



INTERNATIONAL STANDARD

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

Withhold

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

FOREWORD.....	11
INTRODUCTION.....	13
1 Scope.....	14
2 Normative references	14
3 Terms, definitions, abbreviated terms, acronyms, and conventions.....	17
3.1 Terms and definitions	17
3.2 Abbreviated terms and acronyms	20
3.3 Symbols	22
3.3.1 CPF 2 symbols	22
3.3.2 CPF 3 symbols	23
3.3.3 CPF 4 symbols	24
3.3.4 CPF 6 symbols	24
3.3.5 CPF 10 symbols	25
3.3.6 CPF 11 symbols	26
3.3.7 CPF 12 symbols	27
3.3.8 CPF 13 symbols	27
3.3.9 CPF 14 symbols	28
3.3.10 CPF 15 symbols	29
3.3.11 CPF 16 symbols	29
3.4 Conventions	30
3.4.1 Conventions common to all layers	30
3.4.2 Physical Layer	31
3.4.3 Data Link Layer	31
3.4.4 Application Layer	32
4 Conformance to communication profiles	32
5 RTE performance indicators	33
5.1 Basic principles of performance indicators.....	33
5.2 Application requirements.....	34
5.3 Performance indicators.....	34
5.3.1 Delivery time	34
5.3.2 Number of RTE end-stations.....	35
5.3.3 Basic network topology.....	35
5.3.4 Number of switches between RTE end-stations	35
5.3.5 Throughput RTE	35
5.3.6 Non-RTE bandwidth	35
5.3.7 Time synchronization accuracy.....	35
5.3.8 Non-time-based synchronization accuracy.....	36
5.3.9 Redundancy recovery time	36
6 Conformance tests	36
6.1 Concept	36
6.2 Methodology.....	37
6.3 Test conditions and test cases	37
6.4 Test procedure and measuring	38
6.5 Test report	38
7 Communication Profile Family 2 (CIP™) - RTE communication profiles	39
7.1 General overview	39

7.2	Profile 2/2	39
7.2.1	Physical Layer	39
7.2.2	Data Link Layer	39
7.2.3	Application Layer	39
7.2.4	Performance indicator selection	39
7.3	Profile 2/2.1	43
7.3.1	Physical Layer	43
7.3.2	Data Link Layer	44
7.3.3	Application Layer	45
7.3.4	Performance indicator selection	46
8	Communication Profile Family 3 (PROFIBUS & PROFINET) – RTE communication profiles	49
8.1	General overview	49
8.1.1	CPF 3 overview	49
8.1.2	Node Classes	49
8.1.3	Application classes	51
8.1.4	Communication classes	51
8.1.5	Redundancy classes	51
8.1.6	Media classes	52
8.1.7	Conformance class behaviors	52
8.2	Profile 3/4	55
8.2.1	Physical layer	55
8.2.2	Data link layer	55
8.2.3	Application layer	56
8.2.4	Performance indicator selection	61
8.3	Profile 3/5	68
8.3.1	Physical layer	68
8.3.2	Data link layer	68
8.3.3	Application layer	69
8.3.4	Performance indicator selection	73
8.4	Profile 3/6	75
8.4.1	Physical layer	75
8.4.2	Data link layer	75
8.4.3	Application layer	76
8.4.4	Performance indicator selection	81
9	Communication Profile Family 4 (P-NET) - RTE communication profiles	83
9.1	General overview	83
9.2	Profile 4/3, P-NET on IP	83
9.2.1	Physical Layer	83
9.2.2	Data Link Layer	83
9.2.3	Application Layer	84
9.2.4	Performance indicator selection	85
10	Communication Profile Family 6 (INTERBUS®) - RTE communication profiles	89
10.1	General overview	89
10.2	Profile 6/4	90
10.2.1	Mapping	90
10.2.2	Type 10 service and protocol selection	91
10.2.3	Type 8 service and protocol selection	92
10.2.4	Performance indicator selection	92

10.3	Profile 6/5	93
10.3.1	Mapping	93
10.3.2	Type 10 service and protocol selection	93
10.3.3	Type 8 service and protocol selection	93
10.3.4	Performance indicator selection	94
10.4	Profile 6/6	94
10.4.1	Mapping	94
10.4.2	Type 10 service and protocol selection	94
10.4.3	Type 8 service and protocol selection	95
10.4.4	Performance indicator selection	95
11	Communication Profile Family 10 (Vnet/IP) - RTE communication profiles	96
11.1	General overview	96
11.2	Profile 10/1	97
11.2.1	Physical Layer	97
11.2.2	Data Link Layer	97
11.2.3	Application Layer	99
11.2.4	Performance indicator selection	100
12	Communication Profile Family 11 (TCnet) - RTE communication profiles	106
12.1	General overview	106
12.2	Profile 11/1	106
12.2.1	Physical Layer	106
12.2.2	Data Link Layer	106
12.2.3	Application Layer	107
12.2.4	Performance indicator selection	108
13	Communication Profile Family 12 (EtherCAT) - RTE communication profiles	114
13.1	General overview	114
13.2	Profile CP 12/1	114
13.2.1	Physical Layer	114
13.2.2	Data Link Layer	115
13.2.3	Application Layer	119
13.2.4	Performance indicator selection	121
13.3	Profile CP 12/2	124
13.3.1	Physical Layer	124
13.3.2	Data Link Layer	124
13.3.3	Application Layer	128
13.3.4	Performance indicator selection	130
14	Communication Profile Family 13 (ETHERNET Powerlink) - RTE communication profiles	133
14.1	General overview	133
14.2	Profile 13/1	133
14.2.1	Physical Layer	133
14.2.2	Data Link Layer	133
14.2.3	Application Layer	134
14.2.4	Performance indicator selection	134
15	Communication Profile Family 14 (EPA)- RTE communication profiles	140
15.1	General overview	140
15.2	CPF 14 (EPA) communication concept	140
15.2.1	General	140

15.2.2	Network Topology.....	140
15.2.3	EPA devices	141
15.3	Profile 14/1.....	142
15.3.1	Physical Layer.....	142
15.3.2	Data Link Layer	142
15.3.3	Network Layer	142
15.3.4	Transport Layer	142
15.3.5	Application Layer.....	142
15.3.6	Performance indicator selection.....	144
15.4	Profile 14/2.....	147
15.4.1	Physical Layer.....	147
15.4.2	Data Link Layer	147
15.4.3	Network Layer	147
15.4.4	Transport Layer	148
15.4.5	Application Layer.....	148
15.4.6	Performance indicator selection.....	149
16	Communication Profile Family 15 (MODBUS-RTPS)- RTE communication profiles	153
16.1	General overview	153
16.2	Profile 15/1.....	153
16.2.1	Physical layer.....	153
16.2.2	Data link layer	153
16.2.3	Application layer.....	153
16.2.4	Performance indicator selection.....	154
16.3	Profile 15/2.....	158
16.3.1	Physical layer.....	158
16.3.2	Data link layer	158
16.3.3	Application layer.....	158
16.3.4	Performance indicator selection.....	159
17	Communication Profile Family 16 (SERCOS)- RTE communication profiles	164
17.1	General overview	164
17.2	Profile 16/3 (SERCOS III).....	164
17.2.1	Physical Layer.....	164
17.2.2	Data Link Layer	164
17.2.3	Application Layer.....	165
17.2.4	Performance indicator selection.....	165
Annex A (informative)	Performance Indicator calculation	172
A.1	CPF 2 (CIP) - Performance indicator calculation.....	172
A.1.1	Profile 2/2 EtherNet/IP.....	172
A.1.2	Profile 2/2.1 EtherNet/IP with Time Synchronization	173
A.2	Communication Profile Family 3 - Performance indicator calculation.....	174
A.2.1	Application Scenario.....	174
A.2.2	Structural examples used for calculation.....	174
A.2.3	Principles used for calculation	179
A.3	CPF 4/3 P-NET on IP - Performance indicator calculation.....	182
A.3.1	Application scenario	182
A.3.2	Delivery time calculation	182
A.3.3	Non-RTE throughput calculation	183
A.3.4	Non time-base synchronization accuracy.....	185

A.3.5	RTE throughput calculation.....	186
A.3.6	CPF 4/3, Derivation of delivery time formula	186
A.3.7	CPF 4/3, Ethernet characteristics	188
	Bibliography.....	189
Figure 1	— Example of graphical representation of consistent indicators	34
Figure 2	— Conformance test overview.....	36
Figure 3	— Example of network topology using CP 3/4, CP 3/5, and CP 3/6 components	55
Figure 4	— Example of network topology with wireless segment.....	58
Figure 5	— Calculation basis for delivery time and throughput RTE	64
Figure 6	— Linking-device communication profiles RTE-network context	89
Figure 7	— Linking-device mapping principle	90
Figure 8	— Data Mapping	91
Figure 9	— Throughput RTE and non-RTE bandwidth	111
Figure 10	— EPA system network topology example.....	141
Figure A.1	— CP 3/4: Example of line structure.....	174
Figure A.2	— CP 3/4: Example of ring structure.....	174
Figure A.3	— CP 3/4: Example of a wireless segment.....	175
Figure A.4	— CP 3/4: Example of an integrated wireless client	175
Figure A.5	— CP 3/5: Example of line structure	176
Figure A.6	— CP 3/5: Example of ring structure	176
Figure A.7	— CP 3/6: Example of line structure	177
Figure A.8	— CP 3/6: Example of ring structure	178
Figure A.9	— CP 3/6: Example of tree structure.....	179
Figure A.10	— Definition of bridge delay.....	180
Figure A.11	— Example of a switch structure.....	181
Figure A.12	— Application Configuration.....	182
Figure A.13	— Non-RTE throughput calculation	184
Figure A.14	— Non time-base synchronization accuracy.....	185
Table 1	— Layout of profile (sub)clause selection tables.....	30
Table 2	— Contents of (sub)clause selection tables	30
Table 3	— Layout of service selection tables	30
Table 4	— Contents of service selection tables	31
Table 5	— Layout of parameter selection tables.....	31
Table 6	— Contents of parameter selection tables	31
Table 7	— Layout of class attribute selection tables.....	32
Table 8	— Contents of class attribute selection tables	32
Table 9	— Basic network topology types.....	35
Table 10	— CP 2/2: performance indicator overview	40
Table 11	— CP 2/2: Performance indicator dependency matrix	40

Table 12 — CP 2/2: consistent set of performance indicators for factory automation.....	43
Table 13 — CP 2/2.1: DLL protocol selection.....	44
Table 14 — CP 2/2.1: DLL protocol selection of management objects.....	44
Table 15 — CP 2/2.1: AL service selection.....	45
Table 16 — CP 2/2.1: AL protocol selection.....	46
Table 17 — CP 2/2.1: performance indicator overview.....	47
Table 18 — CP 2/2.1: performance indicator dependency matrix.....	47
Table 19 — CP 2/2.1: Consistent set of performance indicators for motion control.....	48
Table 20 — Timeout values for name resolution.....	50
Table 21 — Reaction time for an IO device.....	50
Table 22 — Redundancy class applicable in conformance classes.....	52
Table 23 — Conformance class behaviors.....	52
Table 24 — Conformance class behaviors for network components.....	54
Table 25 — CP 3/4: AL service selection for an IO device.....	56
Table 26 — CP 3/4: AL protocol selection for an IO device and Network component.....	59
Table 27 — CP 3/4: AL protocol selection for an IO controller.....	60
Table 28 — CP 3/4, CP 3/5 and CP 3/6: performance indicator overview.....	61
Table 29 — CP 3/4, CP 3/5 and CP 3/6: performance indicator dependency matrix.....	62
Table 30 — Manager parameters.....	65
Table 31 — Client parameters.....	66
Table 32 — Client parameters.....	66
Table 33 — CP 3/4: Consistent set of PI for MinDeviceInterval=128ms.....	67
Table 34 — CP 3/4: Assumed values for consistent set of PI calculation.....	68
Table 35 — CP 3/5: AL service selection for an IO device.....	69
Table 36 — CP 3/5: AL protocol selection for an IO device and Network component.....	71
Table 37 — CP 3/5: AL protocol selection for an IO controller.....	72
Table 38 — CP 3/5: Consistent set of PI for MinDeviceInterval=128ms.....	74
Table 39 — CP 3/5: Assumed values for consistent set of PI calculation.....	75
Table 40 — CP 3/6: AL service selection for an IO device.....	76
Table 41 — Buffering capacity.....	77
Table 42 — CP 3/6: AL protocol selection for an IO device and network component.....	78
Table 43 — CP 3/6: AL protocol selection for an IO controller.....	80
Table 44 — CP 3/6: Consistent set of PI for MinDeviceInterval=1ms.....	81
Table 45 — CP 3/6: Assumed values for consistent set of PI calculation.....	82
Table 46 — CP 4/3: DLL service selection.....	84
Table 47 — CP 4/3: DLL protocol selection.....	84
Table 48 — CP 4/3: AL service selection.....	84
Table 49 — CP 4/3: AL protocol selection.....	85
Table 50 — CP 4/3: Performance indicator overview.....	85
Table 51 — CP 4/3: Performance indicator dependency matrix.....	85
Table 52 — CP 4/3: Consistent set of performance indicators.....	88
Table 53 — Parameters for Calculation of Consistent set of performance indicators.....	88
Table 54 — CPF 6: device CP identifier assignment.....	90

Table 55 — Linking-device Type 10 network performance indicator overview.....	92
Table 56 — OSI layers and CPF 10 layers.....	96
Table 57 — Overview of CPF 10 profile.....	97
Table 58 — CP 10/1: DLL service selection.....	98
Table 59 — CP 10/1: DLL protocol selection.....	98
Table 60 — Transport Layer Parameter selection.....	99
Table 61 — CP 10/1: AL service selection.....	100
Table 62 — CP 10/1: AL protocol selection.....	100
Table 63 — CP 10/1: Performance indicator overview.....	100
Table 64 — CP 10/1: Performance indicator dependency matrix.....	101
Table 65 — CP 10/1: Consistent set of performance indicators for the communication between two end-stations belonging to the same domain.....	104
Table 66 — CP 10/1: Consistent set of performance indicators for the communication between two end-stations belonging to different domains.....	104
Table 67 — CP 10/1: Consistent set of performance indicators for the communication between two end-stations belonging to the same domain with one lost frame.....	105
Table 68 — CP 10/1: Consistent set of performance indicators for the communication between two end-stations belonging to different domains with one lost frame.....	105
Table 69 — CPF 11: Overview of profile sets.....	106
Table 70 — CP 11/1: DLL service selection.....	107
Table 71 — CP 11/1: DLL protocol selection.....	107
Table 72 — CP 11/1: AL service selection.....	108
Table 73 — CP 11/1: AL protocol selection.....	108
Table 74 — CP 11/1: Performance indicator overview.....	108
Table 75 — CP 11/1: Performance indicator dependency matrix.....	109
Table 76 — CP 11/1: TCC data service selection.....	110
Table 77 — CP 11/1: Consistent set of PIs preferential for RTE communications.....	113
Table 78 — CP 11/1: Consistent set of PIs both for RTE and non-RTE communications.....	113
Table 79 — CP 12/1: PhL selection of preferred physical layer.....	115
Table 80 — CP 12/1: PhL selection of an optimized physical layer.....	115
Table 81 — CP 12/1: DLL service selection.....	116
Table 82 — CP 12/1: DLL protocol selection.....	117
Table 83 — CP 12/1: DLL service selection.....	118
Table 84 — CP 12/1: DLL protocol selection.....	119
Table 85 — CP 12/1: AL service selection.....	120
Table 86 — CP 12/1: AL protocol selection.....	120
Table 87 — CP 12/1: AL service selection.....	121
Table 88 — CP 12/1: AL protocol selection.....	121
Table 89 — CP 12/1: Performance indicator overview.....	122
Table 90 — CP 12/1: Performance indicator dependency matrix.....	122
Table 91 — CP 12/1: Performance indicator ranges.....	123
Table 92 — CP 12/1: Consistent set of performance indicators for mid size automation systems.....	124
Table 93 — CP 12/2: DLL service selection.....	125
Table 94 — CP 12/2: DLL protocol selection.....	126

Table 95 — CP 12/2: DLL service selection	127
Table 96 — CP 12/2: DLL protocol selection	128
Table 97 — CP 12/2: AL service selection	129
Table 98 — CP 12/2: AL protocol selection	129
Table 99 — CP 12/2: AL service selection	130
Table 100 — CP 12/2: AL protocol selection	130
Table 101 — CP 12/2: Performance indicator overview	131
Table 102 — CP 12/2: Performance indicator dependency matrix	131
Table 103 — CP 12/2: Consistent set of performance indicators	132
Table 104 — CPF 13: Overview of profile sets	133
Table 105 — CP 13/1: DLL service selection	133
Table 106 — CP 13/1: DLL protocol selection	134
Table 107 — CP 13/1: AL service selection	134
Table 108 — CP 13/1: AL protocol selection	134
Table 109 — CP 13/1: Performance indicator overview	135
Table 110 — CP 13/1: Performance indicator dependency matrix	135
Table 111 — CP 13/1: Consistent set of PIs small size automation system	138
Table 112 — CP 13/1: Consistent set of PIs medium size automation system	139
Table 113 — CP 13/1: Consistent set of PIs large size automation system	139
Table 114 — CP 14/1: AL service selection	143
Table 115 — CP 14/1: AL protocol selection	143
Table 116 — CP 14/1: Performance indicator overview	144
Table 117 — CP 14/1: Performance indicator dependency matrix	144
Table 118 — CP 14/1: Consistent set of performance indicators	146
Table 119 — CP 14/2: DLL service selection	147
Table 120 — CP 14/2: DLL protocol selection	147
Table 121 — CP 14/2: AL service selection	148
Table 122 — CP 14/2: AL protocol selection	149
Table 123 — CP 14/2: Performance indicator overview	149
Table 124 — CP 14/2: Performance indicator dependency matrix	150
Table 125 — CP 14/2: Consistent set of performance indicators	152
Table 126 — CP 15/1: AL service selection	153
Table 127 — CP 15/1: AL protocol selection	154
Table 128 — CP 15/1: Performance indicator overview	154
Table 129 — CP 15/1: Performance indicator dependency matrix	155
Table 130 — CP 15/2: AL service selection	159
Table 131 — CP 15/2: AL protocol selection	159
Table 132 — CP 15/2: Performance indicator overview	159
Table 133 — CP 15/2: Performance indicator dependency matrix	160
Table 134 — CP 16/3: DLL service selection	164
Table 135 — CP 16/3: DLL protocol selection	165
Table 136 — CP 16/3: AL service selection	165
Table 137 — CP 16/3: AL protocol selection	165

Table 138 — CP 16/3: Performance indicator overview.....	166
Table 139 — CP 16/3: Performance indicator dependency matrix	166
Table 140 — CP 16/3: scenario with a minimum cycle time of 31,25 μ s	170
Table 141 — CP 16/3: scenario with a cycle time of 500 μ s (real-time only).....	170
Table 142 — CP 16/3: Scenario with a cycle time of 500 μ s (real-time and non-real-time)	171
Table 143 — CP 16/3: scenario with non symmetrical data throughput and a cycle time of 500 μ s (real-time and non-real-time)	171

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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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NOTE Use of some of the associated protocol Types in the IEC 61158 family are 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 particular data-link layer protocol Type to be used with physical layer and application layer protocols in Type combinations as specified explicitly in the IEC 61784 series. Use of the various protocol Types in other combinations may require permission from their respective intellectual property right holders.

IEC draws attention to the fact that it is claimed that compliance with this standard may involve the use of patents. IEC takes no position concerning the evidence, validity and scope of these patent rights.

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

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

FDIS	Report on voting
65C/469/FDIS	65C/480/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 publication has been drafted in accordance with ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under <http://webstore.iec.ch> in the data related to the specific publication. At that date this publication will be

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

The list of all the parts of the IEC 61784 series, under the general title *Industrial communication networks – Profiles* – , can be found on the IEC web site.

Withdrawn

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

IEC 61588:2004, *Precision clock synchronization protocol for networked measurement and control systems*

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

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

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

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

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

IEC 61918, *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)*

Internet Engineering Task Force (IETF), Request for Comments (RFC):

- RFC 768, *User Datagram Protocol*
(available at <<http://www.ietf.org/rfc/rfc0768.txt>>)
- RFC 791, *Internet Protocol*
(available at <<http://www.ietf.org/rfc/rfc0791.txt>>)
- RFC 792, *Internet Control Message Protocol*
(available at <<http://www.ietf.org/rfc/rfc0792.txt>>)
- RFC 793, *Transmission Control Protocol*
(available at <<http://www.ietf.org/rfc/rfc0793.txt>>)
- RFC 826, *Ethernet Address Resolution Protocol*
(available at <<http://www.ietf.org/rfc/rfc0826.txt>>)
- RFC 894, *A standard for the Transmission of IP Datagrams over Ethernet Networks*
(available at <<http://www.ietf.org/rfc/rfc0894.txt>>)
- RFC 1112, *Host Extensions for IP Multicasting*
(available at <<http://www.ietf.org/rfc/rfc1112.txt>>)
- RFC 1122, *Requirements for Internet Hosts – Communication Layers*
(available at <<http://www.ietf.org/rfc/rfc1122.txt>>)
- RFC 1123, *Requirements for Internet Hosts – Application and Support*
(available at <<http://www.ietf.org/rfc/rfc1123.txt>>)
- RFC 1127, *A Perspective on the Host Requirements RFCs*
(available at <<http://www.ietf.org/rfc/rfc1127.txt>>)
- RFC 1213, *Management Information Base for Network Management of TCP/IP-based internets: MIB-II*
(available at <<http://www.ietf.org/rfc/rfc1213.txt>>)
- RFC 1305, *Network Time Protocol (Version 3)*
(available at <<http://www.ietf.org/rfc/rfc1305.txt>>)
- RFC 2131, *Dynamic Host Configuration Protocol*
(available at <<http://www.ietf.org/rfc/rfc2131.txt>>)
- RFC 2236, *Internet Group Management Protocol, Version 2*
(available at <<http://www.ietf.org/rfc/rfc2236.txt>>)
- RFC 2328, *OSPF Version 2*
(available at <<http://www.ietf.org/rfc/rfc2328.txt>>)
- RFC 2544, *Benchmarking Methodology for Network Interconnect Devices*
(available at <<http://www.ietf.org/rfc/rfc2544.txt>>)
- RFC 2988, *Computing TCP's Retransmission Timer*
(available at <<http://www.ietf.org/rfc/rfc2988.txt>>)

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