Your route to FRMCS

Upgrade to the coming standard for railway communications in a controlled, non-disruptive, and cost-effective way.

FREQUENTIS
FOR A SAFER WORLD

Executive summary

As countries across Europe firm up their deadlines for decommissioning GSM-R, forward- looking railway organisations are already actively testing and deploying FRMCS. Given the extreme scale and high cost of setting up the private 5G networks that will support FRMCS, two key imperatives emerge:

1. Adopt a migration approach that promotes interoperability between the two standards during what will be a multi-year period of coexistence.

2. Start the journey to FRMCS today, to allow enough time to complete the full rollout before GSM-R is decommissioned. The flexibility of the technology underpinning FRMCS enables railway organisations to embrace the benefits of early adoption, safe in the knowledge they can easily pivot their implementations to meet whatever new challengesand demands emerge.

The flexibility of the technology underpinning FRMCS enables railway organisations to embrace the benefits of early adoption, safe in the knowledge they can easily pivot their implementations to meet whatever new challenges and demands emerge.

The need for coexistence of standards during migration

Railway organisations across Europe – and in many countries worldwide – are required to migrate from GSM-R communications to the Future Railway Mobile Communication System (FRMCS) standard. Target decommissioning dates vary from region to region and have already been adjusted in some cases, but it is clear that support for GSM-R will end within the next ten to twenty years.

What is also clear is that the transition will be long, complex and challenging. It will take place across multiple domains: on trains, in the radionetworks, in the communication services layer, and in the control rooms. Each of these domains will present its own complexities and challenges; equally, railway organisations will need to coordinate and control the overall transition throughout a multi-year transformation.

With GSM-R deployed on more than 130,000 kilometres of track in Europe and some 210,000 kilometres worldwide, the physical scale of the migration will be extreme. Furthermore, the technical implications of switching from 2G to 5G technology will add significantly to the challenge. The higher frequencies of 5G enable extremely high data throughput but limit the range of signals and their ability to pass throughphysical obstacles – meaning that a much larger number of masts and antennas will be required. This in turn implies high rollout costs and long migration projects, making a "big-bang" approach unfeasible. While railway organisations manage the multi-year timelines and budgets for rolling out private 5G networks as a key technical enabler for FRMCS, they will therefore need to maintain GSM-R communications in parallel.

Built-in flexibility reduces risks and costs, favours early adoption

The good news for early adopters is that the software-defined nature of future railway communications and their use of common off-the-shelf hardware together provide flexibility and future-proofing.

By choosing a state-of-the-art deployment approach to FRMCS, railway organisations can gain the flexibility to use Frequentis solutions on-premises in a private cloud, or in the public cloud, or in a hybrid environment. Equally, using web-based control room applications that run on any standard web browser will reduce the total cost of ownership for hardware at controller working positions.

Essentially, railway organisations can confidently deploy the new technology and start learning how best to adapt it to their environment. As and when conditions, standards, and operational preferences change, relatively simple and low-cost updates to software will suffice to bringthe FRMCS solution back in line.

Planning for medium-term interoperability and specialised functionality

By choosing a modernisation approach that supports extended interworking between GSM-R and FRMCS, railway organisations can start to benefit from the new technology while preserving existing investments and working practices. An interworking approach that connects both GSM-R and FRMCS to operator working positions enables a staged migration and avoids potential operational disruption. Employees can begin using the new technology alongside GSM-R, enabling the organisation to determine any required changes to workflows and to optimise the user interface according to identified needs.

Although FRMCS is already being piloted by major railway organisations, there are gaps in the technical specifications, particularly in terms of control-room-specific and customer-specific functions. Organisations will therefore need to carefully consider how to provide extended functions such as role management, pick-up groups, conferencing with and without floor-control, call forwarding, and transfer rules; all of them for voice and data messaging. These are already implemented with various customer-specific flavours in today's fixed terminal systems (FTS) but not fully covered in the current FRMCS specifications. To ensure that this rich functionality is available post-GSM-R, railway organisations should choose a technology partner with a strong understanding both of the underlying technologies and of the typical working practices in railway control rooms.

Getting ahead of the curve

Based on the experience of early adopters, it is clear that the transition to FRMCS presents challenges across several domains, from infrastructure to budgets, and from regulatory compliance to operational concepts. By partnering with an external specialist with vast experience in migration to GSM-R and which has helped early-adopters deploy initial versions of FRMCS, organisations can draw on this accumulated experience to gain speed and avoid some common pitfalls.

Some organisations may be tempted to let others take the lead, gain the experience, make the mistakes, and ultimately define the best practices. However, many of the challenges in FRMCS adoption are associated with each individual organisation's goals, infrastructure, and existing practices. Delaying adoption is therefore unlikely to produce a significant reduction in timescales – since the experience of other organisations will define only a small portion of the optimal adoption path. And since the clock is already ticking, railway organisations should move quickly so that they have enough time to complete their transitions before GSM-R end-of-life.

A further, more practical reason to get ahead of the curve: if all rail organisations across Europe choose to delay deployment, there will simply not be enough capacity in the communications industry to support all the required rollouts simultaneously.

The benefits of adopting FRMCS

By making an early start on migrating to FRMCS, organisations can access its technological and operational advantages sooner. In operational terms, the new technology will provide far greater flexibility and configurability – enabling control room operators to work on essentially any standard device and to tailor their working positions to their exact needs and preferences.

From the perspective of technical operations, the web-based, software-defined nature of the new technology will significantly simplify deployment and integration with other systems. And since it will involve replacing locally installed front-end software with centralised web services, migrating to FRMCS will also accelerate upgrades, fixes and the implementation of new functionality: any changes can be enacted and tested centrally, then immediately rolled out to all users.

Looking at the bigger picture, FRMCS promises to change the way that railways communicate internally and with the public. 5G technologieswill bring high-speed connectivity and multimedia communications such as live video calling, potentially unlocking significant productivity gains and new capabilities.

Frequentis: your experienced partner for FRMCS migration

Frequentis works with leading railway organisations across more than 25 countries, giving us deep knowledge not only of the relevant technologies but also of railway control room operations and requirements. Our architectural approach to FRMCS focuses on bringing railway-specific services into the world of standardised, common mission-critical communications, helping to unlock the migration benefits without compromising on functionality.

In addition to direct experience in migrations for railway organisations, Frequentis has successfully delivered comparable migrations from legacy technology to 4G/5G, web-native, IP-based communications in mission-critical services for the public safety industry. This creates beneficial synergies in terms of the maturity of our systems and methodologies, the experience of our development resources, and the quality of our solutions.

We invite forward-thinking rail organisations to talk to us about their goals and constraints around FRMCS migration. By building a proof of concept together, we can help you learn about thenew technology, determine the challenges it may present in your specific environment, and define a best-practice phased migration plan.

Our experts would be delighted to support you on your route to FRMCS. Let's discuss how our FRMCS solutions could translate to your context: frmcs@frequentis.com

FREQUENTIS AG
Innovationsstraße 1
1100 Vienna, Austria
Tel: +43-1-811 50-0
www.frequentis.com

The information contained in this publication is for general information purposes only. The technical specifications and requirements are correct at the time of publication. Frequentis accepts no liability for any error or omission. Typing and printing errors reserved. The information in this publication may not be used without the express written permission of the copyright holder.

FREQUENTIS
FOR A SAFER WORLD

41_PT_FRMCS_1225