

# TSI CCS ETCS - Modifications and its resulting impact

Feedback from Workshop 6

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- **Topic 1 : CCS TSI – ERTMS specifications (Appendix A)**
- Topic 2: CCS TSI – Implementation framework
- Topic 3: Feedback from Workshop 6

# ERTMS Specifications – Enhancements linked to 'Digital and Green rail'

European Specifications in CCS TSI 2022	Link with strategic objectives
Automated Train Operation Grade 1 and 2 (ETCS over ATO)	ATO provides significant capacity benefits and reduced energy consumption (green rail).
ERTMS Readiness for 5G based communication (FRMCS)	GSM-R (2G) will become obsolete between 2035-2040 and shall be replaced by FRMCS (5G). Further digitalisation of rail as 5G opens many possibilities.
Digital ETCS reducing trackside assets	Hybrid Train Detection: Train integrity allows capacity increase and/or reduced trackside train detection systems. ETCS over DAC readiness: Supervised shunting allows safety increase and when using digital automatic coupling will allow to get rid of shunting signals
On-board modularity	On-board modularity enables further market opening which allows integration of different interoperability constituents/subsystems from different suppliers (open market). ERTMS specifications include additional specifications which provide on-board modularity focusing on a common Ethernet based system and providing harmonised interfaces between ATO, ETCS, FRMCS parts and RST-subsystem.
Additional enhancements to further optimise capacity, safety & security, cost reductions	The ERTMS specifications are further optimised <ul style="list-style-type: none"> <li>- capacity: braking curve optimisation</li> <li>- safety &amp; security: cyber-security</li> <li>- cost: reduction of number of balises to be installed in specific configurations</li> </ul>

Regulatory objective: European specifications included in the CCS TSI avoids different national systems being deployed for these functionalities (interoperability and single market).

## Which changes justify the introduction of a new ETCS system version ?

**ETCS up to system  
version 1.1**  
(introduced in Baseline 2)



**ETCS up to system  
version 2.0**  
(introduced in Baseline 3MR1)



**ETCS up to system  
version 2.1**  
(introduced in Baseline 3R2)



*New:*  
**ETCS up to system  
version 2.2  
(ready for ATO)**  
(introduced as part of  
Baseline 4)



*New:*  
**ETCS up to system  
version 3.0  
(ready for FRMCS/  
supervised  
manoeuvres)**  
(introduced as part of  
Baseline 4)

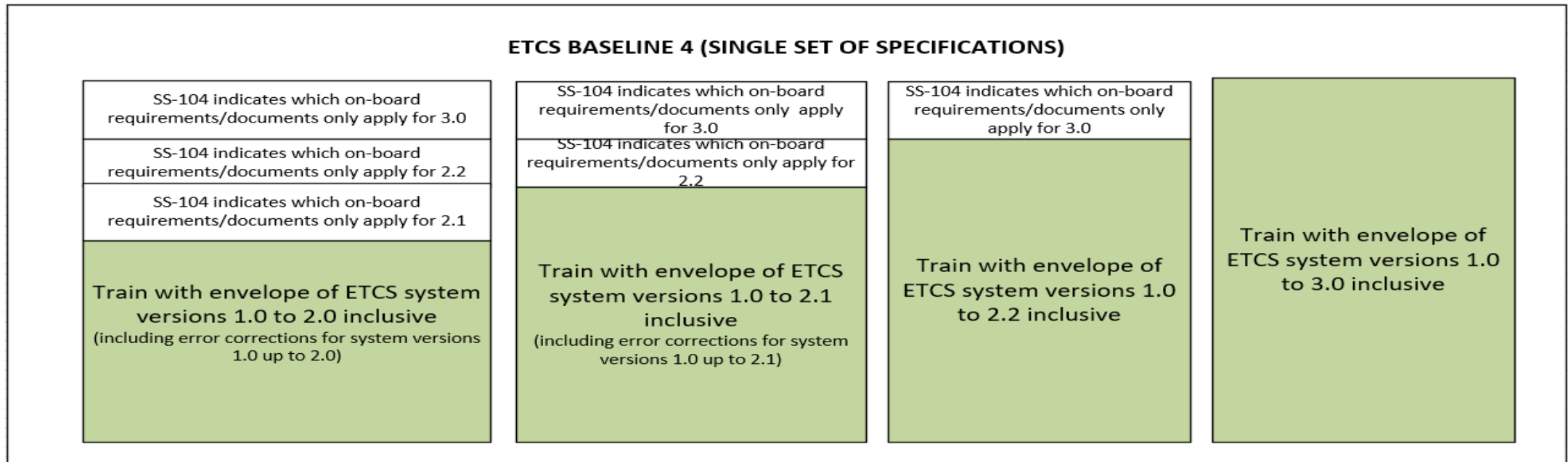


### CCS TSI:

- new (backwards and forwards) compatible functions introduced as part of ETCS system version 2.2;
- new (backwards, but not forwards) incompatible functions introduced as part of ETCS system version 3.0;

Broad return of experience from projects allows to include all errors detected from ongoing projects between 2015 and 2021 (focusing on specification gaps and ambiguities which could prevent the normal service). This broad return of experience allows that this return of experience can be used across the different trackside and on-board ERTMS projects.

**How to include and maintain specifications in an efficient way for error corrections and enhancements allowing a structured approach for partial fulfilment of system versions and different implementation frameworks for fast error corrections and gradual implementation of innovations?**



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## Implementation requirements for new functions

- Objective of balancing IM/RU economic interests:

How to handle innovations for the railway system which have a different business case for the Infrastructure Managers and Railway Undertakings. Example: Reduce trackside assets ('digital rail') might require new mandatory on-board functions to be implemented for existing and new vehicles (e.g. Digital Automatic Coupling, Train Integrity, FRMCS and associated ETCS related changes).

- CCS TSI text:
  - Update of National Implementation Plan by 15<sup>th</sup> December 2023: Member State's obligation to balance different expressed needs between impacted stakeholders (IM and RUs) to decide on ATO implementation, new FRMCS radio system or new ETCS system version;
  - If Member State decides for implementation of new functions a minimum timeframe shall be provided:
    - minimum guaranteed compatibility window of 7 years after entry into force of the TSI; AND
    - minimum notification period of 5 years by IMs;

## Implementation requirements related to maintenance

- EU Policy objective: Providing fully compliant ERTMS products (without deviations/partial fulfilment) allowing vehicles to operate across the EU (without additional restrictions/modifications if the area of use of a vehicle is extended).
  - Objective of balancing IM/RU economic interests: IMs would like that error corrections are implemented in the vehicles in order that temporary mitigation measures can be removed. IMs/RUs depend on their suppliers for integration of error corrections in their products.
- ⇒ CCS TSI text: Enforces the maintainability and responsibility of the trackside and on-board suppliers for implementation of errors in products and corrections to be done in products based on error corrections in the specifications **within a maximum framework of 2 years.**



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