Book principles.

1. Project scope

The use cases identified may include, but not be limited to, the use of telecom connectivity:

* on trains, at trackside or in stations to improve operational performance, passenger travel experience by providing real-time information distribution multimodal journey planning, fault reporting, etc.;
* on passenger trains, freight and yellow plant;
* infrastructure monitoring applications[[13]](#footnote-13);
* rolling stock monitoring applications[[14]](#footnote-14);
* to detect and remotely observe unforeseeable events, e.g. flooding, obstructions on the line, trespass[[15]](#footnote-15);
* to coordinate and enhance service provision under emergency conditions.

For these use cases the focus should not rely solely on proposing new solutions, instead it should also point toward ways connectivity can enhance the use of technologies and solutions already in place. As an example, Remote Condition Monitoring capable devices are already present on some of the currently running rolling stock[[16]](#footnote-16) and installed wayside on some sections of the GB rail corridor[[17]](#footnote-17), but data are seldom accessed in real-time or exploited fully[[18]](#footnote-18). Therefore, this research needs to focus on the possibilities deriving from use of data in real-time or frequently accessed by multiple operators.

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| **In scope**  | **Out of scope** |
| * A review of UK and worldwide examples and literature where connectivity has delivered or has assessed the tangible operational and safety outcomes
* Identification and development, through industry consultation, of as many use cases as possible in the rail industry that could maximise safety and operational benefits. Possible use cases should span from train to infrastructure applications, along route and at termini, passenger/freight/yellow plant and could be included in the following areas:
	+ Remote Condition Monitoring (RCM) to reduce maintenance response times and costs
	+ Facilitate disruption/delays management
	+ Enable better and quicker emergency response
	+ Reduce station dwell times by improved boarding and alighting processes, including assistance provision to disabled users
	+ Disorder/vandalism coordination with BTP
	+ Landslide/embankment movement monitoring. Provide instructions to driver to increase efficiency and safety (e.g. fuel saving on diesel trains, optimal speed in different sections/conditions through enhanced Connected Driver Advisory System, C-DAS)
	+ Fraud prevention and management
* A high-level Cost-Benefit Analysis of 8-12 use cases selected in accordance with project stakeholders
* A quantitative assessment framework (similar to that used in T1110[[19]](#footnote-19)) to be developed and used to evaluate each of the 10 cases and provide impact scores in areas as cost to industry, cost savings, improved safety, etc.
* A detailed Cost-Benefit Analysis including distribution of costs and benefits across the industry, impact on revenues and time delays, etc., of 3-5 cases with earliest realisation potential and largest benefits as defined by assessment framework scores
* Assessment to follow TAG
* Preparation of final report(s)
* Preparation of research in brief and presentation of the findings
* Delivery of dissemination materials
 | * Passenger benefits of WiFi and mobile connectivity. Evaluation of value to customer of access to web services is already covered in “[Mobile connectivity research study](https://www.gov.uk/government/publications/quantifying-the-value-of-internet-access)” from DfT and numerous other sources
* Evaluation of benefits arising from utilisation of communication technologies not available in the next 5-10 years. The objective is to align the implementation of the proposed solutions with the National Infrastructure Commission target for passenger connectivity of 2022-2025
* Generation of roadmap to implementation of connectivity solutions
* Identification of current issues with networks and connectivity (e.g. radio frequency attenuation loss between outside and inside a train, downtime issues intensified by different levels of reliability between systems, network breaches, etc.)
* Evaluation of new revenue streams stemming from improved mobile connectivity, such as targeted advertising within regions
* Economic modelling tool
* Non-mainline railways, intended here as those served by vehicles such as metros, trams, other light rail vehicles, and those reserved for a strictly local, historical or tourist use
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1. Methodology

Following on the requirements presented in the previous sections, at this stage the project is expected to involve:

1. A broad literature review and consultation with industry stakeholders (which will be facilitated by the steering group and client group) to get evidence and examples
2. Engagement with stakeholders to evaluate specific case studies, establish high-level metrics categories and acquire supporting data
3. High level cost and benefit assessment of use cases, using metrics developed as per previous point and a framework as described in the “Project scope” section
4. Further consultation with stakeholders to disseminate early findings and agree on down selection of use cases based on assessment of previous point
5. Detailed cost and benefits assessment on smaller set of use cases developed in agreement with TAG requirements
6. Report preparation and presentation

The project steering group will guide the project direction, emerging outcomes, and review the project outputs. The steering group will also help to identify key industry stakeholders in which it will be expected that the consultant engages with to secure the necessary insights, expertise and cross-industry buy-in. The final project report will be reviewed and approved by the client group Future Communications and Positioning Systems Advisory Group (FC&PS AG).

1. Attendance

Please email Tanja.Odinsen@rssb.co.uk to confirm your attendance, maximum 2 people per supplier.

1. For the purpose of this research, a “rail connected corridor” is a telecom network system linking trains and their components to stations, depots, infrastructures, passengers and different crews that enables real-time data transmission. [↑](#footnote-ref-1)
2. <https://dataportal.orr.gov.uk/statistics/rail-infrastructure-assets-environmental/average-age-of-rolling-stock-by-franchised-train-operating-company-table-231/> [↑](#footnote-ref-2)
3. <https://uwe-repository.worktribe.com/output/841349> [↑](#footnote-ref-3)
4. <https://www.gov.uk/government/publications/quantifying-the-value-of-internet-access>, see appendix D of this document for a literature review of value of WiFi and mobile connectivity on rail for passengers. [↑](#footnote-ref-4)
5. <https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=695> [↑](#footnote-ref-5)
6. <https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=731> [↑](#footnote-ref-6)
7. <https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=25441> [↑](#footnote-ref-7)
8. <https://rssb.wavecast.io/data-sandbox-plus/projects> [↑](#footnote-ref-8)
9. <https://www.networkrail.co.uk/running-the-railway/railway-upgrade-plan/digital-railway/> [↑](#footnote-ref-9)
10. <https://www.gov.uk/government/publications/a-strategic-vision-for-rail/connecting-people-a-strategic-vision-for-rail> [↑](#footnote-ref-10)
11. <https://www.gov.uk/guidance/transport-analysis-guidance-webtag> [↑](#footnote-ref-11)
12. <https://www.nic.org.uk/our-work/connected-future/> [↑](#footnote-ref-12)
13. <https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=8696> [↑](#footnote-ref-13)
14. <https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=24829> [↑](#footnote-ref-14)
15. T1168 - Evaluating effectiveness of Trespass Detection and Prevention methodologies, *in progress* [↑](#footnote-ref-15)
16. <http://www.railtechnologymagazine.com/Rail-News/eversholt-adopts-perpetuum-system-to-monitor-southeastern-class-465s> [↑](#footnote-ref-16)
17. <http://www.humaware.com/track-circuit-monitoring/> [↑](#footnote-ref-17)
18. <https://www.tessella.com/insights/predictive-maintenance-opportunity-rail> [↑](#footnote-ref-18)
19. <https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=24820> [↑](#footnote-ref-19)