



UNIFE Paper

Input to ERJU System Pillar

FRMCS Report 2025 Update

15 April 2025

1. Introduction

In response to the request of the 13th meeting of the ERJU System Pillar Steering Group 13/03/25, the following paper provided UNIFE's input to update of the 2023 ERJU System Pillar FRMCS Report and response to the draft report provided in the mentioned meeting. The rest of this UNIFE paper follows the chapter structure of the draft update of the System Pillar report in turn in order to provide the view of the European rail supply industry.

The introduction of FRMCS is a key priority for the entire railway sector. The focus on the consolidation of FRMCS V3 requirements required to replace GSM-R and improved governance scheme with ERA as system authority, balancing the contributions from railways and suppliers are seen as essential to secure a viable and efficient migration path towards FRMCS.

2. Context

The summary and context chapters of the draft report update give a good overview of the history and current status of the FRMCS development. In our September 2024 paper, UNIFE already raised the concerns of the European rail supply industry on the current development status of the FRMCS specification and risk on the timely delivery of FRMCS 1st Edition to the TSIs and market. While the European railway telecommunications supply industry, represented by the UNITEL Committee of UNIFE, have been in active cooperation with UIC, ERA and other railway stakeholders across Europe in defining and specifying FRMCS as the successor of GSM-R, the draft FRMCS V2 specifications delivered by UIC at the end of March 2024 was the first occasion when the industry had full visibility on the contents of V2. Unfortunately, during the reviews the European rail supply industry had to raise concerns on the overall completeness, anticipated content, and quality of the draft FRMCS V2 specifications presented in the ERA EECT resulting in extensive comments and discussions. The lack of industry (product/implementers) participation and expertise in the drafting was a clear lesson learnt for improvement. As such, the way of working must change if FRMCS is to succeed as expected by the market.

3. Revised FRMCS Specification Scope

The time pressure for the rollout of FRMCS is becoming critical and investments into ETCS and ATO are already impacted due to the unavailability of FRMCS solutions. These serious challenges call for clear priorities and strict project management. As a consequence, the railway sector needs to focus on the stabilisation of FRMCS V3 requirements, which are essential for ETCS, ATO and voice functions to replace GSM-R. Once these requirements are stabilised and frozen, the railway sector can enter the implementation process and work in parallel on the specifications of the second priority features. Obviously, this demands the commitment of all stakeholders not to modify the priority one requirements in a way which endangers the compatibility with future specifications.

The work on FRMCS V3 specifications must first focus on functional equivalency to GSM-R, to ensure this is secured in the FRMCS 1st Edition for the TSI. Only then should an increased feature scope be considered with the focus on additional benefits enabled by FRMCS and 5G advancements. Full sector alignment is needed on the final feature scope to be tested in the EU-RAIL project 'MORANE 2', V3 specifications as 'GSM-R +' for the FRMCS 1st Edition, and scope and roadmap for future releases.

Of course, the long-term objective will be clearly put on the development and implementation of further functionalities which clearly distinguishes FRMCS from GSM-R, adding significant value to the operations of the railways. However, this can only be achieved in a staged approach, allowing for successful introduction and migration from the legacy technology to meet the market requirements.

Careful review of categorisation of mandatory requirements and features must be done as there is a significant risk for elevated system costs without the operational need of some IMs and RUs.

UNIFE's view of the feasible and prioritised FRMCS V2/V3 scope is found below, based on the EECT V2 Open Points list and the EECT Target V3/Vx list found in Annex 1 with revised target versions for FRMCS FRS and FRMCS TOBA FRS on chapter level according to the scheme:

Target Version

V3	included in V3, fully defined & clarified, covered by related specs e.g. SRS, FFFIS, ETSI TS
V3a	adapted scope, reduced, limited functionality can be included in V3, carved out parts to be provided in Vx
V3?	proposed for Vx with additional discussions and alignments needed.
Vx	cannot be included in V3

FRMCS FRS	Title	Target Version	Comment
5	Application concept	Vx	
6	FRMCS functional addressing	V3	
8.2.2	Assured voice communication common function	Vx	Not covered by any system requirements in SRS or FIS.
8.2.3	Multi user talker control common function	V3a	For AHGC planned to be in Rel-19, half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
8.2.4	Role management and presence common function	V3a	Basics for V3, rest for Vx (presence, first-to-answer, train-ID domain change, etc)
8.2.5	Location services common function	V3a	Limit to cell-ID and GNSS, add possibility to use other on-train GNSS sources, half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
8.2.6	Authorisation of communication common function	V3	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
8.2.7	Authorisation of application common function	Vx	Feature is only a concept at this stage, not covered by any system requirements in SRS or FIS
8.2.8	QoS and priority common function	V3	
8.2.9	Assured data communication common function	Vx	
8.2.10	Inviting-a-user common function	V3	Realisation through AHGC (Ad-hoc Group Call)
8.2.11	Arbitration common function	V3	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS.
8.2.12	Distribution of synchronised time common function	V3a	Due to risk of GNSS jamming this should be 5G (FRMCS) network based, limitation of time sources, half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
8.2.13	Billing information common function	Vx	
8.2.14	Recording common function	V3a	For MCX Group Call it becomes part of Rel-19, but potentially user specific or national

FRMCS FRS	Title	Target Version	Comment
			regulation. Limited to trackside solution, should have no impact to on-board
9.3	Generic HMI aspects	V3a	Not covered by SRS, maybe further defined by an update of UIC leaflet 612-4, but limited to on-board VAS and its interoperability related functions
10.1	Voice communication functions for FRMCS applications	V3a	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS, (one user on) multi-device to become Vx
10.2	Generic voice communication	V3a	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
10.3	On-train outgoing voice communication from the train driver towards the controller(s) of a train	V3a	Requirements related to recording should be Vx, half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
10.4	On-train incoming voice communication from the controller towards a train driver	V3a	Requirements related to recording should be Vx, half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
10.5	Multi-train voice communication for drivers	V3a	Requirements related to recording should be Vx, half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
10.6	Banking voice communication	Vx	Not covered by any system requirements in SRS or FIS
10.7	Trackside Maintenance voice communication	Vx	
10.8	Shunting voice communication	Vx	Not covered by any system requirements in SRS or FIS
10.9	Public emergency call	Vx	
10.10	Ground to ground voice communication	V3	
10.11	Railway Emergency Communication	V3	
10.13	Public train emergency voice communication	Vx	
10.14	Working alone	Vx	
10.15	On-train outgoing voice communication from train staff towards a ground user	Vx	Functional requirements missing
10.16	On-train incoming voice communication from a ground user towards train staff	Vx	Functional requirements missing
10.17	Railway staff emergency communication	Vx	
10.18	Urgent On-train outgoing voice communication from the train driver towards the controller(s) of the train	V3	
10.19	Urgent Multi-Train voice communication for drivers	V3	

FRMCS FRS	Title	Target Version	Comment
10.20	Multi-Train voice communication for drivers excluding ground user(s)	Vx	
10.21	On-train voice communication	Vx	Functional requirements missing
10.22	Lineside telephony	Vx	
10.23	On-train voice communication towards passengers (Public Address)	V3a	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
10.24	Station Public Address	Vx	
10.25	Communication at stations and depots	Vx	
11.1	Data communication functions for FRMCS applications	V3	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
11.1i	Data communication functions for applications external to FRMCS	V3	
11.2	Generic data communication	V3a	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
11.3	Role management and presence application	V3a	Basics for V3, rest for Vx (presence, first-to-answer, train-ID domain change, etc)
11.4	Automatic Train Protection communication	V3a	M requirements OK, but enhancements and corrections necessary (e.g. mixing of functional identity and the way to translate an ETCS to an FRMCS address by using an FA)
11.5	Automatic Train Operation communication	V3a	M requirements OK, but enhancements and corrections necessary (e.g. mixing of functional identity and the way to translate an ETCS to an FRMCS address by using an FA)
11.6	Data communication for Possession Management	Vx	
11.7	Trackside Maintenance Warning System communication	Vx	
11.8	Remote control of engines communication	Vx	
11.9	Monitoring and control of critical infrastructure	Vx	Not covered by any system requirements in SRS or FIS; feature very likely to be user specific or falls under national regulation
11.10	Access to recording of communications	Vx	
11.11	Data recording and access	Vx	
11.12	Shunting data communication	Vx	
11.13	Train integrity monitoring data communication	Vx	
11.14	Public emergency warning	Vx	
11.15	Critical Advisory Messaging services- safety related data communication	V3a	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS. No details in SRS what 3GPP mechanism to be used
11.16	Virtual coupling data communication	Vx	

FRMCS FRS	Title	Target Version	Comment
11.17	Train Parking Protection	Vx	
11.18	Key Management System data communication	V3a	M requirements OK, but enhancements and corrections necessary (11.18.2.3 not defined, 11.18.2.4 not defined, 11.18.2.5 (FA) not defined, home routed application and not sensitive to service continuity, requirements about network transitions does not apply, recording/logging of communication need to be restricted to metadata only. No recording of the safety keys themselves shall be allowed.)
11.19	On-train Telemetry communications	Vx	Concept only at this stage so Vx
11.20	Infrastructure Telemetry communications	Vx	
11.21	On-train remote equipment control	Vx	
11.22	Monitoring and Control of Non-Critical Infrastructure	Vx	
11.23	Wireless on-train data communication for train staff	Vx	
11.24	Wireless data communication for railway staff on platforms	Vx	
11.25	Train driver advisory -train performance data communication	Vx	
11.26	Train Departure data communications	Vx	
11.27	Messaging Services	V3a	Not covered by any system requirements in SRS or FIS, should be limited to SMS replacement
11.28	Transfer of data	Vx	Not covered by any system requirements in SRS or FIS
11.29	Record and broadcast of information	Vx	
11.30	Transfer of CCTV archives	Vx	
11.31	Augmented reality data communication	Vx	
11.32	Real time translation of speech data communication	Vx	
11.33	Passenger information data communication	Vx	Not covered by any system requirements in SRS or FIS
11.34	On-train safety device to ground communication	V3	Half or more of the functional requirements are not or only partly covered by system requirements in SRS or FIS
12.1	Basic video communication functions	Vx	
12.2	Generic video communication	Vx	
12.3	Critical real time video	Vx	
12.4	Non-critical real time video	Vx	
12.5	Non-critical real time video communication	Vx	

FRMCS FRS	Title	Target Version	Comment
13	Handheld terminal requirement	Vx	Not covered by any system requirements in SRS or FIS
13.1	Use case: Deported control of applications	Vx	
14	System management and configuration aspects	Vx	Mostly not covered by SRS and FIS; potentially user specific
15	Digital resilience	Vx	Not covered by any system requirements in SRS or FIS
16.1	Inter domain change Introduction	V3a	Should become informative chapter (too generic, and includes statement on costs)
16.2	Inter domain change generic	V3a	Enhancements and corrections necessary (16.2.9 depends on final solution from Super Group; 16.2.13 / 16.2.14 are Vx in Compliance Matrix)
16.3	Interconnection	V3	
16.5	Interworking	V3	
16.6	Intra domain changes and service continuity	V3	Not covered by any system requirements in SRS or FIS. However, supported by normal 5G Handover inside PLMN, with no session layer change. OK for V3

TOBA FRS	Title	Target Version	Comment
4	Scope		
4.3	On-Board Application Agent	V3a	Super Loose Coupling limited to enable ETCS PKI/KMS
5.1	Key Design Paradigms	V3a	Limited to dual-UE approach or equivalent solution with MNO services (substituted or reduced MP)
7.1	Decoupling of application and transport	V3a	Limited to dual-UE approach or equivalent solution with MNO services (substituted or reduced MP)
7.2	Bearer Flexibility	V3a	Limited to dual-UE approach or equivalent solution with MNO services (substituted or reduced MP)
7.3	Providing transport services to multiple applications	V3	
7.5	Local Binding Function	V3	
7.7	Operations and Maintenance	V3a	Excluding requirements not related to interoperability aspects, e.g.: - fully specified OB _{OM} (API and protocol) - information of hard- and software modules (device config management) - trackside OM management system
7.8	The On-Board FRMCS Location services Common function	V3a	Excluding 3GPP positioning information (NC in mapping table)
7.9	Functional Interface between applications and On-Board FRMCS (OBAPP)	V3a	Excluding Notification Function "on demand" (NC in mapping table)
7.11		V3?	OB _{RAD} in general to become an option, V3-Vx depends on ETSI work item

TOBA FRS	Title	Target Version	Comment
8.1	Resilience	Vx	Should be excluded in TOBA FRS and combined with an overall PRAMSS system approach for FRMCS (avoid singular TOBA approach)

4. Revised FRMCS Specification Timing

Based on the above prioritised scope, UNIFE believe the following timeline can be achieved:

Date	Milestone	Comment
04/2025	ERA Technical Opinion FRMCS V2.1 (Addendum)	
09/2025	Closure of V2 open points needed for testing and validation via EECT, Deliverable: FRMCS v2.2	Feasible only for critical items related to MORANE 2 including a reduction of V3 features according to UNITEL proposal
09/2026	Establishment of joint working group (ERA, UIC, UNITEL, UNISIG, other stakeholders)	Start of a joint UIC and UNITEL revision process of the FRMCS specifications towards V3 stable draft
01/2027	MORANE2 consortium provides open point list based on WP3 lab test results affecting the FRMCS specification	Additional input for joint working group and ETSI TC RT work stream
07/2027	MORANE2 consortium provides open point list based on WP4 field test results affecting the FRMCS specification	Additional input for joint working group and ETSI TC RT work stream
09/2027	End of MORANE 2 project	Condition: No delays or project extensions
09/2027	ETSI TC RT delivers Technical Specification stable drafts for FRMCS V3	Inputs from WP4 field tests might have implications on ETSI specifications
09/2027	UIC and UNITEL deliver FRMCS V3 stable draft under the system leadership of ERA	Stable draft specifications as output of the UIC and UNITEL joint working group
12/2027	End of ERA EECT reviews	Expected shortened EECT duration under assumptions above
12/2027	ERA Recommendation to the Commission	This could be the baseline e.g. to adapt ETCS solutions and products, if no further changes of specifications related to ETCS & ATO are applied.

5. Governance Proposition

To guarantee the expected timelines are met and ensure a seamless introduction of a mature FRMCS 1st Edition in the “CCS TSI 2028”, UNIFE is repeating the call to redefine the area of responsibilities of UNIFE, UIC and ERA and emphasises the need to ensure industry experts are involved and considered an equal partner in developing the FRMCS specifications (V2 and V3) development prior to the draft delivery to the ERA EECT process. This is particular necessary for the system requirement specification documents and the lower level requirement specifications.

Full visibility of the specifications is needed prior to EECT, and **a new forum is needed where industry and railways contributions are brought together for equal consideration and common decision**. UNIFE believe that **ERA as ERTMS System Authority shall be given an enhanced mandate to coordinate this development** as done with other rail subsystems and to bring the railways and supply industry together. This would require an enhanced mandate to ERA for FRMCS in comparison to the role of the EECT Radio today.

There is an essential need to strengthen the role of ERA in the FRMCS process. At the very least the ERA needs to be consulted periodically during the drafting process to provide 'quality gates' prior to officially receiving the drafts and EECT process launched.

6. Risks to Specification Delivery

Identified Risk	UNIFE view and proposed mitigation measures
FRMCS V2 completion and impact on the testing and validation process	Closure of V2 open points needed for testing and validation via EECT for critical items related to MORANE 2 including a reduction of V3 features according to UNITEL proposal to focus on GSM-R equivalency.
FRMCS V2 and V3 scope finalization	Sector alignment at ERJU SP level on V3 scope to provide essential FRMCS functionality to achieve GSM-R equivalency in the given timeframe .
Transfer of test results from T&V activities to draft V3 and/or ETSI	Proposal to establish a dedicated joint working group—comprising ERA, UIC, UNITEL, UNISIG, and other key stakeholders—by 3Q2026 to proactively support the upcoming MORANE-2 laboratory and field-testing phases. This group shall operate under a unified, collaborative framework with the clear objective of delivering stable V3 draft specifications by September 2027. The effort will be led and coordinated by ERA and will culminate in a final review by the EECT. To ensure timely delivery and quality outcomes, the proposal includes the implementation of structured progress monitoring and regular checkpoints. These mechanisms would enable early detection of risks, prompt resolution of critical issues, and effective mitigation of potential delays.
Quality of outputs of V3	
Timing of availability of V3	
Chipset availability	There is a plan in place to source the needed chipsets from a leading supplier and feed it into the production process of FRMCS modules/modems, which are required for the MORANE-2 integration, lab & field-testing phases. Relevant milestones should be defined and tracked.
Studies on the innocuity of Public Mobile Network Operator bands	Studies would be beneficial but should follow an objective and well-balanced approach to avoid prejudiced or biased results.

Conclusions:

The European rail supply industry is committed to making FRMCS a success and ensuring the transitions to FRMCS is as smooth as possible. To achieve this objective and the timelines expected by the sector, we request enhanced cooperation between the industry, railways and EU institutions, and an urgent refocus on the scope and delivery of the FRMCS V2 and V3 specifications. We welcome the initiative of the ERJU System Pillar Steering Group to revise the 2023 report and align across the sector on a plan to secure the timely delivery of FRMCS 1st Edition.

UNIFE - The European Rail Supply Industry Association

Avenue Louise 221
B-1050 Brussels, Belgium
Tel: +32 2 626 12 60
general@unife.org



@UNIFE



UNIFE - The European Rail Supply
Industry Association

unife.org

