IEC 61784-1-5

Edition 1.0 2023-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial networks – Profiles – Part 1-5: Fieldbus profiles – Communication Profile Family 5

Réseaux industriels – Profils – Partie 1-5: Profils de bus de terrain – Famille de profils de communication 5

IEC 61784-1-5:2023-03(en-fr)

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

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 Varembé
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 It also gives information on projects, replaced and withdrawn publications.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.

Documents
Document Sharing Hub

Full document details: IEC 61784-1-5-2023

IEC 61784-1-5

Edition 1.0 2023-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial networks – Profiles – Part 1-5: Fieldbus profiles – Communication Profile Family 5

Réseaux industriels – Profils – Partie 1-5: Profils de bus de terrain – Famille de profils de communication 5

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 35.100.20; 35.240.50

ISBN 978-2-8322-6589-5

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.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

Documents
Document Sharing Hub

Full document details: IEC 61784-1-5-2023

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms, definitions, abbreviated terms, symbols, and conventions 8
3.1 Terms and definitions 8
3.2 Abbreviations and symbols 8
3.2.1 Common abbreviations and symbols 8
3.2.2 Other abbreviations and symbols 8
3.3 Conventions 8
4 CPF 5 (WorldFIP®) 8
4.1 General overview 8
4.2 CP 5/1 (WorldFIP) 9
4.2.1 Physical layer 9
4.2.2 Data-link layer 11
4.2.3 Application layer 14
4.3 CP 5/2 (WorldFIP) 20
4.3.1 Physical layer 20
4.3.2 Data-link layer 20
4.3.3 Application layer 20
4.4 CP 5/3 (WorldFIP) 26
4.4.1 Physical layer 26
4.4.2 Data-link layer 26
4.4.3 Application layer 26
Annex A (informative) CPF 5 (WorldFIP) communication concepts 28
A.1 Physical layer characteristics 28
A.2 Data-link layer characteristics 28
A.3 Application layer characteristics 28
Bibliography 29

Table 1 – CPF 5: overview of profile sets 9
Table 2 – CPF 5: PhL selection 10
Table 3 – CPF 5: DLL service selection 11
Table 4 – CPF 5: DLL service selection of Clause 4 12
Table 5 – CPF 5: DLL protocol selection 12
Table 6 – CPF 5: DLL protocol selection of variables and resources 13
Table 7 – CPF 5: DLL protocol selection of DLPDUs 13
Table 8 – CP 5/1: AL service selection 14
Table 9 – CP 5/1: AL service selection of ASEs 14
Table 10 – CPF 5: AL service selection of MPS ASEs 14
Table 11 – CPF 5: AL service selection of variable elements 15
Table 12 – CPF 5: AL service selection of produced variable elements 15
Table 13 – CPF 5: AL service selection of consumed variable elements 15
Table 14 – CP 5/1: AL service selection of MPS services 16

AVA Documents
Document Sharing Hub

Full document details: IEC 61784-1-5-2023

Table 15 – CP 5/1, 5/2: AL service selection of A_Readloc service parameters 16
Table 16 – CP 5/1, 5/2: AL service selection of A_Readfar service parameters 16
Table 17 – CP 5/1, 5/2: AL service selection of A_Read service parameters 17
Table 18 – CP 5/1: AL service selection of MCS service classes 17
Table 19 – CP 5/1: AL service selection of QoS 17
Table 20 – CP 5/1: AL service selection of MCS services 17
Table 21 – CP 5/1, 5/2: AL service selection of A_Data parameters 18
Table 22 – CP 5/1: AL protocol selection 18
Table 23 – CPF 5/1: AL protocol selection of MPS data types 18
Table 24 – CPF 5/1: AL protocol selection of MPS PDUs 18
Table 25 – CPF 5/1: AL protocol selection of MPS encoding rules 19
Table 26 – CP 5/1, 5/2: AL protocol selection of MCS PDUs 19
Table 27 – CP 5/1: AL protocol selection of MCS state machines 20
Table 28 – CP 5/2: AL service selection 20
Table 29 – CP 5/2: AL service selection of ASEs 21
Table 30 – CP 5/2: AL service selection of MPS services 21
Table 31 – CP 5/2: AL service selection of MCS service classes 21
Table 32 – CP 5/2: AL service selection of QoS 22
Table 33 – CP 5/2: AL service selection of MCS services 22
Table 34 – CP 5/2: AL service selection of domain services 22
Table 35 – CP 5/2: AL service selection of domain object attributes 23
Table 36 – CP 5/2: AL service selection of program services 23
Table 37 – CP 5/2: AL service selection of program object attributes 23
Table 38 – CP 5/2: AL service selection of variable services 24
Table 39 – CP 5/2: AL service selection of variable classes 24
Table 40 – CP 5/2: AL service selection of variable class attributes 24
Table 41 – CP 5/2: AL protocol selection 24
Table 42 – CP 5/2: AL protocol selection of MCS state machines 25
Table 43 – CP 5/2: AL protocol selection of sub-MMS coding rules 25
Table 44 – CP 5/2: AL protocol selection of sub-MMS PDUs 26
Table 45 – CP 5/3: AL service selection 26
Table 46 – CP 5/3: AL service selection of ASEs 27
Table 47 – CP 5/3: AL protocol selection 27

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL NETWORKS – PROFILES –

Part 1-5: Fieldbus profiles – Communication Profile Family 5

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 61784-1-5 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 fifth edition of IEC 61784-1 published in 2019. This first edition constitutes a technical revision.

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

This edition includes the following significant technical changes with respect to IEC 61784-1:2019:

a) split of the original IEC 61784-1 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/1207/FDIS	65C/1236/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 61784-1 series, published under the general title *Industrial networks – Profiles – Part 1: Fieldbus profiles*, 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.

Documents
Document Sharing Hub

Full document details: IEC 61784-1-5-2023

INTRODUCTION

The IEC 61784-1 series provides a set of Communication Profiles (CP) in the sense of ISO/IEC TR 10000-1. These answer the need of identifying the protocol families co-existing within the IEC 61158 series, as a result of the international harmonization of fieldbus technologies available on the market. More specifically, these profiles help to correctly state the compliance with the IEC 61158 series, and to avoid the spreading of divergent implementations, which would limit its use, clearness and understanding. Additional profiles to address specific market concerns, such as functional safety or information security, can be addressed by future parts of the IEC 61784-1 series.

The IEC 61784-1 series contains several Communication Profile Families (CPF), which specify one or more communication profiles. Such profiles identify, in a strict sense, protocol subsets of the IEC 61158 series via protocol specific communication profiles. They do not define device profiles that specify communication profiles together with application functions needed to answer the need of a specific application ("application profiles").

It is agreed that these latter classes of profiles would facilitate the use of the IEC 61158 series of standards; the profiles defined in the IEC 61784-1 series are a necessary step to achieve that task.

It is also important to clarify that interoperability – defined as the ability of two or more network systems to exchange information and to make mutual use of the information that has been exchanged (see ISO/IEC TR 10000-1) – can be directly achieved on the same link only for those devices complying with the same communication profile.

Profiles contained in the IEC 61784-1 series are constructed of references to IEC 61158-2 and the IEC 61158-3, IEC 61158-4, IEC 61158-5 and IEC 61158-6 series, and other IS, TS or worldwide-accepted standards, as appropriate[1]. Each profile is required to reference at least one part of the IEC 61158 series in addition to IEC 61158-1.

Two or more Profiles, which are related to a common family, are specified within a "Communication Profile Family" (CPF).

[1] International Standardised Profiles may contain normative references to specifications other than International Standards; see ISO/IEC JTC 1 N 4047: *The Normative Referencing of Specifications other than International Standards in JTC 1 International Standardized Profiles – Guidelines for ISP Submitters.*

AVA Documents
Document Sharing Hub

Full document details: IEC 61784-1-5-2023

INDUSTRIAL NETWORKS – PROFILES –

Part 1-5: Fieldbus profiles – Communication Profile Family 5

1 Scope

This part of IEC 61784-1 defines Communication Profile Family 5 (CPF 5). CPF 5 specifies a set of protocol specific communication profiles (CPs) based on the IEC 61158 series (Type 7) and other standards, to be used in the design of devices involved in communications in factory manufacturing and process control.

NOTE 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.

Each CP selects an appropriate consistent and compatible subset of services and protocols from the relevant set that is defined and modelled in the IEC 61158 series. For the selected subset of services and protocols, the profile also describes any possible or necessary constraints in parameter values.

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 61158-2:2023, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-7:2007, *Industrial communication networks – Fieldbus specifications – Part 3-7: Data-link layer service definition – Type 7 elements*

IEC 61158-4-7:2007, *Industrial communication networks – Fieldbus specifications – Part 4-7: Data-link layer protocol specification – Type 7 elements*

IEC 61158-5-7:2007, *Industrial communication networks – Fieldbus specifications – Part 5-7: Application layer service definition – Type 7 elements*

IEC 61158-6-7:2007, *Industrial communication networks – Fieldbus specifications – Part 6-7: Application layer protocol specification – Type 7 elements*

IEC 61784-1-0:2023, *Industrial networks – Profiles – Part 1-0: Fieldbus profiles – General concepts and terminology*

IEC 61784-1-1:2023, *Industrial networks – Profiles – Part 1-1: Fieldbus profiles – Communication Profile Family 1*

AVA Documents
Document Sharing Hub

Full document details: IEC 61784-1-5-2023

IETF RFC 791, J. Postel, *Internet Protocol*, September 1981, available at https://www.rfc-editor.org/info/rfc791 [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, symbols, and conventions

3.1 Terms and definitions

For the purposes of this document, all terms and definitions provided in the IEC 61158 series and IEC 61784-1-0 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 Abbreviations and symbols

3.2.1 Common abbreviations and symbols

For the purposes of this document, all abbreviations and symbols defined in the IEC 61158 series and IEC 61784-1-0 apply.

CP communication profile

CPF communication profile family

MAU medium attachment unit

3.2.2 Other abbreviations and symbols

IP internet protocol (see IETF RFC 791)

TCP terminal control protocol (see IETF RFC 793)

3.3 Conventions

For the purposes of this document, the conventions defined in IEC 61784-1-0 apply.

4 CPF 5 (WorldFIP®[2])

4.1 General overview

The WorldFIP network is a very flexible and versatile transmission system. The range of functions and performances permit the definition of a large number of profiles to match exactly the requirements of the applications. As a practical approach, the three most popular profiles are developed in this document; they address both time critical context and mission critical functions. Other profiles will be defined for purpose specific application by selecting the appropriate services and protocols in the IEC 61158 series, but respecting the minimum core which is necessary to set up, operate and monitor the network.

[2] WorldFIP is the trade name of ALSTOM company. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trade names holder or any of its products. Compliance with this profile does not require use of the registered trade name. Use of the trade names requires permission of the trade name holder.

AVA Documents Document Sharing Hub

Full document details: IEC 61784-1-5-2023

All the terms are defined in the base standards: IEC 61158-2, IEC 61158-3-7, IEC 61158-4-7, IEC 61158-5-7 and IEC 61158-6-7.

All the defined profiles are composed of a selection of services and protocols from the IEC 61158 series, Type 7, and tuned by a selection of particular parameters within each service or protocol.

All the WorldFIP profiles are based on a common core set of services of MPS, to which is added an appropriated selection of services providing one or more selected appropriated features.

Table 1 summarizes the element selection of the relative profiles.

Table 1 – CPF 5: overview of profile sets

	Profile 5/1	Profile 5/2	Profile 5/3
Application	(MPS, MCS) of IEC 61158-5-7, IEC 61158-6-7	(MPS, MCS, SubMMS) of IEC 61158-5-7, IEC 61158-6-7	(MPS) of IEC 61158-5-7, IEC 61158-6-7
Data-link	IEC 61158-3-7, IEC 61158-4-7	IEC 61158-3-7, IEC 61158-4-7	IEC 61158-3-7, IEC 61158-4-7
Physical	Type 1 of IEC 61158-2	Type 1 of IEC 61158-2	Type 1 of IEC 61158-2

The selection defined in Table 1 represents the most frequently basic used profiles.

The distinctive features of the different profiles in the basic version are the following:

– Profile 5/1, long messages, wide network topology, loose time-critical purpose-built application layer;
– Profile 5/2, large messages, tight time-critical exchanges, mission-critical application, IEC 61158-5-7 and IEC 61158-6-7 (application layer);
– Profile 5/3, open WorldFIP interface for other purpose-built or standardized tight time-critical application layers (segmented or not).

NOTE See Annex A for an overview of WorldFIP communications concepts.

It should be emphasized that profile 5/3 may be fitted with web type upper stack profile containing TCP/IP, BSD sockets, HTTP over DLL access point. The addition of this side stack does not impact the profile definition. This important feature permits a TRANSPARENT access of Fieldbus device from remote browser, as long as the field devices implement an EMBEDDED SERVER. This is an additional integration provided by the profiles to federate intelligent Field device into distributed Control Systems.

The physical layers indicated in this document are those relative to the selected profiles. But variants may be defined in the future, using other WorldFIP approved physical layer options for further applications such as high speed radio or very high speed on fiber or copper.

4.2 CP 5/1 (WorldFIP)

4.2.1 Physical layer

Table 2 specifies the physical layer profile within IEC 61158-2. It is common to all of the CPF 5 profiles.

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Table 2 – CPF 5: PhL selection

Clause	Header	Presence	Constraints
1	Scope	YES	—
2	Normative references	Partial	Used if needed
3	Terms and definitions	—	—
3.1	Common terms and definitions	Partial	Used when applicable
3.2	Type 1: Terms and definitions	YES	—
Next subclauses	—	NO	—
4	Symbols and abbreviated terms	—	—
4.1	Symbols	—	—
4.1.1	Type 1: Symbols	YES	—
Next subclauses	—	NO	—
4.2	Abbreviated terms	—	—
4.2.1	Type 1: Additional abbreviations	YES	—
Next subclauses	—	NO	—
5	Data-link layer – Physical Layer interface	—	—
5.1	General	Partial	Used as needed
5.2	Type 1: Required services	YES	—
Next subclauses	—	NO	—
6	Station Management – Physical Layer interface	—	—
6.1	General	Partial	Used as needed
6.2	Type 1: Station Management – Physical Layer interface	Partial	Used as needed
Next subclauses	—	NO	—
7	DCE Independent Sublayer (DIS)	—	—
7.1	General	Partial	Used as needed
7.2	Type 1: DIS	YES	—
Next subclauses	—	NO	—
8	DTE – DCE interface	NO	—
9	Medium Dependent Sublayer (MDS)	NO	—
10	MDS – MAU interface	—	—
10.1	General	Partial	Used as needed
10.2	Type 1: MDS – MAU interface: wire and optical media	Partial	Used as appropriate
Next subclauses	—	NO	—
11	Type 1 and 7: Medium Attachment Unit: voltage mode, linear-bus-topology 150 Ω twisted-pair wire medium	Partial	See Note
12	Type 1 and 3: Medium Attachment Unit: 31,25 kbit/s, voltage-mode with low-power option, bus- and tree-topology, 100 Ω wire medium	YES	See Note
13 – 14	—	NO	—
15	Type 1 and 7: Medium Attachment Unit: dual-fiber optical media	YES	See Note
16 – 20	—	NO	—

AVA Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Clause	Header	Presence	Constraints
21	Type 3: Medium Attachment Unit: Synchronous transmission, 31,25 kbit/s, voltage mode, wire medium	YES	See Note
Next clauses	—	NO	—
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	See Note
A.2	External Connectors for wire medium	YES	See Note
A.3	External Connectors for optical medium	YES	See Note
Annex B	Type 1: Cable specifications and trunk and spur lengths for the 31,25 kbit/s voltage-mode MAU	YES	See Note
Annex C	Type 1: Optical passive stars	YES	See Note
Annex D	Type 1: Star topology	YES	See Note
Annex E	Type 1: Alternate fibers	YES	See Note
Next annexes		NO	—
NOTE The selection could be an alternate solution for the specified profile.			

4.2.2 Data-link layer

4.2.2.1 DLL service selection

Table 3 specifies the DLL service selection within IEC 61158-3-7 for this profile. It is common to all of the CPF 5 profiles.

Table 3 – CPF 5: DLL service selection

Clause	Header	Presence	Constraints
1	Scope	YES	—
2	Normative references	Partial	Used as needed
3	Terms, definitions, symbols, abbreviations and conventions	Partial	Used as needed
4	Data-link layer services and concepts	Partial	See Table 4

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Table 4 – CPF 5: DLL service selection of Clause 4

Clause	Header	Presence	Constraints
4.1	Field of application, object	YES	—
4.2	General description of services	YES	—
4.3	Sequences of primitives	YES	—
4.4	Buffer writing	YES	See Note 1
4.5	Buffer reading	YES	See Note 1
4.6	Buffer transfer	YES	—
4.7	Explicit request for buffer transfer	Partial	See Note 2
4.8	Unacknowledged message transfer	Partial	See Note 3
4.9	Acknowledged message transfer	Partial	See Note 3

NOTE 1 The maximum length of exchanged DLS-user-data can be either 120 or 128 bytes.

NOTE 2 The two update services are each optional.

NOTE 3 The service is optional. When implemented, the maximum length of exchanged DLS-user-data can be either 122 bytes or 256 bytes.

4.2.2.2 DLL protocol selection

Table 5 specifies the DLL protocol selection within IEC 61158-4-7 for this profile. It is common to all of the CPF 5 profiles.

Table 5 – CPF 5: DLL protocol selection

Clause	Header	Presence	Constraints
1	Scope	YES	—
2	Normative references	Partial	Used as needed
3	Terms, definitions, symbols and abbreviations	Partial	Used as needed
4	Overview of the DL-protocol	YES	See Table 6 for a list of mandatory and optional variables and resources
5	General structure and encoding of PhIDUs and DLPDUs and related elements of procedure	YES	See Table 7 for a list of mandatory and optional DLPDUs
6	DLPDU-specific structure, encoding and element of procedure	YES	—
7	DL-service elements of procedure, interfaces and conformance	YES	—
Annex A	Exemplary FCS implementations	YES	—
Annex B	Object modeling	YES	—
Annex C	Topology of multi-segment DL-subnetwork	YES	—
Annex D	Management of transmission errors	YES	—

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Table 6 – CPF 5: DLL protocol selection of variables and resources

Clause	Variable or resource name	Usage	Constraints
4.2.1	B_DATprod	M	—
4.2.1	B_REQ	O	—
4.2.1	Q_MSGcyc	O	—
4.2.1	RQ	O	—
4.2.1	PR	O	—
4.2.1	RQ_INHIBIT	O	—
4.2.1	B_DATcons	M	—
4.2.1	Q_MSGaper	O	—
4.2.1	Q_MSGrec	O	—
4.2.1	Q_REQ1	O	—
4.2.1	Q_REQ2	O	—
4.2.2	Q_IDRQ1	O	—
4.2.2	Q_IDRQ2	O	—
4.2.2	Q_RPRQ	O	—
4.2.2	Q_IDMSG	O	—

Table 7 – CPF 5: DLL protocol selection of DLPDUs

Clause	DLPDU name	Usage	Constraints
5.5.1	ID_DAT	M	—
5.5.1	ID_MSG	O	—
5.5.1	ID_RQ1	O	See Note
5.5.1	ID_RQ2	O	See Note
5.5.2	RP_DAT	M	See Note
5.5.2	RP_DAT_MSG	O	See Note
5.5.2	RP_DAT_RQ1	O	See Note
5.5.2	RP_DAT_RQ2	O	See Note
5.5.2	RP_DAT_RQ1_MSG	O	See Note
5.5.2	RP_DAT_RQ2_MSG	O	See Note
5.5.4	RP_MSG_ACK	O	See Note
5.5.4	RP_MSG_NOACK	O	See Note
5.5.5	RP_ACK+	O	—
5.5.5	RP_ACK-	O	—
5.5.3	RP_RQ1	O	—
5.5.3	RP_RQ2	O	—
5.5.6	RP_END	O	—
NOTE The need for this DLPDU is implementation dependent.			

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

4.2.3 Application layer

4.2.3.1 AL service selection

Table 8 specifies the AL service selection within IEC 61158-5-7 for this profile.

Table 8 – CP 5/1: AL service selection

Clause	Header	Presence	Constraints
1	Scope	YES	—
2	Normative references	Partial	Used as needed
3	Terms, definitions, symbols, abbreviations and conventions	Partial	Used as needed
4	Concepts	YES	Used as needed
5	Data type ASE	YES	—
6	Communication model specification	Partial	See Table 9

Table 9 – CP 5/1: AL service selection of ASEs

Clause	Header	Presence	Constraints
6.2.1	MPS ASE (periodic/aPeriodic manufacturing services)	Partial	See Table 10 and Table 14
6.2.2	Virtual model of a device (VMD) ASE	NO	—
6.2.3	Domain ASE	NO	—
6.2.4	Program invocation (PI) ASE	NO	—
6.2.5	Variable ASE	NO	—
6.2.6	Event ASE	NO	—
6.2.7	Directory ASE	NO	—
6.3.1	Messaging common service (MCS) AR ASE	Partial	See Table 18

Table 10 – CPF 5: AL service selection of MPS ASEs

Clause	Header	Presence	Constraints
6.2.1.3.2.2	Variable generic class specification	Partial	See Table 11
6.2.1.3.2.4	Produced variable class specification	Partial	See Table 12
6.2.1.3.2.6	Consumed variable class specification	Partial	See Table 13
6.2.1.3.2.8	Third party variable class specification	NO	—
6.2.1.3.2.10	Type constructor class specification	NO	—
6.2.1.4	Variable list	NO	—

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Table 11 – CPF 5: AL service selection of variable elements

Parameter ref.	Parameter name	Usage	Constraints
6.2.1.3.2.2	A_Name	M	—
6.2.1.3.2.2	Reference Type Constructor	NO	—
6.2.1.3.2.2	Transmitted Status	M	—
6.2.1.3.2.2	Significant Status	M	—
6.2.1.3.2.2	Identifier	M	—
6.2.1.3.2.2	Transmission Mode	M	See Note
6.2.1.3.2.2	Network Period	M	—
6.2.1.3.2.2	Class	M	Normal only
6.2.1.3.2.2	Consistency Variable	NO	—
6.2.1.3.2.2	Reference variable list	NO	—
6.2.1.3.2.2	Public value	M	See Note
6.2.1.3.2.2	Universal services requested	NO	—
NOTE This parameter is implementation dependent.			

Table 12 – CPF 5: AL service selection of produced variable elements

Parameter ref.	Parameter name	Usage	Constraints
6.2.1.3.2.4	Refreshment Elaborated	O	Asynchronous only
6.2.1.3.2.4	Punctual Refreshment Elaborated	NO	—
6.2.1.3.2.4	Resynchronization Variable	NO	—
6.2.1.3.2.4	Emission Indication	O	—

Table 13 – CPF 5: AL service selection of consumed variable elements

Parameter ref.	Parameter name	Usage	Constraints
6.2.1.3.2.6	Promptness Elaborated	O	Asynchronous only
6.2.1.3.2.6	Punctual Promptness Elaborated	NO	—
6.2.1.3.2.6	Resynchronization Variable	NO	—
6.2.1.3.2.6	Reception Indication	O	—

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Table 14 – CP 5/1: AL service selection of MPS services

Service ref.	Service name	Usage	Constraint
6.2.1.3.4.2	A_Readloc	M	See Table 15
6.2.1.3.4.3	A_Writeloc	M	—
6.2.1.3.4.4	A_Update	O	—
6.2.1.3.4.5	A_Readfar	O	See Table 15
6.2.1.3.4.6	A_Writefar	O	—
6.2.1.3.4.7	A_Send	M	—
6.2.1.3.4.8	A_Received	M	—
6.2.1.3.5.2	A_Read	O	See Table 15
6.2.1.3.5.3	A_Write	O	—
6.2.1.4.3.1	A_Readlist	NO	—

Table 15 – CP 5/1, 5/2: AL service selection of A_Readloc service parameters

Parameter ref.	Parameter name	Usage	Constraint
6.2.1.3.4.2	Variable Specification	M	—
6.2.1.3.4.2	Value	M	—
6.2.1.3.4.2	Refreshment status	O	—
6.2.1.3.4.2	Punctual Refreshment Status	NO	—
6.2.1.3.4.2	Promptness Status	O	—
6.2.1.3.4.2	Punctual Promptness Status	NO	—

Table 16 – CP 5/1, 5/2: AL service selection of A_Readfar service parameters

Parameter ref.	Parameter name	Usage	Constraint
6.2.1.3.4.5	Variable Specification	M	—
6.2.1.3.4.5	Priority	M	—
6.2.1.3.4.5	Value	M	—
6.2.1.3.4.5	Refreshment status	O	—
6.2.1.3.4.5	Punctual Refreshment Status	NO	—
6.2.1.3.4.5	Promptness Status	O	—
6.2.1.3.4.5	Punctual Promptness Status	NO	—

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023

Table 17 – CP 5/1, 5/2: AL service selection of A_Read service parameters

Parameter ref.	Parameter name	Usage	Constraint
6.2.1.3.5.2	Variable Specification	M	—
6.2.1.3.5.2	Priority	M	—
6.2.1.3.5.2	Value	M	—
6.2.1.3.5.2	Refreshment status	O	—
6.2.1.3.5.2	Punctual Refreshment Status	NO	—
6.2.1.3.5.2	Promptness Status	O	—
6.2.1.3.5.2	Punctual Promptness Status	NO	—

Table 18 – CP 5/1: AL service selection of MCS service classes

Class ref.	Class name	Usage	Constraints
6.3.1.2	negotiated	NO	—
6.3.1.2	predefined	M	See Table 19 and Table 20
6.3.1.2	without negotiation	NO	—

Table 19 – CP 5/1: AL service selection of QoS

QoS ref.	QoS name	Usage	Constraints
6.3.1.2.3.2	Duration of Establishment	NO	—
6.3.1.2.3.3	PDU size	M	See Note
6.3.1.2.3.4	Transfer Rate	M	1, Cyclical channel
6.3.1.2.3.5	Number of Retries	M	Number = 1
6.3.1.2.3.6	Anticipation Factor	M	Number = 0 or 1; see Note
6.3.1.2.3.7	SDU Size	M	User SDU size ≤ 64K Bytes
6.3.1.2.3.8	Termination Duration	NO	—
6.3.1.2.3.9	Priority	NO	—
NOTE The QoS is implementation dependent.			

Table 20 – CP 5/1: AL service selection of MCS services

Service ref.	Service name	Usage	Constraint
6.3.1.3.2	A_Associate	NO	—
6.3.1.3.3	A_Release	NO	—
6.3.1.3.4	A_Abort	NO	—
6.3.1.3.5	A_Data	Partial	See Table 21
6.3.1.3.6	A_Unidata	NO	—

Documents
Document Sharing Hub
Full document details: IEC 61784-1-5-2023