

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial networks – Profiles –
Part 2-11: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 –
CPF 11**

**Réseaux industriels – Profils –
Partie 2-11: Profils de bus de terrain supplémentaires pour les réseaux en temps
réel fondés sur l'ISO/IEC/IEEE 8802-3 – CPF 11**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2023 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Industrial networks – Profiles –
Part 2-11: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 –
CPF 11**

**Réseaux industriels – Profils –
Partie 2-11: Profils de bus de terrain supplémentaires pour les réseaux en
temps réel fondés sur l'ISO/IEC/IEEE 8802-3 – CPF 11**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 35.100.20; 35.240.50

ISBN 978-2-8322-6898-8

**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.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, abbreviated terms, acronyms, and conventions.....	8
3.1 Terms and definitions.....	8
3.2 Abbreviated terms and acronyms	9
3.3 Symbols.....	9
3.4 Conventions.....	10
4 CPF 11 (TCnet) – RTE communication profiles.....	10
4.1 General overview	10
4.2 CP 11/1	11
4.2.1 Physical layer	11
4.2.2 Data-link layer	11
4.2.3 Application layer.....	15
4.2.4 Performance indicator selection.....	15
4.3 CP 11/2	22
4.3.1 Physical layer	22
4.3.2 Data-link layer	22
4.3.3 Application layer.....	25
4.3.4 Performance indicator selection.....	25
4.4 CP 11/3	31
4.4.1 Physical layer	31
4.4.2 Data-link layer.....	31
4.4.3 Application layer.....	34
4.4.4 Performance indicator selection.....	35
Bibliography.....	42
Figure 1 – CP 11/1: Throughput RTE and non-RTE bandwidth.....	19
Figure 2 – CP 11/2: Throughput RTE and non-RTE bandwidth.....	28
Figure 3 – CP 11/3: Throughput RTE and non-RTE bandwidth.....	38
Table 1 – CPF 11 symbols.....	9
Table 2 – CPF 11: Overview of profile sets	11
Table 3 – CP 11/1: DLL service selection.....	11
Table 4 – CP 11/1: DLL protocol selection	12
Table 5 – CP 11/1: DLL protocol selection of Clause 5.....	13
Table 6 – CP 11/1: DLL protocol selection of Clause 6.....	13
Table 7 – CP 11/1: AL service selection.....	15
Table 8 – CP 11/1: AL protocol selection	15
Table 9 – CP 11/1: PI overview.....	16
Table 10 – CP 11/1: PI dependency matrix	16
Table 11 – CP 11/1: TCC data service selection	17
Table 12 – CP 11/1: Consistent set of PIs preferential for RTE communications	21

Table 13 – CP 11/1: Consistent set of PIs both for RTE and non-RTE communications.....	21
Table 14 – CP 11/2: DLL protocol selection	22
Table 15 – CP 11/2: DLL protocol selection of Clause 5.....	23
Table 16 – CP 11/2: DLL protocol selection of Clause 6.....	24
Table 17 – CP 11/2: PI overview	26
Table 18 – CP 11/2: PI dependency matrix	26
Table 19 – CP 11/2: TCC data service selection	27
Table 20 – CP 11/2: Consistent set of PIs preferential for RTE communications	30
Table 21 – CP 11/2: Consistent set of PIs both for RTE and non-RTE communications.....	31
Table 22 – CP 11/3: DLL protocol selection	31
Table 23 – CP 11/3: DLL protocol selection of Clause 5.....	32
Table 24 – CP 11/3: DLL protocol selection of Clause 6.....	33
Table 25 – CP 11/3: PI overview	35
Table 26 – CP 11/3: PI dependency matrix	36
Table 27 – CP 11/3: TCC data service selection	37
Table 28 – CP 11/3: Consistent set of PIs preferential for RTE communications	41
Table 29 – CP 11/3: Consistent set of PIs both for RTE and non-RTE communications.....	41

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[IEC 61784-2-11:2023](https://standards.iteh.ai/catalog/standards/sist/aebaab62-1060-4a71-8783-20dfaf7caa0b/iec-61784-2-11-2023)

<https://standards.iteh.ai/catalog/standards/sist/aebaab62-1060-4a71-8783-20dfaf7caa0b/iec-61784-2-11-2023>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL NETWORKS – PROFILES –

Part 2-11: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 – CPF 11

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

Attention is drawn to the fact that the use of some of the associated protocol types is 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 layer protocol type to be used with other layer protocols of the same type, or in other type combinations explicitly authorized by their respective intellectual property right holders.

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

IEC 61784-2-11 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.

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 2-11: Additional real-time fieldbus profiles based on ISO/IEC/IEEE 8802-3 – CPF 11

1 Scope

This part of IEC 61784-2 defines Communication Profile Family 11 (CPF 11). CPF 11 specifies a set of Real-Time Ethernet (RTE) communication profiles (CPs) and related network components based on the IEC 61158 series (Type 11), 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 profiles use ISO/IEC/IEEE 8802-3 communication networks and its related network components or IEC 61588 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 61158-3-11:2007, *Industrial communication networks – Fieldbus specifications – Part 3-11: Data-link layer service definition – Type 11 elements*

IEC 61158-4-11:2014, *Industrial communication networks – Fieldbus specifications – Part 4-11: Data-link layer protocol specification – Type 11 elements*

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

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

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

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

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*

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]

IETF RFC 793, J. Postel, *Transmission Control Protocol*, September 1981, available at <https://www.rfc-editor.org/info/rfc793> [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:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.2 Abbreviated terms and acronyms

For the purposes of this document, abbreviated terms and acronyms defined in IEC 61784-2-0 and the following apply.

CP	Communication Profile [according to IEC 61784-1-0]
CPF	Communication Profile Family [according to IEC 61784-1-0]
FCS	Frame check sequence
ICMP	Internet Control Message Protocol (see IETF RFC 792)
IETF	Internet Engineering Task Force
IP	Internet Protocol (see IETF RFC 791)
LLDP	Link Layer Discovery Protocol (see IEEE Std 802.1AB-2016)
NoS	Number of Switches
Phy	PHY Physical layer entity sublayer (see ISO/IEC/IEEE 8802-3)
PI	Performance indicator
PTP	Precision Time Protocol (see IEC 61588)
RSTP	Rapid Spanning Tree Algorithm and Protocol (see IEEE Std 802.1Q-2018)
TCC	Time-Critical Cyclic
TCP	Transmission Control Protocol (see IETF RFC 793)
UDP	User Datagram Protocol (see IETF RFC 768)

3.3 Symbols

For the purposes of this document, symbols defined in IEC 61784-2-0 and Table 1 apply.

NOTE Definitions of symbols in this Subclause 3.3 do not use the italic font, as they are already identified as symbols.

Table 1 – CPF 11 symbols

Symbol	Definition	Unit
BW_{CNT}	Bandwidth used both for the communication scheduling and the protocol overhead	%
BW_{NRT}	Bandwidth used for the non-RTE communications	%
BW_{RTE}	Bandwidth used for the RTE communications	%
cd	Cable delay	μ s
cdl	Cable length total	km
Ct	Cycle time	ms
data	Complete Ethernet frame	–
DT_H	Delivery time of the high-speed cyclic data, which includes both the sender stack traversal time (STTs) and the receiver stack traversal time (STTr) including Phy and MAC	ms
DT_L	Delivery time of the low-speed cyclic data, which includes both the sender stack traversal time (STTs) and the receiver stack traversal time (STTr) including Phy and MAC	ms
DT_M	Delivery time of the medium-speed cyclic data, which includes both the sender stack traversal time (STTs) and the receiver stack traversal time (STTr) including Phy and MAC	ms
DV_{HS}	Total volume of the high-speed cyclic data	octets
DV_{LS}	Total volume of the low-speed cyclic data	octets
DV_{MS}	Total volume of the medium-speed cyclic data	octets
NoS	Number of switches	–

Symbol	Definition	Unit
od	Other delays	µs
pd	Propagation delay	µs
STTs	Sender stack traversal time including Phy and MAC	µs
STTr	Receiver stack traversal time including Phy and MAC	µs
T _h	The high-speed transmission time period – the basic cycle_time (ct) of the TCC data service	ms
T _{HS}	Total sum of the frame transmit time, in which the TCC data frame conveys the high-speed cyclic data	µs
T _l	The Low-speed transmission time period	ms
T _{LS}	Total sum of the frame transmit time, in which the TCC data frame conveys the Low-speed Cyclic data	µs
T _m	The Medium-speed transmission time period	ms
T _{MAC}	Time for the maintenance and control, in which a new end-station is solicited to join and the periodic time operation is controlled	µs
T _{MS}	Total sum of the frame transmit time, in which the TCC data frame conveys the medium-speed cyclic data	µs
T _{NRT}	Total sum of the frame transmit time, in which the frame, with the non-RTE data as a payload, is sent out of the end-station within the time period of T _h and is used for the standard Ethernet application on sporadic basis	µs
TR _{HS}	Throughput RTE of the high-speed cyclic data	Moctets/s
TR _{LS}	Throughput RTE of the low-speed cyclic data	Moctets/s
TR _{MS}	Throughput RTE of the medium-speed cyclic data	Moctets/s
TR _{RTE}	Throughput RTE, and the sum of TR _{HS} , TR _{LS} and TR _{MS}	Moctets/s
T _{RTE}	Total sum of the frame transmit time, in which the frame, with the RTE data as a payload of a fixed length, is sent out of the end-station within the time period of T _h	µs
T _{SCH}	Total sum of the frame transmit time for the transmission scheduling	µs
tt	Transfer time	µs

3.4 Conventions

For the purposes of this document, the conventions defined in IEC 61784-2-0 apply.

4 CPF 11 (TCnet¹) – RTE communication profiles

4.1 General overview

Communication Profile Family 11 defines three types of communication profile based on IEC 61158-3-11, IEC 61158-4-11, IEC 61158-5-11 and IEC 61158-6-11 which corresponds to the communication systems commonly known as TCnet.

– Profile 11/1 (TCnet-star)

This profile constitutes a TCnet communication system with star topology. It contains a selection of AL, and DLL services and protocol definitions from IEC 61158-3-11, IEC 61158-4-11, IEC 61158-5-11 and IEC 61158-6-11.

¹ In Japan, TCnet is a trade name of TOSHIBA Corporation. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance with this profile does not require use of the trade name. Use of the trade name requires permission of the trade name holder.

- Profile 11/2 (TCnet-loop 100 with physical layer of 100 Mbit/s)
This profile constitutes a TCnet communication system with loop (ring) topology. It contains a selection of AL, and DLL services and protocol definitions from IEC 61158-3-11, IEC 61158-4-11, IEC 61158-5-11 and IEC 61158-6-11.
- Profile 11/3 (TCnet-loop 1G with physical layer of 1 000 Mbit/s)
This profile constitutes a TCnet communication system with loop (ring) topology. It contains a selection of AL, and DLL services and protocol definitions from IEC 61158-3-11, IEC 61158-4-11, IEC 61158-5-11 and IEC 61158-6-11.

Table 2 shows the overview of TCnet profile set.

Table 2 – CPF 11: Overview of profile sets

Layer	Profile 11/1, profile 11/2, profile 11/3
Application	IEC 61158-5-11, IEC 61158-6-1
Data-link	IEC 61158-3-11, IEC 61158-4-11
Physical	ISO/IEC/IEEE 8802-3

4.2 CP 11/1

4.2.1 Physical layer

The physical layer of 100 Mbit/s shall be according to ISO/IEC/IEEE 8802-3.

Connectors and cables are specified in IEC 61784-5-11 and IEC 61918.

4.2.2 Data-link layer

4.2.2.1 DLL services selection

Table 3 specifies the DLL service selection within IEC 61158-3-11.

Table 3 – CP 11/1: DLL service selection

Clause	Header	Presence	Constraints
1	Scope	YES	–
2	Normative references	YES	Relevant reference only
3	Terms, definitions, symbols, abbreviations and conventions	Partial	–
4	Data Link services and concept	YES	–
4.1	Overview	YES	–
4.2	General description of services	YES	–
4.3	TCC data service	YES	–
4.4	Detail description of sporadic message data service	YES	–
5	DL-management services	YES	–
5.1	General	YES	–
5.2	Facilities of the DL-Management service	YES	–
5.3	Service of the DL-management	YES	–
5.4	Overview of interactions	YES	–
5.5	Detail specification of service and interactions	YES	–

4.2.2.2 DLL protocol selection

Table 4 specifies the DLL protocol selection within IEC 61158-4-11.

Table 4 – CP 11/1: DLL protocol selection

Clause	Header	Presence	Constraints
1	Scope	YES	–
2	Normative references	YES	Relevant reference only
3	Terms, definitions, symbols and abbreviations	Partial	–
4	Overview of the DL-protocol	–	–
4.1	General	YES	–
4.2	Overview of the medium access control	YES	–
4.3	Service assumed from the PhL	YES	–
4.4	DLL architecture	–	–
4.4.1	Overview	YES	–
4.4.2	Star-architecture	YES	–
4.4.3	Loop-architecture	NO	–
4.5	Access control machine and schedule support functions	YES	–
4.6	Local parameters, variables, counters, timers and queues	–	–
4.6.1	Overview	YES	–
4.6.1.1	General		
4.6.1.2	Summary of variables, parameters, counters, timers for star-architecture	YES	–
4.6.1.3	Summary of variables, parameters, counters, timers for loop-architecture	NO	–
4.6.2	Type 11 common variables, parameters, counters, timers and queues	YES	Relevant values and features to star-architecture
4.6.3	Star-architecture specific variables, parameters counters timers and queues	YES	–
4.6.4	Loop-architecture specific variables, parameters, counters timers and queues	NO	–
5	General structure and encoding of PhIDEs and DLPDU and related elements of procedure	YES	See Table 5
6	DLPDU-specific structure, encoding and elements of procedure	YES	See Table 6
7	DLE elements of procedure	–	–
7.1	DLE elements of procedure for star-architecture	YES	–
7.2	DLE elements of procedure for loop-architecture	NO	–
7.3	Serializer and deserializer	YES	–
7.4	DLL management protocol	–	–
7.4.1	DLL management protocol for star-architecture	YES	–
7.4.2	DLL management protocol for loop-architecture	NO	–

Table 5 – CP 11/1: DLL protocol selection of Clause 5

Clause	Header	Presence	Constraints
5.1	Overview	YES	–
5.2	PhIDU structure and encoding	YES	–
5.3	Common MAC frame structure, encoding and elements of procedure	YES	–
5.4	Elements of the MAC frame	–	–
5.4.1	General	YES	–
5.4.2	Preamble field	YES	–
5.4.3	Start frame delimiter (SFD)	YES	–
5.4.4	Address field	YES	–
5.4.5	Length/type field	YES	–
5.4.6	Frame control field (FC)	–	–
5.4.6.1	Structure of FC field	YES	–
5.4.6.2	Frame type (F-type) field	YES	–
5.4.6.3	Priority field (Pri)	YES	Relevant features to star-architecture
5.4.7	Source node number field (SN)	YES	–
5.4.8	Data and pad field	YES	–
5.4.9	Frame check sequence (FCS)	YES	–
5.5	Order of bit transmission	YES	–
5.6	Invalid DLPDU	YES	–

IEC 61784-2-11:2023

<https://standards.itec.org/standards/iec-61784-2-11-2023/>
Table 6 – CP 11/1: DLL protocol selection of Clause 6

Clause	Header	Presence	Constraints
6.1	General	YES	–
6.2	Synchronization DLPDU (SYN)	–	–
6.2.1	General	YES	–
6.2.2	Structure of SYN DLPDU	YES	–
6.2.3	Parameters of SYN DLPDU	–	–
6.2.3.1	Transmission permits node number (PN)	YES	Relevant features to star-architecture
6.2.3.2	Control word (CW)	–	–
6.2.3.2.1	CW for star-architecture	YES	–
6.2.3.2.2	CW for loop-architecture	NO	–
6.2.3.3	Slot time (ST)	YES	Relevant features to star-architecture
6.2.3.4	High-speed transmission period (T_n)	YES	–
6.2.3.5	Medium-speed transmission period (T_m)	YES	–
6.2.3.6	Sporadic message transmission target-token-rotation-time period (T_s)	YES	Relevant features to star-architecture
6.2.3.7	Low-speed transmission period (T_l)	YES	–
6.2.3.8	Live list (LL)	YES	–
6.2.4	User data	YES	–
6.2.5	Sending SYN DLPDU	YES	–