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Entwurf**Industrielle Kommunikationsnetze –
Profile –****Teil 1: Feldbusprofile****(IEC 65C/693/CDV:2012);****Englische Fassung FprEN 61784-1:2012, nur auf CD-ROM**

Industrial communication networks –
Profiles –

Part 1: Fieldbus profiles

(IEC 65C/693/CDV:2012);

English version FprEN 61784-1:2012, only on CD-ROM

Réseaux de communication industriels –
Profils –

Partie 1: Profils de bus de terrain

(CEI 65C/693/CDV:2012);

Version anglaise FprEN 61784-1:2012, seulement en CD-ROM

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2012-12-17 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfes besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal des DIN unter www.entwuerfe.din.de bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an dke@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/stellungnahme oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an die DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (Hausanschrift: Stresemannallee 15, 60596 Frankfurt am Main).

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 294 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE

Nationales Vorwort

Die englische Fassung des europäischen Dokuments FprEN 61784-1:2012 „Industrielle Kommunikationsnetze – Profile – Teil 1: Feldbusprofile“ (Entwurf in der Umfrage) ist unverändert in diesen Norm-Entwurf übernommen worden.

Die Internationale Elektrotechnische Kommission (IEC) und das Europäische Komitee für Elektrotechnische Normung (CENELEC) haben vereinbart, dass ein auf IEC-Ebene erarbeiteter Entwurf für eine Internationale Norm zeitgleich (parallel) bei IEC und CENELEC zur Umfrage (CDV-Stadium) und Abstimmung als FDIS (en: Final Draft International Standard) bzw. Schluss-Entwurf für eine Europäische Norm gestellt wird, um eine Beschleunigung und Straffung der Normungsarbeit zu erreichen. Dem entsprechend ist das internationale Dokument IEC 65C/693/CDV:2012 „Industrial communication networks – Profiles – Part 1: Fieldbus profiles“ unverändert in den Entwurf FprEN 61784-1:2012 übernommen worden.

Das internationale Dokument wurde vom SC 65C „Industrial networks“ der Internationalen Elektrotechnischen Kommission (IEC) erarbeitet.

Bei der Abstimmung zu dem Europäischen Schluss-Entwurf bei CENELEC und dem Internationalen Schluss-Entwurf bei IEC [Final Draft International Standard (FDIS)] sind jeweils nur „JA/NEIN“-Entscheidungen möglich, wobei „NEIN“-Entscheidungen fundiert begründet werden müssen. Dokumente, die bei CENELEC als Europäische Norm angenommen und ratifiziert werden, sind unverändert als Deutsche Normen zu übernehmen.

Für dieses Dokument ist das nationale Arbeitsgremium K 956 „Feldbus“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (www.dke.de) zuständig.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für den vorliegenden Normentwurf erfüllt.

Da sich die Benutzer des vorliegenden Normentwurfs der englischen Sprache als Fachsprache bedienen, wird die Englische Fassung der FprEN 61784-1 veröffentlicht. Zu deren Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als informativer Nationaler Anhang NA des vorliegenden Normentwurfs hinzugefügt. Für viele der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Dieser Normentwurf steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

Es ist vorgesehen, auch bei der entsprechenden zukünftigen Deutschen Norm auf die deutsche Sprachfassung zu verzichten und diese in der englischsprachigen Fassung zu veröffentlichen.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm.

Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Änderungen

Gegenüber DIN EN 61784-1:2011-04 wurden folgende Änderungen vorgenommen:

- a) normative Verweisungen auf den neuesten Stand gebracht;
- b) neue Kommunikationsprotokollfamilie 19 hinzugefügt;
- c) Auswahltable für die Kommunikationsprofilfamilien 1 und 9 auf den neuesten Stand gebracht.

Nationaler Anhang NA (informativ)

3.1 Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach Reihe IEC 61158.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
PROFILES –****Part 1: Fieldbus profiles****FOREWORD**

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International Standard IEC 61784-1 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This fourth edition cancels and replaces the third edition published in 2010. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- update of the dated references to the IEC 61158 series, to IEC 61784-2, to the IEC 61784-3 series, to the IEC 61784-5 series and to IEC 61918 throughout the document;

- new profile family CPF 19;
- update of selection tables for CPF 1 and CPF 9.

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

FDIS	Report on voting
65C/xxx/FDIS	65C/xxx/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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

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

The National Committees are requested to note that for this publication the stability date is 2018

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 61784 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 to 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, may be addressed by future parts of this standard.

This standard 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-type-specific communication profiles for the purpose of guiding manufacturers in feature set selection – for example, in selecting the minimum set of communication services and protocol to implement a specific class of devices, such as generic slaves or transmitters ("implementation profiles"). Neither do they 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 help the use of the IEC 61158 series of standards; the profiles defined in this document 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 3.2.1 of ISO/IEC TR 10000-1) — can be directly achieved on the same link only for those devices complying to the same communication profile.

Profiles contained in this International Standard 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 appropriate¹. Each profile is required to reference at least one (sub)part of IEC 61158-2 through IEC 61158-6.

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.

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 1: Fieldbus profiles

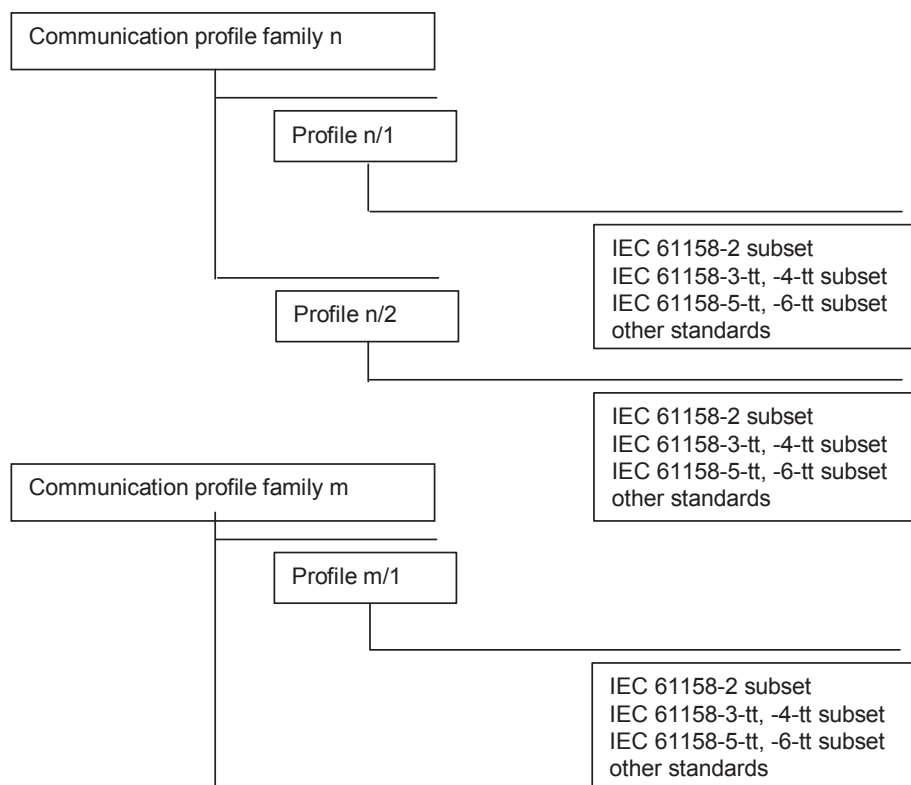
1 Scope

This part of IEC 61784 defines a set of protocol specific communication profiles based primarily on the IEC 61158 series, to be used in the design of devices involved in communications in factory manufacturing and process control.

Each profile selects specifications for the communications protocol stack at a device. It contains a minimal set of required services at the application layer and specification of options in intermediate layers defined through references. If no application layer is included, then a minimal set of required services at the Data-link layer is specified. The appropriate references to the protocol specific types are given in each communication profile family or associated profiles.

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

The structure of communication profile families is specified in Figure 1.



IEC 1651/10

Figure 1 – Communication profile families and profiles

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

Table 1 shows the communication profile families that are defined in this standard.

Table 1 – Relations of Communication Profile Families to type numbers

IEC 61784-1 contents			Corresponding IEC 61158 Types	
CPF	Clause	Communication Profile Families (Note 1)	Type	
1	5	FOUNDATION® Fieldbus	1, 5, 9	(see Note 2)
2	6	CIP™	2	
3	7	PROFIBUS & PROFINET	3, 10	(see Note 3)
4	8	P-NET®	4	
5	9	WorldFIP®	7	
6	10	INTERBUS®	8	
7	11	Has been removed based for lack of market relevance	6	
8	12	CC-Link	18	
9	13	HART	20	
16	14	SERCOS	16	
19	15	MECHATROLINK	24	

NOTE 1 See the specific CPF clauses for information on the respective trademark holders.

NOTE 2 CP 1/1 has a denigrated PhL device profile subclass, which uses a variant of a Type 3 PhL.

NOTE 3 CP 3/2 has a denigrated PhL device profile subclass, which uses a variant of a Type 1 PhL.

NOTE 4 Other CPFs can be found in IEC 61784-2.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 60079-27, *Explosive atmospheres – Part 27: Fieldbus intrinsically safe concept (FISCO)*

IEC 61010 (all parts), *Safety requirements for electrical equipment for measurement, control and laboratory use*

IEC 61131-2, *Programmable controllers – Part 2: Equipment requirements and tests*

IEC 61158-2:2013², *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-1:2013², *Industrial communication networks – Fieldbus specifications – Part 3-1: Data-link layer service definition – Type 1 elements*

IEC 61158-3-2:2013², *Industrial communication networks – Fieldbus specifications – Part 3-2: Data-link layer service definition – Type 2 elements*

IEC 61158-3-3:2013², *Industrial communication networks – Fieldbus specifications – Part 3-3: Data-link layer service definition – Type 3 elements*

² To be published.

IEC 61158-3-4:2013², *Industrial communication networks – Fieldbus specifications – Part 3-4: Data-link layer service definition – Type 4 elements*

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

IEC 61158-3-8:2007, *Industrial communication networks – Fieldbus specifications – Part 3-8: Data-link layer service definition – Type 8 elements*

IEC 61158-3-16:2007, *Industrial communication networks – Fieldbus specifications – Part 3-16: Data-link layer service definition – Type 16 elements*

IEC 61158-3-18:2007, *Industrial communication networks – Fieldbus specifications – Part 3-18: Data-link layer service definition – Type 18 elements*

IEC 61158-4-1:2013², *Industrial communication networks – Fieldbus specifications – Part 4-1: Data-link layer protocol specification – Type 1 elements*

IEC 61158-4-2:2013², *Industrial communication networks – Fieldbus specifications – Part 4-2: Data-link layer protocol specification – Type 2 elements*

IEC 61158-4-3:2013², *Industrial communication networks – Fieldbus specifications – Part 4-3: Data-link layer protocol specification – Type 3 elements*

IEC 61158-4-4:2013², *Industrial communication networks – Fieldbus specifications – Part 4-4: Data-link layer protocol specification – Type 4 elements*

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

IEC 61158-4-8:2007, *Industrial communication networks – Fieldbus specifications – Part 4-8: Data-link layer protocol specification – Type 8 elements*

IEC 61158-4-16:2007, *Industrial communication networks – Fieldbus specifications – Part 4-16: Data-link layer protocol specification – Type 16 elements*

IEC 61158-4-18:2010, *Industrial communication networks – Fieldbus specifications – Part 4-18: Data-link layer protocol specification – Type 18 elements*

IEC 61158-5-2:2013², *Industrial communication networks – Fieldbus specifications – Part 5-2: Application layer service definition – Type 2 elements*

IEC 61158-5-3:2013², *Industrial communication networks – Fieldbus specifications – Part 5-3: Application layer service definition – Type 3 elements*

IEC 61158-5-4:2013², *Industrial communication networks – Fieldbus specifications – Part 5-4: Application layer service definition – Type 4 elements*

IEC 61158-5-5:2013², *Industrial communication networks – Fieldbus specifications – Part 5-5: Application layer service definition – Type 5 elements*

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

IEC 61158-5-8:2007, *Industrial communication networks – Fieldbus specifications – Part 5-8: Application layer service definition – Type 8 elements*

IEC 61158-5-9:2013², *Industrial communication networks – Fieldbus specifications – Part 5-9: Application layer service definition – Type 9 elements*

IEC 61158-5-10:2013², *Industrial communication networks – Fieldbus specifications – Part 5-10: Application layer service definition – Type 10 elements*

IEC 61158-5-16:2007, *Industrial communication networks – Fieldbus specifications – Part 5-16: Application layer service definition – Type 16 elements*

IEC 61158-5-18:2010, *Industrial communication networks – Fieldbus specifications – Part 5-18: Application layer service definition – Type 18 elements*

IEC 61158-5-20:2013², *Industrial communication networks – Fieldbus specifications – Part 5-20: Application layer service definition – Type 20 elements*

IEC 61158-6-2:2013², *Industrial communication networks – Fieldbus specifications – Part 6-2: Application layer protocol specification – Type 2 elements*

IEC 61158-6-3:2013², *Industrial communication networks – Fieldbus specifications – Part 6-3: Application layer protocol specification – Type 3 elements*

IEC 61158-6-4:2013², *Industrial communication networks – Fieldbus specifications – Part 6-4: Application layer protocol specification – Type 4 elements*

IEC 61158-6-5:2013², *Industrial communication networks – Fieldbus specifications – Part 6-5: Application layer protocol specification – Type 5 elements*

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

IEC 61158-6-8:2007, *Industrial communication networks – Fieldbus specifications – Part 6-8: Application layer protocol specification – Type 8 elements*

IEC 61158-6-9:2013², *Industrial communication networks – Fieldbus specifications – Part 6-9: Application layer protocol specification – Type 9 elements*

IEC 61158-6-10:2013², *Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements*

IEC 61158-6-16:2007, *Industrial communication networks – Fieldbus specifications – Part 6-16: Application layer protocol specification – Type 16 elements*

IEC 61158-6-18:2010, *Industrial communication networks – Fieldbus specifications – Part 6-18: Application layer protocol specification – Type 18 elements*

IEC 61158-6-20:2013², *Industrial communication networks – Fieldbus specifications – Part 6-20: Application layer protocol specification – Type 20 elements*

IEC 61784-2:2013², *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3*

IEC 61784-5-2:2012², *Industrial communication networks – Profiles – Part 5-2: Installation of fieldbuses – Installation profiles for CPF 2*

IEC 61918:2012², *Industrial communication networks – Installation of communication networks in industrial premises*

IEC 62026-3, *Low-voltage switchgear and controlgear – Controller-device interfaces (CDIs) – Part 3: DeviceNet*

ISO/IEC 8802-2:1998, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 2: Logical link control*

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 15745-3:2003, *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*

ANSI TIA/EIA-232F:1997, *Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*

ANSI TIA/EIA-485-A:1998, *Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems*

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*

IETF RFC 768, *User Datagram Protocol*; available at <<http://www.ietf.org>>

IETF RFC 791, *Internet Protocol*; available at <<http://www.ietf.org>>

IETF RFC 792, *Internet Control Message Protocol*; available at <<http://www.ietf.org>>

IETF RFC 793, *Transmission Control Protocol*; available at <<http://www.ietf.org>>

IETF RFC 826, *Ethernet Address Resolution Protocol*; available at <<http://www.ietf.org>>

IETF RFC 894, *A standard for the Transmission of IP Datagrams over Ethernet Networks*; available at <<http://www.ietf.org>>

IETF RFC 1112, *Host Extensions for IP Multicasting*; available at <<http://www.ietf.org>>

IETF RFC 1122, *Requirements for Internet Hosts – Communication Layers*; available at <<http://www.ietf.org>>

IETF RFC 1123, *Requirements for Internet Hosts – Application and Support*; available at <<http://www.ietf.org>>

IETF RFC 1127, *A Perspective on the Host Requirements RFCs*; available at <<http://www.ietf.org>>

IETF RFC 2236, *Internet Group Management Protocol, Version 2*; available at <<http://www.ietf.org>>

3 Definitions

3.1 Terms and definitions

For the purposes of this document, all terms and definitions provided in the IEC 61158 series apply.

3.2 Abbreviations and symbols

3.2.1 IEC 61158 abbreviations and symbols

For the purposes of this profile, all abbreviations and symbols defined in the IEC 61158 series apply. The following abbreviations, found within the IEC 61158 series, are repeated here for use by those who wish to understand the general structure of this International Standard without referring to the IEC 61158 series.

AL	Application layer
APDU	Application protocol data unit
AR	Application relationship
ASE	Application service element
DL-	Data-link layer (as a prefix)
DLL	Data-link layer
DLSDU	Data-link service data unit
PhL	Physical layer
TPDU	Transport protocol data unit

3.2.2 Other abbreviations and symbols

CE	"Conformité Européene" (i.e., "European Conformity")
CP	communication profile
CPF	communication profile family
DP-V0	PROFIBUS DP version 0
DP-V1	PROFIBUS DP version 1
EMC	electro-magnetic compatibility
IDN	identification number
IP	internet protocol
IS	intrinsically safe (as an adjective) intrinsic safety (as a noun)
ISP	international standardized profiles
IV	initialization vector
MAU	medium attachment unit
PPDU	presentation protocol data unit
RS 485	MAU according to ANSI TIA/EIA-485-A
RS 485-IS	MAU according to ANSI TIA/EIA-485-A and applicable to IS
TCP	terminal control protocol
UDP	user datagram protocol

3.3 Conventions

3.3.1 Conventions common to all layers

3.3.1.1 (Sub)clause selection tables

(Sub)clause selection for all layers is defined in tables, as shown in Table 2 and Table 3. The selected base specifications are indicated just before the selection table(s). Selection is done at the highest (sub)clause level possible to define the profile selection unambiguously.

Table 2 – Layout of profile (sub)clause selection tables

Clause	Header	Presence	Constraints

Table 3 – Contents of (sub)clause selection tables

Column	Text	Meaning
Clause	<#>	(sub)clause number of the base specifications
	+Clause	any following clauses up to the last clause of the base specification
	+Annex	any following annexes up to the last annex of the base specification
Header	<text>	(sub)clause title of the base specifications
Presence	NO	This (sub)clause is not included in the profile
	YES	This (sub)clause is fully (100%) included in the profile in this case no further detail is given
	—	Presence is defined in the following subclauses
	Partial	Parts of this (sub)clause is included in the profile
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly, for longer text table footnotes or table notes may be used

If sequences of (sub)clauses do not match the profile, then the numbers are concatenated.

EXAMPLE 1 concatenated subclauses

3.4 – 3.7	—	NO	—
-----------	---	----	---

EXAMPLE 2 concatenated clauses up to the last clause

+Clause	—	NO	—
---------	---	----	---

EXAMPLE 3 concatenated annexes up to the last annex

+Annex	—	NO	—
--------	---	----	---

3.3.1.2 Service selection tables

If selection of services is defined in a table the format of Table 4 is used. The table identifies the selected services and includes service constraints, as explained in Table 5.

Table 4 – Layout of service selection tables

Service ref.	Service name	Usage	Constraint

Table 5 – Contents of service selection tables

Column	Text	Meaning
Service ref.	<#>	(sub)clause number of the base specifications where the service is defined
	—	Not applicable
Service name	<text>	The name of the service
Usage	M	Mandatory
	O	Optional
	—	Service is never used
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly, for longer text table footnotes or table notes may be used

If selection of service parameters is defined in a table the format of Table 6 is used. Each table identifies the selected parameters and includes parameter constraints, as explained in Table 7.

Table 6 – Layout of parameter selection tables

Parameter ref.	Parameter name	Usage	Constraint

Table 7 – Contents of parameter selection tables

Column	Text	Meaning
Parameter ref.	<#>	(sub)clause number of the base specifications where the service is defined
	—	Not applicable
Parameter name	<text>	The name of the service parameter
Usage	M	Mandatory
	O	Optional
	—	Attribute is never present
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly, for longer text table footnotes or table notes may be used

3.3.2 Physical layer

No additional conventions are defined.

3.3.3 Data-link layer

3.3.3.1 Service profile conventions

No additional conventions are defined.

3.3.3.2 Service and parameter selections

These are described using the common conventions, see 3.3.1.2.

3.3.4 Application layer

3.3.4.1 Service profile conventions

ASE and class selection is described using (sub)clause selection tables, see 3.3.1.1. If the usage of selected ASE and classes is further constrained this is specified in the profile (e.g. an optional item of the base standard is mandatory in the profile).

If selection of class attributes is defined in a table the format of Table 8 is used. The table identifies the selected class attributes and includes their constraints, as explained in Table 9.

Table 8 – Layout of class attribute selection tables

Attribute	Attribute Name	Usage	Constraint

Table 9 – Contents of class attribute selection tables

Column	Text	Meaning
Attribute	<#>	Attribute number of the base specification class
	—	Not applicable
Attribute Name	<text>	The name of the attribute
Usage	M	Mandatory
	O	Optional
	—	Attribute is never present
Constraints	See <#>	Constraints/remarks are defined in the given subclause, table or figure of this profile document
	—	No constraints other than given in the reference document (sub)clause, or not applicable
	<text>	The text defines the constraint directly, for longer text table footnotes or table notes may be used

3.3.4.2 Service and parameter selections

These are described using the common conventions, see 3.3.1.2.

4 Conformance to communication profiles

Each communication profile within this International Standard includes part of the IEC 61158 series. It may also include parts of other standards or international specifications.

A statement of compliance to a Communication Profile Family (CPF) of this International Standard shall be stated³ as either

Compliance to IEC 61784-1:2013⁴ CPF n <Type>

or

Compliance to IEC 61784-1 (Ed.3.0) CPF n <Type>

³ In accordance with ISO/IEC Directives

⁴ The date should not be used when the edition number is used.

and a statement of compliance to a Communication Profile (CP) of this International Standard shall be stated as either

Compliance to IEC 61784-1:2013⁴ CP n/n <Type>

or

Compliance to IEC 61784-1 (Ed.3.0) CP n/n <Type>

where the Type within the angle brackets < > is optional and the angle brackets are not to be included.

Product Standards shall not include any Conformity Assessment aspects (including QM provisions), neither normative nor informative, other than provisions for product testing (evaluation and examination).

5 Communication Profile Family 1 (FOUNDATION™ fieldbus⁵)

5.1 General overview

Communication Profile Family 1 defines profiles based on IEC 61158-2, IEC 61158-3-1, IEC 61158-4-1 physical and data-link protocol Type 1, IEC 61158-5-9 and IEC 61158-6-9 application protocol Type 9, and IEC 61158-5-5 and IEC 61158-6-5 application protocol Type 5, and on other standards. (See Table 10.)

The FOUNDATION Fieldbus family of protocols consists primarily of two distinct protocol sets, known generically (for historical reasons) as H1 and HSE. The H1 profiles are a subset of IEC 61158 Type 1 physical and data-link and Type 9 application services and protocols, and include both wire-media and fiber-media physical layers operating at 31,25 kbit/s. The HSE profiles are based on use of the ISO/IEC 8802–3 (Ethernet-like) MAC and physical layers, and on use of standard internet network and transport layer protocols; they use the Type 5 application services and protocols.

A third profile set has been developed within the Fieldbus Foundation, but is not in current or planned use. It is included in this profile because it provides a migration path to CPF 1 from some of the CPF 5 protocols, and exclusion from this International Standard could inhibit that migration.

Table 10 – CPF 1: overview of profile sets

Layer	Profile 1/1 (H1)	Profile 1/2 (HSE)	Profile 1/3 (H2)
Application	IEC 61158-5-9, IEC 61158-6-9	IEC 61158-5-5, IEC 61158-6-5	IEC 61158-5-9, IEC 61158-6-9
Transport	—	RFC 768, RFC 793	—
Network	—	RFC 791	—
Data-link	IEC 61158-3-1, IEC 61158-4-1	ISO/IEC 8802-3, ISO/IEC 8802-2, ISO/IEC 8802-10	IEC 61158-3-1, IEC 61158-4-1
Physical	IEC 61158-2, 31,25 kbit/s, primarily Type 1	any of ISO/IEC 8802-3	Type 1 of IEC 61158-2

NOTE See A.1 for an overview of FOUNDATION Fieldbus communications concepts.

⁵ FOUNDATION™ fieldbus is the trade name of the non-profit consortium “Fieldbus Foundation”. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name Foundation Fieldbus. Use of the trade name Foundation Fieldbus requires permission of the trade name holder.

5.2 Profile 1/1 (FOUNDATION™ H1)

5.2.1 Physical layer

5.2.1.1 Communicating devices

5.2.1.1.1 Introduction

Table 11 specifies the IEC 61158-2 PhL selection for a communicating device and its MAU(s).

Table 11 – CP 1/1: PhL selection for communicating devices and their MAUs

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	—
3.3 – 3.7	—	NO	—
4	Symbols and abbreviations	—	—
4.1	Symbols	—	—
4.1.1	Type 1: Symbols	YES	—
4.1.2 – 4.1.6	—	NO	—
4.2	Abbreviations	—	—
4.2.1	Type 1: Abbreviations	YES	—
4.2.2 – 4.2.6	—	NO	—
5	Data-link layer – Physical Layer interface	—	—
5.1	General	Partial	Used when applicable
5.2	Type 1: Required services	YES	—
5.3 – 5.7	—	NO	—
6	Systems Management – Physical Layer interface	—	—
6.1	General	Partial	Used when applicable
6.2	Type 1: Systems Management - Physical Layer interface	YES	—
6.3 – 6.7	—	NO	—
7	DCE Independent Sublayer (DIS)	—	—
7.1	General	Partial	Used when applicable
7.2	Type 1: DIS	YES	—
7.3 – 7.5	—	NO	—
8	DTE – DCE interface	—	—
8.1	General	Partial	Used when applicable
8.2	Type 1: DTE – DCE interface	YES	—
8.3 – 8.4	—	NO	—
9	Medium Dependent Sublayer (MDS)	—	—
9.1	General	Partial	Used when applicable
9.2	Type 1: MDS: Wire and optical media	YES	—
9.3 – 9.8	—	NO	—
10	MDS – MAU interface	—	—
10.1	General	Partial	Used when applicable
10.2	Type 1: MDS — MAU interface: wire and optical media	YES	—
10.3 – 10.6	—	NO	—
11	Type 1 and 7: Medium Attachment Unit: voltage mode, linear-bus-topology 150 Ω twisted-pair wire medium	NO	—
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 5.2.1.1.2
13 – 15	—	NO	—
16	Type 1: Medium Attachment Unit: 31,25 kbit/s, single-fiber optical medium	YES	See 5.2.1.1.2
17 – 20	—	NO	—
21	Type 3: Medium Attachment Unit: Synchronous transmission, 31,25 kbit/s, voltage mode, wire medium	YES	See 5.2.1.1.2 (denigrated)
+Clause	—	NO	—

Clause	Header	Presence	Constraints
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	^a
A.2	External Connectors for wire medium	YES	^a
A.3	External Connectors for optical medium	Partial	^b
Annex B	Type 1: Cable specifications and trunk and spur lengths for the 31,25 kbit/s voltage-mode MAU	YES	—
Annex C	Types 1 and 7: Optical passive stars	Partial	^b
Annex D	Types 1 and 7: Star topology	Partial	^b
Annex E	Type 1: Alternate fibers	Partial	^b
+Annex	—	NO	—
^a Connector is optional for use with shielded or twisted-pair 100 Ω wire media.			
^b Single fiber specifications are optional for use with single fiber media.			

5.2.1.1.2 MAU and device classes

Each MAU is classified according to its characteristics when interfacing to its associated medium, as specified in Table 12. For devices with a single attached MAU, whether separate or integral, the MAU class is also considered to be the device class. The selection of the proper clause of IEC 61158-2, Clause 12 or Clause 16, is based on the MAU class for which the MAU, and sometimes the associated device, are designed. The selection of Clause 21 is denigrated – not recommended for new designs – because the alternative clause, Clause 12, permits devices to lower their power consumption during periods of non-transmission.

This profile also lists recommendations, which are not mandatory for implementation and/or not specified in IEC 61158-2, but are included to achieve interoperability amongst devices conforming to this profile. Specifically, 5.2.1.1.3.3 applies to each MAU, as does 5.2.1.1.3.4 for MAUs meeting IS rules.

Table 12 – CP 1/1: PhL classification of MAUs and attached devices

Attribute	Attribute value	CP 1/1 MAU class										
		111	112	113	114	115	116			511	512	411
Connected medium	100 Ω shielded or twisted wire pair	X	X	X	X	X	X			X	X	
	Single bidirectional multimode fiber											X
Device powered from medium	Completely (see Note 2, 3)	X		X		X				X		
	Partially; not completely (see Note 2, 4)		X		X		X				X	
	Not at all											X
Intrinsic Safety construction rules	Not specified by this profile											X
	None			X	X							
	Entity model (see IEC 60079-11)	X	X									
	Energy Limited (Ex nL) or Nonincendive Field Wiring (NIFW)					X	X			X	X	
	FISCO model (see IEC 60079-27)											
Relevant MAU and device clause of IEC 61158-2	Clause 16 (see Table 13)											X
	Clause 12 (see Table 14)	X	X	X	X	X	X			X	X	
	Clause 21 (denigrated)											

NOTE 1

Low power signaling, optionally specified in Clause 12, is not included in any of these MAU types.

NOTE 2

Bus powered devices require a compatible power supply.

NOTE 3

The device does not contain a power supply, intrinsic safety barrier, galvanic isolator or terminator.

NOTE 4

The MAU needs to draw at least the equivalent of its transmit power from the medium to ensure a positive current on the medium throughout the transmit waveform (therby keeping any polarity protection diodes in connected MAUs forward biased).

Table 13 – CP 1/1: PhL selection of Clause 16 for devices and their MAUs

Clause	Header	Presence	Constraints
16.1	General	YES	—
16.2	Transmitted bit rate	YES	—
16.3	Network specifications	NO	—
16.4	MAU transmit circuit specifications	YES	—
16.5	MAU receive circuit specifications	Partial	High-sensitivity only
16.6	Jabber inhibit	YES	—
16.7	Medium specifications	—	—
16.7.1	Connector	YES	ST or FC type connector
16.7.2	Standard test fiber	YES	The 1 m test fiber shall be used with a mode filter
16.7.3	Optical passive star	NO	—
16.7.4	Optical active star	NO	—

Table 14 – CP 1/1: PhL selection of Clause 12 for devices and their MAUs

Clause	Header	Presence	Constraints
12.1	General	YES	—
12.2	Transmitted bit rate	YES	—
12.3	Network specifications	NO	—
12.4	MAU transmit circuit specifications	YES	—
12.5	MAU receive circuit specifications	YES	See 5.2.1.1.3.2 for recommended receive filters
12.6	Jabber inhibit	YES	—
12.7	Power distribution	—	—
12.7.1	General	Partial	IEC 61158-2, Table 70, applies only to CP 1/1 device classes 121, 123 and 511. All else applies except IEC 61158-2, Table 71
12.7.2	Supply voltage	YES	—
12.7.3	Powered via signal conductors	YES	Applies only to CP 1/1 device classes 121, 123 and 511
12.7.4	Power supply impedance	NO	—
12.7.5	Powered separately from signal conductors	Partial	Applies only to CP 1/1 device class 122, 124 and 512, which do not require power on the bus. However, these devices shall be suitable for use on a powered bus. For example, a transformer-coupled device requires a DC-blocking capacitor in series with the transformer
12.7.6	Electrical isolation	YES	—
12.8	Medium specifications	—	—
12.8.1	Connector	YES	See 5.2.1.1.3.3 for labeling of the connector
12.8.2	Cable (standard test cable)	NO	—
12.8.3	Coupler	YES	—
12.8.4	Splices	NO	—
12.8.5	Terminator	NO	—
12.8.6	Shielding rules	NO	—
12.8.7	Grounding (earthing) rules	YES	—
12.9	Intrinsic safety	NO	See 5.2.1.1.3.4 for the IS device parameters for CP 1/1 device classes 121, 122, 511 and 512
12.10	Galvanic isolators	NO	—

Table 15 – This table has been removed**5.2.1.1.3 Recommended values for MAUs and their devices****5.2.1.1.3.1 Signal polarity**

The signal polarity for CP 1/1 MAU classes 111 to 114 shall be the signal polarity specified in IEC 61158-2, 12.4.5.

5.2.1.1.3.2 Receive filters

The receive filters for MAU classes 111 to 114, 121 to 124, 511 and 512 should be:

- a) 1 kHz 2-pole high pass, $0,6 \leq Q \leq 1,0$;
- b) 40 kHz 2-pole low pass, $0,6 \leq Q \leq 1,0$.

5.2.1.1.3.3 Labeling

The positive (“+”) and negative (“–”) terminals shall be clearly identified on all MAUs that:

- a) do not provide automatic polarity detection, and
- b) do not use the external connectors specified in IEC 61158-2, Annex A.2.

Each device incorporating an MAU shall be labeled with the MAUs CP 1/1 class. Where a device contains multiple MAUs, the labeling shall indicate the MAUs to which it (the labeling) applies.

The apparatus marking requirements of IEC 60079-11 apply to MAU classes 111 to 114, 121 to 124, 511 and 512. The apparatus marking requirements of IEC 60079-27 apply to MAU classes 511 and 512.

5.2.1.1.3.4 IS device parameters

From a communications standpoint, devices of any of the CP 1/1 classes can coexist on the same fieldbus segment. However, in IS applications, device power requirements and device and component approvals shall be taken into consideration.

NOTE Bus powered devices require a compatible power supply. See 5.2.1.2.2.

The recommended IS parameters for devices meeting Entity-model IS rules are listed in Table 16.

Table 16 – CP 1/1: PhL selection of recommended IS parameters for MAU classes 111, 112, 121, 122, 511 and 512

Parameter	Recommended values	
	Entity model	FISCO model
Applicable CP 1/1 devices classes	111, 112, 121, 122	511, 512
Device approval voltage	24 V minimum	17,5 V minimum
Device approval current	250 mA minimum	380 mA minimum
Device input power	1,2 W minimum	5,32 W minimum
Device residual capacitance	≤ 5 nF	≤ 5 nF
Device residual inductance	≤ 20 μ H	≤ 10 μ H
Leakage current	(not specified)	≤ 50 μ A
IS classification	Ex ia, IIC (gas groups A & B), T4	Ex ia, IIC (gas groups A, B, C, D), T4 Ex ib, IIC (gas groups A, B, C, D), T4
Governing requirements	See IEC 60079-11	See IEC 60079-27

The CP 1/1 class 111, 112, 511 and 512 devices shall be designed to only sink power from the bus; i.e., these devices shall not source power to the bus. Since the CP 1/1 class 112 and 512 devices includes a separate source of power, extra precautions, such as galvanic isolation, may be required to prevent power transfer to the bus.

5.2.1.2 Wire media and related network components and considerations

5.2.1.2.1 Wire media

All components shall conform to IEC 61158-2 as shown in Table 17.

NOTE All wire media require termination. See 5.2.1.2.3.

Table 17 – CP 1/1: PhL selection for media components

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 – 3.7	—	NO	—
4 – 11	—	NO	—
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	—	—
12.1	General	YES	—
12.2	Network specifications	YES	This text contains important network configuration specifications
12.3 – 12.6	—	NO	—
12.8	—	NO	—
12.8.1	Connector	YES	—
12.8.2	Cable	YES	—
12.8.3	Coupler	YES	—
12.8.4	Splices	YES	—
12.8.5	—	NO	—
12.8.6	Shielding rules	YES	—
12.8.7	Grounding rules	YES	—
12.9 – 12.10	—	NO	—
+Clause	—	NO	—
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	^b
A.2	External Connectors for wire medium	YES	^b
A.3	—	NO	—
+Annex	—	NO	—
^a The connector is optional.			
^b Networks and their components designed to meet FISCO IS rules shall also conform to Table 18.			

Table 18 – CP 1/1: PhL selection of imperative IS parameters for media in FISCO systems

Parameter	Minimum	Maximum in IIC application	Maximum in IIB application
Maximum trunk cable for IIC applications	0 km	1 km	5 km
Maximum spur cable for IIC applications	0 m	30 m	
Loop resistance	15 Ω/km	150 Ω/km	
Inductance	0,4 μH / km	1 μH / km	
Capacitance	80 nF / km	200 nF / km	
See IEC 60079-27.			

5.2.1.2.2 Power supplies

Unless specifically stated otherwise, it is assumed that a power supply does not contain a fieldbus device, terminator, Intrinsic safety barrier or galvanic isolator.

All power supplies shall conform to IEC 61158-2 as shown in Table 19.

Table 19 – CP 1/1: PhL selection for power supplies

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 – 3.7	—	NO	—
4 – 11	—	NO	—
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	—	—
12.1	General	YES	—
12.2	Network specifications	YES	This text contains important network configuration specifications
12.3 – 12.7	—	NO	—
12.7	Power distribution	—	—
12.7.1	General	YES	a, b
12.7.2	Supply voltage	YES	a
12.7.3	Powered via signal conductors	Partial	a, b
12.7.4	Power supply impedance	YES	a
12.7.5	—	NO	—
12.7.6	Electrical isolation	YES	a
12.8	Medium specifications	—	—
12.8.1	Connector	YES	c
12.8.2 – 12.8.4	—	NO	—
12.8.5	Terminator	Partial	a
12.8.6	—	NO	—
12.8.7	Grounding rules	Partial	Used when applicable
12.9 – 12.10	—	NO	—
+Clause	—	NO	—
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	c
A.2	External Connectors for wire medium	YES	c
A.3	—	NO	—
+Annex	—	NO	—

a For power supplies designed to meet FISCO rules, in case of conflict, FISCO rules take precedence.

b Power supplies with multiple outputs shall comply with the transmit and receive waveform requirements of IEC 61158-2, 12.7, with regard to the signal transfer characteristics between their output ports, and with the requirements of IEC 61158-2, 12.7.4.3.

c The connector is optional.

A fieldbus power supply is categorized as defined in Table 20.

Table 20 – CP 1/1: PhL selection of power supply types

Power supply type	Output voltage	Description
Type 131	compatible with barrier	Non-IS power supply intended for feeding an entity model IS barrier
Type 132	≤ 32 V	Non-IS power supply <u>not</u> intended for feeding an IS barrier
Type 133	≤ 24 V	Entity model, IS power supply
Type 551	$\leq 14,0 - 17,5$ V ^a	FISCO Power Supply for Zone 0, Group IIC Gas applications, [Ex ia] IIC
Type 552	$\leq 14,0 - 17,5$ V ^a	FISCO Power Supply for Zone 0, Group IIB Gas applications, [Ex ia] IIB
Type 553	$\leq 14,0 - 17,5$ V ^a	FISCO Power Supply for Zone 2, Group IIC Gas applications, [Ex ic] IIC
Type 554	$\leq 14,0 - 17,5$ V ^a	FISCO Power Supply for Zone 2, Group IIB Gas applications, [Ex ic] IIB

^a The actual maximum output voltage is a function of the maximum rated current.

Type 55, 552, 553 and 554 power supplies may

- a) be linear (resistance limited),
- b) have a trapezoidal (voltage limited) output characteristic, or
- c) have a rectangular (voltage and current limited) output characteristic.

The recommended output voltage and maximum IS parameters for a Type 551 or Type 552 power supply, which is intended to operate with devices of Types 511 or 512 or both, are listed in Table 21. A Type 551 or Type 552 power supply shall be separated from the nearest terminator, at an end of the trunk cable, by no more than 30 m of cable.

Table 21 – CP 1/1: PhL selection of permissible output voltage and IS parameters for FISCO power supplies

Parameter	Permissible values	
	Type 551 – IIC	Type 552 – IIB
Voltage	14,0 V to 17,5 V	
Maximum current		
at 14,0 V	183 mA	380 mA
at 15,0 V	133 mA	354 mA
at 16,0 V	103 mA	288 mA
at 17,0 V	81 mA	240 mA
at 17,5 V	75 mA	213 mA
Maximum output power	2,52 W	5,32 W
Maximum residual capacitance	5 nF	
Maximum residual inductance	10 μH	
See IEC 60079-27.		

5.2.1.2.3 Terminators

It is assumed that the terminator does not contain a fieldbus MAU, power supply, intrinsic safety barrier or galvanic isolator.

All terminators shall conform to IEC 61158-2 as shown in Table 22.

Table 22 – CP 1/1: PhL selection for terminators

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 – 3.7	—	NO	—
4 – 11	—	NO	—
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	—	—
12.1	General	YES	—
12.2 – 12.6	—	NO	—
12.7	Power distribution	—	—
12.7.1	General	Partial	Does not include IEC 61158-2, Table 70 or Table 71
12.7.2 – 12.7.5	—	NO	—
12.7.6	Electrical isolation	YES	—
12.8	Medium	—	—
12.8.1	Connector	YES	—
12.8.2 – 12.8.4	—	NO	—
12.8.5	Terminator	YES	—
12.8.6	—	NO	—
12.8.7	Grounding (earthing) rules	YES	—
12.9	Intrinsic safety	—	For intrinsically safe networks the network terminator will require appropriate approvals if installed in a hazardous area. See Table 23 for the IS parameters for a terminator intended for installation in a hazardous area
12.9.1	—	NO	—
12.9.2	Intrinsic safety barrier	YES	—
12.9.3	Barrier and terminator placement	YES	—
12.10	—	NO	—
+Clause	—	NO	—
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	^b
A.2	External Connectors for wire medium	YES	^b
+Annex	—	NO	—

^a For terminators designed to meet FISCO IS rules, in case of conflict, FISCO rules take precedence.

^b The connector is optional.

Table 23 – CP 1/1: PhL selection of IS parameters for terminators

Parameter	Required values	
	Entity model	FISCO model
Mounting	Zone 0 (US Div. 1)	Zone 0 (US Div. 1)
Gas group	IIC (US Groups A & B)	IIC (US Groups A & B)
Device approval voltage	≥ 24 V	$\geq 17,5$ V
Device approval current	≥ 250 mA	≥ 380 mA
Device input power	$\geq 1,2$ W	$\geq 5,32$ W
Terminator residual inductance	≤ 20 μ H	≤ 10 μ H
IS classification	Ex ia, IIC (gas groups A & B), T4	Ex ia, IIC (gas groups A, B, C, D), T4 Ex ib, IIC (gas groups A, B, C, D), T4
Governing requirements	See IEC 60079-11	See IEC 60079-27

5.2.1.2.4 Intrinsic safety barriers

NOTE FISCO rules do not permit use of intrinsic safety barriers as separate components. See IEC 60079-27.

It is assumed that the intrinsic safety barrier does not contain a fieldbus MAU, terminator or power supply.

An Intrinsic safety barrier is used to communicate with devices and other network elements installed in a hazardous area. It should be suitably approved by relevant safety authorities for use in the intended application.

All Intrinsic safety barriers shall conform to IEC 61158-2, Clause 12, as shown in Table 24.

Table 24 – CP 1/1: PhL selection of Clause 12 for intrinsic safety barriers

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 – 3.7	—	NO	—
4 – 11	—	NO	—
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	—	—
12.1	General	YES	—
12.2	Transmitted bit rate	NO	—
12.3	Network specifications	NO	—
12.4	MAU transmit circuit specifications	YES	IS barriers shall comply with the transmit waveform requirements of the referenced subclause
12.5	MAU receive circuit specifications	YES	IS barriers shall comply with the receive waveform requirements of the referenced subclause
12.6	Jabber inhibit	NO	—
12.7	Power distribution	—	—
Table 70	Network powered device characteristics	NO	—
Table 71	Network power supply requirements	NO	—
12.7.1	General	NO	—
12.7.2	Supply voltage	NO	—
12.7.3	Powered via signal conductors	NO	—
12.7.4	Power supply impedance	—	—
12.7.4.1	Power supply impedance for single output power supplies	NO	—
12.7.4.2	Power distribution through an IS barrier	YES	—
12.7.4.3	Power supply impedance for multiple output supplies with signal coupling between outputs	NO	—
12.7.5	Powered separately from signal conductors	NO	—
12.7.6	Electrical isolation	YES	For system safety the network shall be grounded only at the IS barrier
12.8	Medium specifications	—	—

Clause	Header	Presence	Constraints
12.8.1	Connector	YES	^a
12.8.2-12.8.6		NO	—
12.8.7	Grounding rules	YES	For system safety the network shall be grounded only at the IS barrier
12.9	Intrinsic safety	YES	See Table 25 for the IS parameters for intrinsic safety barriers
12.10	Galvanic isolators	NO	—
+Clause	—	NO	—
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	^a
A.2	External Connectors for wire medium	YES	^a
+Annex		NO	—

^a The connector is optional.

Table 25 – CP 1/1: PhL selection of recommended IS parameters for intrinsic safety barriers and galvanic isolators (Entity model only)

Parameter	Value
Mounting	Zone 0 (US Div. 1)
Gas group	IIC (US Groups A & B)
Open circuit output voltage (see Note)	≤ 24 V
Short circuit output current	≤ 250 mA
Matched output power	≤ 1,2 W

NOTE The maximum working voltage of the barrier will be less than this value. The power supply voltage of the system is selected to be compatible with the working voltage.

5.2.1.2.5 Galvanic isolators

NOTE FISCO rules do not permit use of galvanic isolators as separate components. See IEC 60079-27.

It is assumed that the Intrinsically safe galvanic isolator does not contain a fieldbus MAU, terminator or power supply.

An Intrinsically safe galvanic isolator is used to communicate with devices and other network elements installed in a hazardous area. It should be suitably approved by relevant safety authorities for use in the intended application.

All Intrinsically safe galvanic isolators shall conform to IEC 61158-2 as shown in Table 26.

Table 26 – CP 1/1: PhL selection of Clause 12 for intrinsically safe galvanic isolators

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 – 3.7	—	NO	—
4 – 11	—	NO	—
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	—	—
12.1	General	YES	—
12.2	Transmitted bit rate	NO	—
12.3	Network specifications	NO	—
12.4	Transmit circuit specifications	YES	Intrinsically safe galvanic isolator shall comply with the transmit waveform requirements of the referenced subclause
12.5	Receive circuit specifications	YES	Intrinsically safe galvanic isolator shall comply with the receive waveform requirements of the referenced subclause
12.6	Jabber inhibit	NO	—
12.7	Power distribution	—	—
12.7.1	General	YES	—
Table 70	Network powered device characteristics for the 31,25 kbit/s, voltage mode MAU	NO	—
Table 71	Network power supply requirements for the 31,25 kbit/s, voltage mode MAU	NO	—
12.7.2-12.7-5	—	NO	—
12.7.6	Electrical isolation	YES	Where a galvanic isolator includes one or more fieldbus power supplies these shall comply with the relevant conditions in 5.2.1.2.2
12.8	Medium specifications	—	—
12.8.1	Connector	YES	—
12.8.2-12.8.7	—	NO	—
12.9	Intrinsic safety	YES	See Table 25 for the IS parameters
12.10	Galvanic isolators	YES	—
+Clause	—	NO	—
Annex A	Type 1: Connector specification	—	—
A.1	Internal Connector for wire medium	YES	^a
A.2	External Connectors for wire medium	YES	^a
+Annex	—	NO	—

^a The connector is optional.

5.2.1.3 Fiber media and related network components and considerations

5.2.1.3.1 Optical fiber types

The alternatives for optical fiber type for a Type 411 device are listed in Table 27.

Table 27 – CP 1/1: PhL selection of Clause 15, recommended optical fiber types

Fiber use	31,25 kbit/s single fiber	NA (numerical aperture)	Attenuation ($f = 850 \text{ nm}$)	Comments
Standard test fiber	100/140 μm (A1d)	$0,26 \pm 0,03$	$\leq 4,0 \text{ dB/km}$	Mode filter required
Recommended operating fiber	100/140 μm (A1d)	$0,26 \pm 0,03$	$\leq 4,0 \text{ dB/km}$	
	200/230 μm (A3c)	$0,4 \pm 0,04$	$\leq 10,0 \text{ dB/km}$	
	50/125 μm (A1a)	$0,2 \pm 0,02$	$\leq 3,0 \text{ dB/km}$	
	62,5/125 μm (A1b)	$0,275 \pm 0,015$	$\leq 3,0 \text{ dB/km}$	
NOTE For fiber types A1d, A3c, A1a and A1b, structure (SI or GI) and bandwidth, refer to IEC 60793, optical fiber specifications. For attenuation, bandwidth and numerical aperture (NA), refer to the test methods of IEC 60793.				

5.2.1.3.2 Passive star couplers

The recommended maximum insertion losses for optical passive star couplers for the 31,25 kbit/s single-fiber optical medium are listed in Table 28. Reflective star couplers (see IEC 61158-2, Annex D) are required for the single-fiber medium.

Table 28 – CP 1/1: PhL selection of passive star couplers, recommended maximum insertion loss

	CP 1/1 class for passive star coupler	Number of branches					
		2	3	4	8	16	32
Recommended maximum insertion loss	CP 1/1 class 421 (100/140 μm (A1d))	7,0	9,0	10,5	14,5	17,5	21,5
	CP 1/1 class 422 (200/230 μm (A3c))	7,5	10,0	11,0	15,0	18,5	22,5
	CP 1/1 class 423 (50/125 μm (A1a))	7,0	9,0	10,5	14,5	18,0	22,0
	CP 1/1 class 424 (62,5/125 μm (A1b))	7,0	9,0	10,5	14,5	18,0	22,0
NOTE The insertion loss includes the loss due to two connectors.							

5.2.1.3.3 Active star couplers

The characteristics for active star couplers for the 31,25 kbit/s, single-fiber optical medium are listed in Table 29.

Table 29 – CP 1/1: PhL selection of active star couplers

Parameter	CP 1/1 class 431 (with timing regeneration)	CP 1/1 class 432 (without timing regeneration)
	Recommended value	
Peak emission wavelength	850 ± 30 nm	
Typical half Intensity wavelength	≤ 50 nm	
Effective launch power Hi level (see Note)	-13,5 ± 1,0 dBm	
Receiver operating range	-40,0 dBm to -20,0 dBm	
Maximum received bit cell jitter	± 14 % nominal bit time	
Rise and fall times of transmitted signal	≤ 2,0% nominal bit time	
Maximum temporal deformation	± 3,0 % nominal bit time	
Maximum transmitted bit cell jitter	± 2,0 % normal bit time	<not specified>
Propagation time	≤ 2,0 nominal bit times	<not specified>
Number of branches	≤32	
NOTE This is the power measured with a standard test fiber connected to a CPIC as defined in IEC 61158-2, 16.4 and 16.7.2.		

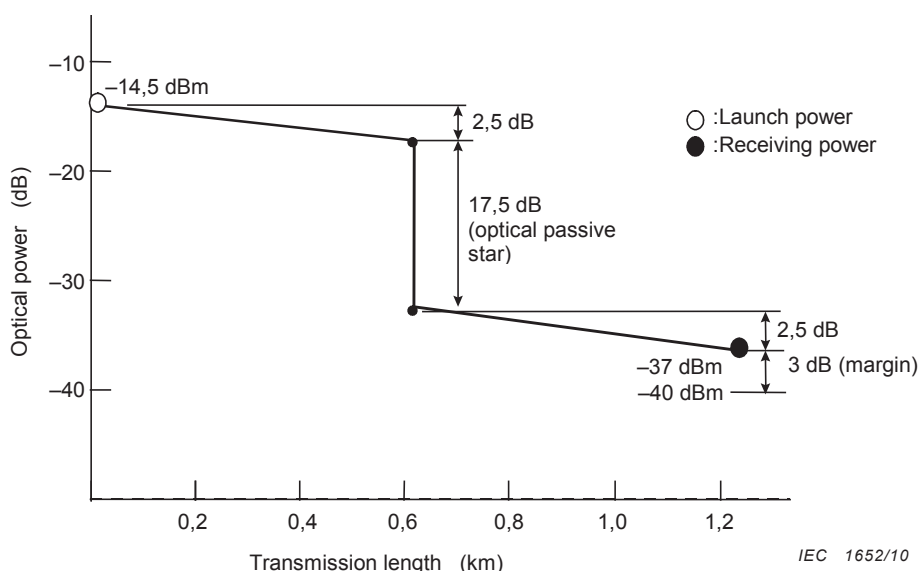
5.2.1.3.4 Optical power budget

Optical power budget considerations are shown in Table 30, and an example optical power budget for a system is shown in Figure 2.

Table 30 – CP 1/1: Optical power budget considerations

Parameter	100/140 μm fiber system	200/230 μm fiber system	62,5/125 μm fiber system	50/125 μm fiber system
Launch power	-14,5 dBm	-8,0 dBm	-18,5 dBm	-21,5 dBm
Receiver sensitivity	-40 dBm	-40 dBm	-40 dBm	-40 dBm
Dynamic range	25,5 dB	31,0 dB	21,5 dB	18,5 dB
OPSC (Optical Passive Star Coupler) attenuation: (16/16 OPSC) (8/8 OPSC) (4/4 OPSC)	17,5 dB — —	18,5 dB — —	— 14,5 dB —	— — 10,5 dB
Attenuation margin	3 dB	6,5 dB	3 dB	3 dB
Attenuation of optical fiber cable	5 dB	6 dB	4 dB	5 dB
Maximum transmission distance: (16/16 OPSC) (8/8 OPSC) (4/4 OPSC)	1,25 km — —	0,6 km — —	— 1,33 km —	— — 1,66 km

NOTE OPSC attenuation measurements include loss from two connectors.

Figure 2 – Example optical power budget for a 100/140 μm fiber system with a 16/16 optical passive star coupler

5.2.1.4 Optical / electrical signaling converters

Active star couplers can have both optical-media and wire-media ports. CP 1/1 class 433 devices are active star couplers with timing regeneration with one or more wire-media ports. Their optical ports shall meet the specifications of CP 1/1 class 431 devices, while each of their electrical ports shall meet the relevant specifications of one of the following CP 1/1 device classes: 121, 122, 123, 124, 511 or 512.

CP 1/1 class 434 devices are active star couplers without timing regeneration with one or more wire-media ports. Their optical ports shall meet the specifications of CP 1/1 class 432 devices, while each of their electrical ports shall meet the relevant specifications of one of the following CP 1/1 device classes: 121, 122, 123, 124, 511 or 512.

5.2.2 Data-link layer

5.2.2.1 DLL service selection

5.2.2.1.1 General

Table 31 specifies the DLL service selection within IEC 61158-3-1 for this profile.

Table 31 – CP 1/1: DLL service selection

Clause	Header	Presence	Constraints
1	Scope	YES	—
2	Normative references	Partial	Used as needed
3	Terms, definitions, symbols, abbreviations and conventions	YES	—
4	Overview of Data-link Services	YES	—
5	DL(SAP)-address, queue and buffer management Data-link Service	—	See Table 32
6	Connection-mode Data-link Service	—	See Table 37
7	Connectionless-mode Data-link Service	—	See Table 52
8	Time and scheduling guidance Data-link Service	—	See Table 54
9	DL-Management service definition	NO	—

Table 32 – CP 1/1: DLL service selection of Clause 5

Clause	Header	Presence	Constraints
5.1	Facilities of the DL(SAP)-address, queue and buffer management Data-link Service	YES	—
5.2	Model of the DL(SAP)-address, queue and buffer management Data-link Service	YES	—
5.3	Sequence of primitives at one DL(SAP)	YES	—
5.4	DL(SAP)-address, queue and buffer management Services	—	See Table 33

Table 33 – CP 1/1: DLL service selection of 5.4

Clause	Header	Presence	Constraints
5.4.0	—	YES	—
5.4.1	Create	Partial	Only the attributes of the objects created by this service are included. See Table 34
5.4.2	Delete	NO	—
5.4.3	Bind	Partial	Only the attributes of the objects bound by this service are included. See Table 35
5.4.4	Unbind	NO	—
5.4.5	Put	YES	—
5.4.6	Get	—	See Table 36

Table 34 – CP 1/1: DLL service selection of 5.4.1

Clause	Header	Presence	Constraints
5.4.1.1	Function	NO	—
5.4.1.2	Types of parameters	—	—
5.4.1.2.0	—	Partial	IEC 61158-3-1, Table 2, is not included in this profile
5.4.1.2.1	Buffer-or-queue DLS-user-identifier	NO	—
5.4.1.2.2	Queuing policy	Partial	Only BUFFER-R and QUEUE are included
5.4.1.2.2.1	Maximum queue depth	YES	—
5.4.1.2.3	Maximum DLSDU size	YES	—
5.4.1.2.4	Status	NO	—
5.4.1.2.5	Buffer-or-queue DL-identifier	YES	—
5.4.1.3	Sequence of primitives	NO	—

Table 35 – CP 1/1: DLL service selection of 5.4.3

Clause	Header	Presence	Constraints
5.4.3.1	Function	NO	—
5.4.3.2	Types of parameters	—	—
5.4.3.2.0	—	YES	—
5.4.3.2.1	DL(SAP)-address DLS-user-identifier	NO	—
5.4.3.2.2	DL(SAP)-address	YES	—
5.4.3.2.3	DL(SAP)-role	Partial	Values of DL(SAP)-role are basic and group, other values are not included in this profile. IEC 61158-3-1, Table 4, is not included in this profile
5.4.3.2.3.1	Indicate-null-Unitdata-Exchange-transactions	NO	—
5.4.3.2.3.2	Remote-DLSAP-address	NO	—
5.4.3.2.4	Receiving buffer-or-queue bindings	YES	—
5.4.3.2.5	Sending buffer-or-queue bindings	YES	—
5.4.3.2.6	Default QoS as sender	—	—
5.4.3.2.6.0	—	Partial	Only the first paragraph immediately under IEC 61158-3-1, 5.4.3.2.6, is included
5.4.3.2.6.1	DLL priority	YES	—
5.4.3.2.6.2	DLL maximum confirm delay	Partial	All maximum confirm delays, except remotely-confirmed DL-UNITDATA, are included
5.4.3.2.6.3	DLPDU authentication	YES	—
5.4.3.2.6.4	DL-scheduling-policy	Partial	Only the value IMPLICIT is included
5.4.3.2.7	Status	NO	—
5.4.3.2.8	DL(SAP)-address DL-identifier	YES	—
5.4.3.3	Sequence of primitives	NO	—

Table 36 – CP 1/1: DLL service selection of 5.4.6

Clause	Header	Presence	Constraints
5.4.6.1	Function	YES	—
5.4.6.2	Types of parameters	—	—
5.4.6.2.0	—	Partial	IEC 61158-3-1, Table 8, except for 'DLS-user-data-timeliness' is included in this profile
5.4.6.2.1	Buffer-or-queue DL-identifier	YES	—
5.4.6.2.2	Status	YES	—
5.4.6.2.3	Reported-service-identification-class	YES	—
5.4.6.2.4	Reported-service-identification	YES	—
5.4.6.2.5	DLS-user-data	YES	—
5.4.6.2.6	DLS-user-data-timeliness	Partial	—
5.4.6.2.6.0	—	YES	—
5.4.6.2.6.1	Local-DLE-timeliness	YES	—
5.4.6.2.6.2	Sender-and remote-DLE-timeliness	YES	—
5.4.6.2.6.3	Time-of-production	NO	—
5.4.6.2.7	Sequence number identification	NO	—
5.4.6.3	Sequence of primitives	YES	—

Table 37 – CP 1/1: DLL service selection of Clause 6

Clause	Header	Presence	Constraints
6.1	Facilities of the connection-mode Data-link Service	YES	—
6.2	Model of the connection-mode Data-link Service	YES	—
6.3	Quality of connection-mode service	—	—
6.3.0	—	YES	—
6.3.1	Determination of QoS for connection-mode service	YES	—
6.3.2	Definition of QoS parameters	—	—
6.3.2.1	DLCEP class	Partial	All three classes are included, but data transfer from Subscriber to Publisher is not included
6.3.2.2	DLCEP data delivery features	Partial	See Table 38 for included parameter values
6.3.2.3	DLL priority	YES	—
6.3.2.4	DLL maximum confirm delay	YES	—
6.3.2.5	DLPDU authentication	Partial	See Table 38 for included parameter values
6.3.2.6	Residual activity	Partial	See Table 38 for included parameter values
6.3.2.7	DL-scheduling-policy	Partial	See Table 38 for included parameter values
6.3.2.8	Maximum DLSDU sizes	Partial	Single segment DLSDU size is the maximum size of a DLSDU that can be conveyed in one DLPDU of the specified priority. In other words, the DLL is not required to support segmentation of the DLSDU
6.3.2.9	DLCEP buffer-or-queue bindings	Partial	See Table 38 for included parameter values
6.3.2.10	DLCEP timeliness	Partial	All are included except IEC 61158-3-1, 6.3.2.10.1.4
6.4	Sequence of primitives	—	—
6.4.1	Concepts used to define the connection-mode DLL service	YES	—
6.4.2	Constraints on sequence of primitives	Partial	All of the referenced subclause, except DL-Reset and DL-Subscriber-Query services is included in this profile
6.4.2.1	Relation of primitives at the two DLC end-points	—	See Table 39
6.4.2.2	Sequence of primitives at one DLC end-point	Partial	IEC 61158-3-1, Figure 15, States 6 through 8 are not included in this profile because this profile does not include the DLC Reset service primitives
6.5	Connection establishment phase	—	See Table 40
6.6	Connection release phase	—	See Table 40
6.7	Data transfer phase	—	See Table 48

Table 38 – CP 1/1: DLL service selection of the summary of 6.3, DL-connection QoS

DLCEP Data Delivery feature	DLCEP Class	Buffer, Queue binding	Data Direction	DLPDU authentication	Max DLSDU size	DL-Scheduling	Residual Activity
CLASSICAL	PEER	QUEUE	Both directions	All three	Single segment DLSDU size	IMPLICIT	TRUE FALSE
DISORDERED	PEER	QUEUE	Both directions	All three	Single segment DLSDU size	IMPLICIT	TRUE FALSE
ORDERED	PUBLISHER SUBSCRIBER	BUFFER-R	Publisher to Subscriber only	SOURCE, ORDINARY	Single segment DLSDU size	EXPLICIT	FALSE
UNORDERED	PUBLISHER SUBSCRIBER	BUFFER-R	Publisher to Subscriber only	SOURCE, ORDINARY	Single segment DLSDU size	EXPLICIT	FALSE

Table 39 – CP 1/1: DLL service selection of figures 9–14 of 6.4

Figure	Sub-part of figure	Presence	Reason
9	a), c), d), e), f), g1), g2), g3)	YES	—
	b)	NO	Profile does not merge connections
10	h), i), n)	YES	—
	j), k), l), m), o), p)	NO	Corresponding services are not included
11	c), d), e), f), g1)	YES	—
	a), b), g2), g3)	NO	DLCEP-address is assigned by the DLS-user
12	h)	NO	DLCEP-address is assigned by the DLS-user
	i), o)	YES	—
	j), k), l), m), n), p)	NO	Corresponding services are not included
13	a), b), c2), c3)	NO	DLCEP-address is assigned by the DLS-user
	c1), d), e), f)	YES	—
	g)	NO	Corresponding services are not included
14	h), i), j), k)	NO	Corresponding services are not included

Table 40 – CP 1/1: DLL service selection of 6.5

Clause	Header	Presence	Constraints
6.5.1	Function	Partial	Simultaneous DL-CONNECT request primitives at the two DLSAPs cannot be merged into one DLC by the concurrently requesting-and-responding DLS-users in this profile
6.5.2	Types of primitives and parameters	Partial	Replace IEC 61158-3-1, Table 13 and Table 14, by IEC 61784-1, Table 41 and Table 42, respectively
6.5.2.1	Local-view identifiers	—	—
6.5.2.1.1	DLCEP DLS-user-identifier	NO	The DL-CONNECTION-ESTABLISHED indication primitive uses the DLCEP DL-identifier parameter
6.5.2.1.2	DLCEP DL-identifier	YES	—
6.5.2.2	Addresses	Partial	This profile includes a profile of all possible forms of addresses. The use of addresses for this profile is specified in Table 43 through Table 45
6.5.2.3	Quality of Service parameter set	Partial	All parameters except Time-of-production are included in this profile. For this profile, the value of Residual activity is the same for both directions: from sender and from receiver. The DLPDU-authentication parameter is not included in indication and confirm primitives of this profile
6.5.2.4	DLS-user-data	Partial	If the called address is a DLCEP-address, then the DLS-provider does not issue a DL-Connect indication at the called address. Therefore, in that case, DLS-user-data is not permitted in the request primitive. This parameter is permitted in all other primitives
6.5.3	Sequence of primitives	Partial	IEC 61158-3-1, Figures 18, 21 and 22, are included in this profile. IEC 61158-3-1, Figures 19, 20 and 24, are not included in this profile, because the DLCEP-address is assigned by the DLS-user, there is no DL-Connect indication to the DLS-user. IEC 61158-3-1, Figures 23 and 24, are not included in this profile, because the connections are not merged

Table 41 – CP 1/1: DLL service selection: replacement for Table 13 of 6.5

DL-Connect	Request		Indication	Response	Confirm
Parameter name	input	output	output	input	output
DLCEP DL-identifier		M	M	M (=)	M ^a
Called address	M		M (=)		
Calling address	M		M (=)		
Responding address				M	M (=)
Calling DLCEP-address	U			U	
QoS parameter set					
DLCEP class	U		M (=)	U ^b	M (=)
DLCEP data delivery features					
from requester to responder(s)	U		M (=, °)	U (=, °)	M (=)
from responder(s) to requester	U		M (=, °)	U (=, °)	M (=)
DLL priority	U		M (=)	U (□)	M (=)
Maximum confirm delay					
on DL-Connect	U		M (=)	U	M (=)
on DL-Data	U		M (=)	U	M (=)
DLPDU-authentication	U			U (^d)	
Residual activity ^e	U			U (^f)	
DL-scheduling-policy	U			U	
Maximum DLSDU sizes					
from requester	U		M (≤)	U (≤)	M (=)
from responder	U		M (≤)	U (≤)	M (=)
Buffer-and-queue bindings					
as sender	U			U	
as receiver	U			U	
Sender timeliness					
DL-timeliness-class	CU		M (=)	CU	M (=)
Time window size (ΔT)	CU			CU	
Synchronizing DLCEP	CU			CU	
Receiver timeliness					
DL-timeliness-class	CU		M (=)	CU	M (=)
Time window size (ΔT)	CU			CU	
Synchronizing DLCEP	CU			CU	
DLS-user-data	U		M (=)	U	M (=)
NOTE The Time-of-production parameter is not specified, because it is not used.					
^a The DLCEP DL-identifier on the confirm primitive shall equal the DL-identifier specified in the corresponding DL-CONNECT request primitive.					
^b The DLCEP classes shall match, Peer with Peer, and Publisher with Subscriber.					
^c The DLCEP data delivery feature UNORDERED may be upgraded to ORDERED, and DISORDERED may be upgraded to CLASSICAL.					
^d DLCEP establishment shall negotiate DLPDU-authentication from ORDINARY to SOURCE to MAXIMAL.					
^e For this profile, the value of Residual activity is the same for both directions: from sender and from receiver.					
^f DLCEP establishment shall negotiate Residual-activity from FALSE to TRUE.					

Table 42 – CP 1/1: DLL service selection of 6.5, replacement for Table 14

DL-Connection-Established	Indication
Parameter name	output
DLCEP DL –identifier	M (^a)
^a The DLCEP DL-identifier shall equal the DL-identifier returned in the corresponding DL-CONNECT response primitive.	

Table 43 – CP 1/1: DLL service selection of 6.5 for use of addresses for peer DLC

DL-Connect	Request	Indication	Response	Confirm
Called address	Remote DLSAP-address	M (=)	—	—
Calling address	Local DLSAP-address	M (=)	—	—
Responding address	—	—	Local DLSAP-address	M (=)
Calling DLCEP-address	DLCEP-address assigned by DLS-user	—	DLCEP-address assigned by DLS-user	—
NOTE — means that the parameter is not allowed.				

Table 44 – CP 1/1: DLL service selection of 6.5 for use of addresses for multipeer DLC connect request at publisher

DL-Connect	Request	Confirm
Called address	UNKNOWN	—
Calling address	Local DLSAP-address	—
Responding address	—	UNKNOWN
Calling DLCEP-address	Publisher DLCEP-address	—
NOTE 1 — means that the parameter is not allowed.		
NOTE 2 No DLS-user data is allowed in the request primitive, because there is no indication at the subscriber.		

Table 45 – CP 1/1: DLL service selection of 6.5 for use of addresses for multipeer DLC connect request at subscriber

DL-Connect	Request	Confirm
Called address	Publisher DLCEP-address	—
Calling address	Local DLSAP-address	—
Responding address	—	Publisher DLSAP-address
Calling DLCEP-address	not used	—
NOTE — means that the parameter is not allowed		

Table 46 – CP 1/1: DLL service selection of 6.6

Clause	Header	Presence	Constraints
6.6.1	Function	YES	—
6.6.2	Types of primitives and parameters	Partial	Replace IEC 61158-3-1, Table 15, by IEC 61784-1, Table 47
6.6.2.0	—	YES	—
6.6.2.1	DLCEP-identifier-type	NO	—
6.6.2.2	DLCEP DLS-user-identifier	NO	—
6.6.2.3	DLCEP DL-identifier	YES	—
6.6.2.4	Originator	YES	—
6.6.2.5	Reason	YES	When the originator parameter indicates a DLS-user-initiated release, then the DLS-user can assign not only the values listed in IEC 61158-3-1, 6.6.2.5, but also other values to the reason parameter. These other values are considered as "reason unspecified" by IEC , 6.6.2.5. The DLS-provider shall deliver the DLS-user provided reason in the indication primitive. The DLS-user of this profile has reserved 16 values for such "reason unspecified"
6.6.2.6	DLS-user-data	YES	—
6.6.3	Sequence of primitives when releasing an established DLC/DLCEP	YES	—
6.6.4	Sequence of primitives in a DLS-user rejection of a DLC / DLCEP establishment attempt	Partial	IEC 61158-3-1, Figures 35 and 38 to 41, are included in this profile. IEC 61158-3-1, Figures 36, 37, 42 and 43, are not included in this profile, because the DLCEP-address is assigned by DLS-user, and there is no DL-CONNECT indication to the DLS-user

Table 47 – CP 1/1: DLL service selection: replacement for Table 15 of 6.6

DL-Disconnect	Request	Indication
Parameter name	input	output
DLCEP DL-identifier	M	M
Originator		M
Reason	U	M (=)
DLS-user-data	U	M (=)

Table 48 – CP 1/1: DLL service selection of 6.7

Clause	Header	Presence	Constraints
6.7.1	Queue data transfer	—	—
6.7.1.1	Function	YES	—
6.7.1.2	Types of primitives and parameters	Partial	Replace IEC 61158-3-1, Table 16 by IEC 61784-1, Table 49
6.7.1.2.0	—	YES	—
6.7.1.2.1	DLCEP DL-identifier	YES	DLCEP DL-identifiers in request and indication primitives are local to the DLE at which the primitive is issued
6.7.1.2.2	DLCEP DLS-user-identifier	NO	—
6.7.1.2.3	Queue DLS-user-identifier	NO	A separate Queue DLS-user-identifier is not included, because the DLCEP address is sufficient to identify the queue, if any queue is bound to the DLCEP
6.7.1.2.4	DLS-user-data	YES	—
6.7.1.2.5	Sequence-number-identification	NO	—
6.7.1.2.6	Status	YES	—
6.7.1.3	Sequence of primitives	Partial	IEC 61158-3-1, Figures 45 and 46, are not included in this profile, because DLCEP data delivery or QoS are not included
6.7.2	Buffer data transfer	—	—
6.7.2.1	Function	YES	—
6.7.2.2	Types of primitives and parameters	Partial	Replace IEC 61158-3-1, Table 17 and Table 18, by IEC 61784-1, Table 50 and Table 51, respectively.
6.7.2.2.0	—	YES	—
6.7.2.2.1	DLCEP DLS-user-identifier	NO	A DLCEP DL-identifier is used in its stead
6.7.2.2.2	Buffer DLS-user-identifier	NO	—
6.7.2.2.3	DLSDU sequencing inference	YES	—
6.7.2.3	Sequence of primitives	Partial	IEC 61158-3-1, Figures 48, 50 and 51, are not included in this profile, because DLCEP data delivery or QoS are not included
6.7.3	Reset	NO	—
6.7.4	Subscriber query	NO	—

Table 49 – CP 1/1: DLL service selection of 6.7, replacement for Table 16

DL-Data	Request	Indication	Confirm
Parameter name	input	output	output
Request DLS-user-identifier	M		M (=)
DLCEP DL-identifier	M	M	
DLS-user-data	M	C (=)	
Status			M

Table 50 – CP 1/1: DLL service selection of 6.7, replacement for Table 17

DL-Buffer-Sent	Indication
Parameter name	output
DLCEP DL-identifier	M