EU-RAIL FRMCS DEPLOYMENT GROUP

Report on the 2026 FRMCS Deployment questionnaire

V 1.0

October 2026

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The information in this report is based on the responses received in the EU-RAIL FRMCS Deployment Group questionnaires during summer 2026. EU-RAIL cannot be made liable for false information that would have been transmitted in the questionnaires.

Analysis sections contain information that is deriving from the data received in the questionnaires as a synthesis. The last chapter of the document identified as Conclusion includes proposals for actions to be discussed in EU-RAIL FRMCS Deployment Subgroups and/or in/with (European) instances and associations.

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1 Introduction

1.1 History of the questionnaire

During the start of EU-RAIL FRMCS European Deployment Group, it soon appeared that the level of information and the readiness and awareness of the stakeholders were unknown.

In September 2025, EU-RAIL FRMCS Deployment Group released the first report of the 2025 EU-RAIL FRMCS Deployment Group Questionnaire[1].

This report was already used as a basis to give recommendations on Deployment to the sector and to answer Recommendation 6 of ERA FRMCS Technical Opinion released in December 2024[2].

> *[…] There is the need for a deeper investigation on the added value of supporting specific mandatory features by On-board FRMCS, the need for granularity of FRMCS usage in Registers of Infrastructure (RINF), and the possibility to consider non-application of CCS TSI in very specific cases for On-board FRMCS (see § 4.5.2).*
>
> *Recommendation #5 ERA's Impact Assessment scheduled for the recommendation on referencing the V3 set of FRMCS specifications in the next CCS TSI update should cover the aspects above.*
>
> ***Recommendation #6 EU-RAIL Deployment Group on FRMCS should provide advice on the aspects indicated in Recommendation #5. […]***

A second version of the EU-RAIL FRMCS Deployment Group Questionnaire has been released during spring 2026. This questionnaire contains two new sections (PublicMobile Network Operators (MNO's) and Notified Bodies (NoBo's)).

The aim of this second report is to give a summary of the information collected in the second edition of the questionnaire but also to compare it with the first edition.

The results of the Questionnaire will be used to create more awareness in the sector, more in-dept FRMCS deployment recommendations to the sector and to update the

[1] https://rail-research.europa.eu/wp-content/uploads/2025/10/20250909_FRMCS-Deployment-Questionnaire-2025-Report_V1.0.pdf

[2] https://www.era.europa.eu/content/opinion-eraopi2024-10-european-union-agency-railways-regarding-version-2-future-railway

Advice to ERA to answer the Technical Opinion. This advice will be released in a separate document.

The results of the questionnaire were also explained in a dedicated Workshop on 7 October. The slides and recording of the webinar are available on the EU-Rail website[3].

1.2 Methodology

The questionnaire contains a first page that gives indication on the reason for the questionnaire and on some practical aspects (Confidentiality, sections of the questionnaire).

The questionnaire is then divided in several sections depending on the stakeholders: - Infrastructure Managers, Railway undertaking and lessors, Infrastructure providers, Onboard providers, Regulatory bodies and Safety Authorities, Mobile Network Operators, Notified Bodies

This information is confidential. It has been agreed that the questionnaire information will be made accessible to a very limited number of people on a need to know basis.

The report does not contain information that would easily enable to understand where some sensitive data comes from. The questionnaire contains precise questions but also gives some space for free expression. The report convenors have done their best to synthetize the information given in the free expression sections.

This report is fact-based and reflect the information gathered. Per paragraph a short analysis is provided. Also an overall conclusion section (paragraph 4) is included. It is the result of questionnaire analysis and does not include opinion on the answers provided in the questionnaire.

3 https://rail-research.europa.eu/frmcs-european-deployment-group/ <News Presentation of the results from the 2026 FRMCS Deployment Survey>

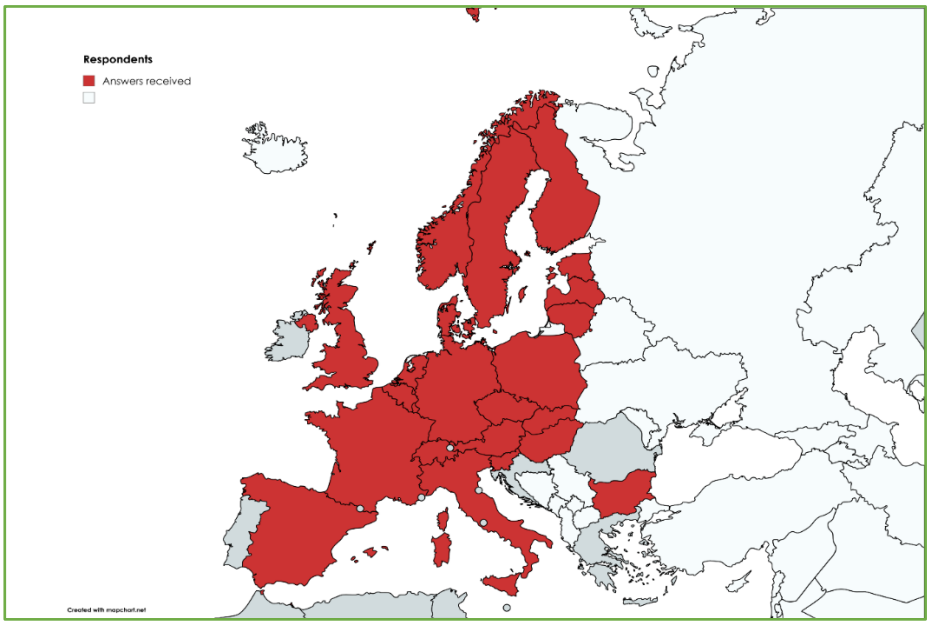
2 Analysis Questionnaires

2.1 Key Figures

Eighty-one (81) respondents of twenty-three (23) different countries have sent answers.

This is more that for the first 2025 questionnaire where 67 answers were received.

In the meantime, two more sections were added (Public MNO and NoBo). These two sections generated 13 answers.



The distribution of the respondents is as follows:

- 20 Infrastructure Managers (22 countries)
- 27 Railway Undertakings / lessors (13 countries)
- 8 NSAs (National Safety Authorities)
- 3 NOBOs (Notified Bodies)
- 6 Onboard Providers
- 7 Trackside Providers
- 10 MNOs (5 countries) (Mobile Network Operators)

As far as Railway Undertakings are considered, both small and big companies were represented. The smallest company owns one locomotive; the biggest one owns thousands of locomotives and trainsets. Lessors also participated in the questionnaire.

2.2 Quality of the answers

EU-RAIL is not in charge of validating the information received.

However, when the information was obviously wrong, it is not used for the analysis. Very few information has been removed from the analysis.

The 'First of Class' notion has not been understood by some respondents. The number of First of Class was equal to the number of vehicles for large fleets. The consequence of it is that the real number of First in Class resulting from the analysis is lower than the real one.

The responses in the questionnaires are more detailed than in the first edition and the general comments in the "open comment" sections are longer and more detailed than in first edition.

Analysis: The reading of the second edition responses shows greater awareness about FRMCS and greater accuracy in the information.

3 Responses

3.1 Infrastructure Managers' responses

Twenty (20) Infrastructure Managers (IM) involved in twenty-two (22) countries sent answers. Note that we got combined input from RailBaltica covering Estonia, Letonia and Lithuania.

The respondents represent over 80% of the total tracks managed within the European Member States.

The main outcomes of the questionnaire are:

- Only 6 IM's have (preliminary) funding plans.
- Start of deployment date varies from 2028 to 2040
- End of deployment date varies from 2032 to 2055. (peak 2035-2036)
- Use of MNO is expected and planned by a majority of IM's
- Currently, no procurement strategies available
- Modularity of system is highly supported

More information collected:

- Large variety of present telecom systems: GSM-R (up to 100%), analogue radio, public networks and no radio coverage.
- Limited number of vendors in use.
- Current view on programmes/subsystems to be aligned with FRMCS in the future: nearly only ETCS and ATO (and a bit monitoring systems).
- All IM's foresee dual mode operations during migration: GSM-R/FRMCS.
- Limited information and plans available on planned FRMCS spectrums for RMR and PMNO (except 900MHz / 1900MHz basis), up to 'full MNO spectrum'
- Only very few IM's foresee or 900 MHz or 1900 MHz spectrum only
- Future expectations on functionalities. Primary is focus on GSM-R replacements. Some answers mentioned for later remote shunting, AI in areas of network configuration, planning and operation, 6G, usage of satellites
- Limited strategies on procurement – dedicated (multivendor) tenders for RAN, core, sites, towers, etc.
- Very few Infrastructure Managers started preparation works on planning, testing, Proof Of Concept, trials, experimental lines
- Various answers on border crossing ideas, many unknown…
- Hardly any activities started on knowledge building or competence development

Analysis:

There is a great awareness of the FRMCS.

Public MNO's which were not intended by a majority in the first edition of the questionnaire are now intended by a large majority of respondents (for example all but two IM's indicated the future use of MNO's).

Infrastructure Managers face difficulties related to resources availability (Budget and skilled people). Major Infrastructure Managers still have no funding plans.

Several Infrastructure Managers intend to start deployment operations as soon as CCS TSI will be published. The availability of the industrial partners is to be checked.

3.2 Trackside Providers' responses

Seven (7) trackside FRMCS providers sent answers.

The main outcomes of the questionnaires are:

- Trackside suppliers consider that MORANE-2 tests will be sufficient to validate their architecture. As their products are software based, the availability of the equipment may not be a concern. However, the interoperability of the systems will have to be tested even after the end of the MORANE-2 tests.
- To ensure evolution of the specifications, new functionalities and the possibility of fast cybersecurity threats, the 3GPP layer structure is a must and shall/must be respected by the providers.
- Software updates are seen as a way for swift deployment (Stable hardware but the need for software update an/or functionalities upgrades).
- Concern about cybersecurity updates and quick authorization process to deal with it. This concern did not appear in first edition of the questionnaire were cybersecurity was hardly mentioned in the responses.
- MNO is seen as a must have but collaboration with the MNOs is necessary to define the specificities of each network.
- The UIC FRMCS V3 specifications will evolve in the future with new functionalities based on new technologies.
- The high demand for some components by the AI business may increase the FRMCS deployment costs (RAM (Memory component) as an example).

Analysis:

The management of the interoperability (between the different components and systems) once MORANE-2[4] is over is an open point. The responses show awareness that Edition 1 specifications (UIC FRMCS V3 specifications and ETSI FRMCS standards) will be a first stage and that the system will evolve. An "easy" evolution is based on the respect of an agreed architecture (3-layer architecture and modularity to enable "seamless" cybersecurity updates).

[4] https://rail-research.europa.eu/rail-projects/fp2-morane-2/

3.3 Railway Undertakings' and Lessors' responses

Twenty-seven (27) Railway Undertakings and Lessors sent answers. They are from thirteen (13) countries.

Based on the figures provided, they manage more than 17.000 locomotives/trainsets and over 450 types (Please refer to the Quality of Anwers chapter).

Main outcomes of the questionnaire are:

- Half of the locomotives/trainsets equipped with FRMCS will not be equipped with ETCS before end of life.
- Authorization process is seen as a burden.
- Nearly no funding plans.
- No (strong) Request For Quotation (RFQ), procurement or industrial plans, wait for TSI CCS.
- Support of train manufacturers is highly expected for engineering, homologation activities and workshop capacity.
- ETCS upgrades (SV3.0) wait until further clarity on the ETCS/FRMCS compatibility (currently under assessment by ERA).
- 2035 full deployment ready is considered as unrealistic.
- Stable hardware expected.

More information collected:

- ETCS and FRMCS modification at the same time is the preferred solution for some Railway Undertakings/Lessors to increase rolling stock availability. But planning, component availability and specification availability are putting this assumption at risk.
- No insights in prioritising areas or corridors to expedite deployment
- Whenever possible, retrofitting together with main maintenance (6 yr interval)
- Limited number of current vendors.
- Railway Undertakings and Lessors expect modularity (both on Software and hardware) for easier maintenance and easier updates
- Expectations to future include improved efficiency and performance, security, futureproof, safety.
- Both Infrastructure Managers' and Railway Undertakings' effects on control room are still unknow

Analysis:

Railway Undertakings and Lessors responses show increased awareness but also questions about the way to deploy because of the present low technical and specification maturity.

The lack of funding plans is a key issue as the necessary improvement of the authorization process.

The hardware future proofness (No need for hardware upgrade for future software versions and possibility to upgrade to 6G/WiFi/Satellite) is highly expected. OBrad is mentioned as a must by the biggest companies.

The modularity of the system should call into question the strategy regarding interoperability constituents. Should radio functions be interoperable constituents?

The global position is more cautious than the Infrastructure Managers because of the fear of frequent costly upgrades and the unknown cost of deployment.

3.4 Onboard Providers' responses

Six (6) onboard providers sent answers.

The main outcomes of the questionnaires are:

- Product availability is expected 6 to 12 months after TSI CCS release. This does not include the authorization process.
- No production capacity concern foreseen assuming components will be available (5G Chipsets availability is questioned). Most components will be off-the-shelf products.
- The product authorization process is considered unclear. Consequently, the OB suppliers cannot commit to an authorization lead-time.
- The lack of orders is placing some of the suppliers in a difficult position as they are investing in the development of equipment that may not be marketed before 2030.
- Modularity is expected to enable cheaper evolution of the systems (Both for corrections and new technologies or functionalities). The respect of the 3GPP three-layer architecture is basis.

Analysis:

Since the reception of the questionnaire, UNIFE has released a paper regarding the difficulty of delivering products covering the full specifications under writing. The scope of the specifications is still under investigation.

3.5 NSA's and NoBo's responses

Eight (8) National Safety Authorities (NSA's) and three (3) Notified Bodies (NoBo's) sent responses.

On the NSA side, there are different perceptions of their role in the authorization procedure. Some say they will have little to do, some say they need (additional) specific resources.

They are still expecting information on the authorization process.

The Notified Body section is new in the second edition of the questionnaire. There was not such a section in the first questionnaire. The number of Notified Bodies which sent an answer is too small to perform an analysis. However, they express a concern regarding the availability of skilled resources.

3.6 Public MNO

Ten (10) Public MNOs from five (5) countries sent responses.

The main outcomes from the questionnaire are:

- Respondents are very interested in supporting the FRMCS Deployment
- There are possibilities for them to comply with FRMCS specificities, but this must be discussed based on improved mutual knowledge and a Service Level Agreement.
- The proposed benefits of using P-MNO are:
  - Decrease the need for investments,
  - Fast deployment thanks to the use of existing infrastructure.

Analysis:

In this moment, the responses do not enable us to understand whether the P-MNO intend to build specific sites for railway needs or whether they intend to use mainly existing sites.

All respondents indicate that there is a need for a technical dialogue to agree on the specificities and service levels on a country basis.

4 Conclusions

Eighty-one respondents from a wide range of European countries isa big number for such enquiries. This shows the interest of the companies and associations in participating and gaining more information and knowledge. The variety of the respondents over the whole railway sector enables a significative better understanding of the situation and upcoming huge transformation.

As the questionnaire was more detailed, the time to fill it was longer than for the first edition of the questionnaire

A vast majority of respondents have filled the questionnaire with detailed answers. Some respondents indicated that working on the questionnaire was a team exercise that was beneficial for their understanding of where they actually stand regarding FRMCS deployment.

The path to the deployment will not be an easy one as many uncertainties are still present (Scope of the specifications, test coverage, funding plans, deployment strategies, alignment with other deployment programs such as ETCS, …).

The FRMCS Stakeholder Alignment Meeting is managing the share of information regarding the progress of the specifications. The participants in this meeting are from the railway sector, -non radio experts- representing IM's, operators, leasing companies, industry and European Institutions.

The FRMCS specification test coverage is managed by ERA. All stakeholders need to support the CCS TSI 2023 Article 10 test declaration process.[5]

EU-RAIL FRMCS Deployment Group WG2 Legal and Financial is currently preparing proposals for ERA to simplify the authorization process. The input from this questionnaire will be used in the advice. As half of the trainsets with FRMCS will not be equipped with ETCS, a specific Testing & Validating and authorisation process should be investigated (simple, fast and cost-effective).

There is a need for skilled resources (engineering and workshop capacity). The opportunity to establish a dedicated organization for FRMCS training and competence centre should be investigated. Also the sector indicates a need for best practice exchanges and a lessons learned platform to accelerate knowledge of the transition

[5] https://www.era.europa.eu/ccs-tsi-art-10-frmcs-pilot-reporting-and-template

and a better understanding of the upcoming new systems, tests and cross-border topics

A chapter for handling the control room migration scenarios will be included to the (WG3) migration scenarios report 2026.

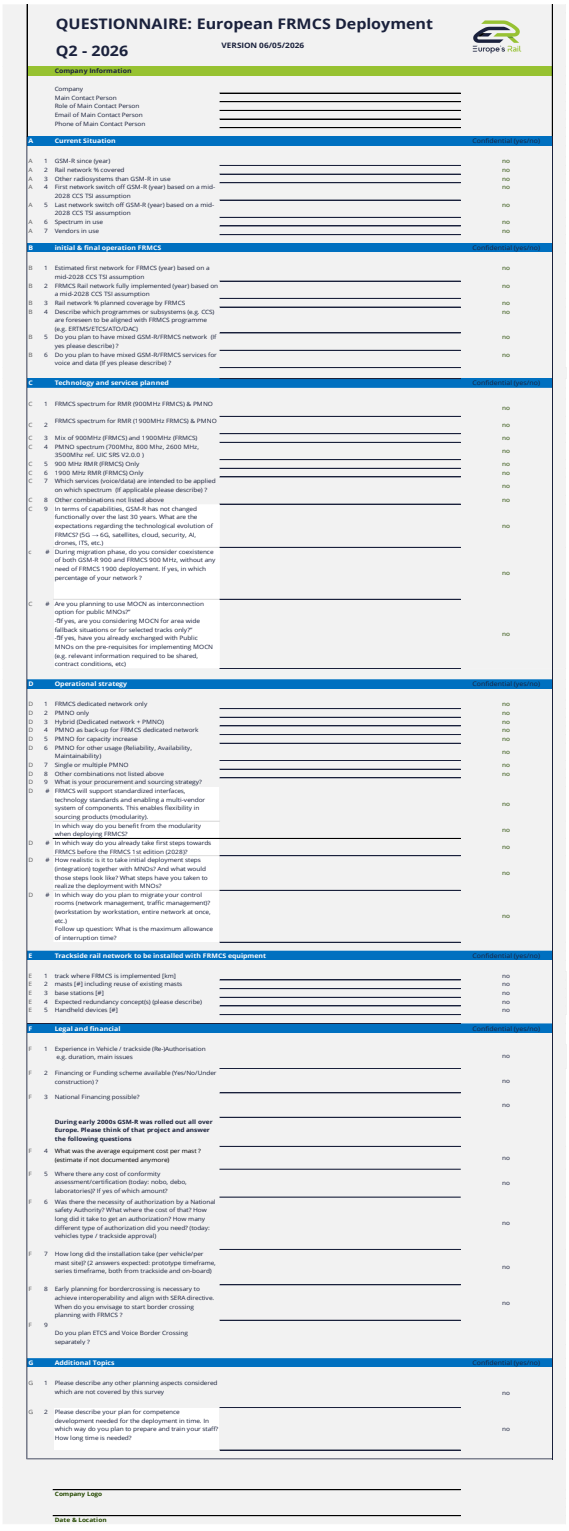
As most of the Railway Undertakings and Lessors intend to ask train manufacturers' support, it seems appropriate to launch an industrial capacity study.

The responses provide material to support the update of the Advice to ERA after Recommendation #6 of the Technical Opinion.

The questionnaires provide far more material than needed for the questions raised by ERA. This information will be used in the different working groups for better recommendations and advice.

The EU-RAIL FRMCS Deployment group will support the diffusion of the open points raised in the questionnaire to the FRMCS stakeholders for the benefit of relevant decisions.

ANNEX - Questionnaire



QUESTIONNAIRE: European FRMCS Deployment

Q2 - 2026 VERSION 06/05/2026

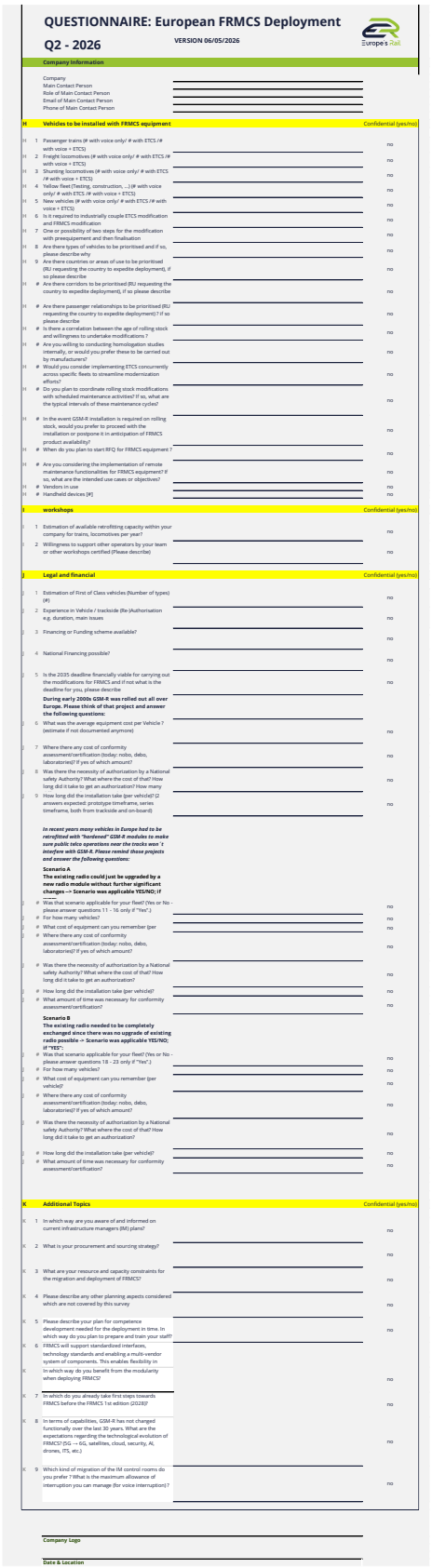
Company Information

Company	
Main Contact Person	
Role of Main Contact Person	
Email of Main Contact Person	
Phone of Main Contact Person	

				Confidential (yes/no)
A		**Current Situation**		
A	1	GSM-R since (year)		no
A	2	Rail network % covered		no
A	3	Other radiosystems than GSM-R in use		no
A	4	First network switch off GSM-R (year) based on a mid-2028 CCS TSI assumption		no
A	5	Last network switch off GSM-R (year) based on a mid-2028 CCS TSI assumption		no
A	6	Spectrum in use		no
A	7	Vendors in use		no
B		**initial & final operation FRMCS**		Confidential (yes/no)
B	1	Estimated first network for FRMCS (year) based on a mid-2028 CCS TSI assumption		no
B	2	FRMCS Rail network fully implemented (year) based on a mid-2028 CCS TSI assumption		no
B	3	Rail network % planned coverage by FRMCS		no
B	4	Describe which programmes or subsystems (e.g. CCS) are foreseen to be aligned with FRMCS programme (e.g. ERTMS/ETCS/ATO/OAC)		no
B	5	Do you plan to have mixed GSM-R/FRMCS network (If yes please describe) ?		no
B	6	Do you plan to have mixed GSM-R/FRMCS services for voice and data (If yes please describe) ?		no
C		**Technology and services planned**		Confidential (yes/no)
C	1	FRMCS spectrum for RMR (900MHz FRMCS) & PMNO		no
C	2	FRMCS spectrum for RMR (1900MHz FRMCS) & PMNO		no
C	3	Mix of 900MHz (FRMCS) and 1900MHz (FRMCS)		no
C	4	PMNO spectrum (700Mhz, 800 Mhz, 2600 MHz, 3500Mhz ref. UIC SRS V2.0.0)		no
C	5	900 MHz RMR (FRMCS) Only		no
C	6	1900 MHz RMR (FRMCS) Only		no
C	7	Which services (voice/data) are intended to be applied on which spectrum (If applicable please describe) ?		no
C	8	Other combinations not listed above		no
C	9	In terms of capabilities, GSM-R has not changed functionally over the last 30 years. What are the expectations regarding the technological evolution of FRMCS? (5G --> 6G, satellites, cloud, security, AI, drones, ITS, etc.)		no
C	#	During migration phase, do you consider coexistence of both GSM-R 900 and FRMCS 900 MHz, without any need of FRMCS 1900 deployement. If yes, in which percentage of your network ?		no
C	#	Are you planning to use MOCN as interconnection option for public MNOs? -?If yes, are you considering MOCN for area wide fallback situations or for selected tracks only?' -?If yes, have you already exchanged with Public MNOs on the pre-requisites for implementing MOCN (e.g. relevant information required to be shared, contract conditions, etc)		no
D		**Operational strategy**		Confidential (yes/no)
D	1	FRMCS dedicated network only		no
D	2	PMNO only		no
D	3	Hybrid (Dedicated network + PMNO)		no
D	4	PMNO as back-up for FRMCS dedicated network		no
D	5	PMNO for capacity increase		no
D	6	PMNO for other usage (Reliability, Availability, Maintainability)		no
D	7	Single or multiple PMNO		no
D	8	Other combinations not listed above		no
D	9	What is your procurement and sourcing strategy?		no
D	#	FRMCS will support standardized interfaces, technology standards and enabling a multi-vendor system of components. This enables flexibility in sourcing products (modularity). In which way do you benefit from the modularity when deploying FRMCS?		no
D	#	In which way do you already take first steps towards FRMCS before the FRMCS 1st edition (2028)?		no
D	#	How realistic is it to take initial deployment steps (integration) together with MNOs? And what would those steps look like? What steps have you taken to realize the deployment with MNOs?		no
D	#	In which way do you plan to migrate your control rooms (network management, traffic management)? (workstation by workstation, entire network at once, etc.) Follow up question: What is the maximum allowance of interruption time?		no
E		**Trackside rail network to be installed with FRMCS equipment**		Confidential (yes/no)
E	1	track where FRMCS is implemented [km]		no
E	2	masts [#] including reuse of existing masts		no
E	3	base stations [#]		no
E	4	Expected redundancy concept(s) (please describe)		no
E	5	Handheld devices [#]		no
F		**Legal and financial**		Confidential (yes/no)
F	1	Experience in Vehicle / trackside (Re-)Authorisation e.g. duration, main issues		no
F	2	Financing or Funding scheme available (Yes/No/Under construction) ?		no
F	3	National Financing possible?		no
		During early 2000s GSM-R was rolled out all over Europe. Please think of that project and answer the following questions		
F	4	**What was the average equipment cost per mast ? (estimate if not documented anymore)**		no
F	5	Where there any cost of conformity assesment/certification (today: nobo, debo, laboratories)? If yes of which amount?		no
F	6	Was there the necessity of authorization by a National safety Authority? What where the cost of that? How long did it take to get an authorization? How many different type of authorization did you need? (today: vehicles type / trackside approval)		no
F	7	How long did the installation take (per vehicle/per mast site)? (2 answers expected: prototype timeframe, series timeframe, both from trackside and on-board)		no
F	8	Early planning for bordercrossing is necessary to achieve interoperability and align with SERA directive. When do you envisage to start border crossing planning with FRMCS ?		no
F	9	Do you plan ETCS and Voice Border Crossing separately ?		
G		**Additional Topics**		Confidential (yes/no)
G	1	Please describe any other planning aspects considered which are not covered by this survey		no
G	2	Please describe your plan for competence development needed for the deployment in time. In which way do you plan to prepare and train your staff? How long time is needed?		no

Company Logo

Date & Location



QUESTIONNAIRE: European FRMCS Deployment

Q2 - 2026

VERSION 06/05/2026

Europe's Rail

Company Information

Company	
Main Contact Person	
Role of Main Contact Person	
Email of Main Contact Person	
Phone of Main Contact Person	

		Vehicles to be installed with FRMCS equipment		**Confidential (yes/no)**
H	1	Passenger trains (# with voice only/ # with ETCS /# with voice + ETCS)		no
H	2	Freight locomotives (# with voice only/ # with ETCS /# with voice + ETCS)		no
H	3	Shunting locomotives (# with voice only/ # with ETCS /# with voice + ETCS)		no
H	4	Yellow fleet (Testing, construction, ...) (# with voice only/ # with ETCS /# with voice + ETCS)		no
H	5	New vehicles (# with voice only/ # with ETCS /# with voice + ETCS)		no
H	6	Is it required to industrially couple ETCS modification and FRMCS modification		no
H	7	One or possibility of two steps for the modification with preequipement and then finalisation		no
H	8	Are there types of vehicles to be prioritised and if so, please describe why		no
H	9	Are there countries or areas of use to be prioritised (RU requesting the country to expedite deployment), if so please describe		no
H	#	Are there corridors to be prioritised (RU requesting the country to expedite deployment), if so please describe		no
H	#	Are there passenger relationships to be prioritised (RU requesting the country to expedite deployment)? If so please describe		no
H	#	Is there a correlation between the age of rolling stock and willingness to undertake modifications ?		no
H	#	Are you willing to conducting homologation studies internally, or would you prefer these to be carried out by manufacturers?		no
H	#	Would you consider implementing ETCS concurrently across specific fleets to streamline modernization efforts?		no
H	#	Do you plan to coordinate rolling stock modifications with scheduled maintenance activities? If so, what are the typical intervals of these maintenance cycles?		no
H	#	In the event GSM-R installation is required on rolling stock, would you prefer to proceed with the installation or postpone it in anticipation of FRMCS product availability?		no
H	#	When do you plan to start RFQ for FRMCS equipment ?		no
H	#	Are you considering the implementation of remote maintenance functionalities for FRMCS equipment? If so, what are the intended use cases or objectives?		no
H	#	Vendors in use		no
H	#	Handheld devices [#]		no

		workshops		**Confidential (yes/no)**
I	1	Estimation of available retrofitting capacity within your company for trains, locomotives per year?		no
I	2	Willingness to support other operators by your teams or other workshops certified (Please describe)		no

		Legal and financial		**Confidential (yes/no)**
J	1	Estimation of First of Class vehicles (Number of types) (#)		no
J	2	Experience in Vehicle / trackside (Re-)Authorisation e.g. duration, main issues		no
J	3	Financing or Funding scheme available?		no
J	4	National Financing possible?		no
J	5	Is the 2035 deadline financially viable for carrying out the modifications for FRMCS and if not what is the deadline for you, please describe		no
		During early 2000s GSM-R was rolled out all over Europe. Please think of that project and answer the following questions:		
J	6	What was the average equipment cost per Vehicle ? (estimate if not documented anymore)		no
J	7	Where there any cost of conformity assessment/certification (today: nobo, debo, laboratories)? If yes of which amount?		no
J	8	Was there the necessity of authorization by a National safety Authority? What where the cost of that? How long did it take to get an authorization? How many		no
J	9	How long did the installation take (per vehicle)? (2 answers expected: prototype timeframe, series timeframe, both from trackside and on-board)		no
		In recent years many vehicles in Europe had to be retrofitted with "hardened" GSM-R modules to make sure public telco operations near the tracks won´t interfere with GSM-R. Please remind those projects and answer the following questions:		
		Scenario A		
		The existing radio could just be upgraded by a new radio module without further significant changes --> Scenario was applicable YES/NO; if "YES":		
J	#	Was that scenario applicable for your fleet? (Yes or No - please answer questions 11 - 16 only if "Yes".)		no
J	#	For how many vehicles?		no
J	#	What cost of equipment can you remember (per		no
J	#	Where there any cost of conformity assessment/certification (today: nobo, debo, laboratories)? If yes of which amount?		no
J	#	Was there the necessity of authorization by a National safety Authority? What where the cost of that? How long did it take to get an authorization?		no
J	#	How long did the installation take (per vehicle)?		no
J	#	What amount of time was necessary for conformity assessment/certification?		no
		Scenario B		
		The existing radio needed to be completely exchanged since there was no upgrade of existing radio possible --> Scenario was applicable YES/NO; if "YES":		
J	#	Was that scenario applicable for your fleet? (Yes or No - please answer questions 18 - 23 only if "Yes".)		no
J	#	For how many vehicles?		no
J	#	What cost of equipment can you remember (per vehicle)?		no
J	#	Where there any cost of conformity assessment/certification (today: nobo, debo, laboratories)? If yes of which amount?		no
J	#	Was there the necessity of authorization by a National safety Authority? What where the cost of that? How long did it take to get an authorization?		no
J	#	How long did the installation take (per vehicle)?		no
J	#	What amount of time was necessary for conformity assessment/certification?		no

		Additional Topics		**Confidential (yes/no)**
K	1	In which way are you aware of and informed on current infrastructure managers (IM) plans?		no
K	2	What is your procurement and sourcing strategy?		no
K	3	What are your resource and capacity constraints for the migration and deployment of FRMCS?		no
K	4	Please describe any other planning aspects considered which are not covered by this survey		no
K	5	Please describe your plan for competence development needed for the deployment in time. In which way do you plan to prepare and train your staff?		no
K	6	FRMCS will support standardized interfaces, technology standards and enabling a multi-vendor system of components. This enables flexibility in		
K		In which way do you benefit from the modularity when deploying FRMCS?		no
K	7	In which do you already take first steps towards FRMCS before the FRMCS 1st edition (2028)?		no
K	8	In terms of capabilities, GSM-R has not changed functionally over the last 30 years. What are the expectations regarding the technological evolution of FRMCS? (5G --> 6G, satellites, cloud, security, AI, drones, ITS, etc.)		no
K	9	Which kind of migration of the IM control rooms do you prefer ? What is the maximum allowance of interruption you can manage (for voice interruption)?		no

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	Company Information		
	Company		
	Scope of supply (e.g. Gateway)		
	Main Contact Person		
	Role of Main Contact Person		
	Email of Main Contact Person		
	Phone of Main Contact Person		
L	**Onboard suppliers**		Confidential (yes/no)
L 1	Products available after release CCS TSI 1st edition (Time between 1st Edition and commercial products (Authorisation pending))		no
L 2	Expected duration of product authorization (on-board comp.)		no
L 3	Estimated leadtime (Order to delivery)		no
L 4	Current Production capacity on-board units (Gateway) annually (peak capacity)		no
L 5	Potential Production capacity on-board units (Gateway) annually (peak capacity)		no
L 6	Expected critical components in supply chain (on-board units)		no
L 7	Potential bottle necks of product authorization (e.g. test facilities)		no
L 8	What kind of modularity can be beneficial when deploying FRMCS?		no
L 9	In terms of capabilities, GSM-R has not changed functionally over the last 30 years. What are the expectations regarding the technological evolution of FRMCS? (5G → 6G, satellites, cloud, security, AI, drones, ITS, etc.)		no
			no
M	**Additional Topics**		Confidential (yes/no)
M 1	Please describe any other planning aspects considered which are not covered by this survey		no

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Company Information

Company	
Scope of supply	
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Phone of Main Contact Person	

		N	Trackside suppliers		Confidential (yes/no)
N	1	Products available after release TSI CCS with FRMCS 1st edition (Time)		no
N	2	Expected duration of product certification		no
N	3	Estimated leadtime (Order to delivery)		no
N	4	Production capacity trackside equipment (Gateway) annually (peak capacity)		no
N	5	Production capacity trackside equipment (MCX Server) annually		no
N	6	Current Production capacity trackside equipment (Basestations) annually		no
N	7	Potential Production capacity trackside equipment (Basestations) annually		no
N	7	Expected critical components in supply chain (trackside) equipment)		no
N	8	Potential bottle necks of product implementation (e.g. test facilities)		no
N	9	What kind of modularity can be beneficial when deploying FRMCS?		
N	#	How would the initial deployment steps (integration) with MNOs networks look like?		
N	#	in terms of capabilities, GSM-R has not changed functionally over the last 30 years. What are the expectations regarding the technological evolution of FRMCS? (5G → 6G, satellites, cloud, security, AI, drones, ITS, etc.)		

		O	Additional Topics		Confidential (yes/no)
O	1	Will you reply on compliance requests for railway specific standards, e.g. EN 50121?		
O	2	Will you reply on compliance requests for cyber security requirements (e.g. NIS2) for mission critical networks? Do you consider implementing Security and Cybersecurity Requirements (i.e. authentication, encryption, Security Operations Centre., vulnerability management, hardening, audits, incident notification)?		
O	3	Will you reply on compliance requests for FRMCS specifications implementation (SRS/FRS/FIS/FFFIS, ETSI, 3GPP etc)? The specifications can be found at ERA homepage.		
O	4	Will you reply on compliance requests for specific coverage KPIs, also considering high speed mobility? Are you willing to agree with the Railways infrastructure managers specific KPIs (i.e. latency, handover interruption, throughput, packet loss, jitter, access time, fault categories, Time to Restore Service/Time to repair, maintenance, communications)		
O	5	Will you reply on compliance requests for specific Railways SLAs? How do you consider to implement Reliability, Resilience, and Redundancy Requirements coming from the needs to implement a mission critical network (power backup, backhaul diversity, core redundancy, UPF redundancy)?		
O	6	Will you reply on compliance requests for specific equipment/network periodic authorization certification?		
O	7	Service stratum sharing: Do you have any plans to provide MCX with monthly fee or similar as a service		
O	8	Service stratum sharing: Interworking with legacy GSM-R from the MCX-server, has the MCX-service provider capability and willingness to provide IWF towards		
		Priorities:		
O	9	Will the prioritisation be dynamic, controlled by MCX/PCF as specified FRMCS?		
O	#	Do you consider and able to reply on compliance requests for specific equipment RAMS?		
O	#	Please describe any other planning aspects considered which are not covered by this survey		no

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	Phone of Main Contact Person		
P	**Legal and process efficiency**		Confidential (yes/no)
P 1	Estimated capacity of certification processes per year		no
P 2	Estimated capacity of authorisation per year		no
P 3	When do you expect, that the certification process for FRMCS will be defined sufficiently, so that NoBos could certify the subsystem FRMCS and the		no
P 4	How do you plan to certify an FRMCS subsystem which is partly based on public MNO's?		no
Q	**Additional Topics**		Confidential (yes/no)
Q 1	Describe regulatory readiness to support FRMCS deployment in terms of e.g. IT support as required by TSI's		no
Q 2	Please describe any other planning aspects considered which are not covered by this survey		no

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QUESTIONNAIRE: European FRMCS Deployment

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	Email of Main Contact Person		
	Phone of Main Contact Person		
R	**Involvement**		Confidential (yes/no)
R 1	Have you been involved in the analysis of files related to onboard GSM-R deployment ? or GSM-R upgrade ? (ifor instance when interference resistant cab radio were deployed)		no
R 2	Were you involved in the analysis of files related to trackside GSM-R deployment ? (for instance when a reinforcement was needed to implement ETCS		no
R 3	Where you involved in the analysis of file related to ERTMS deployment ?		no
R 4	Are you aware of any obsolescence of GSM-R for the companies you are working with ?		no
R 5	Are you aware of the ongoing work conducted at a European level to specify FRMCS and prepare the deployment of this technology ?		no
S	**Onboard**		Confidential (yes/no)
S 1	Give an estimation of number of types of locos, DMU and EMU you have performed analyses on (For any reason) ?		no
S 2	How many analysis and type certificate of a telecommunication system onboard a train do you think you can issue per year ?		no
S 3	Do you have an idea on the duration of the analysis of such an implementation onboard if the train is NOT equipped with ETCS ?		no
S 4	Do you have an idea on the duration of the analysis of such an implementation onboard if the train is equipped with ETCS ?		no
T	**Trackside**		Confidential (yes/no)
T 1	Give an estimation on how many tracksides you performed analyses on ?		no
T 2	How many different analyses of implementation of a trackside telecommunication system do you think you can manage per year ?		
T 3	Do you have an idea on the duration of the analysis of such an implementation without ETCS ?		
T 4	Do you have an idea on the duration of the analysis of such an implementation with ETCS ?		
U	**Additional Topics**		
U 1	Do you think you will have the relevant resources to perform such analyses ?		
U 2	Do you think you will need specific training to perform such analyses ?		Confidential (yes/no)
U 3	Please describe any other planning aspects considered which are not covered by this survey		no
			no
	Company Logo		no
			no
			no
	Date & Location		Confidential (yes/no)

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Europe's Rail

Company Information

Company	
Main Contact Person	
Role of Main Contact Person	
Email of Main Contact Person	
Phone of Main Contact Person	

				Confidential (yes/no)
V		**General**		
V	1	How could MNO offer the FRMCS solution for Railways?		no
V	2	Which business drivers do you foresee for the use of MNOs in the context of FRMCS (railway operations). Possible ideas: a. Cost and deployment time reduction b. Hybrid RMR/MNO operation c. MNO only operation in specific areas d. Enhanced Cybersecurity (enhance resilience and provide backup) e. Site deployment mitigation (MNO/RMR and FRMCS Multipath usage complementing specific areas) f. Support of traffic intensive applications (capacity extension) g. IoT applications (using low cost, power efficient devices)		no
V	3	MNOs and Infrastructure Managers have (or may have) different objectives which may make it difficult to meet all railway requirements. Can you elaborate on the following aspects: a. Service Level Agreements b. Quality of Service support c. Life cycle management d. Regulations		no

				Confidential (yes/no)
X		**Railways specific topics**		
X	1	Will you reply on compliance requests for railway specific standards, e.g. EN 50121?		no
X	2	Will you reply on compliance requests for cyber security requirements (e.g. NIS2) for mission critical networks? Do you consider implementing Security and		no
X	3	Will you reply on compliance requests for FRMCS specifications implementation (SRS/FRS/FIS/FFFIS, ETSI, 3GPP etc)? The specifications can be found at ERA		no
X	4	Will you reply on compliance requests for specific coverage KPIs, also considering high speed mobility? Are you willing to agree with the Railways		no
X	5	Will you reply on compliance requests for specific Railways SLAs? How do you consider to implement Reliability, Resilience, and Redundancy Requirements coming from the needs to implement a mission critical network (power backup, backhaul diversity, core		no
X	6	Will you reply on compliance requests for specific equipment/network periodic authorization certification?		no
X	7	Service stratum sharing: Do you have any plans to provide MCX with monthly fee or similar as a service		no
X	8	Service stratum sharing: Interworking with legacy GSM-R from the MCX-server, has the MCX-service provider capability and willingness to provide IWF towards legacy radio network		no
X		**Priorities:**		
X	9	Is the MNO prepared to offer pre-emptive priority using MOCN architecture and with FRMCS 5QI priorities 5QI65, 5QI70		no
X	#	Will the prioritisation be dynamic, controlled by MCX/PCF as specified FRMCS?		no
X	#	Do you have any plans to introduce static priority based on subscriptions ,e.g. in case of national roaming?		no
X	#	Has the prioritisation been prepared already with national regulator? Regarding net neutrality, CEPT report 294 recommends that special users needs (railways/public safety) will be provided good enough priority, so net neutrality principle should not prevent implementing priorities for railways.		no
X	#	Do you consider and able to reply on compliance requests for specific equipment RAMS?		no

				Confidential (yes/no)
Y		**Spectrum**		
Y	1	Which is the 5G band and the bandwidth you intend to use for FRMCS services (those defined by today UIC SRS, or different ones)		no
Y	2	Are you allowed in your country to operate on Railways specific frequencies n100 and n101? Are you already addressing this topic together with Railways and your National Regulator? Or you will offer FRMCS features only on your public licensed bands?		no

				Confidential (yes/no)
Z		**FRMCS Network Architecture**		
Z	1	Do you consider to offer a complete FRMCS coverage/network along the tracks? Or only main (HS) tracks ? Or only secondary tracks?		no
Z	2	Do you consider to share infrastructure with Railway? Only core? Core and Radio? Only passive (site/tower etc)?		no
Z	3	Which is the architecture you intend to implement to provide FRMCS services (MORAN /MOCN / 5G slicing, National Roaming ..)?		no
Z	4	Which technical solutions do you foresee (or prefer) to offer services to IMs: a. Bull (e2e) FRMCS service offering b. National roaming (MNO with RMR) c. Shared RAN (MOCN: MNO with RMR) d. Passive infrastructure sharing		no
Z	5	Do you consider to offer to operate the FRMCS network on behalf of Railways (solution "as a service")?		no

				Confidential (yes/no)
Á		**Lifecycle**		
Á	1	As FRMCS is intended to have a very long-lasting lifecycle, how do you think to manage technology evolution and related upgrades without affecting the		no

				Confidential (yes/no)
Á		**Additional Topics**		
Á	1	Please describe any other planning aspects considered which are not covered by this survey		no

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