



SLOVENSKI STANDARD SIST EN IEC 61784-2-3:2023

01-november-2023

Industrijska omrežja - Profili - 2-3. del: Dodatni profili procesnih vodil v realnem času po ISO/IEC 8802-3 - CPF 3 (IEC 61784-2-3:2023)

Industrial networks - Profiles - Part 2-3: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 - CPF 3 (IEC 61784-2-3:2023)

Industrielle Kommunikationsnetze - Profile - Teil 2-3: Zusätzliche Feldbusprofile für Echtzeitnetzwerke basierend auf ISO/IEC/IEEE 8802-3 - Kommunikationsprofilfamilie (CPF) 3 (IEC 61784-2-3:2023)

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

<https://standards.iteh.ai>

<https://standards.iteh.ai> **Ta slovenski standard je istoveten z: EN IEC 61784-2-3:2023** <https://standards.iteh.ai>

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.05	Večslojne uporabniške rešitve	Multilayer applications

SIST EN IEC 61784-2-3:2023

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 61784-2-3

May 2023

ICS 35.240.50; 35.100.20

Supersedes EN IEC 61784-2:2019 (partially)

English Version

**Industrial networks - Profiles - Part 2-3: Additional real-time
fieldbus profiles based on ISO/IEC/IEEE 8802-3 - CPF 3
(IEC 61784-2-3:2023)**

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

Industrielle Kommunikationsnetze - Profile - Teil 2-3: Zusätzliche Feldbusprofile für Echtzeitnetzwerke basierend auf ISO/IEC/IEEE 8802-3 - Kommunikationsprofilfamilie (CPF) 3 (IEC 61784-2-3:2023)

This European Standard was approved by CENELEC on 2023-05-03. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

[SIST EN IEC 61784-2-3:2023](https://standards.iteh.ai/SIST/6ca1bbf5-c343-482d-9ea5-8d7ef98e6c36/sist-en-iec-61784-2-3-2023)

<https://standards.iteh.ai/catalog/standards/sist/6ca1bbf5-c343-482d-9ea5-8d7ef98e6c36/sist-en-iec-61784-2-3-2023>



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 61784-2-3:2023 (E)**European foreword**

The text of document 65C/1209/FDIS, future edition 1 of IEC 61784-2-3, 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 61784-2-3:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-02-03
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-05-03

This document, together with other parts of the same series, partially supersedes EN IEC 61784-2:2019 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61784-2-3:2023 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 61158-1	NOTE Approved as EN IEC 61158-1
IEC 61158-2	NOTE Approved as EN IEC 61158-2
IEC 61158-3-3	NOTE Approved as EN 61158-3-3
IEC 61158-4-3	NOTE Approved as EN IEC 61158-4-3
IEC 61158-5-3	NOTE Approved as EN 61158-5-3
IEC 61158-6-3	NOTE Approved as EN IEC 61158-6-3
IEC 61784-1 (series)	NOTE Approved as EN IEC 61784-1 (series)
IEC 61784-1-0	NOTE Approved as EN IEC 61784-1-0
IEC 61784-2 (series)	NOTE Approved as EN IEC 61784-2 (series)
IEC 61918	NOTE Approved as EN IEC 61918

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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 1 Where 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.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61158	series	Industrial communication networks - Fieldbus specifications	EN IEC 61158	series
IEC 61158-5-10	2023	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN IEC 61158-5-10	2023
IEC 61158-6-10	2023	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN IEC 61158-6-10	2023
IEC 61784-1-3	2023	Industrial networks - Profiles - Part 1-3: Fieldbus profiles - Communication Profile Family 3	EN IEC 61784-1-3	2023
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	EN IEC 61784-2-0	2023
IEC 61784-3-3	2021	Industrial communication networks - Profiles - Part 3-3: Functional safety fieldbuses - Additional specifications for CPF 3	EN IEC 61784-3-3	2021
IEC 61784-5-3	2018	Industrial communication networks - Profiles - Part 5-3: Installation of fieldbuses - Installation profiles for CPF 3	EN IEC 61784-5-3	2018
IEC 62439-2	2021	Industrial communication networks - High availability automation networks - Part 2: Media Redundancy Protocol (MRP)	EN IEC 62439-2	2022
ISO/IEC/IEEE 8802-3		Telecommunications and exchange between information technology systems - Requirements for local and metropolitan area networks - Standard for Ethernet	-	-

EN IEC 61784-2-3:2023 (E)

ISO/IEC 9834-8	2014	Information technology - Procedures for the operation of object identifier registration authorities - Part 8: Generation of universally unique identifiers (UUIDs) and their use in object identifiers	-	-
ISO 15745-4/AMD1	2003/ 2006	Industrial automation systems and integration - Open systems application integration framework - Part 4: Reference description for Ethernet-based control systems - Amendment 1: PROFINET profiles	-	-
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	-	-
IEEE 802.1CB	2017	IEEE Standard for Local and metropolitan area networks - Frame Replication and Elimination for Reliability	-	-
IEEE Std 802.1Q	2018	IEEE Standard for Local and metropolitan area networks - Media Access Control (MAC) Bridges and Bridged Networks	-	-
IEEE Std 802.3	2018	IEEE Standard for Ethernet	-	-
IEEE Std 802.11	2020	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 802.11n	2009	IEEE Standard for Information technology -- Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 5: Enhancements for Higher Throughput	-	-
IEEE Std 802.15.1	2005	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	1980	User Datagram Protocol	-	-
IETF RFC 791	1981	Internet Protocol	-	-
IETF RFC 792	1981	Internet Control Message Protocol	-	-
IETF RFC 793	1981	Transmission Control Protocol	-	-

IETF RFC 826	1982	Ethernet Address Resolution Protocol: Or Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware	-	-
IETF RFC 1034	1987	Domain names - concepts and facilities	-	-
IETF RFC 1157	1990	Simple Network Management Protocol (SNMP)	-	-
IETF RFC 1213	1991	Management Information Base for Network- Management of TCP/IP-based Internets: MIB-II	-	-
IETF RFC 2131	1997	Dynamic Host Configuration Protocol	-	-
IETF RFC 4836	2007	Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)	-	-
The Open Group - Publication C706	-	Technical Standard DCE1.1: Remote Procedure Call	-	-
Metro Ethernet Forum – MEF 10.4	2018	Subscriber Ethernet Service Attributes	-	-

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[SIST EN IEC 61784-2-3:2023](https://standards.iteh.ai/catalog/standards/sist/6cafbbf5-c343-482d-9ea5-8d7ef98e6c36/sist-en-iec-61784-2-3-2023)

<https://standards.iteh.ai/catalog/standards/sist/6cafbbf5-c343-482d-9ea5-8d7ef98e6c36/sist-en-iec-61784-2-3-2023>



IEC 61784-2-3

Edition 1.0 2023-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Industrial networks – Profiles –

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

Réseaux industriels – Profils –

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

[SIST EN IEC 61784-2-3:2023](https://standards.iteh.ai/catalog/standards/sist/6ca1bbf5-c343-482d-9ea5-8d7ef98e6c36/sist-en-iec-61784-2-3-2023)

<https://standards.iteh.ai/catalog/standards/sist/6ca1bbf5-c343-482d-9ea5-8d7ef98e6c36/sist-en-iec-61784-2-3-2023>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 35.100.20; 35.240.50

ISBN 978-2-8322-6692-2

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	11
3 Terms, definitions, abbreviated terms, acronyms, symbols and conventions	13
3.1 Terms and definitions.....	13
3.2 Abbreviated terms and acronyms	13
3.3 Symbols.....	15
3.4 Conventions.....	16
4 CPF 3 (PROFIBUS & PROFINET) – RTE communication profiles	16
4.1 General.....	16
4.2 Common	20
4.2.1 Administrative numbers	20
4.2.2 Node Classes	21
4.2.3 Application classes	25
4.2.4 Communication classes	31
4.2.5 Void.....	36
4.2.6 Protocol and timing parameters	36
4.2.7 Media redundancy classes.....	50
4.2.8 Media classes.....	52
4.2.9 Records.....	52
4.2.10 Communication feature list	62
4.3 Conformance class behaviors	63
4.3.1 General	63
4.3.2 IO controller, IO device, IO supervisor and Network Management Entity	64
4.3.3 End station component	65
4.3.4 Bridge component.....	74
4.3.5 Network components	80
4.3.6 Interconnect	81
4.4 Profile 3/4	82
4.4.1 Physical layer	82
4.4.2 Data link layer	82
4.4.3 Application layer.....	83
4.4.4 Performance indicator selection.....	92
4.5 Profile 3/5	99
4.5.1 Physical layer	99
4.5.2 Data link layer	99
4.5.3 Application layer.....	100
4.5.4 Performance indicator selection.....	108
4.6 Profile 3/6	110
4.6.1 Physical layer	110
4.6.2 Data link layer	110
4.6.3 Application layer.....	110
4.6.4 Performance indicator selection.....	118
4.7 Profile 3/7	122
4.7.1 Physical layer	122
4.7.2 Data link layer	122

4.7.3	Application layer	122
4.7.4	Performance indicator selection	130
4.8	Additional information	133
Annex A (informative)	CPF 3 (PROFINET) – Performance Indicator calculation	134
A.1	Application Scenario	134
A.2	Structural examples used for calculation	134
A.2.1	CP 3/4	134
A.2.2	CP 3/5	136
A.2.3	CP 3/6	137
A.2.4	CP 3/7	143
A.3	Principles used for calculation.....	143
A.3.1	General	143
A.3.2	Stack traversal time	143
A.3.3	Bridge structure	143
Bibliography	146
Figure 1	– Conformance class model	17
Figure 2	– End station and bridge systems.....	17
Figure 3	– Bridge as network component	18
Figure 4	– End station with wireless	18
Figure 5	– Network component with wireless.....	19
Figure 6	– Hierarchical conformance class model	19
Figure 7	– Hierarchical conformance class model – with integrated bridge component.....	20
Figure 8	– Hierarchical conformance class model – network component	20
Figure 9	– Example of network topology using CP 3/4, CP 3/5, and CP 3/6 components	81
Figure 10	– Example of network topology using CP 3/4, CP 3/5, CP 3/6 and CP 3/7 components	82
Figure 11	– Example of network topology with wireless segment.....	85
Figure 12	– Calculation basis for delivery time and throughput RTE.....	95
Figure A.1	– CP 3/4: Example of line structure	134
Figure A.2	– CP 3/4: Example of ring structure	135
Figure A.3	– CP 3/4: Example of a wireless segment	135
Figure A.4	– CP 3/4: Example of an integrated wireless client.....	136
Figure A.5	– CP 3/5: Example of line structure	136
Figure A.6	– CP 3/5: Example of ring structure	137
Figure A.7	– CP 3/6: Example of line structure.....	138
Figure A.8	– CP 3/6: Example of line structure	139
Figure A.9	– CP 3/6: Example of ring structure	140
Figure A.10	– CP 3/6: Example of tree structure	141
Figure A.11	– CP 3/6: Example of comb structure	142
Figure A.12	– CP 3/6: Example of comb structure (optional)	143
Figure A.13	– Definition of bridge delay	144
Table 1	– CPF 3 symbols	15
Table 2	– Administrative numbers assignment	21

Table 3 – Node Classes and assigned Traffic Classes	22
Table 4 – Maximum diagnosis data for one submodule	22
Table 5 – Maximum storage delay.....	23
Table 6 – Reporting system minimum storage size.....	23
Table 7 – Reporting system storage.....	23
Table 8 – Reporting system Timeouts	24
Table 9 – Maximum storage delay.....	25
Table 10 – NME requirements.....	25
Table 11 – Application classes applicable in conformance classes for IO device and IO controller	26
Table 12 – Application classes applicable in conformance classes for network components	26
Table 13 – Application class "isochronous application" AL service selection	26
Table 14 – Application class "isochronous application" AL protocol selection component.....	27
Table 15 – Application class "high availability" AL service selection.....	27
Table 16 – Application class "high availability" AL protocol selection component	27
Table 17 – Basis application class for "process automation"	28
Table 18 – Application class "process automation" AL service selection	28
Table 19 – Application class "process automation" AL protocol selection component	28
Table 20 – Application class "High performance" features supported	29
Table 21 – Application class "High performance" parameter values	29
Table 22 – Application class "Controller to Controller" features supported	29
Table 23 – Application class "Functional safety" features supported by IO device	30
Table 24 – Application class "Functional safety" features supported by IO controller.....	30
Table 25 – Application class "Energy saving" AL service selection.....	31
Table 26 – Application class "Energy saving" features supported by IO device	31
Table 27 – Application class "Energy saving" features supported by IO controller	31
Table 28 – Communication classes applicable in conformance classes.....	32
Table 29 – Communication performance parameters	32
Table 30 – FrameSendOffset deviation for RT_CLASS_1 / RT_CLASS_UDP	33
Table 31 – FrameSendOffset deviation for RT_CLASS_1 / RT_CLASS_UDP certification	33
Table 32 – FrameSendOffset deviation factors – SendListControl	34
Table 33 – FrameSendOffset deviation factors – PHY.....	34
Table 34 – FrameSendOffset deviation	34
Table 35 – Minimum FrameSendOffset	35
Table 36 – FrameSendOffset deviation	35
Table 37 – Parameters for RT_CLASS_3 bridges.....	35
Table 38 – PTCP control loop	36
Table 39 – IEEE Std 802.1AS-2020 control loop	36
Table 40 – Maximum frame size.....	36
Table 41 – IP layer parameters for IO controller.....	37
Table 42 – IP layer parameters for IO device	37

Table 43 – Timeout values for name resolution	37
Table 44 – Values for hello request deviation.....	37
Table 45 – DCP Identify responder resources	38
Table 46 – DCP access control.....	38
Table 47 – DCP Identify pruning support.....	38
Table 48 – Maximum time values for MRP for 10 Mbit/s and for ≥ 100 Mbit/s	38
Table 49 – Maximum packet size for MRP	39
Table 50 – Maximum time values for PTCP.....	39
Table 51 – Precision of timers used for PTCP.....	39
Table 52 – Maximum time values	40
Table 53 – Maximum deviation values for Global Time.....	40
Table 54 – Maximum deviation values for Working Clock	40
Table 55 – Maximum time values for LLDP	41
Table 56 – Required RPC resources	42
Table 57 – Required RPCActivityUUID resources	42
Table 58 – Number of ImplicitARs.....	42
Table 59 – RTA Timeout deviation	42
Table 60 – Required receive resources	43
Table 61 – Number of LogBookData entries.....	43
Table 62 – Recommended out of the box default	43
Table 63 – CIMSNMPAdjust.....	43
Table 64 – Community name, default values.....	44
Table 65 – SNMP timeout values	44
Table 66 – MIB objects update time values	44
Table 67 – DHCP client.....	44
Table 68 – High Availability times	45
Table 69 – Address parameter	45
Table 70 – AR Parameters.....	46
Table 71 – PDEV parameters.....	47
Table 72 – Reaction time for an IO device	48
Table 73 – Data Hold Time deviation	49
Table 74 – Expected PHY delay.....	50
Table 75 – Expected Bridge delay.....	50
Table 76 – Media redundancy class applicable in conformance classes	51
Table 77 – Media redundancy – additional forwarding rules	51
Table 78 – Media redundancy startup mode.....	52
Table 79 – Version controlled "Read Record".....	52
Table 80 – Index (user specific)	53
Table 81 – Index (subslot specific).....	53
Table 82 – Index (slot specific)	56
Table 83 – Index (AR specific)	57
Table 84 – Index (API specific)	58
Table 85 – Index (device specific).....	59

Table 86 – PDPortDataAdjust (sub blocks)	61
Table 87 – PDPortDataCheck (sub blocks)	62
Table 88 – Communication feature list	62
Table 89 – IO controller, IO device, IO supervisor and Network Management Entity.....	63
Table 90 – Network Component	64
Table 91 – Conformance class behaviors.....	64
Table 92 – Node classes.....	65
Table 93 – Link speed dependent local injection per Ethernet interface	65
Table 94 – SNMP feature selection	66
Table 95 – IETF RFC 1213-MIB (MIB-2) objects	67
Table 96 – LLDP-MIB objects – range 1	67
Table 97 – LLDP-MIB objects – range 2.....	68
Table 98 – LLDP-MIB objects – range 3.....	68
Table 99 – LLDP-EXT-PNO-MIB objects – range 1	69
Table 100 – LLDP-EXT-PNO-MIB objects – range 2.....	69
Table 101 – LLDP-EXT-DOT3-MIB objects – range 1	69
Table 102 – LLDP-EXT-DOT3-MIB objects – range 2.....	69
Table 103 – IEEE 802.1Q-BRIDGE-MIB objects.....	70
Table 104 – NETCONF feature selection	70
Table 105 – IEEE Std 802.3-2018 feature selection	71
Table 106 – IEEE Std 802.1Q-2018 feature selection.....	71
Table 107 – Node classes for bridge.....	74
Table 108 – Supported concurrent Link Speed for bridges	74
Table 109 – IEEE Std 802.1Q-2018 bridge components for Conformance Class D.....	74
Table 110 – IEC 61784-5-3 feature selection	75
Table 111 – IEC 62439-2 feature selection	75
Table 112 – Buffering capacity per port.....	76
Table 113 – Special case: Buffering capacity for eight and more ports.....	76
Table 114 – IEEE Std 802.1AB-2016 feature selection.....	77
Table 115 – IEEE Std 802.1AS-2020 feature selection.....	77
Table 116 – IEEE Std 802.1CB-2017 feature selection	78
Table 117 – IEEE Std 802.1Q-2018 feature selection.....	79
Table 118 – Cut through feature selection.....	80
Table 119 – Wireless feature selection	80
Table 120 – Node classes for network component	80
Table 121 – Conformance class constraints – wireline	81
Table 122 – Conformance class constraints – wireless	81
Table 123 – CP 3/4: AL service selection for an IO device	83
Table 124 – CP 3/4: Additional AL service selection for an IO controller	86
Table 125 – CP 3/4: Additional AL service selection for an IO supervisor.....	86
Table 126 – CP 3/4: AL protocol selection for an IO device.....	87
Table 127 – CP 3/4: AL protocol selection for an IO controller	89
Table 128 – CP 3/4, CP 3/5, CP 3/6 and CP 3/7: performance indicator overview	92