



SLOVENSKI STANDARD SIST EN 61158-5-20:2015

01-marec-2015

Nadomešča:

SIST EN 61158-5-20:2012

**Industrijska komunikacijska omrežja - Specifikacije za procesna vodila - 5-20. del:
Definicija opravil na aplikacijski ravni - Elementi tipa 20 (IEC 61158-5-20:2014)**

Industrial communication networks - Fieldbus specifications - Part 5-20: Application layer service definition - Type 20 elements (IEC 61158-5-20:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-20: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 20-Elemente (IEC 61158-5-20:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-20: Définition des services de la couche application - Éléments de type 20 (CEI 61158-5-20:2014)

Ta slovenski standard je istoveten z: EN 61158-5-20:2014

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.70	Uporabniški sloj	Application layer
35.110	Omreževanje	Networking

SIST EN 61158-5-20:2015

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61158-5-20:2015

<https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4745fc9c26e4/sist-en-61158-5-20-2015>

EUROPEAN STANDARD

EN 61158-5-20

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2014

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-5-20:2012

English Version

**Industrial communication networks - Fieldbus specifications -
Part 5-20: Application layer service definition - Type 20 elements
(IEC 61158-5-20:2014)**

Réseaux de communication industriels - Spécifications des
bus de terrain - Partie 5-20: Définition des services de la
couche application - Eléments de type 20
(CEI 61158-5-20:2014)

Industrielle Kommunikationsnetze - Feldbusse -
Teil 5-20: Dienstfestlegungen des Application Layer
(Anwendungsschicht) - Typ 20-Elemente
(IEC 61158-5-20:2014)

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.

[SIST EN 61158-5-20:2015](#)

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 3 of IEC 61158-5-20, 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 61158-5-20:2014.

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 61158-5-20:2012.

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

The text of the International Standard IEC 61158-5-20:2014 was approved by CENELEC as a European Standard without any modification.

<https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4b5102010101/iec-61158-5-20-2014>

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61158-6-20	NOTE	Harmonized as EN 61158-6-20.
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	2014	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	2014
IEC 62591	2010	Industrial communication networks - Wireless communication network and communication profiles - WirelessHART™	EN 62591	2010
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic reference model: The basic model	-	-
ISO/IEC 8824-1	-	Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation	-	-
ISO/IEC 8859-1	-	Information technology - 8-bit single-byte coded graphic character sets - Part-1: Latin alphabet No. 1	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application layer structure	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
IEEE 754	-	IEEE Standard for Floating-Point Arithmetic	-	-

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61158-5-20:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4745fc9c26e4/sist-en-61158-5-20-2015>



IEC 61158-5-20

Edition 3.0 2014-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial communication networks – Fieldbus specifications –
Part 5-20: Application layer service definition – Type 20 elements

Réseaux de communication industriels – Spécifications des bus de terrain –
Partie 5-20: Définition des services de la couche application – Éléments
de type 20

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

XA

ICS 25.040.40; 35.100.70; 35.110

ISBN 978-2-8322-1741-2

**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.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms, definitions, symbols, abbreviations and conventions.....	7
3.1 Terms and definitions from other ISO/IEC standards.....	7
3.2 IEC 61158-1 terms.....	8
3.3 Type 20 fieldbus application-layer specific definitions.....	10
3.4 Abbreviations and symbols.....	12
3.5 Conventions.....	13
4 Concepts.....	16
5 Data type ASE.....	16
5.1 Overview.....	16
5.2 Formal definition of data type objects.....	18
5.3 FAL defined data types.....	20
5.4 Data type ASE service specification.....	23
5.5 Summary of data types.....	24
6 Communication model specification.....	24
6.1 Common parameters.....	24
6.2 ASEs.....	25
6.3 ARs.....	52
6.4 Summary of classes.....	54
6.5 Permitted services by AREP role.....	55
Bibliography.....	56
Figure 1 – Data type class hierarchy.....	17
Figure 2 – VFD model.....	25
Table 1 – Packed ASCII character set.....	23
Table 2 – ISO Latin-1 characters.....	23
Table 3 – Data type summary.....	24
Table 4 – Response code values.....	24
Table 5 – Communication status values.....	25
Table 6 – Identify service parameters.....	28
Table 7 – Read service parameters.....	32
Table 8 – Write service parameters.....	33
Table 9 – Information report parameters.....	34
Table 10 – Action service parameters.....	36
Table 11 – AR get attributes service parameters.....	53
Table 12 – AR set attributes service parameters.....	54
Table 13 – Class summary.....	55
Table 14 – Confirmed services by AREP class.....	55
Table 15 – Unconfirmed services by AREP class.....	55

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELD BUS SPECIFICATIONS –**
**Part 5-20: Application layer service definition –
Type 20 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 61158-5-20 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 change with respect to the previous edition is listed below:

- added Data types;
- added services;
- updated the Normative references, Terms, definitions, symbols, abbreviations;
- corrected the editorial errors and the text.

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

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
[SIST EN 61158-5-20:2015](https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4745fc9c26e4/sist-en-61158-5-20-2015)
<https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4745fc9c26e4/sist-en-61158-5-20-2015>

INTRODUCTION

This document is one of a series produced to facilitate the interconnection of automation system components. It is related to other documents 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 document 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 document is a conceptual architectural service, independent of administrative and implementation divisions.

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[SIST EN 61158-5-20:2015](https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4745fc9c26e4/sist-en-61158-5-20-2015)

<https://standards.iteh.ai/catalog/standards/sist/3e101174-bc2b-4c3b-8460-4745fc9c26e4/sist-en-61158-5-20-2015>

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-20: Application layer service definition –

1 Scope

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 International 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 20 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 International Standard defines in an abstract way the externally visible service provided by the Type 20 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 International Standard is to define the services provided to the FAL user at the boundary between the user and the Application Layer of the Fieldbus Reference Model.

This International Standard specifies the structure and services of the 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).

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 International Standard to provide access to the FAL to control certain aspects of its operation.

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 62591:2010, *Industrial communication networks – Wireless communication network and communication profiles – WirelessHART™*

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

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

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

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

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

ANSI/IEEE 754: *IEEE Standard for Floating-Point Arithmetic*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3 Terms, definitions, symbols, abbreviations and conventions

For the purposes of this document, the following terms, definitions, abbreviations, symbols and conventions apply.

3.1 Terms and definitions from other ISO/IEC standards

3.1.1 ISO/IEC 7498-1 terms

- a) abstract syntax
- b) application entity
- c) application process
- d) application protocol data unit
- e) application service element

3.1.2 ISO/IEC 9545 terms

- a) application-entity-invocation
- b) application-service-element
- c) application-service-element

3.1.3 ISO/IEC 8824-1 terms

- a) object identifier
- b) type
- c) value
- d) simple type
- e) structured type
- f) component type

- g) tag
- h) true
- i) false
- j) integer type
- k) octet string type
- m) null type

3.2 IEC 61158-1 terms

For the purposes of this document, the following terms and definitions apply.

3.2.1

application

function or data structure for which data is consumed or produced

3.2.2

application object

object class that manages and provides the run time exchange of messages across the network and within the network device

Note 1 to entry: Multiple types of application object classes may be defined.

3.2.3

application process

part of a distributed application on a network, which is located on one device and unambiguously addressed

3.2.4

application process object

component of an application process that is identifiable and accessible through an FAL application relationship

Note 1 to entry: Application process object definitions are composed of a set of values for the attributes of their class (see the definition for Application Process Object Class Definition). Application process object definitions may be accessed remotely using the services of the FAL Object Management ASE. FAL Object Management services can be used to load or update object definitions, to read object definitions, and to dynamically create and delete application objects and their corresponding definitions

3.2.5

application process object class

class of application process objects defined in terms of the set of their network-accessible attributes and services

3.2.6

application relationship

cooperative association between two or more application-entity-invocations for the purpose of exchange of information and coordination of their joint operation

Note 1 to entry: This relationship is activated either by the exchange of application-protocol-data-units or as a result of pre-configuration activities

3.2.7

application relationship endpoint

context and behavior of an application relationship as seen and maintained by one of the application processes involved in the application relationship

Note 1 to entry: Each application process involved in the application relationship maintains its own application relationship endpoint

3.2.8**attribute**

description of an externally visible characteristic or feature of an object

Note 1 to entry: The attributes of an object contain information about variable portions of an object. Typically, they provide status information or govern the operation of an object. Attributes may also affect the behaviour of an object. Attributes are divided into class attributes and instance attributes

3.2.9**behaviour**

indication of how the object responds to particular events

Note 1 to entry: Its description includes the relationship between attribute values and services.

3.2.10**class**

set of objects, all of which represent the same kind of system component

Note 1 to entry: A class is a generalisation of the object; a template for defining variables and methods. All objects in a class are identical in form and behaviour, but usually contain different data in their attributes

3.2.11**class attributes**

attribute that is shared by all objects within the same class

3.2.12**class code**

unique identifier assigned to each object class

3.2.13**class specific service**

service defined by a particular object class to perform a required function which is not performed by a common service

Note 1 to entry: A class specific object is unique to the object class which defines it.

3.2.14**client**

- a) an object which uses the services of another (server) object to perform a task
- b) an initiator of a message to which a server reacts, such as the role of an AR endpoint in which it issues confirmed service request APDUs to a single AR endpoint acting as a server

3.2.15**conveyance path**

unidirectional flow of APDUs across an application relationship

3.2.16**cyclic**

term used to describe events which repeat in a regular and repetitive manner

3.2.17**endpoint**

one of the communicating entities involved in a connection

3.2.18**error**

discrepancy between a computed, observed or measured value or condition and the specified or theoretically correct value or condition