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Industriell processtyrning – Fältbuss – Del 6-5: Specifikation av protokoll i applikationsskiktet – Delar i fältbuss, Typ 5

*Industrial communication networks –
Fieldbus specifications –
Part 6-5: Application layer protocol specification –
Type 5 elements*

Som svensk standard gäller europastandarden EN 61158-6-5:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-6-5:2014.

Nationellt förord

Europastandarden EN 61158-6-5:2014

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61158-6-5, Second edition, 2014 - Industrial communication networks - Fieldbus specifications - Part 6-5: Application layer protocol specification - Type 5 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-6-5, utgåva 1, 2008, gäller ej fr o m 2017-09-23.

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Box 1284
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English Version

**Industrial communication networks - Fieldbus specifications -
Part 6-5: Application layer protocol specification - Type 5
elements
(IEC 61158-6-5:2014)**

Réseaux de communication industriels - Spécifications des
bus de terrain - Partie 6-5: Spécification du protocole de la
couche application - Éléments de type 5
(CEI 61158-6-5:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 6-5:
Protokollspezifikation des Application Layer
(Anwendungsschicht) - Typ 5-Elemente
(IEC 61158-6-5:2014)

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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.

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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

Foreword

The text of document 65C/764/FDIS, future edition 2 of IEC 61158-6-5, 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 61158-6-5:2014.

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 61158-6-5:2008.

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 61158-6-5:2014 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 61158-3-1	NOTE	Harmonized as EN 61158-3-1.
IEC 61158-4-1	NOTE	Harmonized as EN 61158-4-1.
IEC 61784-1	NOTE	Harmonized as EN 61784-1.
IEC 61784-2	NOTE	Harmonized as EN 61784-2.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61158-1	-	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	-
IEC 61158-5-5	-	Industrial communication networks - Fieldbus specifications - Part 5-5: Application layer service definition - Type 5 elements	EN 61158-5-5	-
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model	-	-
ISO/IEC 8825	1990	Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)	-	-
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	-	-
IETF RFC 791	-	Internet Protocol	-	-

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
1.1 General.....	10
1.2 Specifications.....	11
1.3 Conformance.....	11
2 Normative references	11
3 Terms, definitions, symbols, abbreviations and conventions	12
3.1 Terms and definitions from other ISO/IEC standards	12
3.2 IEC 61158-1 terms	13
3.3 Abbreviations and symbols.....	16
3.4 Conventions	17
3.5 Conventions used in state machines	18
4 Protocol.....	19
4.1 Overview	19
4.2 FAL syntax description	19
4.3 Transfer syntax	19
4.4 FAL protocol state machine structure	71
4.5 SMK state machine	71
4.6 VCR state machine.....	88
4.7 FAL service protocol machine (FSPM).....	89
4.8 Application relationship protocol machines (ARPMs)	89
4.9 DLL mapping protocol machine (DMPM).....	103
Bibliography.....	108
Figure 1 – State transition diagram for SMK.....	73
Figure 2 – State transition diagram of client / server ARPM	92
Figure 3 – State transition diagram of the publisher / subscriber ARPM	98
Figure 4 – State transition diagram of DMPM.....	104
Table 1 – Conventions used for state machines	18
Table 2 – Data types.....	20
Table 3 – Data types.....	20
Table 4 – APDU header format	21
Table 5 – FDA address use.....	22
Table 6 – FDA address header field APDUs sent by a client VCR endpoint.....	23
Table 7 – FDA address header field APDUs sent by a server VCR endpoint	24
Table 8 – FDA address header field APDUs sent by a publisher VCR endpoint.....	24
Table 9 – FDA address header field APDUs sent by a report source VCR endpoint	25
Table 10 – APDU trailer fields.....	25
Table 11 – Request APDU parameters.....	28
Table 12 – SMK FDA address values	30
Table 13 – SMK FDA address values	30

Table 14 – Request APDU parameters.....	31
Table 15 – SMK FDA address values for SM identify	32
Table 16 – SMK FDA address values for SMK set assignment info request APDUs	33
Table 17 – SMK clear address request APDU parameters.....	33
Table 18 – SMK FDA address values for SMK set assignment info request APDUs	33
Table 19 – SMK set assignment info request APDU parameters	34
Table 20 – SMK set assignment info response APDU parameters.....	35
Table 21 – SMK FDA address values for SMK device clear assignment Info APDUs.....	36
Table 22 – SMK clear assignment info request APDU parameters	36
Table 23 – SMK FDA address values for SMK device annunciation request APDUs.....	36
Table 24 – SMK device annunciation request APDU parameters.....	37
Table 25 – Initiate request APDU parameters	39
Table 26 – Initiate response APDU parameters.....	40
Table 27 – Abort request APDU parameters	40
Table 28 – Get response APDU parameters.....	40
Table 29 – Identify response APDU parameters.....	41
Table 30 – Get OD request APDU parameters	41
Table 31 – Get OD response APDU parameters.....	41
Table 32 – Initiate put OD request APDU parameters	42
Table 33 – Put OD request APDU parameters.....	42
Table 34 – Generic initiate download sequence request APDU parameters.....	43
Table 35 – Generic download segment request APDU parameters.....	43
Table 36 – Generic terminate download sequence request APDU parameters	44
Table 37 – Response APDU parameters	44
Table 38 – Initiate download sequence request APDU parameters.....	44
Table 39 – Download segment request APDU parameters	45
Table 40 – Download segment response APDU parameters.....	45
Table 41 – Terminate download sequence request APDU parameters	45
Table 42 – Initiate upload sequence request APDU parameters	46
Table 43 – Upload segment request APDU parameters.....	46
Table 44 – Upload segment response APDU parameters	47
Table 45 – Terminate upload sequence request APDU parameters.....	47
Table 46 – Request domain download request APDU parameters	47
Table 47 – Request domain upload request APDU parameters	48
Table 48 – Create program invocation request APDU parameters.....	48
Table 49 – Create program invocation response APDU parameters	49
Table 50 – Delete program invocation request APDU parameters	49
Table 51 – Start request APDU parameters	49
Table 52 – Stop request APDU parameters.....	50
Table 53 – Resume request APDU parameters	50
Table 54 – Reset request APDU parameters.....	50
Table 55 – Kill request APDU parameters	51
Table 56 – Read request APDU parameters.....	51

Table 57 – Read response APDU parameters	51
Table 58 – Read with subindex request APDU parameters.....	52
Table 59 – Read with subindex response APDU parameters	52
Table 60 – Write request APDU parameters.....	52
Table 61 – Write with subindex request APDU parameters.....	52
Table 62 – Define variable list request APDU parameters	53
Table 63 – Define variable list response APDU parameters	53
Table 64 – Delete variable list request APDU parameters	53
Table 65 – Information report request APDU parameters	54
Table 66 – Information report with subindex request APDU parameters	54
Table 67 – Information report on change request APDU parameters	54
Table 68 – Information report on change with subindex request APDU parameters	55
Table 69 – Event notification request APDU parameters	55
Table 70 – Alter event condition monitoring request APDU parameters.....	55
Table 71 – Acknowledge event notification request APDU parameters	56
Table 72 – LAN redundancy diagnostic message request APDU parameters	56
Table 73 – LAN redundancy get information response APDU parameters	58
Table 74 – LAN redundancy get statistics request APDU parameters.....	59
Table 75 – Object description header.....	61
Table 76 – Null object	61
Table 77 – Structure of the list of object descriptions	62
Table 78 – Structure of a load region in the S-OD	62
Table 79 – Structure of a function invocation in the DP-OD.....	63
Table 80 – Structure of an event in the S-OD.....	64
Table 81 – Structure of a data type in the ST-OD	64
Table 82 – Structure of a data type structure description in the ST-OD	65
Table 83 – Structure of a simple variable in the S-OD.....	65
Table 84 – Structure of an array in the S-OD	66
Table 85 – Structure of a record in the S-OD	66
Table 86 – Structure of a variable list in the DV-OD	67
Table 87 – Common error parameters.....	68
Table 88 – PI error parameters	68
Table 89 – OD error parameters	68
Table 90 – Error class and error code values	69
Table 91 – SMKPM service primitives	72
Table 92 – SMKPM states.....	73
Table 93 – SMKPM state table – initialization	73
Table 94 – SMKPM state table – receive transitions.....	74
Table 95 – SMKPM state table – internal events	79
Table 96 – HseRepeatTimerExpires ()	80
Table 97 – RcvNewNetworkAddress (interface, address)	80
Table 98 – RcvMsg ().....	80
Table 99 – SntpSyncLost ().....	80

Table 100 – AddressToClear (sm_svc)	81
Table 101 – AssignmentInfo_Set ()	81
Table 102 – ConfigurationSessionActive ()	81
Table 103 – DeviceRedundancyState ()	81
Table 104 – DevId_Match (sm_svc)	82
Table 105 – DuplicateQueryIdMatch (sm_svc)	82
Table 106 – DuplicatePdTagDetected ()	82
Table 107 – FdaAddressType (sm_svc)	82
Table 108 – IsValid (sm_svc)	83
Table 109 – NetworkAddressChange (interface, address)	83
Table 110 – NumberOfAssignedAddresses ()	83
Table 111 – OperationalRestore ()	83
Table 112 – PdTag_Match (sm_svc)	83
Table 113 – PdTagDeviceIndex_Check (sm_svc)	84
Table 114 – Query_Match (sm_svc)	84
Table 115 – QueryType (sm_svc)	84
Table 116 – SmCacheEntry (sm_svc)	84
Table 117 – Clear_Address (interface_to_clear)	85
Table 118 – Clear_DuplicatePdTagFlag ()	85
Table 119 – Get_AddlCode ()	85
Table 120 – New_Address (interface, address)	85
Table 121 – Restart_HseRepeatTimer ()	86
Table 122 – Restore_Defaults ()	86
Table 123 – Send_SM_CommonErrorRsp (sm_service_type, svc_spec_params)	86
Table 124 – Send_SM_ReqRspMessage (sm_svc)	86
Table 125 – Set_Assignment_Data (sm_svc)	86
Table 126 – Set_DuplicatePdTagFlag ()	87
Table 127 – SvcType (sm_svc)	87
Table 128 – Additional code used by error class and code	87
Table 129 – Additional code parameter IDs	87
Table 130 – Primitives issued by FSPM to ARPM	89
Table 131 – Primitives issued by ARPM to FSPM	90
Table 132 – Parameters used with primitives exchanged between FSPM and ARPM	90
Table 133 – Client / Server ARPM states	92
Table 134 – Client / server ARPM state table – sender transitions	93
Table 135 – Client / server ARPM state table – receiver transitions	94
Table 136 – Primitives issued by FSPM to ARPM	96
Table 137 – Primitives issued by ARPM to FSPM	96
Table 138 – Parameters used with primitives exchanged between FSPM and ARPM	97
Table 139 – Publisher / subscriber ARPM states	98
Table 140 – MulticastARPM state table – sender transitions	99
Table 141 – MulticastARPM state table – receiver transitions	99
Table 142 – BuildFAL-ErrPDU()	100

Table 143 – BuildFAL-ReqRspPDU()	100
Table 144 – GetArepld()	100
Table 145 – ConfigurationArCheckOK()	100
Table 146 – FAL_Pdu_BufferSize().....	100
Table 147 – FAL_Pdu_Confirmed()	101
Table 148 – FAL_Pdu_DuplicateMsg ()	101
Table 149 – FAL_Pdu_GetVcrlid()	101
Table 150 – FAL_Pdu_InactivityCloseTime().....	101
Table 151 – FAL_Pdu_TransmitDelayTime().....	101
Table 152 – FAL_Pdu_SvcType()	101
Table 153 – FAL_Pdu_RemoteAddress()	102
Table 154 – FAL_Pdu_TrailerFields().....	102
Table 155 – FAL_Pdu_ServiceSpecificParameters()	102
Table 156 – FAL_Pdu_Valid()	102
Table 157 – MaxOutstandingReached()	102
Table 158 – StartInactivityCloseTimer()	102
Table 159 – Primitives issued by ARPM to DMPM	103
Table 160 – Primitives issued by DMPM to ARPM	103
Table 161 – Parameters used with primitives exchanged between ARPM and DMPM	103
Table 162 – Primitives exchanged between the socket model and DMPM	104
Table 163 – Parameters of DMPM/socket model primitives	104
Table 164 – DMPM state descriptions	104
Table 165 – DMPM state table – sender transitions	105
Table 166 – DMPM state table – receiver transitions	106
Table 167 – ConnectionOriented.....	106
Table 168 – GetBufferedData	106
Table 169 – GetConnectionId	106
Table 170 – LoadBuffer	107
Table 171 – RemainingBufferSizeCheck	107
Table 172 – StartTransmitDelayTimer	107

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELDBUS SPECIFICATIONS –****Part 6-5: Application layer protocol specification –
Type 5 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.
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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 61158-6-5 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 change with respect to the previous edition is listed below:

- Add support for message padding
- Clarified encoding rules
- Clarified open session service
- Time synchronization now present in annunciation message
- Additional redundancy options in annunciation message

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 the parts of the IEC 61158 series, 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 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.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-5: Application layer protocol specification – Type 5 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 5 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 5 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

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

This standard specifies the protocol of the Type 5 IEC 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 syntax and behavior of the application layer protocol that conveys the application layer services defined in IEC 61158-5-5.

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 series.

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

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

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

ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*¹

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*

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

¹ Withdrawn