SVENSK STANDARD SS-EN 61158-6-10

Fastställd	Utgåva	Sida	Ansvarig kommitté
2012-10-10	2	1 (1+774)	SEK TK 65

Industriell processtyrning – Fältbuss – Del 6-10: Specifikation av protokoll i applikationsskiktet – Delar i fältbuss, Typ 10

Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements

Som svensk standard gäller europastandarden EN 61158-6-10:2012. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-6-10:2012.

Nationellt förord

Europastandarden EN 61158-6-10:2012

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC

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

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-6-10, utgåva 1, 2008, gäller ej fr o m 2015-03-28.

ICS 25.04.40; 35.100.70; 35.110

Denna standard är fastställd av SEK Svensk Elstandard,
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-6-10

June 2012

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-6-10:2008

English version

Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements

(IEC 61158-6-10:2010)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 6-10: Spécification des protocoles des couches d'application - Eléments de type 10 (CEI 61158-6-10:2010)

Industrielle Kommunikationsnetze - Feldbusse - Teil 6-10: Protokollspezifikation des Application Layer (Anwendungsschicht) - Typ 10-Elemente (IEC 61158-6-10:2010)

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 61158-6-10:2012 E

SEK Svensk Elstandard

Foreword

The text of document 65C/607/FDIS, future edition 2 of IEC 61158-6-10, 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 61158-6-10:2012.

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 61158-6-10:2008.

EN 61158-6-10:2012 includes the following significant technical changes with respect to EN 61158-6-10:2008:

– 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 61158-6-10:2010 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/TR 61158-1	NOTE	Harmonized as CLC/TR 61158-1.
IEC 61158-6-3:2010	NOTE	Harmonized as EN 61158-6-3:2012.

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 61158-5-10	2010	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN 61158-5-10	2012
IEC 61784-3-3	-	Industrial communication networks - Profiles - Part 3-3: Functional safety fieldbuses - Additional specifications for CPF 3	EN 61784-3-3	-
ISO/IEC 646	1991	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	-	-
ISO 8601	-	Data elements and interchange formats - Information interchange - Representation of dates and times	-	-
IEEE 802.1D	2004	IEEE Standard for Local and Metropolitan Area Networks - Media Access Control (MAC) Bridges	-	-
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 802.1Q	2005	IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks	-	-

Publication	Year	Title	EN/HD	Year
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	-	-
IEEE 802.15.1	2005	IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements. - Part 15.1: Wireless medium access control (MAC) and physical layer (PHY) specifications for wireless personal area networks (WPANs)	-	-
IEEE 802.11	1999	IEEE Standard for Information technology- Telecommunications and information exchange between systems-Local and metropolitan area networks-Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications	-	-
IETF RFC 768	-	User Datagram Protocol	-	-
IETF RFC 791	-	Internet Protocol - DARPA Internet Program Protocol Specification	-	-
IETF RFC 826	-	Ethernet Address Resolution Protocol	-	-
IETF RFC 3621	-	Power Ethernet MIB	-	-
IETF RFC 792	-	Internet Control Message Protocol	-	-
IETF RFC 1112	-	Host Extensions for IP Multicasting	-	-
IETF RFC 3490	-	Internationalizing Domain Names in Applications (IDNA)	-	-
IETF RFC 1034	-	Domain names - concepts and facilities	-	-
IETF RFC 2131	-	Dynamic Host Configuration Protocol	-	-
IETF RFC 2674	-	Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions	-	-
IETF RFC 2737	-	Entity MIB (Version 2)	-	-
IETF RFC 2863	-	The Interfaces Group MIB	-	-
IETF RFC 2365	-	Administratively Scoped IP Multicast	-	-
IETF RFC 3330	-	Special-Use IPv4 Addresses	-	-
IETF RFC 4836	-	Definitions of managed objects for IEEE 802.3 medium attachment units (MAUs)	-	-
IETF RFC 1518	-	An architecture for IP address allocation with CIDR	-	-

Publication	Year	Title	EN/HD	Year
IETF RFC 1519	-	Classless Inter-Domain Routing (CIDR): an address assignment and aggregation strategy	-	-
IETF RFC 2474	-	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	-	-
IETF RFC 3418	-	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	-	-
IETF RFC 2132	-	DHCP Options and BOOTP Vendor Extensions	-	-
The Open Group C706	-	CAE Specification DCE11: Remote Procedure Call	-	-

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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/TR 61158–1.

The application protocol provides the application service by making use of the services available from the data-link or other immediately lower 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 application entities (AEs) 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:

as a guide for implementors and designers;

for use in the testing and procurement of equipment;

as part of an agreement for the admittance of systems into the open systems environment;

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.

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 IEC 61784 series. Use of the various protocol types in other combinations may require permission of their respective intellectual-property-right holders.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning Type 10 elements and possibly other types given in the normative elements of this standard.

The following patent rights for Type 10 have been announced by [HI]:

WO publication	Title (WO)
WO 99/046908	Local network, especially ethernet network, with redundancy properties and redundancy manager

The following patent rights for Type 10 have been announced by [SI]:

WO publication	Title (WO)
WO 99/046908	Local network, especially ethernet network, with redundancy properties and redundancy manager
WO 00/026731	Automation system and method for accessing the functionality of hardware components
WO 02/043336	System and method for the parallel transmission of real-time critical and non real-time critical data via switched data networks especially ethernet
WO 02/076033	Synchronous, clocked communication system with local input/output components and method for integrating local input/output components into such a system
WO 03/028258	Method for synchronising nodes of a communication system
WO 03/028259	Communications system and method for synchronising a communications cycle
WO 04/030284	Method for permanent redundant transmission of data telegrams in communication systems

IEC takes no position concerning the evidence, validity and scope of these patent rights.

The holder of these patent rights has assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of these patent rights is registered with IEC. Information may be obtained from:

[HI]: Hirschmann Automation and Control GmbH
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[SI]: Siemens AG
CT IP L&T
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Germany

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. IEC shall not be held responsible for identifying any or all such patent rights.

ISO (www.iso.org/patents) and IEC (http://www.iec.ch/tctools/patent_decl.htm) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-10: Application layer protocol specification – Type 10 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 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 behavior provided by the Type 10 fieldbus application layer in terms of

a) the abstract syntax defining the application layer protocol data units conveyed between communicating application entities,
b) the transfer syntax defining the application layer protocol data units conveyed between communicating application entities,
c) the application context state machine defining the application service behavior visible between communicating application entities; and
d) the application relationship state machines defining the communication behavior visible between communicating application entities; and.

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

a) define the wire-representation of the service primitives defined in IEC 61158-5-10, and
b) define the externally visible behavior associated with their transfer.

This standard specifies the protocol of the Type 10 fieldbus application layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498) and the OSI Application Layer Structure (ISO/IEC 9545).

1.2 Specifications

The principal objective of this standard is to specify the syntax and behavior of the application layer protocol that conveys the application layer services defined in IEC 61158-5-10.

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 protocols standardized in IEC 61158–6.

1.3 Conformance

This standard does not specify individual implementations or products, nor does it constrain the implementations of application layer entities within industrial automation systems. Conformance is achieved through implementation of this application layer protocol specification.

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 61158-5-10:2010[1], *Industrial communication networks – Fieldbus specifications – Application layer service definition – Type 10 elements*

IEC 61784-3-3, *Industrial communication networks – Profiles – Part 3-3: Functional safety fieldbuses – Additional specifications for CPF 3*

ISO/IEC 646:1991, *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*

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

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[1] To be published.

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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 1518, *An Architecture for IP Address Allocation with CIDR,* available at <http://www.ietf.org>

IETF RFC 1519, *Classless Inter-Domain Routing (CIDR): an Address Assignment and Aggregation Strategy,* available at <http://www.ietf.org>

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

IETF RFC 2132, *DHCP Options and BOOTP Vendor Extensions*; available at <http://www.ietf.org>

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

IETF RFC 2474, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*; 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>

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

IETF RFC 4836, *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>

3 Terms, definitions, abbreviations, symbols and conventions

3.1 Referenced terms and definitions

3.1.1 ISO/IEC 7498-1 terms

For the purposes of this document, the following terms as defined in ISO/IEC 7498-1 apply:

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

3.1.2 ISO/IEC 8822 terms

For the purposes of this document, the following terms as defined in ISO/IEC 8822 apply:

a) abstract syntax
b) presentation context

3.1.3 ISO/IEC 8824-1 terms

For the purposes of this document, the following terms as defined in ISO/IEC 8824-1 apply:

a) object identifier
b) type

3.1.4 ISO/IEC 9545 terms

For the purposes of this document, the following terms as defined in ISO/IEC 9545 apply:

a) application-association
b) application-context
c) application context name
d) application-entity-invocation
e) application-entity-type