TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CLC IEC/TR 62453-52-31

February 2019

ICS 25.040.40; 35.100.05; 35.110

This document is a preview generated by EVS

English Version

Field device tool (FDT) interface specification - Part 52-31: Communication implementation for common language infrastructure - IEC 61784 CP 3/1 and CP 3/2 (IEC/TR 62453-52-31:2017)

Spécification des interfaces des outils des dispositifs de terrain (FDT) - Partie 52-31: Mise en œuvre d'un profil de communication pour l'infrastructure commune de langage - CP 3/1 et CP 3/2 de l' IEC 61784
(IEC/TR 62453-52-31:2017)

Field Device Tool (FDT)-Schnittstellenspezifikation - Teil 52-31: Kommunikationsimplementierung mit der allgemeinen Sprachinfrastruktur - Kommunikationsprofilfamilie (CPF) 3/1 und 3/2 nach IEC 61784
(IEC/TR 62453-52-31:2017)

This Technical Report was approved by CENELEC on 2019-01-14.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2019 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

European foreword

This document (CLC IEC/TR 62453-52-31:2019) consists of the text of IEC/TR 62453-52-31:2017 prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation".

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC/TR 62453-52-31:2017 was approved by CENELEC as a European Standard without any modification.

This document is a preview generated by EVS

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This document is a preview generated by EVS

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 61131-3	2003	Programmable controllers -- Part 3: Programming languages	-	-
IEC 61158	series	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158	series
IEC 61158-6-3	2014	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3	2014
IEC 61784-1	2014	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	2014
IEC 62453-1	2016	Field device tool (FDT) interface specification - Part 1: Overview and guidance	EN 62453-1	2017
IEC 62453-2	2016	Field device tool (FDT) interface specification - Part 2: Concepts and detailed description	EN 62453-2	2017
IEC TR 62453-42	2016	Field device tool (FDT) interface specification – Part 42: Object model integration profile – Common language infrastructure	-	-
IEC 62453-303-1	2009	Field device tool (FDT) interface specification - Part 303-1: Communication profile integration - IEC 61784 CP 3/1 and CP 3/2	EN 62453-303-1	2009

CONTENTS

FOREWORD 6
INTRODUCTION 8
1 Scope 9
2 Normative references 9
3 Terms, definitions, symbols, abbreviated terms and conventions 10
3.1 Terms and definitions 10
3.2 Symbols and abbreviated terms 10
3.3 Conventions 10
3.3.1 Datatype names and references to datatypes 10
3.3.2 Vocabulary for requirements 10
3.3.3 Use of UML 10
4 Bus category 10
5 Access to instance and device data 11
5.1 General 11
5.2 IO signals provided by DTM 11
5.3 Data interfaces 11
5.3.1 General 11
5.3.2 Mapping of PROFIBUS datatypes to FDT datatypes 11
5.3.3 SemanticInfo 12
6 Protocol specific behaviour 14
6.1 PROFIBUS device model 14
6.2 Configuration and parameterization of PROFIBUS devices 15
6.2.1 General 15
6.2.2 Monolithic DTM for a modular PROFIBUS device 16
6.2.3 Composite DTM for a modular PROFIBUS device 16
6.3 Support for DP-V0 configuration 17
6.4 PROFIBUS slaves operating without a class 1 PROFIBUS master 17
6.5 PROFIBUS-related information of a slave DTM 17
6.5.1 General 17
6.5.2 PROFIBUS Network Data (PND) 18
6.5.3 GSD Information 25
6.5.4 Process Data Items 26
7 Protocol specific usage of general datatypes 26
7.1 General datatypes 26
7.2 Protocol specific handling of the datatype STRING 27
8 Network management datatypes 27
8.1 General 27
8.2 Configuration 28
8.3 Process Data Items 28
8.4 Parameterization 28
9 Communication datatypes 29
9.1 General 29
9.2 ProfibusAbortMessage 29
9.3 DP-V0 Communication 29
9.3.1 General 29
9.3.2 Dpv0ConnectRequest 30

This document is a preview generated by EVS

9.3.3 Dpv0ConnectResponse 31
9.3.4 Dpv0DisconnectRequest 32
9.3.5 Dpv0DisconnectResponse 32
9.3.6 Dpv0TransactionRequest 33
9.3.7 Dpv0TransactionResponse 37
9.4 DP-V1 Communication 42
9.4.1 Dpv1ConnectRequest 42
9.4.2 Dpv1ConnectResponse 43
9.4.3 Dpv1DisconnectRequest 45
9.4.4 Dpv1DisconnectResponse 45
9.4.5 Dpv1TransactionRequest 46
9.4.6 Dpv1TransactionResponse 47
9.5 Error information provided by Communication Channel 49
10 Datatypes for process data information 49
10.1 General 49
10.2 ProfibusIOSignalInfo 49
11 Device identification 50
11.1 General 50
11.2 ProfibusDeviceScanInfo datatype 51
11.2.1 General 51
11.2.2 Datatypes derived from ProfibusBaseScanInfo 52
11.3 ProfibusDeviceIdentInfo datatype 54
11.3.1 General 54
11.3.2 Datatypes derived from ProfibusBaseIdentInfo 55
11.4 Mapping of Information Source 57
Bibliography 63

Figure 1 – Part 52-31 of the IEC 62453 series 8
Figure 2 – FDT PROFIBUS Device Model 15
Figure 3 – ProfibusNetworkData 27
Figure 4 – ProfibusAbortMessage 29
Figure 5 – Dpv0ConnectRequest 31
Figure 6 – Dpv0ConnectResponse 31
Figure 7 – Dpv0DisconnectRequest 32
Figure 8 – Dpv0DisconnectResponse 32
Figure 9 – Dpv0ReadConfigurationDataRequest 33
Figure 10 – Dpv0ReadDiagnosisDataRequest 34
Figure 11 – Dpv0ReadInputDataRequest 34
Figure 12 – Dpv0ReadOutputDataRequest 35
Figure 13 – Dpv0ReadUserParameterRequest 36
Figure 14 – Dpv0WriteOutputDataRequest 36
Figure 15 – Dpv0WriteUserParameterRequest 37
Figure 16 – Dpv0ReadConfigurationDataResponse 38
Figure 17 – Dpv0ReadDiagnosisDataResponse 39
Figure 18 – Dpv0ReadInputDataResponse 39
Figure 19 – Dpv0ReadOutputDataResponse 40

This document is a preview generated by EVS

Figure 20 – Dpv0ReadUserParameterResponse 41
Figure 21 – Dpv0WriteOutputDataResponse 41
Figure 22 – Dpv0WriteUserParameterResponse 42
Figure 23 – Dpv1ConnectRequest 43
Figure 24 – Dpv1ConnectResponse 44
Figure 25 – Dpv1DisconnectRequest 45
Figure 26 – Dpv1DisconnectResponse 45
Figure 27 – Dpv1ReadRequest 46
Figure 28 – Dpv1WriteRequest 47
Figure 29 – Dpv1ReadResponse 48
Figure 30 – Dpv1WriteResponse 48
Figure 31 – ProfibusIOSignalInfo 50
Figure 32 – ProfibusDeviceScanInfo 51
Figure 33 – Datatypes derived from ProfibusBaseScanInfo 52
Figure 34 – ProfibusDeviceIdentInfo 54
Figure 35 – Datatypes derived from ProfibusBaseIdentInfo 55

Table 1 – Mapping of datatypes 11
Table 2 – Usage of general datatypes 12
Table 3 – PROFIBUS Network Information 19
Table 4 – Protocol specific usage of general datatypes 27
Table 5 – ProfibusAbortMessage datatype 29
Table 6 – Availability of services for Master Class 1 (C1) 30
Table 7 – Availability of services for Master Class 2 (C2) 30
Table 8 – Dpv0ConnectRequest datatype 31
Table 9 – Dpv0ConnectResponse datatype 32
Table 10 – Dpv0DisconnectRequest datatype 32
Table 11 – Dpv0DisconnectResponse datatype 33
Table 12 – Dpv0ReadConfigurationDataRequest datatype 33
Table 13 – Dpv0ReadDiagnosisDataRequest datatype 34
Table 14 – Dpv0ReadInputDataRequest datatype 35
Table 15 – Dpv0ReadOutputDataRequest datatype 35
Table 16 – Dpv0ReadUserParameterRequest datatype 36
Table 17 – Dpv0WriteOutputDataRequest datatype 37
Table 18 – Dpv0WriteUserParameterRequest datatype 37
Table 19 – Dpv0ReadConfigurationDataResponse datatype 38
Table 20 – Dpv0ReadDiagnosisDataResponse datatype 39
Table 21 – Dpv0ReadInputDataResponse datatype 40
Table 22 – Dpv0ReadOutputDataResponse datatype 40
Table 23 – Dpv0ReadUserParameterResponse datatype 41
Table 24 – Dpv0WriteOutputDataResponse datatype 42
Table 25 – Dpv0WriteUserParameterResponse datatype 42
Table 26 – Dpv1ConnectRequest datatype 43

This document is a preview generated by EVS

Table 27 – Dpv1ConnectResponse datatype 44
Table 28 – Dpv1DisconnectRequest datatype 45
Table 29 – Dpv1DisconnectResponse datatype 45
Table 30 – Dpv1ReadRequest datatype 46
Table 31 – Dpv1WriteRequest datatype 47
Table 32 – Dpv1ReadResponse datatype 48
Table 33 – Dpv1WriteResponse datatype 49
Table 34 – ProfibusIOSignalInfo datatype 50
Table 35 – ProfibusDeviceScanInfo datatype 52
Table 36 – Datatypes derived from ProfibusBaseScanInfo 53
Table 37 – ProfibusDeviceIdentInfo datatype 55
Table 38 – Datatypes derived from ProfibusBaseIdentInfo 56
Table 39 – Profile specific mapping of identity information 58

This document is a preview generated by EVS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 52-31: Communication implementation for common language infrastructure – IEC 61784 CP 3/1 and CP 3/2

This document is a preview generated by EVS

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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
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 62453-52-31, which is a technical report, has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technicall 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. The corresponding part for this document is IEC 62453-303-1.

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.

This document is a preview generated by EVS

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 fieldbuses 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.

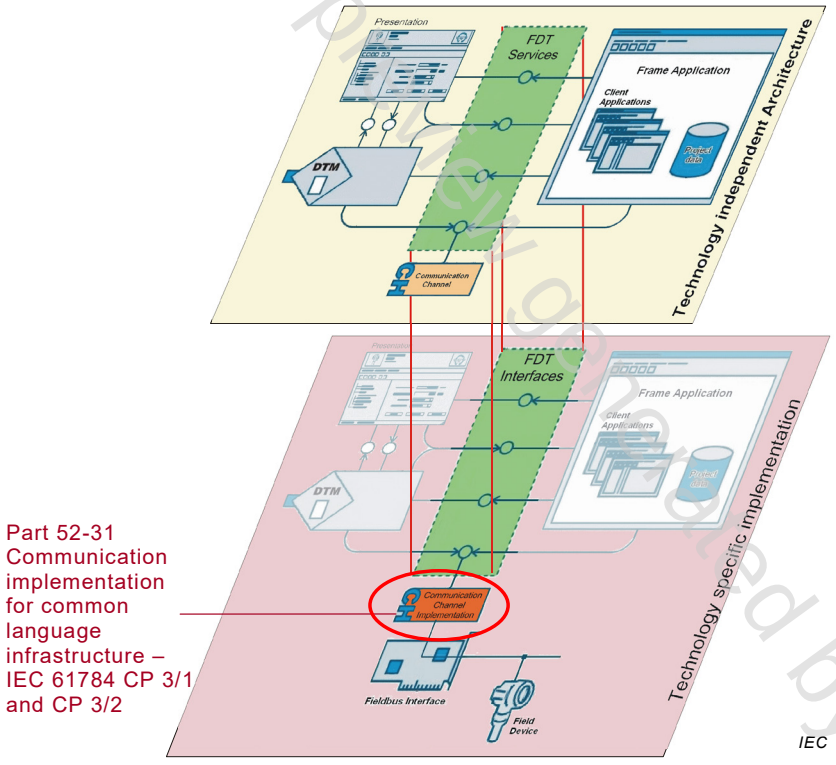

Figure 1 – Part 52-31 of the IEC 62453 series

This preview is a privately generated by EVS