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**Industrial communication networks – Fieldbus specifications –
Part 5-25: Application layer service definition – Type 25 elements**

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CONTENTS

| | |
|--|----|
| FOREWORD..... | 5 |
| INTRODUCTION..... | 7 |
| 1 Scope..... | 8 |
| 1.1 Overview | 8 |
| 1.2 Specification | 9 |
| 1.3 Conformance | 9 |
| 2 Normative references | 9 |
| 3 Terms, definitions, symbols, abbreviations and conventions | 10 |
| 3.1 Referenced terms and definitions..... | 10 |
| 3.1.1 ISO/IEC 7498-1 terms | 10 |
| 3.1.2 ISO/IEC 8822 terms..... | 10 |
| 3.1.3 ISO/IEC 9545 terms..... | 10 |
| 3.1.4 ISO/IEC 8824-1 terms | 11 |
| 3.2 Additional Type 25 terms and definitions..... | 11 |
| 3.3 Symbols and abbreviations | 13 |
| 3.4 Conventions..... | 14 |
| 3.4.1 General conventions..... | 14 |
| 3.4.2 Conventions for class definitions | 14 |
| 3.4.3 Conventions for service definitions | 15 |
| 4 Concept..... | 16 |
| 5 Data type ASE | 17 |
| 5.1 Overview | 17 |
| 5.2 Fixed length types | 17 |
| 5.2.1 Numeric types | 17 |
| 5.3 String types | 19 |
| 5.3.1 OctetString | 19 |
| 6 Communication model specification..... | 19 |
| 6.1 Communication model | 19 |
| 6.1.1 General | 19 |
| 6.1.2 Cyclic communication model..... | 19 |
| 6.1.3 Acyclic communication model | 19 |
| 6.2 ASE type S | 20 |
| 6.2.1 Overview | 20 |
| 6.2.2 Cyclic data type S..... | 20 |
| 6.2.3 Acyclic data ASE type S | 25 |
| 6.3 ASE type N | 29 |
| 6.3.1 Overview type N | 29 |
| 6.3.2 Cyclic data ASE type N..... | 29 |
| 6.3.3 Acyclic data ASE type N | 33 |
| 6.4 AR type S | 46 |
| 6.4.1 Cyclic control type S..... | 47 |
| 6.4.2 Remote control | 51 |
| 6.4.3 RCL communication control..... | 53 |
| 6.4.4 RT communication control | 55 |
| 6.5 AR type N | 59 |
| 6.5.1 Cyclic transmission control | 59 |

| | | |
|----------|---|----|
| 6.5.2 | Acyclic transmission control..... | 63 |
| 6.5.3 | RT communication control type N | 68 |
| | Bibliography..... | 71 |
| | | |
| Figure 1 | – Cyclic communication model (n:n communication with shared memory) | 19 |
| Figure 2 | – Acyclic communication model (client server model)..... | 20 |
| Figure 3 | – Acyclic communication model (push model) | 20 |
| Figure 4 | – Structure of ASE type S of FAL Type 25 | 20 |
| Figure 5 | – Structure of ASE type N of FAL Type 25 | 29 |
| Figure 6 | – Structure of AR type S of FAL Type 25 | 46 |
| Figure 7 | – Structure of AR type N of FAL Type 25 | 59 |
| | | |
| Table 1 | – Put_cyclicdata service parameters | 22 |
| Table 2 | – Get_cyclicdata service parameters..... | 23 |
| Table 3 | – Ctl_cyclic service parameters..... | 24 |
| Table 4 | – Send_ctldata service parameters | 26 |
| Table 5 | – Send_infodata service parameters | 27 |
| Table 6 | – Send_rmtctl service parameters | 28 |
| Table 7 | – Put_cyclicdata service parameters | 30 |
| Table 8 | – Get_cyclicdata service parameters..... | 31 |
| Table 9 | – Control_cyclic service parameters..... | 33 |
| Table 10 | – Put message service parameters | 35 |
| Table 11 | – Get message service parameters | 36 |
| Table 12 | – Put inquiry message service parameters | 39 |
| Table 13 | – Put ninquiry message service parameters | 40 |
| Table 14 | – Put reply message service parameters | 41 |
| Table 15 | – Send aliveinfo service parameters..... | 42 |
| Table 16 | – Receive aliveinfo service parameters | 43 |
| Table 17 | – Control_acyclic service parameters | 45 |
| Table 18 | – CYC_WRITE service parameters..... | 48 |
| Table 19 | – CYC_READ service parameters | 49 |
| Table 20 | – CTL_CYCLIC service parameters..... | 50 |
| Table 21 | – SendRMTCTL service parameters..... | 52 |
| Table 22 | – RCL_START service parameters..... | 54 |
| Table 23 | – RCL_STOP service parameters..... | 55 |
| Table 24 | – SendCTL service parameters | 56 |
| Table 25 | – SendINFO service parameters | 57 |
| Table 26 | – SendCTL_RMT service parameters | 58 |
| Table 27 | – SendCYC service parameters | 58 |
| Table 28 | – Write_cyclicdata service parameters | 60 |
| Table 29 | – Ctl_cyclic service parameters..... | 61 |
| Table 30 | – Transmit_acyclicdata1 service parameters | 64 |
| Table 31 | – Transmit_acyclicdata2 service parameters | 66 |

| | |
|--|----|
| Table 32 – Ctl_acyclic service parameters | 67 |
| Table 33 – Send_cyclicdata service parameters | 69 |
| Table 34 – Send_acyclicdata service parameters | 70 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
FIELD BUS SPECIFICATIONS –****Part 5-25: Application layer service definition –
Type 25 elements**

FOREWORD

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International Standard IEC 61158-5-25 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/947/FDIS | 65C/950/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.

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://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.

A bilingual version of this publication may be issued at a later date.

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 application service is provided by the application protocol making use of the services available from the data-link or other immediately lower layer. This document defines the application service characteristics that fieldbus applications and/or system management may exploit.

Throughout the set of fieldbus standards, the term “service” refers to the abstract capability provided by one layer of the OSI Basic Reference Model to the layer immediately above. Thus, the application layer service defined in this document is a conceptual architectural service, independent of administrative and implementation divisions.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-25: Application layer service definition – Type 25 elements

1 Scope

1.1 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 International 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 25 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 document defines in an abstract way the externally visible service provided by the different Types of the fieldbus Application Layer in terms of

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

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

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

This document specifies the structure and services of the IEC fieldbus Application Layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498-1) 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 such object behavior. In addition to these services, some supporting services are also defined in this document to provide access to the FAL to control certain aspects of its operation.

1.2 Specification

The principal objective of this document 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.

This specification may be used as the basis for formal Application 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 document does not specify individual implementations or products, nor does it 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 document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE All parts of the IEC 61158 series, as well as IEC 61784-1 and IEC 61784-2 are maintained simultaneously. Cross-references to these documents within the text therefore refer to the editions as dated in this list of normative references.

IEC 61158-3-25:2019, *Industrial communication networks – Fieldbus specifications – Part 3-25: Data-link layer service definition – Type 25 elements*

IEC 61158-6-25:2019, *Industrial communication networks – Fieldbus specifications – Part 6-25: Application layer protocol specification – Type 25 elements*

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

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

ISO/IEC 9545, *Information technology – Open Systems Interconnection – Application Layer structure*

ISO/IEC 8824-1, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

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