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Interested committees:

Title: BS EN IEC 61375-1 Electronic railway equipment - Train communication network (TCN)

Part 1: General architecture

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

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CLOSING DATE FOR VOTING:

2025-02-21

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9/2885/CD, 9/2922A/CC

IEC TC 9 : ELECTRICAL EQUIPMENT AND SYSTEMS FOR RAILWAYS

SECRETARIAT:

France

SECRETARY:

Mr Denis MIGLIANICO

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

☒ SUBMITTED FOR CENELEC PARALLEL VOTING**Attention IEC-CENELEC parallel voting**

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Electronic railway equipment – Train communication network (TCN) – Part 1: General architecture

PROPOSED STABILITY DATE: 2027

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRONIC RAILWAY EQUIPMENT – TRAIN COMMUNICATION NETWORK (TCN) –

Part 1: General architecture

FOREWORD

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International Standard IEC 61375-1 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This fourth edition cancels the third edition published in 2012 and constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- Extension of train backbone topologies: aggregated and segregated topology
- Added independent consist orientation check with segregated train backbone topology
- Introduction of wireless technologies: wireless train backbone and wireless consist network
- Possibility of virtual networks
- Definition of data classes and protocol requirements suitable for the OMTS domain
- New clause about cybersecurity in train communication networks

The text of this standard is based on the following documents:

FDIS	Report on voting
9/XXX/FDIS	9/XXXX/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of IEC 61375 series, under the general title *Electronic railway equipment – Train communication network (TCN)*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

1 INTRODUCTION

2 IEC 61375-1 defines the general architecture of the Train Communication Network (TCN) to
3 achieve compatibility between consist networks and train backbones defined by the standard
4 series of IEC 61375.

5 The creation of this fourth edition of the standard has been motivated by advances in technology,
6 namely in the fields of Ethernet communication, wireless communication, and cybersecurity,
7 which made it necessary to adapt or to extend some sections of the TCN general architecture.
8 These changes will then further on be reflected in the detailed technical specifications given in
9 subsequent parts of this standard series.

10 The TCN has a hierarchical structure with two levels of networks, a train backbone and a consist
11 network:

12 a) for interconnecting vehicles in closed or open trains, this part of IEC 61375 specifies train
13 backbones with different characteristics.

14 b) for connecting standard on-board equipment, this part of IEC 61375 specifies consist
15 networks with different characteristics.

16 The general architecture of the TCN, which is defined in this part of the standard, does

17 c) establish the rules for interconnecting consist networks with train backbones, as

- 18 • identifying the interfaces;
- 19 • defining the principles of how train topology changes can be discovered;
- 20 • defining the basic communication services provided by train backbones to be used by
21 consist networks;

22 d) establish basic rules for the train backbone and for the consist network;

23 e) establish rules for communalities in operation, as:

- 24 • patterns for the communication between users;
- 25 • addressing principles;
- 26 • data classes to be supported

27 f) establish rules to support cybersecurity of the TCN

28

ELECTRONIC RAILWAY EQUIPMENT – TRAIN COMMUNICATION NETWORK (TCN) –

Part 1: General architecture

1 Scope

This part of IEC 61375 applies to the architecture of data communication systems in open trains, i.e., it covers the architecture of a communication system for the data communication between vehicles of the said open trains, the data communication within the vehicles and the data communication from train to the ground.

The applicability of this part of IEC 61375 to the train network technologies allows for interoperability of individual vehicles within open trains in international traffic. The data communication systems inside vehicles are given as recommended solutions to cope with the said TCN. In any case, proof of compatibility between a proposed train backbone and a proposed consist network will have to be brought by the supplier.

This part of IEC 61375 may be additionally applicable to closed trains and multiple unit trains when so agreed between purchaser and supplier.

NOTE 1 For a definition of open trains, multiple unit trains and closed trains, see Clause 3.

NOTE 2 Road vehicles such as buses and trolley buses are not considered in this part of IEC 61375.

2 Normative references

There are no normative references in this document.

3 Terms, definitions, abbreviated terms, acronyms, and conventions

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org>

3.1.1

active train backbone node

train backbone node receiving a sequence number during train inauguration and forwarding user data packets between consist network and train backbone

3.1.2

application layer

upper layer in the OSI model, interfacing directly to the application

[SOURCE: IEC 60050-811:2017, 811-37-03]

3.1.3**application process**

element within a real open system which performs the information processing for a particular application

[SOURCE: IEC 60050-811:2017, 811-37-05]

3.1.4**bridge <in a train communication network>**

device which stores and forwards frames from one bus to another on the base of their link layer addresses

[SOURCE: IEC 60050-811:2017, 811-37-09]

3.1.5**broadcast**

nearly simultaneous transmission of the same information to several destinations

Note 1 to entry: broadcast in the TCN is not considered reliable, i.e., some destinations can receive the information and others not.

[SOURCE: IEC 60050-811:2017, 811-37-10]

3.1.6**bus <in a train communication network>**

communication medium which broadcasts the same information to all attached participants at nearly the same time, allowing all devices to obtain the same sight of its state, at least for the purpose of arbitration

[SOURCE: IEC 60050-871:2018, 871-05-02]

3.1.7**closed train**

train composed of one or a set of consists, where the train composition does not change during normal operation

EXAMPLE Metro, sub-urban train, or high-speed train unit.

Note 1 to entry: Consists are coupled in a workshop to establish a closed train for operation.

[SOURCE: IEC 60050-811:2017, 811-37-17]

3.1.8**communication device**

device connected to the consist network or train backbone with the ability to transport, source or sink data

[SOURCE: IEC 60050-811:2017, 811-37-18]

3.1.9**consist**

single vehicle or a group of vehicles which are not separated during normal operation

Note 1 to entry: A consist can contain no, one or several consist networks

[SOURCE: IEC 60050-811:2017, 811-37-20]

3.1.10**consist network**

communication network interconnecting communication devices in one consist

Note 1 to entry: Consist networks do not spread beyond consist boundaries.

110 “[SOURCE: IEC 60050-811:2017, 811-37-21, modified – The definition has been replaced with
111 “communication network interconnecting communication devices in one consist”]

112 **3.1.11**

113 **consist network address**

114 network address, which does not change after train inauguration and which is used to address
115 communication device in the own consist network

116 **3.1.12**

117 **consist sequence number**

118 sequence number of the consist in the train as obtained during train inauguration

119 **3.1.13**

120 **consist switch**

121 network component used in consist network based on switched technology

122 [SOURCE: IEC 60050-811:2017]

123 **3.1.14**

124 **cybersecurity <in railway application>**

125 set of activities and measures taken with the objective to prevent, detect, react to unauthorized
126 access or cyberattack which could lead to an accident, an unsafe situation, or railway
127 application performance degradation

128 [SOURCE: EN TS 50701:2017]

129 **3.1.15**

130 **end device**

131 unit connected to one consist network or to one set of consist networks prepared for redundancy
132 reasons

133 [SOURCE: IEC 60050-811:2017, 811-37-33]

134 **3.1.16**

135 **end node**

136 node which terminates the train backbone

137 [SOURCE: IEC 60050-811:2017, 811-37-34]

138 **3.1.17**

139 **essential function**

140 function or capability that is required to maintain health, safety, the environment and availability
141 for the equipment under control

142 Note 1 to entry: Essential functions include, but are not limited to, the safety instrumented function (SIF), the control
143 function and the ability of the operator to view and manipulate the equipment under control. The loss of essential
144 functions is commonly termed loss of protection, loss of control and loss of view respectively. In some industries
145 additional functions such as history may be considered essential.

146 [SOURCE: IEC 62443-4-2:2019, 3.1.20]

147 **3.1.18**

148 **function, <in a train communication network>**

149 application process which exchanges messages with another application process

150 **3.1.19**

151 **gateway, <in a train communication network>**

152 connection between different busses at the application layer requiring application-dependent data
153 analysis and protocol conversion

154 [SOURCE: IEC 60050-811:2017, 811-37-44]

- 155 **3.1.20**
156 **group address**
157 address of a multicast group to which a device belongs

158 [SOURCE: IEC 60050-811:2017, 811-37-45]
- 159 **3.1.21**
160 **integrity, <in a train communication network>**
161 property of a system to recognize and to reject wrong data in case of malfunction of its parts
- 162 **3.1.22**
163 **intermediate node**
164 node which establishes continuity between two bus sections connected to it, but does not
165 terminate them

166 [SOURCE: IEC 60050-811:2017, 811-37-49]
- 167 **3.1.23**
168 **linear topology**
169 topology where the nodes are connected in series, with two nodes each connected to only one
170 other node and all others each connected to two other nodes (i.e., connected in the shape of a
171 line)

172 [SOURCE: IEC 60050-811:2017, 811-37-51]
- 173 **3.1.24**
174 **local area network, <in a train communication network>**
175 part of a network characterized by a common medium access and address space

176 [SOURCE: IEC 60050-811:2017, 811-37-60]
- 177 **3.1.25**
178 **medium access control, <in a train communication network>**
179 sublayer of the link layer, which controls the access to the medium (arbitration, mastership
180 transfer, polling)
- 181 **3.1.26**
182 **medium, <in a train communication network>**
183 physical carrier of the signal: electrical wires, optical fibers, etc.
- 184 **3.1.27**
185 **message, <in a train communication network>**
186 information which is transmitted in one or several packets from a sender to one or more
187 receivers

188 “[SOURCE: IEC 60050-821:2017, 821-37-29]”
- 189 **3.1.28**
190 **multicast**
191 transmission of the same message to a group of receivers, identified by their group address

192 Note 1 to entry: the word "multicast" is used even if the group includes all receivers
193 [SOURCE: IEC 60050-811:2017, 811-37-66]
- 194 **3.1.29**
195 **multimedia data**
196 data used for onboard multimedia and telematic services (OMTS), like video/audio streams or
197 file transfer

198 **3.1.30**
199 **multiple unit train**
200 train comprising one or more train-units which can be controlled simultaneously from one cab
201 and able to operate at normal speed in either direction without re-marshalling

202 [SOURCE: IEC 60050-811:2017, 811-02-12]

203 **3.1.31**
204 **network, <in a train communication network>**
205 set of possibly different communication systems which interchange information in a commonly
206 agreed way

207 [SOURCE: IEC 60050-811:2017, 811-37-68]

208 **3.1.32**
209 **network address**
210 address which identifies a communication device on network layer

211 [SOURCE: IEC 60050-811:2017, 811-37-69]

212 **3.1.33**
213 **network device**
214 component used to set up consist networks and train networks.

215 Note 1 to entry: these can be passive components like cables or connectors, active unmanaged components like
216 repeaters, media converters or (unmanaged) switches, or managed active components like gateways, routers and
217 (managed) switches.

218 [SOURCE: IEC 60050-811:2017, 811-37-70]

219 **3.1.34**
220 **network layer**
221 layer in the OSI model responsible for routing between different busses

222 [SOURCE: IEC 60050-811:2017, 811-37-72]

223 **3.1.35**
224 **network management, <in a train communication network>**
225 operations necessary to remotely configure, monitor, diagnose and maintain the network

226 [SOURCE: IEC 60050-811:2017, 811-37-73]

227 **3.1.36**
228 **node, <in a train communication network>**
229 device on the train backbone that acts as a gateway between train backbone and consist
230 network

231 [SOURCE: IEC 60050-811:2017, 811-37-74]

232 **3.1.37**
233 **octet**
234 byte
235 ordered set of eight binary digits, operated on as an entity

236 [SOURCE: IEC 60050-171:2019, 171-02-12]

237 **3.1.38**
238 **open train**
239 train composed of one or a set of consists, where the configuration can change during operation

240 EXAMPLE Locomotive-hauled international UIC (International Union of Railways, the international railways operators
241 association) trains

242 [SOURCE: IEC 60050-811:2017, 811-37-79]

243 **3.1.39**

244 **operator**

245 enterprise or organization which is operating trains

246 **3.1.40**

247 **operational data**

248 data critical for train operation (TCMS), like propulsion control, brake control, doors control,
249 lightning control or heating, ventilation, and air conditioning control

250 **3.1.41**

251 **packet, <in a train communication network>**

252 unit of a message (information, acknowledgement, or control) transmitted by protocols on
253 network or transport layer

254 **3.1.42**

255 **receiver, <in a train communication network>**

256 electronic device which can receive signals from the physical medium

257 **3.1.43**

258 **repeater**

259 connection at the physical layer between bus segments, providing an extension of the bus
260 beyond the limits permitted by passive means

261 Note 1 to entry: The connected segments operate at the same speed and with the same protocol. The delay
262 introduced by a repeater is in the order of one bit duration."

263 [SOURCE: IEC 60050-811:2017, 811-37-90]

264 **3.1.44**

265 **ring topology**

266 active network where each node is connected in series to two other nodes

267 Note 1 to entry Ring can also be referred to as loop.

268 [SOURCE: IEC 60050-811:2017, 811-37-91]

269 **3.1.45**

270 **router, <in a train communication network>**

271 connection between two busses at the network layer, which forwards datagrams from one bus
272 to another on the base of their network address

273 **3.1.46 safety integrity**

274 ability of a safety-related system to achieve its required safety functions under all the stated
275 conditions within a stated operational environment and within a stated duration

276 [SOURCE: IEC 60050-821:2017, 821-12-54]

277 **3.1.47**

278 **service, <in a train communication network>**

279 capabilities and features of a sub-system (e.g., a communication layer) provided to a user

280 [SOURCE: IEC 60050-811:2017, 811-37-93]

281 **3.1.48**
282 **system under consideration, <in a train communication network>**
283 collection of assets that are needed to provide and operate a railway application including any
284 relevant network infrastructure assets

285 Note 1 to entry: In a cyber security context as defined in IEC 62443-3-2:2017 [22], a system under consideration
286 consists of one or more zones and related conduits. All assets within a system under consideration belong to either
287 a zone or conduit.

288 **3.1.49**
289 **switch, <in a train communication network>**
290 MAC bridge as defined in IEEE 802.1Q

291 Note 1 to entry: MAC means "Medium Access Control", a sub-layer within the Link Layer ruling which device is
292 entitled to send on the bus.

293 [SOURCE: IEC 60050-811:2017, 811-37-101]

294 **topography**
295 data structure describing the nodes attached to the train backbone, including their address,
296 orientation, position and node descriptor

297 [SOURCE: IEC 60050-811:2017, 811-37-105]

298 **3.1.50**
299 **topology**
300 possible cable interconnection and number of devices in a given network

301 [SOURCE: IEC 60050-811:2017, 811-37-106]

302 **3.1.51**
303 **train**
304 combination of rolling stock coupled together

305 Note 1 to entry: Rolling stock includes banking locomotives.

306 [SOURCE: IEC 60050-811:2011, 811-01-08]

307 **3.1.52**
308 **train communication network**
309 data communication network for connecting programmable electronic equipment on-board rail
310 vehicles

311 [SOURCE: IEC 60050-811:2017, 811-37-108]

312 **3.1.53**
313 **train backbone, <in a train communication network>**
314 train bus

315 bus connecting the consists of a train, in particular the wire train bus, and which conforms to
316 the TCN

317 [SOURCE: IEC 60050-811:2017, 811-37-107]

318 **3.1.54**
319 **train backbone node, <in a train communication network>**
320 node

321 device on the train backbone that acts as a gateway between the train backbone and the consist
322 network

323 [SOURCE: IEC 60050-811:2017, 811-37-74]

- 324 **3.1.55**
 325 **train backbone node number**
 326 node address
 327 node number
- 328 unique number assigned to a node during train inauguration indicating the position of the train
 329 backbone node on the train backbone
- 330 Note 1 to entry: this number can be used as part of the train network address for addressing devices in the consist,
 331 the train backbone node belongs to, from any location in the train.
- 332 **3.1.56**
 333 **train composition**
 334 sequence, orientation and characteristics of consists which represent a train
- 335 **3.1.57**
 336 **train directory**
 337 data structure which describes the train composition and provides user information about the
 338 consists
- 339 **3.1.58 train inauguration**
 340 operation executed in case of train composition change, which gives all nodes of the train
 341 backbone their train backbone node number, their orientation and information about all named
 342 nodes on the same backbone, and which determines the actual train composition
- 343 **3.1.59**
 344 **train network address**
 345 dynamic network address, which is used to address communication devices in other consist
 346 networks
- 347 Note 1 to entry: this address can change after each train inauguration.
 348 [SOURCE: IEC 60050-811:2017, 811-37-109]
- 349 **3.1.60**
 350 **train network directory**
 351 data structure which describes the sequence of train backbone nodes, the sequence of consist
 352 networks and the orientation of the consists the nodes are located in.
- 353 **3.1.61**
 354 **transport layer**
 355 layer of the OSI model responsible for end-to-end flow control and error recovery
 356 [SOURCE: IEC 60050-811:2017, 811-37-113]
- 357 **3.1.62**
 358 **wireless access point**
 359 active network device, using a wireless network interface to offer access to the consist network
- 360 **3.1.63**
 361 **wireless end device**
 362 active end device, using a wireless network interface to exchange data within the consist
 363 network
- 364 **3.2 Abbreviations and acronyms**
 365 ALG Application Layer Gateway
 366 BER Bit Error Rate
 367 CAN Controller Area Network

368	CCN	CANOpen Consist Network
369	CCS	Command, Control and Signalling
370	CCU	Consist Control Unit
371	CLC	CENELEC European Committee for Electrotechnical Standardization
372	CN	Consist Network
373	COTS	Components Off The Shelf
374	CPS	Communication Protocol Stack
375	ECN	Ethernet Consist Network
376	ED	End Device
377	ETB	Ethernet Train Backbone
378	ETBN	Ethernet Train Backbone Node
379	GCG	Ground Communication Gateway
380	HFR	Hazardous Failure Rate
381	HVAC	Heat, Ventilation and Air Conditioning
382	IEEE	Institute of Electrical and Electronics Engineers
383	IETF	Internet Engineering Task Force
384	IP	Internet Protocols
385	IT	Information technology
386	LAN	Local Area Network
387	MAC	Medium Access Control
388	MCG	Mobile Communication Gateway
389	MVB	Multifunction Vehicle Bus
390	ND	Network Device
391	OMTN	OnBoard Multimedia and Telematic Network
392	OMTS	OnBoard Multimedia and Telematic Services
393	OSI	Open System Interconnection
394	OT	Operational Technology
395	PA	Public Address
396	PCP	Priority Code Point
397	QoS	Quality of Service
398	RFC	Request For Comments
399	RFID	Radio Frequency Identification
400	SuC	System under Consideration
401	SW	Software
402	TB	Train Backbone
403	TBN	Train Backbone Node
404	TC	Train Connectivity
405	TCMS	Train Control and Management System
406	TCN	Train Communication Network
407	TPN	Train Passenger Network
408	TPS	Train Passenger Services
409	UIC	International Union of Railways
410	URI	Uniform Resource Identifier

411	UML	Unified Modelling Language
412	VLAN	Virtual Local Area Network
413	WAP	Wireless Access Point
414	WED	Wireless End Device
415	WiFi	Wireless Fidelity
416	WLCN	Wireless Consist Network
417	WLTB	Wireless Train Backbone
418	WLTBN	Wireless Train Backbone Node
419	WTB	Wire Train Bus

420 **3.3 Conventions**

421 **3.3.1 Base of numeric values**

422 All numeric values use a decimal representation unless otherwise noted.

423 Binary and hexadecimal values are represented using the ASN.1 (ISO/IEC 8824-1:2021)
424 convention [17].

425 EXAMPLE Decimal 20 coded on 8 bits = '0001 0100'B = '14'H.

426 **3.3.2 Naming conventions**

427 Parameters are written with a capital letter at the beginning.

428 If the parameter name is composed, the different parts of the name are united without a space,
429 and all parts are beginning with a capital letter.

430 EXAMPLE "NumberOfConsists"

431 Function names are written with a lower-case letter at the beginning.

432 If the function name is composed, the different parts of the name are united without a space,
433 and all parts except the first part are beginning with a capital letter.

434 EXAMPLE "indicateTopoChange"

435 **3.3.3 State diagram conventions**

436 State diagrams are defined following the notation of UML state machines (ISO/IEC 19501:2005
437 [18]).

438 **4 Basic architecture**

439 **4.1 General**

440 This clause specifies the overall on-board IT/OT architecture and the hierarchical network
441 architecture of the train communication network together with the main characteristics of its
442 parts and the interfaces in between. Taking the cybersecurity aspects, detailed in clause 8 of
443 this document into account, the overall architecture defines general structures to allow
444 subsequent standardization steps to implement security mechanisms and enable railway duty
445 holders to select and implement solutions fulfilling their security requirements.

446 **4.2 High-Level Architectural Realms**

447 This clause defines the architectural split of the on-board IT and OT systems and functions.

Figure 1 outlines the various realms (coherent areas of common concern) related to the on-board systems and their communication relations. The figure also shows some wayside realms to provide a more complete overview, though the wayside is beyond the scope of this standard, except for the GCG, which is defined in part 2-6 of this standard series.

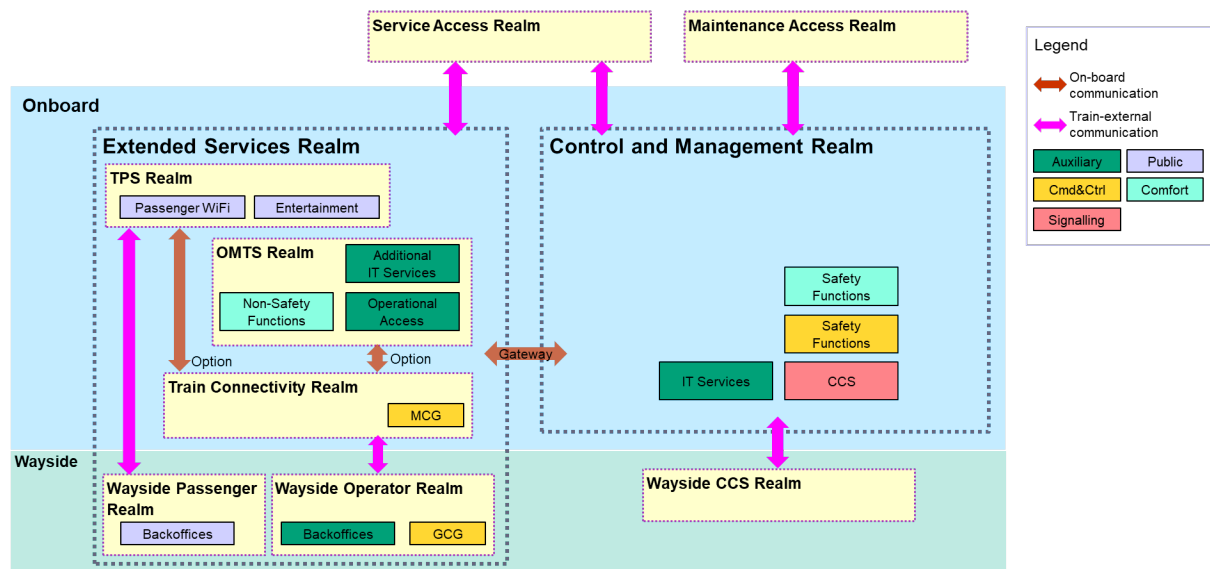


Figure 1 – Architectural Realms

The "Control and Management Realm" is strictly limited to train on-board aspects and comprises on-board safety functions, including TCMS and automatic train operation and protection (CCS), and the general IT services. Some examples for functions provided by the Control and Management Realm are traction, brake, external doors, exterior lighting, public address and audio intercom, operational interior lighting, certain safety-relevant function of the HVAC (comfort-related safety functions), train control functions including the HMI and basic IT services like diagnostics, SW management, authentication and authorisation, process data handling and others. A significant part of the services provided by this realm have at least some homologation relevance. The communication inside this realm and the functions of the gateway towards the other realms are subject to this standard series (IEC 61375).

The "Extended Services Realm" provides additional functions and services and expands to the wayside. To this end, it is split into several realms on its own. The Train Connectivity Realm provides the on-board service for managing the operational communication with the wayside, excluding Control-Command and Signalling (CCS)-related and train passenger related communication, which are not subject of this standard. The Mobile Communication Gateway (MCG) is defined in part 2-6 of this standard series. The OMTS realm provides non-safety relevant functions like passenger information, video surveillance, passenger counting, catering, toilets, ambient lighting, and others. In the OMTS realm, additional IT services may be present, complementing the IT services offered by the Control & Management Realm. Some OMTS functions may have homologation relevance. The TPS (train passenger services) realm comprises services accessible directly by the passengers like passenger WiFi or entertainment systems. Those services often feature their own connectivity to the wayside but may also use the services provided by the Train Connectivity Realm. OMTS and TPS services and functions are subject of the IEC 62580 standard series [15].

On-board services from both the Control and Management as well as from the Extended Services Realm may have supporting/controlling functions in the Wayside Operator Realm not being in the scope of this standard.

Note that the various realms do not necessarily resemble cybersecurity zone. IEC 62443-3-2:2020 defines principles for defining such zones. A realm can comprise one or more zones. However, a zone shall not span across multiple realms. Communication spanning across realms