

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



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

**Matériel électronique ferroviaire – Réseau embarqué de train (TCN) –  
Partie 3-4: Réseau Ethernet de Rame (ECN)**

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## INTRODUCTION

This part of IEC 61375 series of international standards specifies the Consist Network based on Ethernet technology, i.e. the Ethernet Consist Network (ECN) within the TCN architecture as defined in IEC 61375-1, and End Devices which can attach to the ECN. In addition gateway services between Train Backbone and ECN are specified.

The general architecture of the TCN (see IEC 61375-1) defines a hierarchical structure with two levels of networks, Train Backbone(s) and Consist Network(s). This hierarchical structure specifies Consist Networks based on different technologies such as MVB, CANopen and ECN interfacing one Train Backbone. ECNs based on different design and implementation may be interfaced to the same Train Backbone reaching the result that the Train Backbone ensures interoperability between Consist Networks with different implementations.

The common part, consisting of Clauses 1 to 4, defines requirements and specifications which are common to all ECN implementations and End Devices and gateways.

The common part defines

- the data communication interface of End Devices connected to the ECN,
- functions and services provided by the ECN to End Devices,
- the gateway functions for data transfer between Train Backbone and the ECN, and
- performances of the ECN.

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# ELECTRONIC RAILWAY EQUIPMENT – TRAIN COMMUNICATION NETWORK (TCN) –

## Part 3-4: Ethernet Consist Network (ECN)

### 1 Scope

This part of IEC 61375 specifies the data communication network inside a Consist based on Ethernet technology, the Ethernet Consist Network (ECN).

The applicability of this part of IEC 61375 to the Consist Network allows for interoperability of individual vehicles within Open Trains in international traffic.

This part of IEC 61375 may be additionally applicable to closed trains and Multiple Unit Trains when so agreed between purchaser and supplier.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61076-2-101, *Connectors for electronic equipment – Product requirements – Part 2-101: Circular connectors* – *Detail specification for M12 connectors with screw-locking*

IEC 61076-3-104, *Connectors for electronic equipment – Product requirements – Part 3-104: Detail specification for 8-way, shielded free and fixed connectors for data transmissions with frequencies up to 1 000 MHz*

IEC 61156-6, *Multicore and symmetrical pair/quad cables for digital communications – Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Work area wiring – Sectional specification*

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 61375-2-5, *Electronic railway equipment – Train Communication Network (TCN) – Part 2-5: Ethernet Train Backbone (ETB)*

IEC 62439 (all parts), *Industrial communication networks – High availability automation networks*

ISO/IEC 7498, *Information technology – Open Systems Interconnection (OSI) – The Basic reference model*

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

ISO/IEC 11801, *Information technology – Generic cabling for customer premises*

TIA/EIA-568-B, *Commercial Building Telecommunications Cabling Standard – Part 1: General Requirements (ANSI/TIA/EIA-568-B.1-2001)*

ANSI X3.263:1995, *EN-Information Technology - Fibre Distributed Data Interface (FDDI) - Token Ring Twisted Pair Physical Layer Medium Dependent (TP-PMD) (order number ANSI INCITS 263)*

IEEE 802.1D, *IEEE Standard for Local and metropolitan area networks – Media Access Control (MAC) Bridges*

IEEE 802.1Q, *IEEE Standard for Local and metropolitan area networks – Virtual Bridged Local Area Networks*

IEEE 802.3, *IEEE Standard for 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 method and physical layer specifications*

### 3 Terms, definitions, symbols, abbreviations 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.

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##### 3.1.1

##### **auto negotiation**

auto negotiation function allows two network devices on a point-to-point link to choose the best possible configuration; e.g. full/half duplex mode, transmission speed

<https://standards.iteh.ai/catalog/standards/sist/56cb304f-5486-4645-ace4-be49c8535148/iec-61375-3-4-2014>

##### 3.1.2

##### **auto polarity**

auto polarity function corrects the signal polarity automatically

##### 3.1.3

##### **crossover function**

crossover function connects the transmitter of PHY to the receiver of PHY at the end of point-to-point transmit-receive-pair link

##### 3.1.4

##### **full duplex mode**

full duplex mode allows both sending and receiving frames at a time between stations on a link

##### 3.1.5

##### **intra-car connection**

connection (link) between communication devices inside a car

##### 3.1.6

##### **inter-car connection**

connection (link) between communication devices at the interface between two cars excluding the interface between Consists

##### 3.1.7

##### **link layer**

layer in the OSI model establishing point-to-point and broadcast and multicast connections between devices attached to the logical communication channel consisting of one or more physical links