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Réseaux de communication industriels – Spécifications des bus de terrain – Partie 3-2: Définition des services de la couche liaison de données – Eléments de type 2

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CONTENTS

FOREWORD 4
INTRODUCTION 6
INTRODUCTION to the Amendment 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 10
3.3 Common data-link service terms and definitions 11
3.4 Additional Type 2 data-link specific definitions 13
3.5 Common symbols and abbreviations 15
3.6 Additional Type 2 symbols and abbreviations 16
3.7 Common conventions 16
4 Connection-mode and connectionless-mode data-link service 17
4.1 Overview 17
4.2 Facilities of the data-link service 21
4.3 Model of the data-link service 22
4.4 Sequence of primitives 24
4.5 Connection-mode data transfer 26
4.6 Connectionless-mode data transfer 28
4.7 Queue maintenance 31
4.8 Tag filter 33
5 DL-management services 34
5.1 Sequence of primitives 34
5.2 Link synchronization 35
5.3 Synchronized parameter change 36
5.4 Event reports 38
5.5 Bad FCS 40
5.6 Current moderator 40
5.7 Enable moderator 41
5.8 Power-up and online 42
5.9 Listen only 43
5.10 Time distribution 44
Bibliography 46

Figure 1 – Relationships of DLSAPs, DLSAP-addresses and group DL-addresses 12
Figure 2 – NUT structure 18
Figure 3 – Medium access during scheduled time 19
Figure 4 – Medium access during unscheduled time 20
Figure 5 – Queue model for the peer and multipoint DLS, DLSAPs and their DLCEPs 21
Figure 6 – Queue model of a multipoint DLS between a sending DLS-user and one or more receiving DLS-users 23

Withdrawn
iTeh Standards
(https://standards.iteh.ai)
Document Preview
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https://standards.iteh.ai/catalog/standards/iec/7a1f0f2d-0893-4da8-99fc-8b1e761ed80d/iec-61158-3-2-2014

Figure 7 – DLS primitive time-sequence diagram 25
Figure 8 – State transition diagram for sequences of DLS primitives at one DLSAP 26
Figure 9 – Sequence of primitives for a successful connection-mode transfer 28
Figure 10 – Sequence of primitives for an unsuccessful connection-mode transfer 28
Figure 11 – Sequence of primitives for a successful connectionless-mode transfer 31
Figure 12 – Sequence of primitives for an unsuccessful connectionless-mode transfer 31
Figure 13 – Sequence of primitives for a queue maintenance request 33
Figure 14 – Sequence of primitives for a tag filter request 34
Figure 15 – Sequence of primitives for a local link synchronization 36
Figure 16 – Sequence of primitives for a DLM-get/set parameters request 38
Figure 17 – Sequence of primitives for a DLM-tMinus change request 38
Figure 18 – Sequence of primitives for a DLM-event indication 40
Figure 19 – Sequence of primitives for a DLM-bad-FCS indication 40
Figure 20 – Sequence of primitives for a DLM-current-moderator indication 41
Figure 21 – Sequence of primitives for a DLM-enable-moderator request 42
Figure 22 – Sequence of primitives for a DLM-power-up indication 43
Figure 23 – Sequence of primitives for a DLM-online request 43
Figure 24 – Sequence of primitives for a DLM-listen-only request 43

Table 1 – Summary of connection-mode and connectionless-mode primitives and parameters 25
Table 2 – DL-connection-mode transfer primitives and parameters 27
Table 3 – DL-connectionless-mode transfer primitives and parameters 29
Table 4 – Fixed tag services available to the DLS-user 30
Table 5 – DL-queue maintenance primitives and parameters 32
Table 6 – DL-connectionless-mode tag filter primitives and parameters 33
Table 7 – Summary of DL-management primitives and parameters 35
Table 8 – Link synchronization primitives and parameters 36
Table 9 – Synchronized parameter change primitives and parameters 37
Table 10 – DLMS-configuration-data 37
Table 11 – Event report primitives and parameters 39
Table 12 – DLMS events being reported 39
Table 13 – Bad FCS primitives and parameters 40
Table 14 – Current moderator primitives and parameters 41
Table 15 – Enable moderator primitives and parameters 41
Table 16 – Power-up and online primitives and parameters 42
Table 17 – Listen-only primitives and parameters 43
Table 18 – DLMS time and time quality parameters 44
Table 19 – Time distribution source quality 45

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 3-2: Data-link layer service definition – Type 2 elements

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IEC 61158-3-2 edition 2.1 contains the second edition (2014-08) [documents 65C/759/FDIS and 65C/769/RVD] and its amendment 1 (2019-04) [documents 65C/945/FDIS and 65C/954/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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NOTE Combinations of protocol types are specified in IEC 61784-1 and IEC 61784-2.

International Standard IEC 61158-3-2 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition constitutes a technical revision.

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

- Correction of references for fixed tag usage in 4.6.3.6.
- Update of core bibliographic references (original source documents from consortium).
- Miscellaneous editorial corrections.

This publication has been drafted in accordance with ISO/IEC Directives, Part 2.

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 the base publication and its amendment 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

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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.

INTRODUCTION to the Amendment

Source documents referenced by this standard have been updated, this needs to be reflected in the corresponding sections of the document.

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 3-2: Data-link layer service definition – Type 2 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 2 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 2 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 2 DL-service provides both a connected and a connectionless subset of those services specified in ISO/IEC 8886.

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.

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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 1 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.

IEC 61158-4-2:~~2014~~2019, *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

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 10731:1994, *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:

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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** **correspondent DL-entities (N=2)** **correspondent Ph-entities (N=1)**	[ISO/IEC 7498-1]
3.1.12	**DL-duplex-transmission**	[ISO/IEC 7498-1]
3.1.13	**(N)-entity** **DL-entity (N=2)** **Ph-entity (N=1)**	[ISO/IEC 7498-1]
3.1.14	**DL-facility**	[ISO/IEC 7498-1]
3.1.15	**flow control**	[ISO/IEC 7498-1]
3.1.16	**(N)-layer** **DL-layer (N=2)** **Ph-layer (N=1)**	[ISO/IEC 7498-1]
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]

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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:

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