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Standards

Irish Standard
I.S. EN 61158-4-12:2014

Industrial communication networks - Fieldbus specifications - Part 4-12: Data-link layer protocol specification - Type 12 elements

I.S. EN 61158-4-12:2014

Incorporating amendments/corrigenda/National Annexes issued since publication:

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**Industrial communication networks - Fieldbus specifications -
Part 4-12: Data-link layer protocol specification - Type 12
elements
(IEC 61158-4-12:2014)**

Réseaux de communication industriels - Spécifications des
bus de terrain - Partie 4-12: Spécification du protocole de la
couche liaison de données - Éléments de type 12
(CEI 61158-4-12:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 4-12:
Protokollspezifikation des Data Link Layer
(Sicherheitsschicht) - Typ 12-Elemente
(IEC 61158-4-12:2014)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 65C/762/FDIS, future edition 3 of IEC 61158-4-12, 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 61158-4-12:2014.

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) 2015-06-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-09-19

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In the official version, for bibliography, the following notes have to be added for the standards indicated:

IEC 61131-2	NOTE	Harmonised as EN 61131-2
IEC 61131-3	NOTE	Harmonised as EN 61131-3
IEC 61158-1:2014	NOTE	Harmonised as EN 61158-1:2014
IEC 61158-2:2014	NOTE	Harmonised as EN 61158-2:2014
IEC 61158-5-12:2014	NOTE	Harmonised as EN 61158-5-12:2014
IEC 61158-6-12	NOTE	Harmonised as EN 61158-6-12
IEC 61784-1	NOTE	Harmonised as EN 61784-1
IEC 61784-2	NOTE	Harmonised as EN 61784-2

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61158-3-12	-	Industrial communication networks - Fieldbus specifications Part 3-12: Data-link layer service definition - Type 12 elements	EN 61158-3-12	-
IEC 61588	-	Precision clock synchronization protocol for - networked measurement and control systems	-	-
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 8802-3	2000	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	-	-
ISO/IEC 9899	-	Information technology - Programming languages - C	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
IEEE 802.1Q	-	IEEE Standard for Local and metropolitan area networks - Media Access Control (MAC) Bridges and Virtual Bridges	-	-
IETF RFC 768	-	User Datagram Protocol	-	-
IETF RFC 791	-	Internet Protocol - DARPA Internet Program - Protocol Specification	-	-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Industrial communication networks – Fieldbus specifications –
Part 4-12: Data-link layer protocol specification – Type 12 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –
Partie 4-12: Spécification du protocole de la couche liaison de données –
Éléments de type 12**





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Edition 3.0 2014-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Industrial communication networks – Fieldbus specifications –
Part 4-12: Data-link layer protocol specification – Type 12 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –
Partie 4-12: Spécification du protocole de la couche liaison de données –
Éléments de type 12**

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 4-12: Data-link layer protocol specification – Type 12 elements

FOREWORD

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NOTE Combinations of protocol types are specified in IEC 61784-1 and IEC 61784-2.

International Standard IEC 61158-4-12 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision. The main changes with respect to the previous edition are listed below:

- bug fixes and
- editorial improvements.

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

FDIS	Report on voting
65C/762/FDIS	65C/772/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.

A list of all the parts of the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC web site.

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,
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INTRODUCTION

This part of IEC 61158 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 61158-1:2013.

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

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EP 1 590 927 B1	[BE] Koppler für ein Netzwerk mit Ringtopologie und ein auf Ethernet basierten Netzwerk
EP 1 789 857 B1	[BE] Datenübertragungsverfahren und automatisierungssystem zum Einsatz eines solchen Datenübertragungsverfahrens
DE 102007017835.4	[BE] Paketvermittlungsvorrichtung und lokales Kommunikationsnetz mit einer solchen Paketvermittlungsvorrichtung
EP 1 456 722 B1	[BE] Datenübertragungsverfahren, serielles Bussystem und Anschalteinheit für einen passiven Busteilnehmer

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 4-12: Data-link layer protocol specification – Type 12 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, 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 standard specifies

- a) procedures for the transfer of data and control information from one data-link user entity to one or more user entity;
- b) the structure of the DLPDUs used for the transfer of data and control information by the protocol of this standard, and their representation as physical interface data units.

1.3 Procedures

The procedures are defined in terms of

- a) the interactions between DL-entities (DLEs) through the exchange of 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 the MAC services of ISO/IEC 8802-3.

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 reference model, 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 capabilities, and thus its applicability to various time-critical communications needs.

1.5 Conformance

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

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