

# INTERNATIONAL STANDARD

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

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



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Partie 3: Spécification des exigences système**

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## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	9
2 Normative references .....	9
3 Terms, definitions and abbreviated terms .....	10
3.1 Terms and definitions.....	10
3.2 Abbreviated terms.....	10
4 UGTMS system architecture and non-functional requirements .....	12
4.1 Overall system architecture.....	12
4.2 General description of UGTMS subsystems .....	13
4.2.1 General .....	13
4.2.2 UGTMS Wayside Subsystem (WS) .....	13
4.2.3 UGTMS Onboard Subsystem (OBS) .....	14
4.2.4 UGTMS Spot Transmission Subsystem (SPTS) .....	14
4.2.5 UGTMS Data Communication Subsystem (DCS).....	14
4.2.6 UGTMS Operation Control Subsystem (OCS) .....	14
4.3 External equipment in the UGTMS environment.....	15
4.3.1 General.....	15
4.3.2 Infrastructure related equipment (INF) .....	15
4.3.3 Trackside signalling related equipment (TSE).....	15
4.3.4 Station related equipment (SE).....	15
4.3.5 External interlocking related equipment (EIXL) .....	16
4.3.6 Traction Power control system related equipment (TPCS).....	16
4.3.7 Wayside voice communication related equipment (WVC).....	16
4.3.8 Wayside CCTV surveillance related equipment (WCS).....	16
4.3.9 Wayside passenger information related equipment (WPI) .....	16
4.3.10 Maintenance system related equipment (MS).....	16
4.3.11 Operations Control HMI related equipment (OHMI).....	16
4.3.12 Operation planning system related equipment (OPS).....	17
4.3.13 Central voice communication related equipment (CVC).....	17
4.3.14 Central CCTV surveillance related equipment (CCS) .....	17
4.3.15 Central passenger information related equipment (CPI).....	17
4.3.16 Train related equipment (TR).....	17
4.3.17 Train HMI related equipment (THMI).....	17
4.3.18 Onboard voice communication related equipment (OBVC) .....	18
4.3.19 Onboard CCTV surveillance related equipment (OBCS).....	18
4.3.20 Onboard passenger information related equipment (OBPI) .....	18
4.4 Hypotheses for UGTMS architecture .....	18
5 UGTMS rail network description .....	19
5.1 General.....	19
5.2 Line section .....	19
5.3 Track segment .....	20
5.4 Connecting rules between track segments .....	20
5.5 Structure and content of the configuration data related to the rail network description .....	21
6 Requirement allocation and description .....	22

6.1	Functional and non-functional requirement allocation to UGTMS subsystems .....	22
6.1.1	General principles .....	22
6.1.2	Allocation of functional requirements from IEC 62290-2:2014 .....	24
6.2	Summary of allocated functions and subfunctions from IEC 62290-2:2014 .....	252
6.3	Identification of interfaces for the UGTMS subsystems .....	259
6.3.1	General .....	259
6.3.2	Identification of interfaces between UGTMS subsystems .....	259
6.3.3	Interfaces between UGTMS subsystems and the environment .....	265
Figure 1	– The three-step process followed by the UGTMS standard .....	7
Figure 2	– UGTMS system environment (as defined in IEC 62290-1) .....	12
Figure 3	– UGTMS system architecture, external systems and external interfaces .....	13
Figure 4	– UGTMS concept of line section .....	19
Figure 5	– UGTMS track segment definition .....	20
Figure 6	– UGTMS track segment chaining .....	21
Figure 7	– Example for the description of 6.1.2 .....	23
Table 1	– Summary of allocated functions and subfunctions from IEC 62290-2:2014 .....	252
Table 2	– Identification of interfaces between UGTMS subsystems .....	259
Table 3	– Interfaces between UGTMS subsystems and the environment .....	265

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

**Part 3: System requirements specification**

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FDIS	Report on voting
9/2531/FDIS	9/2544/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

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## INTRODUCTION

IEC 62290 standard series specifies the functional, system and interface requirements for the command, control, and management systems intended to be used on urban, guided passenger transport lines and networks. This series does not apply to lines that are operated under specific railway regulations, unless otherwise specified by the authority having jurisdiction.

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

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

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

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

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

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

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

This series defines a catalogue of UGTMS requirements split into mandatory and optional functions. The functions used are based on the given grade of automation. By fulfilling the requirements, a supplier can create one or more generic applications including all mandatory functions and all or a subset of optional functions. A generic application will achieve interoperability within the defined specific application conditions. Customising a generic application will create a specific application taking into account of local conditions such as track layout and headway requirements. It is the choice of supplier and transport authority to add additional functions to a generic or specific application. These additional functions are not described in this series.

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

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



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

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

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

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

The FRS (Functional Requirements Specification) identifies and defines the functions that are necessary to operate an urban guided transport system. Two types of functions are distinguished for a given grade of automation: mandatory functions (e.g. train detection) and optional functions (e.g. interfaces to passenger information and passenger surveillance systems). Requirements of functions have the same allocation, unless they are marked otherwise.

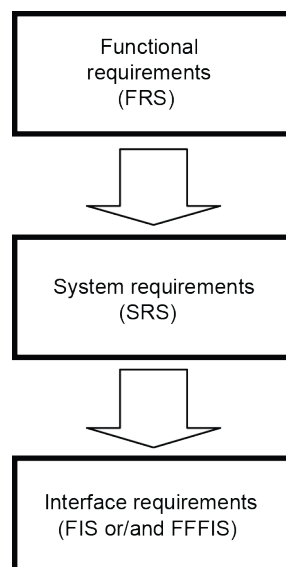
- Part 3 “System requirements specifications” deals with the architecture of the system and the allocation of the requirements and functions identified in Part 2 to architecture constituents.

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

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

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

NOTE The specific structures of Part 3 and Part 4 will be established following completion of Part 2 to accommodate optional and mandatory constituents, and to reflect local conditions. In principle, only one FIS or/and FFFIS will be defined for the same interface. However, when justified in some cases, several FISs or several FFFISs will be defined for the same interface.



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

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

The chosen level of detail in describing requirements enables customers as well as authorities having jurisdiction to be assured that generic applications delivered by different suppliers will cover at least the same functionality as specified in this part of IEC 62290.

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

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

## Part 3: System requirements specification

### 1 Scope

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

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

This document is applicable to applications using:

- continuous data transmission
- continuous supervision of train movements by train protection profile
- localisation by reporting trains, and optionally by external wayside equipment for non-reporting ones (e.g. in case of mixed operation or degraded operation)

This document is not applicable to existing command and control systems or projects in progress prior to the effective date of this document.

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

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

### 2 Normative references

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

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

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

### 3 Terms, definitions and abbreviated terms

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

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

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

#### 3.1 Terms and definitions

##### 3.1.1

##### **train consist**

basic train units coupled together, which can be split or coupled depending on operation needs

Note 1 to entry: When maintenance of IEC 62290-2:2014 is done, requirements in IEC 62290-2 will not use the expression “train consists” any more, in order to be consistent with the meaning of “consist” in the latest edition of IEC 60050-811:2017. IEC 62290-3 will not use as a consequence the expression “train consist” any more.

##### 3.1.2

##### **dwelt time**

time during which a train is berthed in a station served by the mission

##### 3.1.3

##### **headway**

minimum time interval between consecutive trains allowed by the signalling system

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Note 1 to entry: This definition comes from IEC 60050-821:2017, and is given for the term ‘signal headway’. In the rest of this document, only the term ‘headway’ is used.

[SOURCE: IEC 60050-821:2017, 821-02-54]

##### 3.1.4

##### **rollaway**

unintended movement of the train in either a forward or reverse direction

##### 3.1.5

##### **run type**

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

##### 3.1.6

##### **safety-related command**

operator triggered command whose execution has an impact on safety

#### 3.2 Abbreviated terms

<b>CCS</b>	Central CCTV Surveillance
<b>CPI</b>	Central Passenger Information
<b>CVC</b>	Central Voice Communication
<b>DCS</b>	UGTMS Data Communication Subsystem
<b>EB</b>	Emergency Braking
<b>EIXL</b>	External Interlocking
<b>FCN</b>	Function

<b>HVCB</b>	High Voltage Circuit Breaker
<b>INF</b>	Infrastructure
<b>MS</b>	Maintenance System
<b>OBCS</b>	Onboard CCTV Surveillance
<b>OBPI</b>	Onboard Passenger Information
<b>OBS</b>	UGTMS Onboard Subsystem
<b>OBVC</b>	Onboard Voice Communication
<b>OCS</b>	UGTMS Operations Control Subsystem
<b>OHMI</b>	Operations Control HMI
<b>OPS</b>	Operation Planning System
<b>PSD</b>	Platform Screen Door
<b>REQ</b>	Requirement
<b>SE</b>	Station Equipment
<b>SPTS</b>	UGTMS Spot Transmission Subsystem
<b>THMI</b>	Train HMI
<b>TPCS</b>	Traction Power Control System
<b>TR</b>	Train (but not its HMI)
<b>TSE</b>	Trackside Signalling Equipment
<b>TSR</b>	Temporary Speed Restriction
<b>WCS</b>	Wayside CCTV surveillance
<b>WPI</b>	Wayside Passenger Information
<b>WS</b>	UGTMS Wayside Subsystem
<b>WVC</b>	Wayside Voice Communication
<b>ZOP</b>	Zone of Protection

## 4 UGTMS system architecture and non-functional requirements

### 4.1 Overall system architecture

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

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

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

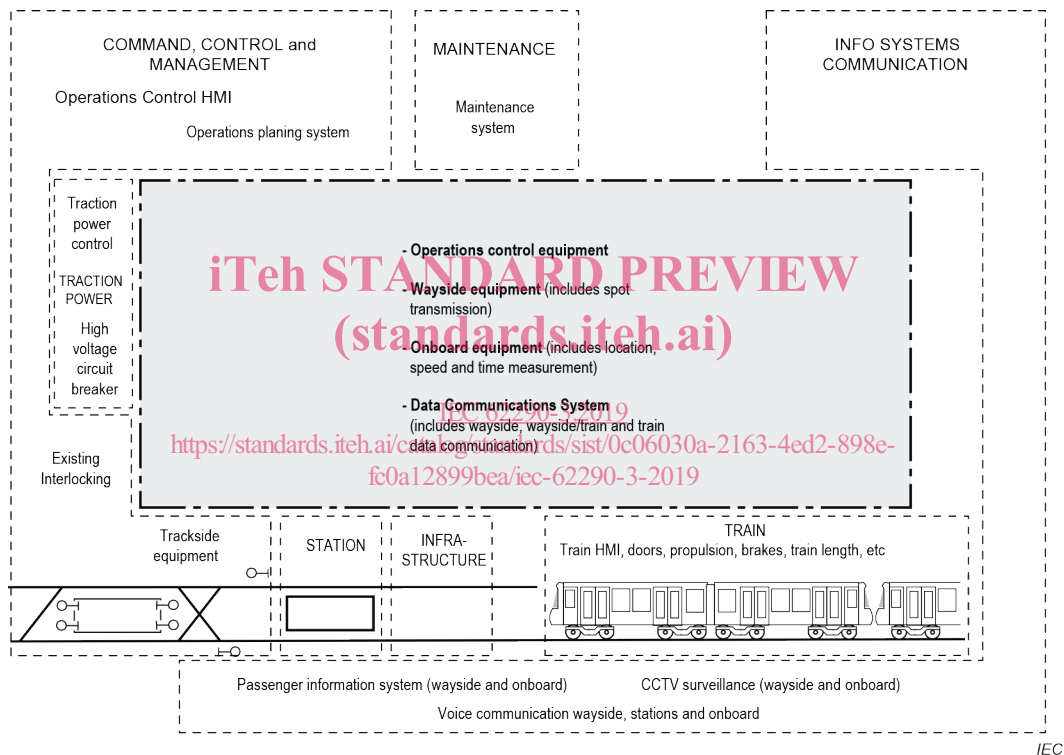
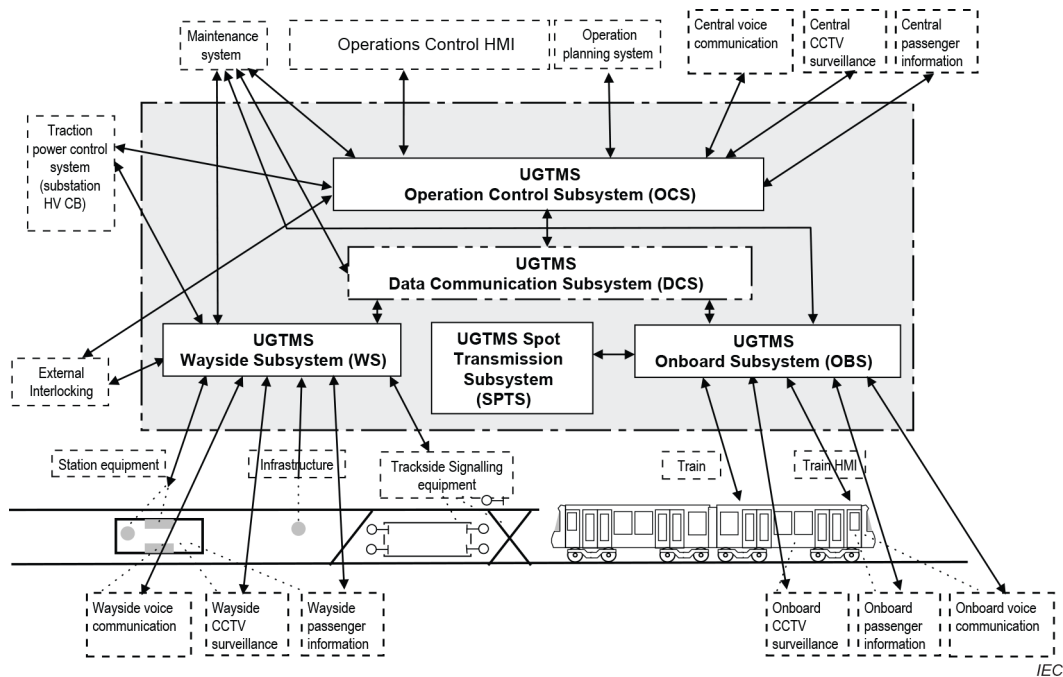


Figure 2 – UGTMS system environment (as defined in IEC 62290-1)

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



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

It has to be noted that Figure 3 does not represent all the flows through the DCS subsystem, in order to keep it readable. The direct flows through the DCS existing possibly between external equipment and a UGTMS subsystem are described in detail in 4.3, in 6.1 and the corresponding subclauses of 6.3.

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It has to be noted as well that the allocation work done in Clause 6 has permitted to identify the situations of direct link for external equipment through the DCS, but the document does not cover all possible direct links through the DCS.

## 4.2 General description of UGTMS subsystems

### 4.2.1 General

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

- the UGTMS Wayside Subsystem
- the UGTMS Onboard Subsystem
- the UGTMS Spot Transmission Subsystem
- the UGTMS Data Communication Subsystem
- the UGTMS Operation Control Subsystem

### 4.2.2 UGTMS Wayside Subsystem (WS)

The UGTMS Wayside Subsystem corresponds to the UGTMS equipment located in technical rooms.

A part of the equipment making the UGTMS Wayside Subsystem is able to manage trains on a portion or the whole line.