



BSI Standards Publication

## Industrial communication networks - Fieldbus specifications

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Part 5-4: Application layer service definition - Type 4 elements

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## National foreword

This British Standard is the UK implementation of EN IEC 61158-5-4:2019. It is identical to IEC 61158-5-4:2019. It supersedes BS EN 61158-5-4:2014, which will be withdrawn on 15 May 2022.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/3, Industrial communications: process measurement and control, including fieldbus.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

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couche application - Éléments de type 4  
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(Anwendungsschicht) - Typ 4-Elemente  
(IEC 61158-5-4:2019)

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## European foreword

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-15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

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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)

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(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](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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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	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELD BUS SPECIFICATIONS –**

**Part 5-4: Application layer service definition –  
Type 4 elements**

FOREWORD

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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 61158-5-4 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.

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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.**

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## 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.

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## **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