

Industrial networks - Profiles - Part 2-21: Additional
real-time fieldbus profiles based on ISO/IEC/IEEE
8802-3 - CPF 21

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61784-2-21:2023 sisaldab Euroopa standardi EN IEC 61784-2-21:2023 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61784-2-21:2023 consists of the English text of the European standard EN IEC 61784-2-21:2023.
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(IEC 61784-2-21:2023)

Réseaux industriels - Profils - Partie 2-21: Profils de bus de
terrain supplémentaires pour les réseaux en temps réel
fondés sur l'ISO/IEC/IEEE 8802-3 - CPF 21
(IEC 61784-2-21:2023)

Industrielle Kommunikationsnetze - Profile - Teil 2-21:
Zusätzliche Feldbusprofile für Echtzeitnetzwerke basierend
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(CPF) 21
(IEC 61784-2-21:2023)

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European foreword

The text of document 65C/1209/FDIS, future edition 1 of IEC 61784-2-21, prepared by SC 65C "Industrial networks" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61784-2-21:2023.

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IEC 61158-1	NOTE Approved as EN IEC 61158-1
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IEC 61784-1-0	NOTE Approved as EN IEC 61784-1-0
IEC 61784-2 (series)	NOTE Approved as EN IEC 61784-2 (series)

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial networks – Profiles –

**Part 2-21: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 –
CPF 21**

Réseaux industriels – Profils –

**Partie 2-21: Profils de bus de terrain supplémentaires pour les réseaux en temps
réel fondés sur l'ISO/IEC/IEEE 8802-3 – CPF 21**



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INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial networks – Profiles –
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temps réel fondés sur l'ISO/IEC/IEEE 8802-3 – CPF 21**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL NETWORKS –
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based on ISO/IEC/IEEE 8802-3 –
CPF 21****FOREWORD**

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

IEC 61784-2-21 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This first edition, together with the other parts of the same series, cancels and replaces the fourth edition of IEC 61784-2 published in 2019. This first edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 61784-2:2019:

- a) split of the original IEC 61784-2 into several subparts, one subpart for the material of a generic nature, and one subpart for each Communication Profile Family specified in the original document;
- b) expand Common-memory-area as a new Common-memory-area-3 (CM3);
- c) add new services and the protocols with expansion of Common-memory-area:
 - Extended-cyclic-data service and the protocol;
 - Extended-participation-req service and the protocol;
 - Extended-network-parameter-read service and the protocol;
 - Extended-network-parameter-write service and the protocol;
- d) add new Table for CP 21/1: Consistent set of PIs with CM3.

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

Draft	Report on voting
65C/1209/FDIS	65C/1237/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 61784-2 series, published under the general title *Industrial networks – Profiles – Part 2: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3*, 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 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.

INTRODUCTION

The IEC 61784-2 series provides additional Communication Profiles (CP) to the existing Communication Profile Families (CPF) of the IEC 61784-1 series 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/IEEE 8802-3 – commonly known as Ethernet. These RTE communication networks use provisions of ISO/IEC/IEEE 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/IEEE 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 the 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 can 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, whose values will be provided with RTE devices based on communication profiles specified in the IEC 61784-2 series, enable the user to match network devices with application-dependent performance requirements of an RTE network.

INDUSTRIAL NETWORKS – PROFILES –

Part 2-21: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 – CPF 21

1 Scope

This part of IEC 61784-2 defines Communication Profile Family 21 (CPF 21). CPF 21 specifies a Real-Time Ethernet (RTE) communication profile (CP) and related network components based on the IEC 61158 series (Type 26), ISO/IEC/IEEE 8802-3 and other standards.

For each RTE communication profile, this document also specifies the relevant RTE performance indicators and the dependencies between these RTE performance indicators.

NOTE 1 All CPs are based on standards or draft standards or International Standards published by the IEC or on standards or International Standards established by other standards bodies or open standards processes.

NOTE 2 The RTE communication profile uses ISO/IEC/IEEE 8802-3 communication networks and its related network components and in some cases amend those standards to obtain RTE features.

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 the IEC 61784-1 series and the IEC 61784-2 series, 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 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61158-5-26:2023, *Industrial communication networks – Fieldbus specifications – Part 5-26: Application layer service definition – Type 26 elements*

IEC 61158-6-26:2023, *Industrial communication networks – Fieldbus specifications – Part 6-26: Application layer protocol specification – Type 26 elements*

IEC 61784-2-0:2023, *Industrial networks – Profiles – Part 2-0: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 – General concepts and terminology*

IEC 61784-5-21, *Industrial communication networks – Profiles – Part 5-21: Installation of fieldbuses – Installation profiles for CPF 21*

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

ISO/IEC/IEEE 8802-3, *Telecommunications and exchange between information technology systems – Requirements for local and metropolitan area networks – Part 3: Standard for Ethernet*

IEEE Std 802-2014, *IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture*

IEEE Std 802.1AB-2016, *IEEE Standard for Local and metropolitan area networks – Station and Media Access Control Connectivity Discovery*

IEEE Std 802.1AS-2020, *IEEE standard for Local and metropolitan area networks – Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks*

IEEE Std 802.1Q-2018, *IEEE Standard for Local and metropolitan area networks – Bridges and Bridged Networks*

IETF RFC 768, J. Postel, *User Datagram Protocol*, August 1980, available at <https://www.rfc-editor.org/info/rfc768> [viewed 2022-02-18]

IETF RFC 791, J. Postel, *Internet Protocol*, September 1981, available at <https://www.rfc-editor.org/info/rfc791> [viewed 2022-02-18]

IETF RFC 792, J. Postel, *Internet Control Message Protocol*, September 1981, available at <https://www.rfc-editor.org/info/rfc792> [viewed 2022-02-18]

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IETF RFC 826, D. Plummer, *An Ethernet Address Resolution Protocol: Or Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware*, November 1982, available at <https://www.rfc-editor.org/info/rfc826> [viewed 2022-02-18]

IETF RFC 894, C. Hornig, *A Standard for the Transmission of IP Datagrams over Ethernet*, April 1984, available at <https://www.rfc-editor.org/info/rfc894> [viewed 2022-02-18]

IETF RFC 919, J.C. Mogul, *Broadcasting Internet Datagrams*, October 1984, available at <https://www.rfc-editor.org/info/rfc919> [viewed 2022-02-18]

IETF RFC 922, J.C. Mogul, *Broadcasting Internet datagrams in the presence of subnets*, October 1984, available at <https://www.rfc-editor.org/info/rfc922> [viewed 2022-02-18]

IETF RFC 950, J.C. Mogul and J. Postel, *Internet Standard Subnetting Procedure*, August 1985, available at <https://www.rfc-editor.org/info/rfc950> [viewed 2022-02-18]

3 Terms, definitions, abbreviated terms, acronyms, and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61784-2-0, ISO/IEC/IEEE 8802-3, IEEE Std 802-2014, IEEE Std 802.1AB-2016, IEEE Std 802.1AS-2020 and IEEE Std 802.1Q-2018 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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