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2006-05

Field Device Tool (FDT) interface specification –

**Part 2:
INTERBUS communication**



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Field Device Tool (FDT) interface specification –**Part 2: INTERBUS communication**

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IEC-PAS 62453-2 has been processed by subcommittee 65C: Digital communications, of IEC technical committee 65: Industrial-process measurement and control.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
65C/398A/NP	65C/411/RVN

Following publication of this PAS, which is a pre-standard, the technical committee or subcommittee concerned will transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of three years starting from 2006-05. The validity may be extended for a single three-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

IEC 62453 consists of the following parts under the general title *Field Device Tool (FDT) interface specification*:

Part 1: Concepts and detailed description

Part 2: INTERBUS communication

Part 3: PROFIBUS communication

Part 4: HART communication

Part 5: FOUNDATION FIELDBUS communication

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INTRODUCTION

This PAS is an interface specification for developers of 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 shall inter-operate seamlessly.

With the integration of fieldbusses into control systems, there are a few other tasks which must be performed. This applies to fieldbusses in general. Although there are fieldbus- and device-specific tools, there is no unified way to integrate those 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 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 kind of fieldbusses and thus meets the requirements for integrating different kinds of devices into heterogeneous control systems.

Field Device Tool (FDT) interface specification –

Part 2: INTERBUS communication

1 Scope

This part of IEC 62435 provides information for integrating the INTERBUS® protocol into the FDT interface specification (IEC 62453-1).

2 Normative references

The following referenced documents are indispensable for the application of this PAS. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

IEC 61158:2003 (all parts), *Digital data communications for measurement and control – Fieldbus for use in industrial control systems*

IEC 62453-1, *Field Device Tool (FDT) interface specification – Part 1: Concepts and detailed description*

ISO 15745-3, *Industrial automation systems and integration – Open systems application integration framework – Part 3: Reference description for IEC 61158-based control systems*

3 General

INTERBUS schemas are required to define the structure and semantics of the protocol-specific data transferred via XML documents on the FDT interfaces. The schemas are based on definitions given in the INTERBUS specification. Furthermore, they contain additional information about the device that is needed by systems to configure INTERBUS links and to establish communication between the INTERBUS master and the INTERBUS slave devices.

NOTE For details of the INTERBUS specification, see the IEC 61158 fieldbus series and the “Reference Manual Peripherals Communication Protocol” available from INTERBUS Club¹ Deutschland e.V.

4 Communication schema for INTERBUS PCP

Used at:

```
IFdtCommunication::ConnectRequest()
IFdtCommunication::TransactionRequest()
IFdtCommunication::DisconnectRequest()
IFdtCommunication::Abort()
IFdtCommunication::SequenceBegin()
IFdtCommunication::SequenceEnd()
IFdtCommunication::SequenceStart()
IFdtCommunicationEvents::OnDisconnectResponse()
IFdtCommunicationEvents::OnConnectResponse()
IFdtCommunicationEvents::OnTransactionResponse()
```

¹ "INTERBUS is the trade name of Phoenix Contact GmbH & Co. KG., control of trade name use is given to the non profit organisation INTERBUS Club (<http://www.interbusclub.com/>). 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 trade name INTERBUS. Use of the trade name INTERBUS requires permission of the INTERBUS Club.

Table 1 provides a description of the attributes and elements defined in the PCPCCommunicationSchema.

Table 1 – INTERBUS PCP attributes and elements

Attribute	Description
systemNumber	System number of the address information according to the INTERBUS specification (see also Clause A.1 of Annex A)
segmentNumber	Segment number of the address information according to the INTERBUS specification (see also Clause A.1 of Annex A)
positionNumber	Position number of the address information according to the INTERBUS specification (see also Clause A.1 of Annex A)
errorCode	Contains information why a service could not be successfully executed
index	Address information according to the INTERBUS specification
subIndex	Address information according to the INTERBUS specification
communicationReference	Mandatory identifier for a communication link to a device. This identifier is allocated by the communication component during the connect. The address information has to be used for all following communication calls. NOTE This is not the communication reference (CR) of the Peripherals Message Specification (PMS)
invokeld	Job number for parallel services (for details, see the INTERBUS specification)
reasonCode	Cause for a connection abort.
abortDetail	Additional information for a connection abort
password	Password for the communication relationship to access device objects
accessGroup	Manufacturer-specific assignment of the controller board to an access group for which an access authorization for device objects is specified
versionOD	Version number of the object directory
profile	Identification of the device profile
protection	Indicates whether the access rights are checked when accessing device objects
manufacturerName	Manufacturer name of the device
deviceName	The name of the device
revision	The revision number of the device
sequenceTime	Period of time in [ms] for the whole sequence
delayTime	Delay time in [ms] between two communication calls
Tag	Description
ConnectRequest	Describes the communication request to establish a connection to an INTERBUS PCP device (Initiate_Request)
ConnectResponse	Describes the communication response to the ConnectRequest and provides the data of the corresponding Initiate_Confirmation service
DisconnectRequest	Describes the communication request to release a connection to an INTERBUS PCP device (Abort_Request)
DisconnectResponse	Describes the corresponding response to a DisconnectRequest
ReadRequest	Describes the communication request to read device objects (Read_Request)
ReadResponse	Describes the communication response to the ReadRequest and provides the data of the corresponding Read_Confirmation
WriteRequest	Describes the communication request to write device objects (Write_Request).
WriteResponse	Describes the communication response to the WriteRequest and provides the data of the corresponding Write_Confirmation
IdentifyRequest	Describes the communication request to identify the device (Identify_Request)
IdentifyResponse	Describes the communication response to the IdentifyRequest and provides the data of the corresponding Identify_Confirmation
SequenceBegin	Describes the sequence begin
SequenceEnd	Describes the sequence end
SequenceStart	Describes the sequence start
Abort	Describes the abort request (Abort_Request)
FDT	Root tag

```
<Schema name="FDTInterbusPCPCCommunicationSchema" xmlns="urn:schemas-microsoft-com:xml-data"
xmlns:dt="urn:schemas-microsoft-com:datatypes" xmlns:fdt="x-schema:FDTDataTypesSchema.xml">
```

```
  <!--Definition of Attributes-->
```

```
    <AttributeType name="systemNumber" dt:type="ui1"/>
    <AttributeType name="segmentNumber" dt:type="ui1"/>
    <AttributeType name="positionNumber" dt:type="ui1"/>
    <AttributeType name="errorCode" dt:type="bin.hex"/>
    <AttributeType name="index" dt:type="ui2"/>
    <AttributeType name="subIndex" dt:type="ui1"/>
    <AttributeType name="communicationReference" dt:type="uuid"/>
    <AttributeType name="invokeld" dt:type="ui1"/>
    <AttributeType name="reasonCode" dt:type="ui1"/>
    <AttributeType name="abortDetail" dt:type="bin.hex"/>
    <AttributeType name="password" dt:type="ui1"/>
    <AttributeType name="accessGroup" dt:type="ui1"/>
    <AttributeType name="versionOD" dt:type="ui2"/>
    <AttributeType name="profile" dt:type="ui2"/>
    <AttributeType name="protection" dt:type="ui1"/>
    <AttributeType name="manufacturerName" dt:type="string"/>
    <AttributeType name="deviceName" dt:type="string"/>
    <AttributeType name="revision" dt:type="string"/>
    <AttributeType name="sequenceTime" dt:type="ui4"/>
    <AttributeType name="delayTime" dt:type="ui4"/>
```

```
  <!--Definition of Elements-->
```

```
  <ElementType name="ConnectRequest" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="systemNumber" required="yes"/>
    <attribute type="segmentNumber" required="yes"/>
    <attribute type="positionNumber" required="yes"/>
    <attribute type="password" required="yes"/>
    <attribute type="accessGroup" required="yes"/>
  </ElementType>
```

```
  <ElementType name="ConnectResponse" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="systemNumber" required="yes"/>
    <attribute type="segmentNumber" required="yes"/>
    <attribute type="positionNumber" required="yes"/>
    <attribute type="versionOD" required="yes"/>
    <attribute type="profile" required="yes"/>
    <attribute type="protection" required="yes"/>
    <attribute type="communicationReference" required="yes"/>
    <attribute type="errorCode" required="yes"/>
  </ElementType>
```

```
  <ElementType name="DisconnectRequest" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="reasonCode" required="yes"/>
    <attribute type="abortDetail" required="yes"/>
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
```

```
  <ElementType name="DisconnectResponse" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="communicationReference" required="yes"/>
    <attribute type="errorCode" required="yes"/>
  </ElementType>
```

```
  <ElementType name="ReadRequest" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="invokeld" required="yes"/>
    <attribute type="index" required="yes"/>
    <attribute type="subIndex" required="yes"/>
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
```

```
  <ElementType name="ReadResponse" content="eltOnly" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="communicationReference" required="yes"/>
    <attribute type="errorCode" required="yes"/>
    <element type="fdt:CommunicationData" minOccurs="1" maxOccurs="1"/>
  </ElementType>
```

```
  <ElementType name="WriteRequest" content="eltOnly" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="invokeld" required="yes"/>
    <attribute type="index" required="yes"/>
    <attribute type="subIndex" required="yes"/>
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
```

```

    <element type="fdt:CommunicationData" minOccurs="1" maxOccurs="1"/>
  </ElementType>
  <ElementType name="WriteResponse" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="communicationReference" required="yes"/>
    <attribute type="errorCode" required="yes"/>
  </ElementType>
  <ElementType name="IdentifyRequest" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="invokeld" required="yes"/>
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
  <ElementType name="IdentifyResponse" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="communicationReference" required="yes"/>
    <attribute type="manufacturerName" required="yes"/>
    <attribute type="deviceName" required="yes"/>
    <attribute type="revision" required="yes"/>
    <attribute type="errorCode" required="yes"/>
  </ElementType>
  <ElementType name="SequenceBegin" content="empty" model="closed">
    <attribute type="sequenceTime" required="no"/>
    <attribute type="delayTime" required="no"/>
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
  <ElementType name="SequenceEnd" content="empty" model="closed">
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
  <ElementType name="SequenceStart" content="empty" model="closed">
    <attribute type="communicationReference" required="yes"/>
  </ElementType>
  <ElementType name="Abort" content="empty" model="closed">
    <attribute type="communicationReference" required="yes"/>
    <attribute type="reasonCode" required="yes"/>
    <attribute type="abortDetail" required="yes"/>
  </ElementType>
  <ElementType name="FDT" content="eltOnly" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <group order="one">
      <element type="ConnectRequest"/>
      <element type="ConnectResponse"/>
      <element type="DisconnectRequest"/>
      <element type="DisconnectResponse"/>
      <element type="ReadRequest"/>
      <element type="ReadResponse"/>
      <element type="WriteRequest"/>
      <element type="WriteResponse"/>
      <element type="IdentifyRequest"/>
      <element type="IdentifyResponse"/>
      <element type="SequenceBegin"/>
      <element type="SequenceEnd"/>
      <element type="SequenceStart"/>
      <element type="Abort"/>
      <element type="fdt:CommunicationError"/>
    </group>
  </ElementType>
</Schema>

```

Example:**Read request:**

```

<?xml version="1.0"?>
<FDT xmlns="x-schema:FDTInterbusPCPCCommunicationSchema.xml" xmlns:fdt="x-
schema:FDTDataTypesSchema.xml">
  <ReadRequest invokeld="0" index="35" subIndex="0" communicationReference="81788AD7-C4C7-48fd-AFE6-
FE99BA44F200"/>
</FDT>

```

Write request:

```

<?xml version="1.0"?>

```

```
<FDT xmlns="x-schema:FDTInterbusPCPCommunicationSchema.xml" xmlns:fdt="x-
schema:FDTDataTypesSchema.xml">
  <WriteRequest invokeld="0" index="1" subIndex="0" communicationReference="81788AD7-C4C7-48fd-AFE6-
FE99BA44F200">
    <fdt:CommunicationData byteArray="010203a0b0"/>
  </WriteRequest>
</FDT>
```

Write response:

```
<?xml version="1.0"?>
<FDT xmlns="x-schema:FDTInterbusPCPCommunicationSchema.xml" xmlns:fdt="x-
schema:FDTDataTypesSchema.xml">
  <WriteResponse communicationReference="81788AD7-C4C7-48fd-AFE6-FE99BA44F200" errorCode=""/>
</FDT>
```

5 ChannelParameter schema

Used at:

IFdtChannel::GetChannelParameters()

IFdtChannel::SetChannelParameters()

The following table provides a description of the elements and attributes of the ChannelParameter Schema.

Table 2 – Channel attributes and elements

Attribute	Description
index	Address information according to the INTERBUS specification for channels accessible via INTERBUS PCP
subIndex	Address information according to the INTERBUS specification for channels accessible via INTERBUS PCP
invokeld	Job number for parallel services
bitLength	Additional data type information especially for fieldbus-specific data types like 12-bit integer
bitPosition	Address information for channels accessible via INTERBUS
frameApplicationTag	Frame application-specific tag used for identification and navigation. The DTM should display this tag at channel-specific user interfaces
gatewayBusCategory	Unique identifier for the supported bus type INTERBUS PCP according to the FDT CATID
invalidBit	Bit position of the invalid status channel accessible via INTERBUS
logic	Additional data type information: 0=FALSE 1=TRUE
protectedByChannelAssignment	TRUE if the channel is set to read only by the frame-application. Usually set to TRUE if a channel assignment exists
simulationBit	Bit position of the simulation status channel accessible via INTERBUS
statusChannel	TRUE if the channel is for status information only
substituteValueBit	Bit position of substitute channel accessible via INTERBUS
Element	Description
ProcessAddress	Address information for channels accessible via INTERBUS
PcpAddress	Address information for channels accessible via INTERBUS PCP
StatusInformation	Description of additional status information for channels accessible via INTERBUS
FDTChannel	Description of the channel
FDTChannelType	Description of the channel component in case of channels with gateway functionality
FDT	Root tag

```
<Schema name="FDTInterbusChannelParameterSchema" xmlns="urn:schemas-microsoft-com:xml-data"
xmlns:dt="urn:schemas-microsoft-com:datatypes" xmlns:fdt="x-schema:FDTDataTypesSchema.xml">
```

```
<!--Definition of Attributes-->
```

```
<AttributeType name="index" dt:type="ui2"/>
<AttributeType name="subIndex" dt:type="ui1"/>
<AttributeType name="invokeld" dt:type="ui1"/>
<AttributeType name="bitLength" dt:type="ui4"/>
<AttributeType name="bitPosition" dt:type="ui4"/>
<AttributeType name="frameApplicationTag" dt:type="string"/>
<AttributeType name="gatewayBusCategory" dt:type="uuid"/>
<AttributeType name="invalidBit" dt:type="ui4"/>
<AttributeType name="logic" dt:type="enumeration" dt:values="positive negative"/>
<AttributeType name="protectedByChannelAssignment" dt:type="boolean"/>
<AttributeType name="simulationBit" dt:type="ui4"/>
<AttributeType name="statusChannel" dt:type="boolean"/>
<AttributeType name="substituteValueBit" dt:type="ui4"/>
```

```
<!--Definition of Elements-->
```

```
<ElementType name="ProcessAddress" content="empty" model="closed">
```

```
<attribute type="fdt:nodeId" required="no"/>
<attribute type="bitPosition" required="yes"/>
<attribute type="bitLength" required="yes"/>
```

```
</ElementType>
```

```
<ElementType name="PcpAddress" content="empty" model="closed">
```

```
<attribute type="fdt:nodeId" required="no"/>
<attribute type="invokeld" required="yes"/>
<attribute type="index" required="yes"/>
<attribute type="subIndex" required="yes"/>
```

```
</ElementType>
```

```
<ElementType name="StatusInformation" content="empty" model="closed">
```

```
<attribute type="fdt:nodeId" required="no"/>
<attribute type="logic" required="yes"/>
<attribute type="invalidBit" required="no"/>
<attribute type="simulationBit" required="no"/>
<attribute type="substituteValueBit" required="no"/>
```

```
</ElementType>
```

```
<ElementType name="FDTChannel" content="eltOnly" model="closed" order="seq">
```

```
<attribute type="fdt:nodeId" required="no"/>
<attribute type="fdt:tag" required="yes"/>
<attribute type="fdt:id" required="yes"/>
<attribute type="protectedByChannelAssignment" required="yes"/>
<attribute type="fdt:dataType" required="yes"/>
<attribute type="fdt:signalType" required="yes"/>
<attribute type="frameApplicationTag" required="no"/>
<element type="fdt:BitEnumeratorEntries" minOccurs="0" maxOccurs="1"/>
<element type="fdt:EnumeratorEntries" minOccurs="0" maxOccurs="1"/>
<element type="fdt:Unit" minOccurs="0" maxOccurs="1"/>
<element type="ProcessAddress" minOccurs="0" maxOccurs="1"/>
<element type="PcpAddress" minOccurs="0" maxOccurs="1"/>
<element type="StatusInformation" minOccurs="0" maxOccurs="1"/>
<element type="fdt:Alarms" minOccurs="0" maxOccurs="1"/>
<element type="fdt:Ranges" minOccurs="0" maxOccurs="1"/>
<element type="fdt:SubstituteValue" minOccurs="0" maxOccurs="1"/>
```

```
</ElementType>
```

```
<ElementType name="FDTChannelType" content="eltOnly" model="closed">
```

```
<attribute type="fdt:nodeId" required="no"/>
<element type="fdt:VersionInformation" minOccurs="1" maxOccurs="1"/>
<attribute type="gatewayBusCategory" required="no"/>
<attribute type="statusChannel" required="no"/>
```

```
</ElementType>
```

```
<ElementType name="FDT" content="eltOnly" model="closed">
```

```
<attribute type="fdt:nodeId" required="no"/>
<element type="FDTChannelType" minOccurs="1" maxOccurs="1"/>
<element type="FDTChannel" minOccurs="1" maxOccurs="1"/>
```

```
</ElementType>
```

```
</Schema>
```

6 FDT CATID

For DTMs supporting the INTERBUS and INTERBUS PCP communication protocol, the following Component Category is added to the existing FDT CATIDs.

CATID description in the registry	SYMBOLIC NAME OF THE CATID	UUID of the CATID	Description
„FDT FIELD BUS INTERBUS PCP“	CATID_FDT_INTERBUS_PCP	{655D3F69-B757-4236-8E80-B0F78023B1DD}	Object supports INTERBUS PCP Protocol
“FDT FIELD BUS INTERBUS”	CATID_FDT_INTERBUS	{79079A7E-FF25-4709-ADB9-8AF16A4FFF82}	Object supports INTERBUS Protocol

7 DTM information

Within the name space of the INTERBUS specification there are no unique identifiers for device types, subdevice types and manufactures defined. The following mapping of FDT identifiers to INTERBUS related information must be used.

Attribute	Date Type	INTERBUS related information	Description
deviceTypeId	ui4	Ident Code	Identification Code according to the INTERBUS specification (1 byte)
subDeviceType	string	<vendor specific>	-
manufacturerId	ui4	Vendor ID	Unique Vendor Id according to Organizationally Unique Identifiers (OUI): http://standards.ieee.org/regauth/oui/index.shtml e.g. “00A045”

The Ident Code provides only information regarding the device class (digital Input, digital Output).

Since the above information is not sufficient to identify a device type, the <fdt:VersionInformation> element must be used to provide further information.

Tag	Description
fdt:VersionInformation	VersionInformation element according to FdtDataTypesSchema

In order to enable an easy assignment of an INTERBUS device DTM to a scanned device it is recommended to use matching device information data. The <VersionInformation> element in the DtmInformation document must contain the same data as returned in the PCP service “Identify_Confirmation” (see table below).

DtmDeviceType/fdt:VersionInformation	Identify _Confirmation service
vendor	Manufacturer's_Name
name	Device_Name
version	Revision

Additional information for the identification of a device can be derived from the FDCML information.

7.1 FDCML information

The FDCML information is a type-specific information and not instance-specific. It is not stored with single slave instances or in a global accessible file. It is provided by the DTM at IDtmInformation. On method GetInformation(), a DTM of an INTERBUS device provides the FDCML information within its XML document (in the attribute "fdt:DtmDeviceType/@deviceTypeInformation").

The master device can use the general type-specific information from the slave's FDCML information like bus timing parameters, supported baud rates etc.

8 Topology scan schema

Used at IDtmEvents::OnScanResponse()

The XML document describes one entry in the list of scanned INTERBUS devices.

Attribute	Description
systemNumber	System number of the address information according to the INTERBUS specification.
segmentNumber	Segment number of the address information according to the INTERBUS specification.
positionNumber	Position number of the address information according to the INTERBUS specification.
identCode	Identification Code according to the INTERBUS specification
PALength	Length of parameter data channel.
PDLength	Length of process data channel.

The Attributes systemNumber, segmentNumber and positionNumber are used to address a device (see also definition of <Address> element in this clause).

The Attributes identCode, PALength and PDLength are used to identify a device type.

Tag	Description
InterbusDevice	Specifies an INTERBUS device.
fdt:VersionInformation	VersionInformation element according to FdtDataTypesSchema.

In order to enable an easy assignment of an INTERBUS device DTM to a scanned device it is recommended to use matching device information data. This means, the data returned in the PCP service "Identify_Confirmation" must be used to provide the data in the <fdt:VersionInformation> element as described below.

DTMInterbusDeviceSchema.xml InterbusDevice\fdt:VersionInformation	Identify_Confirmation service
vendor	Manufacturer's_Name
name	Device_Name
Version	Revision

```
<Schema name="DTMInterbusDeviceSchema" xmlns="urn:schemas-microsoft-com:xml-data" xmlns:fdt="x-
schema:FDTDataTypesSchema.xml" xmlns:dt="urn:schemas-microsoft-com:datatypes">
  <!--Definition of Attributes-->
  <AttributeType name="systemNumber" dt:type="ui1"/>
  <AttributeType name="segmentNumber" dt:type="ui1"/>
  <AttributeType name="positionNumber" dt:type="ui1"/>
  <AttributeType name="identCode" dt:type="ui1"/>
```

```

<AttributeType name="PALength" dt:type="ui1"/>
<AttributeType name="PDLength" dt:type="ui1"/>
<!--Definition of Elements-->
<ElementType name="InterbusDevice" content="mixed" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="systemNumber" required="yes"/>
  <attribute type="segmentNumber" required="yes"/>
  <attribute type="positionNumber" required="yes"/>
  <attribute type="identCode" required="yes"/>
  <attribute type="PALength" required="yes"/>
  <attribute type="PDLength" required="yes"/>
  <element type="fdt:VersionInformation" minOccurs="1" maxOccurs="1"/>
</ElementType>
</Schema>

```

Example (the inline-schema may be deleted in case the FDT frame application knows the DTMInterbusDeviceSchema):

```

<?xml version="1.0"?>
<TopologyScan xmlns="x-schema:DTMTopologyScanSchema.xml" xmlns:fdt="x-schema:FDTDataTypesSchema.xml"
xmlns:fdtinterbusdevice="x-schema:DTMInterbusDeviceSchema.xml" xmlns:xdr="urn:schemas-microsoft-com:xml-
data" xmlns:dt="urn:schemas-microsoft-com:datatypes">
  <xdr:Schema name="DTMInterbusDeviceSchema.xml">
    <xdr:AttributeType name="systemNumber" dt:type="ui1"/>
    <xdr:AttributeType name="segmentNumber" dt:type="ui1"/>
    <xdr:AttributeType name="positionNumber" dt:type="ui1"/>
    <xdr:AttributeType name="identCode" dt:type="ui1"/>
    <xdr:AttributeType name="PALength" dt:type="ui1"/>
    <xdr:AttributeType name="PDLength" dt:type="ui1"/>
    <xdr:ElementType name="InterbusDevice" content="mixed" model="closed">
      <xdr:attribute type="fdt:nodeId" required="no"/>
      <xdr:attribute type="systemNumber" required="yes"/>
      <xdr:attribute type="segmentNumber" required="yes"/>
      <xdr:attribute type="positionNumber" required="yes"/>
      <xdr:attribute type="identCode" required="yes"/>
      <xdr:attribute type="PALength" required="yes"/>
      <xdr:attribute type="PDLength" required="yes"/>
      <xdr:element type="fdt:VersionInformation" minOccurs="1" maxOccurs="1"/>
    </xdr:ElementType>
  </xdr:Schema>
  <!-- example for interbus device -->
  <fdtinterbusdevice:InterbusDevice systemNumber="0" segmentNumber="0" positionNumber="0" identCode="0"
PALength="0" PDLength="0">
    <fdt:VersionInformation name="dtm" vendor="unknown"/>
  </fdtinterbusdevice:InterbusDevice>
</TopologyScan>

```

9 Parameter access schema

Used at:

IDtmParameter::GetParameters()

IDtmParameter::SetParameters()

Attribute	Description
systemNumber	System number of the address information according to the INTERBUS specification
segmentNumber	Segment number of the address information according to the INTERBUS specification
positionNumber	Position number of the address information according to the INTERBUS specification

Tag	Description
Address	The address information of an INTERBUS device

The schema DTMPParameterSchema.xml is a fixed schema, which will be installed at the set-up time of the container. It will be used while invocation of the functions IDtmParameter::SetParameters() and IDtmParameter::GetParameters(). The address information of an INTERBUS Device DTM are exchanged within the corresponding XML documents. Since it is not a common approach to change the XML schemas, which are in charge of the FDT container application, an inline schema must be used.

The DTMPParameterSchema.xml supports the open model for the element "UserDefinedBus". This is the point where the inline schema is plugged-in. The following code snippet shows an example for the use of an inline schema within a "UserDefinedBus" element of the IDtmParameter::GetParameters() result XML document.

Example:

```
<BusInformation>
  <UserDefinedBus>
    <xdr:Schema name="inlineSchema"
      xmlns:xdr="urn:schemas-microsoft-com:xml-data"
      xmlns:dt="urn:schemas-microsoft-com:datatypes">
      <xdr:AttributeType name="systemNumber" dt:type="ui1"/>
      <xdr:AttributeType name="segmentNumber" dt:type="ui1"/>
      <xdr:AttributeType name="positionNumber" dt:type="ui1"/>
      <xdr:ElementType name="Address" model="closed">
        <xdr:attribute type="systemNumber" required="yes"/>
        <xdr:attribute type="segmentNumber" required="yes"/>
        <xdr:attribute type="positionNumber" required="yes"/>
      </xdr:ElementType>
    </xdr:Schema>
    <interbus:Address xmlns:interbus="x-shema:#inlineSchema"
      systemNumber="1"
      segmentNumber="1"
      positionNumber="0"/>
  </UserDefinedBus>
</BusInformation>
```

This approach may be changed with a new version of the FDT specification. Then the inline schema may be changed to an explicit FDT schema. In that case the FDT frame applications will provide this schema in their next program version.