

INTERNATIONAL STANDARD

IEC 61375-1

Second edition
2007-04

**Electric railway equipment –
Train bus –**

**Part 1:
Train communication network**

Withhold.com



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC RAILWAY EQUIPMENT – TRAIN BUS –

Part 1: Train communication network

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61375-1 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This second edition cancels and replaces the first edition published in 1999 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- technical amendments concern Clauses 2, 3 and 4. Some inconsistencies between clauses have been solved, some parameters and values have been changed according to the suggestion of the experts of National Committees involved in the application of the standard;
- the pre-emphasis has been introduced for the MVB transmitted signal;

- Annex B has been superseded by IEC 61375-2.

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

FDIS	Report on voting
9/1013/FDIS	9/1033/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.

The following items are to be taken into consideration:

- in France the needs of data communication between equipment in vehicles and between vehicles are dealt with using products covered by other standards or technical specifications (many trains introduced in the last 10 years are equipped with data communication systems; care has been taken to make use as much as possible of different relevant industrial standards) incompatible with the provisions of this standard and making it inapplicable in that country;
- for instance, in modern rolling stock recently commissioned in France, technical specifications for train communication networks comply with IEC 61158-2 and EN 50170, which are the field bus international standards. On the other hand, token-passing bus access method has been used in technical specifications for data communication networks for the latest generation of high speed trains;
- in China, for closed trains and multiple units, the technical specifications of a train communication network may be based on an agreement between user and manufacturer alternatively to this standard.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

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

INTRODUCTION

This part of IEC 61375 defines interfaces so as to achieve plug-in compatibility:

- a) between equipment located in different vehicles, and
- b) between equipment located within the same vehicle.

This standard defines these interfaces as connections to a data communication network, called the Train Communication Network (TCN).

The TCN has a hierarchical structure with two levels of busses, a Train Bus and a Vehicle Bus:

- a) for interconnecting vehicles in Open Trains (see definition) such as international UIC trains, this standard specifies a Train Bus called the Wire Train Bus (WTB);
- b) for connecting standard on-board equipment, this standard specifies a Vehicle Bus called the Multifunction Vehicle Bus (MVB).

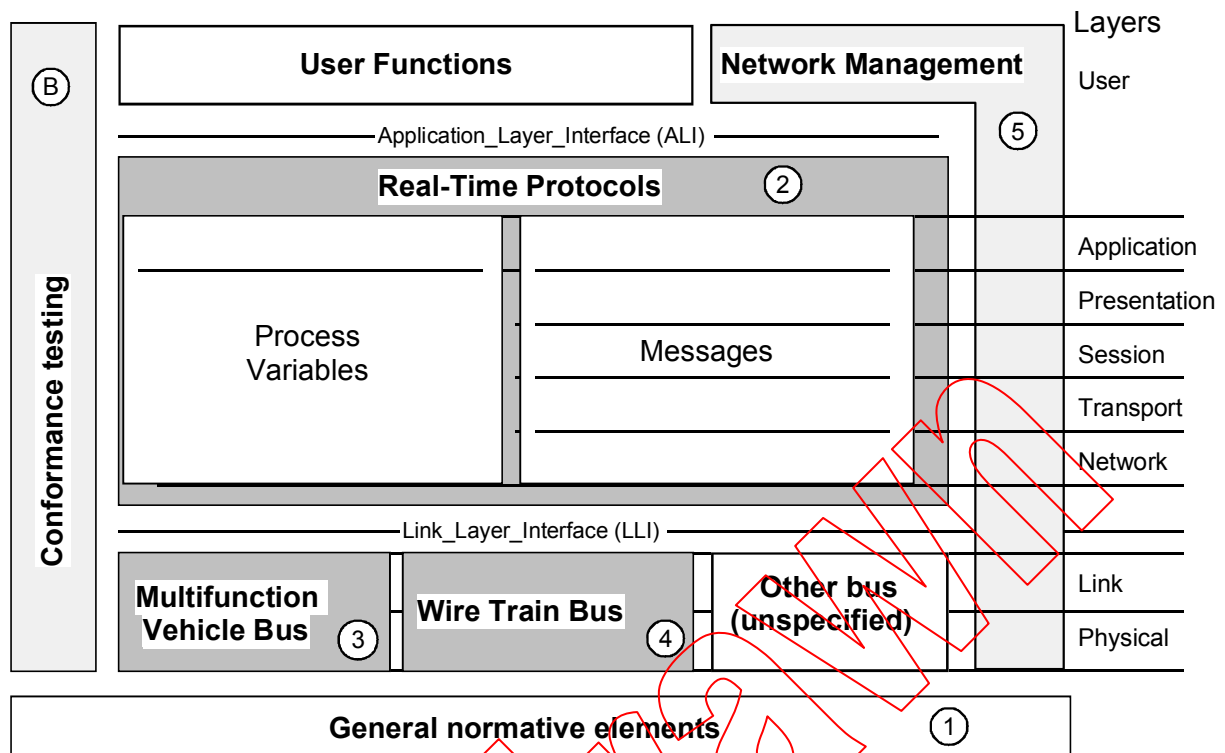
In the TCN architecture, all busses share the same Real-Time Protocols, which offer two communication services:

- a) Process Variables, a distributed, real-time database, periodically refreshed through broadcasting;
- b) messages, transmitted on demand either as:
 - unicast messages (point-to-point) or/and
 - multicast messages.

All busses in the TCN share a common Network Management, which allows debugging, commissioning and maintenance over the network.

Guidelines for conformance testing are included in this standard.

The TCN is structured similarly to the Open System Interconnection model defined in ISO/IEC 7498-1 (see Figure 1).



NOTE The circled numbers refer to the clauses and annexes of this standard.

Figure 1 – Layering of the TCN

This standard has been, for editorial reasons, divided into five clauses and two annexes:

Clause 1: General,

- Definitions and informative overview;

Clause 2: Real-Time Protocols,

- Variables: Link Layer Interface and Application Layer Interface;
- Messages: Link Layer Interface, Protocols, Application Layer Interface;
- Data Representation;

Clause 3: Multifunction Vehicle Bus,

- Physical Layer, Link Layer and Link Layer Management;

Clause 4: Wire Train Bus,

- Physical Layer, Link Layer and Link Layer Management;

Clause 5: Train Network Management,

- Configuration, supervision and control of the network;

Annex A: Tutorial on the Train Communication Network

Annex B: Guidelines for Conformance Test.

ELECTRIC RAILWAY EQUIPMENT – TRAIN BUS –

Part 1: Train communication network

1 General

1.1 Scope

This part of IEC 61375 applies to data communication in Open Trains, i.e. it covers data communication between vehicles of the said open trains and data communication within the vehicles of the said open trains.

The applicability of this standard to the train communication bus (WTB) allows for interoperability of individual vehicles within Open Trains in international traffic. The data communication bus inside vehicles (MVB) is given as recommended solution to cope with the said TCN. In any case, proof of compatibility between WTB and a proposed vehicle bus will have to be brought by the supplier.

This standard 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 1.3.

NOTE 2 Road vehicles such as buses and trolley buses are not considered in this standard.

1.2 Normative references

The following referenced documents are indispensable for the application 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 60096-1: *Radio-frequency cables – Part 1: General requirements and measuring methods*

IEC 60245-1: *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60304: *Standard colours for insulation for low-frequency cables and wires*

IEC 60332-1-1: *Tests on electric and optical fibre cables under fire conditions – Part 1-1: Test for vertical flame propagation for a single insulated wire or cable – Apparatus*

IEC 60571: *Electronic equipment used on rail vehicles*

IEC 60794-1-1: *Optical fibre cables – Part 1-1: Generic specification – General*

IEC 60807 (all parts): *Rectangular connectors for frequencies below 3 MHz*

IEC 60870-5-1: *Telecontrol equipment and systems. Part 5: Transmission protocols - Section One: Transmission frame formats*

IEC 60874-10-1: *Connectors for optical fibres and cables – Part 10-1: Detail specification for fibre optic connector type BFOC/2,5 terminated to multimode fibre type A1*

IEC 60874-10-2, *Connectors for optical fibre and cables – Part 10-2: Detail specification for fibre optic connector BFOC/2,5 terminated to single-mode fibre type B1*

IEC 60874-10-3, *Connectors for optical fibre and cables – Part 10-3: Detail specification for fibre optic connector BFOC/2,5 terminated to single and multimode fibre*

ISO/IEC 8482, *Information technology – Telecommunications and information exchange between systems – Twisted pair multipoint interconnections*

ISO/IEC 8802-2, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control*

ISO/IEC 8824 (all parts), *Information technology – Abstract Syntax Notation One (ASN.1)*

ISO/IEC 8825 (all parts), *Information technology – ASN.1 encoding rules*

ISO/IEC 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ISO/IEC 9646 (all parts), *Information technology – Open Systems Interconnection – Conformance testing methodology and framework*

ISO/IEC 10646, *Information Technology – Universal Multiple Octet Coded Character Set (UCS)*

ISO/IEC 13239, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures*

ITU-T Recommendation V24, *List of definitions for interchange circuits between data terminal equipment (DTE) and data-circuit terminating equipment (DCE)*

ITU-T Recommendation Z.100, *Specification and Description Language (SDL)*

UIC 556 ORE B 108.3 Fiche No. 556, *Information transmission in the train (train-bus)*

UIC 557, *Diagnostics on passenger rolling stock*

IEEE 754, *Standard for Binary Floating-Point Arithmetic*