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TECHNICAL REPORT

colour inside

Interoperation guide for field device tool (FDT) / device type manager (DTM) and electronic device description language (EDDL)

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Interoperation guide for field device tool (FDT) / device type manager (DTM) and electronic device description language (EDDL)

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INTEROPERATION GUIDE FOR FIELD DEVICE TOOL (FDT) / DEVICE TYPE MANAGER (DTM) AND ELECTRONIC DEVICE DESCRIPTION LANGUAGE (EDDL)

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IEC 62795, 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.

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

Enquiry draft	Report on voting
65E/240/DTR	65E/330/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

At present, there are two International Standards for device integration that describe the properties of automation system components to be used in host systems. They are IEC 61804 for electronic device description language (EDDL) and IEC 62453 for field device tools (FDT), with both standards having their own characteristics. The number of manufacturers and users using EDDL or FDT technologies is increasing, and investment in both of them is therefore increasing too.

EDDL technology enables the integration of real product details using the tools of the engineering life cycle and specifies EDDL as a generic language for describing the properties of automation system components. EDDL technology allows to transfer the properties of a device to a data set, called electronic device description (EDD), that can be interpreted by configuration tools in a host system. EDD files, representing the behavior and attributes of a device, can be stored in the field device or control system. The interaction between a field device and a control system uses various communication protocols such as specified in IEC 61784-1, CP 1-1 (FF) or IEC 61784-1, CP 9-1 (HART®[1]).

FDT is an open and independent software interface specification. An FDT specification describes software interface and relationships within the framework of the project (FDT container, FDT frame applications) and device software components in a Device Type Manager (DTM). An FDT framework is independent from the devices and fieldbus system, while the DTM depends on specific device and fieldbuses.

Both technologies are supported by automation vendors and users, so that there is a need to generate a DTM based on an EDD as long as the field device integration (FDI) technology is not published as an International Standard.

FDI (IEC 62769) covers device integration and device management technology, combining base concepts and technology aspects of the EDDL (IEC 61804), FDT (IEC 62543) and OPC UA (IEC 62541-1). The combination of those different proven technologies ensures a secure life cycle and the ability to address all challenges of device integration and device management in a scalable manner.

EDDL and FDT are complimentary in a way that an EDDL can be converted into an FDT-DTM. As long as FDI is not available, converting EDD into a DTM helps to combine the two standards and use EDDs in an FDT frame environment in case there is no specific DTM available. The conversion criterion is based on EDDL and FDT technologies.

1 HART® is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of this product.

INTEROPERATION GUIDE FOR FIELD DEVICE TOOL (FDT) / DEVICE TYPE MANAGER (DTM) AND ELECTRONIC DEVICE DESCRIPTION LANGUAGE (EDDL)

1 Scope

This Technical Report provides the general requirements for converting an EDD into a DTM. Using this TR, an FDT/DTM developer can develop an EDD-DTM conversion tool that can be used to import, parse, and manage EDD to generate the corresponding DTM. A conversion tool versus a DTM written independent of an EDD helps the DTM generation to maintain consistency in function, data and presentation styles.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61804 (all parts), *Function blocks (FB) for process control*

IEC 61804-3:2010, *Function blocks (FB) for process control – Part 3 Electronic Device Description Language (EDDL)*

IEC 62453-1:2009, *Field device tool (FDT) interface specification – Part 1: Overview and guidance*

3 Terms, definitions, and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62453-1, IEC 61804-3, as well as the following apply.

3.1.1
agent interpreter
analytical software for parsing EDD

Note 1 to entry: An agent interpreter can parse out the elements in the EDD document and map to the DTM.

Note 2 to entry: An agent interpreter can realize the interaction between the DTM and the physical device.

3.1.2
application
software functional unit that is specific to the solution of a problem in industrial-process measurement and control

Note 1 to entry: An application may be distributed across multiple resources, and may communicate with other applications.

[SOURCE: IEC 61499-1:2005, 3.5]

3.1.3
device type manager
DTM
device-specific application software components

3.1.4
field device tool
FDT
interfaces for data exchange among the field devices and control systems, engineering tools, and resource management system tools

3.2 Abbreviations

BTM	Block type manager
COM	Component object model
CP	Communication profile
DCS	Distributed control system
DD	Device description
DLL	Dynamic link library
DTM	Device type manager
EDD	Electronic device description
EDDL	Electronic device description language
ERP	Enterprise resource planning
FA	Frame application
FB	Function block
FDI	Field device integration
FDT	Field device tool
FF	Fieldbus Foundation
GUI	Graphical user interface
I/O	Input/output
ID	Identifier
IT	Information technology
MES	Manufacturing execution systems
OLE	Object linking and embedding
OPC	Open connectivity via open standards
PLC	Programmable logic controller
SCADA	Supervisory, control and data acquisition
UML	Unified modeling language
UUID	Universal unique identifier
XML	Extensible markup language

4 Typical methods to convert EDD to FDT/DTM

4.1 Overview

There are three typical methods to integrate EDD documents into FDT:

- Using a universal DTM to integrate EDD documents.

- Using a converting tool importing an EDD document to generate a DTM.
- Developing a DTM based on an EDD.

4.2 Using a universal DTM to integrate the EDD document

4.2.1 General

FDT/DTM developers provide a universal DTM, which contains an EDD interpreter. The implementation of the DTM is very flexible, so an EDD interpreter can be embedded into the COM component of the DTM. The interpreter can be implemented in the DTM interface to not change the external form of the DTM. When the host sends a request to this universal DTM server, the DTM server acquires the information on the requested data by looking for a data sheet generated by the interpreter, which then bases itself on this information to communicate directly with the DTM through a communication device. When the DTM is running, the EDD can be imported, the interpreter analyses the documents, and then generates the functions and data according to the EDD. The corresponding functions and data are released after the FA releases the DTM. Before the next time it is used, the file needs to be imported and treated accordingly. Since the universal DTM needs to parse different EDD files, and generate a corresponding DTM, the EDD file format is very essential The EDD file format needs to be defined in order to parse correctly. If the EDD file format is not unified, the interpreter cannot parse or not exactly as the analytical results are given, and as a result, it will not generate a DTM or generated DTMs will be different, affecting consistency.

The procedure for using a universal FDT/DTM to integrate the EDD document is as follows:

1) Users start updating the list of FDT application devices, more precisely, the list of DTM device types.
2) The FDT application instantiates the general device FDT, calling the DTM interface functions IDtmInformation::GetInformation or calling the DTM interface functions IDtmInformation2::GetDeviceIdentificiationInformation.
3) The universal DTM reads all the EDD files of a predefined path, parsing EDD file type information such as the protocol which the devices support, manufacturer identification, manufacturer name, device type ID, device name, EDD file path names.
4) The universal DTM writes the information into XML documents according to XML schema defined by the FDT, and returns the XML documents back to the FDT application. The XML documents can contain more than one device type information.
5) The FDT frame application generates a list of device types according to XML documents. At this point the devices' name defined in the EDD files will appear in the list.
6) Users create a new project in the FDT application, and select a communication DTM type (i.e. an instance of a communication DTM) for the project.
7) Users select a type of universal DTM from the list of DTM device types (universal DTM) and add it into communication DTM as a sub-project.
8) During the instancing of a universal DTM, the FDT frame application calls a DTM interface function IDtm:InitNew. An input parameter of the function is an XML document, which contains the device type information of a specific DTM. Since the information contains the EDD file path information, the universal DTM reads one EDD file according to this information and parses this file then generates the corresponding internal data model or internal database according to the parameters of this EDD.
9) The communication DTM calls the interface function of the universal DTM IDtmParamenter::GetParamenters to obtain information associated with the parameters of the device.

4.2.2 Basic contents of the transformation from EDD to DTM

The transformation steps could be as follows:

1) Defining the transformation model

This requirement will be based on the EDDL specification to design a conversion model. The model needs to achieve the following contents: parameter type, communication mode, method, menu and other functions.

The characteristics of the DTM need to conform to the specification according to the actual requirements, and the requirements of being able to provide consistent data and functionality.

The features of the DTM need to demonstrate the data and functions which are involved in EDDL. It can support only some of the features in EDDL. The usual functions are: the displaying and setting of parameters, reading and writing parameters, user interface and so on.

2) The specifications of the DTM interface, i.e. it is required to be able to display the EDD interface correctly.

   The EDD’s interface is defined by the menu, so it is better to correspond with the EDDL menu when designing the DTM interface, and that will maintain the consistency of the interface.

3) After the specifications of how describing to resolve the EDD document, the interaction between the instance and field devices as well as between the instance and the framework should be handled.

   The interaction between the instance and field devices needs to communicate with the hardware, which requires a communication DTM to provide communication services. During the interaction, an FDT FA provides a standardized method to handle the interaction between Framework applications and each instance.

4) The specification of object mapping between EDDL and FDT

   Object mapping is divided into two steps. First, it is required to map the elements of the table, such as TYPE, ADDRESSBLOCK parsed from the EDD document, to the member variables of the device object, and map the METHOD COMMAND to the member functions of device object. Second, it is required to map member variables and methods of the device object into FDT.

5) Guarantee that DTM can well manage the EDD document loaded in it well.

4.2.3 Procedure

The procedure for the transformation from EDD to DTM is shown in Figure 1.