

TECHNICAL SPECIFICATION



Electronic railway equipment – Train communication network (TCN) –
Part 2-4: TCN application profile

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IEC TS 61375-2-4:2017

<https://standards.iteh.ai/catalog/standards/sist/74849719-752e-4a83-927f-db79cf342460/iec-ts-61375-2-4-2017>



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRONIC RAILWAY EQUIPMENT –
TRAIN COMMUNICATION NETWORK (TCN) –****Part 2-4: TCN application profile**

FOREWORD

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 61375-2-4, which is a technical specification, has been prepared by IEC technical committee 9: Electrical equipment and systems for railways, in collaboration with UIC.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
9/2093/DTS	9/2150A/RVC

Full information on the voting for the approval of this technical specification 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 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 publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

IEC TS 61375-2-4 defines the application profiles of the Train Communication Network in order to achieve communication between software applications throughout consist networks defined in IEC 61375-1 and the train backbone defined in IEC 61375-2-5.

This part of IEC 61375 defines the requirements for the applications communicating via the data transmission equipment of the consists throughout the consist networks and the train backbones.

The purpose of this part of IEC 61375 is to:

- fully document the communication requirements for all train applications, align them and set them out in standard form,
- provide guidelines for the technical solution of communication between software applications residing on the same or on different consists, which are part of a train, and which are connected to the consist networks and the train backbones in scope,
- define train applications for certain functionalities, which are in scope of this part of IEC 61375.

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ELECTRONIC RAILWAY EQUIPMENT – TRAIN COMMUNICATION NETWORK (TCN) –

Part 2-4: TCN application profile

1 Scope

This part of IEC 61375 applies to the applications in trains, i.e. it covers the application profile for functions belonging to the Train Control and Monitoring System (TCMS). The application profile is based on the TCN communication system for the data communication between consists of the said trains. This document provides for a data interface with parameters and addressing of TCMS functions based on the communication profile laid out in IEC 61375-2-3.

This document is applicable in rolling stock requiring interoperable coupling and uncoupling. This part of IEC 61375 may be additionally applicable to closed trains and multiple unit trains when so agreed between purchaser and supplier.

The applicability of this part of IEC 61375 to the train communication network technologies as defined allows for interoperability of individual consists within trains.

The data communication systems inside consists are not covered by this document and are given only as example 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.

[IEC TS 61375-2-4:2017](https://standards.iteh.ai/catalog/standards/sist/71849719-7531-483-0076/iec-ts-61375-2-4-2017)

Special backup functions, which are used in cases when the train backbone is in a degraded condition are not in the scope of this document.

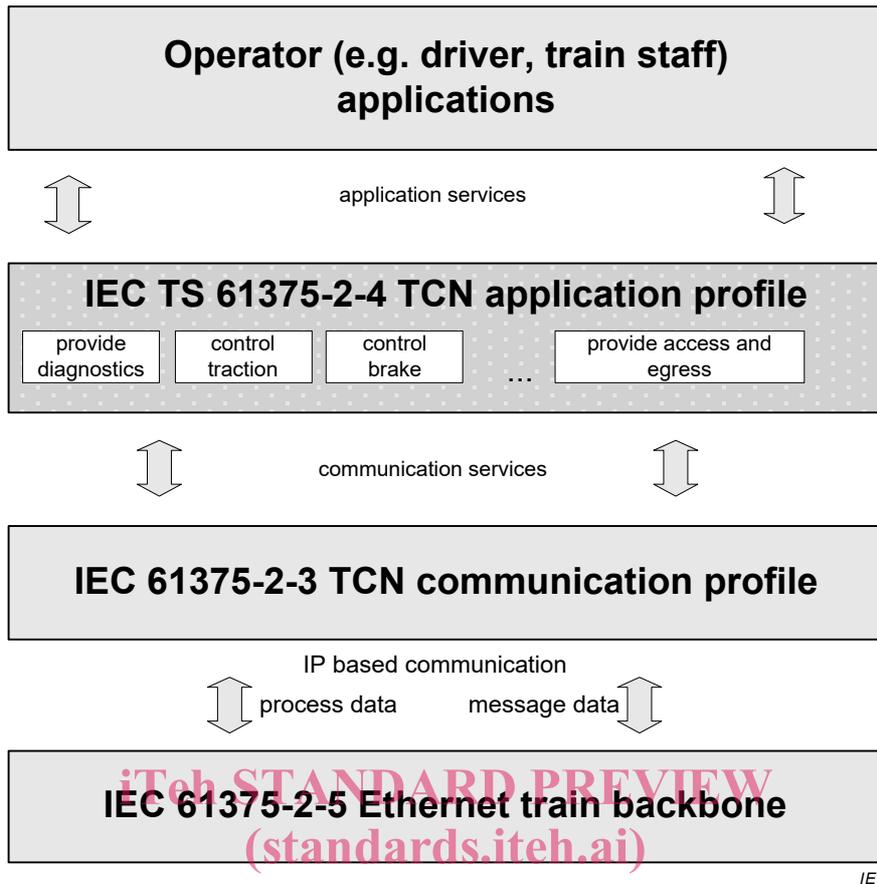


Figure 1 – IEC TS 61375-2-4 as a link between the functions and the applications

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As illustrated in Figure 1 the purpose of this part of IEC 61375 is to create a general model that describes in a functional way the remote control of TCMS functions like “provide access and egress”. This document makes direct reference to IEC 61375-2-3, which covers data transmission on the Ethernet train backbone (ETB) and specifies the functions between the consists concerned (e.g. locomotives, multiple units and driving trailers) including the rules to set up the necessary data telegrams for transmission and process.

This document specifies the application profiles covering the train functions to:

- a) provide access and egress;
- b) control traction;
- c) control brake;
- d) provide diagnostics.

NOTE Functions b) to d) will be covered in a future revision of this document.

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

IEC 61375-2-1, *Electronic railway equipment – Train communication network (TCN) – Part 2-1: Wire Train Bus (WTB)*

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

3 Terms, definitions, abbreviated terms, acronyms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61375-1 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>

3.1.1

all doors of consist CLOSED

each single door of the consist is closed

Note 1 to entry: This state is side selective.

3.1.2

all doors of consist LOCKED

each single door of the consist is locked

Note 1 to entry: This state is side selective.

3.1.3

all doors of train CLOSED

all doors of each consist are closed

Note 1 to entry: This state is side selective.

3.1.4

all doors of train LOCKED

all doors of each consist are locked

Note 1 to entry: This state is side selective.

3.1.5

application profile

defined standardized set of services or functions offered to the application processes for information exchange with specified data formats and data processing

3.1.6

CLOSE

action to juxtapose the door to its frame, to obstruct an entrance or opening

3.1.7

consist FAILURE

the consist is defined in failure state when the consist DCU control function or communication is in failure

Note 1 to entry: Failure detection may be realized by self-diagnostic of the consist DCU or by function supervision of consist DCU by the train DCU (e.g. process data sink time supervision).

3.1.8

door ATTENDED

single door which remains active and open after the crew manipulator associated with it (e.g. square key) has remotely commanded all the other doors of the train to close

3.1.9

door CLOSED

the door is defined closed when the door is adjacent to its frame and the mechanical locking device is not in effect, making possible the mechanical opening of the door itself

Note 1 to entry: In this condition it is possible to move the door electrically or pneumatically.

3.1.10

door OUT OF ORDER

when at least one of the following conditions applies:

- a) the link to the remote control is failing;
- b) the door cannot be controlled locally

3.1.11

door ISOLATED

when it is closed and mechanically locked by means of the appropriate mechanical closure device

Note 1 to entry: In this condition the door is permanently closed and locked and it cannot be moved in any way.

Note 2 to entry: In this condition the internal emergency handle and the outside one have no effect on the opening of the door.

3.1.12

ISOLATE door

to close and mechanically lock the door and leave the door unable to execute any operation command

Note 1 to entry: ISOLATE door uses mechanical methods in case of door malfunction. For example the door isolation device is located on the door leaf, it is accessible from inside and /or outside via a square (or triangular) key lock.

3.1.13

door LOCKED

the door is defined locked when the physical door is adjacent to its frame and the mechanical locking device is in effect, making it impossible to open the door mechanically

Note 1 to entry: In this condition it is impossible to move the door physically.

3.1.14

door OPENED

the door is defined as opened when it is not adjacent to its frame and the entrance is not blocked

Note 1 to entry: In this condition it is ready to accept a closing command.

3.1.15

driving trailer

vehicle with a driving cab at least at one end of the vehicle from which the traction and braking functions of a train can be controlled

3.1.16

functional address

unique identification for a function

3.1.17**leading vehicle**

vehicle, which is elected by a communication service of IEC 61375-2-3 and which controls the movements of the train

3.1.18**locomotive**

motor vehicle, not forming part of a train-unit and not carrying a payload, intended to move other vehicles

[SOURCE: IEC 60050-811:2017, 811-02-06]

3.1.19**OPEN**

action to move the physical door and create an entrance

3.1.20**passenger coach**

passenger carrying vehicle without its own propulsion system

3.1.21**shoegear**

train equipment to transfer electric current from the third rail

Note 1 to entry: It is usually mounted on bogies.

3.1.22**traction unit**

vehicle with its own power equipment [IEC TS 61375-2-4:2017](#)

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3.1.23**vehicle**

single item of rolling stock

Note 1 to entry: Examples of a single item of rolling stock include a locomotive, a coach and a wagon.

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

3.2 Abbreviated terms and acronyms

ASC	Automatic Speed Control
ASN.1	Abstract Syntax Notation 1
DAC	Driver Activity Control
DB	Deutsche Bahn (German Railways)
DCU	Door Control Unit
DDU	Driver Display Unit
DMU	Diesel Multiple Unit
ED	End Device
EMU	Electric Multiple Unit
ENUM	Enumeration
ETB	Ethernet Train Backbone
ETCS	European Train Control System
FI	Function Interface
HMI	Human Machine Interface