SLOVENSKI STANDARD
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Industrijska komunikacijska omrežja - Specifikacije za procesno vodilo - 5-14. del: Definicija opravil na aplikacijskem nivoju - Elementi tipa 14 (IEC 61158-5-14:2010)

Industrial communication networks - Fieldbus specifications - Part 5-14: Application layer service definition - Type 14 elements (IEC 61158-5-14:2010)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-14: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 14-Elemente (IEC 61158-5-14:2010)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-14: Définition des services des couches d'application - Eléments de type 14 (CEI 61158-5-14:2010)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-5-14

June 2012

Supersedes EN 61158-5-14:2008

English version

Industrial communication networks - Fieldbus specifications - Part 5-14: Application layer service definition - Type 14 elements
(IEC 61158-5-14:2010)

Réseaux de communication industriels -
Spécifications des bus de terrain -
Partie 5-14: Définition des services des
couches d'application -
Eléments de type 14
(CEI 61158-5-14:2010)

Industrielle Kommunikationsnetze -
Feldbusse -
Teil 5-14: Dienstfestlegungen des
Application Layer (Anwendungsschicht) -
Typ 14-Elemente
(IEC 61158-5-14:2010)

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This European Standard was approved by CENELEC on 2012-03-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61158-5-14:2012 E

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Foreword

The text of document 65C/606/FDIS, future edition 2 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 61158-5-14:2012.

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)   2012-12-28

- latest date by which the national standards conflicting with the document have to be withdrawn   (dow)   2015-03-28

This document supersedes EN 61158-5-14:2008.

EN 61158-5-14:2012 includes the following significant technical change with respect to EN 61158-5-14:2008:

— updated Normative references and Bibliography;

— corrections of the edit error;

— specification changes for CPF3;

— update of the requirements for all conformance classes;

— update of the requirements for all conformance services.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61158-5-14:2010 was approved by CENELEC as a European Standard without any modification.

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

IEC 61131-1   NOTE Harmonized as EN 61131-1.

IEC/TR 61158-1:2007   NOTE Harmonized as CLC/TR 61158-1:2008 (not modified).

IEC 61158-3-14   NOTE Harmonized as EN 61158-3-14.

IEC 61158-6-14   NOTE Harmonized as EN 61158-6-14.

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   When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
IEC 61158-4-14	-	Industrial communication networks - Fieldbus specifications - Part 4-14: Data-link layer protocol specification - Type 14 elements	EN 61158-4-14	-
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	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic reference model - Conventions for the definition of OSI services	-	-

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IEC 61158-5-14

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INTERNATIONAL
STANDARD

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

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ELECTROTECHNICAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION
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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

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

FOREWORD

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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 second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- updated Normative references and Bibliography;

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- corrections of the edit error;
- specification changes for CPF3;
- 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/606/FDIS	65C/620/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.

NOTE 2   The revision of this standard will be synchronized with the other parts of the IEC 61158 series.

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/TR 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 Overview

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.

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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

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

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

IEC 61588, *Precision clock synchronization protocol for networked measurement and control systems*

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ISO/IEC 8824-1, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

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ISO/IEC 9545, *Information technology – Open Systems Interconnection – Application Layer structure*

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

3 Terms, definitions, symbols, abbreviations and conventions

For the purposes of this document, the following terms as defined in these publications apply:

3.1   ISO/IEC 7498-1 terms

a) application entity

b) application process

c) application protocol data unit

d) application service element

e) application entity invocation

f) application process invocation

g) application transaction

h) real open system

i) transfer syntax

3.2   ISO/IEC 8822 terms

a) abstract syntax

b) presentation context

3.3   ISO/IEC 9545 terms

a) application-association

b) application-context

c) application context name

d) application-entity-invocation

e) application-entity-type

f) application-process-invocation

g) application-process-type

h) application-service-element

i) application control service element

3.4   ISO/IEC 8824-1 terms

a) object identifier

b) type

3.5   Fieldbus application-layer specific definitions

3.5.1
access control
control on the reading and writing of an object

3.5.2
access Path
association of a symbolic name with a variable for the purpose of open communication