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**Industrial communication networks – Fieldbus specifications –
Part 4-28: Data-link layer protocol specification – Type 28 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –
Partie 4-28: Spécification du protocole de la couche liaison de données –
Éléments de type 28**



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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
1.1 General.....	8
1.2 Specifications	8
1.3 Procedures	8
1.4 Applicability	8
1.5 Conformance	8
2 Normative references	9
3 Terms, definitions, symbols, abbreviated terms and conventions	9
3.1 Reference model terms and definitions	9
3.2 Service convention terms and definitions	11
3.3 Common terms and definitions	12
3.4 Additional Type 28 terms and definitions.....	13
3.5 Additional Type 28 symbols and abbreviations	15
4 Overview of the DL-protocol	16
4.1 DLL protocol architecture	16
4.2 DLL working mechanism	18
4.2.1 Node	18
4.2.2 Addressing	18
4.2.3 Multicast.....	19
4.2.4 Resource mapping and scheduling	19
5 DLPDU structure	21
5.1 Universal DLPDU structure	21
5.2 Basic configuration DLPDU	23
5.3 Address assignment DLPDU	25
5.4 Multicast assignment DLPDU	25
5.5 Resource allocation DLPDU	26
5.6 Access notification DLPDU	28
5.7 Resource application DLPDU	29
5.8 Resource release DLPDU	30
5.9 Status query DLPDU	30
5.10 Status response DLPDU	31
5.11 Announcement DLPDU	32
5.12 Clock synchronization DLPDU.....	33
5.13 Common DLPDU.....	34
6 Working procedure	35
6.1 Initialization procedure.....	35
6.1.1 Basic configuration	35
6.1.2 Resource mapping configuration.....	35
6.2 DLL node management procedure	37
6.2.1 DLL maintenance.....	37
6.2.2 Node join	38
6.2.3 Node query.....	39
6.2.4 Node leave	39
6.3 Data transmission procedure	40

6.4	Clock synchronization procedure	42
7	State machine	44
7.1	DLDE state machine	44
7.2	DLME state machine	47
7.3	DLCE state machine	48
8	Error handling.....	49
8.1	General.....	49
8.2	Possible sources and characteristics of errors	49
8.3	Error handling of MN / TN	50
8.4	PhL error source	50
8.4.1	General	50
8.4.2	Lost connection	50
8.4.3	CRC error	50
8.4.4	Buffer overflow	50
8.4.5	Symbol resource conflict.....	50
8.4.6	Symbol resource insufficient.....	50
Annex A (informative)	Example for NodeID and MAC address mapping	51
Annex B (informative)	Example for multicast group working mechanism.....	52
Bibliography		53
Figure 1	– Relationships of DLSAPs, DLSAP-addresses and group DL-addresses	12
Figure 2	– Bitmap data type diagram.....	15
Figure 3	– DLL in Type 28 protocol stack architecture.....	16
Figure 4	– Relationship of the fieldbus DLL to other fieldbus layers and to users of the fieldbus DLS	17
Figure 5	– Type 28 DLL protocol architecture diagram	17
Figure 6	– Resource mapping between DLL and PhL	20
Figure 7	– DLL resource mapping message queue scheduling diagram	21
Figure 8	– Universal DLPDU structure	22
Figure 9	– Basic configuration DLPDU structure	23
Figure 10	– General configuration block structure	24
Figure 11	– Address allocation DLPDU structure.....	25
Figure 12	– Multicast assignment DLPDU structure.....	26
Figure 13	– Resource allocation DLPDU structure	27
Figure 14	– Access notification DLPDU structure	28
Figure 15	– Resource application DLPDU structure.....	29
Figure 16	– Resource release DLPDU structure	30
Figure 17	– Status query DLPDU structure	31
Figure 18	– Status response DLPDU structure	31
Figure 19	– Announcement DLPDU structure	32
Figure 20	– Clock synchronization DLPDU structure	34
Figure 21	– Common DLPDU structure	35
Figure 22	– Resource mapping configuration diagram.....	36
Figure 23	– Initial access configuration procedure diagram	37
Figure 24	– The random access configuration procedure diagram.....	38

Figure 25 – Node leave procedure diagram.....	40
Figure 26 – DLS data sending procedure diagram.....	41
Figure 27 – DLS data receiving procedure diagram.....	42
Figure 28 – Clock synchronization delay measurement procedure diagram.....	43
Figure 29 – Clock register structure diagram.....	43
Figure 30 – Clock synchronization procedure.....	44
Figure 31 – DLDE state machine	45
Figure 32 – DLME state machine	47
Figure 33 – DLCE state machine	48
Figure B.1 – Multicast working mechanism diagram	52
Table 1 – NodeID address assignment of Type 28 DLL.....	18
Table 2 – NodeID and MAC address mapping table	18
Table 3 – Members of multicast group mapping table.....	19
Table 4 – DLDE state transition	46
Table 5 – DLME state machine state transition	48
Table 6 – DLCE state machine state transition.....	49
Table A.1 – Example of NodeID and MAC address mapping table saved on TN	51

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELDBUS SPECIFICATIONS –****Part 4-28: Data-link layer protocol specification –
Type 28 elements**

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

IEC 61158-4-28 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
65C/1206/FDIS	65C/1235/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 61158 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 4-28: Data-link layer protocol specification – Type 28 elements

1 Scope

1.1 General

The data-link layer provides several types of messaging communications between devices in an automation environment.

This part of IEC 61158 provides a means of connecting devices through a partial mesh network, such that most failures of an interconnection between two devices can be circumvented. In common practice, the devices are interconnected in a non-redundant hierarchical manner reflecting application needs.

1.2 Specifications

This document 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 document, 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 the 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 the fieldbus reference models, and which require the ability to interconnect in an open systems interconnection environment.

1.5 Conformance

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. 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 the IEC 61784-1 series and the IEC 61784-2 series 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 61158-2:2023, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-28:2023, *Industrial communication networks – Fieldbus specifications – Part 3-28: Data-link layer service definition – Type 28 elements*

ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model – Basic Reference Model: The Basic Model*

ISO/IEC 7498-3:1997, *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*

ISO/IEC 8886:1996, *Information technology – Open Systems Interconnection – Data link service definition*

ISO/IEC/IEEE 8802-3:2021, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Standard for Ethernet*

3 Terms, definitions, symbols, abbreviated terms and conventions

For the purposes of this document, the following terms, definitions, symbols and abbreviated terms apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Reference model terms and definitions

This document 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	called-DL-address	[ISO/IEC 7498-3]
3.1.2	calling-DL-address	[ISO/IEC 7498-3]
3.1.3	centralized multi-end-point-connection	[ISO/IEC 7498-1]
3.1.4	correspondent (N)-entities	[ISO/IEC 7498-1]
	correspondent DL-entities (N=2)	
	correspondent Ph-entities (N=1)	
3.1.5	Demultiplexing	[ISO/IEC 7498-1]