

Telecoms and Positioning

1. How to get more from Future Railway Mobile Communication System (FRMCS)

Building on a clear understanding of the performance requirements of FRMCS-enabled rail use cases, defining practical approaches to managing data transmitted through FRMCS to maximise value from available bandwidth.

2. How to proactively manage Future Railway Mobile Communication System (FRMCS) obsolescence from the outset

Examining how FRMCS systems can be managed over their lifecycle to reduce the risk of obsolescence and vendor lock-in. Drawing on cross-sector insight to inform more flexible, future-proof architecture.

3. Satellite-based train localisation and virtual balise concepts on GB network

Assessing the applicability of GNSS-based virtual balise concepts for the GB rail network, building on existing international R&D. Identifies GB-specific constraints and requirements to support potential adoption within signalling systems.

4. Assessing high-integrity positioning for track worker and plant safety

Defining how positioning technologies can be assessed for use in these safety-critical rail applications. Establishes clear acceptance criteria, and links positioning performance to measurable safety outcomes to support acceptance and deployment decisions.

How to get more from Future Railway Mobile Communication System (FRMCS)

Workstream: Telecoms and positioning

What is the Challenge / Opportunity?

- FRMCS will replace GSM-R and offers capabilities beyond operational voice communication
- Additional onboard and trackside services enabled by FRMCS (including IoT applications) will utilise additional bandwidth and place limitations on what can be delivered
- Understanding the opportunities and optimising the data transmission could maximise the value of FRMCS investment

Funding

Up to **£100k**
One proposal likely to be funded

Funding source

Opportunity funded by NR & RSSB jointly

What Output(s) are expected?

- Using existing resources, including T1376, establish performance requirements (throughput, latency, QoS, coverage) of FRMCS-enabled rail use cases
- Define practical approaches to managing data transmitted through FRMCS considering
 - Data structures and compression techniques to maximise utilisation of bandwidth
 - Geographical and other variations in available FRMCS network capacity
 - FRMCS capacity implemented in different locations
 - Network service layer type availability and priorities for supporting different applications
- Make recommendations on the pathway towards implementation, including consideration of standards or other means of adoption

What is needed for a good proposal?

- Engage with **operational railway** to understand opportunities and requirements
- Engage with **industrial partners and supply chain** to bring in-kind contributions to improve the delivery and impact of the project
- Apply a **data science approach** to enable most effective utilisation of FRMCS capability by different applications

Useful links and background info

[Develop a GB strategy and roadmap for transitioning to the Future Railway Mobile Communication System \(T1376\)](#)

Satellite-based train localisation and virtual balise concepts on GB network

Workstream: Telecoms and positioning

What is the Challenge / Opportunity?

- Significant research and trials underway in Europe and China on GNSS-based virtual balise concepts, with further European work planned
- Need to understand achievable accuracy, integrity and availability across different GB environments (tunnels, cuttings, urban areas)
- Identify additional sensors or mapping approaches required to support reliable localisation

Funding

Up to £250k
One proposal likely to be funded

Funding source

Opportunity funded by NR & RSSB jointly

What Output(s) are expected?

- Building on current European research and trials, assess the expected GNSS-based virtual balise performance on GB routes
- Establish the level of achievable accuracy, integrity and availability in a way that represents GB environments (considering tunnels, urban areas, mixed traffic routes)
- Identification of any GB-specific additional requirements (e.g. infrastructure, operational rules, signalling integration) to support deployment
- Development of recommendations to inform ETCS/CCS architecture decisions and adoption strategy, considering required safety integrity levels (SIL)
- Make recommendations on the pathway towards implementation, including consideration of standards or other means of adoption

What is needed for a good proposal?

- Proposal could cover either:
 - (i) a GB-wide assessment of applicability, or
 - (ii) a detailed evaluation of a specific GB route or use case
- Must closely engage with parties conducting **European work**
- Contribution in kind **from industrial members** will enhance the attractiveness of proposals
- Clearly demonstrate **capability in GNSS positioning, rail signalling, communications systems**
- Focus on **GB-specific constraints** and identifying what adaptations would be required to support deployment in practice

Useful links and background info

[Virtual Balise and Digital Map: RFI's perspective](#)
[Virtual Balise placement for GNSS-based train control](#)
[Developments in the use of on-train satellite positioning technology based locators \(T1370\)](#)

How to proactively manage Future Railway Mobile Communication System (FRMCS) obsolescence from the outset

Workstream: Telecoms and positioning

What is the Challenge / Opportunity?

- *GSM-R experience highlighted challenges including vendor lock-in and long-term technology obsolescence*
- *FRMCS will rely on rapidly evolving telecom technologies with shorter lifecycle timelines*
- *Opportunity to define strategies to support cost effective long-term maintainability and upgradeability*

Funding

*Up to £100k
One proposal likely to be funded*

Funding source

Opportunity funded by NR & RSSB jointly

What Output(s) are expected?

- *Cross-sector insights (e.g. lessons from GSM-R, lesson from telecoms in other sectors) to inform best practice long-term lifecycle and obsolescence strategies for rail*
- *Assessment of existing FRMCS and telecom architectures to identify opportunities and gaps in modularity, interoperability and vendor independence for GB rail*
- *Practical recommendations for managing FRMCS lifecycle, including approaches to technology refresh and software updates*

What is needed for a good proposal?

- *Requires strong engagement with*
 - *Rail stakeholders to establish learning from GSM-R and requirements for FRMCS*
 - *Other sectors (e.g. telecoms, defence) to draw on experience in technology management*
 - *FRMCS vendors to provide insight into supplier architectures*
- *Provide **technology life-cycle management** experience and expertise*

Useful links and background info

[Development of a GB strategy and roadmap for transitioning to the Future Railway Mobile Communication System \(T1376\)](#)

Assessing high-integrity positioning for track worker and plant safety

Workstream: Telecoms and positioning

What is the Challenge / Opportunity?

- *Reliable real-time location of track workers and on-track plant is needed in complex rail environments*
- *GNSS and other positioning technologies may support improved safety and situational awareness*
- *Unclear how accuracy, latency, battery life and reliability compare across solutions in rail conditions*

Funding

*Up to £150k
One proposal likely to be funded*

Funding source

Opportunity funded by NR & RSSB jointly

What Output(s) are expected?

- *Clear criteria for assessing positioning solutions for product acceptance (e.g. accuracy, latency, availability, battery performance) in rail safety use cases*
- *Risk-based guidance linking positioning performance to measurable safety outcomes for track worker and plant safety*
- *Application of these criteria across representative rail scenarios to support consistent comparison and deployment decisions*

What is needed for a good proposal?

- *Engage with **equipment manufacturers** to understand current capabilities*
- *Clearly **demonstrate capability in GNSS positioning, safety-critical systems, rail operations***
- *Use **representative rail scenarios and real-world conditions** to test performance and support comparison of existing solutions*

Useful links and background info

*[UIC Safety Webinar – Darryl Hopper \(RSSB\)](#)
[Developments in the use of on-train satellite positioning technology based locators \(T1370\)](#)*