BS EN 61784-2:2014



BSI Standards Publication

Industrial communication networks — Profiles

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

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National foreword

This British Standard is the UK implementation of EN 61784-2:2014. It is identical to IEC 61784-2:2014. It supersedes BS EN 61784-2:2010 which is withdrawn.

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Foreword

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 61010	series	Safety requirements for electrical equipment for measurement, control and laboratory use	EN 61010	series
IEC 61131-2	-	Programmable controllers - Part 2: Equipment requirements and tests	EN 61131-2	-
IEC 61158	series	Industrial communication networks - Fieldbus specifications	EN 61158	series
IEC 61158-1	2014	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	2014
IEC 61158-2	2014	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	EN 61158-2	2014
IEC 61158-3-2	2014	Industrial communication networks - Fieldbus specifications - Part 3-2: Data-link layer service definition - Type 2 elements	EN 61158-3-2	2014
IEC 61158-3-4	2014	Industrial communication networks - Fieldbus specifications - Part 3-4: Data-link layer service definition - Type 4 elements	EN 61158-3-4	2014
IEC 61158-3-11	2007	Industrial communication networks - Fieldbus specifications - Part 3-11: Data-link layer service definition - Type 11 elements	EN 61158-3-11	2008
IEC 61158-3-12	2014	Industrial communication networks - Fieldbus specifications - Part 3-12: Data-link layer service definition - Type 12 elements	EN 61158-3-12	2014

Publication	Year	Title	EN/HD	Year
IEC 61158-3-13	2014	Industrial communication networks - Fieldbus specifications - Part 3-13: Data link layer service definition - Type 13 elements	EN 61158-3-13	2014
IEC 61158-3-14	2014	Industrial communication networks - Fieldbus specifications - Part 3-14: Data-link layer service definition - Type 14 elements	EN 61158-3-14	2014
IEC 61158-3-17	2007	Industrial communication networks - Fieldbus specifications - Part 3-17: Data-link layer service definition - Type 17 elements	EN 61158-3-17	2008
IEC 61158-3-19	2014	Industrial communication networks - Fieldbus specifications - Part 3-19: Data-link layer service definition - Type 19 elements	EN 61158-3-19	2014
IEC 61158-3-21	2010	Industrial communication networks - Fieldbus specifications - Part 3-21: Data-link layer service definition - Type 21 elements	EN 61158-3-21	2012
IEC 61158-3-22	2014	Industrial communication networks - Fieldbus specifications - Part 3-22: Data-link layer service definition - Type 22 elements	EN 61158-3-22	2014
IEC 61158-4-2	2014	Industrial communication networks - Fieldbus specifications - Part 4-2: Data-link layer protocol specification - Type 2 elements	EN 61158-4-2	1)
IEC 61158-4-4	2014	Industrial communication networks - Fieldbus specifications - Part 4-4: Data-link layer protocol specification - Type 4 elements	EN 61158-4-4	1)
IEC 61158-4-11	2014	Industrial communication networks - Fieldbus specifications - Part 4-11: Data-link layer protocol specificationn - Type 11 elements	EN 61158-4-11	1)
IEC 61158-4-12	2014	Industrial communication networks - Fieldbus specifications - Part 4-12: Data-link layer protocol specification - Type 12 elements	EN 61158-4-12	1)
IEC 61158-4-13	2014	Industrial communication networks - Fieldbus specifications - Part 4-13: Data-link layer protocol specification - Type 13 elements	EN 61158-4-13	1)
IEC 61158-4-14	2014	Industrial communication networks - Fieldbus specifications - Part 4-14: Data-link layer protocol specification - Type 14 elements	EN 61158-4-14	1)

1) To be published.

Publication	Year	Title	EN/HD	Year
IEC 61158-4-17	2007	Industrial communication networks - Fieldbus specifications - Part 4-17: Data-link layer protocol specification - Type 17 elements	EN 61158-4-17	2008
IEC 61158-4-19	2014	Industrial communication networks - Fieldbus specifications - Part 4-19: Data-link layer protocol specification - Type 19 elements	EN 61158-4-19	[1)]
IEC 61158-4-21	2010	Industrial communication networks - Fieldbus specifications - Part 4-21: Data-link layer protocol specification - Type 21 elements	EN 61158-4-21	2012
IEC 61158-4-22	2014	Industrial communication networks - Fieldbus specifications - Part 4-22: Data-link layer protocol specification - Type 22 elements	EN 61158-4-22	[1)]
IEC 61158-5-2	2014	Industrial communication networks - Fieldbus specifications - Part 5-2: Application layer service definition - Type 2 elements	EN 61158-5-2	2014
IEC 61158-5-4	2014	Industrial communication networks - Fieldbus specifications - Part 5-4: Application layer service definition - Type 4 elements	EN 61158-5-4	2014
IEC 61158-5-10	2014	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN 61158-5-10	2014
IEC 61158-5-11	2007	Industrial communication networks - Fieldbus specifications - Part 5-11: Application layer service definition - Type 11 elements	EN 61158-5-11	2008
IEC 61158-5-12	2014	Industrial communication networks - Fieldbus specifications - Part 5-12: Application layer service definition - Type 12 elements	EN 61158-5-12	2014
IEC 61158-5-13	2014	Industrial communication networks - Fieldbus specifications - Part 5-13: Application layer service definition - Type 13 elements	EN 61158-5-13	2014
IEC 61158-5-14	2014	Industrial communication networks - Fieldbus specifications - Part 5-14: Application layer service definition - Type 14 elements	EN 61158-5-14	2014
IEC 61158-5-15	2010	Industrial communication networks - Fieldbus specifications - Part 5-15: Application layer service definition - Type 15 elements	EN 61158-5-15	2012
IEC 61158-5-17	2007	Industrial communication networks - Fieldbus specifications - Part 5-17: Application layer service definition - Type 17 elements	EN 61158-5-17	2008

Publication	Year	Title	EN/HD	Year
IEC 61158-5-19	2014	Industrial communication networks - Fieldbus specifications - Part 5-19: Application layer service definition - Type 19 elements	EN 61158-5-19	2014
IEC 61158-5-21	2010	Industrial communication networks - Fieldbus specifications - Part 5-21: Application layer service definition - Type 21 elements	EN 61158-5-21	2012
IEC 61158-5-22	2014	Industrial communication networks - Fieldbus specifications - Part 5-22: Application layer service definition - Type 22 elements	EN 61158-5-22	2014
IEC 61158-5-23	2014	Industrial communication networks - Fieldbus specifications - Part 5-23: Application layer service definition - Type 23 elements	EN 61158-5-23	2014
IEC 61158-6-2	2014	Industrial communication networks - Fieldbus specifications - Part 6-2: Application layer protocol specification - Type 2 elements	EN 61158-6-2	[1)]
IEC 61158-6-4	2014	Industrial communication networks - Fieldbus specifications - Part 6-4: Application layer protocol specification - Type 4 elements	EN 61158-6-4	[1)]
IEC 61158-6-10	2014	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN 61158-6-10	[1)]
IEC 61158-6-11	2007	Industrial communication networks - Fieldbus specifications - Part 6-11: Application layer protocol specification - Type 11 elements	EN 61158-6-11	2008
IEC 61158-6-12	2014	Industrial communication networks - Fieldbus specifications - Part 6-12: Application layer protocol specification - Type 12 elements	EN 61158-6-12	[1)]
IEC 61158-6-13	2014	Industrial communication networks - Fieldbus specifications - Part 6-13: Application layer protocol specification - Type 13 elements	EN 61158-6-13	[1)]
IEC 61158-6-14	2014	Industrial communication networks - Fieldbus specifications - Part 6-14: Application layer protocol specification - Type 14 elements	EN 61158-6-14	[1)]
IEC 61158-6-15	2010	Industrial communication networks - Fieldbus specifications - Part 6-15: Application layer protocol specification - Type 15 elements	EN 61158-6-15	2012
IEC 61158-6-17	2007	Industrial communication networks - Fieldbus specifications - Part 6-17: Application layer protocol specification - Type 17 elements	EN 61158-6-17	2008

Publication	Year	Title	EN/HD	Year
IEC 61158-6-19	2014	Industrial communication networks - Fieldbus specifications - Part 6-19: Application layer protocol specification - Type 19 elements	EN 61158-6-19	1)
IEC 61158-6-21	2010	Industrial communication networks - Fieldbus specifications - Part 6-21: Application layer protocol specification - Type 21 elements	EN 61158-6-21	2012
IEC 61158-6-22	2014	Industrial communication networks - Fieldbus specifications - Part 6-22: Application layer protocol specification - Type 22 elements	EN 61158-6-22	1)
IEC 61158-6-23	2014	Industrial communication networks - Fieldbus specifications - Part 6-23: Application layer protocol specification - Type 23 elements	EN 61158-6-23	1)
IEC 61588	2009	Precision clock synchronization protocol for networked measurement and control systems	-	-
IEC 61784-1	2014	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	1)
IEC 61784-5-2	2013	Industrial communication networks - Profiles - Part 5-2: Installation of fieldbuses - Installation profiles for CPF 2	EN 61784-5-2	2013
IEC 61784-5-3	2013	Industrial communication networks - Profiles - Part 5-3: Installation of fieldbuses - Installation profiles for CPF 3	EN 61784-5-3	2013
IEC 61784-5-6	2013	Industrial communication networks - Profiles - Part 5-6: Installation of fieldbuses - Installation profiles for CPF 6	EN 61784-5-6	2013
IEC 61784-5-8	2013	Industrial communication networks - Profiles - Part 5-8: Installation of fieldbuses - Installation profiles for CPF 8	EN 61784-5-8	2013
IEC 61784-5-11	2013	Industrial communication networks - Profiles - Part 5-11: Installation of fieldbuses - Installation profiles for CPF 11	EN 61784-5-11	2013
IEC 61800	series	Adjustable speed electrical power drive systems	EN 61800	series
IEC 61918 (mod) -	2013 -	Industrial communication networks - Installation of communication networks in industrial premises	EN 61918 + AC	2013 2014
ISO/IEC 2382-16	1996	Information technology - Vocabulary - Part 16: Information theory	-	-

Publication	Year	Title	EN/HD	Year
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model	-	-
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 8802-3	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/IEEE 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/IEC 11801 + A1 + A2	2002 2008 2010	Information technology - Generic cabling for customer premises	- - -	- - -
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 + A1	2003 2006	Industrial automation systems and integration - Open systems application integration framework - Part 4: Reference description for Ethernet-based control systems	- -	- -
IEEE Std 802	2001	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture	-	-
IEEE 802.1AB	-	IEEE Standard for Local and Metropolitan Area Networks - Station and Media Access Control Connectivity Discovery	-	-
IEEE 802.1AS	2011	IEEE Standard for Local and Metropolitan Area Networks - Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks	-	-

Publication	Year	Title	EN/HD	Year
IEEE 802.1D	2004	IEEE Standard for Local and Metropolitan Area Networks - Media Access Control (MAC) Bridges	-	-
IEEE 802.1Q	2011	IEEE Standard for Local and metropolitan area networks - Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks	-	-
IEEE 802.3	2008	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	-	-
IEEE 802.11	2007	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	-	-
IEEE Std 802.15.1	-	IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements. - Part 15.1: Wireless medium access control (MAC) and physical layer (PHY) specifications for wireless personal area networks (WPANs)	-	-
IETF RFC 768	-	User Datagram Protocol	-	-
IETF RFC 791	-	Internet Protocol	-	-
IETF RFC 792	-	Internet Control Message Protocol	-	-
IETF RFC 793	-	Transmission Control Protocol	-	-
IETF RFC 826	-	Ethernet Address Resolution Protocol - or - Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware	-	-
IETF RFC 894	-	A Standard for the Transmission of IP Datagrams over Ethernet Networks	-	-
IETF RFC 1034	-	Domain names - concepts and facilities	-	-
IETF RFC 1112	-	Host Extensions for IP Multicasting	-	-
IETF RFC 1122	-	Requirements for Internet Hosts - Communication Layers	-	-
IETF RFC 1123	-	Requirements for Internet Hosts - Application and Support	-	-
IETF RFC 1127	-	Perspective on the Host Requirements RFCs	-	-

Publication	Year	Title	EN/HD	Year
IETF RFC 1157	-	Simple Network Management Protocol (SNMP)	-	-
IETF RFC 1213	-	Management Information Base for Network Management of TCP/IP-based Internets: MIB-II	-	-
IETF RFC 1305	-	Network Time Protocol (Version 3) Specification, Implementation and Analysis	-	-
IETF RFC 2131	-	Dynamic Host Configuration Protocol	-	-
IETF RFC 2236	-	Internet Group Management Protocol, Version 2	-	-
IETF RFC 2544	-	Benchmarking Methodology for Network Interconnect Devices	-	-
IETF RFC 2988	-	Computing TCP's Retransmission Timer	-	-
IETF RFC 4836	-	Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)	-	-
OSF CAE Specification C706	-	Technical Standard DCE1.1: Remote Procedure Call	-	-

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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 or IEEE 802.3 – 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 or IEEE 802.3, 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 or IEEE 802.3, IEC 61158 series, and IEC 61784-1;
- RTE solutions that are able to run in parallel with ISO/IEC 8802-3 or IEEE 802.3 based applications.

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

NOTE The RTE communication profiles use ISO/IEC 8802-3 or IEEE 802.3 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 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 specificatio*ns

IEC 61158-1:2014, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

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

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

IEC 61158-3-4:2014, *Industrial communication networks – Fieldbus specifications – Part 3-4: Data-link layer service definition – Type 4 elements*

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