



BSI Standards Publication

Field device tool (FDT) interface specification

Part 51-10: Communication implementation for
common object model – IEC 61784 CPF 1

National foreword

This Published Document is the UK implementation of CLC/TR IEC 62453-51-10:2019. It is identical to IEC/TR 62453-51-10:2017. It supersedes PD CLC/TR 62453-501:2009, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/3, Industrial communications: process measurement and control, including fieldbus.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

**Field device tool (FDT) interface specification - Part 51-10:
Communication implementation for common object model –
IEC 61784 CPF 1
(IEC/TR 62453-51-10:2017)**

Spécification des interfaces des outils des dispositifs de terrain (FDT) - Partie 51-10: Mise en œuvre d'un profil de communication pour le modèle d'objet commun - CPF 1 de l'IEC 61784
(IEC/TR 62453-51-10:2017)

Field Device Tool (FDT)-Schnittstellenspezifikation - Teil 51-10: Kommunikationsimplementierung mit dem allgemeinen Objektmodell (COM) - Kommunikationsprofilfamilie (CPF) 1 nach IEC 61784
(IEC/TR 62453-51-10:2017)

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European foreword

This document (CLC/TR IEC 62453-51-10:2019) consists of the text of IEC TR 62453-51-10:2017 prepared by 65E: "Devices and integration in enterprise systems", of IEC technical committee 65: "Industrial process measurement, control and automation".

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Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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 When 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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 62453-41	2016	Field device tool (FDT) interface specification – Part 41: Object model integration profile – Common object model	-	-
IEC 62453-301	2009	Field device tool (FDT) interface specification - Part 301: Communication profile integration - IEC 61784 CPF 1	EN 62453-301	2009
+ A1	2016		+ A1	2017

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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
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.....	7
3.3.1 Data type names and references to data types	7
3.3.2 Vocabulary for requirements	7
3.3.3 Use of UML	7
4 Bus category	7
5 Access to instance and device data	7
6 Protocol specific usage of general data types	8
7 Protocol specific common data types – FdtFFDataTypesSchema.....	8
8 Network management data types.....	10
8.1 General.....	10
8.2 H1 Management – FdtFFH1ManagementSchema.....	10
8.3 HSE Management – FdtFFHseManagementSchema	29
8.4 Address management	46
8.5 FF specific Parameter Set.....	46
9 Communication data types.....	46
9.1 General.....	46
9.2 FMS communication – FdtFFFmsSchema	46
9.3 H1 communication – FdtFFH1CommunicationSchema	52
9.4 HSE communication – FdtFFHseCommunicationSchema	55
9.5 Standard block communication – BtmFFCommunicationSchema.....	60
10 Channel parameter data types – FdtFFChannelParameterSchema	61
11 Device identification	62
11.1 Device type identification data types – FDTFieldbusIdentSchema	62
11.2 Topology scan data types	63
11.2.1 General	63
11.2.2 Scan for devices – DtmFFSchema	63
11.2.3 Scan for blocks – FdtFFBlockSchema.....	64
11.3 Scan identification data types – FDTFieldbusScanIdentSchema.....	64
11.4 Device type identification data types – FDTFieldbusDeviceIdentSchema	67
11.5 XSLT Transformation	69
Bibliography.....	80
Figure 1 – Part 51-10 of the IEC 62453 series	5
Table 1 – Protocol specific usage of general data types	8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

**Part 51-10: Communication implementation for common object model –
IEC 61784 CPF 1**

FOREWORD

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IEC TR 62453-51-10, 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 document cancels and replaces IEC TR 62453-501 published in 2009. This edition constitutes a technical revision. The main changes are updates of the methods to access instance and device data (see Clause 5) and updates of the XML schemas (see Clauses 7 to 11).

Each part of the IEC 62453-51-xy series is intended to be read in conjunction with its corresponding part in the IEC 62453-3xy series. This document corresponds to IEC 62453-301.

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.

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 62453-51-xy series is aligned in the structure of the IEC 62453 series.

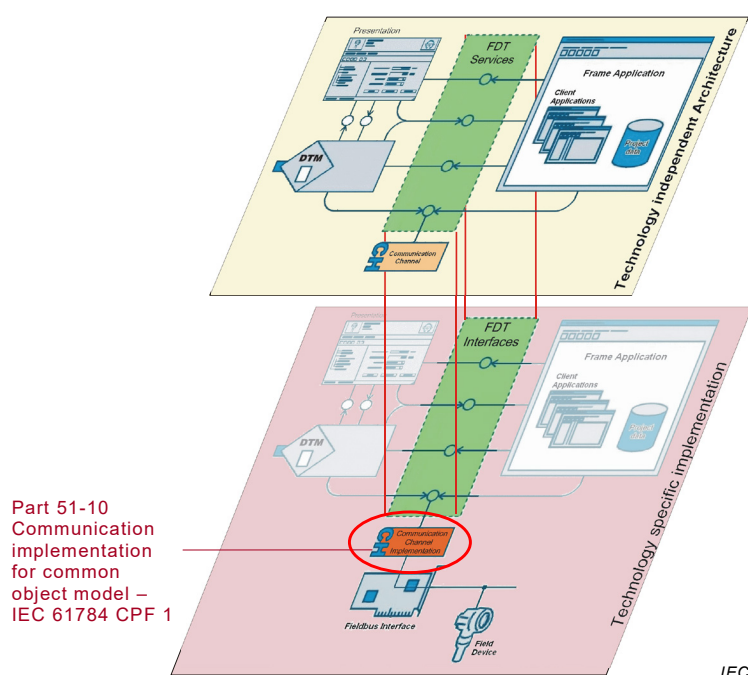


Figure 1 – Part 51-10 of the IEC 62453 series

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 51-10: Communication implementation for common object model – IEC 61784 CPF 1

1 Scope

This part of the IEC 62453-51, which is a Technical Report, provides additional information for integrating the FOUNDATION™ Fieldbus¹ (FF) protocol into the COM-based implementation of the FDT Specification (IEC TR 62453-41).

This document describes communication definitions, protocol specific extensions and the means for block (e.g. transducer, resource or function blocks) representation.

The protocol specific definitions are based on FF-Specifications for H1 and HSE protocols. Furthermore, the definitions contain information that is needed by systems to configure FF devices.

The scope is limited to Foundation Fieldbus device and system-specific definitions.

This part of IEC 62453 specifies implementation of communication and other services based on IEC 62453-301.

This document neither contains the FDT specification nor modifies it.

2 Normative references

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.

IEC 61784-1:2014, *Industrial communication networks – Part 1: Profiles – Fieldbus profiles*

IEC 62453-1:2016, *Field device tool (FDT) interface specification – Part 1: Overview and guidance*

IEC 62453-2:2016, *Field device tool (FDT) interface specification – Part 2: Concepts and detailed description*

IEC TR 62453-41:2016, *Field device tool (FDT) interface specification – Part 41: Object model integration profile – Common object model*

IEC 62453-301:2009/AMD1:2016, *Field device tool (FDT) interface specification – Part 301: Communication profile integration – IEC 61784 CPF 1*

¹ FOUNDATION™ Fieldbus is a trade name of the non-profit organization Fieldbus Foundation. This information is given for the convenience of users of this Technical Report and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this Technical Report does not require use of the trade name Foundation Fieldbus™. Use of the trade name FOUNDATION™ Fieldbus requires permission of Fieldbus Foundation.

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 IEC 62453-301 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

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 62453-301, and IEC TR 62453-41 apply.

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 62453-2:2016 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 behaviour.
Usage of “can” or “optional”	Function or behaviour may be provided, depending on defined conditions.

3.3.3 Use of UML

Figures in this document are using UML notation as defined in Annex A of IEC 62453-1:2016.

4 Bus category

IEC 61784 CPF 1 protocol is identified by the identifiers, as specified in IEC 62453-301.

5 Access to instance and device data

Used at methods:

- IDtmParameter methods
- IDtmSingleDeviceDataAccess methods
- IDtmSingleInstanceDataAccess methods

These methods (if supported according to IEC 62453-41) shall provide access to at least all parameters as defined in IEC 62453-301.

6 Protocol specific usage of general data types

Table 1 shows how general data types are used with IEC 61784 CPF 1 devices.

Table 1 – Protocol specific usage of general data types

Attribute	Description for use
fdt:address	All these attributes of the FDTDatatype schema are used as defined in IEC 62453-301.
fdt:protocolId	
fdt:deviceTypeId	
fdt:deviceTypeInfo	
fdt:deviceTypeInfoPath	
fdt:manufacturerId	
fdt:semanticId	
fdt:applicationDomain	
fdt:tag	

7 Protocol specific common data types – FdtFFDataTypesSchema

This clause specifies the protocol specific common data types, which are used in the definition of other data types.

```
<Schema name="FdtFFDataTypesSchema" xmlns="urn:schemas-microsoft-com:xml-data"
  xmlns:dt="urn:schemas-microsoft-com:datatypes"
  xmlns:fdt="x-schema:FDTDataTypesSchema.xml">
  <AttributeType name="schemaVersion" dt:type="string" default="1.21"/>
  <!--
    Common definitions of datatypes for Fieldbus Foundation
    use name space prefix ftypes when referencing
  -->
  <!--Definition of Attributes-->
  <!-- VFD Reference according to FF-880 section 8 -->
  <AttributeType name="vfdRef" dt:type="ui4"/>
  <AttributeType name="vfdTag" dt:type="string"/>
  <AttributeType name="communicationReference" dt:type="uuid"/>
  <AttributeType name="subIndex" dt:type="ui4"/>
  <AttributeType name="versionOd" dt:type="i2"/>
  <AttributeType name="versionNumber" dt:type="bin.hex"/>
  <AttributeType name="devID" dt:type="string"/>
  <AttributeType name="ip" dt:type="string"/>
  <AttributeType name="port" dt:type="ui2"/>
  <AttributeType name="deviceIndex" dt:type="ui4"/>
  <AttributeType name="listCount" dt:type="ui4"/>
  <AttributeType name="smServiceID" dt:type="enumeration" dt:values="SmSetPDTag SmSetAddress SmClearAddress
SmIdentify SmFindTagQuery SmClearAssignmentInfo SmSetAssignmentInfo"/>
  <AttributeType name="deviceType" dt:type="enumeration" dt:values="linkingDevice ioGateway hseFieldDevice h1Device"/>
  <!--Attributes of element DataLinkAddress - Denotes the Data link (DL) Addresses. see FF-822 Annex A -->
  <!-- Link designator according to FF-822 -->
  <AttributeType name="linkId" dt:type="ui2"/>
  <!-- Node designator according to FF-822 -->
  <AttributeType name="nodeId" dt:type="ui2"/>
  <!-- Selector according to FF-822 -->
  <AttributeType name="selector" dt:type="ui2"/>
  <!-- See FF-870 section 3.3.4 - FMS services and the options supported by the server-->
  <AttributeType name="fmsFeaturesSupported" dt:type="bin.hex"/>
  <!-- Management attributes -->
  <AttributeType name="smSupport" dt:type="bin.hex"/>
  <AttributeType name="macroCycleDuration" dt:type="ui4"/>
  <AttributeType name="operationalPowerup" dt:type="ui4"/>
  <AttributeType name="scheduleActivation" dt:type="ui4"/>
  <AttributeType name="timeValue" dt:type="bin.hex"/>
  <AttributeType name="domain" dt:type="bin.hex"/>
  <!-- represent parameters DEV_REV and DD_REV from the resource block-->
  <AttributeType name="deviceRevision" dt:type="ui1"/>
```

```

<AttributeType name="ddRevision" dt:type="ui1" />
<AttributeType name="devType" dt:type="ui2" />
<!--Definition of Elements-->
<!--Element DataLinkAddress - Denotes the Data link (DL) Addresses. see FF-822 Annex A -->
<ElementType name="DataLinkAddress" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="linkId" required="yes"/>
  <attribute type="nodeId" required="yes"/>
  <attribute type="selector" required="yes"/>
</ElementType>
<!--Element index -->
<ElementType name="Index" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fdt:index" required="yes"/>
</ElementType>
<!--Element SubIndex -->
<ElementType name="SubIndex" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="subIndex" required="yes"/>
</ElementType>
<ElementType name="IndexList" content="eltOnly" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="listCount" required="yes"/>
  <element type="Index" minOccurs="1" maxOccurs="*" />
</ElementType>
<ElementType name="IP" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="ip" required="yes"/>
  <attribute type="port" required="no"/>
</ElementType>
<!-- Management elements -->
<ElementType name="VfdTag" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="vfdTag" required="yes"/>
</ElementType>
<ElementType name="VfdRef" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="vfdRef" required="yes"/>
</ElementType>
<ElementType name="OperationalPowerup" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="operationalPowerup" required="yes"/>
</ElementType>
<ElementType name="PdTag" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fdt:tag" required="yes"/>
</ElementType>
<ElementType name="DeviceId" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" default="1" required="no"/>
  <attribute type="devID" required="yes"/>
</ElementType>
<ElementType name="MacrocycleDuration" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="macroCycleDuration" required="yes"/>
</ElementType>
<ElementType name="CurrentTime" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="timeValue" required="yes"/>
</ElementType>
<ElementType name="SmSupport" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>

```

```

    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="smSupport" required="yes"/>
  </ElementType>
  <ElementType name="VfdIdentification" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="ddRevision" required="yes" />
    <attribute type="deviceRevision" required="yes" />
    <attribute type="devType" required="yes" />
    <attribute type="fdt:manufacturerId" required="no"/>
    <attribute type="vfdTag" required="yes"/>
  </ElementType>
</Schema>

```

8 Network management data types

8.1 General

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

- IDtmParameter:GetParameters
- IDtmParameter:SetParameters

The management schemas will be used as an inline schema within an instance of the DTMPParameterSchema at the element 'BusInformation\UserDefinedBus' as an inline schema.

8.2 H1 Management – FdtFFH1ManagementSchema

```

<Schema name="FdtFFH1ManagementSchema"
  xmlns="urn:schemas-microsoft-com:xml-data"
  xmlns:dt="urn:schemas-microsoft-com:datatypes"
  xmlns:fftypes="x-schema:FdtFFDataTypesSchema.xml"
  xmlns:fdt="x-schema:FDTDataTypesSchema.xml">

  <!-- ***** -->
  <!-- Definition of Attributes -->
  <!-- ***** -->

  <AttributeType name="schemaVersion" dt:type="string" default="1.21"/>

  <!-- ***** -->
  <!-- System management information base (SMIB) attributes as in FF-880 section 8 -->

  <!-- "SmAgent" attributes -->
  <AttributeType name="t1" dt:type="ui4"/>
  <AttributeType name="t2" dt:type="ui4"/>
  <AttributeType name="t3" dt:type="ui4"/>

  <!-- "SyncAndScheduling" attributes -->
  <AttributeType name="localTimeDiff" dt:type="ui4"/>
  <AttributeType name="applicationClockSyncInterval" dt:type="ui1"/>
  <AttributeType name="timeLastReceived" dt:type="bin.hex"/>
  <AttributeType name="primaryApplicationTimePublisher" dt:type="ui1"/>
  <AttributeType name="timePublisherAddress" dt:type="ui1"/>
  <!-- "FbSchedule" attributes -->
  <AttributeType name="startTimeOffset" dt:type="ui4"/>

  <!-- ***** -->
  <!-- Network management information base (NMIB) attributes as in FF-801 section 8 -->

  <!-- "DlmeLinkSettings" attributes -->
  <AttributeType name="slotTime" dt:type="ui2"/>
  <AttributeType name="perDlpduPhlOverhead" dt:type="ui1"/>
  <AttributeType name="maxResponseDelay" dt:type="ui1"/>
  <AttributeType name="firstUnpolledNodeId" dt:type="ui1"/>
  <AttributeType name="thisLink" dt:type="ui2"/>
  <AttributeType name="minInterPduDelay" dt:type="ui1"/>
  <AttributeType name="numConsecUnpolledNodeId" dt:type="ui1"/>
  <AttributeType name="preambleExtension" dt:type="ui1"/>
  <AttributeType name="postTransGapExtension" dt:type="ui1"/>
  <AttributeType name="maxInterChanSignalSkew" dt:type="ui1"/>

```

```

<AttributeType name="timeSyncClass" dt.type="ui1"/>

<!-- "ScheduleDescriptor" attributes -->
<AttributeType name="timeResolution" dt.type="ui2"/>

<!-- "StackCapabilities" attributes -->
<AttributeType name="fasArTypesAndRolesSupported" dt.type="ui4"/>
<AttributeType name="maxDlsapAddressesSupported" dt.type="ui2"/>
<AttributeType name="maxDlcepAddressesSupported" dt.type="ui2"/>
<AttributeType name="dlcepDeliveryFeaturesSupported" dt.type="ui1"/>
<AttributeType name="agentFunctionsSupported" dt.type="ui2"/>

<!-- "ListCharacteristics" attributes -->
<AttributeType name="maxEntries" dt.type="ui2"/>
<AttributeType name="numPermanentEntries" dt.type="ui2"/>
<AttributeType name="numCurrentlyConfigured" dt.type="ui2"/>
<AttributeType name="firstUnconfiguredEntry" dt.type="ui2"/>
<AttributeType name="dynamicsSupportedFlag" dt.type="boolean"/>
<AttributeType name="statisticsSupported" dt.type="ui1"/>
<AttributeType name="numOfStatisticsEntries" dt.type="ui2"/>

<!-- "VcrStaticEntry" attributes -->
<AttributeType name="fasArTypeAndRole" dt.type="ui1"/>
<AttributeType name="fasDIIAddr" dt.type="ui4"/>
<AttributeType name="fasDIIConfiguredRemoteAddr" dt.type="ui4"/>
<AttributeType name="fasDIIISDAP" dt.type="ui1"/>
<AttributeType name="fasDIIConfirmDelayOnConnect" dt.type="ui2"/>
<AttributeType name="fasDIIConfirmDelayOnData" dt.type="ui2"/>
<AttributeType name="fasDIIConfirmDelayOnData" dt.type="ui2"/>
<AttributeType name="fasDIIConfirmDelayOnData" dt.type="ui2"/>
<AttributeType name="fasDIIResidualActivitySupported" dt.type="boolean"/>
<AttributeType name="fasDIITimelinessClass" dt.type="ui1"/>
<AttributeType name="fasDIIPublisherTimeWindowSize" dt.type="ui2"/>
<AttributeType name="fasDIIPublisherSynchronizingDlcep" dt.type="ui4"/>
<AttributeType name="fasDIISubscriberTimeWindowSize" dt.type="ui2"/>
<AttributeType name="fasDIISubscriberSynchronizingDlcep" dt.type="ui4"/>
<AttributeType name="fmsVfId" dt.type="ui4"/>
<AttributeType name="fmsMaxOutstandingServicesCalling" dt.type="ui1"/>
<AttributeType name="fmsMaxOutstandingServicesCalled" dt.type="ui1"/>

<!-- "VcrDynamicEntry" attributes -->
<AttributeType name="fmsState" dt.type="ui1"/>
<AttributeType name="fmsActualMaxOutstandingServicesCalling" dt.type="ui1"/>
<AttributeType name="fmsActualMaxOutstandingServicesCalled" dt.type="ui1"/>
<AttributeType name="fmsOutstandingServicesCounterCalling" dt.type="ui1"/>
<AttributeType name="fmsOutstandingServicesCounterCalled" dt.type="ui1"/>
<AttributeType name="fasState" dt.type="ui1"/>
<AttributeType name="fasDIIActualRemoteAddress" dt.type="ui4"/>
<AttributeType name="fasDIIConfirmDelayOnData" dt.type="ui1"/>
<AttributeType name="fasDIIConfirmDelayOnData" dt.type="ui1"/>

<!-- "VcrStatisticsEntry" attributes -->
<AttributeType name="clearVcrStatistics" dt.type="boolean"/>
<AttributeType name="fasNumOfAbortsCtr" dt.type="ui2"/>
<AttributeType name="fasLocallyGeneratedLastAborted" dt.type="boolean"/>
<AttributeType name="fasReasonLastAborted" dt.type="ui2"/>
<AttributeType name="dIIConfirmDelayOnData" dt.type="ui2"/>
<AttributeType name="dIIConfirmDelayOnData" dt.type="ui2"/>
<AttributeType name="dIIConfirmDelayOnData" dt.type="ui2"/>
<AttributeType name="dIIConfirmDelayOnData" dt.type="ui2"/>

<!-- "DlmeBasicCharacteristics" attributes -->
<AttributeType name="basicStatisticsSupportedFlag" dt.type="boolean"/>
<AttributeType name="dlOperatFunctionalClass" dt.type="ui1"/>
<AttributeType name="dlDeviceConformance" dt.type="ui4"/>

<!-- "DlmeBasicInfo" attributes -->
<!-- AttributeType name="slotTime" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="perDlpduPhlOverhead" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="maxResponseDelay" already defined in DlmeLinkSettings /-->
<AttributeType name="thisNode" dt.type="ui1"/>
<!-- AttributeType name="thisLink" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="minInterPduDelay" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="timeSyncClass" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="preambleExtension" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="postTransGapExtension" already defined in DlmeLinkSettings /-->
<!-- AttributeType name="maxInterChanSignalSkew" already defined in DlmeLinkSettings /-->

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<!-- "DlmeBasicStatistics" attributes -->
<AttributeType name="numOfDlpduTransmitted" dt:type="ui4"/>
<AttributeType name="numOfGoodDlpduReceived" dt:type="ui4"/>
<AttributeType name="numOfPartialReceivedDlpdu" dt:type="ui4"/>
<AttributeType name="numOfFcsFailures" dt:type="ui4"/>
<AttributeType name="numOfNodeTimeOffsetDiscontinuousChanges" dt:type="ui4"/>

<!-- "DlmeLinkMasterInfo" attributes -->
<AttributeType name="maxSchedulingOverhead" dt:type="ui1"/>
<AttributeType name="defMinTokenDelegTime" dt:type="ui2"/>
<AttributeType name="defTokenHoldTime" dt:type="ui2"/>
<AttributeType name="targetTokenRotTime" dt:type="ui2"/>
<AttributeType name="linkMaintTokHoldTime" dt:type="ui2"/>
<AttributeType name="timeDistributionPeriod" dt:type="ui4"/>
<AttributeType name="maximumInactivityToClaimLasDelay" dt:type="ui2"/>
<AttributeType name="lasDatabaseStatusSpduDistributionPeriod" dt:type="ui2"/>

<!-- "DlmeLinkMasterStatistics" attributes -->
<AttributeType name="numLasRoleDelegOrClaimOrDelegTokenHoldTimeout" dt:type="ui2"/>

<!-- "LastValues" attributes -->
<AttributeType name="frameControlOctetN" dt:type="ui1"/>
<AttributeType name="addressSubfieldsN" dt:type="bin.hex"/>
<AttributeType name="frameControlOctetNminus1" dt:type="ui1"/>
<AttributeType name="addressSubfieldsNminus1" dt:type="bin.hex"/>
<AttributeType name="frameControlOctetNminus2" dt:type="ui1"/>
<AttributeType name="addressSubfieldsNminus2" dt:type="bin.hex"/>
<AttributeType name="frameControlOctetNminus3" dt:type="ui1"/>
<AttributeType name="addressSubfieldsNminus3" dt:type="bin.hex"/>

<!-- "LinkScheduleListCharacteristics" attributes -->
<AttributeType name="numOfSchedules" dt:type="ui1"/>
<AttributeType name="numOfSubSchedulesPerSchedule" dt:type="ui1"/>
<AttributeType name="activeScheduleStartingTime" dt:type="bin.hex"/>

<!-- "PlmeBasicCharacteristics" attributes -->
<AttributeType name="channelStatisticsSupported" dt:type="ui1"/>
<AttributeType name="mediumAndDataRatesSupported" dt:type="bin.hex"/>
<AttributeType name="numOfChannels" dt:type="ui1"/>
<AttributeType name="powerMode" dt:type="ui1"/>

<!-- "PlmeBasicInfo" attributes -->
<AttributeType name="interfaceMode" dt:type="ui1"/>
<AttributeType name="loopBackMode" dt:type="ui1"/>
<AttributeType name="xmitEnabled" dt:type="ui1"/>
<AttributeType name="rcvEnabled" dt:type="ui1"/>
<AttributeType name="preferredReceiveChannel" dt:type="ui1"/>
<AttributeType name="mediaTypeSelected" dt:type="ui1"/>
<AttributeType name="receiveSelect" dt:type="ui1"/>

<!-- "MmeWireStatistics" attributes -->
<AttributeType name="channelNumber" dt:type="ui1"/>
<AttributeType name="totalGoodMsgsSent" dt:type="ui4"/>
<AttributeType name="totalGoodMsgsRcvd" dt:type="ui4"/>
<AttributeType name="numOfJabberFaults" dt:type="ui2"/>
<AttributeType name="numOfInternAndJabberFaults" dt:type="ui2"/>
<AttributeType name="numEndActivityBeforeEndData" dt:type="ui2"/>

<!-- "VcrList" attributes -->
<AttributeType name="listControl" dt:type="ui1"/>

<!-- "DlmeLinkMaster" attributes -->
<AttributeType name="dlmeLinkMasterCapabilities" dt:type="ui1"/>
<AttributeType name="primaryLinkMasterFlag" dt:type="boolean"/>
<AttributeType name="liveListStatusArray" dt:type="bin.hex"/>
<AttributeType name="maxTokenHoldTime" dt:type="bin.hex"/>
<AttributeType name="bootOperatFunctionalClass" dt:type="ui1"/>

<!-- "PlmeBasic" attributes -->
<AttributeType name="channelStates" dt:type="bin.hex"/>

<!-- ***** -->
<!-- Definition of Elements -->
<!-- ***** -->

<!-- ***** -->
<!-- SMIB elements for basic variables as in FF-880 section 8 -->

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<!-- ***** -->

<!-- "SmAgent" elements -->
<ElementType name="T1" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="t1" required="yes"/>
</ElementType>
<ElementType name="T2" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="t2" required="yes"/>
</ElementType>
<ElementType name="T3" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="t3" required="yes"/>
</ElementType>

<!-- "SyncAndScheduling" elements -->
<ElementType name="LocalTimeDiff" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="localTimeDiff" required="yes"/>
</ElementType>
<ElementType name="ApplicationClockSyncInterval" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="applicationClockSyncInterval" required="yes"/>
</ElementType>
<ElementType name="TimeLastReceived" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="timeLastReceived" required="yes"/>
</ElementType>
<ElementType name="PrimaryApplicationTimePublisher" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="primaryApplicationTimePublisher" required="yes"/>
</ElementType>
<ElementType name="TimePublisherAddress" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="timePublisherAddress" required="yes"/>
</ElementType>

<!-- "FbSchedule" elements -->
<ElementType name="StartTimeOffset" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="startTimeOffset" required="yes"/>
</ElementType>
<ElementType name="FbObjectIndex" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fdt:index" required="yes"/>
</ElementType>

<!-- ***** -->
<!-- NMIB elements for basic variables as in FF-801 section 8 -->
<!-- ***** -->

<!-- "DimeLinkSettings" elements -->
<ElementType name="SlotTime" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>

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        <attribute type="slotTime" required="yes"/>
    </ElementType>
    <ElementType name="PerDlpduPhlOverhead" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="perDlpduPhlOverhead" required="yes"/>
    </ElementType>
    <ElementType name="MaxResponseDelay" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="maxResponseDelay" required="yes"/>
    </ElementType>
    <ElementType name="FirstUnpolledNodeId" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="firstUnpolledNodeId" required="yes"/>
    </ElementType>
    <ElementType name="ThisLink" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="thisLink" required="yes"/>
    </ElementType>
    <ElementType name="MinInterPduDelay" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="minInterPduDelay" required="yes"/>
    </ElementType>
    <ElementType name="NumConsecUnpolledNodeId" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numConsecUnpolledNodeId" required="yes"/>
    </ElementType>
    <ElementType name="PreambleExtension" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="preambleExtension" required="yes"/>
    </ElementType>
    <ElementType name="PostTransGapExtension" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="postTransGapExtension" required="yes"/>
    </ElementType>
    <ElementType name="MaxInterChanSignalSkew" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="maxInterChanSignalSkew" required="yes"/>
    </ElementType>
    <ElementType name="TimeSyncClass" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="timeSyncClass" required="yes"/>
    </ElementType>

    <!-- "ScheduleDescriptor" elements -->
    <ElementType name="TimeResolution" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="timeResolution" required="yes"/>
    </ElementType>

    <!-- "StackCapabilities" elements -->
    <ElementType name="FasArTypesAndRolesSupported" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasArTypesAndRolesSupported" required="yes"/>
    </ElementType>

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</ElementType>
<ElementType name="MaxDisapAddressesSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="maxDisapAddressesSupported" required="yes"/>
</ElementType>
<ElementType name="MaxDlcepAddressesSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="maxDlcepAddressesSupported" required="yes"/>
</ElementType>
<ElementType name="DlcepDeliveryFeaturesSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="dlcepDeliveryFeaturesSupported" required="yes"/>
</ElementType>
<ElementType name="VersionOfNmSpecSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fftypes:versionNumber" required="yes"/>
</ElementType>
<ElementType name="AgentFunctionsSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="agentFunctionsSupported" required="yes"/>
</ElementType>
<ElementType name="FmsFeaturesSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fftypes:fmsFeaturesSupported" required="yes"/>
</ElementType>
<!-- "ListCharacteristics" elements -->
<ElementType name="MaxEntries" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="maxEntries" required="yes"/>
</ElementType>
<ElementType name="NumPermanentEntries" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="numPermanentEntries" required="yes"/>
</ElementType>
<ElementType name="NumCurrentlyConfigured" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="numCurrentlyConfigured" required="yes"/>
</ElementType>
<ElementType name="FirstUnconfiguredEntry" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="firstUnconfiguredEntry" required="yes"/>
</ElementType>
<ElementType name="DynamicsSupportedFlag" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="dynamicsSupportedFlag" required="yes"/>
</ElementType>
<ElementType name="StatisticsSupported" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="statisticsSupported" required="yes"/>
</ElementType>
<ElementType name="NumOfStatisticsEntries" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>

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        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numOfStatisticsEntries" required="yes"/>
    </ElementType>

    <!-- "VcrStaticEntry" elements -->
    <ElementType name="FasArTypeAndRole" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasArTypeAndRole" required="yes"/>
    </ElementType>
    <ElementType name="FasDIILocalAddr" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIILocalAddr" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIConfiguredRemoteAddr" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIConfiguredRemoteAddr" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIISDAP" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIISDAP" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIMaxConfirmDelayOnConnect" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIMaxConfirmDelayOnConnect" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIMaxConfirmDelayOnData" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIMaxConfirmDelayOnData" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIMaxDlsduSize" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIMaxDlsduSize" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIResidualActivitySupported" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIResidualActivitySupported" required="yes"/>
    </ElementType>
    <ElementType name="FasDIITimelinessClass" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIITimelinessClass" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIPublisherTimeWindowSize" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIPublisherTimeWindowSize" required="yes"/>
    </ElementType>
    <ElementType name="FasDIIPublisherSynchronizingDlcep" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIIPublisherSynchronizingDlcep" required="yes"/>
    </ElementType>
    <ElementType name="FasDIISubscriberTimeWindowSize" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="fasDIISubscriberTimeWindowSize" required="yes"/>
    </ElementType>

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</ElementType>
<ElementType name="FasDIISubscriberSynchronizingDIcep" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fasDIISubscriberSynchronizingDIcep" required="yes"/>
</ElementType>
<ElementType name="FmsVfdld" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsVfdld" required="yes"/>
</ElementType>
<ElementType name="FmsMaxOutstandingServicesCalling" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsMaxOutstandingServicesCalling" required="yes"/>
</ElementType>
<ElementType name="FmsMaxOutstandingServicesCalled" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsMaxOutstandingServicesCalled" required="yes"/>
</ElementType>

<!-- "VcrDynamicEntry" elements -->
<ElementType name="FmsState" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsState" required="yes"/>
</ElementType>
<ElementType name="FmsActualMaxOutstandingServicesCalling" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsActualMaxOutstandingServicesCalling" required="yes"/>
</ElementType>
<ElementType name="FmsActualMaxOutstandingServicesCalled" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsActualMaxOutstandingServicesCalled" required="yes"/>
</ElementType>
<ElementType name="FmsOutstandingServicesCounterCalling" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsOutstandingServicesCounterCalling" required="yes"/>
</ElementType>
<ElementType name="FmsOutstandingServicesCounterCalled" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fmsOutstandingServicesCounterCalled" required="yes"/>
</ElementType>
<ElementType name="FasState" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fasState" required="yes"/>
</ElementType>
<ElementType name="FasDIIActualRemoteAddress" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fasDIIActualRemoteAddress" required="yes"/>
</ElementType>
<ElementType name="FasDIIMaxSendingQueueDepth" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>
  <attribute type="fdt:readAccess" required="no"/>
  <attribute type="fdt:writeAccess" required="no"/>
  <attribute type="fasDIIMaxSendingQueueDepth" required="yes"/>
</ElementType>
<ElementType name="FasDIIMaxReceivingQueueDepth" content="empty" model="closed">
  <attribute type="fdt:nodeId" required="no"/>

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    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fasDllMaxReceivingQueueDepth" required="yes"/>
  </ElementType>

  <!-- "VcrStatisticsEntry" elements -->
  <ElementType name="VcrStaticEntryOdIndex" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fdt:index" required="yes"/>
  </ElementType>
  <ElementType name="ClearVcrStatistics" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="clearVcrStatistics" required="yes"/>
  </ElementType>
  <ElementType name="FasNumOfAbortsCtr" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fasNumOfAbortsCtr" required="yes"/>
  </ElementType>
  <ElementType name="FasLocallyGeneratedLastAborted" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fasLocallyGeneratedLastAborted" required="yes"/>
  </ElementType>
  <ElementType name="FasReasonLastAborted" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fasReasonLastAborted" required="yes"/>
  </ElementType>
  <ElementType name="DllNumOfDtPdsSent" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="dllNumOfDtPdsSent" required="yes"/>
  </ElementType>
  <ElementType name="DllNumOfDtPdsReceived" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="dllNumOfDtPdsReceived" required="yes"/>
  </ElementType>
  <ElementType name="DllNumOfDIDataTransferTimeoutFailures" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="dllNumOfDIDataTransferTimeoutFailures" required="yes"/>
  </ElementType>
  <ElementType name="DllNumOfRcvrQuFullDIDataFailures" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="dllNumOfRcvrQuFullDIDataFailures" required="yes"/>
  </ElementType>

  <!-- "DlmeBasicCharacteristics" elements -->
  <ElementType name="Version" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fftypes:versionNumber" required="yes"/>
  </ElementType>
  <ElementType name="BasicStatisticsSupportedFlag" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="basicStatisticsSupportedFlag" required="yes"/>
  </ElementType>
  <ElementType name="DIOperatFunctionalClass" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>

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        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="dlOperatFunctionalClass" required="yes"/>
    </ElementType>
    <ElementType name="DIDeviceConformance" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="dlDeviceConformance" required="yes"/>
    </ElementType>

    <!-- "DlmeBasicInfo" elements -->
    <!-- AttributeType name="SlotTime" already defined in DlmeLinkSettings /-->
    <!-- AttributeType name="maxResponseDelay" already defined in DlmeLinkSettings /-->
    <ElementType name="ThisNode" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="thisNode" required="yes"/>
    </ElementType>
    <!-- AttributeType name="ThisLink" already defined in DlmeLinkSettings /-->
    <!-- AttributeType name="timeSyncClass" already defined in DlmeLinkSettings /-->
    <!-- AttributeType name="preambleExtension" already defined in DlmeLinkSettings /-->
    <!-- AttributeType name="postTransGapExtension" already defined in DlmeLinkSettings /-->
    <!-- AttributeType name="maxInterChanSignalSkewthisLinkalready defined in DlmeLinkSettings /-->

    <!-- "DlmeBasicStatistics" elements -->
    <ElementType name="NumOfDlpduTransmitted" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numOfDlpduTransmitted" required="yes"/>
    </ElementType>
    <ElementType name="NumOfGoodDlpduReceived" dt:type="ui4">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numOfGoodDlpduReceived" required="yes"/>
    </ElementType>
    <ElementType name="NumOfPartialReceivedDlpdu" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numOfPartialReceivedDlpdu" required="yes"/>
    </ElementType>
    <ElementType name="NumOfFcsFailures" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numOfFcsFailures" required="yes"/>
    </ElementType>
    <ElementType name="NumOfNodeTimeOffsetDiscontinuousChanges" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="numOfNodeTimeOffsetDiscontinuousChanges" required="yes"/>
    </ElementType>

    <!-- "DlmeLinkMasterInfo" elements -->
    <ElementType name="MaxSchedulingOverhead" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="maxSchedulingOverhead" required="yes"/>
    </ElementType>
    <ElementType name="DefMinTokenDelegTime" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="defMinTokenDelegTime" required="yes"/>
    </ElementType>
    <ElementType name="DefTokenHoldTime" content="empty" model="closed">
        <attribute type="fdt:nodeId" required="no"/>
        <attribute type="fdt:readAccess" required="no"/>
        <attribute type="fdt:writeAccess" required="no"/>
        <attribute type="defTokenHoldTime" required="yes"/>
    </ElementType>
    <ElementType name="TargetTokenRotTime" content="empty" model="closed">

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    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="targetTokenRotTime" required="yes"/>
  </ElementType>
  <ElementType name="LinkMaintTokHoldTime" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="linkMaintTokHoldTime" required="yes"/>
  </ElementType>
  <ElementType name="TimeDistributionPeriod" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="timeDistributionPeriod" required="yes"/>
  </ElementType>
  <ElementType name="MaximumInactivityToClaimLasDelay" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="maximumInactivityToClaimLasDelay" required="yes"/>
  </ElementType>
  <ElementType name="LasDatabaseStatusSpduDistributionPeriod" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="lasDatabaseStatusSpduDistributionPeriod" required="yes"/>
  </ElementType>

  <!-- "DlmeLinkMasterStatistics" elements -->
  <ElementType name="NumLasRoleDelegOrClaimOrDelegTokenHoldTimeout" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="numLasRoleDelegOrClaimOrDelegTokenHoldTimeout" required="yes"/>
  </ElementType>

  <!-- "LastValues" elements -->
  <ElementType name="FrameControlOctetN" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="frameControlOctetN" required="yes"/>
  </ElementType>
  <ElementType name="AddressSubfieldsN" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="addressSubfieldsN" required="yes"/>
  </ElementType>
  <ElementType name="FrameControlOctetNminus1" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="frameControlOctetNminus1" required="yes"/>
  </ElementType>
  <ElementType name="AddressSubfieldsNminus1" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="addressSubfieldsNminus1" required="yes"/>
  </ElementType>
  <ElementType name="FrameControlOctetNminus2" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="frameControlOctetNminus2" required="yes"/>
  </ElementType>
  <ElementType name="AddressSubfieldsNminus2" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="addressSubfieldsNminus2" required="yes"/>
  </ElementType>
  <ElementType name="FrameControlOctetNminus3" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>

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    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="frameControlOctetNminus3" required="yes"/>
  </ElementType>
  <ElementType name="AddressSubfieldsNminus3" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="addressSubfieldsNminus3" required="yes"/>
  </ElementType>

  <!-- "LinkScheduleListCharacteristics" elements -->
  <ElementType name="NumOfSchedules" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="numOfSchedules" required="yes"/>
  </ElementType>
  <ElementType name="NumOfSubSchedulesPerSchedule" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="numOfSubSchedulesPerSchedule" required="yes"/>
  </ElementType>
  <ElementType name="ActiveScheduleVersion" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fftypes:versionNumber" required="yes"/>
  </ElementType>
  <ElementType name="ActiveScheduleOdIndex" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fdt:index" required="yes"/>
  </ElementType>
  <ElementType name="ActiveScheduleStartingTime" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="activeScheduleStartingTime" required="yes"/>
  </ElementType>
  <ElementType name="ScheduleDomain" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fftypes:domain" required="yes"/>
  </ElementType>

  <!-- "PlmeBasicCharacteristics" elements -->
  <ElementType name="ChannelStatisticsSupported" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="channelStatisticsSupported" required="yes"/>
  </ElementType>
  <ElementType name="MediumAndDataRatesSupported" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="mediumAndDataRatesSupported" required="yes"/>
  </ElementType>
  <ElementType name="IecVersion" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="fftypes:versionNumber" required="yes"/>
  </ElementType>
  <ElementType name="NumOfChannels" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>
    <attribute type="fdt:writeAccess" required="no"/>
    <attribute type="numOfChannels" required="yes"/>
  </ElementType>
  <ElementType name="PowerMode" content="empty" model="closed">
    <attribute type="fdt:nodeId" required="no"/>
    <attribute type="fdt:readAccess" required="no"/>

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