

OCORA

Open CCS On-board Reference Architecture

Glossary

This OCORA work is licensed under the dual licensing Terms EUPL 1.2 (Commission Implementing Decision (EU) 2017/863 of 18 May 2017) and the terms and condition of the Attributions- ShareAlike 3.0 Unported license or its national version (in particular CC-BY-SA 3.0 DE).



Document ID: OCORA-BWS01-020

Version: 3.21

Date: 01.12.2022

Revision History

Version	Change Description	Initials	Date of change
1.0	Official version for OCORA Gamma Release	TM	07.12.2020
2.01	Official version for OCORA Delta Release	TM	30.06.2021
3.0	Official version for OCORA Release R1	TM	26.11.2021
3.1	Decoupled document evolution from OCORA release cycle	TM	08.06.2022
3.2	Updates as part of OCORA R3 Release Cycle	TM	15.11.2022
3.21	Official version for OCORA Release R3	TM	01.12.2022

Table of Contents

1	Introduction	5
1.1	Purpose of the document	5
1.2	Applicability of the document	5
1.3	Context of the document	5
2	Terms and Definitions	6
3	Stakeholders	17
4	Table of Abbreviations and Acronyms	18

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 [\[OCORA-BWS01-040\]](#).

If you are a railway undertaking, you may find useful information to compile tenders for OCORA compliant CCS building blocks, for tendering complete CCS system, or also for CCS replacements, functional upgrades or for life-cycle reasons.

If you are an organisation interested in developing CCS building blocks according to the OCORA initiative, information provided in this document can be used as input for your development.

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	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	<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	<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>
CCS On-board Integrator	<p>Entity in charge of the safe integration of all necessary OCORA certified building blocks to build a OCORA compliant CCS On-board System.</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</p>

other components.

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)
Device	A physical entity performing a predefined (set of) task(s). It consists of software integrated on a hardware.
Diesel Multiple Unit	<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	<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	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	<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	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.

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

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	<p>Abstraction of a system, describing interaction between individual functions of a system.</p> <p><i>OCORA targets using a formal language for functional modelling.</i></p> <p><i>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.</i></p>
Functional Vehicle Adapter	<p>The Functional Vehicle Adapter (FVA) 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.</p>
Future Railway Mobile Communication System	<p>Railway specific radio communication system based on global 5G telecommunication standards and technologies.</p>
Hardware Building Block	<p>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.</p>
Harmonised standard	<p>A harmonized standard is a European standard elaborated on the basis of a request from the European Commission to a recognized European Standards Organisation (CEN, CENELEC or ETSI) to develop a European standard that provides solutions for compliance with a legal provision. (Source: CENELC)</p> <p><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></p>
Infrastructure Manager/Management	<p>A (Railway) Infrastructure Manager (IM) 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.</p>

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. <i>Interoperability is an architecture design principle, to be realised in the engineering concept of concrete products.</i>
Juridical Recording Unit	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 prime task to be performed by the EVC (Vehicle Supervisor), including data exchange management with peripheral Systems like DMI and odometry.
Logic	Systematic set of principles for retrieving, dispatching, storing, modelling, analysing and predicting information so as to perform a specified task. <i>Pertains specifically to the management of data by a System, both internal as in exchange with peripheral Systems.</i>
Manufacturer	Any natural or legal person who manufactures a OCORA certified building block or has it designed or manufactured, and markets it under his name or trademark.
Migrateability	The property of a system to allow changes to one or multiple building blocks, without affecting other building blocks or the overall system. <i>Migrateability is an architecture design principle, to be realised in the engineering concept of concrete products. It is a prerequisite for upgradeability.</i>
Mobile Communication Gateway	The Mobile Communication Gateway (MCG) 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	<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).</p> <p>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	A physically existent, independent item of rolling-stock, comprising one or more mechanically connected Physical Vehicles, whose composition cannot be changed within System OCORA System Borders.
Physical Train Unit	A physically existent, driveable and made up of a single or an ordered sequence of Physical Consists coupled together.
Physical Train Unit Operation Systems	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. <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 un-changed 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	<p>The property that allows migrating a software from one concrete Computing Platform implementation to another concrete Computing Platform implementation.</p> <p><i>See also Platform Independence.</i></p>
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 harmonized 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 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 Official Journal of the European Union</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 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	<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 Radio Block Centre (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>
Railway Undertaking	<p>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</p>

ensure traction; this also includes undertakings which provide traction only.

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 documents can also be referenced in a Technical Specification for Interoperability (TSI). When referenced, their nature changes from voluntary to mandatory.</i></p>
Replaceability	<p>The property of a component or a device to be removed and installed without support of the OEM.</p> <p><i>Replaceability is the technical implementation of exchangeability, enabling components and devices to be removed and installed without support of the OEM.</i></p> <p><i>Replaceability is a design principle, used in the development of the engineering (concept) of concrete products. See also: Exchangeability</i></p>
Runtime Environment	<p>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.</p>
Safe / Safety	<p>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.</p> <p><i>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.</i></p> <p><i>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.</i></p>
Security	<p>(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</p>

considered.

(Cyber) security is a design principle, used in the development of the engineering (concept) of concrete products.

Service	<p>Services are specialized 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	<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> <p><i>Refer to OCORA-40-001-Gamma, System Architecture for a definition of the OCORA system under consideration.</i></p>

Train Control and Management System	<p>The Train Control and Management System (TCMS) is an on-board 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.</p> <p><i>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.</i></p>
Train Interface Unit	<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 standardized 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>
Train Set	See Diesel Multiple Unit, Electrical Multiple Unit
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).
Vehicle Supervisor	<p>The (Business) Logic enabling calculating location specific speed limits and activation of the braking system in case of speed limit overshoot.</p> <p><i>Describes the prime task to be performed by the EVC (ETCS Kernel functions), including data exchange management with peripheral Systems like DMI and odometry.</i></p>
Vital	See Safe

67 items found 

3 Stakeholders

Title	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	A (Railway) Infrastructure Manager (IM) 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 a OCORA certified building block or has it designed or manufactured, and markets it under his name or trademark.
Railway Undertaking	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 Protection On-Board
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

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	Command, Control and Signaling On-Board
CCTV	Closed-Circuit Television
CCU	CCS Computing Unit
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
COM	Communication
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
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
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
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
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
ERA	European Union Agency for Railways
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
ETCS	European Train Control System
ETP-OB	European Train Protection On-Board
EUDD	European Driver's Desk
EUG	ERTMS User Group
EVC	European Vital Computer

FAT	Factory Acceptance Test
FFFIS	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 Machine 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
LAN	Local Area Network
LOC	Localisation

LOC-OB	Localisation On-Board
LTM	Loop Transmission Module
MAC	Message Authentication Code
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
MNT	Maintenance Terminal
MOT	Mobile Object Transactor
MQTT	Message Queuing Telemetry Transport
MT	Movement Authority Transactor
MT	Movement Authority Transactor
MTC	Manoeuvre Train Control
MVB	Multifunction Vehicle Bus
MVCI	Modular vehicle communication interface (ISO 22900)
MVCI	Modular Vehicle Communication Interface
MVP	Minimal Viable Product
MoU	Memorandum of Understanding
NFF	No Fault Found

NG	Next-Generation
NG-TCN	Next/New Generation TCN
NNTR	Notified National Technical Rules
NR	Non Regression
NSA	National Safety Authority
NTC	National Train Control
NTPs	National Train Protections
NoBo	Notified Body
OB	Onboard
OBU	On-board Unit
OCORA	Open CCS On-board Reference Architecture
ODO	Odometry
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
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
OTX	Open Test sequence eXchange (ISO 13209)
OpMode	Operation Mode
PC	Physical Consist
PD	Process Data
PER	Perception
PIN	Passenger Information Network
PIS	Passenger Information System
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
QA	Quality Assurance
QoS	Quality of Service
RACI	Responsibility, Accountability, Consulted, Informed
RAMS(S)	Reliability, Availability, Maintainability, Safety, (Cyber Security)
RBC	Radio Block Centre
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	Robotics Operating System
RQM	Requirements Manager
RST	Rolling Stock
RT	Reliability Target
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
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, ERMTS-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
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
TFFR	Tolerable Functional Failure Rate
TFM	Train Front Monitor
THR	Tolerable Hazard Rate
TI	Track Intrusion
TIMS	Train Integrity Monitoring System
TIU	Train Interface Unit
TLS	Transport Layer Service
TMS	Traffic Management System
TOBA	Telecom On-Board Architecture
TRB	Train Born
TRDP	Train Real-time Data Protocol
TS	Trackside
TSI	Technical Specification for Interoperability
TSN	Time Sensitive Networking
TSN-PD	Time Sensitive Networking Process Data
TST	Tester
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
V&V	Verification & Validation
VAL	Validator
VCCU	Virtual CCS Computing Unit
VCU	Vehicle Control Unit
VER	Verifier
VETS	Virtual ETCS Transponder Service
VL	Vehicle Locator
VLAN	Virtual Local Area Network
VLS	Vehicle Localisation
VS	Vehicle Supervisor
VTCS-OB	Virtual Train Coupling System On-Board
WBS	Work Breakdown Structure
WTB	Wired Train Bus
YAML	Yet Another Markup Language

293 items found 