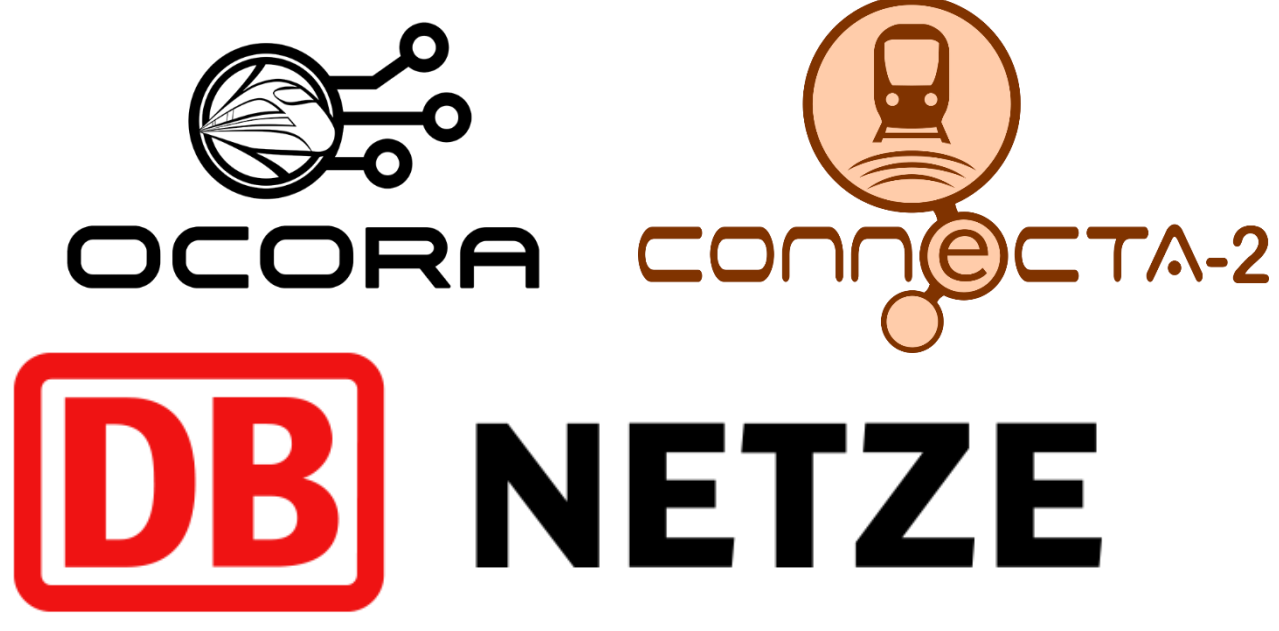


# OCORA-CONNECTA Alignment



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## Introduction

OCORA Gateway definition:

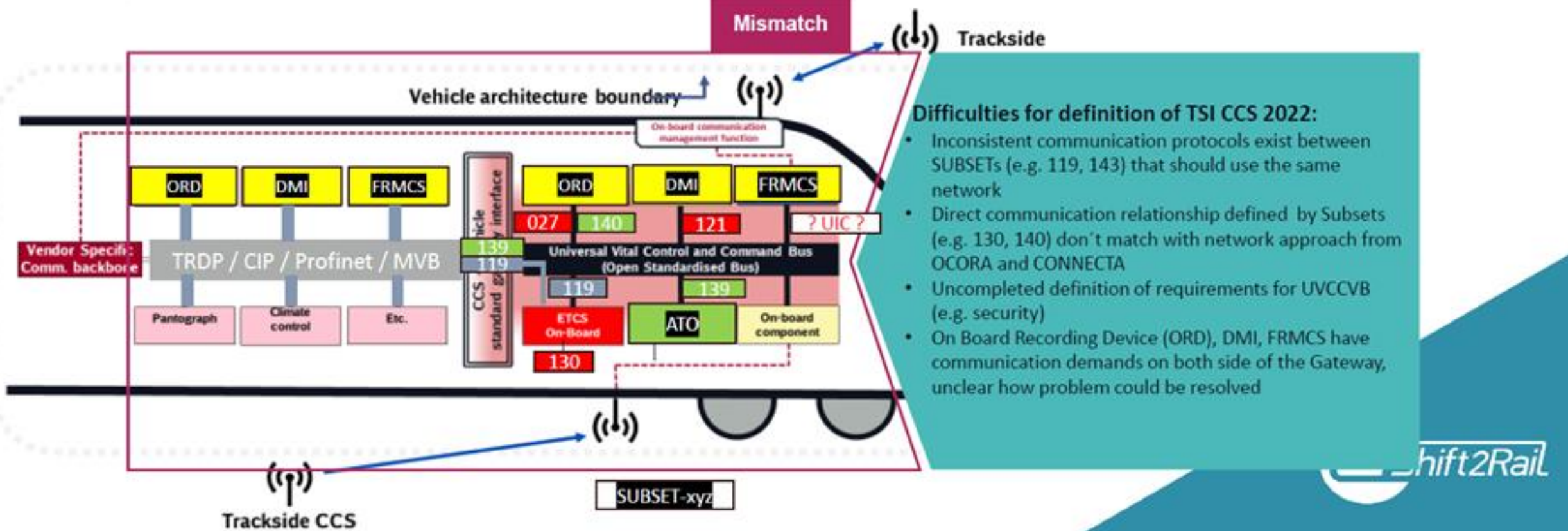
- OCORA aims at having standardized **Command Control and Signaling (CCS)** on-board applications that can be installed without modification or adaptation on any type of vehicle. In order to achieve this the use of the same and **standardised interface** is proposed. While interface standardization ensures portability, typically it does not provide the flexibility for the adaptation to different vehicle types. Where a Gateway due to a legacy TCMS bus is introduced, it needs a configurable **Functional Vehicle Adapter (FVA)** to convert data from the legacy vehicle bus to the standardised OCORA data format. Where the CONNECTA bus is used, the Gateway is no longer needed and the FVA is limited to parametrising rolling stock specific data to the CCS.
- The main objective is the application of a common safety data bus as standardised by **CONNECTA (UVCCB)** for both **CCS** and **TCMS** applications. Where a legacy TCMS bus has to be reused, a Gateway needs to be provided between CCS and TCMS. CCS is managing the functions and their interfaces with the ground (ETCS, ATO, TMS). TCMS is managing the actors and sensors residing in the train domain.
- FVA is a piece of software deployed on the OCORA to provide an OCORA unified and standardized interface towards the CCS applications and services for vehicle functions and vehicle information needed by the OCORA on-board applications and services.
- CONNECTA project defines the general specifications for TCMS technologies and high-level architectures to shape the future system with less cabling, increased availability, enhanced performance, easier integration and commissioning of functions and, above it, reduced life cycle costs
- The Global System for Mobile Communications-Railway (**GSM-R**) and the **FRMCS** Radio may also be connected to the Gateway, providing connectivity for the CCS Systems with the Radio Block Centre (RBC) (for existing ETCS L2 networks).

OCORA: Open Control Command and Signaling (CCS) On-board Reference Architecture  
 CONNECTA: CONTRIBUTING to Shift2Rail's Next generation of high Capable and safe TCMS and brAkes  
 FRMCS: Future Railways Mobile Communication System  
 TCMS: Train Control and Management System  
 UVCCB: Universal Vital Control and Command Bus  
 ETCS: European Train Control System  
 ATO: Automatic Train Operation  
 TMS: Traffic Management System

## Objectives

### Status of partially contradicting Specs

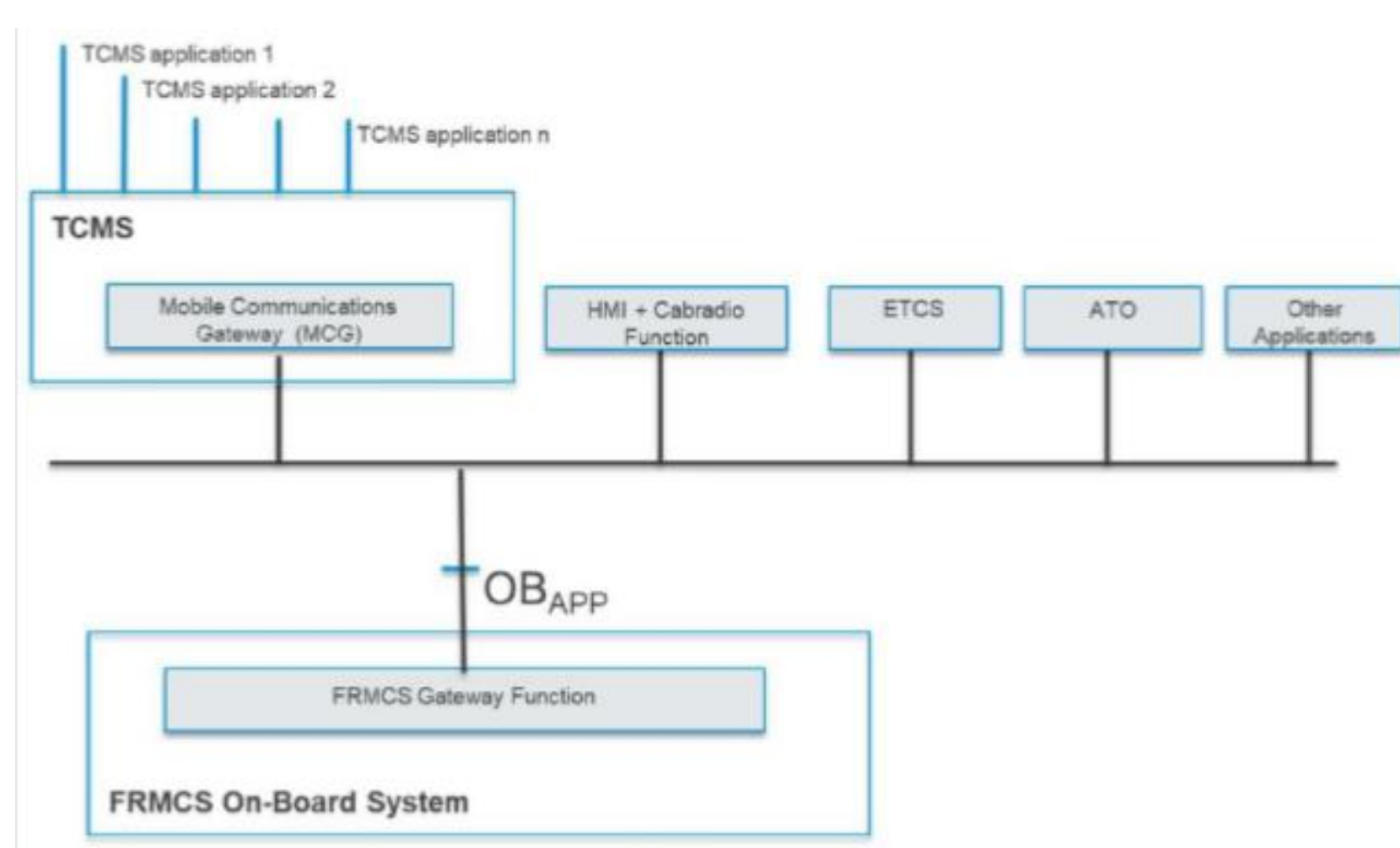
Mismatch on targets leads to mismatch of preferred communication protocol e.g.:  
 Low "integration cost" also taking into account "existing TCMS architectures" → Subset 119  
 Low "component cost" → Subset 140



Assess architectural aspects to integrate TCMS bus technology defined in Connecta as a candidate for the **Universal Vital CCS Bus** in OCORA

- Compare and align architectures
- Identify differences and needed decisions and investigations

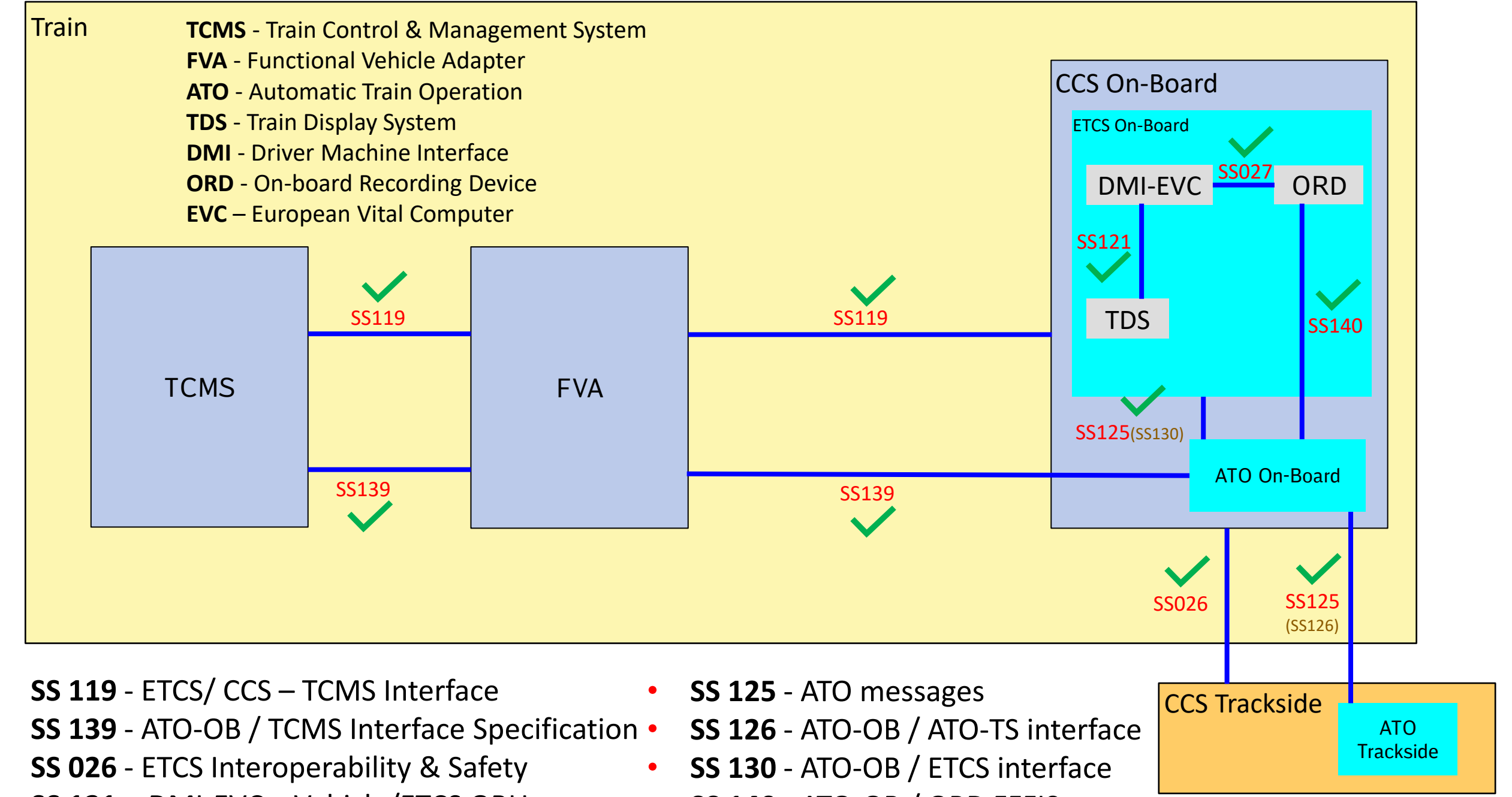
## FRMCS Interfacing with TCMS



Train control and management system (TCMS) uses a **Mobile Communication Gateway (MCG)** for train to ground communication (IEC 61375-2-6)

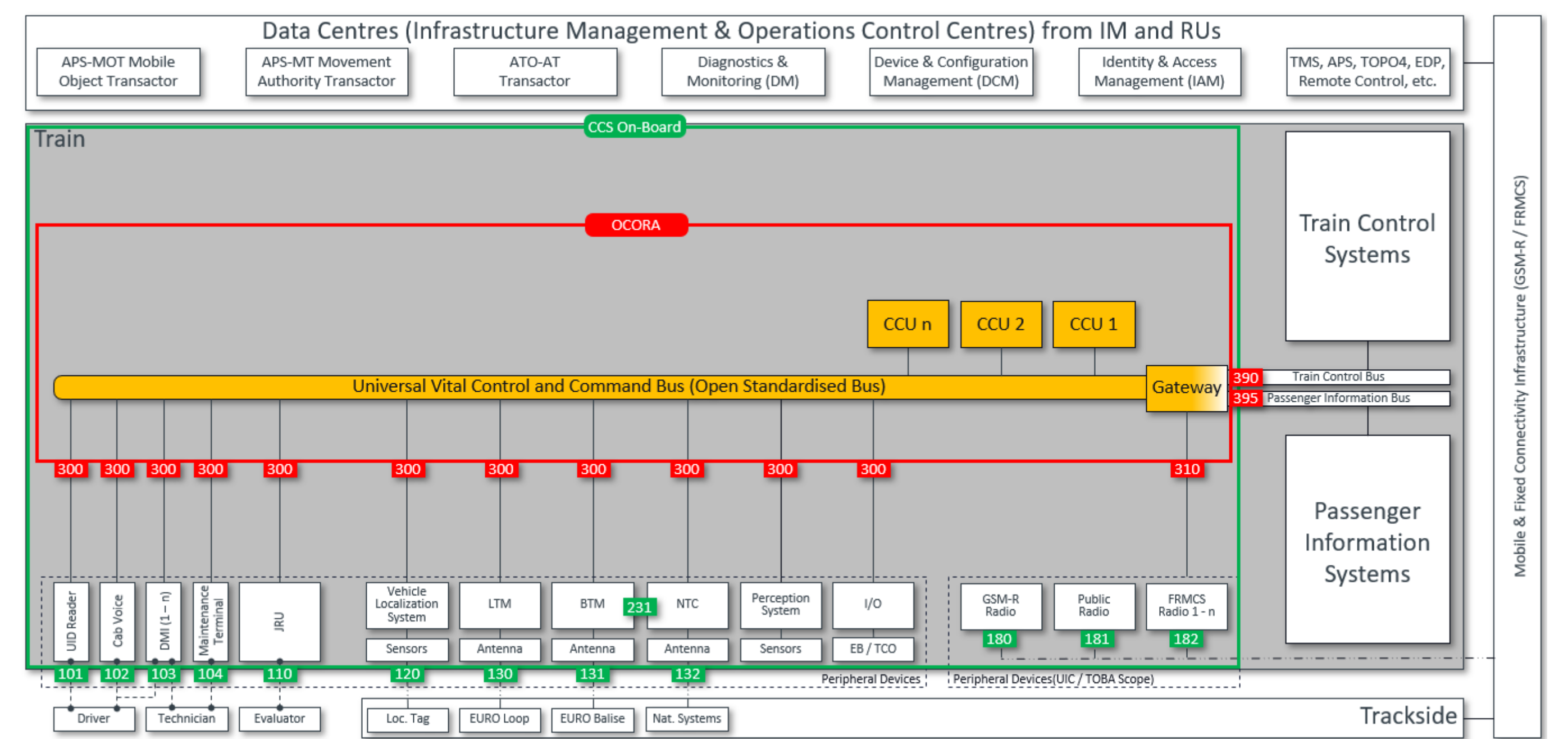
## Priority List of Subsets and Architecture

The list of subsets that define the interfaces in the OCORA model.



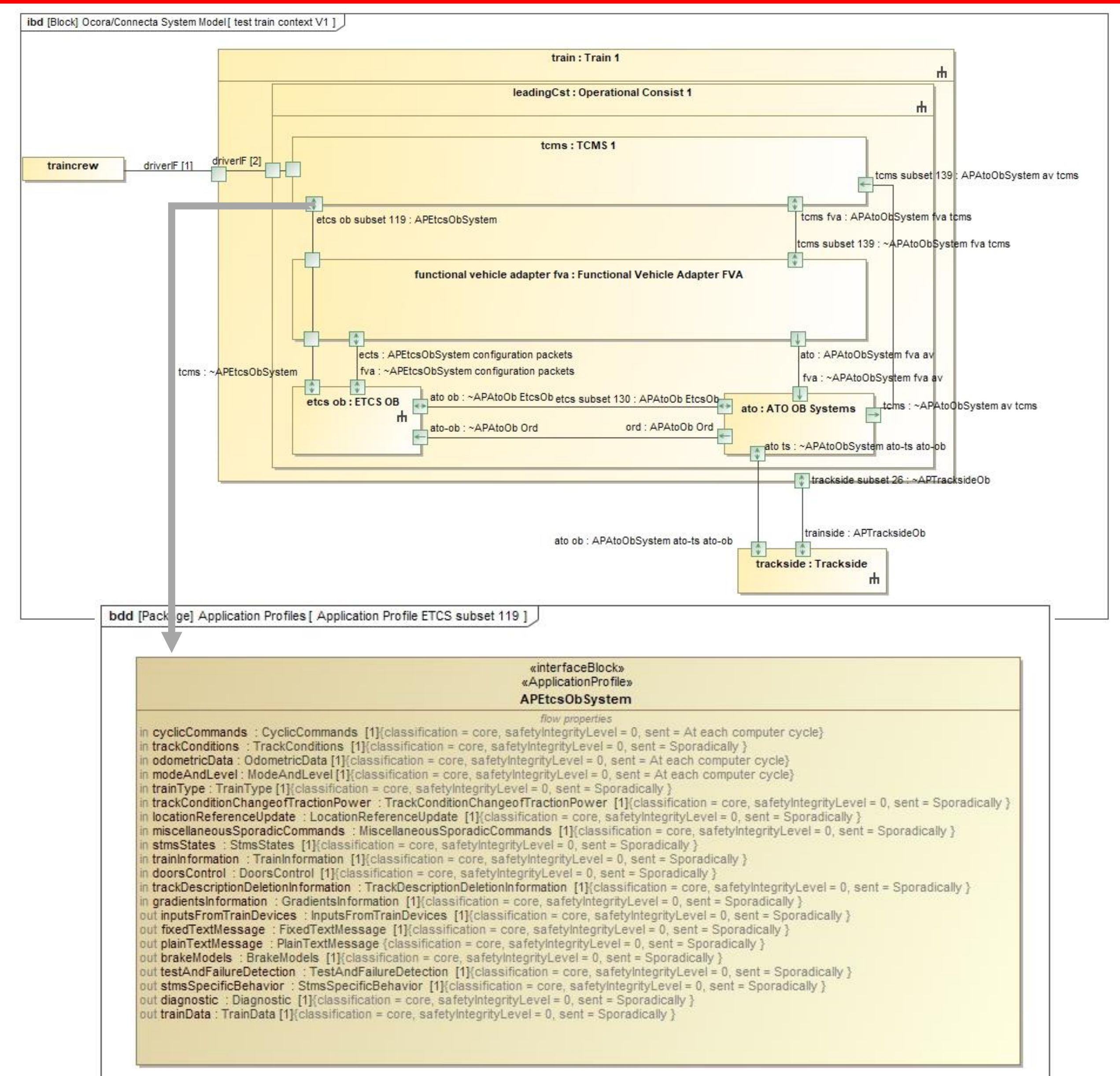
- SS 119 - ETCS/ CCS – TCMS Interface
- SS 139 - ATO-OB / TCMS Interface Specification
- SS 026 - ETCS Interoperability & Safety
- SS 121 - DMI-EVC – Vehicle/ETCS OBU
- SS 125 - ATO messages
- SS 126 - ATO-OB / ATO-TS interface
- SS 130 - ATO-OB / ETCS interface
- SS 140 - ATO-OB / ORD FFFIS

## OCORA Hardware Architecture (OSI Layers 1-6) :



- White boxes are external systems / Orange boxes are OCORA hardware
- Red solid boxes are OCORA identified external interfaces / Green boxes are other relevant interfaces

## Interface Communication Model in SysML



The model was developed by using the **Systems Modeling Language (SysML)**. The communication defined in the subsets were integrated into the existing CONNECTA model. The **SysML model** clearly defines the telegrams between subsystems. The objective is to compare the proposed architectures and resolve the differences.

## Contact



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## References

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- OCORA - Functional Vehicle Adapter - Introduction & Overview Beta Release
- Shift2Rail-CONNECTA. URL <https://projects.shift2rail.org/>
- FRMCS Telecom On-Board System – Functional Requirements Specification
- The OMG Systems Modelling Language. URL - <http://www.omg.org/what-is-sysml.htm>