

OCORA

Open CCS On-board Reference Architecture

Glossary

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References

Reader's note: please be aware that the document IDs in square brackets, e.g. [OCORA-BWS01-010], as per the list of referenced documents below, are used throughout this document to indicate the references to external documents. Wherever a reference to a TSI-CCS SUBSET is used, the SUBSET is referenced directly (e.g. SUBSET-026). OCORA always reference to the latest available official version of the SUBSET, unless indicated differently.

[\[OCORA-BWS01-010\] – Release Notes](#)

[\[OCORA-BWS01-030\] – Question and Answers](#)

[\[OCORA-BWS01-040\] – Feedback Form](#)

[\[OCORA-BWS03-010\] - Introduction to OCORA](#)

[\[OCORA-BWS04-010\] - Problem Statements](#)

1 Introduction

1.1 Purpose of the document

The purpose of this document is to provide clear definitions of terms used in the OCORA documentation.

This document is addressed to experts in the CCS domain and to any other person, interested in the OCORA concepts for on-board CCS. The reader is invited to provide feedback to the OCORA collaboration and can, therefore, engage in shaping OCORA. Feedback to this document and to any other OCORA documentation can be given by using the feedback form [\[OCORA-BWS01-040\]](#).

1.2 Applicability of the document

The document is currently considered informative but may become mandatory at a later stage for OCORA compliant on-board CCS solutions. Subsequent releases of this document will be developed based on a modular and iterative approach, evolving within the progress of the OCORA collaboration.

1.3 Context of the document

This document is published as part of the OCORA Delta release, together with the documents listed in the release notes [\[OCORA-BWS01-010\]](#). Before reading this document, it is recommended to read the Release Notes [\[OCORA-BWS01-010\]](#). If you are interested in the context and the motivation that drives OCORA we recommend to read the Introduction to OCORA [\[OCORA-BWS03-010\]](#) and the Problem Statements [\[OCORA-BWS04-010\]](#). The reader should also be aware of the Question and Answers [\[OCORA-BWS01-030\]](#).

2 Terms and Definitions

Title	Abbreviation	Description
Architecture		<p>The fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution. (ISO 42010)</p> <p><i>Describes the structure of a coherent ensemble of building blocks and the glue (e.g. interfaces, bus system) between these building blocks that maintains structure consistency and coherence.</i></p>
Basic Software		<p>Provides a replica-deterministic environment to the ETCS Kernel - typically using a super-loop architecture.</p> <p><i>The Basic Software is usually vendor specific and handles all input/output with peripheral functions.</i></p>
Building Block	BB	<p>A Building Block is a sourceable unit of the CCS on-board system (hardware and/or software), having standardised functionality, standardised PRAMSS requirements (including Tolerable Functional Failure Rate [TFFR], Safety Integrity Level [SIL] and Safety Related Application Conditions [SRAC]), standardised interfaces (on all OSI Layers) towards other building blocks and/or external systems.</p> <p><i>Building Blocks are separately sourceable from different suppliers and capable of being integrated by a third party.</i></p> <p><i>There are two types of building blocks: a) Hardware Building Blocks and b) Software Building Blocks.</i></p>
CCS Computing Unit	CCU	<p>A computing unit hosting all or parts of the CCS on-board and eventually other software.</p> <p><i>The unit consists of 1 to n processors and has a single connection to the CCN.</i></p>
Component		<p>A component of a CCS on-board system is used to structure functionality within Building Blocks. It implements and encapsulates one or more behaviors (business logic) and exposes services via defined interfaces to other components.</p>

Device		A physical entity performing a predefined (set of) task(s). It consists of software integrated on a hardware.
Diesel Multiple Unit	DMU	<p>Diesel Multiple Unit: combustion engine powered, self-propelled integrated combination of two or more rail cars for the transportation of passengers.</p> <p><i>Also known as ‘train set’. Once broken, the combination can no longer perform its function. Propulsion can be direct (diesel hydraulic) or indirect (diesel electric) and distributed over the combination or concentrated in e.g. power heads or locomotives.</i></p>
Electrical Multiple Unit	EMU	<p>Electrical Multiple Unit: external power driven, electrically propelled integrated combination of two or more rail cars for the transportation of passengers.</p> <p><i>Also known as ‘train set’. Once broken, the combination can no longer perform its function. Propulsion can be distributed over the combination or concentrated in e.g. power heads or locomotives.</i></p>
Entity in Charge of Maintenance	ECM	An Entity in Charge of Maintenance of a vehicle, and registered as such in a vehicle register referred to in Article 47 of Directive (EU) 2016/797.
European standard		A standard adopted and formally ratified by a European standardisation organisation (CEN, CENELEC or ETSI).
European Vital Computer	EVC	<p>Device for performing the designated ETCS function of safe train operation.</p> <p><i>It includes the logic needed to perform the ETCS tasks, i.e. data exchange management between internal and peripheral functions like odometry or DMI.</i></p>
Evolvability		<p>Evolvability (Flexibility) is the ability to easily adopt to new technologies or to extend the functionality of an on-board CCS system without the involvement of the original supplier.</p> <p><i>Evolvability is an architecture design principle, to be realised in the engineering concept of concrete products.</i></p>
Example		Any physical, graphical or textual representation of a concept, object or abstraction used for explaining or clarifying that concept,

object or abstraction.

Examples shall not in any way be limitative or perceived as limitative and are not in any way to be understood as prescriptive or as a requirement.

Exchangeability

Exchangeability (Interchangeability) is the ability to replace one or multiple Building Blocks with (a) respective Building Block(s) of (an)other supplier(s), without affecting other Building Blocks or the overall CCS on-board system.

Exchangeability is an architecture design principle that has to be achieved on the engineering concept of concrete products (hard- or software). Replaceability is the realisation of this design principle in concrete products.

Formal Model

A Formal Model is the description of a Functional Model using formal grammar and the symbolism of a logical language.

A precise mathematical set of rules by which a valid Functional Model description is constructed that eventually can be (directly) transformed into computer code.

Function

A (coherent set of) task(s) to be performed in order to achieve a defined result.

Functions express actions that are executed. They are usually embedded in structural elements of a system.

Functional Application

Functional Application refers to the software that implements the actual (Business) Logic of a railway Function.

Examples would be the Vehicle Locator or the Vehicle Supervisor. Functional Applications shall be platform independent and make use of a "generalized abstraction" (API) to the Computing Platform.

Functional Decomposition

The partition of a system into single structural elements that each represent one or more coherent functions to be performed that together fulfil the design objective of the system.

Describes how (clusters of) Functions are embedded into the structural elements of a system.

Functional Model

Abstraction of a system, describing interaction between individual functions of a system.

*OCORA targets using a formal language for functional modelling.
Describes the actions performed by a coherent ensemble of
building blocks and the glue between these Building Blocks (e.g.
interfaces, bus system) that together constitute a system.*

Functional Vehicle Adapter	FVA	The Functional Vehicle Adapter is a piece of software deployed on the OCORA computing platform, or on the OCORA Gateway. Its job is 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.
Future Railway Mobile Communication System	FRMCS	Railway specific radio communication system based on global 5G telecommunication standards and technologies.
Hardware Building Block	HBB	Hardware Building Blocks consist of hardware and typically software that provide the building block's functionality. They exclusively communicate with each other and with external systems through the CCS Communication Network (CCN) using standardised interfaces.
Harmonised Standard		A harmonised standard is a European standard elaborated on the basis of a request from the European Commission to a recognised European Standards Organisation (CEN, CENELEC or ETSI) to develop a European standard that provides solutions for compliance with a legal provision. (Source: CENELC) <i>Its application can be mandatory (referenced standard) or voluntary (standard listed in the Official Journal of the EU in the New Legislative Framework).</i>
International Standard		A standard adopted and ratified by an international standardisation body. Examples are: ISO, IEC and ITU.
Interoperability		Interoperability is the ability of a train service to run seamlessly, i.e. without the need to change either rolling stock or train staff, on any ERTMS equipped rail network.

Interoperability is an architecture design principle, to be realised in the engineering concept of concrete products.

Juridical Recording Unit	JRU	A device mounted in a train with the purpose to record ATP data of all actions and exchanges relating to the movement of trains sufficient for off-line analysis of all events leading to an incident.
Kernel		The term Kernel refers to the main tasks performed by the EVC: vehicle supervision, including data exchange management with peripheral Systems like DMI and odometry.
Logic		<p>Systematic set of principles for retrieving, dispatching, storing, modelling, analysing and predicting information so as to perform a specified task.</p> <p><i>Pertains specifically to the management of data by a System, both internal as in exchange with peripheral Systems.</i></p>
Migrateability		<p>The property of a system to allow changes to one or multiple building blocks, without affecting other building blocks or the overall system.</p> <p><i>Migrateability is an architecture design principle to be realised in the engineering concept of concrete products. It is a prerequisite for upgradeability.</i></p>
Mobile Communication Gateway	MCG	The Mobile Communication Gateway provides train to track-side communication for the on-board CCS and depending on the vehicle, it may also provide track-side connectivity for the systems of the Train Control Bus (VCS and PIS).
Model		A consistent digital representation of an Architecture, allowing to generate different views for documenting and explaining different aspects of the Architecture.
Modular Safety		<p>Is the concept to reduce the overall safety case workload by using modularity, not only for the technical design of components, but also to use modularity to foster independent, re-usable, composable safety cases.</p> <p><i>Overall, it means to reduce the workload of the impact analysis for changes and end2end corrections to a possible minimum.</i></p>

Modularity		<p>The property of a system being composed of a coherent whole of single, independent building blocks or modules.</p> <p><i>Modularity is a prerequisite for having “plug & play”-like exchangeability of an on-board CCS system or its subsystems without the need to involve either the original supplier of the vehicle, of the CCS system or one of its subsystems.</i></p>
Non-Railway Component		<p>A part of or a single building block that originates from a non-railway domain.</p>
Non-Safe		<p>Adjective indicating that a system or function in itself is not designed to protect against bodily harm or material damage when it fails.</p> <p><i>In general, the qualification of a system or function as ‘non safe’ indicates that the safety function, protecting both the involved animate or inanimate entities, is allocated to other safety systems or functions.</i></p>
Non-Vital		<p>See Non-Safe</p>
OCORA Gateway		<p>A hardware device providing communication capabilities between the CCN (CCS-ECN) and the legacy train control network or bus or the legacy actors and sensors residing outside the CCS domain but important to CCS.</p>
Open CCS On-board Reference Architecture	OCORA	<p>OCORA is first and foremost a platform for cooperation to the benefit of the European Railway sector.</p> <p>Guiding principles, rules and regulations agreed between OCORA members, are expressed in the OCORA Memorandum of Understanding (MoU) and the OCORA Code of Conduct (CoC). Members collaborate on the development of an open reference architecture for on-board command-control and signalling systems that supports the mutually agreed OCORA main objectives.</p>
Physical Consist	PC	<p>A physically existent, independent item of rolling-stock, comprising one or more mechanically connected Physical Vehicles, whose composition cannot be changed within OCORA System Borders.</p>
Physical Train Unit	PTU	<p>A physically existent, driveable and made up of a single or an ordered sequence of Physical Consists coupled together.</p>

Physical Train Unit Operation Systems	PTU-OS	The Physical Train Unit Operation Systems includes all systems of the train that interact directly or through the Train Adapter (TA) with the CCS On-Board.
Platform		<p>Refers to the environment on which Functional Applications are executed.</p> <p><i>Comprised of</i></p> <ul style="list-style-type: none"> • <i>Hardware (i.e. Compute Nodes, Memory, etc.) and</i> • <i>Software (i.e. the Runtime Environment)</i>
Platform Independence		<p>The property of allowing a functional application to work on different Computing Platform implementations.</p> <p><i>Platform Independence is the fact of using a “generalized abstraction” between Functional Application logic and the underlying (Computing) Platform.</i></p> <p><i>To concretely attain Platform Independence, the following elements are needed:</i></p> <ul style="list-style-type: none"> • <i>A definition of a “generalized abstraction” (in the form of an API specification)</i> • <i>At least one provider implementation of the “generalized abstraction” in form of a concrete (Computing) Platform</i> • <i>One or more Functional Applications applying the specification and being able to run on the (Computing) Platform.</i> <p><i>Platform Independence is achieved when a Functional Application, based on the generalized abstraction, runs unchanged on different (Computing) Platform implementations. For this, the Functional Application shall only use external functions through a defined application programming interface (API). Platform independence is a design principle, used in the development of the engineering (concept) of concrete products.</i></p>
Portability		The property that allows migrating a software from one concrete Computing Platform implementation to another concrete Computing Platform implementation.

See also *Platform Independence*.

Presumption of Conformity		<p>Condition of per se demonstrating product, service or process compliance with relevant EU legislation in case of consistent application of EU harmonised standards by manufacturers, other economic operators or conformity assessment bodies.</p> <p><i>The presumption of conformity is a concept that is widely used in the context of the European “New Approach” for better regulation. The presumption of conformity means that a manufacturer who has complied with a harmonised standard listed in the Official Journal of the European Union (OJEU) can legally assume he has met the requirements of the directive (or TSI) covered by that standard, as described in its Annex Z.</i></p> <p><i>ANNEX Z of standards and the OJEU</i></p> <p><i>The listing of a European standard in the OJEU requires a positive assessment of the Harmonized Standard Consultant and a corresponding positive statement of the European Council (EC) desk officer. Furthermore, it is required that the listed standard contains an Annex Z detailing to which requirements of the directive (or TSI) it provides presumption of conformity.</i></p>
Radio Block Centre	RBC	<p>The RBC is a centralised, radio communication enabled safety system to manage safe train movement based on train position information.</p> <p><i>The RBC is a specialised computing device with Safety Integrity Level 4 (SIL) for generating Movement Authorities (MA) and transmitting it to trains. It gets information from Signalling Control and from the trains in its section. It hosts the specific geographic data of the railway section and receives cryptographic keys from trains passing in. According to conditions the RBC will attend the trains with MA until leaving the section. RBC have defined interfaces to trains but have no regulated interfaces to Signalling Control and only follow national regulation.</i></p>
Referenced Standard		<p>A standard or a part of a standard referenced in a Technical Specification for Interoperability (TSI).</p> <p><i>Furthermore, article 4.8 of Directive (EU) 2016/797 sets out that other normative documents, such as specifications or technical</i></p>

documents can also be referenced in a TSI. When referenced, their nature changes from voluntary to mandatory.

Replaceability

The property of a component or a device to be removed and installed without support of the Original Equipment Manufacturer (OEM).

Replaceability is the technical implementation of exchangeability, enabling components and devices to be removed and installed without support of the OEM.

Replaceability is a design principle, used in the development of the engineering (concept) of concrete products. See also: Exchangeability

Runtime Environment

RTE

The Runtime Environment represents the execution context of Functional Applications. It consists of all software aspects required to provide that execution context including safety and security services, communication stack and if applicable Operating System and Virtualization. It provides a Platform Independent API - a general abstraction that allows Functional Applications to run unchanged on different Computing Platform implementations.

Safe / Safety

Safety is defined as a property of railway functions or systems that safeguards humans, physical assets and environment against (fatal) injury or damage in conformity with predefined acceptable risk thresholds.

Safe systems ensure that the defined risk levels are not exceeded and that the function or system enters its fail-safe state in case of failure. Since risks can never be completely mitigated, acceptable risk levels have to be established. Determining such levels is subject to ethical considerations and is, therefore, not within OCORA scope.

Security

(Cyber) Security is the protection of (especially safety related) communication and data used in on-board CCS systems against threats (like cyber-attacks and hacks). To achieve this, all main security functionality like identify, protect, detect, respond and recover are considered.

(Cyber) security is a design principle, used in the development of

the engineering (concept) of concrete products.

Service		<p>Services are specialised Functional Applications providing common functionality used by multiple other Functional Applications or an “input-output” conversion from and to other Functional Applications in coherence with the data model. An example of a Service is the "Vehicle Locator" (VL) which is used by the "Vehicle Supervisor" (VS) and the "ATO vehicle" (AV).</p>
Software Building Block	SBB	<p>Software Building Blocks consist of software that provide the building block's functionality. They are deployed on an instance of the Generic Safe Computing Platform (SCP) and shall communicate with each other through the standardised Platform Independent Application Programming Interface (PI-API). Communication with computing platform external building blocks and systems is realised by the Computing Platform (integrating with the CCN).</p> <p><i>Software Building Blocks are portable i.e., they may be deployed on different Computing Platform implementations.</i></p>
Specific Vehicle Interface		<p>Data exchange function between the on-board CCS system and the vehicle that defines data and data formats that are not otherwise defined in either formal TSI specifications or published UNISIG or OCORA proposals for TSI specifications.</p>
Standard		<p>A technical specification, adopted by a recognised standardisation body, for repeated or continuous application, with which compliance is not compulsory, except when referenced in a Technical Specification for Interoperability, or any other regulatory text (e.g. national rule, law, ...)</p>
System		<p>A coherent group of interacting or interrelated entities that form a unified whole, described by its structure and purpose and expressed in its functioning.</p> <p><i>A System is described by its spatial and temporal boundaries as surrounded and influenced by its environment.</i></p>
Train Control and Management System	TCMS	<p>The Train Control and Management System (TCMS) is an on-board</p>

Management System

distributed control, communication and train management system that provides data communications interfaces to other train-borne systems and is designed to control and monitor train equipment. The TCMS also includes wired control logic.

At interface level it refers to all aspects of the integration into the “Train”: conceptually it groups together the two types of interfaces “serial interface” and “hard-wired interface” indicated in SUBSET -119.

Train Interface Unit	TIU	<p>The Train Interface Unit (TIU) defines the interface between the ERTMS / ETCS on-board equipment and the train.</p> <p><i>To avoid confusion, the term TIU is no longer used in context of OCORA as it would also be used in another context than only ERTMS / ETCS. The newly introduced Functional Vehicle Adapter (FVA) incorporates the full TIU functionality and ensures standardised communication with the TCMS on OSI layer 7. It is accessible to all OCORA applications like VS, ATO and any possible future extension.</i></p>
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Train Set		See Diesel Multiple Unit, Electrical Multiple Unit
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Vehicle Supervisor	VS	<p>The (Business) Logic enabling calculating location specific speed limits and activation of the braking system in case of speed limit overshoot. Includes data exchange management with peripheral systems like DMI and odometry.</p>
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Vital		See Safe
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61 items found 

3 Stakeholders

Title	Abbreviation	Description
CCS On-Board Integrator		Entity in charge of the safe integration of all necessary OCORA certified Building Blocks to build a OCORA compliant CCS On-Board System.
Contracting Entity		The contracting entity is a public or private entity which orders the design and/or construction or the renewal or upgrading of a subsystem (i.e. Directive 2016/798 and Directive 2016/797)
Infrastructure Manager/Management	IM	A (Railway) Infrastructure Manager is any body or undertaking that is responsible in particular for establishing and maintaining railway infrastructure, or a part thereof, as defined in Article 3 of Directive 91/440/EEC, which may also include the management of infrastructure control and safety systems. The functions of the infrastructure manager on a network or part of a network may be allocated to different bodies or undertakings.
Manufacturer		Any natural or legal person who manufactures an OCORA certified Building Block or has it designed or manufactured, and markets it under his name or trademark.
Railway Undertaking	RU	A Railway Undertaking as defined in Directive 2001/14/EC, and any other public or private undertaking, the activity of which is to provide transport of goods and/or passengers by rail on the basis that the undertaking must ensure traction; this also includes undertakings which provide traction only.
Vehicle Integrator		The entity in charge of the safe integration of an OCORA based CCS On-Board System (as a black box) into a physical train unit (rolling stock).

6 items found 

4 Table of Abbreviations and Acronyms

Abbreviation	Title
2oo2	Two out of two (redundancy)
2oo3	Two out of three (redundancy)
AC	Application Condition (not safety related)
AI	Artificial Intelligence
AP	Adaptive Platform, Autosar-specific term
API	Application Programming Interface
APM	Automatic Processing Module
APOM	Authorization for Placing On the Market
APS	Advanced Protection System
ASR	Assessor
AT	ATO Transactor
ATC	Automatic Train Control
ATO	Automatic Train Operation
ATO-OB	Automatic Train Operation On-Board
ATOM	Automatic Train Operation Monitoring
ATP	Automatic Train Protection
AV	ATO Vehicle
AsBo	Assessment Body
Autosar	Automotive Open System Architecture
BB	Building Block
BDD	Block Definition Diagram

BIU	Break Interface Unit
BSD	Berkeley Software Distribution
BTM	Balise Transmission Module
BWS	Business Workstream
CAN	Controller Area Network
CBM	Condition Based Maintenance
CCN	CCS Communication Network
CCS	Control-Command and Signalling
CCS-OB	Control-Command and Signalling On-Board
CCTV	Closed-Circuit Television
CCU	CCS Computing Unit
CDS	Configuration Data Storage
CENELEC	Comité européen de normalisation en électronique et en électrotechnique
CER	Community of European Railway and Infrastructure Companies
CI-*	Communication Interface
CM	Configuration Manager
CMD	Cold Movement Detection
COBSS	CCS Off-Board Support System
COM	Communication
CONS	Connectivity Service
COS	Customer Oriented Services
COTS	Commercial off-the-shelf
CP*	CENELEC Phase (1 to 12)

CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CS	Consist Switch
CS	Configuration Service
CS	Coupler Status
CSM-RA	Common Safety Method for Risk evaluation and Assessment
CU	Computing Unit
CVR	Cabin Voice Radio
CiA	CAN in Automation
CoC	Code of Conduct
ComId	Communication Identifier
D-PDU API	Diagnostic protocol adapter API (ISO 22900-2)
D-Server API	Diagnostic server (or diagnostic kernel) API (ISO 22900-3)
DAS	Driver Advisory System
DAS-OB	Driver Advisory System On-Board
DCM	Device & Configuration Management
DDS/RTPS	Data Distribution Service / real-time publish-subscribe
DES	Designer
DIA	Diagnostics
DIAG	Diagnostics
DM	Digital Map
DM	Diagnostic Management
DMI	Driver Machine Interface

DMU	Diesel Multiple Unit
DNR	Domain Name Resolver (DNS-Resolver)
DREP-OB	Digital Map Repository On-Board
DRV	Driver
DS	Data Service
DeBo	Designed Body
DoIP	Diagnostics over Internet Protocol (ISO 13400)
E/E	Electrics and Electronics
EB	Emergency Braking
EBA	Euro Balise Antenna
EBICAB	EBICAB is a trademark registered by Bombardier (later Alstom) for the equipment on board a train used as a part of an Automatic Train Control system.
EC	European Commission
ECM	Entity in Charge of Maintenance
ECN	Ethernet Consist Network
ECU	Electronic Control Unit, Automotive-specific term
ED	End Device
EDOR	ETCS Data Only Radio
EE	Emitting Entity
EMC	Electromagnetic Compatibility
EMU	Electrical Multiple Unit
ENV	Environment
ERA	European Union Agency for Railways

EREP	ETP Repository
ERJU	Europe's Rail Joint Undertaking
ERJU/FA	Europe's Rail Joint Undertaking / Flagship Area
ERORAT	EULYNX RCA OCORA Risk Assessment Tool
ERTMS	European Rail Traffic Management System
ETB	Ethernet Train Backbone
ETBN	Ethernet Train Backbone Node
ETBTopoCnt	ETB Topography counter
ETCS	European Train Control System
ETP-OB	European Train Protection On-Board
ETS	ETCS Transponder Service
EUB	Eurobalise
EUDD	European Driver's Desk
EUG	ERTMS User Group
EUL	Euroloop
EVAL	Evaluator
EVC	European Vital Computer
FAT	Factory Acceptance Test
FCS	Frame Check Sequence
FFIS	Form Fit Function Interface Specification
FIS	Functional Interface Specification
FM	Formal Model
FMECA	Failure Mode and Effect Critical Analysis

FRMCS	Future Railway Mobile Communication System
FTA	Fault Tree Analysis
FVA	Functional Vehicle Adapter
GASC	Generic Application Safety Case
GNSS	Global Navigation Satellite System
GPSC	Generic Product Safety Case
GSM-R	Global System for Mobile Communications - Railway
GoA	Grade of Automation
HBB	Hardware Building Block
HI-*	Human Interface
HMI	Human Machine Interface
HPC	High Performance Computing
HTTP	Hypertext Transfer Protocol
HVAC	Heating Ventilation and Air-Conditioning
HW	Hardware
I/O	Input/Output
IAM	Identity & Access Management
IBD	Internal Block Diagram
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
IF	Interface
IM	Infrastructure Manager/Management

IMA	Integrated Modular Avionics
IMP	Implementer
IMU	Inertial Measurement Unit
INT	Integrator
IP	Internet Protocol
IPM	Incident Prevention Manager
IPv4	Internet Protocol version 4
ISA	Independent Safety Assessor
ISMS	Information Security Management System
ISO	International Organization for Standardization
IT	Information Technology
IU	Interface Unit
IVV	Integration, Verification and Validation
IXL	Interlocking
JRU	Juridical Recording Unit
JSON	JavaScript Object Notation
KER	KVB Contrôle vitesse balise, EBICAB, RSDD Ripetizione Segnali Discontinua Digitale
KMC	Key Management Center
LAN	Local Area Network
LOC	Localisation
LOC-OB	Localisation On-Board
LRBG	Last relevant balise group
LSIG	Light Signal

LTM	Loop Transmission Module
Len	Length
LibC	C-Library
MA	Movement Authority
MAC	Message Authentication Code
MAC	Media Access Control
MBSD	Model Based Software Development
MBSE	Model Based Systems Engineering
MC-OB	Monitoring & Configuration On-Board
MCG	Mobile Communication Gateway
MD	Message Data
MDCM	Monitoring, Diagnostics, Configuration, Maintenance
MIMOSA	Machinery Information Management Open Systems Alliance
ML	Maturity Level
MLM	Model and Level Manager
MNT	Maintenance Terminal
MOT	Mobile Object Transactor
MP	Movement Permission
MQTT	Message Queuing Telemetry Transport
MT	Movement Authority Transactor
MTC	Manoeuvre Train Control
MVB	Multifunction Vehicle Bus
MVCI	Modular Vehicle Communication Interface

MVP	Minimal Viable Product
MoU	Memorandum of Understanding
NAT	Network Address Translation
NFF	No Fault Found
NG	Next-Generation
NG-TCN	Next/New Generation TCN
NIC	Network Interface Card
NNTR	Notified National Technical Rules
NR	Non Regression
NSA	National Safety Authority
NTC	National Train Control
NTPs	National Train Protections
NoBo	Notified Body
OB	On-Board
OBS	On-Board Staff
OBU	On-board Unit
OCORA	Open CCS On-board Reference Architecture
OCS	Operation Control System
ODO	Odometry
ODS	Operational Data Storage
ODX	Open Diagnostic Data Exchange (ISO 22901-1)
OEM	Original Equipment Manufacturer
OMS	Online-Monitoring System

OOS	Operator Oriented Services
OPC-UA	Open Platform Communication Unified Architecture
OPTrnTopoCnt	Operational Train Topography Counter
ORD	Onboard Recording Device
OS	Operating System
OSA-CBM	Open System Architecture for Condition-Based Maintenance
OT	Operational Technology
OTA	Over The Air
OTIS	Onboard Train Integrity System
OTR	Other Train
OTX	Open Test sequence eXchange (ISO 13209)
OpMode	Operation Mode
PC	Physical Consist
PCP	Priority Code Point (VLAN priority)
PD	Process Data
PDU	Protocol Data Unit
PER	Perception
PETS	Physical ETCS Transponder System
PIN	Passenger Information Network
PIS	Passenger Information System
PKI	Public Key Infrastructure
PM	Project Manager
PS	Perception

PS-OB	Perception On-Board
PSMP	Project Security Management Plan
PTU	Physical Train Unit
PTU-OS	Physical Train Unit Operation Systems
PoC	Proof of Concept
QA	Quality Assurance
QoS	Quality of Service
R-NAT	Railway-NAT
RACI	Responsibility, Accountability, Consulted, Informed
RAMS(S)	Reliability, Availability, Maintainability, Safety, (Cyber Security)
RBC	Radio Block Centre
RC	Route Control
RCA	Reference CCS Architecture
RDH	Railway Duty Holder
RE	Receiving Entity
REST	Representational State Transfer; method used for designing “stateless” APIs
RFID	Radio-frequency identification
RIM	Radio Interface Module
RIU	Radio In-fill Unit
RMTO-OB	Remote Manual Train Operation On-Board
ROS	Robot Operating System
RQM	Requirements Manager

RST	Rolling Stock
RT	Reliability Target
RTE	Runtime Environment
RTM	Real-Time Model
RU	Railway Undertaking
S2R	Shift2Rail
SASC	Specific Application Safety Case
SB	Service Brakes
SBB	Software Building Block
SC	Safety Case
SCI-*	Standard Communication Interface
SCP	Safe Computing Platform
SCV	Signal Converter
SDT	Safe Data Transmission
SDTv2	Safe Data Transmission version 2
SDTv4	Safe Data Transmission version 4
SERA	Single European Railway Area
SFERA	Smart Communication for Efficient Rail Activities
SFM	Semi-Formal Model
SHI-*	Standard Human Interface
SIEM	Security Information and Event Management
SIL	Safety Integrity Level
SMI	Source Message Identifier

SMS	Short Message Service
SOC	Security Operation Center
SOME/IP	Scalable Service-Oriented Middleware over IP
SPSC	Specific Product Safety Case
SRAC	Safety Related Application Condition
SRD	Single Rules Database
SRP	Stream Reservation Protocol
SRS	System Requirements Specification
SS	Subset, ERTMS-specific term for specifications
SSRS	Sub-System Requirement Specification
SSS-OB	Shared Security Services On-Board
SSS-TS	Shared Security Services Trackside
STM	Specific Transmission Module
SW	Software
SWC	Software Cluster
SoA	Service-oriented Architecture
Stdclib	Standard C-library
SuC	System under Consideration
T&C	Test and Commissioning
TA	Train Adapter
TCMS	Train Control and Management System
TCN	Train Communication Network
TCO	Traction Cut-Off

TCP	Transmission Control Protocol
TDS	Train Display System
TECH	Technician
TFFR	Tolerable Functional Failure Rate
TFM	Train Font Monitor
THR	Tolerable Hazard Rate
TI	Track Intrusion
TIMS	Train Integrity Monitoring System
TIU	Train Interface Unit
TLS	Transport Layer Service
TM	Train Management
TMS	Traffic Management System
TOBA	Telecom On-Board Architecture
TPR	Train Position
TRB	Train Born
TRDP	Train Real-time Data Protocol
TS	Trackside
TS	Time Service
TSE	Trackside System and Environment
TSI	Technical Specification for Interoperability
TSN	Time Sensitive Networking
TSN-PD	Time Sensitive Networking Process Data
TST	Tester

TTI	Train Topology Information Access
TWS	Technical Workstream
UADP	Unified Architecture Datagram Protocol
UC	Use Case
UDP	User Datagram Protocol
UDS	Unified Diagnostic Services (ISO 14229)
UI	User Interface
UIC	Union Internationale de Chemins de Fer
UNIFE	Union des Industries Ferroviaires Européennes (European Rail Supply Industry Association)
UNISIG	Union Industry of Signalling
URI	Uniform Resource Identifier
V&V	Verification & Validation
VAL	Validator
VCCU	Virtual CCS Computing Unit
VCS	Voice Communication System
VCU	Vehicle Control Unit
VER	Verifier
VETS	Virtual ETCS Transponder Service
VL	Vehicle Locator
VLAN	Virtual Local Area Network
VLS	Vehicle Localisation
VOS	Virtual Operating System

VS Vehicle Supervisor

VTCS-OB Virtual Train Coupling System On-Board

WBS Work Breakdown Structure

WTB Wired Train Bus

XML Extensible Markup Language

YAML Yet Another Markup Language

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