BS EN 61158-4-1:2014



BSI Standards Publication

Industrial communication networks — Fieldbus specifications

Part 4-1: Data-link layer protocol specification — Type 1 elements

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National foreword

This British Standard is the UK implementation of EN 61158-4-1:2014. It is identical to IEC 61158-4-1:2014. It supersedes BS EN 61158-4-1:2008 which is withdrawn.

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

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

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Published by BSI Standards Limited 2014

ISBN 978 0 580 79372 1
ICS 25.040.40; 35.100.20; 35.110

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 30 November 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-4-1

October 2014

ICS 25.040.40; 35.100.20; 35.110

Supersedes EN 61158-4-1:2008

English Version

Industrial communication networks - Fieldbus specifications - Part 4-1: Data-link layer protocol specification - Type 1 elements (IEC 61158-4-1:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 4-1: Spécification du protocole de la couche liaison de données - Éléments de type 1 (CEI 61158-4-1:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 4: Protokollspezifikation des Data Link Layer (Sicherungsschicht) - Typ 1-Elemente (IEC 61158-4-1:2014)

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Foreword

The text of document 65C/762/FDIS, future edition 2 of IEC 61158-4-1, prepared by IEC/TC 65C "Industrial networks" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61158-4-1:2014.

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)	2015-06-19
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-09-19

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

IEC 61158-5-5:2014	NOTE	Harmonised as EN 61158-5-5:2014
IEC 61158-6-5:2014	NOTE	Harmonised as EN 61158-6-5:2014
IEC 61784-1	NOTE	Harmonised as EN 61784-1
IEC 61784-2	NOTE	Harmonised as EN 61784-2

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.

Publication	Year	Title	EN/HD	Year
IEC 61158-1	2014	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	2014
IEC 61158-2	2014	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	EN 61158-2	2014
IEC 61158-3-1	2014	Industrial communication networks - Fieldbus specifications - Part 3-1: Data-link layer service definition - Type 1 elements	EN 61158-3-1	2014
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 10038	1993	Information technology - Telecommunications and information exchange between systems - Local area networks - Media Access Control (MAC) bridges	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-

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0 INTRODUCTION

0.1 General

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.

The data-link protocol provides the data-link service by making use of the services available from the physical layer. The primary aim of this standard is to provide a set of rules for communication expressed in terms of the procedures to be carried out by peer data-link entities (DLEs) at the time of communication. These rules for communication are intended to provide a sound basis for development in order to serve a variety of purposes:

a) as a guide for implementors and designers;

b) for use in the testing and procurement of equipment;

c) as part of an agreement for the admittance of systems into the open systems environment;

d) as a refinement to the understanding of time-critical communications within OSI.

This standard is concerned, in particular, with the communication and interworking of sensors, effectors and other automation devices. By using this standard together with other standards positioned within the OSI or fieldbus reference models, otherwise incompatible systems may work together in any combination.

0.2 Nomenclature for references within this standard

Clauses, including annexes, can be referenced in their entirety, including any subordinate subclauses, as “Clause N” or “Annex N”, where N is the number of the clause or letter of the annex.

Subclauses can be referenced in their entirety, including any subordinate subclauses, as “N.M” or “N.M.P” and so forth, depending on the level of the subclause, where N is the number of the subclause or letter of the annex, and M, P and so forth represent the successive levels of subclause up to and including the subclause of interest.

When a clause or subclause contains one or more subordinate subclauses, the text between the clause or subclause heading and its first subordinate subclause can be referenced in its entirety as “N.0” or “N.M.0” or “N.M.P.0” and so forth, where N, M and P are as above. Stated differently, a reference ending with “.0” designates the text and figures between a clause or subclause header and its first subordinate subclause.

NOTE This nomenclature provides a means of referencing text in hanging clauses. Such clauses existed in earlier editions of IEC 61784-3, Type 1 clauses. Those hanging clauses are maintained in this edition to minimize the disruption to existing national and multi-national standards and consortia documents which reference that prior subclause numbering.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 4-1: Data-link layer protocol specification – Type 1 elements

1 Scope

1.1 General

The data-link layer provides basic time-critical messaging communications between devices in an automation environment.

This protocol provides the data-link service by making use of the services available from the physical layer. The relationship between the International Standards for fieldbus data-link service, fieldbus data-link protocol, fieldbus physical service and systems management is described in IEC 61158-1.

This protocol provides communication opportunities to all participating data-link entities

a) in a cyclic asynchronous manner, sequentially to each of those data-link entities, and
b) in a synchronous manner, either cyclically or acyclically, according to a pre-established schedule.

The specified protocol also provides means of changing the set of participating data-link entities and of modifying the set of scheduled communications opportunities. When the set of scheduled communications opportunities is null, the distribution of communication opportunities to the participating data-link entities is completely asynchronous.

Thus this protocol can be characterized as one which provides access asynchronously but with a synchronous overlay.

1.2 Specifications

This standard specifies

a) procedures for the timely transfer of data and control information from one data-link user entity to a peer user entity, and among the data-link entities forming the distributed data-link service provider;
b) the structure of the fieldbus DLPDUs used for the transfer of data and control information by the protocol of this standard, and their representation as physical interface data units.

NOTE In IEC 61158-4-1, gray boxes have been used in the tables to indicate that the specified field is not a conceptual part of the specific DLPDU.

1.3 Procedures

The procedures are defined in terms of

a) the interactions between peer DL-entities (DLEs) through the exchange of fieldbus DLPDUs;
b) the interactions between a DL-service (DLS) provider and a DLS-user in the same system through the exchange of DLS primitives;
c) the interactions between a DLS-provider and a Ph-service provider in the same system through the exchange of Ph-service primitives.