SVENSK STANDARD SS-EN 61158-6-2

Fastställd	Utgåva	Sida	Ansvarig kommitté
2015-02-18	3	1 (1+263)	SEK TK 65

Industriell processtyrning – Fältbuss – Del 6-2: Specifikation av protokoll i applikationsskiktet – Delar i fältbuss, Typ 2

Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements

Som svensk standard gäller europastandarden EN 61158-6-2:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-6-2:2014.

Nationellt förord

Europastandarden EN 61158-6-2:2014

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61158-6-2, Third edition, 2014 - Industrial communication networks - Fieldbus specifications - Part 6-2: Application layer protocol specification - Type 2 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-6-2, utgåva 2, 2012, gäller ej fr o m 2017-09-23.

ICS 25.040.40; 35.100.70; 35.110.00

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Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-6-2

October 2014

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-6-2:2012

English Version

Industrial communication networks - Fieldbus specifications - Part 6-2: Application layer protocol specification - Type 2 elements (IEC 61158-6-2:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 6-2: Spécification du protocole de la couche application - Éléments de type 2 (CEI 61158-6-2:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 6-2: Protokollspezifikation des Application Layer (Anwendungsschicht) - Typ 2-Elemente (IEC 61158-6-2:2014)

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 61158-6-2:2014 E

SEK Svensk Elstandard

Foreword

The text of document 65C/764/FDIS, future edition 3 of IEC 61158-6-2, 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 61158-6-2:2014.

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) 2015-06-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-09-23

This document supersedes EN 61158-6-2:2012.

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.

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

Endorsement notice

The text of the International Standard IEC 61158-6-2:2014 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 61131-3	NOTE	Harmonized as EN 61131-3.
IEC 61784-1:2014	NOTE	Harmonized as EN 61784-1:2014 (not modified).
IEC 61784-2:2014	NOTE	Harmonized as EN 61784-2:2014 (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 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 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 61158-3-2	2014	Industrial communication networks - Fieldbus specifications - Part 3-2: Data-link layer service definition - Type 2 elements	EN 61158-3-2	2014
IEC 61158-4-2	2014	Industrial communication networks - Fieldbus specifications - Part 4-2: Data-link layer protocol specification - Type 2 elements	EN 61158-4-2	1)
IEC 61158-5-2	2014	Industrial communication networks - Fieldbus specifications - Part 5-2: Application layer service definition - Type 2 elements	EN 61158-5-2	2014
IEC 61588	2009	Precision clock synchronization protocol for networked measurement and control systems	-	-
IEC 61784-3-2	-	Industrial communication networks - Profiles - Part 3-2: Functional safety fieldbuses - Additional specifications for CPF 2	EN 61784-3-2	-
IEC 61800-7-202	-	Adjustable speed electrical power drive systems - Part 7-202: Generic interface and use of profiles for power drive systems - Profile type 2 specification	EN 61800-7-202	-

1) To be published.

Publication	Year	Title	EN/HD	Year
IEC 62026-3	2008	Low-voltage switchgear and controlgear - Controller-device interfaces (CDIs) - Part 3: DeviceNet	EN 62026-3	2009
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic reference model: The basic model	-	-
ISO/IEC 8802-3	-	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 8824-1	-	Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation	-	-
ISO/IEC 8825-1	-	Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application layer structure	-	-
ISO/IEC 10646	-	Information technology - Universal Coded Character Set (UCS)	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
ISO 639-2	-	Codes for the representation of names of languages - Part-2: Alpha-3 code	-	-
ISO 11898	1993	Road vehicles - Interchange of digital information - Controller area network (CAN) for high-speed communication	-	-
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	2008	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 Specifications	-	-

Publication	Year	Title	EN/HD	Year
IETF RFC 791	-	Internet Protocol	-	-
IETF RFC 1035	-	Domain Names - Implementation and Specification	-	-
IETF RFC 1112	-	Host Extensions for IP Multicasting	-	-
IETF RFC 1117	-	Internet numbers	-	-
IETF RFC 1122	-	Requirements for Internet Hosts - Communication Layers	-	-
IETF RFC 1759	-	Printer MIB	-	-
IETF RFC 2236	-	Internet Group Management Protocol, Version 2	-	-
IETF RFC 2474	-	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	-	-
IETF RFC 2475	-	An Architecture for Differentiated Services	-	-
IETF RFC 2597	-	Assured Forwarding PHB Group	-	-
IETF RFC 2873	-	TCP Processing of the IPv4 Precedence Field	-	-
IETF RFC 3140	-	Per Hop Behavior Identification Codes	-	-
IETF RFC 3246	-	An Expedited Forwarding PHB (Per-Hop Behavior)	-	-
IETF RFC 3376	-	Internet Group Management Protocol, Version 3	-	-
IETF RFC 4594	-	Configuration Guidelines for DiffServ Service Classes	-	-

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-2: Application layer protocol specification – Type 2 elements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
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9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

Attention is drawn to the fact that the use of the associated protocol type is restricted by its 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 layer protocol type to be used with other layer protocols of the same type, or in other type combinations explicitly authorized by its intellectual-property-right holders.

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

International Standard IEC 61158-6-2 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:

- Updates of definition used by the Time Sync object;
- Addition of “member” and object specific services in 4.1.2.1, 4.1.8, 4.1.10, 8.2;
- Removal of obsolete transport classes 4 to 6 in 4.1.4.6, and 9.3.9 to 9.3.12;
- Clarification of transport header formats in 4.1.4;
- Update of CM and MR PDUs in 4.1.5 to 4.1.7;
- Updates of Identity object PDUs in 4.1.8.2;
- Updates of Assembly object PDUs in 4.1.8.4;
- Updates of Time sync object PDUs in 4.1.8.6;
- Updates of Parameter object PDUs in 4.1.8.7;
- Updates of Connection Manager object PDUs in 4.1.8.8;
- Updates of message and connection paths in 4.1.9;
- Updates of object class codes in 4.1.10 and error codes in 4.1.11;
- Updates of data types in 4.2.4 and 5.2.3;
- Updates of the encapsulation abstract syntax in 4.3;
- Updates to the DLL mapping protocol machine 2 in Clause 11;
- Miscellaneous editorial corrections.

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

FDIS	Report on voting
65C/764/FDIS	65C/774/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.

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 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 implementers 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.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-2: Application layer protocol specification – Type 2 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 2 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 specifies interactions between remote applications and defines the externally visible behavior provided by the Type 2 fieldbus application layer in terms of

a) the formal abstract syntax defining the application layer protocol data units conveyed between communicating application entities;
b) the transfer syntax defining encoding rules that are applied to the application layer protocol data units;
c) the application context state machine defining the application service behavior visible between communicating application entities;
d) the application relationship state machines defining the communication behavior visible between communicating application entities.

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

a) define the wire-representation of the service primitives defined in IEC 61158-5-2, and
b) define the externally visible behavior associated with their transfer.

This standard specifies the protocol of the Type 2 fieldbus application layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498-1) 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 61158-5-2.

A secondary objective is to provide migration paths from previously-existing industrial communications protocols.

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

IEC 61158-3-2:2014, *Industrial communication networks – Fieldbus specifications – Part 3-2: Data-link layer service definition – Type 2 elements*

IEC 61158-4-2:2014, *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

IEC 61158-5-2:2014, *Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements*

IEC 61588:2009, *Precision clock synchronization protocol for networked measurement and control systems*

IEC 61784-3-2, *Industrial communication networks – Profiles – Part 3-2: Functional safety fieldbuses – Additional specifications for CPF 2*

IEC 61800-7-202, *Adjustable speed electrical power drive systems – Part 7-202: Generic interface and use of profiles for power drive systems – Profile type 2 specification*

IEC 62026-3:2008, *Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs) – Part 3: DeviceNet*

ISO/IEC 7498-1, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 8802-3, *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 8824-1, *Information technology – Abstract Syntax Notation One (ASN.1)*: *Specification of basic notation*

ISO/IEC 8825-1, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

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

ISO/IEC 10646, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*

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

ISO 639-2, *Codes for the representation of names of languages – Part 2: Alpha-3 code*

ISO 11898:1993[1], *Road vehicles – Interchange of digital information – Controller area network (CAN) for high-speed communication*

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[1], *IEEE standard for local and metropolitan area networks – Virtual bridged local area networks*, available at <http://www.ieee.org>

IEEE 802.3-2008: *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 Specifications,* available at <http://www.ieee.org>

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

IETF RFC 1035, *Domain Names – Implementation and Specification*, available at <http://www.ietf.org>

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

IETF RFC 1117, *Internet Numbers*, available at <http://www.ietf.org>

IETF RFC 1122, *Requirements for Internet Hosts – Communication Layers*, available at <http://www.ietf.org>

IETF RFC 1759, *Printer MIB*, available at <http://www.ietf.org>

IETF RFC 2236, *Internet Group Management Protocol, Version 2*, 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 2475, *An Architecture for Differentiated Services*, available at <http://www.ietf.org>

IETF RFC 2597, *Assured Forwarding PHB Group*, available at <http://www.ietf.org>

IETF RFC 2873, *TCP Processing of the IPv4 Precedence Field*, available at <http://www.ietf.org>

IETF RFC 3140, *Per Hop Behavior Identification Codes*, available at <http://www.ietf.org>

[1] A newer edition of this standard has been published, but only the cited edition applies.

IETF RFC 3246, *An Expedited Forwarding PHB (Per-Hop Behavior)*, available at <http://www.ietf.org>

IETF RFC 3376, *Internet Group Management Protocol, Version 3*, available at <http://www.ietf.org>

IETF RFC 4594, *Configuration Guidelines for DiffServ Service Classes*, available at <http://www.ietf.org>