

TECHNICAL REPORT



**Field device tool (FDT) interface specification –
Part 503-2: Communication implementation for common object model –
IEC 61784 CP 3/4, CP 3/5 and CP 3/6**

IEC TR 62453-503-2:2009

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

**Part 503-2: Communication implementation for common object model –
IEC 61784 CP 3/4, CP 3/5 and CP 3/6**

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IEC/TR 62453-503-2, 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.

Each part of the IEC/TR 62453-5xy series is intended to be read in conjunction with its corresponding part in the IEC 62453-3xy series.

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

Enquiry draft	Report on voting
65E/68/DTR	65E/117/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- withdrawn,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.

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FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 503-2: Communication implementation for common object model – IEC 61784 CP 3/4, CP 3/5 and CP 3/6

1 Scope

IEC/TR 62453-503-2, which is a technical report, provides information for integrating the PROFINET®¹ technology into the implementation of the FDT interface specification (IEC/TR 62453-41).

This part of 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 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*

IEC 62453-303-2:2009, *Field Device Tool (FDT) interface specification – Part 303-2: Communication profile integration - IEC 61784 CP 3/4, CP 3/5 and CP 3/6*

3 Terms, definitions, symbols, abbreviated terms and conventions

3.1 Terms and definitions

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

3.2 Symbols and abbreviated terms

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

GSDML	Generic Station Description Markup Language
DCP	Discovery and basic Configuration Protocol

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.

3.3 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”	Function or behavior may be provided, depending on defined conditions.

4 Bus category

IEC 61784 CP 3/3 protocol is identified in the attribute `busCategory` of the `BusCategory` element by the identifiers, as specified in IEC 62453-303-2.

5 Access to instance and device data

Used at methods:

- `IDtmParameter::GetParameters()`
- `IDtmParameter::SetParameters()`

These methods shall provide access to at least to all parameters defined in IEC 62453-303-2.

6 Protocol specific usage of general data types

Table 1 shows how general data types are used with IEC 61784 CP 3/3 devices.

Table 1 – Protocol specific usage of general data types

Attribute	Description for use
<code>fdt:address</code> <code>fdt:protocolId</code>	All these attributes of the <code>FDTDatatype</code> schema are used as defined in IEC 62453-303-2.
<code>fdt:deviceTypeId</code> <code>fdt:deviceTypeInfo</code> <code>fdt:deviceTypeInfoPath</code> <code>fdt:manufacturerId</code> <code>fdt:semanticId</code> <code>fdt:applicationDomain</code>	
<code>fdt:tag</code>	

7 Network management data types

7.1 General

The data types specified in this clause are used at following methods:

- IDtmParameter:GetParameters
- IDtmParameter:SetParameters

7.2 PNIO device address

The address information of a PNIO device is handled in the <BusInformation/UserdefinedBus> element.

7.3 Bus configuration – FDTProfinetIOPParameterSchema

```
<Schema name="FDTProfinetIOPParameterSchema" xmlns="urn:schemas-microsoft-com:xml-data"
xmlns:dt="urn:schemas-microsoft-com:datatypes" xmlns:fdt="x-schema:FDTDataTypesSchema.xml">
<!-- Version of the Schema -->
<AttributeType name="schemaVersion" dt:type="number" default="1.00"/>

<!--AR attributes-->
<AttributeType name="arType" dt:type="ui2"/>
<AttributeType name="arProperties" dt:type="ui4"/>
<AttributeType name="arUUID" dt:type="uuid"/>

<!--AlarmCR attributes-->
<AttributeType name="alarmCRType" dt:type="ui2"/>
<AttributeType name="alarmCRProperties" dt:type="ui4"/>
<AttributeType name="rtaTimeoutFactor" dt:type="ui2"/>
<AttributeType name="rtaRetries" dt:type="ui2"/>
<AttributeType name="localAlarmReference" dt:type="ui2"/>
<AttributeType name="maxAlarmDataLength" dt:type="ui2"/>

<!--Identification attributes-->
<AttributeType name="infoText" dt:type="string"/>
<AttributeType name="localIndex" dt:type="ui2"/>

<!--Network attributes-->
<AttributeType name="nameOfStation" dt:type="string"/>
<AttributeType name="dynIpAddress" dt:type="boolean" default="false"/>
<AttributeType name="ipAddress" dt:type="string"/>
<AttributeType name="ipSubnetMask" dt:type="string"/>
<AttributeType name="ipDefaultGateway" dt:type="string"/>
<AttributeType name="macAddress" dt:type="string"/>

<!--Module attributes-->
<AttributeType name="slotNumber" dt:type="ui2"/>
<AttributeType name="moduleIdentNumber" dt:type="ui4"/>
<AttributeType name="moduleProperties" dt:type="ui2"/>

<!--SubModule attributes-->
<AttributeType name="subSlotNumber" dt:type="ui2"/>
<AttributeType name="subModuleIdentNumber" dt:type="ui4"/>
<AttributeType name="api" dt:type="ui4"/>
<!--SubModule attributes / Submodule properties-->
<AttributeType name="ioType" dt:type="enumeration" dt:values="Input Output InputAndOutput"/>
<AttributeType name="sharedInput" dt:type="enumeration" dt:values="IOController IOControllerShare"/>
<AttributeType name="reduceInputSubmoduleDataLength" dt:type="enumeration" dt:values="Expected Zero"/>
<AttributeType name="reduceOutputSubmoduleDataLength" dt:type="enumeration" dt:values="Expected Zero"/>
<AttributeType name="discardIOXS" dt:type="enumeration" dt:values="Expected Zero"/>

<!--RecordParamData attributes-->
<AttributeType name="index" dt:type="ui2"/>
<AttributeType name="recordData" dt:type="bin.hex"/>
```

```

<!--InputDataList attributes-->
<AttributeType name="consistency" dt:type="enumeration" dt:values="itemConsistency allItemsConsistency"/>

<!--DataItem attributes-->
<AttributeType name="sendClockFactor" dt:type="ui2"/>
<AttributeType name="reductionRatio" dt:type="ui2"/>
<AttributeType name="watchdogFactor" dt:type="ui2"/>
<AttributeType name="dataHoldFactor" dt:type="ui2"/>

<!--Definition of Element RecordParamData-->
<ElementType name="RecordParamData" content="empty" model="closed">
  <attribute type="index" required="yes"/>
  <attribute type="recordData" required="yes"/>
  <attribute type="fdt.name" required="no"/>
</ElementType>

<!--Definition of Element RecordParamDataList-->
<ElementType name="RecordParamDataList" content="eltOnly" model="closed">
  <element type="RecordParamData" minOccurs="1" maxOccurs="*/>
</ElementType>

<!--Definition of Element OutputDataList-->
<ElementType name="OutputDataList" content="eltOnly" model="closed">
  <attribute type="consistency" required="no" default="itemConsistency"/>
  <element type="fdt.ChannelReferences" minOccurs="1" maxOccurs="1"/>
</ElementType>

<!--Definition of Element InputDataList-->
<ElementType name="InputDataList" content="mixed" model="closed">
  <attribute type="consistency" required="no" default="itemConsistency"/>
  <element type="fdt.ChannelReferences" minOccurs="1" maxOccurs="1"/>
</ElementType>

<!--Definition of Element SubModuleProperties-->
<ElementType name="SubModuleProperties" content="empty" model="closed">
  <attribute type="ioType" required="yes"/>
  <attribute type="sharedInput" required="yes"/>
  <attribute type="reduceInputSubmoduleDataLength" required="yes"/>
  <attribute type="reduceOutputSubmoduleDataLength" required="yes"/>
  <attribute type="discardIOXS" required="yes"/>
</ElementType>

<!--Definition of Element SubModule-->
<!--sendClockfactor, reduction ratio etc. are set by CommDTM, but saved at DeviceDTM-->
<ElementType name="SubModule" content="eltOnly" model="closed">
  <attribute type="subSlotNumber" required="yes"/>
  <attribute type="fdt.name" required="yes"/>
  <attribute type="fdt.descriptor" required="no"/>
  <attribute type="subModuleIdentNumber" required="yes"/>
  <attribute type="api" required="yes"/>
  <attribute type="sendClockFactor" required="yes"/>
  <attribute type="reductionRatio" required="yes"/>
  <attribute type="watchdogFactor" required="yes"/>
  <attribute type="dataHoldFactor" required="yes"/>
  <element type="InputDataList" minOccurs="0" maxOccurs="1"/>
  <element type="OutputDataList" minOccurs="0" maxOccurs="1"/>
  <element type="RecordParamDataList" minOccurs="0" maxOccurs="1"/>
  <element type="SubModuleProperties" minOccurs="0" maxOccurs="1"/>
</ElementType>

<!--Definition of Element SubModuleList-->
<ElementType name="SubModuleList" content="eltOnly" model="closed">
  <element type="SubModule" minOccurs="1" maxOccurs="*/>
</ElementType>

<!--Definition of Element Module-->
<ElementType name="Module" content="eltOnly" model="closed">
  <attribute type="slotNumber" required="yes"/>
  <attribute type="moduleIdentNumber" required="yes"/>

```

```

<attribute type="moduleProperties" required="yes"/>
<attribute type="fdt:name" required="yes"/>
<attribute type="fdt:descriptor" required="no"/>
<element type="SubModuleList" minOccurs="1" maxOccurs="1"/>
</ElementType>

<!--Definition of Element ModuleList-->
<ElementType name="ModuleList" content="eltOnly" model="closed">
  <element type="Module" minOccurs="1" maxOccurs="*" />
</ElementType>

<!--Definition of Element AlarmCR-->
<!--only for saving at Device DTM-->
<ElementType name="AlarmCR" content="empty" model="closed">
  <attribute type="alarmCRType" required="yes"/>
  <attribute type="alarmCRProperties" required="yes"/>
  <attribute type="rtaTimeoutFactor" required="yes"/>
  <attribute type="rtaRetries" required="yes"/>
  <attribute type="localAlarmReference" required="yes"/>
  <attribute type="maxAlarmDataLength" required="yes"/>
</ElementType>

<!--Definition of Element AR-->
<!--only for saving at Device DTM-->
<ElementType name="AR" content="eltOnly" model="closed">
  <attribute type="arType" required="yes"/>
  <attribute type="arProperties" required="yes"/>
  <attribute type="arUUID" required="yes"/>
  <element type="AlarmCR" minOccurs="1" maxOccurs="1"/>
  <element type="ModuleList" minOccurs="0" maxOccurs="1"/>
</ElementType>

<!--Definition of Element Identification-->
<ElementType name="Identification" content="eltOnly" model="closed">
  <attribute type="localIndex" required="yes"/>
  <attribute type="fdt:deviceType" required="yes"/>
  <attribute type="fdt:manufacturerId" required="yes"/>
  <attribute type="infoText" required="no"/>
  <element type="fdt:VersionInformation" minOccurs="0" maxOccurs="1"/>
</ElementType>

<!--Definition of Element SendClockFactor-->
<ElementType name="SendClockFactor" content="empty" model="closed">
  <attribute type="sendClockFactor" required="yes"/>
</ElementType>

<!--Definition of Element ReductionRatio-->
<ElementType name="ReductionRatio" content="empty" model="closed">
  <attribute type="reductionRatio" required="yes"/>
</ElementType>

<!--Definition of Element TimingProperties-->
<ElementType name="TimingProperties" content="eltOnly" model="closed">
  <element type="SendClockFactor" minOccurs="1" maxOccurs="*" />
  <element type="ReductionRatio" minOccurs="1" maxOccurs="*" />
</ElementType>

<!--Definition of Element Device-->
<ElementType name="Device" content="eltOnly" model="closed">
  <element type="Identification" minOccurs="1" maxOccurs="1"/>
  <element type="AR" minOccurs="0" maxOccurs="*" />
  <element type="TimingProperties" minOccurs="0" maxOccurs="1"/>
</ElementType>

<!--Definition of Element Network-->
<ElementType name="Network" content="empty" model="closed">
  <attribute type="nameOfStation" required="yes"/>
  <attribute type="dynIpAddress" required="yes"/>
  <attribute type="ipAddress" required="yes"/>
  <attribute type="ipSubnetMask" required="yes"/>

```