IEC/TR 62453-61

Edition 1.0 2009-08

TECHNICAL REPORT

colour inside

Field device tool (FDT) interface specification – Part 61: Device Type Manager (DTM) Styleguide for common object model

IEC/TR 62453-61:2009(E)

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.
If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.
Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub
The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub
Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org
The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv
If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

IEC/TR 62453-61

Edition 1.0 2009-08

TECHNICAL REPORT

colour inside

Field device tool (FDT) interface specification – Part 61: Device Type Manager (DTM) Styleguide for common object model

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE V

ICS 25.040.40; 35.100.05; 35.110

ISBN 978-2-88910-718-6

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms, definitions, symbols, abbreviated terms and conventions 7
3.1 Terms and definitions 7
3.2 Symbols and abbreviated terms 7
3.3 Conventions 8
3.3.1 Data type names and references to data types 8
3.3.2 Vocabulary for requirements 8
3.3.3 Specific formatting 8
3.3.4 State machine diagrams 8
4 Principles for designing DTM user interfaces 8
5 Benefits from the FDT user's point of view 9
6 Functions of a DTM 11
6.1 General 11
6.2 Function "Main operation" 11
6.3 Functions "Online Parameterize" and "Offline Parameterize" 12
7 DTM user interface 12
7.1 Objective 12
7.2 General behavior 12
7.2.1 General 12
7.2.2 GUI navigation 12
7.2.3 GUI resizeability 12
7.2.4 Display of information 12
7.3 Microsoft Active Accessibility 13
7.4 Appearance 13
7.4.1 General 13
7.4.2 DTM user interface categories 14
7.4.3 DTM user interface areas 15
7.5 Parameter handling 20
7.5.1 Representation within Application Area 20
7.5.2 Change of parameter values 20
7.5.3 Representation of parameters 22
8 Representation of DTM functions 24
9 DTM behavior 27
9.1 Close of user interface with modified parameter values 27
9.2 Data set 27
9.2.1 Parameter in multiple user interfaces 27
9.2.2 Locking mechanism 27
9.3 Online parameterization / data source: device 28
9.4 Offline parameterization / data source: data set 28
9.5 Error handling 29
9.6 Communication 29
9.7 Access rights 30
9.7.1 FDT actors and parameter classes 30

AVA Documents
Document Sharing Hub
Full document details: IEC TR 62453-61 2009

9.7.2 OEM login 30
9.8 Localization 30
9.9 Documentation 30
9.10 Installation and un-installation 31
Bibliography 33

Figure 1 – Part 61 of the IEC 62453 series 6
Figure 2 – Standard User Interface (SUI) 10
Figure 3 – Advanced User Interface (AUI) 11
Figure 4 – Areas of an SUI 14
Figure 5 – Areas of an AUI 15
Figure 6 – State diagram: Continuous Check 21
Figure 7 – State diagram: One Time Check 22
Figure 8 – Parameter value and associated information 22

Table 1 – Contents of Identification Area 16
Table 2 – Contents of Action Area 17
Table 3 – Contents of Status Bar 18
Table 4 – Possible connection states 18
Table 5 – Possible data source states 19
Table 6 – Possible states of the instance data set 19
Table 7 – Possible device diagnostic states (see [1]) 19
Table 8 – Possible states of parameters 23
Table 9 – Display of inadmissible or wrong data 24
Table 10 – Representation of functions 25
Table 11 – Relation between user roles and parameter classes 30
Table 12 – Installation and un-installation 31

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 61: Device Type Manager (DTM) Styleguide for common object model

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC/TR 62453-61, 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:

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.

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

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

Enquiry draft	Report on voting
65E/72/DTR	65E/121/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 publication 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 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

- 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 publication using a colour printer.

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

INTRODUCTION

This technical report is a user interface design specification for developers of FDT (Field Device Tool) components for Function Control and Data Access within a Client/Server architecture. The technical report is a result of an analysis and design process to develop standard interfaces to facilitate the development of components by multiple vendors that shall interoperate seamlessly.

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.

To ensure the consistent management of a plant-wide control and automation technology, it is necessary to fully integrate fieldbusses, devices and sub-systems as a seamless part of a wide range of automation tasks covering the whole automation life-cycle. This integration also requires a consistent look and feel of device specific components.

Figure 1 shows how IEC/TR 62453-61 is aligned in the structure of the IEC 62453 series.

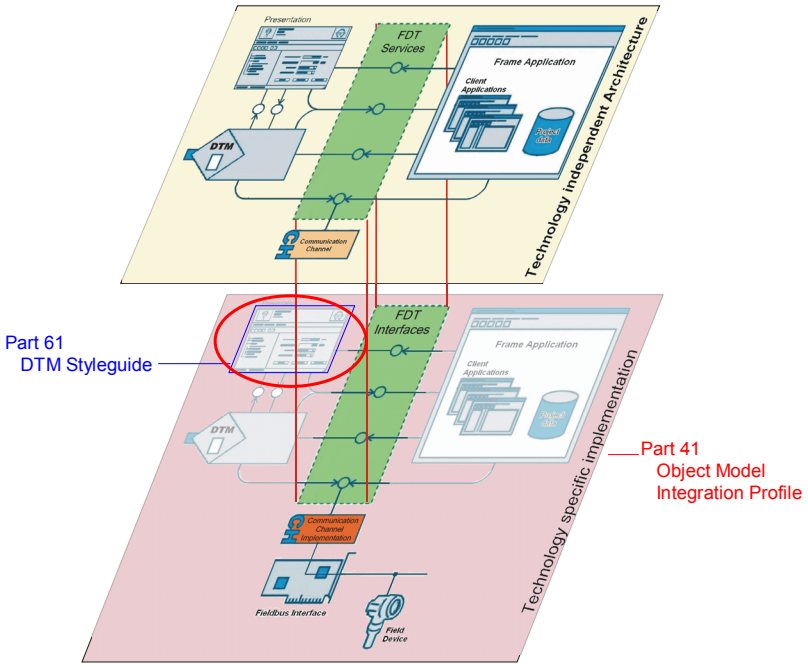

Figure 1 – Part 61 of the IEC 62453 series

Documents
Document Sharing Hub
Full document details: IEC TR 62453-61 2009

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 61: Device Type Manager (DTM) Styleguide for common object model

1 Scope

IEC/TR 62453-61, which is a technical report, explains the guidelines and rules for the implementation of a Device Type Manager (DTM) with regard to the user interface and its functions. These guidelines and rules are part of the FDT specification and are intended to ensure that all users are provided with clear and consistent user interface functions and features across DTM devices in a system.

2 Normative references

The following referenced documents are indispensable for the application 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 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*

IEC/TR 62453-41:2009, *Field Device Tool (FDT) interface specification – Part 41: Object model integration profile – Common object model*

ISO/IEC 19501:2005, *Information technology – Open Distributed Processing – Unified Modeling Language (UML)* Version 1.4.2

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 62453-41 and the following apply.

3.1.1
screen reader
software application that provides additional output to users (e.g. text-to-sound, braille)

3.1.2
navigation tree
GUI element, which displays the navigation information by means of a tree (e.g. tree control)

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/TR 62453-41 and the following apply.

GUI Graphical User Interface

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

SUI	Standard User Interface (a GUI layout defined in this document)
AUI	Advanced User Interface (a GUI layout defined in this document)
CUI	Composition User Interface (a GUI layout defined in this document)
MSAA	Microsoft Active Accessibility
OEM	Original Equipment Manufacturer

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 behavior.
Usage of “can’ or “optional’	A DTM may provide the function or behavior depending on the task and type of the DTM. If a function or behavior is provided, it shall follow the style guide.

3.3.3 Specific formatting

The following formatting is used to describe specific context.

CAPITAL LETTERS	Names of keys on the keyboard —for example, SHIFT, CTRL, or ALT.
[Button text]	Button with the specified text.
<Element name>	Name of an XML element according to data type definition in IEC/TR 62453-41.

3.3.4 State machine diagrams

Syntax of the state machine diagrams in this document is defined in IEC 62453-1 and in ISO/IEC 19501:2005.

4 Principles for designing DTM user interfaces

The design of GUIs for DTMs is based on the following general principles for user interface design [4],[5]. These are recommendations for good engineering practice. For additional fundamentals of user interface design, please see the available literature.

Visibility of system status
The system should always keep users informed about what is going on, through appropriate feedback within an acceptable time limit.

Match between system and the real world
The system should speak the users' language with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

Documents
Document Sharing Hub

Full document details: IEC TR 62453-61 2009

User control and freedom
Users often choose system functions by mistake and need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Error prevention
A careful design which prevents a problem from occurring in the first place is even better than good error messages.

Recognition rather than recall
Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Flexibility and efficiency of use
Accelerators - unseen by the novice user - may often speed up the interaction for the expert user so that the system can cater to both inexperienced and experienced users. Allow users tailoring of frequent actions.

Aesthetic and minimalist design
Dialogue should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors
Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focus on the user's task, list concrete steps to be carried out, and not be too large.

5 Benefits from the FDT user's point of view

Using DTMs compliant with this style guide enables the user to operate more efficiently and more safely. The user is able to parameterize and manage the data of devices from various manufacturers in a uniform way. Therefore, the user is presented with a clearly structured concept regardless of the manufacturer or the type of the device. Details or requirements for developers of a DTM are given within the following clauses.

Guideline and rules are defined for

- uniform user guidance: DTM user interfaces are used and displayed in engineering systems and stand alone tools in the same manner regardless of the device or DTM manufacturer or communication protocol employed;
- uniform behavior of a DTM. This includes:
  - persistent storage,
  - behavior in multi-user environments,
  - error handling;
- clear identification of the DTM and the assigned device;
- ensuring users will be updated on the status and the parameterization of the configuration constantly. All changes of the configuration are marked;
- informing users, whether GUI input affects the device directly or the offline configuration;

AVA Documents
Document Sharing Hub
Full document details: IEC TR 62453-61 2009

- executing plausibility checks of the configuration on a lexical (e.g. only certain characters are accepted), syntactical (e.g. a limited number of characters) and semantically (e.g. given value is below upper limit) correct basis;
- uniform installation/un-installation procedure.

The following screen shots show a Standard User Interface (SUI) (see Figure 2) and an Advanced User Interface (AUI) (Figure 3), two of three possible user interface types (see 7.4.2).

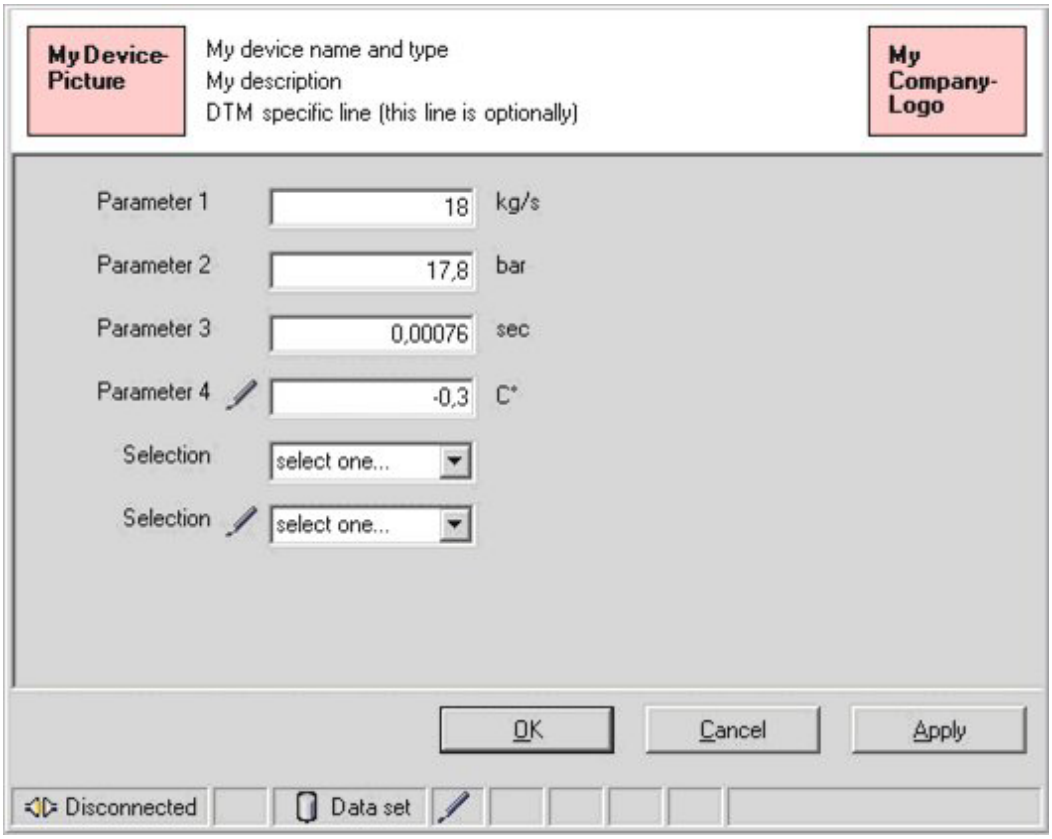

Figure 2 – Standard User Interface (SUI)

Documents
Document Sharing Hub
Full document details: IEC TR 62453-61 2009