IEC TR 62453-52-150

Edition 1.0 2017-06

TECHNICAL REPORT

colour inside

Field device tool (FDT) interface specification – Part 52-150: Communication implementation for common language infrastructure – IEC 61784 CPF 15

IEC TR 62453-52-150:2017-06(en)

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CONTENTS

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FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 52-150: Communication implementation for common language infrastructure – IEC 61784 CPF 15

FOREWORD

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IEC TR 62453-52-150, which is a technical report, has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

Each part of the IEC 62453-52-xy series is intended to be read in conjunction with its corresponding part in the IEC 62453-3xy series. This document corresponds to IEC 63453-315.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
65E/440/DTR	65E/514/RVC

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

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

The 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

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 62453 is an interface specification for developers of Field Device Tool (FDT) 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 fieldbuses 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 Device Type Manager (DTM), 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 kind of fieldbusses and thus meets the requirements for integrating different kinds of devices into heterogeneous control systems.

Figure 1 shows how this part of the IEC 62453-52-xy series is aligned in the structure of the IEC 62453 series.

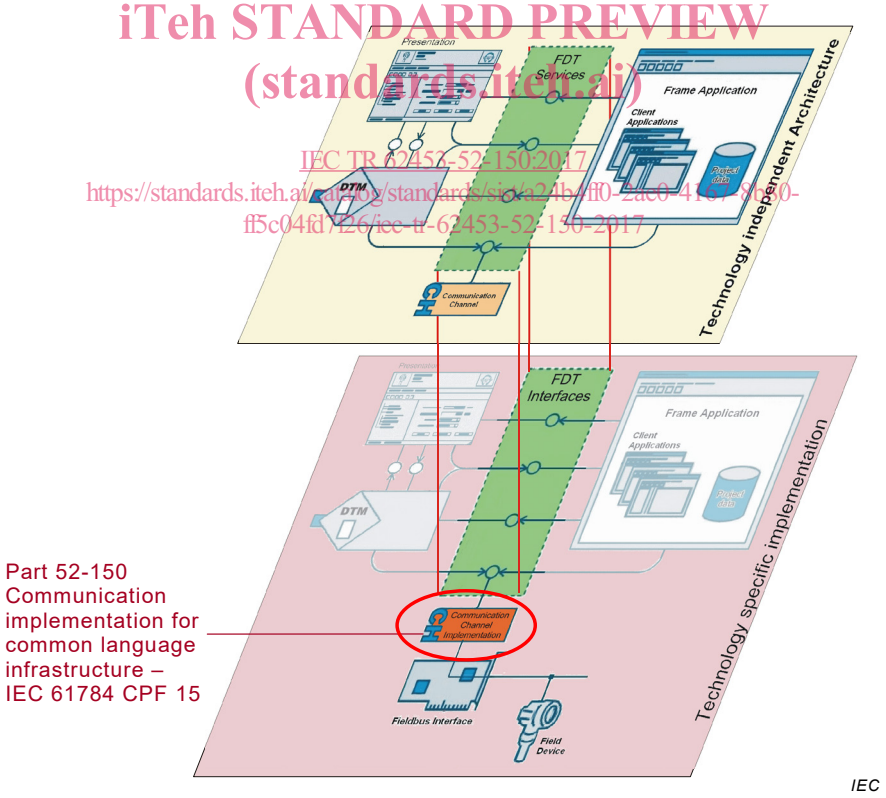

Figure 1 – Part 52-150 of the IEC 62453 series

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 52-150: Communication implementation for common language infrastructure – IEC 61784 CPF 15

1 Scope

This part of the IEC 62453-52-xy series, which is a Technical Report, provides information for integrating the Modbus®[1] technology into the CLI-based implementation of FDT interface specification (IEC TR 62453-42).

This part of IEC 62453 specifies the implementation of communication and other services based on IEC 62453-315.

This document neither contains the FDT specification nor modifies it.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61131-3:2013, *Programmable controllers – Part 3: Programming languages*

IEC 61158-5-15:2010, *Industrial communication networks – Fieldbus specifications – Part 5-15: Application layer service definition – Type 15 elements*

IEC 61784-1:2014, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

IEC 62453-1:2016, *Field device tool (FDT) interface specification – Part 1: Overview and guidance*

IEC 62453-2:2016, *Field device tool (FDT) interface specification – Part 2: Concepts and detailed description*

IEC TR 62453-42:2016, *Field device tool (FDT) interface specification – Part 42: Object model integration profile – Common language infrastructure*

IEC 62453-315:2009, *Field device tool (FDT) interface specification – Part 315: Communication profile integration – IEC 61784 CPF 15*
IEC 62453-315:2009/AMD1:2016

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[1] Modbus is the trademark of Schneider Automation Inc. It is registered in the United States of America. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trademark Modbus. Use of the trademark Modbus requires permission from Schneider Automation Inc.

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, IEC 62453-2, IEC TR 62453-42 and IEC 62453-315 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.2 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviations given in IEC 62453-1, IEC 62453-2, IEC 62453-315, IEC TR 62453-42 and the following apply.

IO Input/Output

3.3 Conventions

3.3.1 Datatype names and references to datatypes

The conventions for naming and referencing of datatypes are explained in IEC 62453-2:2016, 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 62453-1:2016.

4 Bus category

IEC 61784 CPF 15 protocol is identified in the attribute busCategory of the BusCategory element by the identifiers, as specified in IEC 62453-315.

5 Access to instance and device data

5.1 General

The minimum set of provided data shall be:

- All process values available for the device shall be modeled as ProcessData including the ranges and scaling if applicable;
- All network configuration related parameters shall be exposed in NetworkData (see Clause 9).

5.2 IO signals provided by DTM

A DTM shall provide IO signal information for the device using the IProcessData interface. The IO signals describe datatype and address parameters of process data as detailed in 11.2.

5.3 Data interfaces

5.3.1 Common data set

For Modbus no minimum set of parameters or common data set is defined which shall be provided by a DTM. Exposure of device parameters is at the vendor's discretion. If a DTM provides process values, the process variables shall be modelled as process data objects.

5.3.2 Mapping of Modbus datatypes to FDT datatypes

Modbus uses datatypes as specified in [2][2] for the transmission on the fieldbus. The FDT interfaces IDeviceData and IInstanceData use .NET datatypes, while PLC applications use datatypes defined in IEC 61131-3. This subclause defines the mapping of parameter datatypes, whereas mapping of process datatypes is defined in 11.3.

The mapping of parameter datatypes is described in Table 1.

Table 1 – Mapping of datatypes

Modbus datatype	FDT datatype	IEC 61131 datatype
Discrete Inputs	BitArray	ARRAY [] OF BOOL
Coil	bool	BOOL
Coils	BitArray	ARRAY [] OF BOOL
Input Registers	ushort[]	ARRAY [] OF WORD
Holding Register	ushort	WORD
Holding Registers	ushort[]	ARRAY [] OF WORD

The FDT data types do not change any byte or bit order of the data. The data interpretation, e.g. if a float value is transferred in a holding register, is under the responsibility of the DTM respectively the user of the data. The user of the data shall know how the data is represented by the hardware device.

5.3.3 SemanticInfo

The usage of the SemanticInfo datatype is shown in Table 2. The identifier in SemanticId shall be unique and always reference the same element. This means the semantic information shall be the same whenever the same data is referenced. By using this attribute e.g. a Frame Application is able to get the information regarding the meaning and usage of a single data structure.

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2 Figures in square backets refer to the Bibliography.