

# INTERNATIONAL STANDARD

**Industrial communication networks – Fieldbus specifications –  
Part 3-19: Data-link layer service definition – Type 19 elements**

(<https://standards.iteh.ai>)

Document Preview

IEC 61158-3-19:2010

<https://standards.iteh.ai/cs/02/standards/iec/1a77e25f-f908-48fe-baac-8ca5c72eb9c4/iec-61158-3-19-2010>

WITHDRAWN



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2010 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  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [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 corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

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

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

IEC 111-3-19:2010

<https://standards.iec.ch/standards/iec/111/3-19:2010>



IEC 61158-3-19

Edition 2.0 2010-08

# INTERNATIONAL STANDARD

Industrial communication networks – Fieldbus specifications –  
Part 3-19: Data-link layer service definition – Type 19 elements

(<https://standards.iteh.ai>)  
Document Preview

IEC 61158-3-19:2010

<https://standards.iteh.ai/cs/192/standards/iec/1a77e25f-f908-48fe-baac-8ca5c72eb9c4/iec-61158-3-19-2010>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

T

ICS 25.04.40; 35.100.20; 35.110

ISBN 978-2-88912-078-9

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
1.1 Overview.....	6
1.2 Specifications.....	6
1.3 Conformance.....	6
2 Normative references.....	7
3 Terms, definitions, symbols, abbreviations and conventions.....	7
3.1 Reference model terms and definitions.....	7
3.2 Service convention terms and definitions.....	8
3.3 Data-link service terms and definitions.....	9
3.4 Symbols and abbreviations.....	12
3.5 Common conventions.....	13
4 Data-link services and concepts.....	14
4.1 Overview.....	14
4.2 Service channel services (SVC services).....	16
4.3 Hot-plug services.....	18
4.4 Realtime channel setup services (RTCS services).....	19
4.5 RTC services.....	21
Bibliography.....	25
Figure 1 – Relationships of DLSAPs, DLSAP-addresses and group DL-addresses.....	11
Table 1 – Summary of DL services and primitives.....	15
Table 2 – Read (RD).....	17
Table 3 – Write (WR).....	18
Table 4 – Enable_Hotplug (EHP).....	18
Table 5 – Notify_Hotplug (NHP).....	19
Table 6 – Initiate_cyclic_communication (ICC).....	20
Table 7 – Disable_cyclic_communication (DCC).....	21
Table 8 – Notify_Error (NER).....	21
Table 9 – Write_cyclic (WRC).....	22
Table 10 – Get_Device_Status (GDS).....	22
Table 11 – Write_Device_Status (WDS).....	23
Table 12 – Notify_Network_Status_Change (NNSC).....	24

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELDBUS SPECIFICATIONS –****Part 3-19: Data-link layer service definition –  
Type 19 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.

NOTE 1 Use of some of the associated protocol types is restricted by their 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 particular data-link layer protocol type to be used with physical layer and application layer protocols in type combinations as specified explicitly in the profile parts. Use of the various protocol types in other combinations may require permission of their respective intellectual-property-right holders.

International Standard IEC 61158-3-19 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- increasing the number of supported devices (511 instead of 254);

- introducing a communication version identification;
- adding a mechanism for remote address allocation;
- introducing enhanced parameter addressing (32 bit instead of 16 bit);
- restructuring control and status word;
- improving the redundancy and hotplug features;
- improving the error handling;
- adding a multiplexing protocol (SMP: Type 19 Messaging Protocol).

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

FDIS	Report on voting
65C/604/FDIS	65C/618/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.

NOTE 2 The revision of this standard will be synchronized with the other parts of the IEC 61158 series.

## INTRODUCTION

This part of IEC 61158 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/TR 61158-1.

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 data-link layer service defined in this standard is a conceptual architectural service, independent of administrative and implementation divisions.

Withhold

iTech Standards  
(<https://standards.itih.ai>)  
Document Preview

IEC 61158-3-19:2010  
<https://standards.itih.ai/standards/sc/1a77c25f-f908-48fe-baae-8ca5c72eb9c4/iec-61158-3-19-2010>

# INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

## Part 3-19: Data-link layer service definition – Type 19 elements

### 1 Scope

#### 1.1 Overview

This standard provides common elements for basic time-critical messaging communications between devices in an automation environment. 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 standard defines in an abstract way the externally visible service provided by the Type 19 fieldbus data-link layer in terms of

- a) the primitive actions and events of the service;
- b) the parameters associated with each primitive action and event, and the form which they take; and
- c) the interrelationship between these actions and events, and their valid sequences.

The purpose of this standard is to define the services provided to

- the Type 19 fieldbus application layer at the boundary between the application and data-link layers of the fieldbus reference model, and
- systems management at the boundary between the data-link layer and systems management of the fieldbus reference model.

#### 1.2 Specifications

The principal objective of this standard is to specify the characteristics of conceptual data-link layer services suitable for time-critical communications, and thus supplement the OSI Basic Reference Model in guiding the development of data-link protocols for time-critical communications. A secondary objective is to provide migration paths from previously-existing industrial communications protocols.

This standard may be used as the basis for formal DL-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 standard does not specify individual implementations or products, nor do they constrain the implementations of data-link entities within industrial automation systems.

There is no conformance of equipment to this data-link layer service definition standard. Instead, conformance is achieved through implementation of the corresponding data-link protocol that fulfills the Type 19 data-link layer services defined in this standard.



## 2 Normative references

The following referenced documents are indispensable for the application 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.

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

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

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

### 3.1 Reference model terms and definitions

This standard 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:

3.1.1 DL-address	[7498-3]
3.1.2 DL-address-mapping	[7498-1]
3.1.3 called-DL-address	[7498-3]
3.1.4 calling-DL-address	[7498-3]
3.1.5 centralized multi-end-point-connection	[7498-1]
3.1.6 DL-connection	[7498-1]
3.1.7 DL-connection-end-point	[7498-1]
3.1.8 DL-connection-end-point-identifier	[7498-1]
3.1.9 DL-connection-mode transmission	[7498-1]
3.1.10 DL-connectionless-mode transmission	[7498-1]
3.1.11 correspondent (N)-entities	[7498-1]
correspondent DL-entities (N=2)	
correspondent Ph-entities (N=1)	
3.1.12 DL-duplex-transmission	[7498-1]
3.1.13 (N)-entity	[7498-1]
DL-entity (N=2)	
Ph-entity (N=1)	
3.1.14 DL-facility	[7498-1]
3.1.15 flow control	[7498-1]

<b>3.1.16 (N)-layer</b>	[7498-1]
DL-layer (N=2)	
Ph-layer (N=1)	
<b>3.1.17 layer-management</b>	[7498-1]
<b>3.1.18 DL-local-view</b>	[7498-3]
<b>3.1.19 DL-name</b>	[7498-3]
<b>3.1.20 naming-(addressing)-domain</b>	[7498-3]
<b>3.1.21 peer-entities</b>	[7498-1]
<b>3.1.22 primitive name</b>	[7498-3]
<b>3.1.23 DL-protocol</b>	[7498-1]
<b>3.1.24 DL-protocol-connection-identifier</b>	[7498-1]
<b>3.1.25 DL-protocol-data-unit</b>	[7498-1]
<b>3.1.26 DL-relay</b>	[7498-1]
<b>3.1.27 reset</b>	[7498-1]
<b>3.1.28 responding-DL-address</b>	[7498-3]
<b>3.1.29 routing</b>	[7498-1]
<b>3.1.30 segmenting</b>	[7498-1]
<b>3.1.31 (N)-service</b>	[7498-1]
DL-service (N=2)	
Ph-service (N=1)	
<b>3.1.32 (N)-service-access-point</b>	[7498-1]
DL-service-access-point (N=2)	
Ph-service-access-point (N=1)	
<b>3.1.33 DL-service-access-point-address</b>	[7498-3]
<b>3.1.34 DL-service-connection-identifier</b>	[7498-1]
<b>3.1.35 DL-service-data-unit</b>	[7498-1]
<b>3.1.36 DL-simplex-transmission</b>	[7498-1]
<b>3.1.37 DL-subsystem</b>	[7498-1]
<b>3.1.38 systems-management</b>	[7498-1]
<b>3.1.39 DL-user-data</b>	[7498-1]

**3.2 Service convention terms and definitions**

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

**3.2.1 acceptor**

**3.2.2 asymmetrical service**

**3.2.3 confirm (primitive);  
requestor.deliver (primitive)**

**3.2.4 deliver (primitive)**

**3.2.5 DL-confirmed-facility**

**3.2.6 DL-facility**

**3.2.7 DL-local-view**

**3.2.8 DL-mandatory-facility**

**3.2.9 DL-non-confirmed-facility**

**3.2.10 DL-provider-initiated-facility**

**3.2.11 DL-provider-optional-facility**

**3.2.12 DL-service-primitive;  
primitive**

**3.2.13 DL-service-provider**

**3.2.14 DL-service-user**

**3.2.15 DL-user-optional-facility**

**3.2.16 indication (primitive);  
acceptor.deliver (primitive)**

**3.2.17 multi-peer**

**3.2.18 request (primitive);  
requestor.submit (primitive)**

**3.2.19 requestor**

**3.2.20 response (primitive);  
acceptor.submit (primitive)**

**3.2.21 submit (primitive)**

**3.2.22 symmetrical service**

### **3.3 Data-link service terms and definitions**

#### **3.3.1**

##### **communication cycle**

fixed time period between two master synchronization telegrams in which real-time telegrams are transmitted in the RT channel and non real-time telegrams are transmitted in the IP channel

#### **3.3.2**

##### **cycle time**

duration of a communication cycle

#### **3.3.3**

##### **cyclic communication**

periodic exchange of telegrams