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Electronic railway equipment – Train communication network (TCN) – Part 2-6: On-board to ground communication

Matériel électronique ferroviaire – Réseau embarqué de train (TCN) – Partie 2-6: Communication train-sol

IEC 61375-2-6:2018-05(en-fr)

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRONIC RAILWAY EQUIPMENT – TRAIN COMMUNICATION NETWORK (TCN) –

Part 2-6: On-board to ground communication

FOREWORD

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International Standard IEC 61375-2-6 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

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

FDIS	Report on voting
9/2374/FDIS	9/2402/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 document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61375 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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INTRODUCTION

Considering that the TCN series includes IEC 61375-2-3*: Electronic railway equipment – Train communication network (TCN) – Part 2-3: TCN communication profile*, references to this document are given when the case applies.

This document follows the ISO-OSI model.

This document does not cover the specification of the radio technologies and protocols relevant to the wireless communication between train and ground.

In the preparation of this document, the following main use cases, which the train to ground communication applies to, were considered:

a) Commissioning application
   1) Operational Application.
   2) Mission data application.
   3) Driver Assistance Application.
   4) Energy Meter Application.
b) Maintenance application
   1) Configuration data application.
   2) Monitoring train status (e.g. telemetry).
   3) Diagnostic data application.
   4) Event Recorder Application.
c) Multimedia application
   1) Passenger information application.
   2) Passenger entertainment application.
   3) Electronic ticketing application.
   4) CCTV and video-surveillance.

ELECTRONIC RAILWAY EQUIPMENT – TRAIN COMMUNICATION NETWORK (TCN) –

Part 2-6: On-board to ground communication

1 Scope

This part of IEC 61375 establishes the specification for the communication between the on-board subsystems and the ground subsystems.

The communication system, interfaces and protocols are specified as a mobile communication function, using any available wireless technology.

This document provides requirements in order to:

a) select the wireless network on the basis of QoS parameters requested by the application;
b) allow TCMS and/or OMTS applications, installed on-board and communicating on the on-board communication network, to have a remote access to applications running on ground installations;
c) allow applications running on ground installations to have a remote access to the TCMS and/or OMTS applications installed on-board.

This document specifies further requirements which allow the applications running on-board and the applications running on ground to connect each other applying the virtual/functional addressing mechanism specified by IEC 61375-2-3 and exchanging application data sets produced or consumed by the on-board functions implemented in the devices attached to the TCN network.

Furthermore, this document covers the security requirements in order to grant the access only to authenticated and authorised applications and to allow encryption of exchanged data.

The communication of safety related data between on-board applications and ground applications are out of the scope of this International Standard as well as Internet connectivity service for passengers.

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 61375-1:2012, *Electronic railway equipment – Train communication network (TCN) – Part 1: General architecture*

IEC 61375-2-3:2015, *Electronic railway equipment – Train communication network (TCN) – Part 2-3: TCN communication profile*

IEC 61375-3-4, *Electronic railway equipment – Train communication network (TCN) – Part 3-4: Ethernet Consist Network (ECN)*

IEC 62280, *Railway applications – Communication, signalling and processing systems – Safety related communication in transmission systems*

IEC 62443 (all parts), *Industrial communication networks – Network and system security*

IEC 62443-3-3, *Industrial communication networks – Network and system security – Part 3-3: System security requirements and security levels*

IEC 62580-1, *Electronic railway equipment – On-board multimedia and telematic subsystems for railways – Part 1: General architecture*

ISO/IEC 20922:2016, *Information technology – Message Queuing Telemetry Transport (MQTT) v3.1.1*

IEEE 802.3, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access*

IEEE 802.11:2016, *IEEE Standard for Information technology – Telecommunications and information exchange between systems Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*

IEEE 802.1X:2010, *IEEE Standard for Local and metropolitan area networks – Port-Based Network Access Control*

RFC 2136, *Dynamic Updates in the Domain Name System (DNS UPDATE)*

RFC 2616, *Hypertext Transfer Protocol – HTTP/1.1*

RFC 2818, *HTTP Over TLS*

RFC 3986, *Uniform Resource Identifier (URI): Generic Syntax*

RFC 4627, *The application/json Media Type for JavaScript Object Notation (JSON)*

RFC 7159, *The JavaScript Object Notation (JSON) Data Interchange Format*

3 Terms, definitions, symbols, abbreviated terms and conventions

3.1 Terms and definitions

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

3.1.1
Authentication Authorization Accounting
access control, policy enforcement and auditing framework for computing systems

3.1.2
Authentication Authorization Accounting service
security architecture for distributed systems, which enables control over which users are allowed access to which services, and how much of the resources they have used

3.1.3
Application Layer
upper layer in the OSI model, interfacing directly to the Application

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

3.1.4
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]

3.1.5
Bit Error Rate
rate of bit errors in a data stream, mainly caused by noise (random bit errors), but also caused by memory defects in data storing devices (systematic bit errors)

3.1.6
bridge
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]

3.1.7
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]

3.1.8
bus
functional unit for the transfer of data between several participants, these being functional units for data processing, via a common transmission path, wherein participants are not involved in the transfer of data between other participants

Note 1 to entry: The logic and functional definition of a bus applies independently of the topological configuration and physical implementation of the bus. A bus may have a line or a ring configuration.

Note 2 to entry: In some cases, transmission rights are distributed by another participant, for example by a bus arbitrator.

[SOURCE: IEC 60050-351:2013, 351-56-10]

3.1.9
closed train
train composed of one or a set of consists, where the composition does not change during normal operation

EXAMPLE Metro, suburban 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]