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Industriell processtyrning – Fältbuss – Del 5-4: Definition av tjänster i applikationsskiktet – Delar i fältbuss, Typ 4

*Industrial communication networks –
Fieldbus specifications –
Part 5-4: Application layer service definition –
Type 4 elements*

Som svensk standard gäller europastandarden EN IEC 61158-5-4:2019. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61158-5-4:2019.

Nationellt förord

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- **IEC 61158-5-4, Third edition, 2019 - Industrial communication networks - Fieldbus specifications - Part 5-4: Application layer service definition - Type 4 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-5-4, utgåva 2, 2015, gäller ej fr o m 2022-05-15.

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English Version

**Industrial communication networks - Fieldbus specifications -
Part 5-4: Application layer service definition - Type 4 elements
(IEC 61158-5-4:2019)**

Réseaux de communication industriels - Spécifications des
bus de terrain - Partie 5-4 : Définition des services de la
couche application - Éléments de type 4
(IEC 61158-5-4:2019)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-4:
Dienstfestlegungen des Application Layer
(Anwendungsschicht) - Typ 4-Elemente
(IEC 61158-5-4:2019)

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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.

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.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 65C/947/FDIS, future edition 3 of IEC 61158-5-4, 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 IEC 61158-5-4:2019.

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) 2020-02-15
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-15

This document supersedes EN 61158-5-4:2014.

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

Endorsement notice

The text of the International Standard IEC 61158-5-4:2019 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 61158-1:2019	NOTE	Harmonized as EN IEC 61158-1:2019 (not modified)
IEC 61158-2	NOTE	Harmonized as EN 61158-2
IEC 61784-1:2019	NOTE	Harmonized as EN IEC 61784-1:2019 (not modified)
IEC 61784-2:2019	NOTE	Harmonized as EN IEC 61784-2:2019 (not modified)

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where 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 61158-3-4	2019	Industrial communication networks - Fieldbus specifications - Part 3-4: Data-link layer service definition - Type 4 elements	EN IEC 61158-3-4	2019
IEC 61158-4-4	2019	Industrial communication networks - Fieldbus specifications - Part 4-4: Data-link layer protocol specification - Type 4 elements	EN IEC 61158-4-4	2019
IEC 61158-6-4	2019	Industrial communication networks - Fieldbus specifications - Part 6-4: Application layer protocol specification - Type 4 elements	EN 61158-6-4	2019
IEC 61158-6	series	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN 61158-6	series
ISO/IEC 7498-1	-	Information technology - Open Systems - Interconnection - Basic Reference Model: The Basic Model		-
ISO/IEC 7498-3	-	Information technology - Open Systems - Interconnection - Basic Reference Model: Naming and addressing		-
ISO/IEC 8822	-	Information technology - Open Systems - Interconnection - Presentation service definition		-
ISO/IEC 8824-1	-	Information technology - Abstract Syntax - Notation One (ASN.1): Specification of basic notation		-
ISO/IEC 9545	-	Information technology - Open Systems - Interconnection - Application layer structure		-
ISO/IEC 10731	-	Information technology - Open Systems - Interconnection - Basic Reference Model - Conventions for the definition of OSI services		-
ISO/IEC/IEEE 60559	-	Information technology - Microprocessor - Systems - Floating-Point arithmetic		-

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
1.1 General.....	8
1.2 Specifications	9
1.3 Conformance	9
2 Normative references	9
3 Terms, definitions, symbols, abbreviations and conventions	10
3.1 ISO/IEC 7498-1 terms.....	10
3.2 ISO/IEC 8822 terms.....	10
3.3 ISO/IEC 9545 terms.....	10
3.4 ISO/IEC 8824-1 terms.....	11
3.5 Fieldbus data-link layer terms	11
3.6 Fieldbus application layer specific definitions.....	11
3.7 Abbreviations and symbols	17
3.8 Conventions.....	18
3.8.1 Overview	18
3.8.2 General conventions.....	19
3.8.3 Conventions for class definitions	19
3.8.4 Conventions for service definitions	20
4 Concepts.....	21
4.1 Overview	21
4.2 Architectural relationships.....	22
4.2.1 Relationship to the Application Layer of the OSI basic reference model.....	22
4.2.2 Relationships to other fieldbus entities	22
4.3 Fieldbus Application Layer structure	24
4.3.1 Overview	24
4.3.2 Fundamental concepts.....	24
4.3.3 Fieldbus application processes	24
4.3.4 Application process objects	28
4.3.5 Application entities	30
4.3.6 Fieldbus application service elements.....	31
4.3.7 Application relationships.....	34
4.4 Fieldbus Application Layer naming and addressing	36
4.4.1 General	36
4.4.2 Identifying objects accessed through the FAL	36
4.4.3 Addressing APs accessed through the FAL	37
4.5 Architecture summary	37
4.6 FAL service procedures	37
4.6.1 FAL confirmed service procedures.....	37
4.6.2 FAL unconfirmed service procedures.....	38
4.7 Common FAL attributes	38
4.8 Common FAL service parameters	39
4.9 APDU size	39

5	Type 4 communication model specification	40
5.1	Concepts	40
5.1.1	Overview	40
5.1.2	Application entities	40
5.1.3	Gateway and routing	42
5.1.4	Architecture summary	43
5.1.5	FAL service procedures and time sequence diagrams	44
5.2	Variable ASE	46
5.2.1	Variable types	46
5.2.2	Variable model class specification	48
5.2.3	Basic variable type specifications	49
5.2.4	Constructed variable type specifications	53
5.2.5	Route endpoint ASE	57
5.2.6	Route endpoint ASE service specification	60
5.3	Application relationship ASE	64
5.3.1	Overview	64
5.3.2	Application relationship class specification	65
5.3.3	Application relationship ASE service specifications	66
	Bibliography	71
	Figure 1 – Relationship to the OSI basic reference model	22
	Figure 2 – Architectural positioning of the fieldbus Application Layer	23
	Figure 3 – Client/server interactions	25
	Figure 4 – Pull model interactions	26
	Figure 5 – Push model interactions	27
	Figure 6 – APOs services conveyed by the FAL	29
	Figure 7 – Application entity structure	30
	Figure 8 – Example FAL ASEs	32
	Figure 9 – FAL management of objects	32
	Figure 10 – ASE service conveyance	33
	Figure 11 – Defined and established AREPs	36
	Figure 12 – FAL architectural components	37
	Figure 13 – FAL AE	41
	Figure 14 – Summary of the FAL architecture	43
	Figure 15 – FAL service procedure overview	44
	Figure 16 – Time sequence diagram for the confirmed services	45
	Figure 17 – Time sequence diagram for unconfirmed services	46
	Table 1 – REQUEST service parameters	60
	Table 2 – RESPONSE service parameters	61
	Table 3 – Error codes by source	62
	Table 4 – Reserve REP service parameters	63

Table 5 – Free AREP service parameters	63
Table 6 – Get REP attribute service parameters	63
Table 7 – Set REP attribute service parameters.....	64
Table 8 – AR send service parameters	68
Table 9 – AR acknowledge service parameters.....	68
Table 10 – AR get attributes service parameters.....	69
Table 11 – AR set attributes service parameters	69

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELDBUS SPECIFICATIONS –****Part 5-4: Application layer service definition –
Type 4 elements****FOREWORD**

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

International Standard IEC 61158-5-4 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 2014. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) additional user parameters to services;
- b) additional services to support distributed objects;
- c) additional secure services;

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/947/FDIS	65C/950/RVD

Full information on the voting for the approval of this International 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.

A bilingual version of this publication may be issued at a later date.

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 document 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 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.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-4: Application layer service definition – Type 4 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 part of IEC 61158 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 4 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 4 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 document 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 document specifies the structure and services of the Type 4 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 document to provide access to the FAL to control certain aspects of its operation.

1.2 Specifications

The principal objective of this document 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, and the corresponding protocols standardized in IEC 61158-6 (all subparts).

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 document 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 2 application layer services as defined in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 61158-3-4:2019, *Industrial communication networks – Fieldbus specifications – Part 3-4: Data-link layer service definition – Type 4 elements*

IEC 61158-4-4:2019, *Industrial communication networks – Fieldbus specifications – Part 4-4: Data-link layer protocol specification – Type 4 elements*

IEC 61158-6-4:2019, *Industrial communication networks – Fieldbus specifications – Part 6-4: Application layer protocol specification – Type 4 elements*

IEC 61158-6 (all subparts), *Industrial communication networks – Fieldbus specifications – Part 6: Application layer protocol specification*

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

ISO/IEC 7498-3, *Information technology – Open Systems Interconnection – Basic Reference Model – Part 3: Naming and addressing*

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

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

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

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

ISO/IEC/IEEE 60559, *Information technology – Microprocessor Systems – Floating-Point arithmetic*