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Industrial communication networks - Fieldbus specifications - Part 4-25: Data-link layer protocol specification - Type 25 elements

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 09/19

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**Industrial communication networks - Fieldbus specifications -  
Part 4-25: Data-link layer protocol specification - Type 25  
elements  
(IEC 61158-4-25:2019)**

Réseaux de communication industriels - Spécifications des  
bus de terrain - Partie 4-25: Spécification du protocole de la  
couche liaison de données - Éléments de type 25  
(IEC 61158-4-25:2019)

Industrielle Kommunikationsnetze - Feldbusse - Teil 4-25:  
Protokollspezifikation des Data Link Layer  
(Sicherheitsschicht) - Typ 25-Elemente  
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**EN IEC 61158-4-25:2019 (E)****European foreword**

The text of document 65C/946/FDIS, future edition 1 of IEC 61158-4-25, prepared by SC 65C "Industrial networks" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61158-4-25:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-02-15
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-15

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IEC 61158-1:2019 NOTE Harmonized as EN IEC 61158-1:2019 (not modified)

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

| <u>Publication</u>          | <u>Year</u> | <u>Title</u>   | <u>EN/HD</u> | <u>Year</u> |
|-----------------------------|-------------|--|--------------|-------------|
| ISO/IEC 7498-1              | -           | Information technology - Open Systems-Interconnection - Basic reference model: The basic model                                 |              | -           |
| ISO/IEC 7498-3              | -           | Information technology - Open Systems-Interconnection - Basic reference model: Naming and addressing                           |              | -           |
| ISO/IEC 10731               | -           | Information technology - Open Systems-Interconnection - Basic Reference Model - Conventions for the definition of OSI services |              | -           |
| ISO/IEC/IEEE 8802-2017<br>3 |             | Standard for Ethernet  | -            | -           |
| IEEE Std 802.1D             | -           | IEEE Standard for Local and Metropolitan-Area Networks - Media access Control (MAC) Bridges                                    |              | -           |
| IEEE Std 802.1Q             | -           | IEEE Standard for Local and Metropolitan-Area Networks - Bridges and Bridged Networks  |              | -           |



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# **INTERNATIONAL STANDARD**

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**Industrial communication networks – Fieldbus specifications –  
Part 4-25: Data-link layer protocol specification – Type 25 elements**



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67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.



IEC 61158-4-25

Edition 1.0 2019-04

# INTERNATIONAL STANDARD

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**Industrial communication networks – Fieldbus specifications –  
Part 4-25: Data-link layer protocol specification – Type 25 elements**

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**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELDBUS SPECIFICATIONS –****Part 4-25: Data-link layer protocol specification –  
Type 25 elements**

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| FDIS         | Report on voting |
| 65C/946/FDIS | 65C/955/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 in the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

## INTRODUCTION

This document is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the “three-layer” fieldbus reference model described in IEC 61158-1.

The data-link protocol provides the data-link service by making use of the services available from the physical layer. The primary aim of this document is to provide a set of rules for communication expressed in terms of the procedures to be carried out by peer data-link entities (DLEs) at the time of communication. These rules for communication are intended to provide a sound basis for development in order to serve a variety of purposes:

- a) as a guide for implementers and designers;
- b) for use in the testing and procurement of equipment;
- c) as part of an agreement for the admittance of systems into the open systems environment;
- d) as a refinement to the understanding of time-critical communications within OSI.

This document is concerned, in particular, with the communication and interworking of sensors, effectors and other automation devices. By using this document together with other standards positioned within the OSI or fieldbus reference models, otherwise incompatible systems may work together in any combination.

**NOTE** Use of some of the associated protocol types is restricted by their intellectual-property-right holders. In all cases, the commitment to limited release of intellectual-property-rights made by the holders of those rights permits a particular data-link layer protocol type to be used with physical layer and application layer protocols in Type combinations as specified explicitly in the profile parts. Use of the various protocol types in other combinations may require permission from their respective intellectual-property-right holders.

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|                  |  |
|------------------|--|
| JP4074631 [HI]   | Transmission line system, frame transmitter therein, and transmission line switching method  |
| JP4653800 [HI]   | Transmission line system, frame transmission apparatus, method and program for switching transmission line in transmission line system |
| JP4944986 [HI]   | Transmission line system and transmission line construction method   |
| CN1964307 [HI]   | Transfer path system and frame transfer device in same system, transfer path handover method and system                                |
| CN101515887 [HI] | Transmission line system, frame transmitter therein, transmission line switching method and program                                    |

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## **INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –**

### **Part 4-25: Data-link layer protocol specification – Type 25 elements**

#### **1 Scope**

##### **1.1 General**

The data-link layer provides basic time-critical messaging communications between devices in an automation environment.

This protocol provides communication opportunities to all participating data-link entities

- a) in a synchronously-starting cyclic manner, according to a pre-established schedule, and
- b) in a cyclic or acyclic asynchronous manner, as requested each cycle by each of those data-link entities.

Thus this protocol can be characterized as one which provides cyclic and acyclic access asynchronously but with a synchronous restart of each cycle.

##### **1.2 Specifications**

This document specifies

- a) procedures for the timely transfer of data and control information from one data-link user entity to a peer user entity, and among the data-link entities forming the distributed datalink service provider;
- b) procedures for giving communications opportunities to all participating DL-entities, sequentially and in a cyclic manner for deterministic and synchronized transfer at cyclic intervals up to one millisecond;
- c) procedures for giving communication opportunities available for time-critical data transmission together with non-time-critical data transmission without prejudice to the time-critical data transmission;
- d) procedures for giving cyclic and acyclic communication opportunities for time-critical data transmission with prioritized access;
- e) procedures for giving communication opportunities based on ISO/IEC/IEEE 8802-3 medium access control, with provisions for nodes to be added or removed during normal operation;
- f) the structure of the fieldbus DLPDUs used for the transfer of data and control information by the protocol of this document, and their representation as physical interface data units.

##### **1.3 Procedures**

The procedures are defined in terms of

- a) the interactions between peer DL-entities (DLEs) through the exchange of fieldbus DLPDUs;
- b) the interactions between a DL-service (DLS) provider and a DLS-user in the same system through the exchange of DLS primitives;
- c) the interactions between a DLS-provider and a Ph-service provider in the same system through the exchange of Ph-service primitives.

## 1.4 Applicability

These procedures are applicable to instances of communication between systems which support time-critical communications services within the data-link layer of the OSI or fieldbus reference models, and which require the ability to interconnect in an open systems interconnection environment.

Profiles provide a simple multi-attribute means of summarizing an implementation's capability, and thus its applicability to various time-critical communications needs.

## 1.5 Conformance

This document also specifies conformance requirements for systems implementing these procedures. This document does not contain tests to demonstrate compliance with such requirements.

## 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.

NOTE All parts of the IEC 61158 series, as well as IEC 61784-1 and IEC 61784-2 are maintained simultaneously. Cross-references to these documents within the text therefore refer to the editions as dated in this list of normative references.

ISO/IEC 7498-1, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 7498-3, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing*

ISO/IEC/IEEE 8802-3:2017, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Standard for Ethernet*

ISO/IEC 10731, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

IEEE Std 802.1D, *IEEE Standard for Local and metropolitan area networks – Media access Control (MAC) Bridges*, available at <http://www.ieee.org> [viewed 2018-09-17]

IEEE Std 802.1Q, *IEEE Standard for Local and metropolitan area networks – Bridges and Bridged Networks*, available at <http://www.ieee.org> [viewed 2018-09-17]

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