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## Position Paper

Brussels, 10 December 2024

# ETCS BL3 - FRMCS compatibility

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# ETCS-FRMCS compatibility

## 1. Problem statement

FRMCS migration faces significant implementation challenges for railways. GSM-R will become obsolete in the 2030-2035 timeframe.

As part of a European sector plan, mature and verified FRMCS Specifications are expected to be released in the TSI mid of 2027. While first elements of FRMCS were incorporated into the 2023 TSI CCS to have a legal anchor for the preparation of FRMCS deployment plans by railway companies, it must be understood that the FRMCS specifications are not yet mature enough to deliver FRMCS-ready products.

In addition, existing ETCS Baseline 3 vehicles — representing 30% of the European fleet by 2030 — are incompatible with FRMCS under current TSI provisions, necessitating retrofits or costly upgrades. These challenges, coupled with significant resource demands and operational risks, raise serious concerns about the feasibility of a timely FRMCS migration.

## 2. Introduction

The current GSM-R telecommunications system, based on 2G technology, needs to be replaced by its successor, the Future Rail Mobile Communication System (FRMCS). FRMCS is based on the latest 5G technology and designed to adapt to future standards.

FRMCS is a key technology for the future European railway system and is recognised as one of the Key Technology Enablers by AERRL, CER, ERFA and UNIFE.

The imminent obsolescence of GSM-R (projected between 2030 and 2035) necessitates ensuring compatibility between ETCS and FRMCS onboard equipment. FRMCS specifications are expected to reach maturity and be released within the TSI framework by mid-2027.

It is crucial to finalise the FRMCS specifications (FRMCS V3 „FRMCS 1st Edition“) in the TSI CCS 2027, as it will legally ensure compatibility with FRMCS and will enable the secured procurement of ETCS Baseline 4 products equipped with FRMCS.

However, fleets equipped with earlier ETCS versions than TSI CCS 2027, i.e. those currently being equipped or in an advanced state of procurement will require new investments, which face significant challenges, including the authorisation process, product availability, financial difficulties, and resource shortages. These upgrades will demand considerable investments in time, workshop capacity, and financial resources. Some vehicles will likely not even have used the Baseline 3 (R2) equipment before it is exchanged for FRMCS-compatible equipment.

## 3. Unfeasible FRMCS migration

The FRMCS migration timeline and current ETCS-FRMCS incompatibility make timely migration unfeasible, posing a threat to railway operations.

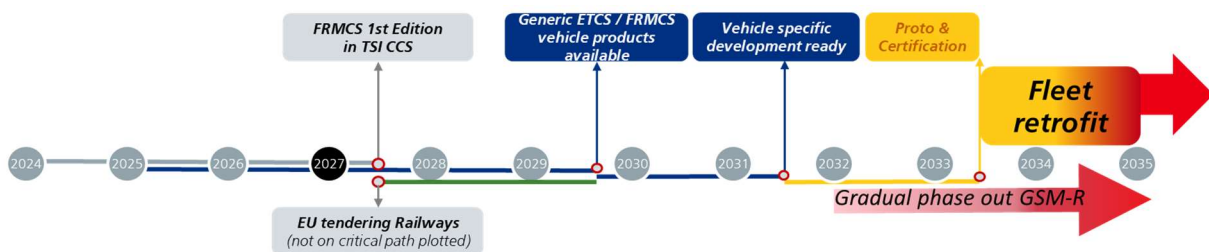
- GSM-R Phase-Out: GSM-R is expected to begin its gradual phase-out between 2030 and 2032, with a planned GSM-R switch-off and FRMCS migration around 2035.

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However, existing ETCS fleets require ETCS-FRMCS compatibility, which is currently unavailable.

- Timeline of the FRMCS Specifications: FRMCS specifications are not yet finalised. With the TSI CCS specifications anticipated by mid-2027, compatible products for vehicles are unlikely to be available before 2029. This delay may push first-in-class implementation to 2032, with series rollouts beginning even later.
- Due to the state of the current FRMCS specifications, industry is currently unable to provide Baseline 4 SV3.0 (FRMCS ready) ETCS products, because several open FRMCS specification topics could have an impact on ETCS requirements.
- Operational Risks: a delayed FRMCS introduction could lead to significant costs for extending GSM-R's lifetime or, in the worst-case scenario, result in partial or complete disruptions to train services.



## 4. Solutions needed

In 2024, a working group on FRMCS, comprising six railway companies — DB, Network Rail, NS, ÖBB, SBB, and SNCF — collaborated with EUG and UNIFE to develop the Baseline Light proposal. The goal of the solution is ETCS-FRMCS compatibility for existing ETCS Baseline 3 fleets. Its aim is to enable a technically feasible and faster migration at reduced costs compared to the complete ETCS Baseline 4 (SV3.0).

The primary objective is to give Railway Undertakings (RUs) the flexibility to choose between Baseline Light and ETCS Baseline 4 (SV3.0) for FRMCS. Key considerations include:

- ETCS Baseline 4 (SV3.0) for New Vehicles: Vehicles currently without ETCS or newly built vehicles (approximately 30,000 vehicles) need to be equipped with ETCS Baseline 4 (SV3.0) for FRMCS.
- Baseline Light for most of the existing ETCS Fleet: For a significant share of the existing ETCS fleet (approximately 11,000 vehicles), Baseline Light provides a more cost-effective option, with estimated savings of EUR 1 billion. However, actual market prices remain uncertain. The remaining share of the existing fleet includes Baseline 3 vehicles that will only need a software upgrade to Baseline 4 (SV3.0).
- Functional Limitations and Risk of Second Upgrade: RUs adopting Baseline Light may face the need for a second upgrade to newer ETCS versions in the future if additional functionalities like ATO (GoA2) are required.

Baseline Light introduces ETCS-FRMCS compatibility on the vehicle side. The impact on Infrastructure Managers (IMs) is that they are not able to update their network to SV3.x until all vehicles are updated to SV3.x. Railway Undertakings must have the choice between Baseline Light or ETCS Baseline 4 (SV3.x) as long as no additional functionality is required by the IM on a given track.



Instead of having the Baseline Light solution for Baseline 3 vehicles and CR1359 for Baseline 4 vehicles, we support the adoption of only one FRMCS solution for both Baseline 3 and Baseline 4 vehicles.

The Baseline Light approach is independent of the error corrections process. We do not expect that Baseline Light could have a negative impact on further evolution of ERTMS nor that it will have a negative impact on the planning of the EU-wide migration to FRMCS; it will even help to accelerate it.

The results of the working group were delivered to ERA in May 2024, as ERA was requested by the European Commission to deliver its analysis of the topic.

### 5. Technical Opinion delivered by ERA on Nov 7<sup>th</sup>

ERA sees at the moment no advantage in the introduction of a Baseline Light solution, claiming it would have significant safety and operational issues, lead to fragmentation, be more expensive and in conflict with TSI CCS regulations.

EUG did not identify additional safety risks and a detailed answer on the technical aspects of the Technical Opinion (TO) is provided by EUG and UNISIG. We recognise the issue of fragmentation (which is not constrained to telecom), but we do not believe that Baseline Light will significantly add to that if only one FRMCS solution is adopted, enabling an EU-wide industrial approach that can preserve investments for both Baseline 3 and Baseline 4 vehicles. Certification and authorisation need anyway to be reduced in time and costs, as acknowledged by ERA (TO, section 3.3.4).

### 6. Conclusion and proposal

**AERRL, CER, ERFA and UNIFE support the development of the Baseline Light solution (or any solution for Baseline 3 products), which enables a faster migration and offers a cost-effective alternative for existing fleets, with potential savings of at least around EUR 1 billion. We are convinced that Baseline Light is a safe, interoperable and technically feasible solution, fit for the operational purpose.**

Taking the ERA Technical Opinion into consideration, AERRL, CER, ERFA and UNIFE are also keen to engage in a deeper common analysis of ERA's thoughts regarding the implementation of CR1359 in Baseline 3 onboard units and the optimisation of testing and certification processes. AERRL, CER, ERFA and UNIFE advocate giving Railway Undertakings the option to choose between a solution which enables Baseline 3 onboard units to be FRMCS-compatible and ETCS Baseline 4 (SV3.0), enabling faster, more affordable migration and safeguarding railway operations. In order to enable the application of Baseline Light, we are aware of the need to consider this aspect in the update of the TSI CCS in 2027.

We support the objective of the European Commission to deploy the target ETCS version for FRMCS (BL4 SV 3.0) over the entire EU network as the long-term solution.

As FRMCS deployment will generate costs for the European railway sector, we should look for ways to reduce those costs as much as possible, which is why initiatives such as Baseline Light are needed. The greater the costs, the higher the price that our end customers have to pay, which will impede the modal shift to rail that we all want to see.

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### About AERRL

The purpose of the Association of European Rail Rolling Stock Lessors (AERRL) is to promote interoperable, sustainable, efficient and safe passenger and cargo rolling stock transport for the European railways. AERRL is also supporting an increased open access to railway infrastructure.

We aim to address all technical, operational, legal and scientific issues related to locomotives and train leasing operations for lessors operating in the European Union, like broad access to rolling stock, the European freight corridor development, realistic and affordable upgrades of rolling stock to ETCS, promotion of a more competitive European maintenance, spare parts market and support to further decarbonization and digitalization of rail transportation. The organization is open to all companies or persons likely to contribute to the pursuit of its objectives. For more information, visit: [www.aerrl.eu](http://www.aerrl.eu) or follow us on LinkedIn.

### About CER

The Community of European Railway and Infrastructure Companies (CER) brings together railway undertakings, their national associations as well as infrastructure managers and vehicle leasing companies. The membership is made up of long-established bodies, new entrants and both private and public enterprises, representing 78% of the rail network length, 81% of the rail freight business and about 94% of rail passenger operations in EU, EFTA and EU accession countries. CER represents the interests of its members towards EU policy makers and transport stakeholders, advocating rail as the backbone of a competitive and sustainable transport system in Europe. For more information, visit [www.cer.be](http://www.cer.be) or follow [@CER\\_railways](https://twitter.com/CER_railways) on X or LinkedIn.

### About ERFA

ERFA is the European Association representing European private and independent rail freight companies. ERFA members share a commitment to work towards a non-discriminatory, competitive and innovative Single European Railway area. ERFA supports the continuous growth of competition in the European rail freight market, with over 52% of the market today coming from challengers to incumbent operators. For more information, visit [www.erfarail.eu](http://www.erfarail.eu).

### About UNIFE

UNIFE represents the European Rail Supply Industry in Brussels since 1992. The association gathers more than 120 of Europe's leading large and medium-sized rail supply companies active in the design, manufacture, maintenance and refurbishment of rail transport systems, subsystems and related equipment. UNIFE also brings together 12 national rail industry associations of European countries. For more information, visit [www.unife.org](http://www.unife.org) or follow us on X and LinkedIn.

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