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CTO Council – Working Group

ETCS-FRMCS Compatibility / Final results

Brussels

April 26th, 2024

Goal of todays' meeting and agenda

🎯 **Presentation and discussion of the final results of the Working group**

🎯 **Discussion of and agreemnt on further investigations**

Time	Topic	Speaker
10.00 – 10.10	Welcome	Dr. Karsten Kemeter, DB
10.10 – 10.30	Executive summary	Wolfgang Köstinger, ÖBB
10.30 – 10.50	Key findings solution stream	Alex Brand, SBB
10.50 – 11.10	Key findings legal stream	Fraser Allen, NR
11.10 – 11.40	Key findings migration stream	Wolfgang Köstinger, ÖBB
11.40 – 12.00	Wrap up and conclusion	J. van Gennip NS, W. Köstinger, ÖBB
12.00 – 13.30	*Lunch break*	
13.30 – 14.00	Brief Executive Summary and decision regarding way forward	Joost van Gennip, NS / Wolfgang Köstinger, NS

Introduction

- **The imminent obsolescence of GSM-R in the 2030-2035 timeframe** requires the compatibility of ETCS and FRMCS onboard equipment
- **Mature FRMCS specification are expected to be released mid 2027 in the TSI.** ETCS BL4 SV3.0 will ensure FRMCS compatibility
- **For fleets with earlier ETCS versions new investments are required and timewise feasibility is challenging** (additional authorization process, product availability and resources shortages). It will require considerable investments and time, workshop capacity etc.

In scope:

- **The working group analyzed two possible technical variants which do not require a change of the current ETCS SV2.y application** (SIL 4 part) in order to ensure ETCS/FRMCS compatibility with SV2.y : (1) BL Light and (2) Adapter. The objective: reduce time and costs compared to an upgrade to ETCS BL4 SV3.0.
- The working group analyzed the following aspects:
  1. **Technical feasibility** of the variants
  2. **Legal impact** (Needed changes and impact on authorization)
  3. **Migration aspects** (Volume, costs, timeline, risks)

This powerpoint was set up by ÖBB, SBB, NS, DB, NetworkRail and SNCF, with support on specific topics coming from UNIFE, UIC, EUG and CER.

Key findings

BL Light and the Adapter are technically feasible and have the potential for realizing a faster migration against reduced costs compared to the BL4 SV3.0 solution.

1. We have substantiated that technically both variants, BL Light and Adapter, are feasible
2. With these variants we can improve the feasibility of the overall European FRMCS migration as both variants have a potential for lighter authorization and faster migration
3. Cost analysis based on industry input show a potential cost savings between 500 – 1.500 million Euro for 11.000 vehicles, compared to implementing a BL4 SV3.0 solution
4. As current FRMCS development remains “untouched”, these variants would not delay availability of BL4 SV3.0 solution (e.g. for new rolling stock)

We would like to request EC and ERA to examine approval of BL Light and include possibilities to significantly shorten the needed time for authorization, as it is a prerequisite for BL Light to become viable.

5. BL Light is a low-risk solution and interim step towards SV3.y, with limited operational and trackside impact, for which industry support can be expected
6. The Adapter solutions are accompanied with higher technical risks, uncertain supplier ecosystem (a complete separate development) and are not an interim step towards SV3.y
7. Therefore, we see BL Light as a priority solution and the Adapter as an alternative
8. Further way forward to be discussed.

Key findings

Solution stream

D1: Overview of Solution Workstream Achievements / Deliverables

- The solution stream has analysed the solution space identified in the first report in more detail.
  Conclusion: baseline light and adapter solutions span the available solution space as alternative to onboard BL4 SV3.0.

<u>Baseline Light</u>

- Baseline light design principles and focus could be agreed quickly. A solution proposal document was elaborated and released on March 28, 2024. Baseline light is a low-risk solution with limited operational and trackside impact for which industry support can be expected. It is an intermediate step to SV3.y. To what extent costs and migration time can be reduced, will – among other factors – depend on the future certification regime for this solution which unlike BL4 SV3.0 does not affect the SIL4 core.
- The detailed change requests for baseline light have not yet been written. First the regulatory framework must be agreed with ERA. However, the concept document provides a comprehensive basis for detailed change requests.

<u>Adapter Solutions</u>

- The adapter topic was ridden with considerable complexity (wide solution space and multiple challenges and risks)
- From 7 identified solutions one solution (D) suitable for SV2.1 vehicles and a second solution (A) for SV2.0 vehicles could be identified and the basic way of working described.
- Adapter solutions are associated with higher technical risks, especially variant A, and uncertain supplier ecosystem (complete separate development needed).

<u>Technical Stream Report</u>, covering

- Compatibility aspects
- Overall migration aspects including FRMCS radio coverage
- Summary of baseline light including assessment
- Description of the adapter solutions

D1: Baseline Light Solution Proposal

- The EUG/UNIFE subteam of the solution stream has created a concept for baseline light that revises CR1359 and eliminates the need for changes to the ETCS core application (SS-026), hence no GUI/DMI changes and no balise packet 245 supporting the bearer selection process.
- This “purified” or “minimalist” CR1359 satisfies the well accepted design principles of separation of application on the one hand and connectivity (FRMCS service and transport stratum) on the other hand and provides an interim step towards SV3.y.
- This solution proposal “24E009-1_Baseline_Light “ has been elaborated for SV2.1 vehicles and applicability to SV2.0 vehicles has been confirmed. It was reviewed by various EUG and UNISIG members. All relevant identified open issues could be resolved. Version 1.0 was released on March 28th, 2024 and informally submitted to ERA.
- The elimination of GUI changes and balise packet 245 have some minor operational consequences described in chapters 3 and 4 of the solution proposal that should not prevent this solution from being considered.
- Basic compatibility constraint of any solution based on BL3/SV2.y vehicles: trackside migration to BL4 SV3.0 with associated new functionality is not possible.
- Other trackside impact is minimal. We propose that for TS SV2.3 a new “FRMCS-only” mode shall be introduced so that after decommissioning of GSM-R also the ISDN infrastructure can be put out of service.
- As aspired, baseline light has no impact on FRMCS standardisation.
- Development needs are limited and concern only Euroradio (starting point is Euroradio of SV3.0, needs adaptation of bearer selection process and faking of GSM-R registration towards the application after decommissioning of GSM-R).

➔ **Low risk solution with limited operational and trackside impact for which industry support can be expected. To what extent costs and migration time can be reduced will also depend on the future certification regime.**

D1: Baseline Light, Operational consequences, DMI impact (example)

Situation	implemented radio network		RBC	B3 on-board	B Light on-board		SV 3.0 on-board		
	GSM-R	FRMCS		GSM-R	FRMCS + GSM-R	FRMCS	GSM-R	FRMCS + GSM-R	FRMCS
SoM with valid position on a line where RBC is reachable by GSM-R and FRMCS	yes	no [3]	GSM-R + FRMCS	NA [2]	NA [2]	NA [2]	NA [2]	NA [2]	NA [2]
	yes	yes	GSM-R + FRMCS						
	yes	failed	GSM-R + FRMCS			Registration failed			FRMCS registration failed
	failed	no	GSM-R + FRMCS	NA [2]	NA [2]	NA [2]	NA [2]	NA [2]	NA [2]
	failed	yes	GSM-R + FRMCS	Registration failed			GSM-R registration failed		
	failed	failed	GSM-R + FRMCS	Registration failed	Registration failed	Registration failed	GSM-R registration failed	GSM-R registration failed FRMCS registration failed	FRMCS registration failed
	no	yes	GSM-R + FRMCS	NA [1]			NA [1]		
	no	failed	GSM-R + FRMCS	NA [1]	Registration failed	Registration failed	NA [1]	FRMCS registration failed	FRMCS registration failed

In this scenario, only difference on DMI between SV3.0 on board and baseline light onboard:

- SV3.0 shows whether an FRMCS or GSM-R registration has failed
- baseline light will generically show that the registration failed
- this is in accordance with the basic FRMCS design principle that application and telecoms should be separated

D1: Baseline Light, Operational consequences, DMI impact (example 2)

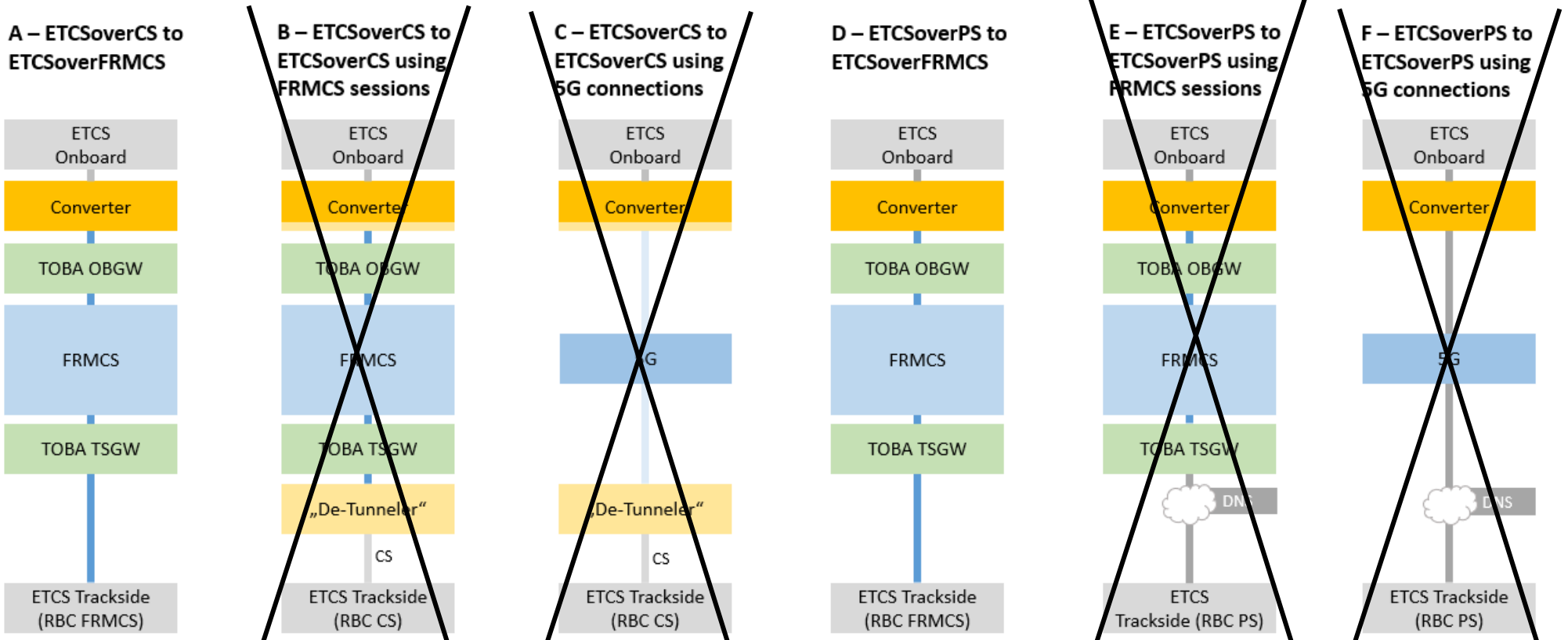
Situation	implemented radio network		RBC	B3 on-board	B Light on-board		SV 3.0 on-board		
	GSM-R	FRMCS		GSM-R	FRMCS + GSM-R	FRMCS	GSM-R	FRMCS + GSM-R	FRMCS
SoM with valid position on a line where RBC is reachable by GSM-R only	yes	no	GSM-R			NA [1]			NA [1]
	yes	yes	GSM-R			NA [1]			NA [1]
	yes	failed	GSM-R			NA [1]			NA [1]
	failed	no	GSM-R	Registration failed	Registration failed	NA [1]	GSM-R registration failed	GSM-R registration failed	NA [1]
	failed	yes	GSM-R	Registration failed		NA [1]	GSM-R registration failed	GSM-R registration failed	NA [1]
	failed	failed	GSM-R	Registration failed	Registration failed	NA [1]	GSM-R registration failed	GSM-R registration failed FRMCS registration failed	NA [1]

In this scenario, on top of the behaviour shown in example 1 there is one use case, where instead of “registration failed” a “radio connection failure”-symbol will appear.
However, this indication is due to a more generic problem of interaction between onboard and mobile network independent of the BL solution.

D1: Solution Space for Converter/ Adapter Solution and Selection of Solution

Converter variants – TOBA migration option 1b

Two variants E1 and E2 investigated



Solution for SV2.0 vehicles

Trackside impact with „legacy perpetuation“ too significant

Functional limitations, no synergy with mainstream FRMCS SV 3.0 migration

Solution for SV2.1 vehicles

Trackside impact without providing significant onboard benefits wrt to D

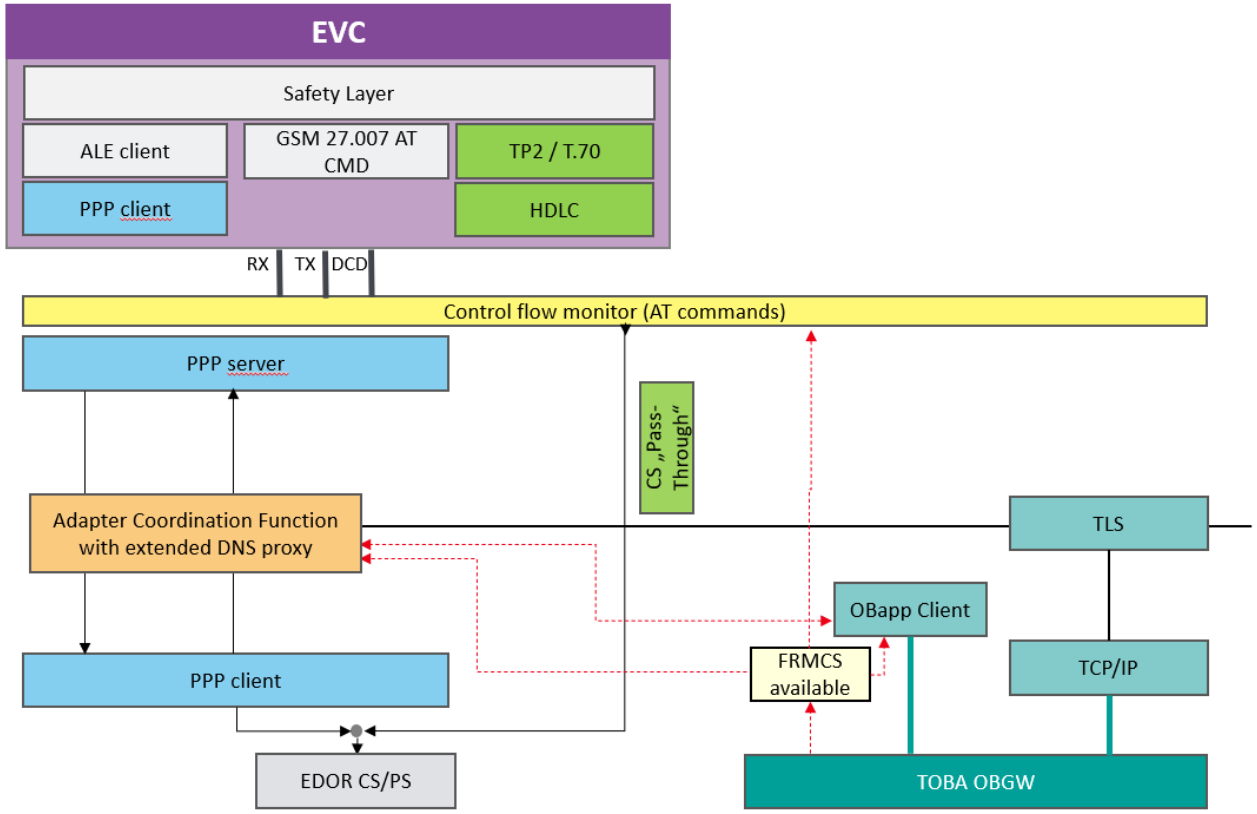
Functional limitations, no synergy with mainstream FRMCS SV 3.0 migration

D1: Conclusions and Recommendations regarding Adapter Solutions (1) Solution D for SV2.1 vehicles

- For SV2.1 vehicles, owing to the idea provided by industry of introducing an onboard DNS proxy with some extra functionality, an implementation of adapter solution D could be identified that looks technically feasible and not overly complex.
- **No protocol conversion** required, thus some of the major risks identified in earlier assessments could be mitigated.
- However, the issue of needing implementations specific to vendor combinations of ETCS and telecom onboard (EDOR) remains. Without prototyping, a final risk assessment is not possible.

➔ It needs to be assessed whether there are specific supplier combinations that would cover a large enough subfleet and whether the necessary supplier ecosystem will be available.

- Trackside impact and functional limitations equivalent to baseline light.
- Operational impacts have yet to be studied, they are expected to be similar to baseline light but this needs to be confirmed.
- Standardisation and certification regime yet unclear.



Adapter solution D for SV 2.1 vehicles with extended DNS Proxy

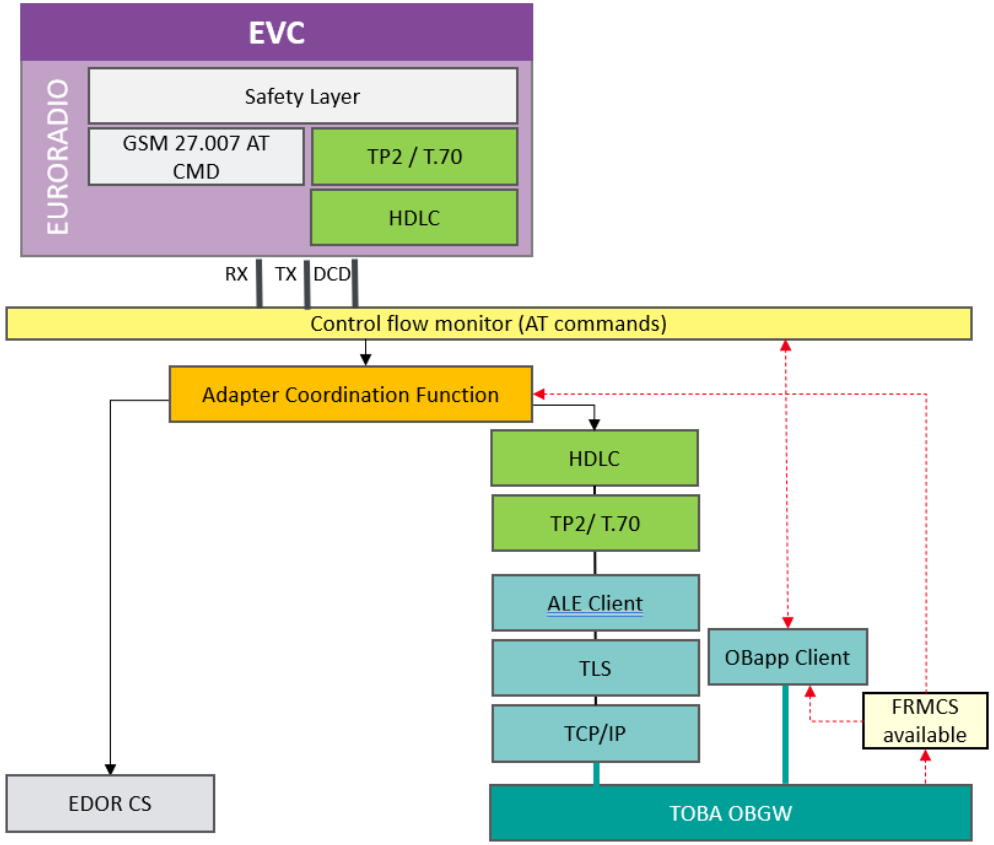
➔ **If baseline light does not provide the hoped-for benefits, solution D could be a higher risk alternative that would have to be studied in more detail.**

D1: Conclusions and Recommendations regarding Adapter Solutions (2)
Solution A for SV2.0 vehicles

- For SV2.0 vehicles, the solution of choice is adapter A.
- Some key aspects in terms of addressing and bearer choice mechanisms could be identified including two approaches to “look-up tables” or “transmission mode tables”.
- Disadvantages compared to solution D: tricky protocol conversion and higher communication timing risks, while challenges of solution D like supplier specific implementation also remain.
- Without prototyping, a final risk assessment is even less possible than with adapter D.

➔ It needs to be assessed whether there are specific supplier combinations that would cover a large enough subfleet and whether the necessary supplier ecosystem will be available.

- Trackside impact and functional limitations equivalent to baseline light
- Operational impacts have yet to be studied, they are expected to be similar to baseline light but this needs to be confirmed.
- Standardisation and certification regime yet unclear.



Adapter solution A for SV2.0 vehicles with extended DNS Proxy

➔ **Higher risks than with solution D and significantly higher risks than with baseline light.**

Key findings

Legal stream

Legal Stream

High level Problem Statement:
Technical and legal non compatibility of FRMCS with existing and pre 2030 planned fitment on board subsystems

L&A Key findings:

SV2.y do not account for the existence of FRMCS. The proposed changes (adaptor and BS-Light with FRMCS) do not change ETCS functionality but only change the communications options and maintain or exceeding existing levels of reliability

It is our opinion that the current TSI is not compatible with existing subsystems which are already commercially available in relation to the above problem statement. In line with Article 7 of EU 2016/797 the updating of existing subsystems would compromise the economic viability or compatibility of the subsystem.

From an authorisation view in relation to Article 21 EU 2016/797, item 12(b) highlights the requirement for authorisation whenever the safety of the subsystem is adversely affected by the works or 12(c) required by the TSI. The proposed solutions do not directly alter the ETCS safety function. TSI 7.2.2.2 item (2) would be deemed to be met, i.e. that the introduction of BS Light or adapter would not change the state expected during the original authorization. Moreover, the technical compatibility with the network is not affected.

Change Request (CR1359) would need to be amended legally to enable compatibility. (Review of error correction impact is still required but expectations are these are ETCS maintenance updates only and non impacting).

Articles 24 EU 2016/797 provides the detail on vehicle type authorisation following change. Article 25 allows for authorisation of a series of vehicles which are in conformity with an existing authorised vehicle type without further checks.

There are no recommendations from the L&A WG to suggest the need for alterations to the directives

Legal Stream

Recommendations

Proposals:

Align TSI27 activities to incorporate the necessary changes to legally and technically allow the compatibility and use of the baseline light solution to interface FRMCS with SV2.0 & 2.1 *(EU 2018/545 Article 17 3.)*

If timelines (2027/8) permit changes to TSI: *(ref. 7.2.4.1.2-(4) Permissible to use the most recent version of any TSI)*

- Introduce the TSI changes required as part of TSI27 that will enable FRMCS compatibility with baseline 3 system versions
- Introduce the differentiation of safety and non-safety functions and define that changes of the non-safety part do not require new authorisation. Non safety changes would reduce the requirement for NOBO verification and allow ASBO system compatibility verification only.
- Amendment of CR1359 (packet 245) to account only for the changes necessary for FRMCS compatibility to the baseline light solution.
- Indicate that ATO is out of scope for baseline light.

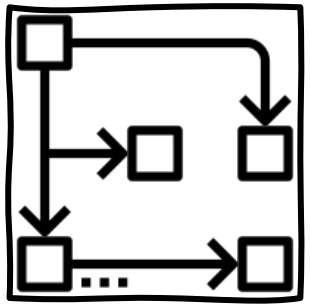
If timelines do not permit:

- Request the provision of a Technical Opinion on the backwards compatibility of FRMCS with Baseline 3 system versions.
- Member states could submit derogation requests for the allowance of backwards compatibility of FRMCS with Baseline 3 system versions in reference to partial fulfilment as detailed in Appendix G (1) and (2)(c).

Request that wherever possible, the vehicle series type compatibility with an authorised vehicle of the same type is applied with no further testing requirements for subsystem compatibility

Key findings

Migration stream



How did we build up the volume?

- The analysis is based on **EVC hardware capabilities** of existent and contracted fleets in four European countries.
- It is especially based on the questions whether an **Ethernet interface** is available (that is needed for FRMCS) and on the architecture **split of safety and non safety layers** related to Euroradio (SS-037)
- Moreover industry companies provided their view on the foreseen compatibility of their EVCs based on certain example trains
- The breakdown is based on the assumption that **ATO is only in limited use** in the 2030ies, therefore no trains have been excluded in the analysis from an ATO point of view. If ATO GoA 2 is mandatory vehicles must be upgraded to SV3.0 as BL Light and Adapter are not suited for ATO GoA 2
- The analysis is based on 11.000 vehicles which are or will be in service with ETCS SV2.y by 2030. Out of these **4.600 vehicles were analyzed in detail** for which detailed data was provided.
- The sum shows a **weighted sum of four European countries** (Austria, Germany, The Netherlands, Switzerland), where information was sufficient enough and which are understood to be representative for European RUs
- In total seven scenarios were built up (see next slide) in order to allow for **different combinations** (e.g. what will happen if only one alternative solution would be available vs. all solutions available)
- However, other parameters must be taken into account like **costs, authorization and timeline**

Most of vehicle volume is from hardware perspective suitable for BL Light

Scenarios	All solutions	Reference, BL Light and Adapter A	Reference, BL Light and Adapter D	Reference and BL Light	Reference and Adapters	Reference and Adapter A	Reference and Adapter D
	A	B	C	D	E	F	G
SV 3.y reference[1]	10-20%	10-20%	10-20%	10-20%	10-20%	10-20%	10-20%
SV3.y reference with HW Upgrade	0%	0%	0-10%	0-10%	40-50%	60-70%	60-70%
BL Light SW Upgrade[2]	60-70%	60-70%	60-70%	60-70%	0%	0%	0%
BL Light HW Upgrade[2]	0-10%	10-20%	0-10%	10-20%	0%	0%	0%
Adapter D (SV2.1)[3]	0-10%	0%	0-10%	0%	20-30%	0%	20-30%
Adapter A (SV2.0)[3]	0-10%	0-10%	0%	0%	20-30%	20-30%	0%
	100%	100%	100%	100%	100%	100%	100%

- **Scenario A**: In a quantitative analysis approach the fleets are distributed based on their hardware suitability to the six potential solutions: SV3.y reference, SV3.y reference with a Hardware Upgrade, BL Light with a Software Upgrade, Baseline Light with a required hardware upgrade of the non-safety part, Adapter D for the remaining SV2.1 vehicles and Adapter A for the remaining SV2.0 vehicles
- **Scenario B-G:** Using scenario A as a starting point the fleets are then distributed, based on expert judgement, in the most likely way to each potential solution based on their hardware suitability and also on their given lifetime (e.g. the adapter solutions are considered a more attractive solutions for vehicles with a remaining lifetime <15 years then the SV3.y reference solution)
- The green fields highlight the best cases for each solution whereas the red fields highlight the worst case

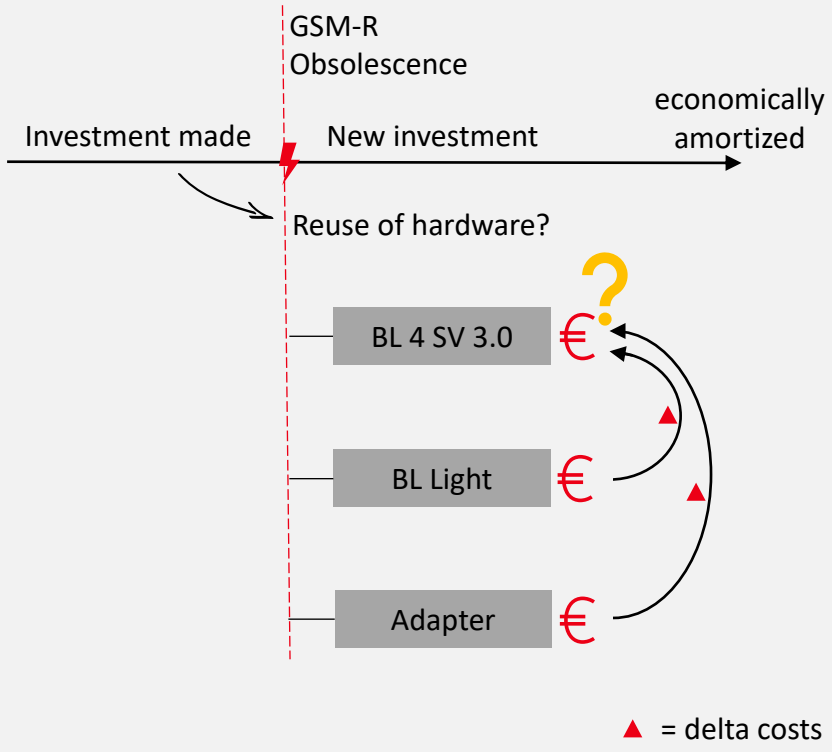
[1] Vehicles suitable for SV3.0, BL Light and Adapter | [2] Vehicles suitable for BL Light and Adapter | [3] Vehicles suitable from hardware perspective only for the Adapter

Most of vehicle volume is from hardware perspective suitable for BL Light

- **BL Light** seems to be suitable for a big amount of the existing / contracted fleet (assuming BL Light exists and is attractive on cost and authorization side)
  - BL Light with SW Upgrade covers roughly **more than half of the fleet** in all scenarios
  - in addition BL Light with HW Upgrade delivers **an additional 10-20%** of the fleet
  - BL Light amount of the fleet will **even increase depending on the attractiveness of BL Light vs. SV3.y** (costs and authorization requirements)
- If **no BL Light** exists
  - the volume will be split between SV3.y and Adapters A and D
  - depending on the RU strategy, balancing e.g. cost versus a “dead end” Adapter, from a technological point of view, and lifetime, volumes will be allocated
  - the Adapter will cover roughly half of the fleet if both Adapters are available; if only one Adapter is available it will cover 20-30% of the fleet
- From a technical point of view, the **adapters would be a solution for all vehicles**, however:
  - two Adapter options needed and a specific integration per product version required
  - Adapter options only make sense if they bring a significant cost advantage compared to BL Light
  - at least the **Adapters are an option where BL Light is not applicable** (10-20 % with an equal split between Adapter A and D)
  - if there is only one Adapter, the respective other Adapter does not benefit
- The **attractiveness of SV3.y for retrofit** depends on the existence of BL Light
  - if BL Light exists, SV3.y is likely to cover around **1/3 of the fleet**
  - if only one adapter comes to live, it could be beneficial to upgrade **70-80% of the fleet** to SV3.y**,** however it is expected, **that 50-60% thereof** would then need a **hardware** (and software) **change**

How did we try to identify the costs of the two alternative solutions?

- The analysis is based on the goal to identify the **delta costs** of the BL Light solution compared to BL 4 SV3.0 and the Adapter approach compared to BL 4 SV3.0
- In order to analyze the delta costs different **categories** were built:
  - out of scope: Identical costs of each solution (e.g. FRMCS)
  - in scope: **Different costs** of each solution (components that differ compared to the reference solution)
    → **development costs**
    → **non-recurrent costs**: e.g. engineering
    → **recurrent costs**: e.g. installation

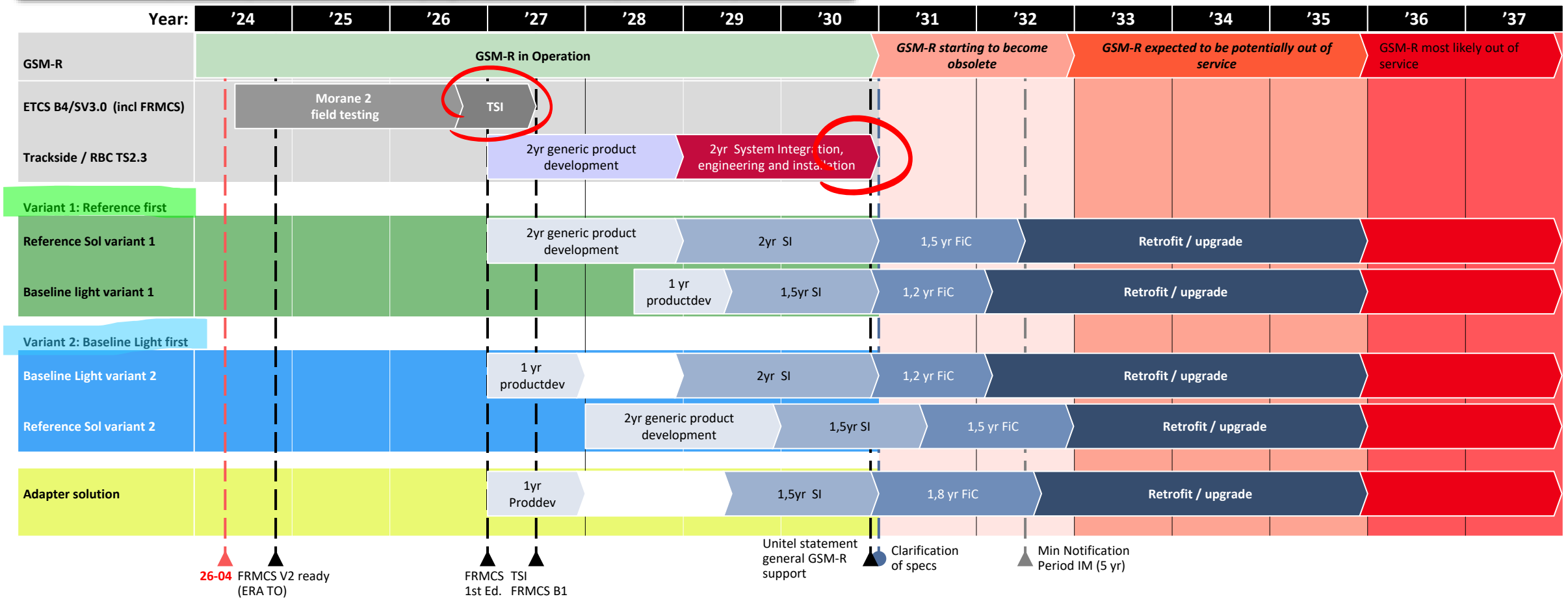


Cost analysis based on industry input show a potential cost savings between 0.5-1.5bn €, compared to implementing a BL4 SV3.0 solution

- **Risk of initial 3-8 billion Euro sunk cost has not been disproved** during the working phase by any participating institution – therefore we consider it still valid
- Based on the information received we were **not able to make any more detailed cost (TCO) analysis**
- As the initial reference costs were not provided by industry and our earlier estimate has a high margin (3-8bn), and we only have a delta cost estimate (0,5-1.5 bn), **we are not able to tell what the absolute costs (incl TCO) will be in the end** (within reasonable margins)

Under the current framework there is no real time gain between availability of solutions and overall feasibility to reach the 2035 target remains in danger.

Timeline analysis based on expert judgement from railways and industry



Explanation on used terms and timeframes / deadlines;

- **System integration (SI)**; All verification and validation activities needed for ensuring the quality, functionality, and reliability of the FRMCS and ETCS system at network level under any operational condition.
- **Clarification of specs**; Based on expert judgement it is most likely that the outcome of the SI phase triggers questions on clarification of requirements via Technical Opinion, potentially leading to additional SI activities to be executed.
- **First in Class (FiC);** The first First of Class per vehicle type, this includes integration of the FRMCS hard- and software, upgrade of existing ETCS OBU if needed, re-authorization, needed re-engineering for preparation of mass retrofit, up to approval for putting into commercial operation. The re-authorization includes verifications, certificates, declarations of conformity, proof of compliance, examination procedures… (all these words are used in chapter 6 of the CCS TSI) which needs lot of tests, test sequences, checks, assessments, impact analysis, verifications, validation processes, controls, carried out by a lot of actors (AsBo, DeBo, NoBo, NSAs, ERA).
- **GSM-R in operation**; **UNITEL statement that GSM-R support will be provided to at least until 2030 on a general basis** and beyond 2030 on a per contract basis (subject to individual contracts and maintenance agreements). Source; (link). Depending on (national) individual contracts and agreements, GSM-R availability of products and services, i.e. the whole ecosystem will gradually run out of service, costs and performance risks will go up. The general assumption is that GSM-R will most likely be out of service in 2035 in most countries, as keeping GSM-R in service after 2035 is expected to become very costly and operational risks will become severe.
- **UIC stable draft of FRMCS V2** specs have been delivered to ERA for EECT review at 29-03-2024, with a planned Technical Opinion from ERA by the end of the year. The EECT review for FRMCS v2.0 includes also the update of ETCS SS-037-03. (email JME 29-03-2024 and website info website UIC; Link 2)
- **MORANE 2 field testing** to start June 2024 ending Q3-2026. TSI CCS publication June 2027 (according to website UIC; Link 3)
- **5-year notification period**; TSI CCS 2023, §7.3.1.2; GSM-R may only be taken out of operation when the following conditions are fulfilled: Condition 1: minimum notification period of 5 years where GSM-R services shall be stopped. Condition 2: FRMCS is in service.
- **Generic product development**; time needed for suppliers to develop a generic product up to manufacture / industrialization.

Under the current framework there is no real time gain between availability of solutions and overall feasibility to reach the 2035 target remains in danger.

- **Overall feasibility remains in danger**
  - None of the three solutions (SV3.0, BL Light, Adapter) will ensure a feasible FRMCS migration within the set timeframe
- **There is no significant time gain between any of the solutions related to the starting point of mass retrofit/upgrade**
  - Development of all solutions is depending on final FRMCS specifications (1st edition), foreseen beginning 2027
  - Start of FiC phase for all solutions is depending on availability of RBC trackside SV2.3 and it's system integration period, foreseen earliest end 2030
  - FiC will take 1,2-1,8 years for each fleet type, depending on the complexity for integration in the vehicle, scope and effort needed for re-authorization
  - Mass ETCS/FRMCS retrofit/upgrade is foreseen to start no earlier then 2032, leaving a remaining timeframe of 4 years until foreseen GSM-R out of service
  - GSM-R service stop by IM could be possible from mid 2032 onwards (IM notification period of 5 years starting earliest in 2027), leaving no time for mass retrofit/upgrade for the involved operators.
- **Shorter FiC phase (for each vehicle type) for BL Light could lead to overall reduction in time needed for retrofit/upgrade of the fleet**
  - significance is related to the ratio of FiC per vehicle
- **No significant difference between solutions expected related to the time needed in the workshop**
  - It is assumed that most time in the workshop is needed for integrating the cables and mounting of the antennas
  - Time needed for ETCS hardware change is considered not significant / time path critical during FRMCS integration
- **Development of Adapter solution could – to a certain extent – be done in parallel with development of other solutions**
  - Adapter development could be mainly done by telecommunication experts with support of signaling experts
  - BL Light development relies mainly on signaling experts
  - However, no commitment by industry so far for Adapter


THE
WAY
FORWARD

Key findings

BL Light and the Adapter are technically feasible and have the potential for realizing a faster migration against reduced costs compared to the BL4 SV3.0 solution.

1. We have substantiated that technically both variants, BL Light and Adapter, are feasible
2. With these variants we can improve the feasibility of the overall European FRMCS migration as both variants have a potential for lighter authorization and faster migration
3. Cost analysis based on industry input show a potential cost savings between 500 – 1.500 million Euro for 11.000 vehicles, compared to implementing a BL4 SV3.0 solution
4. As current FRMCS development remains “untouched”, these variants would not delay availability of BL4 SV3.0 solution (e.g. for new rolling stock)

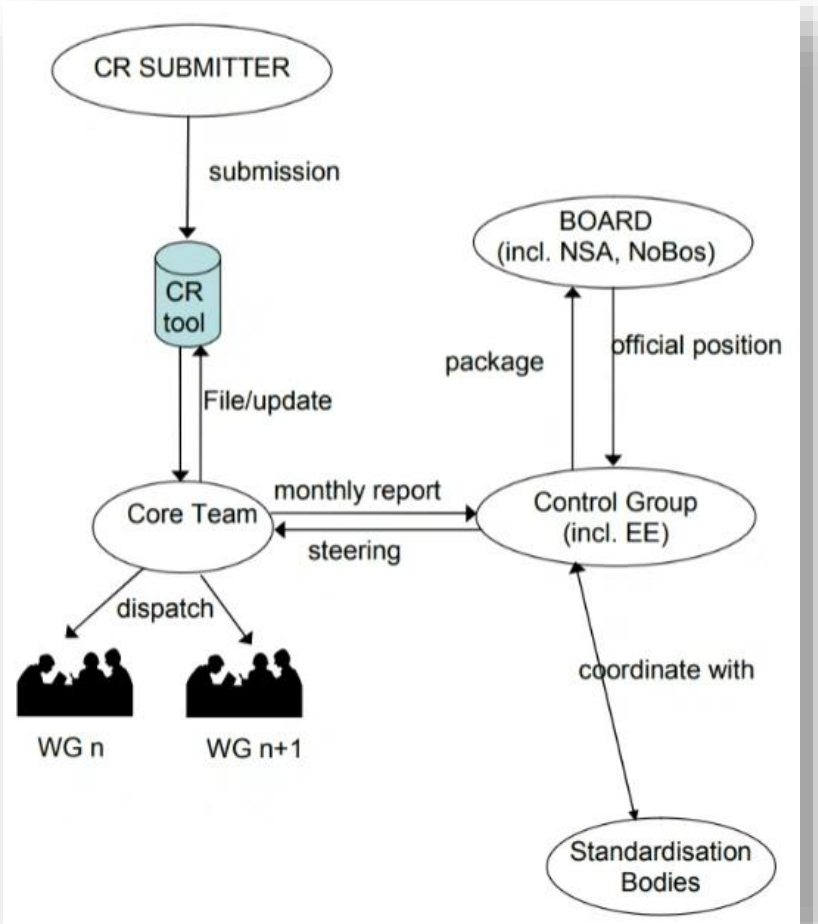
We would like to request EC and ERA to examine approval of BL Light and include possibilities to significantly shorten the needed time for authorization, as it is a prerequisite for BL Light to become viable.

5. BL Light is a low-risk solution and interim step towards SV3.y, with limited operational and trackside impact, for which industry support can be expected
6. The Adapter solutions are accompanied with higher technical risks, uncertain supplier ecosystem (a complete separate development) and are not an interim step towards SV3.y
7. Therefore, we see BL Light as a priority solution and the Adapter as an alternative
8. Further way forward to be discussed.

Way forward

- The Commission has addressed their request to the Agency for an opinion to be delivered within 3 months after today.
- We would like to request ERA to include in their analyses the possibilities to significantly shorten the needed time for authorization of each vehicle (type) to be equipped with BL Light, as we consider this as to be essential for BL Light to become viable.
- If ERA's opinion would confirm our recommendation for BL Light as a priority solution, we would expect that the CCM process for including BL Light in the legal framework could be initiated.
- First step of the CCM process would then be to clarify how to implement BL Light in the Legal framework. A CR could be written by EUG / UNISIG for this (with support working group members).
- CER, EIM and/or UNIFE could then initiate the CCM process by submitting the CR in the CCM tool.

Change Control Management Process illustrated:



Source; https://www.era.europa.eu/content/change-control-management