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Industrial communication networks – Fieldbus specifications – Part 6-19: Application layer protocol specification – Type 19 elements

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CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
1.1 General 7
1.2 Specifications 8
1.3 Conformance 8
2 Normative references 8
3 Terms, definitions, abbreviations, symbols and conventions 9
3.1 Referenced terms and definitions 9
3.2 Additional terms and definitions 10
3.3 Additional abbreviations and symbols 11
3.4 Conventions 11
4 Abstract syntax 12
5 Transfer syntax 12
5.1 Introduction 12
5.2 RTC-MDT PDU merged abstract and transfer syntax 12
5.3 RTC-AT PDU merged abstract and transfer syntax 12
5.4 RTC-CC PDU merged abstract and transfer syntax 13
5.5 RTC-MDT PDU encoding 14
5.6 RTC-AT PDU encoding 14
5.7 RTC-CC PDU encoding 14
6 Structure of FAL protocol state machines 15
7 AP-context state machine 16
7.1 Overview 16
7.2 States 17
7.3 States, events and transitions 17
8 FAL service protocol machine (FSPM) 17
8.1 Overview 17
8.2 MGT services 18
8.3 IDN services 18
8.4 CYCIDN services 19
9 Application relationship protocol machine (ARPM) 19
9.1 Overview 19
9.2 Master ARPM 19
9.3 Slave ARPM 21
9.4 Primitives received from the FSPM 22
9.5 Indications received from the DMPM 23
10 DLL mapping protocol machine (DMPM) 24
10.1 Overview 24
10.2 Primitives received from the ARPM 24
10.3 Indications received from the DL 25
Bibliography 26

Figure 1 – Relationships among protocol machines and adjacent layers 15
Figure 2 – APCSM state diagram 16

Withdrawn

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Full document details: IEC 61158-6-19 2007

Figure 3 – ARPM master AR state diagram 20
Figure 4 – ARPM slave AR state diagram 21

Table 1 – RTC-MDT PDU attribute format 12
Table 2 – RTC-AT PDU attribute format 13
Table 3 – RTC-CC PDU attribute format 13
Table 4 – RTC-MDT PDU attribute encoding 14
Table 5 – RTC-AT PDU attribute encoding 14
Table 6 – RTC-CC PDU attribute encoding 15
Table 7 – APCSM state-event table 17
Table 8 – Master ARPM state-event table 20
Table 9 – Slave ARPM state-event table 22
Table 10 – ARPM to DL mapping 24
Table 11 – DL to ARPM mapping 25

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Full document details: IEC 61158-6-19 2007

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-19: Application layer protocol specification – Type 19 elements

FOREWORD

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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 IEC 61784 series. Use of the various protocol types in other combinations may require permission from their respective intellectual-property-right holders.

International Standard IEC 61158-6-19 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This first edition and its companion parts of the IEC 61158-6 subseries cancel and replace IEC 61158-6:2003. This edition of this part constitutes a technical addition. This part and its Type 19 companion parts also cancel and replace IEC/PAS 62410, published in 2005.

This edition of IEC 61158-6 includes the following significant changes from the previous edition:

a) deletion of the former Type 6 fieldbus for lack of market relevance;
b) addition of new types of fieldbuses;

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c) partition of part 6 of the third edition into multiple parts numbered -6-2, -6-3, …

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

FDIS	Report on voting
65C/476/FDIS	65C/487/RVD

Full information on the voting for the approval of this 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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under http://webstore.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.

NOTE The revision of this standard will be synchronized with the other parts of the IEC 61158 series.

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 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/TR 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 standard 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 implementors and designers;
- for use in the testing and procurement of equipment;
- as part of an agreement for the admittance of systems into the open systems environment;
- 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.

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INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 6-19: Application layer protocol specification – Type 19 elements

1 Scope

1.1 General

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 standard provides common elements for basic time-critical and non-time-critical messaging communications between application programs in an automation environment and material specific to Type 19 fieldbus. 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 standard define in an abstract way the externally visible service provided by the different Types of fieldbus Application Layer in terms of

- an abstract model for defining application resources (objects) capable of being manipulated by users via the use of the FAL service;
- the primitive actions and events of the service;
- the parameters associated with each primitive action and event, and the form which they take; and
- the interrelationship between these actions and events, and their valid sequences.

The purpose of this standard is to define the services provided to

- the FAL user at the boundary between the user and the Application Layer of the Fieldbus Reference Model, and
- Systems Management at the boundary between the Application Layer and Systems Management of the Fieldbus Reference Model.

This standard specifies the structure and services of the IEC fieldbus Application Layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498) and the OSI Application Layer Structure (ISO/IEC 9545).

FAL services and protocols are provided by FAL application-entities (AE) contained within the application processes. The FAL AE is composed of a set of object-oriented Application Service Elements (ASEs) and a Layer Management Entity (LME) that manages the AE. The ASEs provide communication services that operate on a set of related application process object (APO) classes. One of the FAL ASEs is a management ASE that provides a common set of services for the management of the instances of FAL classes.

Although these services specify, from the perspective of applications, how request and responses are issued and delivered, they do not include a specification of what the requesting and responding applications are to do with them. That is, the behavioral aspects of the applications are not specified; only a definition of what requests and responses they can send/receive is specified. This permits greater flexibility to the FAL users in standardizing

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such object behavior. In addition to these services, some supporting services are also defined in this standard to provide access to the FAL to control certain aspects of its operation.

1.2 Specifications

The principal objective of this standard is to specify the characteristics of conceptual application layer services suitable for time-critical communications, and thus supplement the OSI Basic Reference Model in guiding the development of application layer protocols for time-critical communications.

A secondary objective is to provide migration paths from previously-existing industrial communications protocols. It is this latter objective which gives rise to the diversity of services standardized as the various Types of IEC 61158, and the corresponding protocols standardized in subparts of IEC 61158-6.

1.3 Conformance

This standard do not specify individual implementations or products, nor do they constrain the implementations of application layer entities within industrial automation systems.

There is no conformance of equipment to this application layer service definition standard. Instead, conformance is achieved through implementation of conforming application layer protocols that fulfill any given Type of application layer services as 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.

IEC 61158-3-19, *Industrial communication networks – Fieldbus specifications – Part 3-19: Data-link layer service definition – Type 19 elements*

IEC 61158-4-16, *Industrial communication networks – Fieldbus specifications – Part 4-16: Data-link layer protocol specification – Type 16 elements*

IEC 61158-4-19, *Industrial communication networks – Fieldbus specifications – Part 4-19: Data-link layer protocol specification – Type 19 elements*

IEC 61158-5-19, *Industrial communication networks – Fieldbus specifications – Part 5-19: Application layer service definition – Type 19 elements*

ISO/IEC 10731, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

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

ISO/IEC 8822, *Information technology – Open Systems Interconnection – Presentation service definition*

ISO/IEC 8824, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1)*

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