

FTIA cuts costs and smooths future migration path with bearer-independent communication



Deployed in 2003, the GSM-R network operated by the Finnish Transport Infrastructure Agency (FTIA) was approaching the end of its planned service life in 2018. The FTIA wanted to completely renew the network, but with future industry standards for railway communication not yet defined, it needed a highly flexible approach.

To avoid deploying and maintaining a costly new GSM-R network, the FTIA set out to get as close as possible to existing functionality using a combination of Finland's nationwide TETRA radio network and public mobile networks. Choosing a bearer-independent solution from Frequentis enabled the organisation to achieve a smooth and non-disruptive migration.

Switching from GSM-R to TETRA and public mobile networks has enabled the FTIA to eliminate interference caused by adjacent frequency bands, ensuring uninterrupted communication on the Finnish railways. The solution delivered significant cost savings by removing the need to run a dedicated GSM-R network, while preserving the most important railway-specific functionality.

Client profile

FTIA develops and maintains the state-owned road network, waterways and railways.

Business situation

Facing rising costs, interference from adjacent frequencies, and the end of support for its GSM-R network, the FTIA wanted to enable a low-risk migration to a new communication network for drivers, conductors, signallers, traffic controllers, maintenance staff and contractors working on the Finnish railways.

Solution

The FTIA worked with Frequentis to deploy a unique bearer-independent solution that replicates the most important GSM-R capabilities – including group calls and location-based functional calls – and enables communication over both the nationwide public-safety TETRA network and public mobile networks.

Impact

- Supported both GSM-R and TETRA during transition, reducing potential disruption
- Enables users on TETRA and public mobile networks to be conferenced together
- Won ICCA 2019 award for Best Use of Critical Communications in Transport.

“The Frequentis solution separates out the network layer and allows us to adapt to future demands without needing to change other parts of the communication stack.”

Markku Voutilainen, Senior Inspector, FTIA

Reducing costs, increasing flexibility through bearer-independence

Seeking network freedom

In 2018, the GSM-R network was reaching the end of its planned life cycle. With the FRMCS standard still in development, the FTIA could not immediately deploy a next-generation replacement for GSM-R, yet at the same time the organisation had no appetite for simply renewing the existing previous generation network. Deciding instead to use a combination of VIRVE – Finland's public-safety TETRA digital radio network – and public mobile networks, the FTIA sought permission from the EU Commission to replace GSM-R.

Two challenges remained – first, relying only on the public safety TETRA network would entail the loss of important railway-specific functionality in GSM-R, such as Functional Numbering, Location Dependent Addressing and Voice Group Call Service. The FTIA therefore set out to find a technological solution capable of duplicating most GSM-R features on a TETRA network. Second, the FTIA wanted a solution that would decouple its communication applications from the underlying network layer, so that it could ensure both a smooth, non-disruptive migration away from GSM-R, and the easy adoption of other network technologies in the future.

Bearer independence

The Frequentis solution uses a patented, user-centric, bearer-independent approach that layers railway-specific communication services on top of the communication networks, rather than inextricably integrating them. This means that railway organisations can change carrier technologies without impact on users or applications – an ideal solution given both the requirement for a smooth migration from GSM-R to TETRA and the need to adapt to new technologies in the future.

Frequentis created a tailored solution for the FTIA based on existing components – including a unified radio gateway – developed and proven in numerous

public safety projects. In addition to emulating most GSM-R-specific functions on TETRA, Frequentis created a mobile app called RAPLI that provides a subset of GSM-R functionality over public mobile networks. RAPLI can be installed by TETRA users as a fall-back option, but its target use case is for maintenance contractors and construction workers, who can use the solution on a standard Android phone on any public mobile network. The Frequentis communication backbone can conference TETRA and RAPLI users together, enabling seamless communication without the need to provide specialised handsets to all railway workers.

Smooth migration

Given the deeply embedded nature of GSM-R, railway organisations cannot expect the introduction of new communication technologies such as 5G and LTE to be fast or simple. Rather, they must plan carefully for a period of coexistence between GSM-R and other technologies. Thanks to bearer-independence, the FTIA was able to use GSM-R and TETRA in parallel during its migration project, enabling a uniquely smooth and non-disruptive switchover.

The same concept and principles can be applied in the future to enable a similar seamless migration to 5G and LTE networks.

Successful go-live

With the GSM-R network now shut down in Finland, the FTIA is serving more than 2,000 TETRA subscribers and more than 2,500 RAPLI users. In general, bearer independence should enable railway organisations to benefit from lower complexity, greater choice of network technology, faster deployment and reduced costs. Although other EU countries need to continue with GSM-R for the time being, they have the option to start expanding functionality by introducing other network technologies in parallel. This could also be the first step towards future plans under FRMCS.

The logo for Frequentis, featuring the word "FREQUENTIS" in a bold, blue, sans-serif font. The letters are closely spaced and have a slight shadow effect.

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