

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial communication networks – Fieldbus specifications –
Part 6-21: Application layer protocol specification – Type 21 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –
Partie 6-21: Spécification du protocole de la couche application – Eléments
de Type 21**





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CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
1.1 General.....	9
1.2 Overview.....	9
1.3 Specifications.....	9
1.4 Conformance.....	10
2 Normative references.....	10
3 Terms, definitions, symbols, abbreviations and conventions.....	10
3.1 Terms and definitions from other ISO/IEC standards.....	11
3.1.1 ISO/IEC 7498-1 terms.....	11
3.1.2 ISO/IEC 8822 terms.....	11
3.1.3 ISO/IEC 8824-1 terms.....	11
3.1.4 ISO/IEC 9545 terms.....	11
3.2 Other terms and definitions.....	11
3.3 Abbreviations and symbols.....	17
3.4 Conventions.....	18
3.4.1 General conventions.....	18
3.4.2 Convention for the encoding of reserved bits and octets.....	18
3.4.3 Conventions for the common coding of specific field octets.....	18
3.4.4 Conventions for APDU abstract syntax definitions.....	19
3.4.5 Conventions for APDU transfer syntax definitions.....	19
3.4.6 Conventions for AE state machine definitions.....	20
4 FAL syntax description.....	21
4.1 General.....	21
4.2 FAL-AR PDU abstract syntax.....	21
4.2.1 Top level definition.....	21
4.2.2 Confirmed send service.....	21
4.2.3 Unconfirmed send service.....	21
4.2.4 FalArHeader.....	21
4.2.5 InvokeID.....	21
4.2.6 ServiceType.....	21
4.3 Abstract syntax of PDU body.....	22
4.3.1 ConfirmedServiceRequest PDUs.....	22
4.3.2 ConfirmedServiceResponse PDUs.....	22
4.3.3 UnconfirmedServiceRequest PDUs.....	22
4.3.4 Error information.....	22
4.4 Protocol data units (PDUs) for application service elements (ASEs).....	23
4.4.1 PDUs for Application process ASE.....	23
4.4.2 PDUs for Service data object ASE.....	25
4.4.3 PDUs for Process data object ASE.....	28
5 Transfer Syntax.....	28
5.1 Overview of encoding.....	28
5.2 APDU header encoding.....	29
5.2.1 Encoding of FalArHeader field.....	29
5.2.2 Encoding of InvokeID Field.....	29

5.2.3	Encoding of Type field	29
5.3	APDU body encoding	30
5.3.1	General	30
5.4	Encoding of Data types	30
5.4.1	General description of data types and encoding rules	30
5.4.2	Transfer syntax for bit sequences	30
5.4.3	Encoding of a Boolean value	31
5.4.4	Encoding of an unsigned integer value	31
5.4.5	Encoding of a signed integer	31
5.4.6	Encoding of a floating point value	32
5.4.7	Encoding of an octet string value	32
5.4.8	Encoding of a visible string value	33
5.4.9	Encoding of a Unicode string value	33
5.4.10	Encoding of a time of day value	33
5.4.11	Encoding of a Time Difference value	34
6	FAL protocol state machines	34
7	AP context state machine	36
8	FAL service protocol machine	36
8.1	General	36
8.2	Common parameters of the primitives	36
8.3	AP ASE protocol machine	36
8.3.1	Primitive definitions	36
8.3.2	State machine	38
8.4	Service data object ASE protocol machine (SDOM)	40
8.4.1	Primitive definitions	40
8.4.2	State machine	41
8.5	Process data object ASE protocol machine (PDOM)	44
8.5.1	Primitive definitions	44
8.5.2	State machine	44
9	AR protocol machine	45
9.1	General	45
9.2	Point-to-point user-triggered confirmed client/server AREP (PTC-AR) ARPM	46
9.2.1	PTC-AR primitive definitions	46
9.2.2	DLL mapping of PTC-AREP class	46
9.2.3	PTC-ARPM state machine	47
9.3	Multipoint network-scheduled unconfirmed publisher/subscriber AREP (MSU-AR) ARPM	48
9.3.1	MSU-AR primitive definitions	48
9.3.2	DLL mapping of MSU-AR class	49
9.3.3	MSU-ARPM state machine	49
9.4	Multipoint user-triggered unconfirmed publisher/subscriber AREP (MTU-AR) ARPM	51
9.4.1	MTU-AR primitive definitions	51
9.4.2	DLL mapping of MTU-AR class	51
9.4.3	MTU-ARPM state machine	52
10	DLL mapping protocol machine	53
10.1	Primitive definitions	53
10.1.1	Primitives exchanged between DMPM and ARPM	53
10.1.2	Parameters of ARPM/DMPM primitives	53

10.1.3	Primitives exchanged between DLL and DMPM	53
10.1.4	Parameters of DMPM/DLL primitives	54
10.2	DMPM state machine	54
10.2.1	DMPM states	54
10.2.2	DMPM state table	54
10.2.3	Functions used by DMPM	54
	Bibliography	55
	Figure 1 – Common structure of specific fields	19
	Figure 2 – APDU overview	29
	Figure 3 – Type field	30
	Figure 4 – Encoding of Time of Day value	33
	Figure 5 – Encoding of Time Difference value	34
	Figure 6 – Primitives exchanged between protocol machines	35
	Figure 7 – State transition diagram of APAM	38
	Figure 8 – State transition diagram of SDOM	41
	Figure 9 – State transition diagram of PDOM	44
	Figure 10 – State transition diagram of PTC-ARPM	47
	Figure 11 – State transition diagram of MSU-ARPM	50
	Figure 12 – State transition diagram of MTU-ARPM	52
	Figure 13 – State transition diagram of DMPM	54
	Table 1 – Conventions used for AE state machine definitions	20
	Table 2 – Status code for the confirmed response primitive	23
	Table 3 – Encoding of FalArHeader field	29
	Table 4 – Transfer Syntax for bit sequences	30
	Table 5 – Transfer syntax for data type UNSIGNEDn	31
	Table 6 – Transfer syntax for data type INTEGERn	32
	Table 7 – Primitives exchanged between FAL-user and APAM	37
	Table 8 – Parameters used with primitives exchanged FAL-user and APAM	38
	Table 9 – APAM state table – Sender transitions	38
	Table 10 – APAM state table – Receiver transitions	39
	Table 11 – Functions used by the APAM	39
	Table 12 – Primitives exchanged between FAL-user and SDOM	40
	Table 13 – Parameters used with primitives exchanged FAL-user and SDOM	41
	Table 14 – SDOM state table – Sender transitions	42
	Table 15 – SDOM state table – Receiver transitions	43
	Table 16 – Functions used by the SDOM	43
	Table 17 – Primitives exchanged between FAL-user and PDOM	44
	Table 18 – Parameters used with primitives exchanged between FAL-user and PDOM	44
	Table 19 – PDOM state table – Sender transitions	45
	Table 20 – PDOM state table – Receiver transitions	45
	Table 21 – Functions used by the SDOM	45
	Table 22 – Primitives issued by user to PTC-ARPM	46

Table 23 – Primitives issued by PTC-ARPM to user	46
Table 24 – PTC-ARPM state table – sender transactions	47
Table 25 – PTC-ARPM state table – receiver transactions	48
Table 26 – Function BuildFAL-PDU.....	48
Table 27 – Primitives issued by user to ARPM	48
Table 28 – Primitives issued by ARPM to user	48
Table 29 – MSU-ARPM state table – sender transactions	50
Table 30 – MSU-ARPM state table – receiver transactions	50
Table 31 – Function BuildFAL-PDU.....	50
Table 32 – Primitives issued by user to ARPM	51
Table 33 – Primitives issued by ARPM to user	51
Table 34 – MTU-ARPM state table – sender transactions.....	52
Table 35 – MTU-ARPM state table – receiver transactions.....	52
Table 36 – Function BuildFAL-PDU.....	53
Table 37 – Primitives issued by ARPM to DMPM	53
Table 38 – Primitives issued by DMPM to ARPM	53
Table 39 – Primitives issued by DMPM to DLL	53
Table 40 – Primitives issued by DLL to DMPM	53
Table 41 – DMPM state table – sender transactions.....	54
Table 42 – DMPM state table – receiver transactions.....	54

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Type 21 elements**

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

International Standard IEC 61158-6-21 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- added WriteAndRead service;
- miscellaneous editorial corrections.

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

FDIS	Report on voting
65C/948/FDIS	65C/956/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 ISO/IEC Directives, Part 2.

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 publication will remain unchanged until the stability date indicated on the IEC web site under "<http://www.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.

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 application protocol provides the application service by making use of the services available from the data-link or other immediately lower 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 application entities (AEs) 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:

- as a guide for implementers and designers;
- for use in the testing and procurement of equipment;
- as part of an agreement for the admission of systems into the open systems environment;
- 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 model, otherwise incompatible systems may work together in any combination.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-21: Application layer protocol specification – Type 21 elements

1 Scope

1.1 General

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.

This International Standard contains material specific to the Type 21 communication protocol.

1.2 Overview

The Fieldbus Application Layer (FAL) provides user programs with a means to access the fieldbus communication environment. In this respect, the FAL can be viewed as a window between corresponding application programs.

This document provides common elements for basic time-critical and non-time-critical messaging communications between application programs in an automation environment, as well as material specific to Type 21. The term “time-critical” is used to represent the presence of a time-window, within which one or more specified actions must be completed with some defined level of certainty. Failure to complete specified actions within the required time risks the failure of the applications requesting the actions, with attendant risk to equipment, plant, and possibly human life.

This document defines interactions between remote applications. It also defines the externally visible behavior provided by the Type 21 application layer in terms of:

- a) the formal abstract syntax defining the application layer protocol data units (APDUs) conveyed between communicating application entities;
- b) the transfer syntax defining encoding rules that are applied to the APDUs;
- c) the application context state machine defining the application service behavior visible between communicating application entities;
- d) the application relationship state machines defining the communication behavior visible between communicating application entities.

The purpose of this document is to:

- a) describe the wire-representation of the service primitives defined in IEC 61158-5-21;
- b) describe the externally visible behavior associated with their transfer.

This document defines the protocol of the Type 21 application layer in conformance with the OSI Basic Reference Model (ISO/IEC 7498) and the OSI application layer structure (ISO/IEC 9545).

1.3 Specifications

The principal objective of this document is to specify the syntax and behavior of the application layer protocol that conveys the Type 21 application layer services.