



## Reference CCS Architecture

*An initiative of the ERTMS users group and  
the EULYNX consortium*

# A. System Specification RCA – Glossary

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	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>2</b>

Table of Contents

1. Terms ..... 4

2. Abbreviations..... 15

	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>3</b>

## REVISION HISTORY

Version	Date	Superseded documents/description/details	Change Request No
0.0.7	27.11.2019	Joined the general glossary from RCA and the glossary from the RCA specifications	
Gamma.1	28.01.2020	Integrated review feedback from RCA Core Group	

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	4

## 1. TERMS

Name	Description
Advanced Protection System	A group of components in the <a href="#">RCA</a> interface architecture, aggregates approximately the function of today's interlockings
Grade of Automation	<p><a href="#">Grade of Automation</a> refers to the degree of automation in remote train control (<a href="#">ATO</a>). The list of automatable activities of the driver is divided into 5 categories:</p> <p>GoA 0: No automation, everything is in the hands of the driver.</p> <p>GoA 1: The driver is prevented from unsafe actions (e.g. driving over a signal).</p> <p>GoA 2: The train driver is present, but during the journey a system takes over the speed control or at the station the door control (autopilot).</p> <p>GoA 3: No person is present in the driver's cab, most processes are automated. In situations that are difficult to automate (e.g. driving on sight in the event of faults), manual remote control is provided by the train attendant or the operations centre, for example.</p> <p>GoA 4: All train control processes are automated. Intervention groups only intervene on site in the event of locomotive malfunctions or evacuations.</p>
Operational Train Number	A number which, within certain limits, defines the type of train, the traffic relationship and the direction of travel and enables the unambiguous identification of the moving unit.
RCA Architecture Overview	<a href="#">RCA</a> Architecture Overview Document, published on the ERTMS Website. Version: Alpha.1. Source: <a href="https://ertms.be/sites/default/files/2019-02/RCA_Alpha_Architecture_Overview_1.pdf">https://ertms.be/sites/default/files/2019-02/RCA_Alpha_Architecture_Overview_1.pdf</a>
Operating State	The <a href="#">Operating State</a> is the representation of all relevant objects known to the <a href="#">Advanced Protection System</a> , including their state. It is the only true representation of all safety critical objects and their states.
Operation Point	Infrastructure elements such as railway stations. In TAF/TAP Operation Points are called locations
Object	An <a href="#">Object</a> is an abstract, logical representation of one or several <a href="#">Devices</a> .
Device	A <a href="#">Device</a> is a "technical thing" in the real world like a <a href="#">TA</a> , a <a href="#">VD</a> , etc.
Train Position Report	<a href="#">ToDo</a>
EULYNX	<a href="#">EULYNX</a> is an European initiative by 13 Infrastructure Managers to standardise interfaces and elements of the signalling systems. Aiming for defining and standardising interfaces in the future digital control command communication, signalling and automation system, the goal is a

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	5

Name	Description
	significant reduction of the lifecycle cost. A full set of <a href="#">EULYNX</a> specifications was published as Baseline 3 in 2018 and 2019.
Train Detection System	<p><a href="#">Train Detection System</a> is a system which determines the occupancy status of track vacancy proving sections. Train detection system may be a track circuit or an axle counting system.</p> <p>(Source: <a href="#">EULYNX</a> Glossary)</p>
Mission	<p>Any train movement started under the supervision of an <a href="#">ERTMS/ETCS</a> on-board equipment in one the following modes: FS, LS, SR, OS, NL, UN, or SN. The <a href="#">ETCS</a> mission is ended when any of the following modes is entered: SB, SH. A concept used in the <a href="#">ETCS</a> Standard.</p> <p>Source: <a href="#">ETCS</a> Specification SUBSET-023 v330</p>
Point	<p>A junction of two railway lines that can be set to guide a train onto one of two alternative routes, or allow two lines to merge into one. <a href="#">Points</a> can either be in "Reverse" or "Normal". Reverse being : The position of points where the reversed position indicates that the points are set for the less commonly used route. Normal being: The position of <a href="#">Point</a> where the normal position indicates that the points are set for the more commonly-used route, usually straight running. (Source: <a href="https://safety.networkrail.co.uk">https://safety.networkrail.co.uk</a>)</p>
Level Crossing	<p>A place where a railway and a road cross at the same level. (Source: <a href="https://safety.networkrail.co.uk">https://safety.networkrail.co.uk</a>)</p>
Flank Protection	<p>A means of protecting movements of trains across junctions by the setting of <a href="#">Point</a> (either manually or automatically) that prevent any other unauthorised movement coming into contact with it. (Source: <a href="https://safety.networkrail.co.uk">https://safety.networkrail.co.uk</a>)</p>
Design Rationales	Explains the reason for a certain design decision
SIL4	<a href="#">Safety Integrity Level</a> 4. Level 4 is the highest level.
Safety Integrity Level	<p><a href="#">Safety Integrity Level</a> is defined as a relative level of risk reduction provided by a safety function, or to specify a target level of risk reduction. In simple terms, <a href="#">Safety Integrity Level</a> is a measurement of performance required for a safety instrumented function. The <a href="#">Safety Integrity Level</a>s are defined in the European norm EN 50128.</p>
Trackside Asset	<p><a href="#">Trackside Assets</a> are installations such as rail points, level crossing barriers, signals, <a href="#">Train Detection System</a> (axle counters, track circuits), etc. <a href="#">Trackside Asset</a> are external actors in the <a href="#">RCA</a> interface architecture. See <a href="#">TA</a></p>

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	6

Name	Description
Overlap	<a href="#">Overlap</a> is the space of the track beyond the end of <a href="#">Movement Authority</a> , that is kept clear in case the trains overruns the end of <a href="#">Movement Authority</a> .
Application Lifecycle Management	Application Lifecycle Management is the product lifecycle management (governance, development, and maintenance) of computer programs and continues after development until the application is no longer used.
Application Programming Interface	In computer programming, an <a href="#">Application Programming Interface</a> is a set of subroutine definitions, communication protocols, and tools for building software.
APS Fixed Object Transactor	A device abstraction component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys APS-FOT</a> .
APS Mobile Object Transactor	A device abstraction component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys APS-MOT</a>
APS Movement Authority Transactor	A device abstraction component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys APS-MT</a>
APS Safety Logic	Safety Control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys APS-SL</a>
APS Safety Manager	Safety control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys APS-SM</a>
APS Object Aggregation	Object Abstraction component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys APS-OA</a>
ATO Transactor	Device Abstraction component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys ATO-AT</a>
ATO Vehicle	A device control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys ATO-AV</a>
ATO GoAx	<a href="#">ATO</a> is an operational safety enhancement device used to help automate operations of trains. See <a href="#">Grade of Automation</a> .
Business Continuity Management	The process of creating systems of prevention and recovery to deal with potential threats to a company. In addition to prevention, the goal is to permit ongoing operation, before and during execution of Disaster recovery.

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	7

Name	Description
Change Control Board	A Change Control Board is a committee that consists of Subject Matter Experts and Technical Chiefs, who will make decisions regarding whether or not proposed changes to a software project should be implemented.
Command, Control and Signaling	The systems, which are ensuring the safe operation of the railways as e.g. the train control system or the interlocking.
European Committee for Electrotechnical Standardization	CENELEC is the European Committee for Electrotechnical Standardization and is responsible for standardization in the electrotechnical engineering field. <a href="http://www.cenelec.eu">www.cenelec.eu</a> < <a href="http://www.cenelec.eu">http://www.cenelec.eu</a>
Community of European Railway and Infrastructure Companies	CER's role is to represent the interests of its members on the EU policy-making scene, in particular to support an improved business and regulatory environment for European railway operators and railway infrastructure companies. <a href="http://www.cer.be">www.cer.be</a>
Confidentiality, Integrity, and Availability	Confidentiality, integrity and availability, also known as the CIA triad, is a model designed to guide policies for information security within an organization. The elements of the triad are considered the three most crucial components of security.
Consortium Management Bureau	The Consortium Management Bureau forms the central core team of the consortium and consists of the Technical Lead, Liaising expert and the support staff.
Consortium Management Committee	Organisation group in <a href="#">EULYNX</a> .
Change Request	A change request is a document containing a call for an adjustment of a system; it is of great importance in the change management process.
Device & Configuration Management	Generic function component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys DCM</a>
Diagnostics & Monitoring	Generic Function component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys DM</a>
Driver Machine Interface	The interface to enable direct communication between the <a href="#">ERTMS/ETCS</a> on-board equipment and the driver.
Digital Railway	<a href="#">DR</a> is the name of the British programme for digitalisation of <a href="#">CCS</a> System (see <a href="#">DSD</a> , <a href="#">SR40</a> ).
Digitale Schiene Deutschland	<a href="#">Digitale Schiene Deutschland</a> is the German programme for digitisation of <a href="#">CCS</a> Systems (see also <a href="#">DR</a> , <a href="#">SR40</a> ).

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	8

Name	Description
Engineering & Data Preparation	Generic Function component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys EDP</a>
European Rail Infrastructure Managers	The role of <a href="#">EIM</a> is to provide a single voice to represent its members (infrastructure managers vis-à-vis to the relevant European institutions and sector stakeholders. <a href="#">EIM</a> also assists members to develop their businesses through the sharing of experiences and contributing to the technical and safety activities of the Agency ( <a href="#">ERA</a> ). <a href="http://www.eimrail.org">www.eimrail.org</a>
European Union Agency for Railways	The <a href="#">European Union Agency for Railways</a> is established to provide the EU Member States and the Commission with technical assistance in the development and implementation of the Single European Railway Area. <a href="http://www.era.europa.eu">www.era.europa.eu</a>
European Rail Traffic Management System	The <a href="#">European Rail Traffic Management System</a> is a major industrial project developed by eight UNIFE members - Alstom Transport, Ansaldo STS, AZD Praha, Bombardier Transportation, CAF, Mermec, Siemens Mobility and Thales - in close cooperation with the European Union, railway stakeholders and the GSM-R industry.
European Train Control System (Level x)	The European Train Control System is the signaling and control component of the European Rail Traffic Management System ( <a href="#">ERTMS</a> ). It is a replacement for legacy train protection systems and designed to replace the many incompatible safety systems currently used by European railways. <a href="#">ETCS</a> is specified at four numbered levels (x = 0, 1, 2, 3).
ERTMS Users Group	The mission of the <a href="#">ERTMS Users Group</a> is to help the railway companies in applying <a href="#">ERTMS/ETCS</a> in a harmonized and interoperable way, to enable the free flow of trains and a competitive railway. <a href="http://www.ertms.be">www.ertms.be</a>
European Union Public Licence	The European Union Public Licence is a free software licence that has been created and approved by the European Commission.
European Vital Computer	The <a href="#">European Vital Computer</a> is the heart of local computing capabilities in the driving vehicle. It is connected with external data communication, internal controls to speed regulation of the loco, location sensors and all cab devices of the driver.
Form Fit Function Interface Specification	Form, Fit, and Function is the identification and description of characteristics of a part or assembly. Each defines a specific aspect of the part to help engineers match parts to needs. The FFF framework increases design change flexibility by allowing changes to the part with minimal documentation and design cost as long as the fit, form and function of the product are maintained.
Future Railway Mobile Communication System	<a href="#">FRMCS</a> has the objective to become the worldwide standard, conforming to European regulation as well as responding to the needs and obligations of rail organizations outside of Europe. As such, the <a href="#">UIC FRMCS</a> project duly associates non-European members and is a first concrete application of UIC strategy to build a Global Rail Traffic Management System for the whole rail industry. <a href="http://www.uic.org/frmcs">www.uic.org/frmcs</a>

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	9

Name	Description
Global Navigation Satellite System	<a href="#">Global Navigation Satellite System</a> refers to a constellation of satellites providing signals from space that transmit positioning and timing data to GNSS receivers. The receivers then use this data to determine location.
Global Positioning System	The Global Positioning System is a satellite-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites.
Global system for mobile communication Railway	<a href="#">GSM-R</a> is an international wireless communications standard for railway communication and applications.
Horizon 2020	<a href="#">Horizon 2020</a> is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. <a href="https://ec.europa.eu/programmes/horizon2020/en">https://ec.europa.eu/programmes/horizon2020/en</a>
Hardware	<a href="#">Hardware</a> includes the physical, tangible parts or components of a computer.
Identity and Access Management	IAM is, in computer security, the security and business discipline that "enables the right individuals to access the right resources at the right times and for the right reasons". Generic Function component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys IAM</a>
International Electrotechnical Commission	The IEC is the world's leading organization for the preparation and publication of International Standards for all electrical, electronic and related technologies. These are known collectively as "electrotechnology". <a href="http://www.iec.ch">www.iec.ch</a>
Institute of Electrical and Electronics Engineers	IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE and its members inspire a global community through its highly cited publications, conferences, technology standards, and professional and educational activities. <a href="http://www.ieee.org">www.ieee.org</a>
Infrastructure Manager	A railway infrastructure manager is any body or undertaking that is responsible in particular for establishing and maintaining railway infrastructure. This also includes the management of infrastructure control and safety systems.
Intellectual Property Rights	Intellectual property is a category of property that includes intangible creations of the human intellect. Intellectual property encompasses two types of rights; industrial property rights (trademarks, patents, designations of origin, industrial designs and models) and copyright.

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	10

Name	Description
International Requirements Engineering Board	The <a href="#">International Requirements Engineering Board</a> , a non-profit organization, is the provider of the CPRE (Certified Professional for Requirements Engineering) certification scheme. The board consists of leading RE representatives, who come from science, research, industry and consulting.
International Organization for Standardization	ISO is an independent, non-governmental international organization with a membership of 164 national standards bodies. Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global challenges. <a href="http://www.iso.org">www.iso.org</a>
Independent Verification & Validation	<a href="#">Independent Verification &amp; Validation</a> is targeted at safety-critical software systems and aims to increase the quality of software products, thereby reducing risks and costs through the operational life of the software. <a href="#">IVV</a> provides assurance that software performs to the specified level of confidence and within its designed parameters and defined requirements.
Interlocking	In railway signalling, an interlocking is a system composed by a set of signal apparatus that prevents trains from conflicting movements through only allowing trains to receive authority to proceed, when routes have been set, lock and detected in safe combinations. See also <a href="#">APS</a>
Life Cycle Cost	<a href="#">Life Cycle Cost</a> refers to the total cost of ownership over the life of an asset. Costs considered include the financial cost which is relatively simple to calculate and also the environmental and social costs which are more difficult to quantify and assign numerical values. Typical areas of expenditure which are included in calculating the whole-life cost include planning, design, construction and acquisition, operations, maintenance, renewal and rehabilitation, depreciation and cost of finance and replacement or disposal.
Movement Authority	<a href="#">Movement Authority</a> is the permission for a train to move to a specific location within the constraints of the infrastructure and with supervision of speed. End of Authority is the location to which the train is permitted to proceed and where target speed is equal to zero. See <a href="#">Movement Authority</a>
Model-Based Systems Engineering	<a href="#">Model-Based Systems Engineering</a> is a systems engineering methodology that focuses on creating and exploiting domain models as the primary means of information exchange between engineers, rather than on document-based information exchange.
Man Machine Interface	The <a href="#">Man Machine Interface</a> (also called User Interface) is the space where interactions between humans and machines occur. The goal of this interaction is to allow effective operation and control of the machine from the human end, whilst the machine simultaneously feeds back information that aids the operators' decision-making process.

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	11

Name	Description
Mobile Object	Objects like persons, cars that are close to the track.
Mobile Object Locator	A device control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys MOL</a>
Mean Time to Recovery resp. Repair	Mean Time to Recovery is the average time that a device will take to recover from any failure.
Middleware	Middleware is computer software that provides services to software applications beyond those available from the operating system. It can be described as "software glue".
Non Functional Requirement	In systems engineering and requirements engineering, a <a href="#">Non Functional Requirement</a> is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.
National Safety Authority	Authority for authorization of <a href="#">CCS</a> components and systems.
On Board Unit	The <a href="#">ETCS</a> equipment located on the driving vehicle.
Object Controller	A device control component in the <a href="#">RCA</a> interface architecture. The different <a href="#">OC</a> component types and their interfaces are defined in <a href="#">EULYNX</a> . See <a href="#">SubSys OC</a>
Open CCS Onboard Reference Architecture	European initiative to define the <a href="#">CCS</a> vehicle architecture. Confirms with the COAT program of smartrail 4.0.
Operating System	An <a href="#">Operating System</a> is system software that manages computer hardware and software resources and provides common services for computer programs.
Platform of Rail Infrastructure Managers in Europe	<a href="#">PRIME</a> was established between DG MOVE and Infrastructure Managers at the end of 2013 with the objective to improve the cooperation of rail infrastructure managers across borders, support implementation of Europe-an rail policy and develop performance benchmarking for the exchange of best practices.
Person Supervisor & Locator	A device control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys PSL</a>
Research and Development	Research and Development refers to the work a business conducts for the innovation, introduction and improvement of its products and procedures. It is a series of investigative activities to improve existing products and procedures or to lead to the development of new products and procedures.

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	12

Name	Description
Reliability, Availability, Maintainability (and Safety)	RAMS constitutes the key element of the assessment in the rail industry today. For rail system operator, RAMS means a safe, reliable, high-quality service and lower operating and maintenance costs. For the rail system provider, RAMS is representing a high-quality system and product.
Radio Block Centre	A <a href="#">Radio Block Centre</a> is a specialized computing device with specification <a href="#">Safety Integrity Level (SIL4)</a> for generating <a href="#">Movement Authority</a> s and transmitting it to trains. It gets information from signaling 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 <a href="#">Radio Block Centre</a> will attend the trains with <a href="#">Movement Authority</a> until leaving the section.
Reference CCS architecture	<a href="#">Reference CCS architecture</a> is an initiative by the members of <a href="#">EUG</a> and <a href="#">EULYNX</a> to define a harmonized architecture for the future railway <a href="#">CCS</a> , with the main goal to substantially in-crease the performance/TCO ratio of <a href="#">CCS</a> in comparison with today's implementations.
Railway Undertaking	Rail transport undertaking means a private or public undertaking which is authorized to carry persons or goods by rail and which ensures traction or which only ensures traction.
Shift2Rail	<a href="#">Shift2Rail</a> fosters the introduction of better trains to the market (quieter, more comfortable, more dependable, etc.), which operate on an innovative rail network infrastructure reliably from the first day of service introduction, at a lower <a href="#">Life Cycle Cost</a> , with more capacity to cope with growing passenger and freight mobility demand.
smartrail 4.0	With the smartrail 4.0 program, the Swiss railway industry is harnessing digitalization and the potential of new technologies to further increase capacity and safety, make more efficient use of railway infrastructure, save costs and thus maintain the railway's competitiveness in the longer term. <a href="http://www.smartrail40.ch">www.smartrail40.ch</a>
Software	Software is a collection of data or computer instructions that tell the computer how to work. Software includes computer programs, libraries and related non-executable data, such as online documentation or digital media.
Systems Modeling Language	The <a href="#">Systems Modeling Language</a> is a general purpose architecture modeling language for systems engineering applications. <a href="#">Systems Modeling Language</a> supports the specification, analysis, design, verification and validation of a broad range of systems and systems-of-systems. These systems may include hardware, software, information, processes, personnel, and facilities. <a href="http://www.sysml.org">www.sysml.org</a>
Total Cost of Ownership	<a href="#">Total Cost of Ownership</a> is a financial estimate intended to help buyers and owners determine the direct and indirect costs of a product or system. It is a management accounting concept that can be used in full cost accounting or even ecological economics where it includes social costs.

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	13

Name	Description
Train Integrity Monitoring System	System to monitor and confirm train integrity when train detection is absent.
TIMS	Abbreviation for <a href="#">Train Integrity Monitoring System</a>
Traffic Management System	<a href="#">Traffic Management System</a> provide permanent control across the network, automatically sets routes for trains and logs train movements as well as detects and solves potential conflicts.
TMS ATO Execution	A movement control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys TMS-AE</a>
TMS Plan Execution	A movement control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys TMS-PE</a>
Technical Specification for Interoperability	The <a href="#">Technical Specification for Interoperability</a> are specifications drafted by the European Railway Agency and adopted in a decision by the European Commission, to ensure the interoperability of the trans-European rail system. The interoperability issues apply to the lines within the Trans-European Rail network.
Union Internationale des Chemins de fer or International Union of Railways	The worldwide railway organisation. <a href="http://www.uic.org">www.uic.org</a>
Union des Industries Ferroviaires Européennes	<a href="#">Union des Industries Ferroviaires Européennes</a> is representing the European rail manufacturing industry. <a href="#">Union des Industries Ferroviaires Européennes</a> ' purpose is to represent its members' interests at international and EU level. The mission of the association is to proactively foster an environment where its members can provide competitive railway systems for the growing demand for rail transport. <a href="http://www.unife.org">www.unife.org</a>
Union Industry of Signaling	<a href="#">Union Industry of Signaling</a> is a working group of <a href="#">UNIFE</a> with the goal to create the <a href="#">ERTMS/ETCS</a> specifications.
Unique Selling Proposition	A <a href="#">Unique Selling Proposition</a> refers to the unique benefit exhibited by a company, service, product or brand that enables it to stand out from competitors. The <a href="#">Unique Selling Proposition</a> must be a feature that highlights product benefits that are meaningful to consumers.
Verification and Validation	Verification and validation are independent procedures that are used together for checking that a product, service, or system meets requirements and specifications and that it fulfills its intended purpose.

	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>14</b>

Name	Description
Vehicle Devices	An external actor in the <a href="#">RCA</a> interface architecture, See <a href="#">VD</a>
Vehicle Locator	a device control component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys VL</a>
Vehicle Supervisor	A device control component in the RCA interface architecture. See <a href="#">SubSys VS</a>
RCA Workbench	A component in the <a href="#">RCA</a> interface architecture. See <a href="#">SubSys RCA-WB</a>

**Table 1 Terms**

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	15

## 2. ABBREVIATIONS

Name	Description
APS	Abbreviation for <a href="#">Advanced Protection System</a>
ATO	Abbreviation for Automatic Train Operation
ATO-AT	Abbreviation for <a href="#">ATO Transactor</a>
ATO-AV	Abbreviation for <a href="#">ATO Vehicle</a>
DPL	Abbreviation for Drive Protection Level
DPS	Abbreviation for <a href="#">Drive Protection Section</a>
ERA	Abbreviation for <a href="#">European Union Agency for Railways</a>
ETCS	Abbreviation for <a href="#">European Train Control System (Level x)</a>
GoA	Abbreviation for <a href="#">Grade of Automation</a>
MOB	Abbreviation for <a href="#">Movable Object</a>
MOL	Abbreviation for <a href="#">Mobile Object Locator</a>
MP	Abbreviation for <a href="#">Movement Permission</a>
OC	Abbreviation for <a href="#">Object Controller</a>
OTN	Abbreviation for <a href="#">Operational Train Number</a>
PSL	Abbreviation for <a href="#">Person Supervisor &amp; Locator</a>
RCA	Abbreviation for <a href="#">Reference CCS architecture</a>
RCA WB	Abbreviation for <a href="#">RCA Workbench</a>

	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>16</b>

Name	Description
TMS	Abbreviation for <a href="#">Traffic Management System</a>
TMS-PE	Abbreviation for <a href="#">TMS Plan Execution</a>
TMS-AE	Abbreviation for <a href="#">TMS ATO Execution</a>
VS	Abbreviation for <a href="#">Vehicle Supervisor</a>
APS-MOT	Abbreviation for <a href="#">APS Mobile Object Transactor</a>
APS-MT	Abbreviation for <a href="#">APS Movement Authority Transactor</a>
APS-OA	Abbreviation for <a href="#">APS Object Aggregation</a> .
APS-FOT	Abbreviation for <a href="#">APS Fixed Object Transactor</a>
APS-SL	Abbreviation for <a href="#">APS Safety Logic</a>
APS-SM	Abbreviation for <a href="#">APS Safety Manager</a>
VD	Abbreviation for <a href="#">Vehicle Devices</a>
TA	Abbreviation for <a href="#">Trackside Asset</a>
OBU	Abbreviation for <a href="#">On Board Unit</a>
ERTMS	Abbreviation for <a href="#">European Rail Traffic Management System</a>
TDS	Abbreviation for <a href="#">Train Detection System</a> .
UML	Abbreviation for Unified Modelling Language
SoM	Abbreviation for Start of Mission. A Term used in <a href="#">ETCS</a> .

	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>17</b>

Name	Description
TMS-PAS	Abbreviation for <a href="#">TMS</a> Planning System
EDP	Abbreviation for <a href="#">Engineering &amp; Data Preparation</a>
DCM	Abbreviation for <a href="#">Device &amp; Configuration Management</a>
IAM	Abbreviation for <a href="#">Identity and Access Management</a>
DM	Abbreviation for <a href="#">Diagnostics &amp; Monitoring</a>
CR	Abbreviation for <a href="#">Change Request</a>
ALM	Abbreviation for <a href="#">Application Lifecycle Management</a>
API	Abbreviation for <a href="#">Application Programming Interface</a>
BCM	Abbreviation for <a href="#">Business Continuity Management</a>
CCB	Abbreviation for <a href="#">Change Control Board</a>
CCS	Abbreviation for <a href="#">Comand, Control and Signaling</a>
CER	Abbreviation for <a href="#">Community of European Railway and Infrastructure Companies</a>
CIA	Abbreviation for <a href="#">Confidentiality, Integrity, and Availability</a>
CMB	Abbreviation for <a href="#">Consortium Management Bureau</a>
CENELEC	Abbreviation for <a href="#">European Committee for Electrotechnical Standardization</a>
CMC	Abbreviation for <a href="#">Consortium Management Committee</a>
DMI	Abbreviation for <a href="#">Driver Machine Interface</a>
DR	Abbreviation for <a href="#">Digital Railway</a>

	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>18</b>

Name	Description
DSD	Abbreviation for <a href="#">Digitale Schiene Deutschland</a>
EIM	Abbreviation for <a href="#">European Rail Infrastructure Managers</a>
EUG	Abbreviation for <a href="#">ERTMS Users Group</a>
EUPL	Abbreviation for <a href="#">European Union Public Licence</a>
EVC	Abbreviation for <a href="#">European Vital Computer</a>
FFFIS	Abbreviation for <a href="#">Form Fit Function Interface Specification</a>
UIC	Abbreviation for <a href="#">Union Internationale des Chemins de fer or International Union of Railways</a>
FRMCS	Abbreviation for <a href="#">Future Railway Mobile Communication System</a>
GNSS	Abbreviation for <a href="#">Global Navigation Satellite System</a>
GPS	Abbreviation for <a href="#">Global Positioning System</a>
GSM-R	Abbreviation for <a href="#">Global system for mobile communication Railway</a>
HW	Abbreviation for <a href="#">Hardware</a>
IEC	Abbreviation for <a href="#">International Electrotechnical Commission</a>
IEEE	Abbreviation for <a href="#">Institute of Electrical and Electronics Engineers</a>
IM	Abbreviation for <a href="#">Infrastructure Manager</a>
IPR	Abbreviation for <a href="#">Intellectual Property Rights</a>
IREB	Abbreviation for <a href="#">International Requirements Engineering Board</a>

	<b>Document Number and Issue</b>	<b>RCA.Doc.14, Gamma.1</b>
	<b>Date of Publication</b>	<b>28-01-2020</b>
	<b>Page No</b>	<b>19</b>

Name	Description
ISO	Abbreviation for <a href="#">International Organization for Standardization</a>
IVV	Abbreviation for <a href="#">Independent Verification &amp; Validation</a>
IXL	Abbreviation for <a href="#">Interlocking</a>
LCC	Abbreviation for <a href="#">Life Cycle Cost</a>
MA	Abbreviation for <a href="#">Movement Authority</a> .
MBSE	Abbreviation for <a href="#">Model-Based Systems Engineering</a>
MMI	Abbreviation for <a href="#">Man Machine Interface</a>
MO	Abbreviation for <a href="#">Mobile Object</a>
MTTR	Abbreviation for <a href="#">Mean Time to Recovery resp. Repair</a>
MW	Abbreviation for <a href="#">Middleware</a>
NFR	Abbreviation for <a href="#">Non Functional Requirement</a>
NSA	Abbreviation for <a href="#">National Safety Authority</a>
OCORA	Abbreviation for <a href="#">Open CCS Onboard Reference Architecture</a>
OS	Abbreviation for <a href="#">Operating System</a>
PRIME	Abbreviation for <a href="#">Platform of Rail Infrastructure Managers in Europe</a>
R&D	Abbreviation for <a href="#">Research and Development</a>
RAM(S)	Abbreviation for <a href="#">Reliability, Availability, Maintainability (and Safety)</a>
RBC	Abbreviation for <a href="#">Radio Block Centre</a>

	Document Number and Issue	RCA.Doc.14, Gamma.1
	Date of Publication	28-01-2020
	Page No	20

Name	Description
RU	Abbreviation for <a href="#">Railway Undertaking</a>
S2R	Abbreviation for <a href="#">Shift2Rail</a>
SIL	Abbreviation for <a href="#">Safety Integrity Level</a>
SR40	Abbreviation for <a href="#">smartrail 4.0</a>
SW	Abbreviation for <a href="#">Software</a>
SysML	Abbreviation for <a href="#">Systems Modeling Language</a>
TCO	Abbreviation for <a href="#">Total Cost of Ownership</a>
TSI	Abbreviation for <a href="#">Technical Specification for Interoperability</a>
UI	Abbreviation for user interface. See <a href="#">Man Machine Interface</a>
SCI	Abbreviation for Standard Communication Interface. (Source: EULYNX, Eu.Glo.1869)
UNIFE	Abbreviation for <a href="#">Union des Industries Ferroviaires Européennes</a>
USP	Abbreviation for <a href="#">Unique Selling Proposition</a>
V&V	Abbreviation for <a href="#">Verification and Validation</a>
VL	Abbreviation for <a href="#">Vehicle Locator</a>
SDI	Abbreviation for Standard Diagnostic Interface. (Source: EULYNX, Eu.Glo.1870)

**Table 2 Abbreviations**