

INTERNATIONAL STANDARD

**Industrial communication networks – Fieldbus specifications –
Part 5-26: Application layer service definition – Type 26 elements**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2019 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.

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

Tel.: +41 22 919 02 11
info@iec.ch
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 corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

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 It also gives information on projects, replaced and withdrawn publications.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

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

IEC Customer Service Centre - 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: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 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 61158-5-26

Edition 1.0 2019-04

INTERNATIONAL STANDARD

**Industrial communication networks – Fieldbus specifications –
Part 5-26: Application layer service definition – Type 26 elements**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.40; 35.100.70; 35.110

ISBN 978-2-8322-6768-4

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
1.1 Overview	8
1.2 Specifications	9
1.3 Conformance	9
2 Normative references	9
3 Terms, definitions, symbols, abbreviations and conventions	10
3.1 Terms and definitions from other ISO/IEC standards.....	11
3.1.1 Terms and definitions from ISO/IEC 7498-1	11
3.1.2 Terms and definitions from ISO/IEC 8822	11
3.1.3 Terms and definitions from ISO/IEC 9545	11
3.1.4 Terms and definitions from ISO/IEC 8824-1	11
3.2 Fieldbus application layer Type 26-specific definitions	12
3.3 Abbreviations and symbols	18
3.4 Conventions.....	20
3.4.1 Overview	20
3.4.2 General conventions.....	20
3.4.3 Conventions for class definitions	20
3.4.4 Conventions for service definitions	21
4 Concepts	22
5 Data type ASE	23
5.1 Overview	23
5.2 Formal definition of data type objects.....	23
5.2.1 Data type class definitions	23
5.2.2 Attributes	24
5.3 FAL defined data types	25
5.3.1 Fixed length types	25
5.3.2 String types	29
5.4 Data type ASE service specification.....	30
6 Communication model specification	30
6.1 General.....	30
6.2 Protocol stack for Type 26 fieldbus	30
6.3 Overview of Type 26 communication model	31
6.4 Cyclic data communication service with Common-memory.....	32
6.4.1 Overview	32
6.4.2 Common-memory: allocation to each node.....	32
6.4.3 Data sharing among nodes with the CM.....	33
6.4.4 CM data type	35
6.5 ASEs	35
6.5.1 Overview of Type 26 ASEs	35
6.5.2 Type 26 specific conventions for FAL service common parameters.....	36
6.5.3 Cyclic-data ASE.....	37
6.5.4 Message data ASE	42
6.5.5 Communication load measurement ASE	69
6.5.6 Network management ASE	74

6.5.7	General purpose command server ASE	87
6.5.8	AR ASE	90
6.5.9	FAL ASE summary	101
Bibliography.....		104
Figure 1	– Protocol stack for Type 26 fieldbus	31
Figure 2	– Unconfirmed Push-Publisher/Subscriber type interaction	32
Figure 3	– Unconfirmed/Confirmed Client/Server type interaction	32
Figure 4	– Common memory allocation	33
Figure 5	– Data sharing with the CM	34
Figure 6	– Node #01 for reception only	34
Figure 7	– Node #01 without the CM	35
Figure 8	– The structure of ASEs for Type 26 FAL	36
Figure 9	– Virtual-address-space for Byte block	45
Figure 10	– Virtual-address-space for Word block	48
Figure 11	– AR ASE internal architecture	91
Figure 12	– Structure of IP address	99
Table 1	– Write service parameters.....	39
Table 2	– Send-CM service parameters	40
Table 3	– Read service parameters.....	40
Table 4	– Update memory service parameters	41
Table 5	– Get- buffer service parameters	42
Table 6	– Byte block read service parameters.....	46
Table 7	– Byte block write service parameters	47
Table 8	– Word block read service parameters	48
Table 9	– Word block write service parameters	49
Table 10	– Network parameter read service parameters	50
Table 11	– Network parameter write service parameters	51
Table 12	– Stop command service parameters.....	52
Table 13	– Operation command service parameters.....	53
Table 14	– profile read service parameters	53
Table 15	– Transparent message service parameters	56
Table 16	– Log data read service parameters	57
Table 17	– Log data items.....	57
Table 18	– Log data clear service parameters.....	61
Table 19	– Message return service parameters.....	62
Table 20	– Vendor specific message service parameters	63
Table 21	– Set remote node configuration parameter service parameters	64
Table 22	– Data elements and Node configuration parameters.....	64
Table 23	– Service parameters of Read remote participating node management information parameter service.....	65
Table 24	– Participating node management information parameters.....	66
Table 25	– Read remote node management information parameter service parameters	67

Table 26 – Node management information parameters	67
Table 27 – Read remote node setting information parameter service parameters.....	68
Table 28 –Node setting information parameters	69
Table 29 – Start TK-holding-time measurement service parameters.....	71
Table 30 – Terminate TK-holding-time measurement service parameters.....	71
Table 31 – Token-holding-time measurement result	72
Table 32 – Start GP_Comm sender log service parameters	73
Table 33 – Terminate GP_Comm sender log service parameters	73
Table 34 – GP_Comm sender log measurement result.....	74
Table 35 – Service parameters for Set configuration parameter	77
Table 36 – Configuration parameters	78
Table 37 – Read node management information parameter service parameters	78
Table 38 – Node management information parameters	79
Table 39 – Service parameters for Read participating node mgt. information parameter	80
Table 40 – Participating node management information parameters.....	80
Table 41 – Service parameters for Read network management information parameter.....	81
Table 42 – Network management information parameters	81
Table 43 – Service parameters for Read message sequence number management information.....	82
Table 44 – Read message sequence number management information parameters	82
Table 45 –Read node status service parameters.....	83
Table 46 – Read node status parameters.....	83
Table 47 – Upper layer operating condition matrix	84
Table 48 –Reset node service parameters	84
Table 49 – Set network address service parameters	85
Table 50 – Register service parameters.....	85
Table 51 – Event service parameters	86
Table 52 – Activate/Deactivate measurement service parameters	86
Table 53 – Get log data service parameters.....	87
Table 54 – Send command service parameters.....	90
Table 55 – CT send service parameters.....	93
Table 56 – MT send service parameters	95
Table 57 – CS send service parameters.....	96
Table 58 – Notify state change service parameters	97
Table 59 – Control measurement service parameters.....	97
Table 60 – DLSAP assignments.....	99
Table 61 – DLS Primitives and parameters	100
Table 62 – Lower layer T-profile and the required standards.....	101
Table 63 – Summary of FAL ASEs	101

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELD BUS SPECIFICATIONS –****Part 5-26: Application layer service definition –
Type 26 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.

International Standard IEC 61158-5-26 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement and control.

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 the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC website.

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.

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 5-26: Application layer service definition – Type 26 elements

1 Scope

1.1 Overview

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 26 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 different Types of 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

- a) the FAL user at the boundary between the user and the Application Layer of the Fieldbus Reference Model, and
- b) 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 IEC Fieldbus Application Layer, in conformance with the OSI Basic Reference Model (see ISO/IEC 7498-1) and the OSI Application Layer Structure (see 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