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Irish Standard
I.S. EN 61158-5-14:2014

Industrial communication networks - Fieldbus specifications - Part 5-14: Application layer service definition - Type 14 elements

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I.S. EN 61158-5-14:2014

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NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-5-14

October 2014

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-5-14:2012

English Version

Industrial communication networks - Fieldbus specifications - Part 5-14: Application layer service definition - Type 14 elements (IEC 61158-5-14:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-14: Définition des services de la couche application - Eléments de type 14 (CEI 61158-5-14:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-14: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 14-Elemente (IEC 61158-5-14:2014)

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Foreword

The text of document 65C/763/FDIS, future edition 3 of IEC 61158-5-14, 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 61158-5-14:2014.

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)	2015-06-22
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-09-22

This document supersedes EN 61158-5-14:2012.

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

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

IEC 60870 Series	NOTE	Harmonized as EN 60870 Series (not modified).
IEC 61375 Series	NOTE	Harmonized as EN 61375 Series (not modified).
IEC 61784-1	NOTE	Harmonized as EN 61784-1.
IEC 61784-2	NOTE	Harmonized as EN 61784-2.

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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

Publication	Year	Title	EN/HD	Year
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
IEC 61158-1	2014	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	2014
IEC 61158-4-14	-	Industrial communication networks - Fieldbus specifications - Part 4-14: Data-link layer protocol specification - Type 14 elements	EN 61158-4-14 [1)]	-
IEC 61158-6-14	-	Industrial communication networks - Fieldbus specifications - Part 6-14: Application layer protocol specification - Type 14 elements	EN 61158-6-14 [1)]	-
IEC 61588	-	Precision clock synchronization protocol for networked measurement and control systems	-	-
ISO/IEC 646	-	Information technology - ISO 7-bit coded character set for information interchange	-	-
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic reference model: The basic model	-	-
ISO/IEC 8822	-	Information technology - Open Systems Interconnection - Presentation service definition	-	-
ISO/IEC 8824-1	-	Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application layer structure	-	-

[1)] To be published.

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Publication	Year	Title	EN/HD	Year
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
IETF RFC 2030	-	Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI	-	-
IEEE 754	-	IEEE Standard for Floating-Point Arithmetic	-	-

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IEC 61158-5-14

Edition 3.0 2014-08

INTERNATIONAL STANDARD

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Industrial communication networks – Fieldbus specifications – Part 5-14: Application layer service definition – Type 14 elements

Réseaux de communication industriels – Spécifications des bus de terrain – Partie 5-14: Définition des services de la couche application – Eléments de type 14

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IEC 61158-5-14

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Industrial communication networks – Fieldbus specifications – Part 5-14: Application layer service definition – Type 14 elements

Réseaux de communication industriels – Spécifications des bus de terrain – Partie 5-14: Définition des services de la couche application – Eléments de type 14

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-14: Application layer service definition – Type 14 elements

FOREWORD

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

International Standard IEC 61158-5-14 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:

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- corrections of the edit error;
- specification changes for CPF4;
- update of the requirements for all conformance classes;
- update of the requirements for all conformance services.

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

FDIS	Report on voting
65C/763/FDIS	65C/773/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 ISO/IEC Directives, Part 2.

A list of all 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;
- replaced by a revised edition, or
- amended.

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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.

The application service is provided by the application protocol making use of the services available from the data-link or other immediately lower layer. This standard defines the application service characteristics that fieldbus applications and/or system management may exploit.

Throughout the set of fieldbus standards, the term “service” refers to the abstract capability provided by one layer of the OSI Basic Reference Model to the layer immediately above. Thus, the application layer service defined in this standard is a conceptual architectural service, independent of administrative and implementation divisions.

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-14: Application layer service definition – Type 14 elements

1 Scope

1.1 General

The fieldbus application layer (FAL) provides user programs with a means to access the fieldbus communication environment. In this respect, the FAL can be viewed as a "window between corresponding application programs."

This standard provides common elements for basic time-critical and non-time-critical messaging communications between application programs in an automation environment and material specific to Type 14 fieldbus. The term "time-critical" is used to represent the presence of a time-window, within which one or more specified actions are required to be completed with some defined level of certainty. Failure to complete specified actions within the time window risks failure of the applications requesting the actions, with attendant risk to equipment, plant and possibly human life.

This standard defines in an abstract way the externally visible service provided by the Type 14 fieldbus application layer in terms of

a) an abstract model for defining application resources (objects) capable of being manipulated by users via the use of the FAL service,
b) the primitive actions and events of the service;
c) the parameters associated with each primitive action and event, and the form which they take; and
d) the interrelationship between these actions and events, and their valid sequences.

The purpose of this standard is to define the services provided to

a) the FAL user at the boundary between the user and the application layer of the fieldbus reference model, and
b) Systems Management at the boundary between the application layer and Systems Management of the fieldbus reference model.

This standard specifies the structure and services of the Type 14 fieldbus application layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498-1) and the OSI application layer structure (ISO/IEC 9545).

FAL services and protocols are provided by FAL application-entities (AE) contained within the application processes. The FAL AE is composed of a set of object-oriented application service elements (ASEs) and a layer management entity (LME) that manages the AE. The ASEs provide communication services that operate on a set of related application process object (APO) classes. One of the FAL ASEs is a management ASE that provides a common set of services for the management of the instances of FAL classes.

Although these services specify, from the perspective of applications, how request and responses are issued and delivered, they do not include a specification of what the requesting and responding applications are to do with them. That is, the behavioral aspects of the applications are not specified; only a definition of what requests and responses they can

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send/receive is specified. This permits greater flexibility to the FAL users in standardizing such object behavior. In addition to these services, some supporting services are also defined in this standard to provide access to the FAL to control certain aspects of its operation.

1.2 Specifications

The principal objective of this standard is to specify the characteristics of conceptual application layer services suitable for time-critical communications, and thus supplement the OSI Basic Reference Model in guiding the development of application layer protocols for time-critical communications.

A secondary objective is to provide migration paths from previously-existing industrial communications protocols. It is this latter objective which gives rise to the diversity of services standardized as the various types of IEC 61158.

This specification may be used as the basis for formal Application Programming-Interfaces. Nevertheless, it is not a formal programming interface, and any such interface will need to address implementation issues not covered by this specification, including

a) the sizes and octet ordering of various multi-octet service parameters, and

b) the correlation of paired request and confirm, or indication and response, primitives.

1.3 Conformance

This standard does not specify individual implementations or products, nor do they constrain the implementations of application layer entities within industrial automation systems.

There is no conformance of equipment to this application layer service definition standard. Instead, conformance is achieved through implementation of conforming application layer protocols that fulfill the Type 14 application layer services as defined in this standard.

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.

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.

IEC 61131-3, *Programmable controllers – Part 3: Programming languages*

IEC 61158-1:2014, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

IEC 61158-4-14, *Industrial communication networks – Fieldbus specifications – Part 4-14: Data-link layer protocol specification – Type 14 elements*

IEC 61158-6-14, *Industrial communication networks – Fieldbus specifications – Part 6-14: Application layer protocol specification – Type 14 elements*

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