

# Unleashing the potential of **FRMCS** together

*Nicholas Shrimpton*, UNIFE Technical Affairs Manager, writes about the potential that FRMCS offers the European railway network and explores the challenges that operators are faced with when making the transition.

**F**URTHERING DIGITALISATION and automation in rail is key to achieving the objectives of the European Union's Green Deal and European Commission's (EC) Sustainable and Smart Mobility Strategy<sup>1</sup>. The EC's twin objectives of carbon neutrality and leadership in digitalisation will become a dominant driver for the deployment of the Future Railways Mobile Communication System (FRMCS) on the European railway network. The deployment of 5G FRMCS will open the possibility to implement an extensive list of new applications contributing to optimised train operations and ultimately enhanced services to rail passengers and freight customers.

From the European supply industry side, UNIFE's UNITEL Committee<sup>2</sup> brings together the association's members that have significant

telecommunications experience to build a consensus within the sector concerning the development and implementation of the future interoperable railway communication system under FRMCS, as part of the future European Rail Traffic Management System (ERTMS). As the recognised voice of the European railway telecoms supply industry since its establishment in 2018, the committee continues to work closely together with their cross sectoral partners and the European institutions to ensure that the transition to FRMCS is as smooth and successful as possible.

## **The transition from GSM-R to FRMCS**

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to its current 2G-based technology, the timely introduction and deployment of FRMCS is essential to ensuring a stable and healthy business environment for all involved partners. UNIFE's GSM-R Long-term Support Statement, published in 2021<sup>3</sup>, provides a joint assessment of how this communication service can be supported until the migration to FRMCS has been successfully finalised. Currently, this is projected for some time after 2030. Today, GSM-R covers around 130,000km of tracks in Europe, with significant rollouts and extensions of new lines still ongoing. As a result, their statement highlights the need for early planning and reciprocal commitment by all involved parties given the existing and future challenges in supporting and phasing out GSM-R until a time when co-existence between the two systems is no longer needed. In a separate Position Paper on the Successful Transition to FRMCS<sup>4</sup>, the committee went further by outlining the key technical, organisational, or legislative factors for success to be addressed to achieve the smooth introduction and migration to FRMCS. The publication draws upon lessons learned from the industry's early introduction of GSM-R.

#### Latest developments and industrialisation challenges

The railway sector has been closely collaborating on the definition, standardisation, and piloting of FRMCS in various relevant groups at the European Telecommunications Standards Institute (ETSI<sup>5</sup>), the 3rd Generation Partnership Project (3GPP<sup>6</sup>) and the Electronic Communications Committee of The European Conference of Postal and Telecommunications Administrations (ECC CEPT<sup>7</sup>). With the support of the sector, the European Union Agency for Railways (ERA<sup>8</sup>) has recently concluded its recommendation to the EC for the update of

the Technical Specification for Interoperability of Control Command and Signalling (CCS TSI) and has scheduled for a Member State vote and subsequent publication during the 2022/2023 period. This CCS TSI update will contain 'version 1' of the FRMCS specifications with respect to functionalities for interoperability. It will provide 'FRMCS readiness' by preparing the European Train Control System (ETCS) specifications for future interfacing with the new radio system once available. However, it must be noted that the content of the new CCS TSI and 'version 1' specifications is not yet mature enough for the real implementation of FRMCS, but should be seen as positioning the legislation in preparation for the 'version 2' specifications enabling first FRMCS deployment by 2025, following further necessary development and testing activities.

One such activity is the Horizon 2020 5GRAIL<sup>9</sup> project, launched on 1 November 2020 and co-financed by DG Connect, which recently reached its halfway point. Consisting of eight Work Packages, it aims to validate the first FRMCS specifications by developing and testing prototypes for the system's ecosystem for both trackside infrastructure and onboard use, as well as laboratory and real track conditions. Coordinated by the UIC, and with UNIFE leading dissemination activities, this project brings together European railways and suppliers to pave the way towards the future communication system. At this stage, a final test plan has been made and the FRMCS on-board System (TOBA) prototype architecture has achieved a good maturity level with the first prototypes built and already supporting lab testing. The Nokia<sup>10</sup> and Kontron<sup>11</sup> labs are now fully operational, and a second edition of these prototypes is being made available. The project will also include a new FRMCS Modem prototype from Thales<sup>12</sup>, supporting FRMCS 1900MHz band and positioning capabilities, as well

as FRMCS compliant applications like ETCS and Automatic Train Operation (ATO) from Alstom<sup>13</sup>. The test results will then support the specifications update in preparation for next step, the desired European Trials, based on upgraded 5G equipment around 2024.

The recent establishment of Europe's Rail Joint Undertaking (EU-Rail<sup>14</sup>), the successor of the Shift2Rail Joint Undertaking, both led by Carlo Borghini as Executive Director, has been a priority for UNIFE and the rail sector. It is central to continuing the excellent cooperation between rail stakeholders that was established under Shift2Rail. EU-Rail, with its Innovation and System 'pillars', will play a pivotal role in fostering the green and digital transformation of the European rail system and defining both the FRMCS migration plan and its introduction across Europe's networks. Notable activities within EU-Rail's Flagship Area 2 on 'Digital & Automated up to Autonomous Train Operations' and the system pillar aim to further FRMCS developments by furthering specification development and component demonstration and validation. EU-Rail will ensure collaboration with 5GRAIL in relation to FRMCS, just as it leveraged the results and findings from Shift2Rail before it. This contributes to deployable commercial solutions and demonstrates the benefits of a strong EU research and innovation framework.

However, it must be acknowledged that significant challenges remain for industrialising FRMCS solutions before commercial rollout by 2025 becomes a reality. The European rail telecommunications supply industry remains convinced of the need of a full-scale programme focused on first market applications, trials, and

pilot rollouts of FRMCS within real-life railway operational environments. This is reminiscent of the late-1990s MORANE project which helped introduce GSM-R. The demands that accompany the introduction of FRMCS and its network rollout are certainly comparable to those experienced with GSM-R before it. Coordinated activities for a European first market application and piloting represent an essential step to successfully introducing the new communication system to the railway network. If these full-scale trial activities cannot be achieved under EU-Rail, an alternative solution must be found to establish a successor to that early project, a so-called MORANE 2, in the near future. Additionally, the availability of customised 5G chipsets and modems needed for the introduction of FRMCS to the railway network remains uncertain. This problem is only exacerbated by the global supply chain issues being experienced across sectors.

We remain at a crucial stage in the definition, development, and eventual deployment of FRMCS as we migrate away from GSM-R. Important milestones have recently been reached and positive progress is being seen within the EU R&I activities. However, much more remains to be done. The European rail telecommunications supply industry is committed to driving FRMCS forward, tackling the outstanding challenges and ensuring a successful transition. This will require strong coordination and cooperation between all European rail stakeholders, as well as strong financial support from the EC and its agencies. Together, we can unleash the potential of FRMCS and the advantages that come with creating a digital railway that is even more efficient, attractive, and competitive. 

## References:

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