SLOVENSKI STANDARD
oSIST prEN IEC 62769-8:2022

01-maj-2022

Integracija procesne naprave (FDI) - 8. del: Preslikava EDD v OPC-UA

Field device integration (FDI) - Part 8: EDD to OPC-UA Mapping

Ta slovenski standard je istoveten z: **prEN IEC 62769-8:2022**

ICS:		
25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

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65E/851/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC SC 65E : DEVICES AND INTEGRATION IN ENTERPRISE SYSTEMS

SECRETARIAT: United States of America	SECRETARY: Mr Donald (Bob) Lattimer
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

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TITLE:

Field device integration (FDI) - Part 8:EDD to OPC-UA Mapping

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIELD DEVICE INTEGRATION (FDI) –

Part 8: EDD to OPC-UA Mapping

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The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

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

The language used for the development of this International Standard is English.

148 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance
149 with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at
150 www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater
151 detail at www.iec.ch/standardsdev/publications.

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

155 • reconfirmed,
156 • withdrawn,
157 • replaced by a revised edition, or
158 • amended.
159

FIELD DEVICE INTEGRATION (FDI) –

Part 8: EDD to OPC-UA Mapping

1 Scope

This part of IEC 62769 specifies how the internal view of a device model represented by the EDD can be transferred into an external view as an OPC-UA information model by mapping EDD constructs to OPC-UA objects.

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 edition of the referenced document (including any amendments), which applies for a specific FDI Technology Version is defined within the FDI Technology Management Document and on the support portals of FieldComm Group and PI International.

IEC 62769-1, Field Device Integration (FDI) – Part 1: Overview

IEC 62769-5, Field Device Integration (FDI) – Part 5: FDI Information Model

IEC 62769-6, Field Device Integration (FDI) – Part 6: FDI Technology Mapping

IEC 62541-3, *OPC unified architecture – Part 3: Address Space* Model

IEC 62541-4, *OPC unified architecture – Part 4:* Services

IEC 62541-5, *OPC unified architecture – Part 5: Information Model*

IEC 62541-8, *OPC unified architecture – Part 8: Data* Access

IEC 62541-9, OPC unified architecture – Part 9: Alarms and Conditions

IEC 62541-17, OPC unified architecture – Part 17: Alias Names

IEC 62541-19, OPC unified architecture – Part 19: Dictionary Reference

IEC 62541-100, OPC unified architecture – Part 100: Devices

OPC 30081, UA CS for Process Automation Devices - PA-DIM 1.00

UN/CEFACT, UNECE Recommendation N 20, Codes for Units of Measure Used in International Trade

https://www.unece.org/cefact/codesfortrade/codes_index.html

3 Terms, definitions, abbreviated terms, acronyms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62769-1, IEC 62769-5, IEC 62769-6, IEC 62541-3, IEC 62541-3, IEC 62541-5, IEC 62541-8, IEC 62541-9, IEC 62541-17, IEC 62541-19, IEC 62541-100, and OPC 30081 apply.

3.2 Abbreviated terms and acronyms

For the purposes of this document, the abbreviated terms and acronyms given in FCG TS62769-1 as well as the following apply.

PA-DIM Process Automation Device Information Model

3.3 Conventions for graphical notation

OPC UA defines a graphical notation for an OPC UA AddressSpace. It defines graphical symbols for all NodeClasses and how different types of References between Nodes can be visualized. Figure 1 shows the symbols for the NodeClasses used in this standard. NodeClasses representing types always have a shadow.

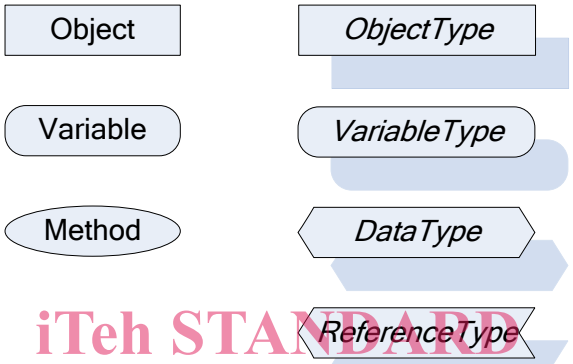


Figure 1 - OPC UA Graphical Notation for NodeClasses

Figure 2 shows the symbols for the ReferenceTypes used in this standard. The Reference symbol is normally pointing from the source Node to the target Node. The only exception is the HasSubType Reference. The most important References such as HasComponent, HasProperty, HasTypeDefinition and HasSubType have special symbols avoiding the name of the Reference. For other ReferenceTypes or derived ReferenceTypes the name of the ReferenceType is used together with the symbol.

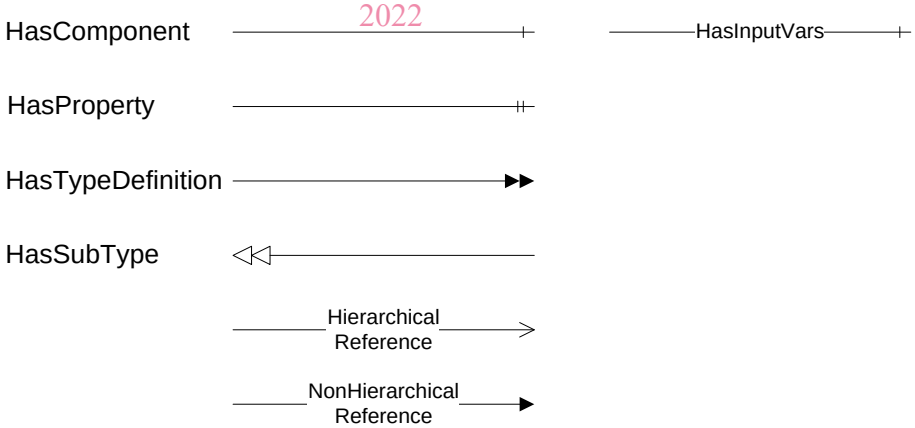


Figure 2 -OPC UA Graphical Notation for References

Figure 3 shows a typical example for the use of the graphical notation. Object_A and Object_B are instances of the ObjectType_Y indicated by the HasTypeDefinition References. The ObjectType_Y is derived from ObjectType_X indicated by the HasSubType Reference. The Object_A has the components Variable_1, Variable_2 and Method_1.

To describe the components of an Object on the ObjectType the same NodeClasses and References are used on the Object and on the ObjectType such as for ObjectType_Y in the example. The Nodes used to describe an ObjectType are instance declaration Nodes.

To provide more detailed information for a Node, a subset or all Attributes and their values can be added to a graphical symbol (see for example Variable_1, the component of Object_A in Figure 3).

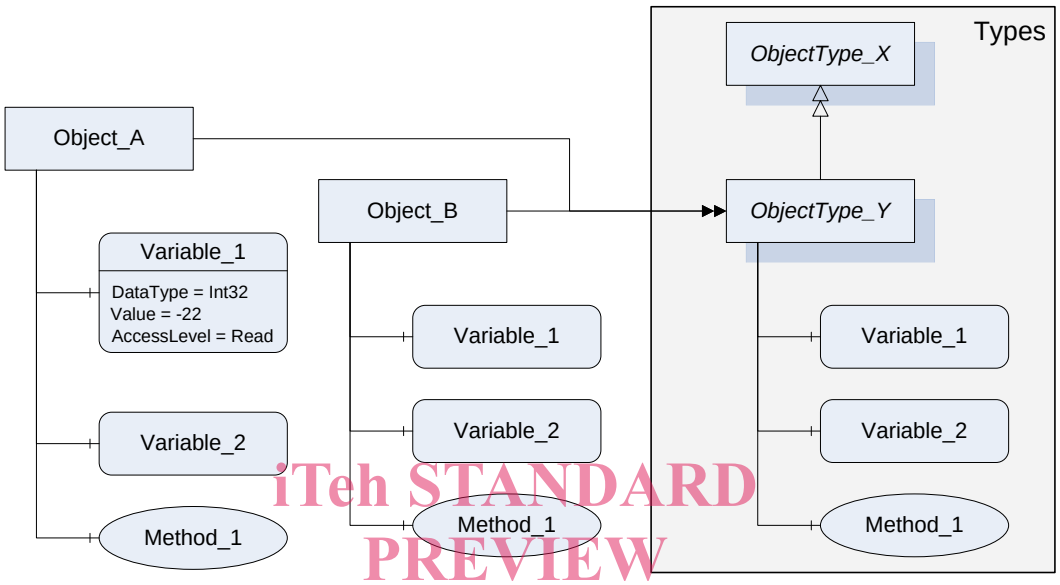


Figure 3 - OPC UA Graphical Notation Example

To improve readability, this document frequently includes the type name inside the instance box rather than displaying both boxes and a reference between them. This optimization is shown in Figure 4.

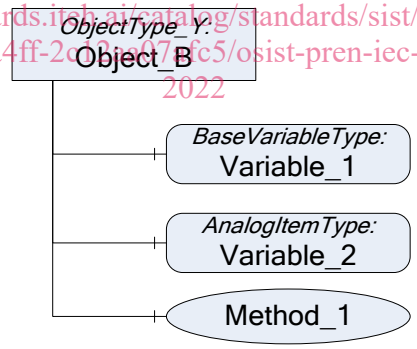
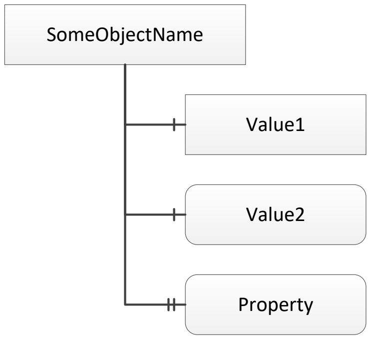


Figure 4 - Optimized Type Reference

4 Introduction

There are two types of mapping mechanisms – explicit and implicit mapping. Explicit mapping is provided by the EDD constructs SEMANTIC_MAP in combination with COLLECTIONS, METHODS and VARIABLES including the mapping of enumerations and is done by the EDD-developer. Implicit mapping is provided by the implementation of the OPC-UA server in conjunction with a FDI server and covers definitions like default casts (e.g. any number value to float64) or even the mapping of complete lists of unit codes from a fieldbus domain (HART, Profibus, …) into an OPC-UA domain (e.g. UNECE, CDD, …).

Looking at OPC-UA objects containing named data items like attributes, properties, variables and other objects, the most similar EDD objects are collections containing named data items like variables, menus and other collections (see Figure 5).




```
COLLECTION SomeCollectionName
{
    LABEL      "Some Label";
    HELP   [blank];
    MEMBERS
    {
     Value1,    VAR_Value_1;
     Value2,    VAR_Value_1;
     Property, VAR_Property_1;
    }
}
```

Figure 5 - Similarity of OPC-UA objects and EDD collections

In fact, the EDD construct collection is the key element for the basic principle of how EDD device model data shall be mapped into an OPC-UA information model. The following clauses describe and define how this must be done. Therefor this document has normative character for EDD developers and developers of OPC-servers accessing an FDI server to publish an OPC-UA information model according to a specific OPC-UA namespace and the mapping information provided by the EDD.

Clause 5 covers in detail how the mapping works in principle and for any OPC-UA information model based on any namespace.

Based on Clause 5, Clause 7 describes some details how to map the EDD into PA-DIM. Additional normative definitions how to map fieldbus specific data (e.g. identification) into PA-DIM is provided by the FDI-Profile specifications for HART, FF, PROFINET, Profibus, Modbus and ISA100.

Before starting with doing some EDD mapping, it is strongly recommended to get a basic understanding of OPC-UA concerning how object types, variable types and reference types are defined.

5 Basic principles of explicit mapping

5.1 Semantic maps to tag EDD constructs

For not having to use naming conventions for EDD constructs to link a specific purpose to an EDD construct, semantic maps shall be used to kind of tag an EDD construct by a specifically defined semantic id. For the time being three syntax definitions exist for three specific purposes. The details of how to use them will be explained in the corresponding context.

The syntax of semantic ids for EDD entry pointes is illustrated in Figure 6.

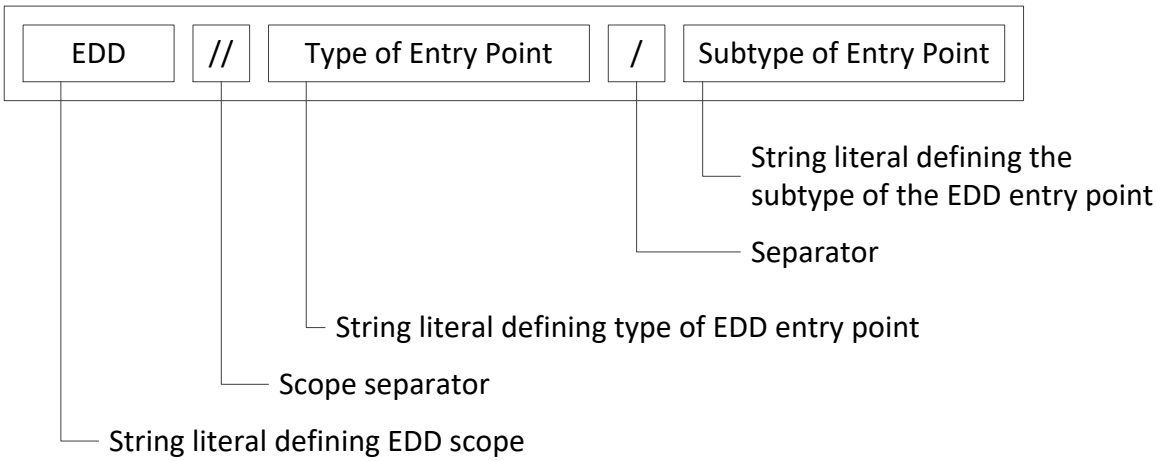


Figure 6 - Syntax of sematic ids for EDD entry points

5.2 Alias collections

Alias collections are used to define aliases for lengthy strings having a specific meaning. The alias should be short and shall be unique across the complete EDD. Aliases will be used as member identifiers or as a part of member identifiers or in SEMANTIC_MAPs for OPC-UA type mapping. Alias collections are the main entry points to resolve EDD to OPC-UA mapping and shall not depend on each other (see 5.3 and 5.4).

5.2.1 Syntax of semantic id for alias mappings

The syntax of semantic id for alias mapping is illustrated in Figure 7.

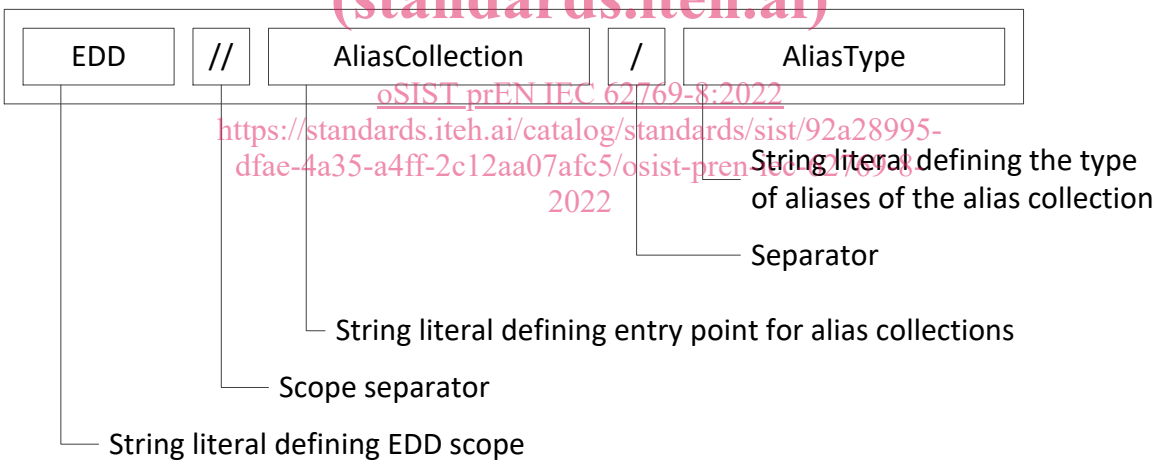


Figure 7 - Syntax of sematic id for alias mapping

5.3 Namespace Alias Collection

To prevent name conflicts, any OPC-UA type is defined in scope of a specific namespace. A namespace collection and appropriate variables shall be defined to provide suitable names for the namespace URIs. The member identifier of the collection item shall be used as an alias wherever a namespace identifier is needed. In the following example “__UA_” represents the namespace http://opcfoundation.org/UA/ which is defined by the default value of the referenced variable “UA_Namespace”.

It is mandatory to define at least one namespace collection for an EDD defining EDD to OPC-UA mapping.

Definition:
The name of the namespace collection shall be tagged by a SEMANTIC_MAP with the following semantic ID:

“EDD//AliasCollection/Namespaces”

The name of the namespace COLLECTION, the name of the SEMANTIC_MAP and the names of the referenced string variables can be freely chosen. The default value of the referenced string variable must contain a valid namespace.

Figure 8 shows an EDD Namespace Collection example.

```
SEMANTIC_MAP Namespace_Map
{
    "EDD//AliasCollection/Namespaces" : Namespace_Collection
}

COLLECTION OF VARIABLE Namespace_Collection
{
    LABEL "OPC-UA Namespaces";
    MEMBERS
    {
       __UA_,        UA_Namespace;
       __DI_,        DI_Namespace;
       __PADIM_,     PADIM_Namespace;
       UNECE,        UNECE_Namespace;
    }
}

VARIABLE UA_Namespace
{
    LABEL   "UA namespace";
    HELP    [blank];
    CLASS   LOCAL;
    HANDLING READ;
    TYPE    ASCII(100);
    DEFAULT_VALUE   "http://opcfoundation.org/UA/";
}

VARIABLE DI_Namespace
{
    LABEL   "DI namespace";
    HELP    [blank];
    CLASS   LOCAL;
    HANDLING READ;
    TYPE    ASCII(100);
    DEFAULT_VALUE   "http://opcfoundation.org/UA/DI/";
}

VARIABLE PADIM_Namespace
{
    LABEL   "PADIM namespace";
    HELP    [blank];
    CLASS   LOCAL;
    HANDLING READ;
    TYPE    ASCII(100);
    DEFAULT_VALUE   "http://opcfoundation.org/UA/PADIM/";
}

VARIABLE UNECE_Namespace
{
    LABEL   "UNECE namespace";
```