IEC 62453-1

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Field device tool (FDT) interface specification – Part 1: Overview and guidance

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Spécification des interfaces des outils des dispositifs de terrain (FDT) – Partie 1: Vue d'ensemble et guide

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IEC 62453-1:2016-12(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 25.040.40; 35.100.05; 35.110

ISBN 978-2-8322-3745-8

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FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 1: Overview and guidance

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International Standard IEC 62453-1 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: introduction of a new implementation technology (defined in IEC 62453-42).

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

CDV	Report on voting
65E/333/CDV	65E/393A/RVC

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 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 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

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INTRODUCTION

Enterprise automation requires two main data flows: a “vertical” data flow from enterprise level down to the field devices including signals and configuration data, and a “horizontal” communication between field devices operating on the same or different communication technologies.

With the integration of fieldbuses into control systems, there are a few additional tasks to be performed. The may result in a large number of fieldbus- and device-specific tools in addition to system and engineering tools. Integration of these tools into higher-level system-wide planning or engineering tools is an advantage. 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.

Several different manufacturer specific tools are used. The data in these tools are often invisible data islands from the viewpoint of system life-cycle management and plant-wide automation.

To ensure the consistent management of a plant-wide control and automation technology, it is important to fully integrate fieldbuses, devices and sub-systems as a seamless part of a wide range of automation tasks covering the whole automation life-cycle.

IEC 62453 provides an interface specification for developers of FDT (Field Device Tool) components to support function control and data access within a client/server architecture. The availability of this standard interface facilitates development of servers and clients by multiple manufacturers and supports open interoperation.

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A device or module-specific software component, called a DTM (Device Type Manager) is supplied by a manufacturer with the related device type or software entity type. Each DTM can be integrated into engineering tools via defined FDT interfaces. This approach to integration is in general open for all fieldbusses and thus supports integration of different devices and software modules into heterogeneous control systems.

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The IEC 62453 common application interface supports the interests of application developers, system integrators, and manufacturers of field devices and network components. It also simplifies procurement, reduces system costs and helps manage the lifecycle. Significant savings are available in operating, engineering and maintaining the control systems.

The objectives of the IEC 62453 series are to support:

- universal plant-wide tools for life-cycle management of heterogeneous fieldbus environments, multi-manufacturer devices, function blocks and modular sub-systems for all automation domains (e.g. process automation, factory automation and similar monitoring and control applications);
- integrated and consistent life-cycle data exchange within a control system including its fieldbuses, devices, function blocks and modular sub-systems;
- simple and powerful manufacturer-independent integration of different automation devices, function blocks and modular sub-systems into the life-cycle management tools of a control system.

The FDT concept supports planning and integration of monitoring and control applications, it does not provide a solution for other engineering tasks such as "electrical wiring planning”, “mechanical planning”. Plant management subjects such as "maintenance planning”, “control optimization”, “data archiving”, are not part of this FDT standard. Some of these aspects may be included in future editions of FDT publications.

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 1: Overview and guidance

1 Scope

This part of IEC 62453 presents an overview and guidance for the IEC 62453 series. It

- explains the structure and content of the IEC 62453 series (see Clause 5);
- provides explanations of some aspects of the IEC 62453 series that are common to many of the parts of the series;
- describes the relationship to some other standards.

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.

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IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61784 (all parts), *Industrial communication networks – Profiles*

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3 Terms, definitions, symbols, abbreviations and conventions

For the purposes of this document the following terms, definitions, abbreviations and conventions apply.

3.1 Terms and definitions

3.1.1
actor
coherent set of roles that users of use cases play when interacting with these use cases

Note 1 to entry: An actor has one role for each use case with which it communicates.

[SOURCE: ISO/IEC 19501:2005, 4.11.2.1]

3.1.2
address
communication protocol specific access identifier

3.1.3
application
software functional unit that is specific to the solution of a problem in industrial-process measurement and control

Note 1 to entry: An application may be distributed among resources, and may communicate with other applications.

3.1.4
business object
object representing specific behavior (e.g. DTM, BTM and channel)

Note 1 to entry: The term business object has been defined originally as part of the design pattern three-tier architecture, where the business object is part of the business layer.

3.1.5
Block Type Manager
BTM
specialized DTM to manage and handle a block

Note 1 to entry: This note applies to the French language only.

3.1.6
communication
fieldbus protocol specific data transfer

3.1.7
Communication Channel
access point for communication to field device

3.1.8
configuration
system created by configuring the plant components and the topology

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3.1.9
configure
setting parameters at the instance data as well as the logical association of plant components to build up the plant topology (off-line)

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Note 1 to entry: See also parameterize (3.1.38).

3.1.10
connection
established data path for communication with a selected device

3.1.11
data
set of parameter values

3.1.12
data type
defined set of data objects of a specified data structure and a set of permissible operations, such that these data objects act as operands in the execution of any one of these operations

[SOURCE: ISO 2382-15.04.01:1999]

3.1.13
DCS manufacturer
system manufacturer
manufacturer of the control system

Note 1 to entry: This note applies to the French language only.

3.1.14
device
independent physical entity of an automation system capable of performing specified functions in a particular context and delimited by its interfaces

[SOURCE: IEC 61499-1:2012, 3.29, modified – the note has been deleted]

3.1.15
field device
networked independent physical entity of an automation system capable of performing specified functions in a particular context and delimited by its interfaces

[SOURCE: IEC 61375-3-3:2012, 3.1.3]

3.1.16
device manufacturer
manufacturer of fieldbus devices

3.1.17
device type
device characterization based on abstract properties such as manufacturer, fieldbus protocol, device type identifier, device classification, version information or other information

Note 1 to entry: The scope of such characterizations can vary depending on the properties that are used in the definition of such a set and is manufacturer specific for each DTM.

3.1.18
distributed system
FDT objects that jointly are executed on different PCs in a network

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Note 1 to entry: The implementation of such a distributed system is vendor specific (for example: DTM and Presentation are executed on different PCs or DTMs are executed in a multi-user system on different PCs).

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Note 2 to entry: This note applies to the French language only.

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3.1.19
documentation
human readable information about a device instance

Note 1 to entry: This may be electronic information in a database.

3.1.20
Device Type Manager
DTM
software component containing device-specific application software

Note 1 to entry: The DTM is a generic class and means "Type Manager". The D is kept because the acronym is well-known in the market.

Note 2 to entry: This note applies to the French language only.

3.1.21
DTM device type
software module for a particular device type within the DTM

Note 1 to entry: A DTM may contain one or more DTM device types.

3.1.22
entity
particular thing, such as a person, place, process, object, concept, association, or event

[SOURCE: IEC 61499-1:2012, 3.31]

3.1.23
Frame Application
FDT runtime environment

3.1.24
FDT model
interface specification for objects and object behavior in a monitoring and control system

3.1.25
function
specific purpose of an entity or its characteristic action

[SOURCE: IEC 61499-1:2012, 3.44]

3.1.26
Generic DTM
DTM which interprets device type or domain specific device descriptions and provides the FDT interfaces

Note 1 to entry: This note applies to the French language only.

3.1.27
hardware
physical equipment, as opposed to programs, procedures, rules and associated documentation

[SOURCE: IEC 61499-1:2012, 3.49]

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3.1.28
implementation
development phase in which the hardware and software of a system become operational

[SOURCE: IEC 61499-1:2012, 3.51]

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3.1.29
instantiation
creation of an instance of a specified type

[SOURCE: IEC 61499-1:2012, 3.57]

3.1.30
interface
shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics as appropriate

[SOURCE: IEC 60050-351:2013, 351-42-25]

3.1.31
Interpreter DTM
Generic DTM which interprets device descriptions

3.1.32
mapping
set of features or attributes having defined correspondence with the members of another set

[SOURCE: IEC 61499-1:2012, 3.66]

3.1.33
multi-user environment
environment which allows operation by more than one user

3.1.34
network
all of the media, connectors, repeaters, routers, gateways and associated node communication elements by which a given set of communicating devices are interconnected

Note 1 to entry: In this document network is used to express that one or more interconnected fieldbus systems with different protocols can be applied.

[SOURCE: IEC 61158-1:2014, 3.1.5]

3.1.35
nested communication
communication using a hierarchy of communication systems

3.1.36
operation
well-defined action that, when applied to any permissible combination of known entities, produces a new entity

[SOURCE: IEC 61499-1:2012, 3.73]

3.1.37
parameter
variable that is given a constant value for a specified application and that may denote the application

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[SOURCE: IEC 61499-1:2012, 3.75]

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3.1.38
parameterize
setting parameters in a device or a block or an object

Note 1 to entry: See configure (3.1.9).

3.1.39
persistent data
stored data that is preserved through shutdown/restart and maintenance activities

3.1.40
Process Channel
representation of process value and its properties

3.1.41
service
functional capability of a resource which can be modeled by a sequence of service primitives

[SOURCE: IEC 61499-1:2012, 3.87]

3.1.42
session
instance of user interactions within the FDT model

3.1.43
synchronization
synchronization of data depending on the context where used

Note 1 to entry: For example, synchronization can occur between the DTM and the device or between several DTM instances having a reference to the same instance data.

3.1.44
system
set of interrelated elements considered in a defined context as a whole and separated from their environment

Note 1 to entry: Elements of a system may be natural or man-made material objects, as well as modes of thinking and the results thereof (for example forms of organization, mathematical methods, and programming languages).

Note 2 to entry: The system is considered to be separated from the environment and other external systems by an imaginary surface, which can cut the links between them and the considered system.

[SOURCE: IEC 60050-351:2013, 351-42-08, modified – some notes have been deleted]

3.1.45
transient data
temporary data which have not been stored (while configuring or parameterizing)

3.1.46
type
software element which specifies the common attributes shared by all instances of the type

[SOURCE: IEC 61499-1:2012, 3.99]

3.1.47
variable
software entity that may take different values, one at a time

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Note 1 to entry: The values of a variable are usually restricted to a certain data type.

Note 2 to entry: Variables are described as input variables, output variables, and internal variables.

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[SOURCE: IEC 61499-1:2012, 3.102]

3.1.48
use case
class specification of a sequence of actions, including variants, that a system (or other entity) can perform, interacting with actors of the system

[SOURCE: IEC TR 62390:2005, 3.1.26]

3.2 Abbreviations

BTM	Block Type Manager	
CLI	Common Language Infrastructure	
COM	Component Object Model	[IEC 62541-1]
CP	Communication profile	[IEC 61784-1]
CPF	Communication profile family	[IEC 61784-1]
DCS	Distributed control system	[IEC 62351-2]
DD	Device description	
DTM	Device Type Manager	
ERP	Enterprise resource planning	
FA	Frame Application	
FB	Function block	[IEC 61784-3-3]
FDT	Field device tool	
GUI	Graphical user interface	
ID	Identifier	