SVENSK STANDARD SS-EN 61158-3-1

Fastställd	Utgåva	Sida	Ansvarig kommitté
2014-11-19	2	1 (1+130)	SEK TK 65

© Copyright SEK. Reproduction in any form without permission is prohibited.

Industriell processtyrning – Fältbuss – Del 3-1: Definition av tjänster i datalänkskiktet – Delar i fältbuss, Typ 1

Industrial communication networks – Fieldbus specifications – Part 3-1: Data-link layer service definition – Type 1 elements

Som svensk standard gäller europastandarden EN 61158-3-1:2014. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61158-3-1:2014.

Nationellt förord

Europastandarden EN 61158-3-1:2014

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61158-3-1, Second edition, 2014 - Industrial communication networks - Fieldbus specifications - Part 3-1: Data-link layer service definition - Type 1 elements**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61158-3-1, utgåva 1, 2008, gäller ej fr o m 2017-09-17.

ICS 25.040.40; 35.100.20; 35.110.00

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00.
E-post: sek@elstandard.se. Internet: www.elstandard.se

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard
Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61158-3-1

October 2014

ICS 35.100.20; 35.110; 25.040.40

Supersedes EN 61158-3-1:2008

English Version

Industrial communication networks - Fieldbus specifications - Part 3-1: Data-link layer service definition - Type 1 elements (IEC 61158-3-1:2014)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 3-1: Définition des services de la couche liaison de données - Éléments de type 1 (CEI 61158-3-1:2014)

Industrielle Kommunikationsnetze - Feldbusse - Teil 3-1: Dienstfestlegungen des Data Link Layer (Sicherungsschicht) - Typ 1-Elemente (IEC 61158-3-1:2014)

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.

Ref. No. EN 61158-3-1:2014 E

SEK Svensk Elstandard

Foreword

The text of document 65C/759/FDIS, future edition 2 of IEC 61158-3-1, 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 61158-3-1:2014.

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

This document supersedes EN 61158-3-1:2008.

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 61158-3-1:2014 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 61158-4-1	NOTE	Harmonized as EN 61158-4-1.
IEC 61158-5-9	NOTE	Harmonized as EN 61158-5-9.
IEC 61158-6-9	NOTE	Harmonized as EN 61158-6-9.
IEC 61784-1	NOTE	Harmonized as EN 61784-1.
IEC 61784-2	NOTE	Harmonized 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
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	1994	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-

CONTENTS

FOREWORD 7
0 INTRODUCTION 9
0.1 General 9
0.2 Nomenclature for references within this standard 9
1 Scope 10
1.1 General 10
1.2 Specifications 10
1.3 Conformance 10
2 Normative references 11
3 Terms, definitions, symbols, abbreviations and conventions 11
3.1 Reference model terms and definitions 11
3.2 Service convention terms and definitions 12
3.3 Data-link service terms and definitions 13
3.4 Common symbols and abbreviations 16
3.5 Common conventions 17
4 Overview of the data-link layer service 19
4.1 General 19
4.2 Types and classes of data-link layer service 21
4.3 Quality-of-service (QoS) attributes common to multiple types of data-link layer service 22
5 DL(SAP)-address, queue and buffer management data-link layer service 27
5.1 Facilities of the DL(SAP)-address, queue and buffer management data-link layer service 27
5.2 Model of the DL(SAP)-address, queue and buffer management data-link layer service 27
5.3 Sequence of primitives at one DLSAP 27
5.4 DL(SAP)-address, queue and buffer management facilities 29
6 Connection-mode data-link layer service 43
6.1 Facilities of the connection-mode data-link layer service 43
6.2 Model of the connection-mode data-link layer service 44
6.3 Quality of connection-mode service 51
6.4 Sequence of primitives 57
6.5 Connection establishment phase 68
6.6 Connection release phase 75
6.7 Data transfer phase 81
7 Connectionless-mode data-link layer service 93
7.1 Facilities of the connectionless-mode data-link layer service 93
7.2 Model of the connectionless-mode data-link layer service 93
7.3 Quality of connectionless-mode service 95
7.4 Sequence of primitives 95
7.5 Connectionless-mode functions 98
8 Time and scheduling guidance data-link layer service 109
8.1 Facilities and classes of the time and scheduling guidance data-link layer service 109
8.2 Model of the time and scheduling guidance data-link layer service 110
8.3 Quality of scheduling guidance service 110
8.4 Sequence of primitives at one DLE 110

8.5 Scheduling guidance functions 112
9 DL-management service 123
9.1 Scope and inheritance 123
9.2 Facilities of the DL-management service 123
9.3 Model of the DL-management service 123
9.4 Constraints on sequence of primitives 123
9.5 Set 124
9.6 Get 125
9.7 Action 125
9.8 Event 126
Bibliography 128

Figure 1 – Relationships of DLSAPs, DLSAP-addresses, DLCEPs, DLCEP-addresses, DLSEP-addresses and group DL-addresses 14
Figure 2 – Example of paths, links, bridges, and the extended link 20
Figure 3 – Types of DL-timeliness In terms of elapsed DL-time and events at the assessing DLCEP 25
Figure 4 – Sequence of primitives for the DL(SAP)-address, queue and buffer management DLS 29
Figure 5 – Supported methods of data management for transmission and delivery 30
Figure 6 – Peer-to-peer and multi-peer DLCs and their DLCEPs 44
Figure 7 – OSI abstract queue model of a peer DLC between a pair of DLS-users 45
Figure 8 – OSI abstract queue model of a multi-peer DLC between a publishing DLS-user and a set of subscribing DLS-users 49
Figure 9 – Summary of DL-connection-mode service primitive time-sequence diagrams for peer DLCs (portion 1) 61
Figure 10 – Summary of DL-connection-mode service primitive time-sequence diagrams for peer DLCs (portion 2) 62
Figure 11 – Summary of DL-connection-mode service primitive time-sequence diagrams for publishers of a multi-peer DLC (portion 1) 63
Figure 12 – Summary of DL-connection-mode service primitive time-sequence diagrams for publishers of a multi-peer DLC (portion 2) 64
Figure 13 – Summary of additional DL-connection-mode service primitive time-sequence diagrams for a multi-peer DLC subscriber where the diagrams differ from the corresponding ones for a publisher (portion 1) 65
Figure 14 – Summary of additional DL-connection-mode service primitive time-sequence diagrams for a multi-peer DLC subscriber where the diagrams differ from the corresponding ones for a publisher (portion 2) 66
Figure 15 – State transition diagram for sequences of DL-connection-mode service primitives at a DLCEP 67
Figure 16 – Peer DLC/DLCEP establishment initiated by a single DLS-user 73
Figure 17 – Multi-peer DLC/DLCEP establishment initiated by the publishing DLS-user 74
Figure 18 – Multi-peer DLC/DLCEP establishment initiated by a subscribing DLS-user 74
Figure 19 – Multi-peer DLC/DLCEP establishment using known DLCEP addresses initiated first by the publishing DLS-user 74
Figure 20 – Multi-peer DLC/DLCEP establishment using known DLCEP addresses initiated first by one or more subscribing DLS-users 74
Figure 21 – Peer DLC/DLCEP establishment initiated simultaneously by both peer DLS-users, resulting in a merged DLC 75

Figure 22 – Multi-peer DLC/DLCEP establishment initiated simultaneously by both publishing and subscribing DLS-users, resulting in a merged DLC 75
Figure 23 – Peer DLS-user invocation 78
Figure 24 – Publishing DLS-user invocation 78
Figure 25 – Subscribing DLS-user invocation 78
Figure 26 – Simultaneous invocation by both DLS-users 78
Figure 27 – Peer DLS-provider invocation 78
Figure 28 – Publishing DLS-provider invocation 78
Figure 29 – Subscribing DLS-provider invocation 78
Figure 30 – Simultaneous peer DLS-user and DLS-provider invocations 78
Figure 31 – Simultaneous publishing DLS-user and DLS-provider invocations 79
Figure 32 – Simultaneous subscribing DLS-user and DLS-provider invocations 79
Figure 33 – Sequence of primitives in a peer DLS-user rejection of a DLC/DLCEP establishment attempt 79
Figure 34 – Sequence of primitives in a publishing DLS-user rejection of a DLC/DLCEP establishment attempt 79
Figure 35 – Sequence of primitives in a subscribing DLS-user rejection of a DLC/DLCEP establishment attempt 79
Figure 36 – Sequence of primitives in a DLS-provider rejection of a DLC/DLCEP establishment attempt 80
Figure 37 – Sequence of primitives in a DLS-user cancellation of a DLC/DLCEP establishment attempt: both primitives are destroyed in the queue 80
Figure 38 – Sequence of primitives in a DLS-user cancellation of a DLC/DLCEP establishment attempt: DL-DISCONNECT indication arrives before DL-CONNECT response is sent 80
Figure 39 – Sequence of primitives in a DLS-user cancellation of a DLC/DLCEP establishment attempt: peer DL-DISCONNECT indication arrives after DL-CONNECT response is sent 80
Figure 40 – Sequence of primitives in a DLS-user cancellation of a DLC/DLCEP establishment attempt: publisher's DL-DISCONNECT indication arrives after DL-CONNECT response is sent 81
Figure 41 – Sequence of primitives in a DLS-user cancellation of a DLC/DLCEP establishment attempt: subscriber's DL-DISCONNECT request arrives after DL-CONNECT request has been communicated to the publisher 81
Figure 42 – Sequence of primitives for a CLASSICAL or DISORDERED peer-to-peer queue-to-queue data transfer 83
Figure 43 – Sequence of primitives for an ORDERED or UNORDERED peer-to-peer, or an UNORDERED subscriber-to-publisher queue-to-queue data transfer 84
Figure 44 – Sequence of primitives for a publisher-to-subscribers queue-to-queue data transfer 84
Figure 45 – Sequence of primitives for a failed queue-to-queue data transfer 84
Figure 46 – Sequence of primitives for an ORDERED or UNORDERED peer to peer, or an UNORDERED subscriber to publisher, buffer to buffer data transfer 85
Figure 47 – Sequence of primitives for a publisher to subscribers buffer to buffer data transfer 86
Figure 48 – Sequence of primitives for an ORDERED or UNORDERED peer to peer, or an UNORDERED subscriber to publisher, buffer to queue data transfer 86
Figure 49 – Sequence of primitives for a publisher to subscribers buffer to queue data transfer 86

Figure 50 – Sequence of primitives in a peer DLS-user initiated Reset 89
Figure 51 – Sequence of primitives in a publishing DLS-user initiated Reset 90
Figure 52 – Sequence of primitives in a subscribing DLS-user initiated Reset 90
Figure 53 – Sequence of primitives in a simultaneous peer DLS-users initiated Reset 90
Figure 54 – Sequence of primitives in a simultaneous multi-peer DLS-users initiated Reset 90
Figure 55 – Sequence of primitives in a peer DLS-provider initiated Reset 90
Figure 56 – Sequence of primitives in a publishing DLS-provider initiated Reset 90
Figure 57 – Sequence of primitives in a subscribing DLS-provider initiated Reset 91
Figure 58 – Sequence of primitives in a simultaneous peer DLS-user and DLS-provider initiated Reset 91
Figure 59 – Sequence of primitives in a simultaneous publishing DLS-user and DLS-provider initiated Reset 91
Figure 60 – Sequence of primitives in a simultaneous subscribing DLS-user and DLS-provider initiated Reset 91
Figure 61 – Sequence of primitives for Subscriber Query 92
Figure 62 – Model for a data-link layer connectionless-mode unitdata transmission or unitdata exchange 94
Figure 63 – Summary of DL-connectionless-mode service primitive time-sequence diagrams 97
Figure 64 – State transition diagram for sequences of connectionless-mode primitives at one DLSAP 98
Figure 65 – Sequence of primitives for a successful locally-acknowledged connectionless-mode unitdata transfer 101
Figure 66 – Sequence of primitives for a successful remotely-acknowledged connectionless-mode unitdata transfer 102
Figure 67 – Sequence of primitives for an unsuccessful connectionless-mode unitdata transfer 102
Figure 68 – Sequence of primitives for connectionless-mode unitdata exchange 107
Figure 69 – Sequence of primitives for connectionless-mode listener query 108
Figure 70 – Summary of time and scheduling-guidance service primitive time sequence diagrams 112
Figure 71 – Sequence of primitives for DL-time 114
Figure 72 – Sequence of primitives for the Compel-Service service 116
Figure 73 – Sequence of primitives for the sequence scheduling services 120
Figure 74 – Sequence of primitives for the DLM action service 123

Table 1 – Summary of DL(SAP)-address, queue and buffer management primitives and parameters 28
Table 2 – DL-buffer-and-queue-management create primitive and parameters 30
Table 3 – DL-buffer-and-queue-management delete primitive and parameters 33
Table 4 – DL(SAP)-address-management bind primitive and parameters 34
Table 5 – DL(SAP)-role constraints on DLSAPs, DLCEPs and other DLS Primitives 35
Table 6 – DL(SAP)-address-management unbind primitive and parameters 39
Table 7 – DL-buffer-management put primitive and parameters 39
Table 8 – DL-buffer-and-queue-management get primitive and parameters 41
Table 9 – Relationships between abstract queue model objects 47

Table 10 – Attributes and class requirements of DLCEP data delivery features 53
Table 11 – Summary of DL-connection-mode primitives and parameters (portion 1) 59
Table 12 – Summary of DL-connection-mode primitives and parameters (portion 2) 60
Table 13 – DLC / DLCEP establishment primitives and parameters (portion 1) 69
Table 14 – DLC / DLCEP establishment primitives and parameters (portion 2) 70
Table 15 – DLC / DLCEP release primitives and parameters 76
Table 16 – Queue data transfer primitive and parameters 81
Table 17 – Buffer sent primitive and parameter 84
Table 18 – Buffer received primitive and parameter 85
Table 19 – DLC/DLCEP reset primitives and parameters (portion 1) 87
Table 20 – DLC/DLCEP reset primitives and parameters (portion 2) 87
Table 21 – Subscriber query primitives and parameters 92
Table 22 – Summary of DL-connectionless-mode primitives and parameters 96
Table 23 – DL-connectionless-mode unitdata transfer primitives and parameters 99
Table 24 – DL-connectionless-mode unitdata exchange primitive and parameters 103
Table 25 – Listener query primitives and parameters 108
Table 26 – Summary of DL-scheduling-guidance primitives and parameters 111
Table 27 – DL-time primitive and parameters 113
Table 28 – DL-scheduling-guidance Compel-service primitive and parameters 114
Table 29 – DL-scheduling-guidance Schedule Sequence primitives and parameters 117
Table 30 – DL-scheduling-guidance Cancel Schedule primitives and parameters 121
Table 31 – DL-scheduling-guidance Subset Sequence primitives and parameters 122
Table 32 – Summary of DL-management primitives and parameters 124
Table 33 – DLM-Set primitive and parameters 124
Table 34 – DLM-Get primitive and parameters 125
Table 35 – DLM-Action primitive and parameters 126
Table 36 – DLM-Event primitive and parameters 127

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 3-1: Data-link layer service definition – Type 1 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 61158-3-1 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 change with respect to the previous edition is listed below:

- Improved terms.

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.

NOTE 2 Slight variances from the directives have been allowed by the IEC Central Office to provide continuity of subclause numbering with prior editions.

A list of all the parts of the IEC 61158 series, 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 maintenance result 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.

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.

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.

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 61158-3, 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 3-1: Data-link layer service definition – Type 1 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 1 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 1 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;
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 7 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 10731:1994, *Information technology – Open Systems Interconnection – Conventions for the definition of OSI services*