

SLOVENSKI STANDARD

SIST EN 61158-3-12:2015

01-marec-2015

Nadomešča:

SIST EN 61158-3-12:2012

Industrijska komunikacijska omrežja - Specifikacije za procesna vodila - 3-12. del: Specifikacija protokola na ravni podatkovnih povezav - Elementi tipa 12 (IEC 61158-3-12:2014)

Industrial communication networks - Fieldbus specifications - Part 3-12: Data-link layer service definition - Type 12 elements (IEC 61158-3-12:2014)

iTeh STANDARD PREVIEW

Industrielle Kommunikationsnetze - Feldbusse - Teil 3-12: Dienstfestlegungen des Data Link Layer (Sicherheitsschicht) - Typ 12-Elemente (IEC 61158-3-12:2014)

[SIST EN 61158-3-12:2015](#)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 3-12: Définition des services de la couche liaison de données - Éléments de type 12 (CEI 61158-3-12:2014)

Ta slovenski standard je istoveten z: EN 61158-3-12:2014

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.20	Podatkovni povezovalni sloj	Data link layer
35.110	Omreževanje	Networking

SIST EN 61158-3-12:2015

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61158-3-12:2015](https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015)

<https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015>

EUROPEAN STANDARD

EN 61158-3-12

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2014

ICS 25.040.40; 35.100.20; 35.110

Supersedes EN 61158-3-12:2012

English Version

**Industrial communication networks - Fieldbus specifications -
Part 3-12: Data-link layer service definition - Type 12 elements
(IEC 61158-3-12:2014)**

Réseaux de communication industriels - Spécifications des
bus de terrain - Partie 3-12: Définition des services de la
couche liaison de données - Éléments de type 12
(CEI 61158-3-12:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 3-12:
Dienstfestlegungen des Data Link Layer
(Sicherheitsschicht) - Typ 12-Elemente
(IEC 61158-3-12:2014)

This European Standard was approved by CENELEC on 2014-09-17. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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.

SIST EN 61158-3-12:2015

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 65C/759/FDIS, future edition 3 of IEC 61158-3-12, 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 61158-3-12:2014.

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) 2015-06-17
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-09-17

This document supersedes EN 61158-3-12:2012.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd14111111/sist-en-61158-3-12-2015>
Endorsement notice

The text of the International Standard IEC 61158-3-12:2014 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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>
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 8802-3	-	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
IEEE 802.1D	-	IEEE Standard for local and metropolitan area networks - Media Access Control (MAC) Bridges	-	-

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61158-3-12:2015](https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015)

<https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015>



IEC 61158-3-12

Edition 3.0 2014-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Réseaux de communication industriels – Spécifications des bus de terrain –
Partie 3-12: Définition des services de la couche liaison de données – Éléments
de type 12**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX



ICS 25.040.40; 35.100.20; 35.110

ISBN 978-2-8322-1713-9

**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.....	4
INTRODUCTION.....	6
1 Scope.....	7
1.1 General.....	7
1.2 Specifications.....	7
1.3 Conformance.....	7
2 Normative references.....	8
3 Terms, definitions, symbols, abbreviations and conventions.....	8
3.1 Reference model terms and definitions.....	8
3.2 Service convention terms and definitions.....	9
3.3 Data-link service terms and definitions.....	10
3.4 Symbols and abbreviations.....	13
3.5 Common conventions.....	14
4 Data-link layer services and concepts.....	15
4.1 Operating principle.....	15
4.2 Topology.....	16
4.3 Data-link layer overview.....	16
4.4 Error detection overview.....	17
4.5 Parameter and process data handling introduction.....	17
4.6 Node reference model.....	18
4.7 Operation overview.....	19
4.8 Addressing.....	20
4.9 Slave classification.....	22
4.10 Structure of the communication layer in the slave.....	23
5 Communication services.....	24
5.1 Overview.....	24
5.2 Read services.....	24
5.3 Write services.....	27
5.4 Combined read/write services.....	29
5.5 Network services.....	33
5.6 Mailbox.....	34
6 Local interactions.....	38
6.1 Read local.....	38
6.2 Write local.....	39
6.3 Event local.....	40

Figure 1 – Mapping of logical data in an Ethernet frame consisting of a single Type 12 DLPDU	17
Figure 2 – Type 12 data-link reference model	18
Figure 3 – Type 12 segments in open mode.....	19
Figure 4 – Type 12 segment in direct mode	19
Figure 5 – Addressing mode overview	20
Figure 6 – Fieldbus memory management unit overview	22
Figure 7 – Layering of communication.....	23
Figure 8 – Flow of Type 12 service primitives	24
Figure 9 – Successful mailbox write sequence.....	35
Figure 10 – Successful mailbox read sequence.....	35
Table 1 – Auto-increment physical read (APRD)	25
Table 2 – Configured-address physical read (FPRD).....	25
Table 3 – Broadcast read (BRD)	26
Table 4 – Logical read (LRD)	27
Table 5 – Auto-increment physical write (APWR)	27
Table 6 – Configured-address physical write (FPWR)	28
Table 7 – Broadcast write (BWR)	28
Table 8 – Logical write (LWR).....	29
Table 9 – Auto-increment physical read/write (APRW)	30
Table 10 – Configured-address physical read/write (FPRW).....	30
Table 11 – Broadcast read/write (BRW).....	31
Table 12 – Logical read/write (LRW)	31
Table 13 – Auto-increment physical read / multiple write (ARMW).....	32
Table 14 – Configured-address physical read / multiple write (FRMW).....	32
Table 15 – Provide network variable (PNV).....	33
Table 16 – Mailbox write	36
Table 17 – Mailbox read update	37
Table 18 – Mailbox read	38
Table 19 – Read local	39
Table 20 – Write local	39
Table 21 – Event local	40

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELD BUS SPECIFICATIONS –****Part 3-12: Data-link 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 61158-3-12 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 2010. This edition constitutes a technical revision. The main changes with respect to the previous edition are listed below:

– Editorial improvements for clarification.

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

FDIS	Report on voting
65C/759/FDIS	65C/769/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.

iTeh STANDARD PREVIEW (standards.itech.ai)

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.

<https://standards.itech.ai/catalog/standards/sist/5b201dca-2b5c-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015>

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 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.

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

[SIST EN 61158-3-12:2015](https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015)

<https://standards.iteh.ai/catalog/standards/sist/5b201dca-2b5e-4e5c-b684-14fd71ae78c6/sist-en-61158-3-12-2015>

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 3-12: Data-link layer service definition – Type 12 elements

1 Scope

1.1 General

This part of IEC 61158 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 12 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;
- 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 12 fieldbus application layer at the boundary between the application and data-link layers of the fieldbus reference model;
- 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 specification 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 does it 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 fulfils the Type 12 data-link layer services defined in this standard.