

EU funded and coordinated FRMCS pilot projects

*The key to successful introduction of the next generation
railway communication system*

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About UNIFE

Based in Brussels since 1992, UNIFE is the association representing Europe's rail supply industry at the European Union (EU) and international levels. UNIFE's members include more than 100 companies – from SMEs to major industrial champions– active in the design, engineering and manufacture of rolling stock (i.e. trains, metros, trams, freight wagons) as well as rail signalling and infrastructure equipment. UNIFE also brings together the national rail industry associations of 11 European countries.

The UNITEL Committee of UNIFE, set up in 2018, brings together UNIFE members with significant telecommunications experience with a focus on building consensus for the development and implementation of the future interoperable railway communication system (FRMCS/Next Generation), the inherent successor of GSM-R, as part of the future ERTMS.

Context

With the UIC FRMCS user requirements specification document becoming a stable and comprehensive reference for defining the capabilities and features of future communication system for railway, the experts from UIC work closely with the members of UNITEL, ETSI TC RT working group and 3GPP standardisation groups to translate requirements into technical specifications. In the next step the UIC FRMCS project and ETSI TC RT will define railway functions based on the capabilities enabled by the 3GPP Rel.16/17 features and create railway related specifications which could be referenced in the upcoming "Next Generation" TSI. At the same time the Shift2Rail adaptable communication system technology demonstrator has assessed and defined an architecture which enables bearer independent communication services for railway applications using one or more radio access networks but keeping the radio technology functions completely transparent to the application layer. In Shift2Rail it is foreseen to implement adaptable communication prototypes and test them in a lab environment as well as validate the capabilities and system behaviour in combination with existing and new railway services.

Challenge and Proposal

Although the FRMCS and Shift2Rail work streams represent essential steps in defining the future communication system for railway, the railway communication supply industry has identified a major challenge to industrialise the solutions and ensure readiness for a commercial rollout, similar to the challenge of introducing GSM-R.

During the introduction period of GSM-R in the late 1990s the involved stakeholders successfully created a framework to translate the technical requirements into commercial products and solutions with a dedicated project to focus on first market applications, trials and pilot rollouts within real-life railway operational environments. This project was named MORANE and it facilitated close cooperation between railway users, regulatory bodies and the supply industry¹.

¹ Further details at <https://uic.org/gsm-r>

The challenges with the FRMCS introduction and network rollout are certainly comparable due to the fact that (again) technologies which are new for the railway operational environment shall be used (e.g. 4G, 5G, 3GPP Mission Critical Services).

Starting with the introduction of the FRMCS, and during the whole migration phase, the rolling stock will have to be compatible with both systems, GSM-R and FRMCS. It is therefore important to define the GSM-R/FRMCS onboard solutions as soon as possible in order to include these requirements in the ongoing development of new vehicle platforms.

Therefore coordinated activities for a European first market application and piloting would represent an essential step to successfully introduce the new communication system into the railway networks. These activities could cover the following tasks:

- validate the specified FRMCS technical systems in a real railway environment (trackside and onboard)
- verify the hybrid network approach combining different radio access networks and technologies as well as satellite communication systems
- analyse the implications of FRMCS radio planning in terms of coverage, service quality and interferences for real networks
- optimise relevant system parameters for the rail applications under different conditions
- assess migration concepts to enable a smooth transition from GSM-R to FRMCS, which includes the onboard communication system evolution to support ERTMS applications during the transition phase
- provide feedback and corrections to specification groups, e.g. ETSI TC RT, to remove inaccuracies and inconsistencies
- assess the security profiles for rail communication

A dedicated joint project would provide the right focus from all involved parties and ensure the support from vendors and laboratories to successfully launch FRMCS in European countries. This approach would also leverage the results and findings from the X2Rail projects of Shift2Rail IP2 and translate them into deployable commercial solutions demonstrating the benefits of strong EU research work.

From a timing perspective pilot projects should start once the technical specifications have stabilised and the related products and solutions become available. Furthermore emerging FRMCS implementation plans from European infrastructure managers will outline the required transition scenarios, which represent the necessary framework and context for the pilot projects. In consequence it is expected that pilot projects in the timeframe from end of 2020 until 2022 (or 2023) would represent an essential step in the overall process including the preparation and validation of the CCS TSI 2022.

Conclusion

In summary the rail supply industry is convinced that an initiative to support first market application and pilot projects for the introduction of FRMCS within the scope of the Horizon Europe (e.g. extension of Shift2Rail in Horizon Europe) would help to pave the way towards the future communication system and as such significantly contribute to achieve the benefits of the railway game changers.

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