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NORME INTERNATIONALE

Industrial communication networks – Fieldbus specifications –
Part 4-8: Data-link layer protocol specification – Type 8 elements
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Réseaux de communication industriels – Spécifications de bus de terrain –
Partie 4-8: Spécification du protocole de couche liaison de données – Éléments
de Type 8
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FIELDBUS SPECIFICATIONS –****Part 4-8: Data-link layer protocol specification –
Type 8 elements**

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International Standard IEC 61158-4-8 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This first edition and its companion parts of the IEC 61158-4 subseries cancel and replace IEC 61158-4:2003. This edition of this part constitutes an editorial revision.

This edition of IEC 61158-4 includes the following significant changes from the previous edition:

- a) deletion of the former Type 6 fieldbus, and the placeholder for a Type 5 fieldbus data link layer, for lack of market relevance;
- b) addition of new types of fieldbuses;
- c) division of this part into multiple parts numbered -4-1, -4-2, ..., -4-19.

This bilingual version (2013-02) corresponds to the monolingual English version, published in 2007-12.

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

FDIS	Report on voting
65C/474/FDIS	65C/485/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.

The French version of this standard has not been voted upon.

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

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- withdrawn;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.

NOTE The revision of this standard will be synchronized with the other parts of the IEC 61158 series.

The 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.

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/TR 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.

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 4-8: Data-link layer protocol specification – Type 8 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 a highly-optimized means of interchanging fixed-length input/output data and variable-length segmented messages between a single master device and a set of slave devices interconnected in a loop (ring) topology. The exchange of input/output data is totally synchronous by configuration, and is unaffected by the messaging traffic.

Devices are addressed implicitly by their position on the loop. The determination of the number, identity and characteristics of each device can be configured, or can be detected automatically at start-up.

1.2 Specifications

This standard specifies

[IEC 61158-4-8:2007](https://standards.iteh.ai/catalog/standards/sist/24934a24-2795-41e2-a469-02208d9e0317/iec-61158-4-8-2007)

- 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.

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.

1.4 Applicability

These procedures are applicable to instances of communication between systems which support time-critical communications services within the data-link layer of the OSI or fieldbus reference models, and which require the ability to interconnect in an open systems interconnection environment.

Profiles provide a simple multi-attribute means of summarizing an implementation's capabilities, and thus its applicability to various time-critical communications needs.

1.5 Conformance

This standard also specifies conformance requirements for systems implementing these procedures. This standard does not contain tests to demonstrate compliance with such requirements.

2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61158-2 (Ed.4.0), *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-8, *Digital data communications for measurement and control – Fieldbus for use in industrial control systems – Part 3-8: Data link service definition – Type 8 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 10731, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

3 Terms, definitions, symbols and abbreviations

For the purposes of this standard, the following terms, definitions, symbols and abbreviations 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	[7498-3]
3.1.2 DL-address-mapping	[7498-1]
3.1.3 DL-connection	[7498-1]
3.1.4 DL-connection-end-point	[7498-1]
3.1.5 DL-connection-end-point-identifier	[7498-1]
3.1.6 DL-data-source	[7498-1]
3.1.7 DL-name	[7498-3]
3.1.8 DL-protocol	[7498-1]
3.1.9 DL-protocol-connection-identifier	[7498-1]
3.1.10 DL-protocol-control-information	[7498-1]
3.1.11 DL-protocol-data-unit	[7498-1]

3.1.12 DL-service-connection-identifier	[7498-1]
3.1.13 DL-service-data-unit	[7498-1]
3.1.14 DL-user-data	[7498-1]
3.1.15 layer-management	[7498-1]
3.1.16 (N)-entity DL-entity Ph-entity	[7498-1]
3.1.17 (N)-interface-data-unit DL-service-data-unit (N=2) Ph-interface-data-unit (N=1)	[7498-1]
3.1.18 (N)-layer DL-layer (N=2) Ph-layer (N=1)	[7498-1]
3.1.19 (N)-service DL-service (N=2) Ph-service (N=1)	[7498-1]
3.1.20 (N)-service-access-point DL-service-access-point (N=2) Ph-service-access-point (N=1)	[7498-1]
3.1.21 (N)-service-access-point-address DL-service-access-point-address (N=2) Ph-service-access-point-address (N=1)	[7498-1]
3.1.22 Ph-interface-control-information	[7498-1]
3.1.23 Ph-interface-data	[7498-1]
3.1.24 primitive name	[7498-3]
3.1.25 reset	[7498-1]
3.1.26 systems-management	[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 confirm (primitive);**
requestor.deliver (primitive)
- 3.2.2 DL-service-primitive;**
primitive
- 3.2.3 DL-service-provider**
- 3.2.4 DL-service-user**
- 3.2.5 indication (primitive)**
acceptor.deliver (primitive)

3.2.6 request (primitive); requestor.submit (primitive)

3.2.7 response (primitive); acceptor.submit (primitive)

3.3 Common terms and definitions

NOTE This subclause contains the common terms and definitions used by Type 8.

3.3.1

link, local link

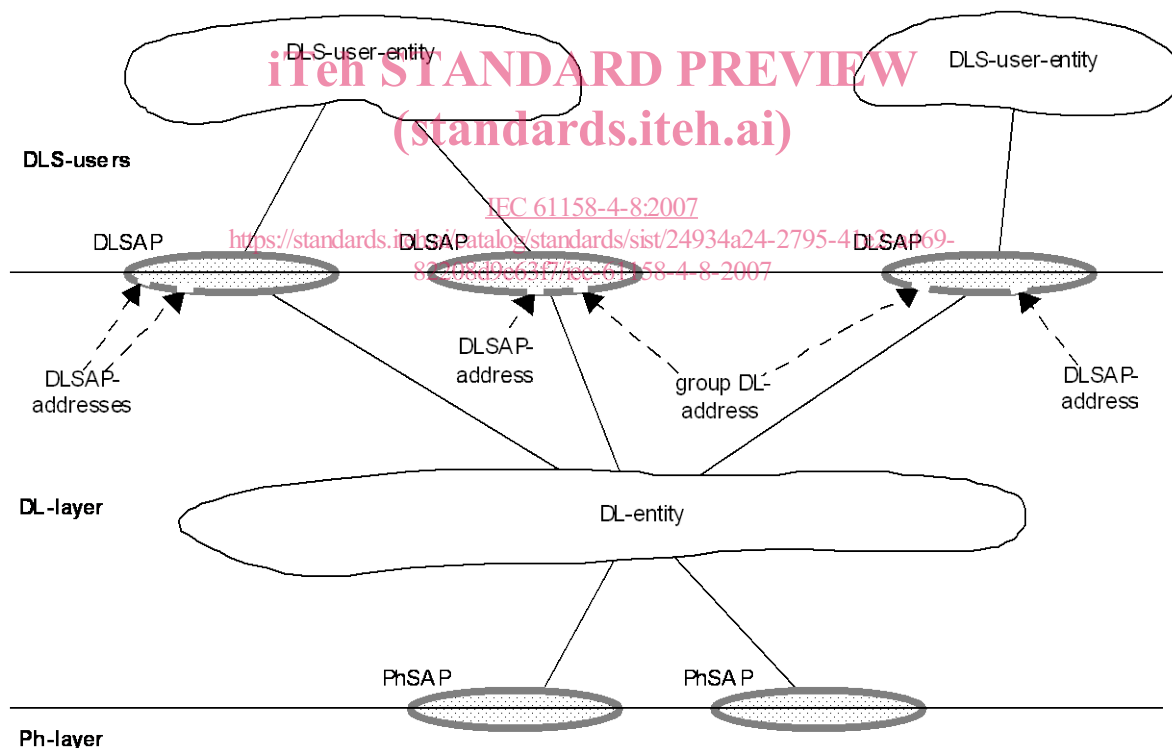
single DL-subnetwork in which any of the connected DLEs may communicate directly, without any intervening DL-relaying, whenever all of those DLEs that are participating in an instance of communication are simultaneously attentive to the DL-subnetwork during the period(s) of attempted communication

3.3.2

DLSAP

distinctive point at which DL-services are provided by a single DL-entity to a single higher-layer entity.

NOTE This definition, derived from ISO/IEC 7498-1, is repeated here to facilitate understanding of the critical distinction between DLSAPs and their DL-addresses. (See Figure 1.)



NOTE 1 DLSAPs and PhSAPs are depicted as ovals spanning the boundary between two adjacent layers.

NOTE 2 DL-addresses are depicted as designating small gaps (points of access) in the DLL portion of a DLSAP.

NOTE 3 A single DL-entity may have multiple DLSAP-addresses and group DL-addresses associated with a single DLSAP.

Figure 1 – Relationships of DLSAPs, DLSAP-addresses and group DL-addresses

3.3.3

DL(SAP)-address

either an individual DLSAP-address, designating a single DLSAP of a single DLS-user, or a group DL-address potentially designating multiple DLSAPs, each of a single DLS-user