

# PUBLICLY AVAILABLE SPECIFICATION

## PRE-STANDARD

**Industrial communication networks – Fieldbus specifications –  
Part 3-22: Data-link layer service definition – Type SnpTYPE elements**

<https://standards.iteh.ai/catalog/standards/sist/b64da2d-7dc3-471e-943f-84e58fcaec51/iec-pas-61158-3-22-2009>



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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

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## CONTENTS

|   |    |
|---|----|
| FOREWORD.....   | 4  |
| INTRODUCTION.....   | 6  |
| 1 Scope.....  | 7  |
| 1.1 Overview.....   | 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 Data-link service terms and definitions.....                  | 10 |
| 3.4 Symbols and abbreviations.....                                | 13 |
| 3.5 Common conventions.....                                       | 15 |
| 4 Data-link layer services and concepts.....                      | 16 |
| 4.1 Operating principle.....                                      | 16 |
| 4.2 Communication models.....                                     | 16 |
| 4.2.1 Overview.....   | 16 |
| 4.2.2 RTFL device reference model.....                            | 16 |
| 4.2.3 RTFN device reference model.....                            | 17 |
| 4.3 Topology.....   | 18 |
| 4.3.1 RTFL topology.....  | 18 |
| 4.3.2 RTFN topology.....  | 18 |
| 4.4 Addressing.....   | 19 |
| 4.4.1 Overview.....   | 19 |
| 4.4.2 RTFL device addressing.....                                 | 19 |
| 4.4.3 RTFN device addressing.....                                 | 19 |
| 4.5 Gateway.....  | 19 |
| 4.6 Interaction models.....                                       | 19 |
| 4.6.1 Overview.....   | 19 |
| 4.6.2 Producer-consumer.....                                      | 19 |
| 4.6.3 Publisher-subscriber.....                                   | 20 |
| 4.7 Synchronization concept.....                                  | 20 |
| 5 Communication services.....                                     | 21 |
| 5.1 Overview.....   | 21 |
| 5.2 Communication management services.....                        | 22 |
| 5.2.1 Overview.....   | 22 |
| 5.2.2 Network verification.....                                   | 22 |
| 5.2.3 Communication management.....                               | 23 |
| 5.3 CDC service.....  | 27 |
| 5.3.1 Overview.....   | 27 |
| 5.3.2 CDC send service (CDCS).....                                | 27 |
| 5.4 MSC services.....   | 28 |
| 5.4.1 Overview.....   | 28 |
| 5.4.2 MSC send service (MSCS).....                                | 28 |
| 5.4.3 MSC send broadcast service (MSCSB).....                     | 28 |
| 5.4.4 MSC data notification (MSCDN).....                          | 29 |

|       |   |    |
|-------|---|----|
| 5.4.5 | MSC read service (MSCR)   | 29 |
| 5.5   | Time synchronization  | 29 |
| 5.5.1 | DL-DelayMeasurement start service (DMS)                         | 29 |
| 5.5.2 | DL-DelayMeasurement read service (DMR)                          | 30 |
| 5.5.3 | DL-PCS configuration service (PCSC)                             | 30 |
| 5.5.4 | DL-Sync master configuration service (SYNC_MC)                  | 30 |
| 5.5.5 | DL-Sync start service (SYNC_START)                              | 31 |
| 5.5.6 | DL-Sync stop service (SYNC_STOP)                                | 31 |
| 5.6   | Media independent interface (MII) management services           | 32 |
| 5.6.1 | Overview  | 32 |
| 5.6.2 | DL-MII read service (MIIR)                                      | 32 |
| 5.6.3 | DL-MII write service (MIIW)                                     | 32 |
|       | Bibliography  | 33 |
|       | Figure 1 – RTFL device reference model                          | 17 |
|       | Figure 2 – RTFN device reference model                          | 17 |
|       | Figure 3 – Logical double line in a physical tree topology      | 18 |
|       | Figure 4 – Logical double line in a physical line topology      | 18 |
|       | Figure 5 – Addressing modes                                     | 19 |
|       | Figure 6 – Time sequence diagram for time SYNC_START service    | 20 |
|       | Figure 7 – Synchronized timing signals without offset           | 21 |
|       | Figure 8 – Synchronized timing signals with offset              | 21 |
|       | Table 1 – Summary of DL-services and primitives                 | 21 |
|       | Table 2 – DL-Network verification service (NV)                  | 23 |
|       | Table 3 – DL-RTFN scan network read service (RTFNSNR)           | 23 |
|       | Table 4 – DL-RTFN connection establishment DLL service (RTFNCE) | 24 |
|       | Table 5 – DL-RTFN connection release service (RTFNCR)           | 24 |
|       | Table 6 – DL-RTFL control service (RTFLCTL)                     | 25 |
|       | Table 7 – DL-RTFL configuration service (RTFLCFG)               | 25 |
|       | Table 8 – DL-Read configuration data service (RDCD)             | 26 |
|       | Table 9 – CDC send service (CDCS)                               | 27 |
|       | Table 10 – MSC send service (MSCS)                              | 28 |
|       | Table 11 – MSC send broadcast service (MSCSB)                   | 28 |
|       | Table 12 – MSC read service (MSCR)                              | 29 |
|       | Table 13 – DL-DelayMeasurement start service (DMS)              | 29 |
|       | Table 14 – DL-DelayMeasurement read service (DMR)               | 30 |
|       | Table 15 – DL-PCS configuration service (PCSC)                  | 30 |
|       | Table 16 – DL-Sync master configuration service (SYNC_MC)       | 30 |
|       | Table 17 – DL-Sync start service (SYNC_START)                   | 31 |
|       | Table 18 – DL-Sync stop service (SYNC_STOP)                     | 31 |
|       | Table 19 – DL-MII read service (MIIR)                           | 32 |
|       | Table 20 – DL-MII write service (MIIW)                          | 32 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELDBUS SPECIFICATIONS –**

**Part 3-22: Data-link layer service definition –  
Type SNpTYPE elements**

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The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

| Draft PAS   | Report on voting |
|-------------|------------------|
| 65C/530/PAS | 65C/534/RVD      |

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 3 years starting from the publication date. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document, or shall be withdrawn.

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.

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## INTRODUCTION

This PAS contains an additional profile – SNpTYPE – which may be integrated into a future new edition of the IEC 61158-3 series.



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## INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

### Part 3-22: Data-link layer service definition – Type SNpTYPE elements

#### 1 Scope

##### 1.1 Overview

This part of IEC 61158-3 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 part of IEC 61158-3 defines in an abstract way the externally visible service provided by the Type SNpTYPE 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 part of IEC 61158-3 is to define the services provided to:

- the Type SNpTYPE fieldbus application layer at the boundary between the application and data-link layers of the fieldbus reference model; and
- 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 part of IEC 61158-3 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; and
- b) the correlation of paired request and confirm, or indication and response, primitives.

##### 1.3 Conformance

This part of IEC 61158-3 does not specify individual implementations or products, nor do they 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 fulfils the Type SNpTYPE data-link layer services defined in this part of IEC 61158-3.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

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

ISO/IEC 7498-3, *Information technology – Open Systems Interconnection – Basic Reference Model — 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, abbreviations and conventions

### 3.1 Reference model terms and definitions

This part of IEC 61158-3 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:

|  |          |
|--|----------|
| <b>3.1.1 DL-address</b>                                | [7498-3] |
| <b>3.1.2 called-DL-address</b>                         | [7498-3] |
| <b>3.1.3 calling-DL-address</b>                        | [7498-3] |
| <b>3.1.4 DL-connection</b>                             | [7498-1] |
| <b>3.1.5 DL-connection-end-point</b>                   | [7498-1] |
| <b>3.1.6 DL-connection-end-point-identifier</b>        | [7498-1] |
| <b>3.1.7 DL-connection-mode transmission</b>           | [7498-1] |
| <b>3.1.8 DL-connectionless-mode transmission</b>       | [7498-1] |
| <b>3.1.9 correspondent (N)-entities</b>                | [7498-1] |
| <b>correspondent DL-entities (N=2)</b>                 |          |
| <b>correspondent Ph-entities (N=1)</b>                 |          |
| <b>3.1.10 decentralized multi-end-point-connection</b> | [7498-1] |
| <b>3.1.11 DL-duplex-transmission</b>                   | [7498-1] |
| <b>3.1.12 (N)-entity</b>                               | [7498-1] |
| <b>DL-entity (N=2)</b>                                 |          |
| <b>Ph-entity (N=1)</b>                                 |          |
| <b>3.1.13 DL-facility</b>                              | [7498-1] |
| <b>3.1.14 flow control</b>                             | [7498-1] |

|   |          |
|---|----------|
| <b>3.1.15 (N)-layer</b>                         | [7498-1] |
| <b>DL-layer (N=2)</b>                           |          |
| <b>Ph-layer (N=1)</b>                           |          |
| <b>3.1.16 layer-management</b>                  | [7498-1] |
| <b>3.1.17 DL-local-view</b>                     | [7498-3] |
| <b>3.1.18 multi-endpoint-connection</b>         | [7498-1] |
| <b>3.1.19 DL-name</b>                           | [7498-3] |
| <b>3.1.20 naming-(addressing)-domain</b>        | [7498-3] |
| <b>3.1.21 peer-entities</b>                     | [7498-1] |
| <b>3.1.22 primitive name</b>                    | [7498-3] |
| <b>3.1.23 DL-protocol</b>                       | [7498-1] |
| <b>3.1.24 DL-protocol-connection-identifier</b> | [7498-1] |
| <b>3.1.25 DL-protocol-data-unit</b>             | [7498-1] |
| <b>3.1.26 DL-relay</b>                          | [7498-1] |
| <b>3.1.27 reassembling</b>                      | [7498-1] |
| <b>3.1.28 reset</b>                             | [7498-1] |
| <b>3.1.29 responding-DL-address</b>             | [7498-3] |
| <b>3.1.30 routing</b>                           | [7498-1] |
| <b>3.1.31 segmenting</b>                        | [7498-1] |
| <b>3.1.32 (N)-service</b>                       | [7498-1] |
| <b>DL-service (N=2)</b>                         |          |
| <b>Ph-service (N=1)</b>                         |          |
| <b>3.1.33 (N)-service-access-point</b>          | [7498-1] |
| <b>DL-service-access-point (N=2)</b>            |          |
| <b>Ph-service-access-point (N=1)</b>            |          |
| <b>3.1.34 DL-service-access-point-address</b>   | [7498-3] |
| <b>3.1.35 DL-service-connection-identifier</b>  | [7498-1] |
| <b>3.1.36 DL-service-data-unit</b>              | [7498-1] |
| <b>3.1.37 DL-simplex-transmission</b>           | [7498-1] |
| <b>3.1.38 DL-subsystem</b>                      | [7498-1] |
| <b>3.1.39 systems-management</b>                | [7498-1] |
| <b>3.1.40 DL-user-data</b>                      | [7498-1] |

### 3.2 Service convention terms and definitions

This part of IEC 61158-3 also makes use of the following terms defined in ISO/IEC 10731 as they apply to the data-link layer:

3.2.1 acceptor

3.2.2 asymmetrical service

3.2.3 confirm (primitive);  
requestor.deliver (primitive)

3.2.4 deliver (primitive)

3.2.5 DL-confirmed-facility

3.2.6 DL-facility

3.2.7 DL-local-view

3.2.8 DL-mandatory-facility

3.2.9 DL-non-confirmed-facility

3.2.10 DL-provider-initiated-facility

3.2.11 DL-provider-optional-facility

3.2.12 DL-service-primitive;  
primitive

3.2.13 DL-service-provider

3.2.14 DL-service-user

3.2.15 DL-user-optional-facility

3.2.16 indication (primitive);  
acceptor.deliver (primitive)

3.2.17 multi-peer

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

3.2.19 requestor

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

3.2.21 submit (primitive)

3.2.22 symmetrical service

### 3.3 Data-link service terms and definitions

#### 3.3.1

##### acyclic data

data which is transferred from time to time for dedicated purposes