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IEC 61784-2

Edition 2.0 2010-07

INTERNATIONAL STANDARD



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE **XH**

ICS 35.100.20, 35.240.50

ISBN 978-2-88912-053-6

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Withdrawn

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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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International Standard IEC 61784-2 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 2007. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- update of the dated references to the IEC 61158 series, to IEC 61784-1, to the IEC 61784-3 series, to the IEC 61784-5 series and to IEC 61918 throughout the document;
- update of selection tables for CPF 2, CPF 3, CPF 11 and CPF 14;
- addition of a new profile CP 11/2 in 12.3;
- addition of a new profile CP 14/3 in subclause 15.5;
- addition of a new Communication Profile Family - CPF 17;
 - new subclause 3.3.12 (CPF 17 symbols);
 - new Clause 18 for CPF 17 with one profile;
- addition of a new Communication Profile Family - CPF 18;
 - new subclause 3.3.13 (CPF 18 symbols);
 - new Clause 19 for CPF 18 with one profile;
 - specification changes for CPF3;
- update of the requirements for all conformance classes;
- added precise timing requirements for IP;
- updated timing requirements for IO devices;
- added precise timing requirements for PTCP;
- increasing the amount of synchronized devices in line;
- integrating the fast startup as additional feature.

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

FDIS	Report on voting
05C/601/FDIS	05C/617/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.

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 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://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.

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 part of IEC 61784 provides additional Communication Profiles (CP) to the existing Communication Profile Families (CPF) of IEC 61784-1 and additional CPFs with one or more CPs. These profiles meet the industrial automation market objective of identifying Real-Time Ethernet (RTE) communication networks coexisting with ISO/IEC 8802-3 – commonly known as Ethernet. These RTE communication networks use provision from ISO/IEC 8802-3 for the lower communication stack layers and additionally provide more predictable and reliable real-time data transfer and means for support of precise synchronization of automation equipment.

More specifically, these profiles help to correctly state the compliance of RTE communication networks with ISO/IEC 8802-3, and to avoid the spreading of divergent implementations.

Adoption of Ethernet technology for industrial communication between controllers and even for communication with field devices promotes use of Internet technologies in the field area. This availability would be unacceptable if it causes the loss of features required in the field area for industrial communication automation networks, such as:

- real-time,
- synchronized actions between field devices like drives,
- efficient, frequent exchange of very small data records.

These new RTE profiles may take advantage of the improvements of Ethernet networks in terms of transmission bandwidth and network span.

Another implicit but essential requirement is that the typical Ethernet communication capabilities, as used in the office world, are fully retained, so that the software involved remains applicable.

The market is in need of several network solutions, each with different performance characteristics and functional capabilities, matching the diverse application requirements. RTE performance indicators (see Clause 5), which values will be provided with RTE devices based on communication profiles specified in this part of IEC 61784, enable the user to match network devices with application dependant performance requirements of an RTE network.

Subclause 5.1 specifies basic principles of performance indicators required to express RTE performance of a CP. Subclause 5.2 describes the view of application requirements. An application dependant class could be used to find out a suitable CP. Clause 4 specifies how conformance of a device to the CPF or CP should be stated.

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3

1 Scope

This part of IEC 61784 specifies

- performance indicators supporting classification schemes for Real-Time Ethernet (RTE) requirements;
- profiles and related network components based on ISO/IEC 8802-3, IEC 61158 series, and IEC 61784-1;
- RTE solutions that are able to run in parallel with ISO/IEC 8802-3-based applications.

These communication profiles are called Real-Time Ethernet communication profiles.

NOTE The RTE communication profiles use ISO/IEC 8802-3 communication networks and its related network components or IEC 61588 and may in some cases amend those standards to obtain RTE features.

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 61158-2:2010, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-2:2007, *Industrial communication networks – Fieldbus specifications – Part 3-2: Data-link layer service definition – Type 2 elements*

IEC 61158-3-4:2007, *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 61158-3-11:2007, *Industrial communication networks – Fieldbus specifications – Part 3-11: Data-link layer service definition – Type 11 elements*

IEC 61158-3-12:2010, *Industrial communication networks – Fieldbus specifications – Part 3-12: Data-link layer service definition – Type 12 elements*

IEC 61158-3-13:2007, *Industrial communication networks – Fieldbus specifications – Part 3-13: Data-link layer service definition – Type 13 elements*

IEC 61158-3-14:2010, *Industrial communication networks – Fieldbus specifications – Part 3-14: Data-link layer service definition – Type 14 elements*

IEC 61158-3-15:2007, *Industrial communication networks – Fieldbus specifications – Part 3-15: Data-link layer service definition – Type 15 elements*

IEC 61158-3-17:2007, *Industrial communication networks – Fieldbus specifications – Part 3-17: Data-link layer service definition – Type 17 elements*

IEC 61158-3-19:2010, *Industrial communication networks – Fieldbus specifications – Part 3-19: Data-link layer service definition – Type 19 elements*

IEC 61158-3-21:2010, *Industrial communication networks – Fieldbus specifications – Part 3-21: Data-link layer service definition – Type 21 elements*

IEC 61158-3-22:2010, *Industrial communication networks – Fieldbus specifications – Part 3-22: Data-link layer service definition – Type 22 elements*

IEC 61158-4-2:2010, *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

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

IEC 61158-4-11:2010, *Industrial communication networks – Fieldbus specifications – Part 4-11: Data-link layer protocol specification – Type 11 elements*

IEC 61158-4-12:2010, *Industrial communication networks – Fieldbus specifications – Part 4-12: Data-link layer protocol specification – Type 12 elements*

IEC 61158-4-13:2007, *Industrial communication networks – Fieldbus specifications – Part 4-13: Data-link layer protocol specification – Type 13 elements*

IEC 61158-4-14:2010, *Industrial communication networks – Fieldbus specifications – Part 4-14: Data-link layer protocol specification – Type 14 elements*

IEC 61158-4-17:2007, *Industrial communication networks – Fieldbus specifications – Part 4-17: Data-link layer protocol specification – Type 17 elements*

IEC 61158-4-19:2010, *Industrial communication networks – Fieldbus specifications – Part 4-19: Data-link layer protocol specification – Type 19 elements*

IEC 61158-4-21:2010, *Industrial communication networks – Fieldbus specifications – Part 4-21: Data-link layer protocol specification – Type 21 elements*

IEC 61158-4-22:2010, *Industrial communication networks – Fieldbus specifications – Part 4-22: Data-link layer protocol specification – Type 22 elements*

IEC 61158-5-2:2010, *Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements*

IEC 61158-5-4:2007, *Industrial communication networks – Fieldbus specifications – Part 5-4: Application layer service definition – Type 4 elements*

IEC 61158-5-9:2007, *Industrial communication networks – Fieldbus specifications – Part 5-9: Application layer service definition – Type 9 elements*

IEC 61158-5-10:2010, *Industrial communication networks – Fieldbus specifications – Part 5-10: Application layer service definition – Type 10 elements*

IEC 61158-5-11:2007, *Industrial communication networks – Fieldbus specifications – Part 5-11: Application layer service definition – Type 11 elements*

IEC 61158-5-12:2010, *Industrial communication networks – Fieldbus specifications – Part 5-12: Application layer service definition – Type 12 elements*

IEC 61158-5-13:2007, *Industrial communication networks – Fieldbus specifications – Part 5-13: Application layer service definition – Type 13 elements*

IEC 61158-5-14:2010, *Industrial communication networks – Fieldbus specifications – Part 5-14: Application layer service definition – Type 14 elements*

IEC 61158-5-15:2010, *Industrial communication networks – Fieldbus specifications – Part 5-15: Application layer service definition – Type 15 elements*

IEC 61158-5-17:2007, *Industrial communication networks – Fieldbus specifications – Part 5-17: Application layer service definition – Type 17 elements*

IEC 61158-5-19:2010, *Industrial communication networks – Fieldbus specifications – Part 5-19: Application layer service definition – Type 19 elements*

IEC 61158-5-21:2010, *Industrial communication networks – Fieldbus specifications – Part 5-21: Application layer service definition – Type 21 elements*

IEC 61158-5-22:2010, *Industrial communication networks – Fieldbus specifications – Part 5-22: Application layer service definition – Type 22 elements*

IEC 61158-6-2:2010, *Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements*

IEC 61158-6-4:2007, *Industrial communication networks – Fieldbus specifications – Part 6-4: Application layer protocol specification – Type 4 elements*

IEC 61158-6-10:2010, *Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements*

IEC 61158-6-11:2007, *Industrial communication networks – Fieldbus specifications – Part 6-11: Application layer protocol specification – Type 11 elements*

IEC 61158-6-12:2010, *Industrial communication networks – Fieldbus specifications – Part 6-12: Application layer protocol specification – Type 12 elements*

IEC 61158-6-13:2007, *Industrial communication networks – Fieldbus specifications – Part 6-13: Application layer protocol specification – Type 13 elements*

IEC 61158-6-14:2010, *Industrial communication networks – Fieldbus specifications – Part 6-14: Application layer protocol specification – Type 14 elements*

IEC 61158-6-15:2010, *Industrial communication networks – Fieldbus specifications – Part 6-15: Application layer protocol specification – Type 15 elements*

IEC 61158-6-17:2007, *Industrial communication networks – Fieldbus specifications – Part 6-17: Application layer protocol specification – Type 17 elements*

IEC 61158-6-19:2010, *Industrial communication networks – Fieldbus specifications – Part 6-19: Application layer protocol specification – Type 19 elements*

IEC 61158-6-21:2010, *Industrial communication networks – Fieldbus specifications – Part 6-21: Application layer protocol specification – Type 21 elements*

IEC 61158-6-22:2010, *Industrial communication networks – Fieldbus specifications – Part 6-22: Application layer protocol specification – Type 22 elements*

IEC 61588:2009, *Precision clock synchronization protocol for networked measurement and control systems*

IEC 61784-1:2010, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

IEC 61784-5-2:2010, *Industrial communication networks – Profiles – Part 5-2: Installation of fieldbuses – Installation profiles for CPF 2*

IEC 61784-5-3:2010, *Industrial communication networks – Profiles – Part 5-3: Installation of fieldbuses – Installation profiles for CPF 3*

IEC 61784-5-6:2010, *Industrial communication networks – Profiles – Part 5-6: Installation of fieldbuses – Installation profiles for CPF 6*

IEC 61784-5-11:2010, *Industrial communication networks – Profiles – Part 5-11: Installation of fieldbuses – Installation profiles for CPF 11*

IEC 61918:2010, *Industrial communication networks – Installation of communication networks in industrial premises*

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

ISO/IEC 8802-2/Cor. 1

ISO/IEC 8802-3:2000, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 8802-11, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications*

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

ISO 15745-4:2003, *Industrial automation systems and integration – Open systems application integration framework – Part 4: Reference description for Ethernet-based control systems*

Amendment 1 (2006): PROFINET profiles

IEEE 802.1AB, *IEEE Standard for Local and metropolitan area networks Station and Media Access Control Connectivity Discovery*

IEEE 802.1D, *IEEE Standard for Information technology – Telecommunications and information exchange between systems – IEEE standard for local and metropolitan area networks – Common specifications – Media access control (MAC) Bridges*

IEEE 802.1Q *IEEE Standard for Information technology – Telecommunications and information exchange between systems – IEEE standard for Local and metropolitan area networks – Virtual bridged local area networks*

IEEE 802.3-2002: *IEEE Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*

NOTE 1 Compliance with future editions of this standard will need checking.

NOTE 2 IEEE 802.3-2002 includes extensions to ISO/IEC 8802-3:2000. When a next edition of ISO/IEC 8802-3 is available the references to IEEE 802.3-2002 will be replaced if appropriate.

IEEE Std 802.3ab, *Information technology – telecommunications and information exchange between systems – local and metropolitan area networks – Specific requirements. Supplement to Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method and physical layer specifications – Physical layer parameters and specifications for 1000 Mb/s operation over 4-pair of category 5 balanced copper cabling, type 1000BASE-T*

IEEE Std 802.11g, *IEEE Standard for Information technology— Telecommunications and information exchange between systems— Local and metropolitan area networks— Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications – Amendment 4: Further higher data rate extension in the 2,4 GHz band*

IEEE Std 802.11h, *IEEE Standard for Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications – Amendment 5: Spectrum and transmit power management extensions in the 5 GHz band in Europe*

IEEE Std 802.11e, *IEEE Standard for Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications – Amendment 8: Medium Access Control (MAC) quality of service enhancements*

IEEE Std 802.11i, *IEEE Standard for Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks— Specific requirements — Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications – Amendment 6: Medium Access Control (MAC) security enhancements*

IEEE Std 802.15.1, *IEEE Standard for Information technology— Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 15: Wireless medium access control (MAC) and physical layer (PHY) specifications for wireless personal area networks (WPANs)*

IETF RFC 768, *User Datagram Protocol*, available at <<http://www.ietf.org>>

IETF RFC 791, *Internet Protocol*, available at <<http://www.ietf.org>>

IETF RFC 792, *Internet Control Message Protocol*, available at <<http://www.ietf.org>>

IETF RFC 793, *Transmission Control Protocol*, available at <<http://www.ietf.org>>

IETF RFC 826, *Ethernet Address Resolution Protocol*, available at <<http://www.ietf.org>>

IETF RFC 894, *A standard for the Transmission of IP Datagrams over Ethernet Networks*, available at <<http://www.ietf.org>>

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>

IETF RFC 1123, *Requirements for Internet Hosts – Application and Support*, available at <http://www.ietf.org>

IETF RFC 1127, *A Perspective on the Host Requirements RFCs*, available at <http://www.ietf.org>

IETF RFC 1213, *Management Information Base for Network Management of TCP/IP-based internets: MIB-II*, available at <http://www.ietf.org>

IETF RFC 1305, *Network Time Protocol (Version 3)*, available at <http://www.ietf.org>

IETF RFC 2131, *Dynamic Host Configuration Protocol*, available at <http://www.ietf.org>

IETF RFC 2236, *Internet Group Management Protocol, Version 2*, available at <http://www.ietf.org>

IETF RFC 2544, *Benchmarking Methodology for Network Interconnect Devices*, available at <http://www.ietf.org>

IETF RFC 2988, *Computing TCP's Retransmission Timer*, available at <http://www.ietf.org>

Open Software Foundation (OSF): C706, *CAE Specification DCE1.1: Remote Procedure Call*, available at <http://www.opengroup.org/onlinepubs/9629399/toc.htm>

Withdrawing