

<b>STN</b>	<b>Priemyselné komunikačné siete. Špecifikácie prevádzkových zberníc. Časť 5-5: Definícia služieb aplikačnej vrstvy. Prvky typu 5.</b>	<b>STN EN 61158-5-5</b>  18 4020
------------	--	--

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

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 01/15

Obsahuje: EN 61158-5-5:2014, IEC 61158-5-5:2014

Oznámením tejto normy sa od 22.09.2017 ruší  
STN EN 61158-5-5 (18 4020) z októbra 2008

**120044**

EUROPEAN STANDARD

**EN 61158-5-5**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2014

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-5-5:2008

English Version

**Industrial communication networks - Fieldbus specifications -  
Part 5-5: Application layer service definition - Type 5 elements  
(IEC 61158-5-5:2014)**

Réseaux de communication industriels - Spécifications des  
bus de terrain - Partie 5-5: Définition des services de la  
couche application - Éléments de type 5  
(CEI 61158-5-5:2014)

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

This European Standard was approved by CENELEC on 2014-09-22. 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, Former Yugoslav Republic of Macedonia, 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.



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/763/FDIS, future edition 2 of IEC 61158-5-5, 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 61158-5-5:2014.

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) 2015-06-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-09-22

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

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 61158-5-5:2014 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 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](http://www.cenelec.eu)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
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 61158-3-1	-	Industrial communication networks - Fieldbus specifications - Part 3-1: Data-link layer service definition - Type 1 elements	EN 61158-3-1	-
IEC 61158-4-1	-	Industrial communication networks - Fieldbus specifications - Part 4-1: Data-link layer protocol specification - Type 1 elements	EN 61158-4-1	-
IEC 61158-5	Series	Industrial communication networks - Fieldbus specifications - Part 5: Application layer service definition	EN 61158-5	Series
IEC 61158-6-5	-	Industrial communication networks - Fieldbus specifications - Part 6-5: Application layer protocol specification - Type 5 elements	EN 61158-6-5	-
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	1990 <sup>1)</sup>	Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1)	-	-

---

<sup>1)</sup> Withdrawn publication.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	-	-
ANSI/IEEE 754	1985	Binary Floating-Point Arithmetic	-	-



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



---

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

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 5-5: Définition des services de la couche application – Éléments de type 5**





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2014 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

### A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



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

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 5-5: Définition des services de la couche application – Éléments de type 5**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE **XH**  
CODE PRIX

ICS 25.040.40; 35.100.70; 35.110

ISBN 978-2-8322-1734-4

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**



## 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 and definitions.....	12
3.1 ISO/IEC 7498-1 terms.....	12
3.2 ISO/IEC 8822 terms.....	12
3.3 ISO/IEC 9545 terms.....	12
3.4 ISO/IEC 8824 terms.....	13
3.5 Fieldbus data-link layer terms.....	13
3.6 Fieldbus application layer specific terms and definitions.....	13
3.7 Abbreviations and symbols.....	23
3.8 Conventions.....	25
4 Concepts.....	28
5 Data type ASE.....	28
5.1 Overview.....	28
5.2 Formal definition of data type objects.....	28
5.3 FAL defined data types.....	30
5.4 Data type ASE service specification.....	66
6 Communication model specification.....	66
6.1 Concepts.....	66
6.2 ASEs.....	66
6.3 ARs.....	208
6.4 Summary of FAL classes.....	232
6.5 Permitted FAL services by AREP role.....	233
7 Type 5 communication model specification.....	234
7.1 Concepts.....	234
7.2 ASEs.....	257
7.3 FDA sessions.....	292
7.4 Summary of FAL Type 9 and Type 5 classes.....	302
7.5 Permitted FAL Type 9 and Type 5 services by AREP role.....	303
Bibliography.....	306
Figure 1 – The AR ASE conveys APDUs between APs.....	97
Figure 2 – 1-to-1 AR establishment.....	109
Figure 3 – 1-to-many AR establishment.....	109
Figure 4 – Event model overview.....	148
Figure 5 – Residence timeliness.....	222
Figure 6 – Synchronized timeliness.....	223
Figure 7 – Residence timeliness.....	229
Figure 8 – Synchronized timeliness.....	230
Figure 9 – VCR initiation.....	241

Figure 10 – Misordered message handling.....	247
Figure 11 – FF SM port message processing order .....	248
Figure 12 – FF FDA port message processing order .....	248
Figure 13 – FF TCP connection message processing order .....	249
Figure 14 – Session endpoint message processing order.....	249
Figure 15 – FDA LAN redundancy port message processing order .....	249
Figure 16 – Message processing by receiving entity .....	250
Table 1 – PERSISTDEF .....	35
Table 2 – VARTYPE .....	35
Table 3 – ITEMQUALITYDEF .....	36
Table 4 – STATEDEF .....	40
Table 5 – GROUPEXCEPTIONDEF .....	41
Table 6 – ACCESSRIGHTSDEF .....	41
Table 7 – HRESULT .....	41
Table 8 – UUID .....	48
Table 9 – Data type names for value.....	64
Table 10 – UUID .....	66
Table 11 – Create service parameters .....	68
Table 12 – Delete service parameters.....	69
Table 13 – Get attributes service parameters.....	70
Table 14 – Set attributes service parameters .....	72
Table 15 – Begin set attributes .....	74
Table 16 – End set attributes .....	75
Table 17 – Subscribe service parameters .....	84
Table 18 – Identify .....	87
Table 19 – Get status .....	88
Table 20 – Status notification.....	89
Table 21 – Initiate.....	90
Table 22 – Terminate.....	93
Table 23 – Conclude.....	95
Table 24 – Reject .....	95
Table 25 – Conveyance of service primitives by AREP role.....	98
Table 26 – Valid combinations of AREP roles involved in an AR .....	98
Table 27 – AR-Unconfirmed send .....	104
Table 28 – AR-Confirmed send .....	106
Table 29 – AR-Establish service .....	108
Table 30 – Valid combinations of AREP classes to be related .....	110
Table 31 – AR-Deestablish service .....	111
Table 32 – AR-Abort .....	112
Table 33 – AR-Compel service.....	113
Table 34 – AR-Get buffered message service .....	114
Table 35 – AR-Schedule communication service.....	115

Table 36 – AR-Cancel scheduled sequence service .....	116
Table 37 – AR-Status .....	117
Table 38 – AR-XON-OFF .....	117
Table 39 – AR-Remote read service .....	118
Table 40 – AR-Remote write service .....	119
Table 41 – Read service parameters .....	128
Table 42 – Read list service parameters .....	131
Table 43 – Write service parameters .....	133
Table 44 – Write list service parameters .....	135
Table 45 – Information report service .....	137
Table 46 – Information report list service .....	138
Table 47 – Exchange service parameters .....	141
Table 48 – Exchange list service parameters .....	144
Table 49 – Acknowledge event .....	156
Table 50 – Acknowledge event list service parameters .....	157
Table 51 – Enable event .....	159
Table 52 – Event notification service parameters .....	160
Table 53 – Enable event list .....	162
Table 54 – Notification recovery service parameters .....	163
Table 55 – Get event summary service parameters .....	164
Table 56 – Get event summary list service parameters .....	166
Table 57 – Query event summary list service parameters .....	169
Table 58 – Initiate load service parameters .....	176
Table 59 – Terminate load service parameters .....	178
Table 60 – Push segment service parameters .....	179
Table 61 – Pull segment service parameters .....	180
Table 62 – Discard service parameters .....	182
Table 63 – Pull upload sequencing of service primitives .....	183
Table 64 – Pull upload service parameter constraints .....	184
Table 65 – Pull upload state table .....	185
Table 66 – Pull download sequencing of service primitives .....	186
Table 67 – Pull download service parameter constraints .....	186
Table 68 – Pull download state table .....	187
Table 69 – Push download sequencing of service primitives .....	189
Table 70 – Push download service parameter constraints .....	189
Table 71 – Push download state table .....	190
Table 72 – Start service parameters .....	197
Table 73 – Stop service parameters .....	198
Table 74 – Resume service parameters .....	199
Table 75 – Reset service parameters .....	200
Table 76 – Kill service parameters .....	201
Table 77 – Action invoke service parameters .....	202
Table 78 – Action return service parameters .....	203

Table 79 – State transitions for a function invocation object.....	205
Table 80 – FAL class summary.....	232
Table 81 – Services by AREP role.....	233
Table 82 – Scope of Invoke Id.....	245
Table 83 – Types of misordering detectable by message numbers.....	246
Table 84 – Delivery of misordered message types on publisher/subscriber VCRs.....	246
Table 85 – Statistics gathered per VCR.....	246
Table 86 – Determination of misordering type at a subscriber VCR.....	247
Table 87 – Mapping of received messages to primitives.....	247
Table 88 – Mapping of received primitives to messages.....	248
Table 89 – Defined network addresses.....	251
Table 90 – Use of network addresses.....	252
Table 91 – Use of endpoint selectors in server VCRs.....	252
Table 92 – Use of endpoint selectors in publisher VCRs.....	253
Table 93 – Use of endpoint selectors in source VCRs.....	253
Table 94 – Network address and port numbers for device annunciation.....	255
Table 95 – Network address and port numbers for set/clear assignment info and clear address.....	255
Table 96 – Network address and port numbers for SM identify.....	255
Table 97 – Network address and port numbers for SM find tag.....	255
Table 98 – Network address and port numbers for clients and servers (part 1).....	255
Table 99 – Network address and port numbers for clients and servers (part 2).....	256
Table 100 – Network address and port numbers for publishers and subscribers.....	256
Table 101 – Network address and port numbers for report distribution.....	256
Table 102 – Network address and port numbers for LAN redundancy get and put information.....	256
Table 103 – Network address and port numbers for LAN redundancy diagnostics.....	256
Table 104 – VCR types.....	258
Table 105 – Use of VCR user id.....	259
Table 106 – Use of FDA address.....	259
Table 107 – Initiate.....	261
Table 108 – Connect option.....	262
Table 109 – Find tag query service parameters.....	267
Table 110 – SMK IDs.....	267
Table 111 – Find tag reply service parameters.....	269
Table 112 – Identify service parameters.....	271
Table 113 – Annunciate service parameters.....	274
Table 114 – Set assignment info service parameters.....	276
Table 115 – Clear assignment info service parameters.....	279
Table 116 – Clear address service parameters.....	281
Table 117 – Diagnostic message service.....	286
Table 118 – Get redundancy info service.....	287
Table 119 – Put redundancy info service.....	289

Table 120 – Get redundancy statistics service .....	291
Table 121 – Open session service .....	299
Table 122 – Idle session service .....	302
Table 123 – FAL class summary .....	303
Table 124 – Services by AREP role .....	304

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELDBUS SPECIFICATIONS –****Part 5-5: Application layer service definition –  
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.
- 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.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 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 61158-5-5 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:

- Added message padding

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

FDIS	Report on voting
65C/763/FDIS	65C/773/RVD

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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## 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 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 5-5: Application layer service definition – 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 service provided by the Type 5 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

- 1) the FAL user at the boundary between the user and the application layer of the fieldbus reference model, and
- 2) 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 2 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.

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 does it 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 5 application layer services as defined in this standard.

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

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

IEC 61158-3-1, *Industrial communication networks – Fieldbus specifications – Part 3-1: Data-link layer service definition – Type 1 elements*

IEC 61158-4-1, *Industrial communication networks – Fieldbus specifications – Part 4-1: Data-link layer protocol specification – Type 1 elements*

IEC 61158-5:2014 (all parts), *Industrial communication networks – Fieldbus specifications – Part 5: Application layer service definition*

IEC 61158-6-5, *Industrial communication networks – Fieldbus specifications – Part 6-5: Application layer protocol specification – Type 5 elements*

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 – Part 1: The Basic Model*

ISO/IEC 8822, *Information technology – Open Systems Interconnection – Presentation service definition*

ISO/IEC 8824: 1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1)*<sup>1</sup>

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*

ANSI/IEEE 754-1985, *Binary Floating-Point Arithmetic*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**

---

<sup>1</sup> Withdrawn.