

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Industrial communication networks – Fieldbus specifications –  
Part 5-12: Application layer service definition – Type 12 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 5-12: Définition des services de la couche liaison de données –  
Éléments de type 12**





## 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.

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  
[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 corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://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 It also gives information on projects, replaced and withdrawn publications.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 online collection - [oc.iec.ch](http://oc.iec.ch)

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

#### 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 once a month by email.

#### Electropedia - [www.electropedia.org](http://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 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### 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: [sales@iec.ch](mailto:sales@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.

#### Recherche de publications IEC -

[webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

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 online collection - [oc.iec.ch](http://oc.iec.ch)

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

#### 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 une fois par mois par email.

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

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### 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: [sales@iec.ch](mailto:sales@iec.ch).



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Industrial communication networks – Fieldbus specifications –  
Part 5-12: Application layer service definition – Type 12 elements  
(standards.iteh.ai)

Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 5-12: Définition des services de la couche liaison de données –  
Éléments de type 12  
0aacad565198/iec-61158-5-12-2019

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 25.040.40; 35.100.70; 35.110

ISBN 978-2-8322-9168-9

**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.....	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 Reference model terms and definitions .....	10
3.2 Service convention terms and definitions .....	11
3.3 Application layer and data-link service terms and definitions.....	11
3.4 Common symbols and abbreviations .....	15
3.5 Conventions.....	16
4 Concepts .....	17
4.1 Common concepts .....	17
4.2 Type specific concepts.....	17
4.2.1 Operating principle .....	17
4.2.2 Communication model overview.....	18
4.2.3 Application layer element description.....	18
4.2.4 Slave reference model .....	20
4.2.5 Master reference model.....	22
5 Data type ASE.....	24
5.1 General.....	24
5.2 Formal definition of data type objects.....	24
5.3 FAL defined data types .....	24
5.3.1 Fixed length types .....	24
5.3.2 String types .....	32
5.3.3 GUID Types.....	33
5.4 Data type ASE service specification.....	33
6 Communication model specification.....	33
6.1 ASEs .....	33
6.1.1 Process data ASE.....	33
6.1.2 SII ASE .....	40
6.1.3 Isochronous ASE.....	49
6.1.4 CoE ASE .....	52
6.1.5 EoE ASE .....	85
6.1.6 FoE ASE.....	94
6.1.7 MBX ASE .....	100
6.2 AR.....	105
6.2.1 Overview .....	105
6.2.2 AR control class specification .....	110
6.2.3 AR service specification .....	114
Bibliography.....	117
Figure 1 – Producer consumer model.....	19
Figure 2 – Client server model.....	19

Figure 3 – Server triggered invocation .....	19
Figure 4 – Slave reference model .....	20
Figure 5 – Simple slave device .....	21
Figure 6 – Complex slave device .....	22
Figure 7 – Master functional overview .....	23
Figure 8 – Process output data sequence .....	34
Figure 9 – Process input data sequence .....	35
Figure 10 – CoE server model .....	52
Figure 11 – Successful single SDO-Download sequence .....	57
Figure 12 – Unsuccessful single SDO-Download sequence .....	58
Figure 13 – Successful segmented SDO-Download sequence .....	58
Figure 14 – Successful single SDO-Upload sequence .....	59
Figure 15 – Unsuccessful single SDO-Upload sequence .....	59
Figure 16 – Successful segmented SDO-Upload sequence .....	60
Figure 17 – SDO information sequence .....	61
Figure 18 – Emergency service .....	62
Figure 19 – Command sequence .....	63
Figure 20 – PDO mapping .....	64
Figure 21 – Sync manager PDO assignment .....	64
Figure 22 – RxPDO service .....	66
Figure 23 – TxPDO service .....	66
Figure 24 – RxPDO remote transmission sequence .....	67
Figure 25 – TxPDO remote transmission sequence .....	67
Figure 26 – EoE sequence .....	87
Figure 27 – FoE read sequence with success .....	94
Figure 28 – FoE read sequence with error .....	95
Figure 29 – FoE write sequence with success .....	95
Figure 30 – FoE write sequence with error .....	96
Figure 31 – FoE write sequence with busy .....	96
Figure 32 – Successful AL control sequence .....	106
Figure 33 – Unsuccessful AL control sequence .....	107
Figure 34 – AL state changed sequence .....	108
Table 1 – Process output data .....	37
Table 2 – Process input data .....	38
Table 3 – Update process input data .....	39
Table 4 – SII read .....	47
Table 5 – SII write .....	48
Table 6 – SII reload .....	49
Table 7 – Allocation of SDO areas .....	53
Table 8 – SDO download expedited .....	71
Table 9 – SDO download normal .....	72
Table 10 – Download SDO segment .....	73

Table 11 – SDO upload expedited.....	74
Table 12 – SDO upload normal.....	75
Table 13 – Upload SDO segment.....	76
Table 14 – Abort SDO transfer.....	76
Table 15 – Get OD list.....	77
Table 16 – OD list segment.....	78
Table 17 – Get object description.....	79
Table 18 – Get entry description.....	80
Table 19 – Object entry segment.....	82
Table 20 – Emergency.....	83
Table 21 – RxPDO.....	84
Table 22 – TxPDO.....	84
Table 23 – RxPDO remote transmission.....	85
Table 24 – TxPDO remote transmission.....	85
Table 25 – Initiate EoE.....	90
Table 26 – EoE fragment.....	91
Table 27 – Set IP parameter.....	92
Table 28 – Set address filter.....	93
Table 29 – FoE read.....	98
Table 30 – FoE write.....	98
Table 31 – FoE data.....	99
Table 32 – FoE ack.....	99
Table 33 – FoE busy.....	100
Table 34 – FoE error.....	100
Table 35 – MBX read.....	102
Table 36 – MBX write.....	103
Table 37 – MBX read upd.....	104
Table 38 – AL management and ESM service primitives.....	105
Table 39 – AL control.....	115
Table 40 – AL state change.....	116

iTech STANDARD PREVIEW  
(standards.itech.ai)

<https://standards.itech.ai/catalog/standards/sist/cfb98257-6123-4607-a95b-0aacad565198/iec-61158-5-12-2019>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELDBUS SPECIFICATIONS –****Part 5-12: Application layer service definition –  
Type 12 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 61158-5-12 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fourth edition cancels and replaces the third edition published in 2014. This edition constitutes a technical revision.

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

- Technical corrections; and
- Editorial improvements for clarification.

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 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)

[IEC 61158-5-12:2019](https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019)

<https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019>



## 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.

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

[IEC 61158-5-12:2019](https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019)

<https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019>

## INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

### Part 5-12: Application layer service definition – Type 12 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 12 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 the 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 (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 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 subparts of IEC 61158-6.

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 any given Type of 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 61131-3, *Programmable controllers – Part 3: Programming languages*

IEC 61158-1:2019, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

IEC 61158-3-12:2019, *Industrial communication networks – Fieldbus specifications – Part 3-12: Data-link layer service definition – Type 12 elements*

ISO/IEC 646:1991, *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 7498-3, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing*

ISO/IEC/IEEE 8802-3, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Standard for Ethernet*

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

ISO/IEC 10646, *Information technology – Universal Coded Character Set (UCS)*

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*

IEEE Std 802.1D, *IEEE standard for local and metropolitan area networks – Media access control (MAC) Bridges*; available at <http://www.ieee.org> [viewed 2018-09-11]

IETF RFC 791, *Internet Protocol darpa internet program protocol specification*; available at <http://www.ietf.org> [viewed 2018-09-11]

**iTeh STANDARD PREVIEW**

### 3 Terms, definitions, symbols, abbreviations and conventions

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

<https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019>

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1 Reference model terms and definitions

This document is based in part on the concepts developed in ISO/IEC 7498-1 and ISO/IEC 7498-3, and makes use of the following terms defined therein:

<b>3.1.1</b>	<b>correspondent (N)-entities correspondent AL-entities (N=7)</b>	[ISO/IEC 7498-1]
<b>3.1.2</b>	<b>(N)-entity AL-entity (N=7)</b>	[ISO/IEC 7498-1]
<b>3.1.3</b>	<b>(N)-layer AL-layer (N=7)</b>	[ISO/IEC 7498-1]
<b>3.1.4</b>	<b>layer-management</b>	[ISO/IEC 7498-1]
<b>3.1.5</b>	<b>peer-entities</b>	[ISO/IEC 7498-1]
<b>3.1.6</b>	<b>primitive name</b>	[ISO/IEC 7498-3]
<b>3.1.7</b>	<b>AL-protocol</b>	[ISO/IEC 7498-1]
<b>3.1.8</b>	<b>AL-protocol-data-unit</b>	[ISO/IEC 7498-1]

<b>3.1.9</b>	<b>reset</b>	[ISO/IEC 7498-1]
<b>3.1.10</b>	<b>routing</b>	[ISO/IEC 7498-1]
<b>3.1.11</b>	<b>segmenting</b>	[ISO/IEC 7498-1]
<b>3.1.12</b>	<b>(N)-service AL-service (N=7)</b>	[ISO/IEC 7498-1]
<b>3.1.13</b>	<b>AL-service-data-unit</b>	[ISO/IEC 7498-1]
<b>3.1.14</b>	<b>AL-simplex-transmission</b>	[ISO/IEC 7498-1]
<b>3.1.15</b>	<b>AL-subsystem</b>	[ISO/IEC 7498-1]
<b>3.1.16</b>	<b>systems-management</b>	[ISO/IEC 7498-1]
<b>3.1.17</b>	<b>AL-user-data</b>	[ISO/IEC 7498-1]

### **3.2 Service convention terms and definitions**

This document also makes use of the following terms defined in ISO/IEC 10731 as they apply to the data-link layer:

<b>3.2.1</b>	<b>acceptor</b>	
<b>3.2.2</b>	<b>asymmetrical service</b>	
<b>3.2.3</b>	<b>confirm (primitive); requestor.deliver (primitive)</b>	
<b>3.2.4</b>	<b>deliver (primitive)</b>	
<b>3.2.5</b>	<b>AL-service-primitive; primitive</b>	<a href="https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019">IEC 61158-5-12:2019 https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019</a>
<b>3.2.6</b>	<b>AL-service-provider</b>	
<b>3.2.7</b>	<b>AL-service-user</b>	
<b>3.2.8</b>	<b>indication (primitive); acceptor.deliver (primitive)</b>	
<b>3.2.9</b>	<b>request (primitive); requestor.submit (primitive)</b>	
<b>3.2.10</b>	<b>requestor</b>	
<b>3.2.11</b>	<b>response (primitive); acceptor.submit (primitive)</b>	
<b>3.2.12</b>	<b>submit (primitive)</b>	
<b>3.2.13</b>	<b>symmetrical service</b>	

### **3.3 Application layer and data-link service terms and definitions**

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

#### **3.3.1**

##### **application**

function or data structure for which data is consumed or produced

#### **3.3.2**

##### **application objects**

multiple object classes that manage and provide a run time exchange of messages across the network and within the network device

**3.3.3**

**basic slave**

slave device that supports only physical addressing of data

**3.3.4**

**bit**

unit of information consisting of a 1 or a 0

Note 1 to entry: This is the smallest data unit that can be transmitted.

**3.3.5**

**client**

<object> object which uses the services of another (server) object to perform a task

**3.3.6**

**client**

<message> initiator of a message to which a server reacts

**3.3.7**

**communication object**

component that manage and provide a run time exchange of messages across the network

**3.3.8**

**connection**

logical binding between two application objects within the same or different devices

**3.3.9**

**cyclic**

events which repeat in a regular and repetitive manner

<https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019>

**3.3.10**

**data**

generic term used to refer to any information carried over a fieldbus

**3.3.11**

**data consistency**

means for coherent transmission and access of the input- or output-data object between and within client and server

**3.3.12**

**data type**

relation between values and encoding for data of that type

Note 1 to entry: The data type definitions of IEC 61131-3 apply.

**3.3.13**

**data type object**

entry in the object dictionary indicating a data type

**3.3.14**

**default gateway**

device with at least two interfaces in two different IP subnets acting as router for a subnet.

**3.3.15**

**device**

physical entity connected to the fieldbus composed of at least one communication element (the network element) and which may have a control element and/or a final element (transducer, actuator, etc.)

**3.3.16****device profile**

collection of device dependent information and functionality providing consistency between similar devices of the same device

**3.3.17****diagnosis information**

all data available at the server for maintenance purposes

**3.3.18****distributed clocks**

method to synchronize slaves and maintain a global time base

**3.3.19****error**

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

**3.3.20****error class**

general grouping for related error definitions and corresponding error codes

**3.3.21****error code**

identification of a specific type of error within an error class

**3.3.22****event**

instance of a change of conditions [IEC 61158-5-12:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/efb98257-6123-4b07-a9bb-0aacad565198/iec-61158-5-12-2019>

**3.3.23****fieldbus memory management unit**

function that establishes one or several correspondences between logical addresses and physical memory

**3.3.24****fieldbus memory management unit entity**

single element of the fieldbus memory management unit: one correspondence between a coherent logical address space and a coherent physical memory location

**3.3.25****frame**

denigrated synonym for DLPDU

**3.3.26****full slave**

slave device that supports both physical and logical addressing of data

**3.3.27****index**

address of an object within an application process

**3.3.28****interface**

shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics as appropriate