SVENSK STANDARD SS-EN 61158-5-10

Fastställd	Utgåva	Sida	Ansvarig kommitté
2012-09-12	2	1 (1+770)	SEK TK 65

Industriell processtyrning – Fältbuss – Del 5-10: Definition av tjänster i applikationsskiktet – Delar i fältbuss, Typ 10

Industrial communication networks – Fieldbus specifications – Part 5-10: Application layer service definition – Type 10 elements

Som svensk standard gäller europastandarden EN 61158-5-10:2012. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-5-10:2012.

Nationellt förord

Europastandarden EN 61158-5-10:2012

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC

– **IEC 61158-5-10, Second edition, 2010 - Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-5-10, utgåva 1, 2008, gäller ej fr o m 2015-03-28.

ICS 25.04.40; 35.100.70; 35.110

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-5-10

June 2012

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-5-10:2008

English version

Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements

(IEC 61158-5-10:2010)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-10: Définition des services des couches d'application - Eléments de type 10 (CEI 61158-5-10:2010)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-10: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 10-Elemente (IEC 61158-5-10:2010)

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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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 61158-5-10:2012 E

SEK Svensk Elstandard

Foreword

The text of document 65C/606/FDIS, future edition 2 of IEC 61158-5-10, 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 61158-5-10:2012.

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 61158-5-10:2008.

EN 61158-5-10:2012 includes the following significant technical change with respect to EN 61158-5-10:2008:

— corrections;

— improvements;

— optimization of the synchronization;

— optimization of the startup time from power down.

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 61158-5-10:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC/TR 61158-1:2010	NOTE Harmonized as CLC/TR 61158-1:2010 (not modified).

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 60559	-	Binary floating-point arithmetic for microprocessor systems	HD 592 S1	-
IEC 61131-1	-	Programmable controllers - Part 1: General information	EN 61131-1	-
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
IEC 61158-5-3	2010	Industrial communication networks - Fieldbus specifications - Part 5-3: Application layer service definition - Type 3 elements	EN 61158-5-3	2012
IEC 61158-6-3	2010	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3	2012
IEC 61158-6-10	2010	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN 61158-6-10	2012
IEC 61375-1	-	Electric railway equipment - Train bus - Part 1: Train communication network	-	-
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 7498-3	-	Information technology - Open Systems Interconnection - Basic Reference Model: Naming and addressing	-	-
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 8859-1	-	Information technology - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No.1	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application Layer structure	-	-

Publication	Year	Title	EN/HD	Year
ISO/IEC 10646-1	-	Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic reference model - Conventions for the definition of OSI services	-	-
ISO 8601	-	Data elements and interchange formats - Information interchange - Representation of dates and times	-	-
IEEE 802	2001	IEEE standard for local and metropolitan area networks: overview and architecture	-	-
IEEE 802.1AB	2005	IEEE Standard for Local and metropolitan area networks Station and Media Access Control Connectivity Discovery	-	-
IEEE 802.1D	2004	IEEE Standard for Local and Metropolitan Area Networks - Media Access Control (MAC) Bridges	-	-
IEEE 802.1Q	2005	IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks	-	-
IEEE 802.3	2005	IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications	-	-
IETF RFC 1305	-	Network Time Protocol, Version 3 - Specification and Implementation	-	-
IETF RFC 768	-	User Datagram Protocol	-	-
IETF RFC 3636	-	Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)	-	-
IETF RFC 3621	-	Power Ethernet MIB	-	-
IETF RFC 3490	-	Internationalizing Domain Names in Applications (IDNA)	-	-
IETF RFC 3418	-	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	-	-
IETF RFC 791	-	Internet Protocol - DARPA Internet Program Protocol Specification	-	-
IETF RFC 2863	-	The Interfaces Group MIB	-	-
IETF RFC 826	-	Ethernet Address Resolution Protocol	-	-
IETF RFC 1034	-	Domain names - concepts and facilities	-	-
IETF RFC 2737	-	Entity MIB (Version 2)	-	-
IETF RFC 2674	-	Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions	-	-
IETF RFC 792	-	Internet Control Message Protocol	-	-
IETF RFC 1112	-	Host Extensions for IP Multicasting	-	-
IETF RFC 1952	-	GZIP file format specification version 4.3	-	-

Publication	Year	Title	EN/HD	Year
IETF RFC 2131	-	Dynamic Host Configuration Protocol	-	-
IETF RFC 2365	-	Administratively Scoped IP Multicast	-	-
IETF RFC 3330	-	Special-Use IPv4 Addresses	-	-
The Open Group C706	-	CAE Specification DCE11: Remote Procedure Call	-	-

CONTENTS

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.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-10: Application layer service definition – Type 10 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 10 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 10 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 10 IEC fieldbus Application Layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498) 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, and the corresponding protocols standardized in subparts of IEC 61158–6.

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 conformance of equipment to this application layer service definition standard mainly achieved through implementation of the modeled behavior of an application layer user (e.g. see user state machines) accompanied by implementation of conforming application layer protocols that fulfill the 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 60559, *Binary floating-point arithmetic for microprocessor systems*

IEC 61131-1, *Programmable controllers – Part 1: General information*

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

IEC 61158-5-3:2010[1], *Industrial communication networks – Fieldbus specifications – Part 5-3: Application layer service definitions – Type 3 elements*

IEC 61158-6-3:2010[1], *Industrial communication networks – Fieldbus specifications – Part 6-3: Application layer protocol specification – Type 3 elements*

IEC 61158-6-10:2010[1], *Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements*

IEC 61375-1*, Electric railway equipment – Train bus – Part 1:Train communication network*

[1] To be published.

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

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

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 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

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

ISO/IEC 10646-1, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*

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

IEEE 802-2001, *IEEE Standard for Local and metropolitan area networks: Overview and architecture,* available at <http://www.ieee.org>

IEEE 802.1AB-2005, *IEEE Standard for Local and metropolitan area networks: Station and media access control connectivity discovery,* available at <http://www.ieee.org>

IEEE 802.1D-2004, *IEEE Standard for Local and Metropolitan Area Networks – Media Access Control (MAC) Bridges,* available at <http://www.ieee.org>

IEEE 802.1Q-2005, *IEEE Standard for Local and metropolitan area networks – Virtual bridged local area networks,* available at <http://www.ieee.org>

IEEE 802.3-2005, *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,* available at <http://www.ieee.org>

IETF RFC 768, *User Datagram Protocol*, available at <http://www.ietf.org>

IETF RFC 791, *Internet Protocol*, available at <http://www.ietf.org>

IETF RFC 792, *Internet Control Message Protocol*, available at <http://www.ietf.org>

IETF RFC 826, *An Ethernet Address Resolution Protocol or Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware*, available at <http://www.ietf.org>

IETF RFC 1034, *Domain names – concepts and facilities*, available at <http://www.ietf.org>

IETF RFC 1112, *Host Extensions for IP Multicasting*, available at <http://www.ietf.org>

IETF RFC 1305, *Network Time Protocol (Version 3) – Specification, Implementation and Analysis*, available at <http://www.ietf.org>

IETF RFC 1952, *GZIP file format specification version 4.3*, available at <http://www.ietf.org>

IETF RFC 2131, *Dynamic Host Configuration Protocol*; available at <http://www.ietf.org>

IETF RFC 2365, *Administratively Scoped IP Multicast*, available at <http://www.ietf.org>

IETF RFC 2674, *Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions*, available at <http://www.ietf.org>

IETF RFC 2737, *Entity MIB (Version 2)*, available at <http://www.ietf.org>

IETF RFC 2863, *The Interfaces Group MIB*, available at <http://www.ietf.org>

IETF RFC 3330, *Special-Use IPv4 Addresses*, available at <http://www.ietf.org>

IETF RFC 3418, *Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)*, available at <http://www.ietf.org>

IETF RFC 3490, *Internationalizing Domain Names in Applications (IDNA)*, available at <http://www.ietf.org>

IETF RFC 3621, *Power Ethernet MIB*, available at <http://www.ietf.org>

IETF RFC 3636, *Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)*, available at <http://www.ietf.org>

The Open Group – Publication C706, *Technical standard DCE1.1: Remote Procedure Call*, available at <http://www.opengroup.org/onlinepubs/9629399/toc.htm>