TECHNICAL SPECIFICATION

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Digital data communications for measurement and control — Fieldbus for use in industrial control systems

Part 5: Application Layer Service definition

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DIGITAL DATA COMMUNICATIONS FOR MEASUREMENT AND CONTROL – FIELDBUS FOR USE IN INDUSTRIAL CONTROL SYSTEMS –

Part 5: Application Layer Service definition

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.

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The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- The subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61158-5, which is a technical specification, has been prepared by subcommittee 65C: Digital communications, of IEC technical committee 65: Industrial-process measurement and control.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
65C/199/FDIS	65C/207+207A/RVD

Full information on the voting for the approval of this technical specification 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 3.

IEC 61158 consists of the following parts, under the general title *Digital data communications for measurement and control — Fieldbus for use in industrial control systems*:

- Part 1: Introductory guide (under preparation)
- Part 2: Physical layer specification and service definition
- Part 3: Data Link Service definition
- Part 4: Data Link Protocol specification
- Part 5: Application layer service definition
- Part 6: Application layer protocol specification
- Part 7: System management (under consideration)
- Part 8: Conformance testing (under consideration)

Annexes C to L form an integral part of this technical specification.

Annexes A and B are for information only.

This publication will be reviewed by the committee responsible for its preparation before 2002. Information relating to confirmation, amendment or revision of the publication is available from the IEC web site.

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

INTRODUCTION

This technical specification describes the Fieldbus Application Layer services intended to support the information interchange and the interactions between application processes.

This set of application layer standards and technical specifications does not specify individual implementations or products, nor does it constrain the implementations of Application entities and interfaces within the industrial automation system.

This set of application layer standards and technical specifications does not contain test specifications used to demonstrate compliance with IEC 61158-5 and IEC 61158-6.

DIGITAL DATA COMMUNICATIONS FOR MEASUREMENT AND CONTROL – FIELDBUS FOR USE IN INDUSTRIAL CONTROL SYSTEMS –

Part 5: Application Layer Service definition

1 Scope

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”.

The FAL is an Application Layer Communication Standard designed to support the conveyance of time-critical and non-time-critical application requests and responses among devices in an automation environment. The term “time-critical” is used to represent the presence of an application time-window, within which one or more specified actions are required to be completed with some defined level of certainty.

This technical specification specifies the structure and services of the IEC Fieldbus Application Layer (FAL). It is specified 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.

This part of IEC 61158 specifies interactions between remote applications in terms of

- an abstract model for defining application resources (objects) capable of being manipulated by users via the use of FAL Services,
- the primitives (interactions between the FAL and the FAL user) associated with each FAL Service;
- the parameters associated with each primitive;
- the interrelationship between and the valid sequences of the primitives for each service.

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 specification to provide access to the FAL to control certain aspects of its operation.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61158. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 646: 1991, Information technology – ISO 7–bit coded character set for information interchnage

ISO/IEC 7498 (all parts), *Information technology – Open Systems Interconnection – Basic Reference Modell*

ISO/IEC 7498–1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO 7498–3:1997, *Information technology – Open Systems Interconnection – Basic Reference Model – Part 3: Naming and addressing*

ISO 7498–4:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management framework*

ISO/IEC 8822:1994, *Information technology – Open Systems Interconnection – Presentation service definition*

ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN)*

ISO/IEC 8824–1:1995, *Information technology – Abstract Syntax Notation One (ASN.1); Specification of basic notation*
Amendment 1(1996): Rules of extensibility

ISO/IEC 8824–2:1995, *Information technology – Abstract Syntax Notation One (ASN.1); Information object specification*
Amendment 1(1996): Rules of extensibility

ISO/IEC 8824–3:1995, *Information technology – Abstract Syntax Notation One (ASN.1) Constraint specification*

ISO/IEC 8824–4:1995, *Information technology – Abstract Syntax Notation One (ASN.1) Parameterization of ASN.1 specifications*

ISO/IEC 9545:1994, *Information technology – Open Systems Interconnection – Application Layer structure*

ISO/IEC 10731:1994, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

IEC 61158–3:1999, *Digital data communications for measurement and control – Fieldbus for use in industrial control systems– Part 3: Data Link Layer service definition*

IEC 61158–4:1999, *Digital data communications for measurement and control – Fieldbus for use in industrial control systems – Part 4: Data Link Layer Protocol Specification*

IEC 61158–6:1999, *Digital data communications for measurement and control – Fieldbus for use in industrial control systems – Part 6: Application Layer Protocol Specification*

ANSIIEEE 754:– *IEEE Standard for Binary Floating–Point arithmetic*