IEC 62453-303-2

Edition 1.0   2009-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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**FIeld device tool (FDT) interface specification –
Part 303-2: Communication profile integration – IEC 61784 CP 3/4, CP 3/5
and CP 3/6**

**Spécification des interfaces des outils des dispositifs de terrain (FDT) –
Partie 303-2: Intégration des profils de communication – CP 3/4, CP 3/5 et
CP 3/6 de la CEI 61784**

IEC 62453-303-2:2009

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FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

**Part 303-2: Communication profile integration –
IEC 61784 CP 3/4, CP 3/5 and CP 3/6**

FOREWORD

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International Standard IEC 62453-303-2 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This part, in conjunction with the other parts of the first edition of the IEC 62453 series cancels and replaces IEC/PAS 62453-1, IEC/PAS 62453-2, IEC/PAS 62453-3, IEC/PAS 62453-4 and IEC/PAS 62453-5 published in 2006, and constitutes a technical revision.

Each part of the IEC 62453-3xy series is intended to be read in conjunction with IEC 62453-2.

This bilingual version (2013-07) corresponds to the monolingual English version, published in 2009-06.

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

FDIS	Report on voting
65E/128/FDIS	65E/141/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.

The French version of this standard has not been voted upon.

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

A list of all parts of the IEC 62453 series, under the general title *Field Device Tool (FDT) interface specification,* can be found on the IEC website.

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

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*   withdrawn,
*   replaced by a revised edition, or
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INTRODUCTION

This part of IEC 62453 is an interface specification for developers of FDT (Field Device Tool) components for function control and data access within a client/server architecture. The specification is a result of an analysis and design process to develop standard interfaces to facilitate the development of servers and clients by multiple vendors that need to interoperate seamlessly.

With the integration of fieldbusses into control systems, there are a few other tasks which need to be performed. In addition to fieldbus- and device-specific tools, there is a need to integrate these tools into higher-level system-wide planning- or engineering tools. In particular, for use in extensive and heterogeneous control systems, typically in the area of the process industry, the unambiguous definition of engineering interfaces that are easy to use for all those involved is of great importance.

A device-specific software component, called DTM (Device Type Manager), is supplied by the field device manufacturer with its device. The DTM is integrated into engineering tools via the FDT interfaces defined in this specification. The approach to integration is in general open for all kinds of fieldbusses and thus meets the requirements for integrating different kinds of devices into heterogeneous control systems.

Figure 1 shows how IEC 62453-303-2 is aligned in the structure of the IEC 62453 series.
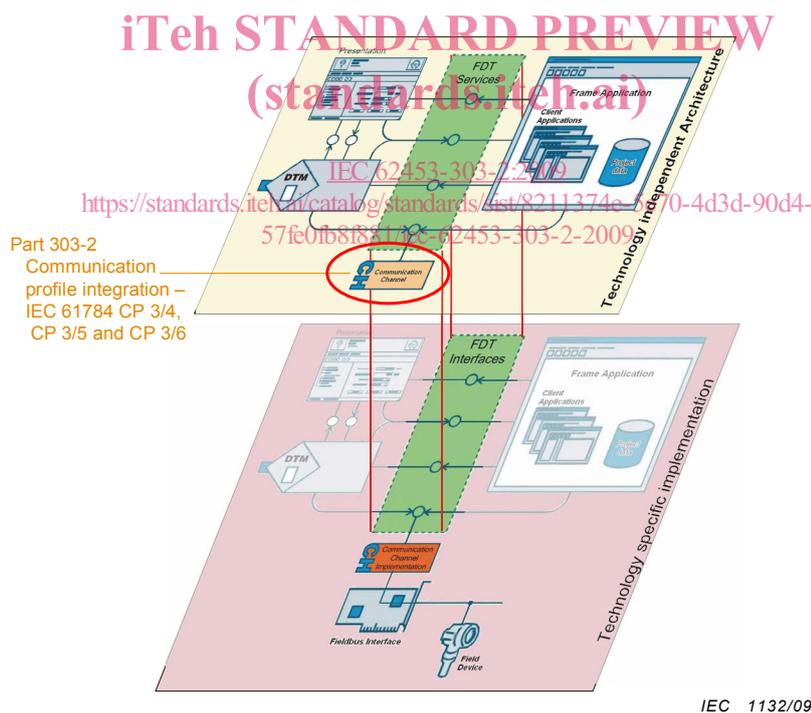

Part 303-2
Communication
profile integration –
IEC 61784 CP 3/4,
CP 3/5 and CP 3/6

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Figure 1 – Part 303-2 of the IEC 62453 series

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

**Part 303-2: Communication profile integration –
IEC 61784 CP 3/4, CP 3/5 and CP 3/6**

1   Scope

Communication Profile 3/4, Communication Profile 3/5 and Communication Profile 3/6 (commonly known as PROFINET®[1] IO) define communication profiles based on IEC 61158-5-10 and IEC 61158-6-10. The basic profiles CP 3/4, CP 3/5, and CP 3/6 are defined in IEC 61784-2.

This part of IEC 62453 provides information for integrating the PROFINET® technology into the FDT interface (IEC 62453-2).

This part of the IEC 62453 specifies communication and other services.

This specification neither contains the FDT specification nor modifies it.

2   Normative references

The following referenced documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

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

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

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

IEC 62453-1:2009, *Field Device Tool (FDT) interface specification – Part 1: Overview and guidance*

IEC 62453-2:2009, *Field Device Tool (FDT) interface specification – Part 2: Concepts and detailed description*

3   Terms, definitions, symbols, abbreviated terms and conventions

3.1   Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62453-1 and IEC 62453-2 apply.

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[1] PROFINET ® is the trademark of PROFIBUS Nutzerorganisation e.V. (PNO). PNO is a non-profit trade organization to support the fieldbus PROFIBUS. 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 registered trademark. Use of the trademark PROFIBUS and PROFINET requires permission of the trade name holder.

3.2   Abbreviated terms

For the purposes of this document, the abbreviations given in IEC 62453-1 and IEC 62453-2 and the following apply.

AR	Application Relation
DCP	Discovery and basic Configuration Protocol
GSDML	Generic Station Description Markup Language
IOCS	IO Consumer Status
IOPS	IO Provider Status
UML	Unified Modeling Language

3.3   Conventions

3.3.1   Data type names and references to data types

The conventions for naming and referencing of data types are explained in IEC 62453-2, Clause A.1

3.3.2   Vocabulary for requirements

The following expressions are used when specifying requirements.

Usage of "shall" or "mandatory"	No exceptions allowed.
Usage of "should" or "recommended"	Strong recommendation. It may make sense in special exceptional cases to differ from the described behaviour.
Usage of "can' or "optional'	Function or behaviour may be provided, depending on defined conditions.

3.3.3   Use of UML

Figures in this document are using UML notation as defined in Annex A of IEC 62453-1.

4   Bus category

IEC 61784 CP 3/4, CP 3/5 and CP 3/6 protocols are identified in the protocolId element of the structured data type 'fdt:BusCategory' by the following unique identifier as defined in Table 1:

Table 1 – Protocol identifier

Identifier value	ProtocolId name	Description
DFC98364-DAB8-493B-BB92-23B3F92FEBCD	'Profinet IO'	Support of IEC 61784 CP 3/4, CP 3/5 and CP 3/6 protocols

IEC 61784 CP 3/4, CP 3/5 and CP 3/6 use the following unique identifier for its physical layers.

Table 2 – Physical layer identifier

PhysicalLayer element	Description
99C36176-E59A-11DA-9023-0002B3ECDCBE	10BASET
99C36177-E59A-11DA-9023-0002B3ECDCBE	10BASETXHD
99C36178-E59A-11DA-9023-0002B3ECDCBE	10BASETXFD
99C36179-E59A-11DA-9023-0002B3ECDCBE	100BASETXHD
99C3617A-E59A-11DA-9023-0002B3ECDCBE	100BASETXFD

PhysicalLayer element	Description
99C3617B-E59A-11DA-9023-0002B3ECDCBE	10BASEFXHD
99C3617C-E59A-11DA-9023-0002B3ECDCBE	10BASEFXFD
99C3617D-E59A-11DA-9023-0002B3ECDCBE	1000BASEXHD
99C3617E-E59A-11DA-9023-0002B3ECDCBE	1000BASEXFD
99C3617F-E59A-11DA-9023-0002B3ECDCBE	1000BASELXHD
99C36180-E59A-11DA-9023-0002B3ECDCBE	1000BASELXFD
99C36181-E59A-11DA-9023-0002B3ECDCBE	1000BASESXHD
99C36182-E59A-11DA-9023-0002B3ECDCBE	1000BASESXFD
99C36183-E59A-11DA-9023-0002B3ECDCBE	1000BASETHD
99C36184-E59A-11DA-9023-0002B3ECDCBE	1000BASETFD
99C36185-E59A-11DA-9023-0002B3ECDCBE	10GigBASEFX

5 Access instance and device data

5.1 Process Channel objects provided by DTM

The minimum set of provided data should be:

- process values modeled as channel objects including the ranges and scaling.

5.2 DTM services to access instance and device data

The services InstanceItemList and DeviceItemList shall provide access to at least all mandatory parameters of CP 3/4, CP 3/5 and CP 3/6 devices.

6 Protocol specific behavior

Not applicable.

7 Protocol specific usage of general data types

The following table (Table 3) shows how general data types, defined in IEC 62453-2 within the namespace 'fdt', are used with CP 3/4, CP 3/5 and CP 3/6 devices.

Table 3 – Protocol specific usage of general data types

Attribute	Description for use in IEC 61784 CP 3/4, CP 3/5 and CP 3/6
fdt:address	For CP 3/4, CP 3/5 and CP 3/6 the address attribute is mandatory for the exposed parameters in the DTMs. The address string shall be constructed according to the rules of the FDT semanticId. That means the attribute 'semanticId' is always the same as the attribute 'address'
fdt:protocolId	See Clause 4
fdt:physicalLayer	See Clause 4
fdt:deviceTypeId	The attribute "fdt:DtmDeviceType/@deviceTypeId" must contain the DeviceID according to the CP 3/4, CP 3/5 and CP 3/6 specification. The DeviceID shall be entered in decimal format, however, the value should be displayed as hex to the user. GSDML XPath Expression: "/ISO15745Profile/ProfileBody/DeviceIdentity/@DeviceID"
fdt:subDeviceType	Enter manufacturer specific value here

Attribute	Description for use in IEC 61784 CP 3/4, CP 3/5 and CP 3/6
fdt:vendor	The attribute fdt:DtmDeviceType/VersionInformation/@vendor shall contain the VendorName according to CP 3/4, CP 3/5 and CP 3/6 specification. GSDML XPath Expression: "/ISO15745Profile/ProfileBody/DeviceIdentity/@VendorName"
fdt:manufacturerId	The attribute fdt:DtmDeviceType/VersionInformation/@vendor shall contain the VendorName according to the CP 3/4, CP 3/5 and CP 3/6 specification. GSDML XPath Expression: "/ISO15745Profile/ProfileBody/DeviceIdentity/@VendorName"
fdt:deviceTypeInformation	Path to the GSDML file. The attribute contains the full path including the file name. For IEC 61784 CP 3/4, CP 3/5 and CP 3/6 devices, it is mandatory to provide this attribute. Only a parent developed according to IEC 61784 CP 3/4, CP 3/5 and CP 3/6 Annex can handle GSDML information. Thus, it is not necessary to fill this attribute with the GSDML itself, if the parent is FDT 1.2 conformant. The deviceTypeInformation attribute is of type string and shall be used with format shown in the example: Example: file://c:/myDtm/myGsdFile.xml
fdt:deviceTypeInformationPath	Shall not be used. The GSDML path information is already mandatory in the deviceTypeInformation attribute
fdt:semanticId fdt:applicationDomain	The SemanticIDs follow the different device models that are defined for IEC 61784 CP 3/4, CP 3/5 and CP 3/6 devices. FDT currently supports following models: • Profinet IO • PROFIdrive **PROFINET IO** The applicationDomain is: FDT_PROFINET_IO The semanticId follows the access information of a communication request: The semanticId is: Api.Slot.Subslot.Index.ByteOffset.BitOffset.BitLength Api – Api number Slot – Slot number Subslot – Subslot number Index – Index number ByteOffset – Start byte within the Index BitOffset – Start bit within the Index (range 0-7) BitLength –Length of values in bit These values are numbers based on decimal format without leading '0'. **PROFIdrive** The applicationDomain is: FDT_PROFINET_PROFIDRIVE According to the PROFIdrive profile, a device (drive unit) may be composed by a number (1-many) of drive objects (DOs). The DOs may have different types. Each DO is uniquely identifiable and manages its own parameters. Each parameter can be uniquely identified by its number (PNU). Each DO has its own number space. A parameter may contain simple data or composed data (e.g. arrays). The data of the device are accessible via a parameter channel (normally Api 0x3A00, Subslot 1, Index 0xB02E and a slot number which is the DO number). The semanticId is: DOdo-id.PNUpnu do-id Drive Object ID pnu ParameterNumber

Attribute	Description for use in IEC 61784 CP 3/4, CP 3/5 and CP 3/6
	do-id, pnu are based on decimal format without leading '0'

8 Protocol specific common data types

Not applicable.

9 Network management data types

9.1 General

The data types specified in this subclause are used in the following services:

- NetworkManagementInfoRead service;
- NetworkManagementInfoWrite service.

9.2 Parameter access data types

The data types describe the parameter information of an IEC 61784 CP 3/4, CP 3/5 and CP 3/6 device (see Table 4 and Table 5)

Table 4 – Simple parameter access data types

Data type	Definition	Description
arType	UINT	ARType according to the PROFINET specification Shall only be set by Parent
arProperties	UDINT	ARProperties according to the PROFINET specification Shall only be set by Parent
arUUID	UUID	ARUUID according to the PROFINET specification Shall only be set by Parent
alarmCRType	UINT	AlarmCRType according to the PROFINET specification Shall only be set by Parent
alarmCRProperties	UDINT	AlarmCRProperties according to the PROFINET specification Shall only be set by Parent
rtaTimeoutFactor	UINT	RTATimeoutFactor according to the PROFINET specification Shall only be set by Parent
rtaRetries	UINT	RTARetries according to the PROFINET specification Shall only be set by Parent
localAlarmReference	UINT	LocalAlarmReference according to the PROFINET specification Shall only be set by Parent
maxAlarmDataLength	UINT	MaxAlarmDataLength according to the PROFINET specification Shall only be set by Parent
infoText	STRING	Additional textual information Shall only be set by DTM
localIndex	UINT	The attribute used within Device/Identification to address the device instance. Shall only be set by DTM

Data type	Definition	Description
nameOfStation	STRING	The station name is the primary address. The default value is the DNS_CompatibleName of the GSDML. The Parent shall configure the station name according to the rules defined by the DNS_CompatibleName. Shall only be set by Parent apart of the default value, which shall be set by DTM (during InitNew)
dynIpAddress	BOOL	The attribute indicates whether the IP address is dynamically assigned to the device. Shall only be set by Parent
extAddrSupported	BOOL	Extended address assignment (e.g. by DHCP, BootP) is supported by the Profinet IO Device. Shall only be set by DTM
ipAddress	STRING	The attribute contains the IP address that is assigned to the device. The IP address is a secondary address. The default value is "0.0.0.0". Shall only be set by Parent
ipSubnetMask	STRING	The attribute contains the subnet mask. The default value is "255.255.255.255". Shall only be set by Parent
ipDefaultGateway	STRING	The attribute contains the default gateway address. The default value is an empty string. Shall only be set by Parent
macAddress	STRING	The attribute contains the MAC address of the device. The MAC address is a secondary address. The macAddress attribute is of type string and shall be used with format shown in the example: Example: 00:A0:45:01:02:03 Shall only be set by Parent
slotNumber	UINT	The slot address that is used by the module Shall be set by DTM during configuration. Can be set by Parent during topology scan
moduleIdentNumber	UDINT	The ModuleIdentNumber according to the PROFINET specification Shall be set by DTM during configuration. Can be set by Parent during topology scan
moduleProperties	UINT	This attribute is reserved for future use according to the PROFINET specification
subSlotNumber	UINT	The subslot address that is used by the submodule. Shall be set by DTM during configuration. Can be set by Parent during topology scan
subModuleIdentNumber	UDINT	The SubmoduleIdentNumber according to the PROFINET specification. Shall be set by DTM during configuration. Can be set by Parent during topology scan
ioType	enumeration (Input | Output | InputAndOutput)	Allowed values are: Input, Output, InputAndOutput. Values and meaning according to the PROFINET specification - SubmoduleProperties.Type. Shall be set by DTM during configuration. Can be set by Parent during topology scan
sharedInput	enumeration (IOController | IOControllerShare)	Allowed values are: IOController, IOControllerShare. Values and meaning according to the PROFINET specification - SubmoduleProperties.SharedInput. Shall be set by DTM during configuration. Can be set by Parent during topology scan

Data type	Definition	Description
reduceInputSubmodule DataLength	enumeration (Expected | Zero)	Allowed values are: Expected, Zero. Values and meaning according to the PROFINET specification - SubmoduleProperties.ReduceInputSubmoduleDataLength. Shall be set by DTM during configuration. Can be set by Parent during topology scan
reduceOutputSubmodule DataLength	enumeration (Expected | Zero)	Allowed values are: Expected, Zero. Values and meaning according PROFINET specification - SubmoduleProperties.ReduceOutputSubmoduleDataLength. Shall be set by DTM during configuration. Can be set by Parent during topology scan
discardIOXS	enumeration (Expected | Zero)	Allowed values are: Expected, Zero. Values and meaning according PROFINET specification - SubmoduleProperties.DiscardIOXS. Shall be set by DTM during configuration. Can be set by Parent during topology scan
api	UDINT	The API according to the PROFINET specification. Shall be set by DTM during configuration. Can be set by Parent during topology scan
index	UINT	The address of the desired record data object. Shall only be set by DTM
recordData	ARRAY OF USINT	The binary data that will be written to the submodule during startup or connect. The record data implicitly contain the record data length. Shall only be set by DTM
consistency	enumeration (itemConsistency | allItemsConsistency)	The consistency of the input data. Shall only be set by DTM during configuration
sendClockFactor	UINT	SendClockFactor according to the PROFINET specification. Shall only be set by Parent, if the attribute belongs to the element SubModule. Shall only be set by DTM, if the attribute belongs to the element SendClockFactor
reductionRatio	UINT	ReductionRatio according to the PROFINET specification. Shall only be set by Parent, if the attribute belongs to the element SubModule. Shall only be set by DTM, if the attribute belongs to the element ReductionRatio
watchdogFactor	UINT	WatchdogFactor according to the PROFINET specification. Shall only be set by Parent
dataHoldFactor	UINT	DataHoldFactor according to the PROFINET specification. Shall only be set by Parent