



**SLOVENSKI STANDARD**  
**oSIST prEN IEC 62290-3:2023**

**01-junij-2023**

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**Železniške naprave - Komandno-kontrolni sistemi za upravljanje urbanega prometa - 3. del: Specifikacija sistemskih zahtev**

Railway applications - Urban guided transport management and command/control systems - Part 3: System requirements specification

Bahnanwendungen - Betriebsleit- und Zugsicherungssysteme für den städtischen schienengebundenen Personennahverkehr - Teil 3: Systembezogene Anforderungsspezifikation

Applications ferroviaires - Systèmes de contrôle/commande et de gestion des transports guidés urbains - Partie 3: Spécification des exigences système

**Ta slovenski standard je istoveten z: prEN IEC 62290-3:2023**

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**ICS:**

45.060.01      Železniška vozila na splošno      Railway rolling stock in general

**oSIST prEN IEC 62290-3:2023**

**en**





9/2948/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TC 9 : ELECTRICAL EQUIPMENT AND SYSTEMS FOR RAILWAYS

SECRETARIAT:

France

SECRETARY:

Mr Denis MIGLIANICO

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:

Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

 EMC ENVIRONMENT QUALITY ASSURANCE SAFETY SUBMITTED FOR CENELEC PARALLEL VOTING NOT 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.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of

- any relevant patent rights of which they are aware and to provide supporting documentation,
- any relevant "in some countries" clauses to be included should this proposal proceed. Recipients are reminded that the enquiry stage is the final stage for submitting "in some countries" clauses. See AC/22/2007.

TITLE:

**Railway applications - Urban guided transport management and command/control systems - Part 3: System requirements specification**

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

## CONTENTS

|  |     |
|--|-----|
| FOREWORD.....  | 4   |
| INTRODUCTION.....  | 5   |
| 1 Scope.....   | 8   |
| 2 Normative references .....   | 8   |
| 3 Terms, definitions and abbreviated terms .....   | 8   |
| 3.1 Terms and definitions.....   | 9   |
| 3.2 Abbreviated terms.....   | 9   |
| 4 UGTMS system architecture and non-functional requirements .....                                    | 10  |
| 4.1 Overall system architecture.....   | 10  |
| 4.2 Hypotheses for UGTMS architecture .....  | 11  |
| 4.3 General description of UGTMS subsystems .....  | 12  |
| 4.3.1 General .....  | 12  |
| 4.3.2 UGTMS Wayside Subsystem (WS) .....   | 12  |
| 4.3.3 UGTMS Onboard Subsystem (OBS) .....  | 12  |
| 4.3.4 UGTMS Spot Transmission Subsystem (SPTS) .....   | 12  |
| 4.3.5 UGTMS Data Communication Subsystem (DCS).....  | 12  |
| 4.3.6 UGTMS Operation Control Subsystem (OCS) .....  | 13  |
| 4.4 External equipment in the UGTMS environment.....   | 13  |
| 4.4.1 General .....  | 13  |
| 4.4.2 Infrastructure related equipment (INF) .....   | 13  |
| 4.4.3 Trackside signalling related equipment (TSE) .....   | 13  |
| 4.4.4 Station related equipment (SE).....  | 13  |
| 4.4.5 External interlocking related equipment (EIXL) .....   | 14  |
| 4.4.6 Traction power control system related equipment (TPCS).....                                    | 14  |
| 4.4.7 Maintenance system related equipment (MS).....   | 14  |
| 4.4.8 Operations control HMI related equipment (OHMI).....   | 14  |
| 4.4.9 Operation planning system related equipment (OPS).....   | 15  |
| 4.4.10 Voice communication system related equipment (VCS) .....                                      | 15  |
| 4.4.11 CCTV surveillance system related equipment (CSS).....   | 15  |
| 4.4.12 Passenger information system related equipment (PIS) .....                                    | 15  |
| 4.4.13 Train related equipment (TR).....   | 15  |
| 4.4.14 Train HMI related equipment (THMI).....   | 16  |
| 5 UGTMS rail network description .....   | 17  |
| 5.1 General.....   | 17  |
| 5.2 Line section .....   | 17  |
| 5.3 Track segment .....  | 18  |
| 5.4 Connecting rules between track segments .....  | 18  |
| 5.5 Structure and content of the configuration data related to the rail network<br>description ..... | 19  |
| 6 Requirement allocation and description .....   | 20  |
| 6.1 Functional and non-functional requirement allocation to UGTMS subsystems .....                   | 20  |
| 6.1.1 General principles .....   | 20  |
| 6.1.2 Allocation of functional requirements from IEC 62290-2:2014 .....                              | 23  |
| 6.2 Summary of allocated functions and subfunctions from IEC 62290-2:2014 .....                      | 267 |
| 6.3 Identification of interfaces for the UGTMS subsystems .....                                      | 273 |

|          |   |     |
|----------|---|-----|
| 6.3.1    | General .....   | 273 |
| 6.3.2    | Identification of interfaces between UGTMS subsystems .....                   | 273 |
| 6.3.3    | Interfaces between UGTMS subsystems and the environment .....                 | 280 |
|          |   |     |
| Figure 1 | – The three-step process followed by the UGTMS standard .....                 | 7   |
| Figure 2 | – UGTMS system environment (as defined in IEC 62290-1) .....                  | 10  |
| Figure 3 | – UGTMS system architecture, external systems and external interfaces .....   | 11  |
| Figure 4 | – UGTMS concept of line section .....   | 17  |
| Figure 5 | – UGTMS track segment definition .....  | 18  |
| Figure 6 | – UGTMS track segment chaining .....  | 19  |
| Figure 7 | – Example for the description of 6.1.2 .....                                  | 21  |
|          |   |     |
| Table 1  | – Summary of allocated functions and subfunctions from IEC 62290-2:2014 ..... | 267 |
| Table 2  | – Identification of interfaces between UGTMS subsystems .....                 | 274 |
| Table 3  | – Interfaces between UGTMS subsystems and the environment.....                | 280 |

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN IEC 62290-3:2023](https://standards.iteh.ai/catalog/standards/sist/931d673f-ba28-42ed-aef2-cc502671c8bc/osist-pren-iec-62290-3-2023)

<https://standards.iteh.ai/catalog/standards/sist/931d673f-ba28-42ed-aef2-cc502671c8bc/osist-pren-iec-62290-3-2023>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**RAILWAY APPLICATIONS –  
URBAN GUIDED TRANSPORT MANAGEMENT  
AND COMMAND/CONTROL SYSTEMS –****Part 3: System requirements specification**

## FOREWORD

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- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62290-3 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This second edition cancels and replaces the first edition issued in 2019. It constitutes a technical revision.

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

- the last maintenance of IEC 62290-1 is taken into account, in particular the changes made for describing the external environment of UGTMS,
- the last maintenance of IEC 62290-2 is taken into account, as IEC 62290-3 is using the requirements defined in the latter. Therefore the document reflects the deleted

functions and requirements in IEC 62290-2, and also the new functions and requirements

The text of this International Standard is based on the following documents:

|             |                  |
|-------------|------------------|
| FDIS        | Report on voting |
| 9/XXXX/FDIS | 9/XXXX/RVD       |

Full information on the voting for the approval of this International 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 62290 series, under the general title *Railway applications – Urban guided transport management and command/control systems*, 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 62290 standard series specifies the functional, system and interface requirements for the  
3 command, control, and management systems intended to be used on urban, guided  
4 passenger transport lines and networks. This series does not apply to lines that are operated  
5 under specific railway regulations, unless otherwise specified by the authority having  
6 jurisdiction.

7 These systems are designated herein as Urban Guided Transport Management and  
8 Command/Control Systems (UGTMS). UGTMS cover a wide range of operations needs from  
9 non-automated (GOA1) to unattended (GOA4) operation. A line may be equipped with  
10 UGTMS on its full length or only partly equipped.

11 This series does not specifically address security issues. However, aspects of safety  
12 requirements may apply to ensuring security within the urban guided transit system.

13 The main objective of this series is to achieve interoperability, interchangeability and  
14 compatibility.

15 This series is a recommendation for those transport authorities wishing to introduce  
16 interoperable, interchangeable and compatible equipment.

17 It is the responsibility of the transport authority concerned in accordance with the authority  
18 having jurisdiction to decide on how to apply this series and to take into account their  
19 particular needs.

20 IEC 62290 series is also intended to support applications for upgrading existing signalling and  
21 command control systems. In this case, interchangeability and compatibility could be ensured  
22 only for the additional UGTMS equipment. Checking the possibility for upgrading existing  
23 equipment and the level of interoperability is the responsibility of the transport authority  
24 concerned.

25 Application of the series should take into account the differences between the various  
26 networks operated in different nations. Those differences include operational and regulatory  
27 requirements as well as different safety cultures.

28 This series defines a catalogue of UGTMS requirements split into mandatory and optional  
29 functions. The functions used are based on the given grade of automation. Most of the  
30 functions characterized as mandatory are to be considered with no condition. Some specific  
31 functions have a condition to be mandatory (this condition being generally related to the use  
32 of an external equipment by UGTMS). By fulfilling the requirements, a supplier can create one  
33 or more generic applications including all mandatory functions and all or a subset of optional  
34 functions. A generic application will achieve interoperability within the defined specific  
35 application conditions. Customising a generic application will create a specific application  
36 taking into account of local conditions such as track layout and headway requirements. It is  
37 the choice of supplier and transport authority to add additional functions to a generic or  
38 specific application. These additional functions are not described in this series.

39 According to IEC 62278, it is the responsibility of the transport authority, in agreement with  
40 the authority having jurisdiction, to decide, taking into account their risk acceptance principles  
41 to conduct specific hazard and risk analysis for each specific application. The safety levels for  
42 the functions of each specific application have to be determined by a specific risk analysis.

43 Terms like "safety related command", "safety conditions", "safe station departure" are  
44 mentioned without having performed any hazard analysis.

45 Standard series IEC 62290 is intended to consist of four parts:

- 46 • Part 1 "System principles and fundamental concepts" provides an introduction to the  
47 standard and deals with the main concepts, the system definition, the principles and  
48 the basic functions of UGTMS (Urban Guided Transport Management and  
49 Command/Control Systems).

50 The three other parts correspond to the three steps (see Figure 1) required in the process of  
51 specifying UGTMS and are to be used accordingly.

- 52 • Part 2 "Functional requirements specification" specifies the functional requirements  
53 associated to the basic functions provided by Part 1, within the system boundaries and  
54 interfaces as defined in Figure 3 of Part 1.

55 The FRS (Functional Requirements Specification) identifies and defines the functions  
56 that are necessary to operate an urban guided transport system. Two types of  
57 functions are distinguished for a given grade of automation: mandatory functions (e.g.  
58 train detection) and optional functions (e.g. manage stabling). Requirements of  
59 functions have the same allocation, unless they are marked otherwise.

- 60 • Part 3 "System requirements specifications" deals with the architecture of the system  
61 and the allocation of the requirements and functions identified in Part 2 to UGTMS  
62 equipment.

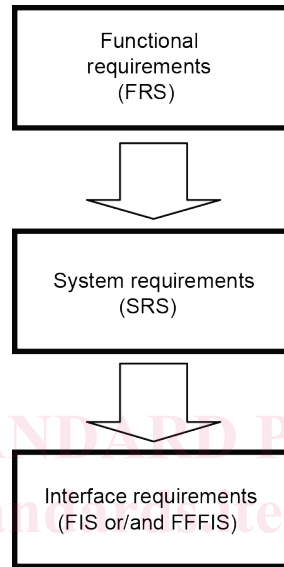
63 The SRS (System Requirement Specification) specifies the architecture of a UGTMS  
64 system, with mandatory and optional UGTMS equipment.



- 65 • Part 4 (under consideration) “Interface specifications” deals with the definition of the  
66 interfaces, as well as the data exchanged by them (FIS and FFFIS), for the  
67 interoperable and interchangeable UGTMS equipment identified in Part 3.

68 For interfaces between UGTMS equipment, the logical interface or FIS (Functional  
69 Interface Specification) and/or the physical and logical interface or FFFIS (Form Fit  
70 Functional Interface Specification) will be considered.

71 NOTE The specific structure of Part 4 will be established to accommodate optional and mandatory UGTMS  
72 equipment, and to reflect local conditions. In principle, only one FIS or/and FFFIS will be defined for the same  
73 interface. However, when justified in some cases, several FISs or several FFFISs will be defined for the same  
74 interface.



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75 **Figure 1 – The three-step process followed by the UGTMS standard**

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77 Requirements are those necessary to fulfil all operational needs for safe and orderly operation  
78 requested by transport authorities without regard to technical solutions.

79 The chosen level of detail in describing requirements enables customers as well as authorities  
80 having jurisdiction to be assured that generic applications delivered by different suppliers will  
81 cover at least the same functionality as specified in this document.

82 Requirements which are established by this series are indicated clearly with a requirement  
83 identification number related to the function to be covered.

84

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93

# RAILWAY APPLICATIONS – URBAN GUIDED TRANSPORT MANAGEMENT AND COMMAND/CONTROL SYSTEMS –

## Part 3: System requirements specification

94

### 1 Scope

95 This document specifies the system architecture for Urban Guided Transport Management  
96 and Command/Control systems (UGTMS) as defined in IEC 62290-1 and IEC 62290-2, and  
97 the allocation of functions and requirements defined in IEC 62290-2 to the different UGTMS  
98 subsystems (designated as system constituents in IEC 62290-1 and IEC 62290-2), for use in  
99 urban guided passenger transport lines and networks.

100 This document is applicable for new lines or for upgrading existing signalling and command  
101 control systems.

102 This document is applicable to applications using:

- 103
- continuous data transmission
  - continuous supervision of train movements by train protection profile
  - localisation by onboard UGTMS equipment (reporting trains), and optionally by  
106 external wayside (and optionally onboard) device

107 The functional allocations of the UGTMS subsystems are mandatory (forming a sort of core  
108 system) or optional, according to the mandatory/optional functions and requirements defined  
109 in IEC 62290-2.

110 This document is applicable as a basis to define FIS and FFFIS. For specific applications,  
111 some elements may be added to meet the requirements coming from additional functions or  
112 equipment.

113

### 2 Normative references

114 The following documents are referred to in the text in such a way that some or all of their  
115 content constitutes requirements of this document. For dated references, only the edition  
116 cited applies. For undated references, the latest edition of the referenced document (including  
117 any amendments) applies.

118 IEC 62290-1:2014, *Railway applications – Urban guided transport management and*  
119 *command/control systems – Part 1: System principles and fundamental concepts*

120 IEC 62290-2:2014, *Railway applications – Urban guided transport management and*  
121 *command/control systems – Part 2: Functional requirements specification*

122

### 3 Terms, definitions and abbreviated terms

123 For the purposes of this document, the terms and definitions given in IEC 62290-1 and the  
124 following apply.

125 ISO and IEC maintain terminological databases for use in standardization at the following  
126 addresses:

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

### 129 3.1 Terms and definitions

130

#### 131 3.1.1

##### 132 run type

133 predefined speed profile which is managed at OCS level (energy saving profile, minimum run  
 134 time, etc.)

135

### 136 3.2 Abbreviated terms

|     |             |                                    |
|-----|-------------|------------------------------------|
| 137 | <b>CSS</b>  | CCTV Surveillance System           |
| 138 | <b>DCS</b>  | UGTMS Data Communication Subsystem |
| 139 | <b>EB</b>   | Emergency Braking                  |
| 140 | <b>EIXL</b> | External Interlocking              |
| 141 | <b>FCN</b>  | Function                           |
| 142 | <b>HVCB</b> | High Voltage Circuit Breaker       |
| 143 | <b>INF</b>  | Infrastructure                     |
| 144 | <b>MS</b>   | Maintenance System                 |
| 145 | <b>OBS</b>  | UGTMS Onboard Subsystem            |
| 146 | <b>OCS</b>  | UGTMS Operations Control Subsystem |
| 147 | <b>OHMI</b> | Operations Control HMI             |
| 148 | <b>OPS</b>  | Operation Planning System          |
| 149 | <b>PIS</b>  | Passenger Information System       |
| 150 | <b>REQ</b>  | Requirement                        |
| 151 | <b>SE</b>   | Station Equipment                  |
| 152 | <b>SPTS</b> | UGTMS Spot Transmission Subsystem  |
| 153 | <b>THMI</b> | Train HMI                          |
| 154 | <b>TPCS</b> | Traction Power Control System      |
| 155 | <b>TR</b>   | Train (but not its HMI)            |
| 156 | <b>TSE</b>  | Trackside Signalling Equipment     |
| 157 | <b>TSR</b>  | Temporary Speed Restriction        |
| 158 | <b>VCS</b>  | Voice Communication System         |
| 159 | <b>WS</b>   | UGTMS Wayside Subsystem            |
| 160 | <b>ZOP</b>  | Zone of Protection                 |

161

162

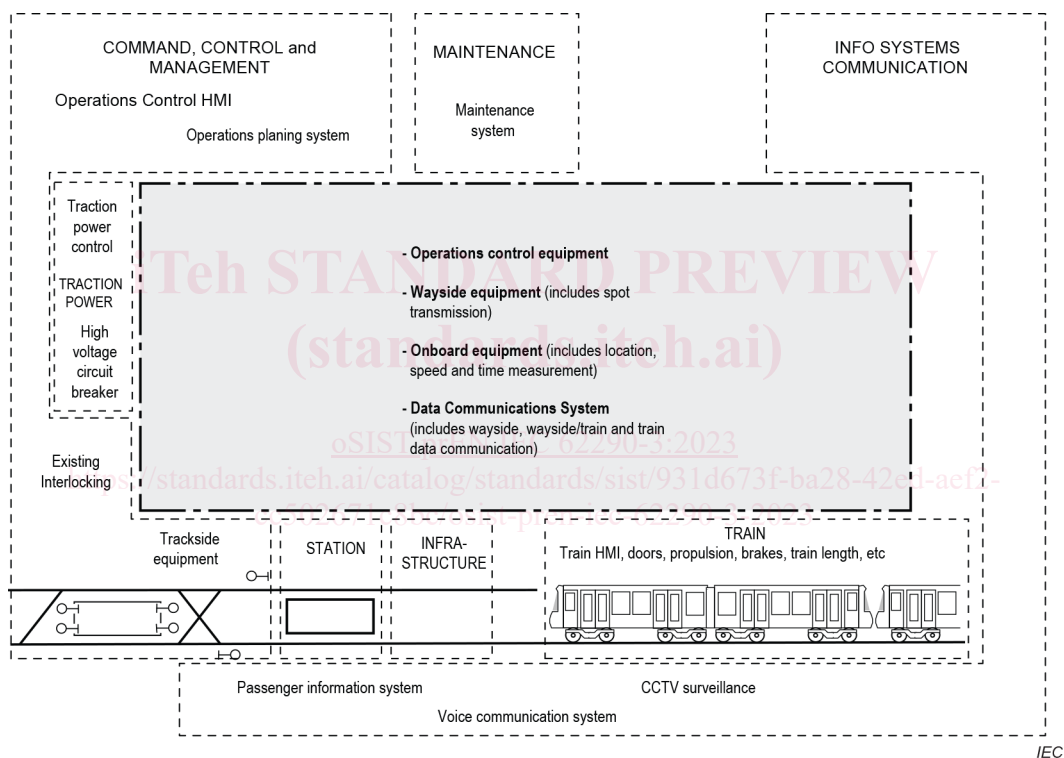
## 163 4 UGTMS system architecture and non-functional requirements

### 164 4.1 Overall system architecture

165 This clause provides the general description of UGTMS architecture, the list of UGTMS  
166 subsystems, the identification of interfaces between UGTMS subsystems, and between  
167 UGTMS subsystems and the environment.

168 Non-functional requirements (like the ones related to performance) are described as well, in  
169 addition to the main choices made in this document and having an impact on architecture.

170 Figure 2 and Figure 3 describe the UGTMS System architecture in consistency with the  
171 environment described in IEC 62290-1:2014, and highlighting external interfaces with this  
172 environment, and internal interfaces between UGTMS equipment.



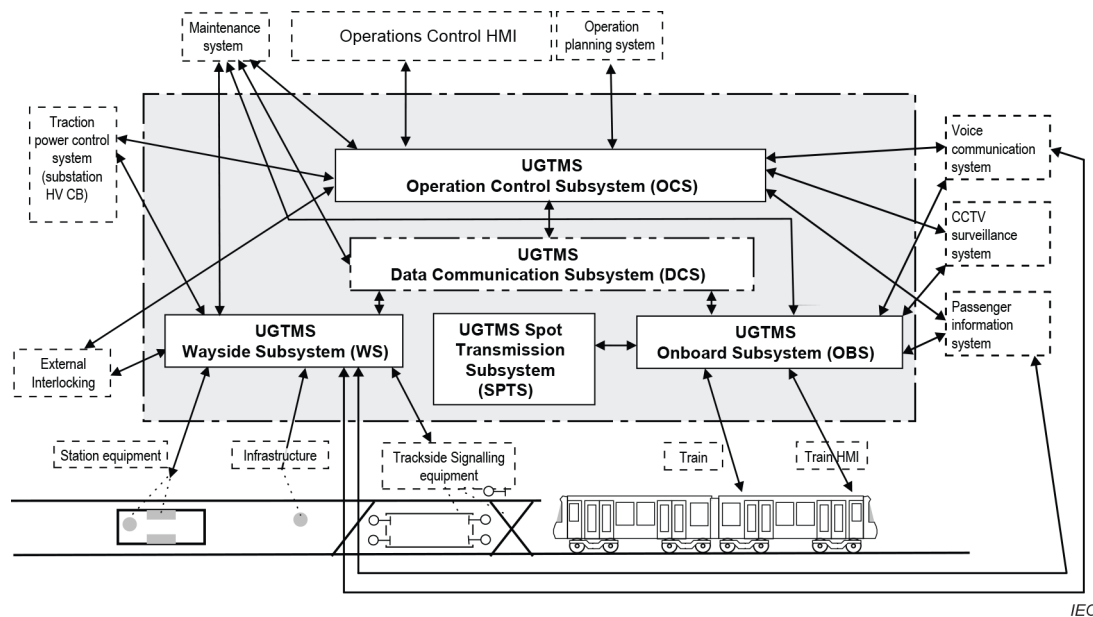
173

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174 **Figure 2 – UGTMS system environment (as defined in IEC 62290-1)**

175 In the rest of the document, following an architecture decision (as shown in Figure 3), the  
176 Spot Transmission subsystem is considered as an independent UGTMS subsystem.

177



178

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179 **Figure 3 – UGTMS system architecture, external systems and external interfaces**

180 It has to be noted that Figure 3 does not represent all the flows through the DCS subsystem,  
 181 in order to keep it readable. The direct flows through the DCS existing possibly between  
 182 external equipment and a UGTMS subsystem are described in subclauses 4.4, in 6.1 and 6.3.

183 It has to be noted as well that the allocation work done in Clause 6 has permitted the  
 184 identification of potential communication links for external equipment through the DCS, but  
 185 the document does not cover all of these communication links.

186 Hypotheses [H1], [H2] and [H3] in 4.2 have been applied for the determination of this system  
 187 architecture.

## 188 4.2 Hypotheses for UGTMS architecture

189 This subclause describes the major choices identified in the standard and having an impact  
 190 on architecture, and that result from the allocation done in 6.1, and in 6.2.

191 While Figure 3 is an architecture prepared to achieve the allocation of functions and  
 192 requirements defined in IEC 62290-2:2014, some allocating works are difficult on this system  
 193 breakdown structure level of the figure. The following hypotheses complement the  
 194 representation of architecture to complete the allocations (tag with “H” is added to each item  
 195 in preparation to link related descriptions):

196 [H1] It is assumed that the external OHMI is connected to the UGTMS subsystems via the  
 197 OCS. As an option, according to the decided allocation for requirements from  
 198 IEC 62290-2:2014, the connection can be done directly through the DCS.

199 [H2] It is assumed that the external Train HMI is directly connected to the OBS. As an option,  
 200 it could be through the DCS

201 [H3] The architecture and the related allocation considered in this document is the one of the  
 202 current state of the art which involves both WS and OBS (different approaches induced  
 203 by technology evolution could be considered in the future maintenance of this  
 204 document, such as for instance an architecture which allocates a maximum of functions  
 205 to OBS)

206 [H4] The duty roster, if any, is considered to be included in the Operation Planning System.

## 207 **4.3 General description of UGTMS subsystems**

### 208 **4.3.1 General**

209 As shown on Figure 3, UGTMS system is split into five subsystems:

- 210 – the UGTMS Wayside Subsystem
- 211 – the UGTMS Onboard Subsystem
- 212 – the UGTMS Spot Transmission Subsystem
- 213 – the UGTMS Data Communication Subsystem
- 214 – the UGTMS Operation Control Subsystem

### 215 **4.3.2 UGTMS Wayside Subsystem (WS)**

216 The UGTMS Wayside Subsystem consists of UGTMS wayside equipment not related to the  
217 Spot Transmission Subsystem.

218 The equipment included in the UGTMS Wayside Subsystem is able to perform the following  
219 main functions:

- 220 – ensures safe route through interlocking related functions, or an interface with an external  
221 interlocking,
- 222 – ensures the safe separation of trains, for instance through the determination of movement  
223 authority to be sent to trains, or contribution to it, and based on train locations,
- 224 – ensures the management of inputs/outputs to interface with trackside signalling equipment  
225 (such as points, signals, etc.) or platform door control systems.

### 226 **4.3.3 UGTMS Onboard Subsystem (OBS)**

227 The UGTMS Onboard Subsystem consists of UGTMS onboard equipment not related to the  
228 Spot Transmission Subsystem.

229 The equipment included in the UGTMS Onboard Subsystem performs the following main  
230 functions (depending on the GOA):

- 231 – determines the train location,
- 232 – ensures that the train proceeds safely in accordance with its movement authority and  
233 permitted speed,
- 234 – drives and controls the train automatically,
- 235 – interfaces with the Spot Transmission Subsystem

### 236 **4.3.4 UGTMS Spot Transmission Subsystem (SPTS)**

237 The UGTMS Spot Transmission Subsystem includes transponders or equivalent located at  
238 wayside, an antenna for transmitting information, and a receiver located onboard.

239 The UGTMS Spot Transmission Subsystem performs synchronisation of train location.

### 240 **4.3.5 UGTMS Data Communication Subsystem (DCS)**

241 The UGTMS Data Communication Subsystem provides data communication within UGTMS.

242 It can be used as well for exchanges between UGTMS subsystems and external systems.

243 It is made up of a wayside related part, the Wayside Data Communication Network, an  
244 onboard part, the Onboard Data Communication Network, and the Radio Data Communication  
245 Network making the connection between these two parts.

246 The Onboard Data Communication Network interconnects the UGTMS Onboard equipment  
247 within a train. Another possible configuration might be for instance to connect a UGTMS  
248 Onboard Subsystem and a neighbouring subsystem, in the case of two trains coupled and  
249 equipped with UGTMS equipment.

250 The Radio Data Communication Network provides a radio link between UGTMS Wayside  
251 equipment and UGTMS Onboard subsystem.

#### 252 **4.3.6 UGTMS Operation Control Subsystem (OCS)**

253 The UGTMS Operation Control Subsystem provides control and monitoring facilities to  
254 supervise the traffic and other subsystems.

255 The Operations Control Human Machine Interface (OHMI) is out of UGTMS scope.

### 256 **4.4 External equipment in the UGTMS environment**

#### 257 **4.4.1 General**

258 These external devices as shown on Figure 3 have been defined accordingly with Figure 3 of  
259 IEC 62290-1:2014.

#### 260 **4.4.2 Infrastructure related equipment (INF)**

261 The infrastructure related equipment covers:

- 262 – the track and related detectors (intrusion detection systems along the track, wayside  
263 obstacle detection, broken rail detection),
- 264 – devices used as staff protection purposes (e.g. plungers for switching off the power),
- 265 – the tunnel ventilation,
- 266 – fire and smoke detectors deployed in tunnels or along the track,
- 267 – washing machines,
- 268 – flood gates or blasting doors,
- 269 – emergency exits.

#### 270 **4.4.3 Trackside signalling related equipment (TSE)**

271 The concerned devices are those installed along the track, and that are in relation with  
272 signalling.

273 This covers:

- 274 – points, signals, track circuits and any other train detection devices like axle counters,
- 275 – equipment for displaying train hold information,
- 276 – equipment for displaying wayside obstacle information,
- 277 – equipment for displaying working zone information,
- 278 – equipment for displaying station departure authorization,
- 279 – and equipment for initiating the unattended turnback.

#### 280 **4.4.4 Station related equipment (SE)**

281 The concerned devices are those installed in stations.

282 The devices that are covered by this category are:

- 283 – fire detection/protection systems deployed in stations,