

BS EN 61158-3-20:2014



BSI Standards Publication

Industrial communication networks — Fieldbus specifications

Part 3-20: Data-link layer service definition — Type 20 elements

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN 61158-3-20:2014. It is identical to IEC 61158-3-20:2014.

The UK participation in its preparation was entrusted to Technical Committee AMT/7, Industrial communications: process measurement and control, including fieldbus, classification and testing.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2014.

Published by BSI Standards Limited 2014

ISBN 978 0 580 79369 1

ICS 25.040.40; 35.100.20; 35.240.50

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2014.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61158-3-20

October 2014

ICS 25.040.40; 35.100.20; 35.110

English Version

**Industrial communication networks - Fieldbus specifications -
Part 3-20: Data-link layer service definition - Type 20 elements
(IEC 61158-3-20:2014)**

Réseaux de communication industriels - Spécifications des
bus de terrain - Partie 3-20: Définition des services de la
couche liaison de données - Éléments de type 20
(CEI 61158-3-20:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 3-20:
Dienstfestlegungen des Data Link Layer
(Sicherheitsschicht) - Typ 20-Elemente
(IEC 61158-3-20:2014)

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.

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

© 2014 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Foreword

The text of document 65C/759/FDIS, future edition 1 of IEC 61158-3-20, 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 61158-3-20:2014.

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

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.

Endorsement notice

The text of the International Standard IEC 61158-3-20:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61158-1	NOTE	Harmonized as EN 61158-1.
IEC 61158-2	NOTE	Harmonized as EN 61158-2.
IEC 61158-4-20	NOTE	Harmonized as EN 61158-4-20.
IEC 61158-5-20	NOTE	Harmonized as EN 61158-5-20.
IEC 61158-6-20	NOTE	Harmonized as EN 61158-6-20.
IEC 61784-1:2014	NOTE	Harmonized as EN 61784-1 ¹⁾ (not modified).
IEC 62591:2010	NOTE	Harmonized as EN 62591:2010 (not modified).

¹⁾ To be published.

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 8886	-	Information technology - Open Systems Interconnection - Data link service definition	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-

CONTENTS

INTRODUCTION.....	5
1 Scope.....	6
1.1 General.....	6
1.2 Specification	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 Common data-link service terms and definitions.....	9
3.4 Additional Type 20 data-link specific definitions.....	10
3.5 Common symbols and abbreviations	17
3.6 Additional Type 20 symbols and abbreviations	17
3.7 Common conventions	18
4 Type 20 Data-link layer services.....	19
4.1 General.....	19
4.2 Data-link layer services	20
Bibliography.....	27
Figure 1 – Relationships of DLSAPs, DLSAP-addresses and group DL-addresses	9
Figure 2 – Data exchange service	21
Figure 3 – Receive only data service	21
Figure 4 – Cyclic data transfer service	22
Table 1 – DL-DATA-EXCHANGE primitives and parameters	22
Table 2 – DL-RECEIVE primitive and parameters.....	24
Table 3 – DL-CYCLIC-DATA primitives and parameters	24
Table 4 – DLM-SET primitive and parameters.....	25
Table 5 – DLM-GET primitive and parameters	25

INTRODUCTION

This standard 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.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 3-20: Data-link layer service definition – Type 20 elements

1 Scope

1.1 General

This International 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 20 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 20 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.

Type 20 DL-service provides both a connected and a connectionless subset of those services specified in ISO/IEC 8886.

1.2 Specification

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;
- 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 fulfills the Type 20 data-link layer services defined in this standard.

2 Normative references

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 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.

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 8886, *Information technology – Open Systems Interconnection – Data link service definition*

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

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