

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Industrial communication networks – Fieldbus specifications –  
Part 4-25: Data-link layer protocol specification – Type 25 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 4-25: Spécification du protocole de la couche liaison de données –  
Éléments de type 25**



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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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INTERNATIONAL  
ELECTROTECHNICAL  
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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 .....	9
1.5 Conformance .....	9
2 Normative references .....	9
3 Terms, definitions, symbols, abbreviations and conventions .....	9
3.1 Reference model terms and definitions .....	10
3.2 Service convention terms and definitions .....	11
3.3 Terms and definitions.....	11
3.4 Symbols and abbreviations .....	13
3.5 Common conventions.....	14
3.6 Additional Type 25 conventions .....	16
3.6.1 Primitive conventions.....	16
3.6.2 State machine conventions.....	16
4 Overview of the DL-protocol .....	17
4.1 General.....	17
4.2 Overview of the medium access control .....	17
4.2.1 General .....	17
4.2.2 Network topology.....	18
4.2.3 Priority control with VLAN.....	19
4.2.4 The maximum delivery delay in Type 25 network .....	20
4.2.5 Traffic control for real-time communication .....	21
4.3 Service assumed from PhL .....	21
4.4 DL Layer architecture.....	22
4.5 Local parameters and variables .....	23
4.5.1 Overview .....	23
4.5.2 Variables, parameter, counter and timer .....	23
5 General structure and encoding of PhPDUs and DLPDU and related elements of procedure.....	24
5.1 Overview .....	24
5.2 Common MAC frame structure, encoding and elements of procedure.....	24
5.2.1 MAC frame structure.....	24
5.2.2 Elements of the MAC frame .....	25
6 DLPDU-specific structure, encoding and elements of procedure .....	27
6.1 General.....	27
6.2 Structure of the RCL DLPDU.....	27
6.2.1 RCL header .....	27
7 DLE elements of procedure .....	29
7.1 Overview .....	29
7.2 RCL communication control (RCLC).....	29
7.2.1 General .....	29
7.2.2 Primitive definitions .....	29

7.2.3	RCLC state machine.....	32
7.2.4	Function of RCLC .....	48
7.3	Real-time communication control (RTC).....	48
7.3.1	General .....	48
7.3.2	Primitive definitions .....	48
7.3.3	RTC state machine .....	50
7.3.4	Function of RTC .....	51
7.4	Transmit/Receive control (TRC).....	52
7.4.1	General .....	52
7.4.2	Primitive definitions .....	52
7.4.3	TRC state machine .....	52
7.4.4	Function of TRC .....	57
7.5	DLL management protocol (DLM).....	58
7.5.1	Overview .....	58
7.5.2	Primitive definitions .....	58
7.5.3	DLM state machine (DLM_SM) .....	59
	Bibliography.....	61
	Figure 1 – Relationships of DLSAPs, DLSAP-addresses and group DL-addresses .....	16
	Figure 2 – Ring control in Type 25 network .....	18
	Figure 3 – Communication ranges of Type 25 frames .....	19
	Figure 4 – Priority control with VLAN of Type 25 network.....	20
	Figure 5 – The mechanism of transmission delay in a node .....	20
	Figure 6 – The maximum delay in Type 25 network.....	21
	Figure 7 – Data-Link layer internal architecture.....	22
	Figure 8 – Type 25 fieldbus DLPDU frame format .....	25
	Figure 9 – RCL frame format.....	26
	Figure 10 – State transition diagram of RHE_SM-A.....	33
	Figure 11 – State transition diagram of RHE_SM-B.....	36
	Figure 12 – The state diagram of RCLNode_SM .....	39
	Figure 13 – The state diagram of RCLTR_SM.....	46
	Figure 14 – The state diagram of RTTR_SM .....	51
	Figure 15 – The state diagram of TRC_SM .....	52
	Figure 16 – The state diagram of DLM_SM .....	59
	Table 1 – State transition descriptions .....	16
	Table 2 – Descriptions of state machine elements .....	17
	Table 3 – Conventions used in state machine .....	17
	Table 4 – Characteristics of the node states .....	18
	Table 5 – Characteristic of the frame classes.....	19
	Table 6 – VLAN priority mapping of Type 25 network.....	19
	Table 7 – Data-link layer components .....	22
	Table 8 – Destination address format.....	25
	Table 9 – VLAN tag format.....	26
	Table 10 – Types and classes of RCL frames .....	27

Table 11 – Structure of RCL header.....	28
Table 12 – Class field format .....	28
Table 13 – Destination address field format .....	28
Table 14 – Source address field format.....	29
Table 15 – CMD field format .....	29
Table 16 – The primitives and parameters for DLS-user interface .....	30
Table 17 – Parameters used with primitives exchanged between RCLC and DLS-user .....	30
Table 18 – The primitives and parameters for TRC interface.....	31
Table 19 – Parameters used with primitives exchanged between RCLC and TRC .....	31
Table 20 – The primitives and parameters for DLM interface.....	32
Table 21 – Parameters used with primitives exchanged between RCLC and DLM.....	32
Table 22 – Transitions of RHE_SM-A at RCL communication.....	33
Table 23 – Transitions of RHE_SM-B at RCL communication.....	36
Table 24 – Transitions of RCLNode_SM at RCL communication .....	39
Table 25 – Transitions of RCLTR_SM at RCL communication .....	47
Table 26 – RCLC function table .....	48
Table 27 – The primitives and parameters for DLS-user interface .....	49
Table 28 – Parameters used with primitives exchanged between RTC and DLS-user.....	49
Table 29 – The primitives and parameters for TRC interface.....	49
Table 30 – Parameters used with primitives exchanged between RTC and TRC .....	50
Table 31 – The primitives and parameters for DLM interface.....	50
Table 32 – Parameters used with primitives exchanged between RTC and DLM .....	50
Table 33 – Transitions of RTTR_SM at RT communication .....	51
Table 34 – RTC function table.....	51
Table 35 – The primitives and parameters for DLM interface.....	52
Table 36 – Parameters used with primitives exchanged between TRC and DLM .....	52
Table 37 – Transitions of TRC_SM .....	53
Table 38 – TRC function table.....	57
Table 39 – Primitives exchanged between DLM and DLS-user.....	58
Table 40 – Parameters used with primitives exchanged between DLM and DLS-user.....	59
Table 41 – Transitions of DLM_SM .....	60

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**INDUSTRIAL COMMUNICATION NETWORKS –  
 FIELDBUS SPECIFICATIONS –**
**Part 4-25: Data-link layer protocol specification –  
 Type 25 elements**
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International Standard IEC 61158-4-25 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

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

FDIS	Report on voting
65C/946/FDIS	65C/955/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC website.

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

## INTRODUCTION

This document 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 standards positioned within the OSI or fieldbus reference models, otherwise incompatible systems may work together in any combination.

**NOTE** Use of some of the associated protocol types is restricted by their 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 particular data-link layer protocol type to be used with physical layer and application layer protocols in Type combinations as specified explicitly in the profile parts. Use of the various protocol types in other combinations may require permission from their respective intellectual-property-right holders.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning Type 25 elements and possibly other types given in this document as follows:

JP4074631 [HI]	Transmission line system, frame transmitter therein, and transmission line switching method
JP4653800 [HI]	Transmission line system, frame transmission apparatus, method and program for switching transmission line in transmission line system
JP4944986 [HI]	Transmission line system and transmission line construction method
CN1964307 [HI]	Transfer path system and frame transfer device in same system, transfer path handover method and system
CN101515887 [HI]	Transmission line system, frame transmitter therein, transmission line switching method and program

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## **INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –**

### **Part 4-25: Data-link layer protocol specification – Type 25 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 communication opportunities to all participating data-link entities

- a) in a synchronously-starting cyclic manner, according to a pre-established schedule, and
- b) in a cyclic or acyclic asynchronous manner, as requested each cycle by each of those data-link entities.

Thus this protocol can be characterized as one which provides cyclic and acyclic access asynchronously but with a synchronous restart of each cycle.

### **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 datalink service provider;
- b) procedures for giving communications opportunities to all participating DL-entities, sequentially and in a cyclic manner for deterministic and synchronized transfer at cyclic intervals up to one millisecond;
- c) procedures for giving communication opportunities available for time-critical data transmission together with non-time-critical data transmission without prejudice to the time-critical data transmission;
- d) procedures for giving cyclic and acyclic communication opportunities for time-critical data transmission with prioritized access;
- e) procedures for giving communication opportunities based on ISO/IEC/IEEE 8802-3 medium access control, with provisions for nodes to be added or removed during normal operation;
- f) 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 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.