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FOREWORD

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Attention is drawn to the fact that the 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 layer protocol type to be used with other layer protocols of the same type, or in other type combinations explicitly authorized by their respective intellectual property right holders.

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

International Standard IEC 61784-1 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fifth edition cancels and replaces the fourth edition published in 2014. This edition constitutes a technical revision.

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

- update of the dated references to the IEC 61158 series, to IEC 61784-2, to the IEC 61784-3 series, to the IEC 61784-5 series and to IEC 61918 throughout the document;
- update of selection tables CPF 2, CPF 4 and CPF 8.

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

FDIS	Report on voting
65C/942/FDIS	65C/951/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 document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61784 series, published under the general title *Industrial communication networks – Profiles*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document provides a set of Communication Profiles (CP) in the sense of ISO/IEC TR 10000-1. These answer the need of identifying the protocol families co-existing within the IEC 61158 series, as a result of the international harmonization of fieldbus technologies available on the market. More specifically, these profiles help to correctly state the compliance to the IEC 61158 series, and to avoid the spreading of divergent implementations, which would limit its use, clearness and understanding. Additional profiles to address specific market concerns, such as functional safety or information security, may be addressed by future parts of this standard.

This standard contains several Communication Profile Families (CPF), which specify one or more communication profiles. Such profiles identify, in a strict sense, protocol subsets of the IEC 61158 series via protocol specific communication profiles. They do not define device-type-specific communication profiles for the purpose of guiding manufacturers in feature set selection – for example, in selecting the minimum set of communication services and protocol to implement a specific class of devices, such as generic slaves or transmitters ("implementation profiles"). Neither do they define device profiles that specify communication profiles together with application functions needed to answer the need of a specific application ("application profiles").

It is agreed that these latter classes of profiles would help the use of the IEC 61158 series of standards; the profiles defined in this document are a necessary step to achieve that task.

It is also important to clarify that interoperability – defined as the ability of two or more network systems to exchange information and to make mutual use of the information that has been exchanged (see ISO/IEC TR 10000-1) – can be directly achieved on the same link only for those devices complying to the same communication profile.

Profiles contained in this International Standard are constructed of references to IEC 61158-2 and the IEC 61158-3, IEC 61158-4, IEC 61158-5 and IEC 61158-6 series, and other IS, TS or worldwide-accepted standards, as appropriate[1]. Each profile is required to reference at least one (sub)part of IEC 61158-2 through IEC 61158-6.

Two or more Profiles, which are related to a common family, are specified within a "Communication Profile Family" (CPF).

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[1] International Standardised Profiles may contain normative references to specifications other than International Standards; see ISO/IEC JTC 1 N 4047: *The Normative Referencing of Specifications other than International Standards in JTC 1 International Standardized Profiles – Guidelines for ISP Submitters*.

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 1: Fieldbus profiles

1 Scope

This part of IEC 61784 defines a set of protocol specific communication profiles based primarily on the IEC 61158 series, to be used in the design of devices involved in communications in factory manufacturing and process control.

Each profile selects specifications for the communications protocol stack at a device. It contains a minimal set of required services at the application layer and specification of options in intermediate layers defined through references. If no application layer is included, then a minimal set of required services at the Data-link layer is specified. The appropriate references to the protocol specific types are given in each communication profile family or associated profiles.

NOTE All profiles are based on standards or draft standards or International Standards published by the IEC or from standards or International Standards established by other standards bodies or open standards processes.

The structure of communication profile families is specified in Figure 1.

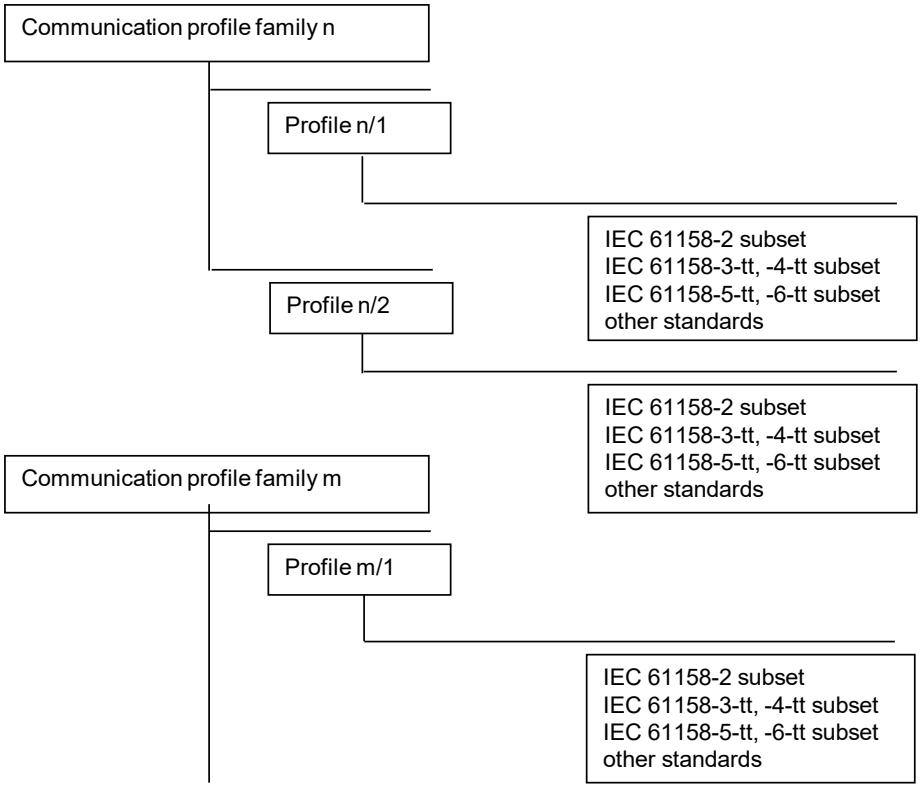

Figure 1 – Communication profile families and profiles

Each profile selects an appropriate consistent and compatible subset of services and protocols from the total available set that is defined and modelled in IEC 61158. For the selected subset of services and protocols, the profile also describes any possible or necessary constraints in parameter values.

Table 1 shows the communication profile families that are defined in this standard.

Table 1 – Relations of Communication Profile Families to type numbers

IEC 61784-1 contents			Corresponding IEC 61158 Types
CPF	**Clause**	**Communication Profile Families (Note 1)**	**Type**
1	5	Foundation® Fieldbus	1, 5, 9 (see Note 2)
2	6	CIP™	2
3	7	PROFIBUS & PROFINET	3 (see Note 3)
4	8	P-NET®	4
5	9	WorldFIP®	7
6	10	INTERBUS®	8
7	11	Has been removed based for lack of market relevance	6
8	12	CC-Link	18
9	13	HART	20
16	14	SERCOS	16
19	15	MECHATROLINK	24

NOTE 1 See the specific CPF clauses for information on the respective trademark holders.

NOTE 2 CP 1/1 has a denigrated PhL device profile subclass, which uses a variant of a Type 3 PhL.

NOTE 3 CP 3/2 has a denigrated PhL device profile subclass, which uses a variant of a Type 1 PhL.

NOTE 4 Other CPFs can be found in IEC 61784-2.

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 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-25, *Explosive atmospheres – Part 25: Intrinsically safe electrical systems*

IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control and laboratory use*

IEC 61131-2, *Programmable controllers – Part 2: Equipment requirements and tests*

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61158-2:2014, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-1:2014, *Industrial communication networks – Fieldbus specifications – Part 3-1: Data-link layer service definition – Type 1 elements*

IEC 61158-3-2:2014, *Industrial communication networks – Fieldbus specifications – Part 3-2: Data-link layer service definition – Type 2 elements*

IEC 61158-3-2:2014/AMD1:2019

IEC 61158-3-3:2014, *Industrial communication networks – Fieldbus specifications – Part 3-3: Data-link layer service definition – Type 3 elements*

IEC 61158-3-4:2019, *Industrial communication networks – Fieldbus specifications – Part 3-4: Data-link layer service definition – Type 4 elements*

IEC 61158-3-7:2007, *Industrial communication networks – Fieldbus specifications – Part 3-7: Data-link layer service definition – Type 7 elements*

IEC 61158-3-8:2007, *Industrial communication networks – Fieldbus specifications – Part 3-8: Data-link layer service definition – Type 8 elements*

IEC 61158-3-16:2007, *Industrial communication networks – Fieldbus specifications – Part 3-16: Data-link layer service definition – Type 16 elements*

IEC 61158-3-18:2007, *Industrial communication networks – Fieldbus specifications – Part 3-18: Data-link layer service definition – Type 18 elements*

IEC 61158-3-19:2019, *Industrial communication networks – Fieldbus specifications – Part 3-19: Data-link layer service definition – Type 19 elements*

IEC 61158-3-20:2014, *Industrial communication networks – Fieldbus specifications – Part 3-20: Data-link layer service definition – Type 20 elements*

IEC 61158-3-24:2014, *Industrial communication networks – Fieldbus specifications – Part 3-24: Data-link layer service definition – Type 24 elements*

IEC 61158-4-1:2014, *Industrial communication networks – Fieldbus specifications – Part 4-1: Data-link layer protocol specification – Type 1 elements*

IEC 61158-4-2:2019, *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

IEC 61158-4-3:2019, *Industrial communication networks – Fieldbus specifications – Part 4-3: Data-link layer protocol specification – Type 3 elements*

IEC 61158-4-4:2019, *Industrial communication networks – Fieldbus specifications – Part 4-4: Data-link layer protocol specification – Type 4 elements*

IEC 61158-4-7:2007, *Industrial communication networks – Fieldbus specifications – Part 4-7: Data-link layer protocol specification – Type 7 elements*

IEC 61158-4-8:2007, *Industrial communication networks – Fieldbus specifications – Part 4-8: Data-link layer protocol specification – Type 8 elements*

IEC 61158-4-16:2007, *Industrial communication networks – Fieldbus specifications – Part 4-16: Data-link layer protocol specification – Type 16 elements*

IEC 61158-4-18:2010, *Industrial communication networks – Fieldbus specifications – Part 4-18: Data-link layer protocol specification – Type 18 elements*

IEC 61158-4-19:2019, *Industrial communication networks – Fieldbus specifications – Part 4-19: Data-link layer protocol specification – Type 19 elements*

IEC 61158-4-20:2014, *Industrial communication networks – Fieldbus specifications – Part 4-20: Data-link layer protocol specification – Type 20 elements*

IEC 61158-4-24:2019, *Industrial communication networks – Fieldbus specifications – Part 4-24: Data-link layer protocol specification – Type 24 elements*

IEC 61158-5-2:2019, *Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements*

IEC 61158-5-3:2014, *Industrial communication networks – Fieldbus specifications – Part 5-3: Application layer service definition – Type 3 elements*

IEC 61158-5-4:2019, *Industrial communication networks – Fieldbus specifications – Part 5-4: Application layer service definition – Type 4 elements*

IEC 61158-5-5:2014, *Industrial communication networks – Fieldbus specifications – Part 5-5: Application layer service definition – Type 5 elements*

IEC 61158-5-7:2007, *Industrial communication networks – Fieldbus specifications – Part 5-7: Application layer service definition – Type 7 elements*

IEC 61158-5-8:2007, *Industrial communication networks – Fieldbus specifications – Part 5-8: Application layer service definition – Type 8 elements*

IEC 61158-5-9:2014, *Industrial communication networks – Fieldbus specifications – Part 5-9: Application layer service definition – Type 9 elements*

IEC 61158-5-16:2007, *Industrial communication networks – Fieldbus specifications – Part 5-16: Application layer service definition – Type 16 elements*

IEC 61158-5-18:2010, *Industrial communication networks – Fieldbus specifications – Part 5-18: Application layer service definition – Type 18 elements*

IEC 61158-5-19:2019, *Industrial communication networks – Fieldbus specifications – Part 5-19: Application layer service definition – Type 19 elements*

IEC 61158-5-20:2014, *Industrial communication networks – Fieldbus specifications – Part 5-20: Application layer service definition – Type 20 elements*

IEC 61158-5-24:2014, *Industrial communication networks – Fieldbus specifications – Part 5-24: Application layer service definition – Type 24 elements*

IEC 61158-6-2:2019, *Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements*

IEC 61158-6-3:2019, *Industrial communication networks – Fieldbus specifications – Part 6-3: Application layer protocol specification – Type 3 elements*

IEC 61158-6-4:2019, *Industrial communication networks – Fieldbus specifications – Part 6-4: Application layer protocol specification – Type 4 elements*

IEC 61158-6-5:2014, *Industrial communication networks – Fieldbus specifications – Part 6-5: Application layer protocol specification – Type 5 elements*

IEC 61158-6-7:2007, *Industrial communication networks – Fieldbus specifications – Part 6-7: Application layer protocol specification – Type 7 elements*

IEC 61158-6-8:2007, *Industrial communication networks – Fieldbus specifications – Part 6-8: Application layer protocol specification – Type 8 elements*

IEC 61158-6-9:2014, *Industrial communication networks – Fieldbus specifications – Part 6-9: Application layer protocol specification – Type 9 elements*

IEC 61158-6-16:2007, *Industrial communication networks – Fieldbus specifications – Part 6-16: Application layer protocol specification – Type 16 elements*

IEC 61158-6-18:2010, *Industrial communication networks – Fieldbus specifications – Part 6-18: Application layer protocol specification – Type 18 elements*

IEC 61158-6-19:2019, *Industrial communication networks – Fieldbus specifications – Part 6-19: Application layer protocol specification – Type 19 elements*

IEC 61158-6-20:2014, *Industrial communication networks – Fieldbus specifications – Part 6-20: Application layer protocol specification – Type 20 elements*

IEC 61158-6-24:2014, *Industrial communication networks – Fieldbus specifications – Part 6-24: Application layer protocol specification – Type 24 elements*

IEC 61784-2:2019, *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC/IEEE 8802-3*

IEC 61784-5-2:2018, *Industrial communication networks – Profiles – Part 5-2: Installation of fieldbuses – Installation profiles for CPF 2*

IEC 61918:2018, *Industrial communication networks – Installation of communication networks in industrial premises*

IEC 62026-3, *Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs) – Part 3: DeviceNet*

IEC 62591:2016, *Industrial communication networks – Wireless communication network and communication profiles – WirelessHART™*

ISO/IEC 8482, *Information technology – Telecommunications and information exchange between systems – Twisted pair multipoint interconnections*

ISO/IEC 8802-2:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control*

ISO/IEC/IEEE 8802-3:2017, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Standard for Ethernet*

ISO/IEC 15802-3, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Common specifications – Part 3: Media Access Control (MAC) Bridges*

ISO 15745-3:2003, *Industrial automation systems and integration – Open systems application integration framework – Part 3: Reference description for IEC 61158-based control systems*

ANSI TIA/EIA-485-A:1998, *Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems*

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IETF RFC 1112, *Host Extensions for IP Multicasting*. Available at <http://www.ietf.org>

IETF RFC 1122, *Requirements for Internet Hosts – Communication Layers*. Available at <http://www.ietf.org> [viewed 2018-09-03]

IETF RFC 1123, *Requirements for Internet Hosts – Application and Support*. Available at <http://www.ietf.org> [viewed 2018-09-03]

IETF RFC 1127, *A Perspective on the Host Requirements RFCs*. Available at <http://www.ietf.org> [viewed 2018-09-03]

IETF RFC 2236, *Internet Group Management Protocol, Version 2*. Available at <http://www.ietf.org> [viewed 2018-09-03]