

**DIN EN 61158-4-18**

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Ersatz für  
DIN EN 61158-4-18:2008-09  
Siehe Anwendungsbeginn

**Industrielle Kommunikationsnetze –  
Feldbusse –  
Teil 4-18: Protokollspezifikation des Data Link Layer  
(Sicherheitsschicht) –  
Typ 18-Elemente  
(IEC 61158-4-18:2010);  
Englische Fassung EN 61158-4-18:2012, nur auf CD-ROM**

Industrial communication networks –  
Fieldbus specifications –  
Part 4-18: Data-link layer protocol specification –  
Type 18 elements  
(IEC 61158-4-18:2010);  
English version EN 61158-4-18:2012, only on CD-ROM

Réseaux de communication industriels –  
Spécifications de bus de terrain –  
Partie 4-18: Spécification du protocole de couche de liaison de données –  
Éléments de type 18  
(CEI 61158-4-18:2010);  
Version anglaise EN 61158-4-18:2012, seulement en CD-ROM

Gesamtumfang 38 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE

## Anwendungsbeginn

Anwendungsbeginn für die von CENELEC am 2012-03-28 angenommene Europäische Norm als DIN-Norm ist 2013-01-01.

Für DIN EN 61158-4-18:2008-09 gilt eine Übergangsfrist bis zum 2015-03-28.

## Nationales Vorwort

*Vorausgegangener Norm-Entwurf: E DIN IEC 61158-400:2009-06.*

Für dieses Dokument ist das nationale Arbeitsgremium K 956 „Feldbus“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE ([www.dke.de](http://www.dke.de)) zuständig.

Die enthaltene IEC-Publikation wurde vom SC 65C „Industrial networks“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (stability date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

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- geändert.

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Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die englische Fassung der EN 61158-4-18 veröffentlicht. Zu deren Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als informativer Nationaler Anhang NA der vorliegenden Norm hinzugefügt. Für viele der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Diese Norm steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

## Einführung

Ein Feldbus ist ein digitaler serieller Datenbus für die Kommunikation zwischen Geräten der industriellen Automatisierungstechnik wie beispielsweise Messeinrichtungen, Stellgliedern, Reglern und speicherprogrammierbaren Steuerungen. Die Normen der Reihe DIN EN 61158 legen eine Anzahl von Feldbus-Protokolltypen fest. Die vorliegende Norm legt das Protokoll der Datensicherungsschicht von Typ 18 fest.

## Erklärung zu Schutzrechten

Die Internationale Elektrotechnische Kommission macht darauf aufmerksam, dass ihr gegenüber erklärt wurde, dass die Übereinstimmung mit dem vorgesehenen Norm-Inhalt die Anwendung von Patenten erforderlich machen könnte. Nähere Informationen hierzu befinden sich in der „Introduction“.

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## Änderungen

Gegenüber DIN EN 61158-4-18:2008-09 wurden folgende Änderungen vorgenommen:

- a) redaktionelle Verbesserungen;
- b) zyklische Datensegmentierung hinzugefügt.

## Frühere Ausgaben

DIN V 19245-1: 1988-01  
 DIN 19245-1: 1991-04  
 DIN 19245-2: 1991-04  
 DIN EN 50170/1: 1997-07  
 DIN EN 50170/2: 1997-07  
 DIN EN 50170/3: 1997-07  
 DIN EN 50254: 1999-07  
 DIN EN 50170/A2: 2000-08  
 DIN EN 50170/A1 :2002-11  
 DIN EN 50170/A3: 2002-11  
 DIN EN 61158-4: 2005-05  
 DIN EN 61158-4-18: 2008-09

## Nationaler Anhang NA (informativ)

### 3.1 Begriffe zum Referenzmodell

Diese Norm beruht teilweise auf den in ISO/IEC 7498-1 und ISO/IEC 7498-3 erarbeiteten Begriffen und verwendet die folgenden zusätzlichen Begriffe:

#### 3.1.1

##### **Kennung der DLE-Station**

**(en: DLE station identifier)**

einer DLE zugewiesene Netzwerkadresse

#### 3.1.2

##### **Slot der DLE-Station**

**(en: DLE station slot)**

Einheit (Granularität von eins) positionsabhängiger Zuordnung (für ein zyklisches Datenfeld), von der eine DLE eine oder mehrere belegen kann, beschrieben durch den Bereich beginnend bei der Kennung der DLE-Station mit einer Länge, die der konfigurierten Anzahl von belegten Slots entspricht

### 3.1.3

#### **Master-DLE**

(en: **Master DLE**)

DLE, die die Funktionen eines Netzwerk-Masters ausführt

### 3.1.4

#### **Master-gepackte DLE**

(en: **Master-packed DLE**)

Master-DLE, die das Zugriffsprotokoll mit gepackten Antworten verwendet

### 3.1.5

#### **Master-abgefragte DLE**

(en: **Master-polled DLE**)

Master-DLE, die das Zugriffsprotokoll mit abgefragten Antworten verwendet

### 3.1.6

#### **gepackte Antwort**

(en: **Packed response**)

Übertragung von Daten, die durch den Prozess eines Masters gesteuert wird, der eine Auslösenachricht sendet, auf die jeder Slave eine bestimmte Zeitdauer, die für die Kennung seiner DLE-Station eindeutig ist, wartet und anschließend seine Antwort übermittelt, wobei alle durch eine einzige Master-Anforderung ausgelösten Slave-Antworten zeitscheibenbasiert gepackt werden

### 3.1.7

#### **abgefragte Antwort**

(en: **Polled response**)

Übertragung von Daten, die durch den Prozess eines Masters gesteuert wird, welcher jeden Slave in einem Anforderung/Antwort-Paradigma einzeln abfragt

### 3.1.8

#### **Slave-DLE**

(en: **Slave DLE**)

DLE, die die Funktionen eines Netzwerk-Slaves ausführt

### 3.1.9

#### **Slave-gepackte DLE**

(en: **Slave-packed DLE**)

Slave-DLE, die das Zugriffsprotokoll mit gepackten Antworten verwendet

### 3.1.10

#### **Slave-abgefragte DLE**

(en: **Slave-polled DLE**)

Slave-DLE, die das Zugriffsprotokoll mit abgefragten Antworten verwendet

English version

**Industrial communication networks -  
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Part 4-18: Data-link layer protocol specification -  
Type 18 elements  
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Feldbusse -  
Teil 4-18: Protokollspezifikation des  
Data Link Layer (Sicherheitsschicht) -  
Typ 18-Elemente  
(IEC 61158-4-18:2010)

This European Standard was approved by CENELEC on 2012-03-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 65C/605/FDIS, future edition 2 of IEC 61158-4-18, prepared by SC 65C, "Industrial networks", of IEC/TC 65, "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61158-4-18:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-12-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-03-28

This document supersedes EN 61158-4-18:2008.

EN 61158-4-18:2012 includes the following significant technical changes with respect to EN 61158-4-18:2008:

- Editorial improvements;
- Addition of cyclic data segmenting.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

## Endorsement notice

The text of the International Standard IEC 61158-4-18:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

|                     |      |                                                   |
|---------------------|------|---------------------------------------------------|
| IEC/TR 61158-1:2010 | NOTE | Harmonized as CLC/TR 61158-1:2010 (not modified). |
| IEC 61158-2:2010    | NOTE | Harmonized as EN 61158-2:2010 (not modified).     |
| IEC 61158-3-18      | NOTE | Harmonized as EN 61158-3-18.                      |
| IEC 61158-5-18:2010 | NOTE | Harmonized as EN 61158-5-18:2012 (not modified).  |
| IEC 61158-6-18:2010 | NOTE | Harmonized as EN 61158-6-18:2012 (not modified).  |

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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 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.

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 patents concerning Type 18 elements and possibly other types given in 7.1.2 as follows:

|                  |       |                                              |
|------------------|-------|----------------------------------------------|
| 3343036/Japan    | [MEC] | Network System for a Programmable Controller |
| 5896509/USA      | [MEC] | Network System for a Programmable Controller |
| 246906/Korea     | [MEC] | Network System for a Programmable Controller |
| 19650753/Germany | [MEC] | Network System for a Programmable Controller |

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[MEC] Mitsubishi Electric Corporation  
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ISO ([www.iso.org/patents](http://www.iso.org/patents)) and IEC ([http://www.iec.ch/tctools/patent\\_decl.htm](http://www.iec.ch/tctools/patent_decl.htm)) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

## INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

### Part 4-18: Data-link layer protocol specification – Type 18 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 part of IEC 61158 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) 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 standard ISO/ IEC 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 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 part of IEC 61158 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 fulfills the Type 18 data-link layer services defined in this standard.

## 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: The Basic Model*

ISO/IEC 7498-3, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing*

ISO/IEC 13239:2002, *Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures*

## 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 additional terms:

#### 3.1.1

##### **DLE station identifier**

network address assigned to a DLE

#### 3.1.2

##### **DLE station slot**

unit (granularity of one) of position dependent mapping (for cyclic data field) of which a DLE may occupy one or more, delineated by the range beginning at the DLE station identifier with a length equal to the configured number of occupied slots

#### 3.1.3

##### **Master DLE**

DLE that performs the functions of network master

#### 3.1.4

##### **Master-packed DLE**

master DLE that uses the packed response access protocol