



IEC 62769-5

Edition 3.0 2023-04  
REDLINE VERSION

# INTERNATIONAL STANDARD



Field device integration (FDI®) –  
Part 5: FDI Information Model

ITh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[IEC 62769-5:2023](https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023)

<https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023>



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2023 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

**About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

**IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)**

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

**IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)**

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

**Electropedia - [www.electropedia.org](http://www.electropedia.org)**

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

International Standards  
Document Preview

[IEC 62769-5:2023](https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023)

<https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023>



IEC 62769-5

Edition 3.0 2023-04  
REDLINE VERSION

# INTERNATIONAL STANDARD



Field device integration (FDI®) –  
Part 5: FDI Information Model

IEC Standards  
(<https://standards.iteh.ai>)  
Document Preview

[IEC 62769-5:2023](https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023)

<https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 25.040.40; 35.100.05

ISBN 978-2-8322-6828-5

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	7
<del>INTRODUCTION.....</del>	<del>7</del>
1 Scope.....	10
2 Normative references .....	11
3 Terms, definitions, abbreviated terms, <b>acronyms</b> and conventions.....	12
3.1 Terms and definitions.....	12
3.2 Abbreviated terms and acronyms .....	12
3.3 Conventions.....	12
3.3.1 <b>Capitalization</b> .....	12
3.3.2 Conventions for graphical notation.....	12
4 Overview of OPC Unified Architecture .....	14
4.1 General.....	14
4.2 Overview of OPC UA Devices .....	15
5 Concepts .....	17
5.1 General.....	17
5.2 Device topology .....	17
5.3 Online/offline .....	18
5.4 Catalogue (Type Definitions).....	19
5.5 Communication .....	19
5.6 <b>Semantic Information</b> .....	19
6 AddressSpace organization.....	21
7 Device Model for FDI®.....	22
7.1 General.....	22
7.2 Online/offline .....	22
7.3 Device health.....	23
7.3.1 DeviceHealth Mapping.....	23
7.3.2 DeviceHealth Diagnostics .....	24
7.4 User interface elements .....	25
7.4.1 General .....	25
7.4.2 UI Description Type .....	25
7.4.3 UI Plug-in Type.....	26
7.5 Type-specific support information .....	27
7.6 Actions .....	28
7.6.1 Overview .....	28
7.6.2 Action Type .....	28
7.6.3 ActionService Type.....	29
7.6.4 ActionService Object .....	29
7.6.5 InvokeAction Method .....	30
7.6.6 RespondAction Method.....	31
7.6.7 AbortAction Method .....	32
7.6.8 <b>Interactive Transfer to device</b> .....	33
8 Network and connectivity.....	33
9 Utility functions.....	33
9.1 Overview.....	33
9.2 Locking.....	33
9.3 EditContext.....	34

9.3.1	Overview .....	34
9.3.2	EditContext Type .....	34
9.3.3	EditContext Object .....	34
9.3.4	GetEditContext Method .....	35
9.3.5	RegisterNodes Method .....	36
9.3.6	Apply Method .....	37
9.3.7	Reset Method .....	38
9.3.8	Discard Method .....	39
9.4	DirectDeviceAccess .....	40
9.4.1	General .....	40
9.4.2	DirectDeviceAccess Type .....	40
9.4.3	DirectDeviceAccess Object .....	41
9.4.4	InitDirectAccess Method .....	42
9.4.5	EndDirectAccess Method .....	42
9.4.6	Transfer Method .....	43
10	Parameter Types .....	44
10.1	General .....	44
10.2	ScalingFactor Property .....	45
10.3	Min_Max_Values Property .....	45
11	FDI® StatusCodes .....	46
11.1	General .....	46
11.2	Structure of the StatusCode .....	46
11.3	FDI® specific operation level result codes .....	47
12	Specialized topology elements .....	50
13	Auditing .....	51
13.1	General .....	51
13.2	FDI® Client-provided context information .....	51
13.3	LogAuditTrailMessage Method .....	51
14	FDI® Server Version .....	52
15	Mapping FDI® Package information to the FDI® Information Model .....	52
15.1	General .....	52
15.2	Localization .....	53
15.2.1	Localized text .....	53
15.2.2	Engineering units .....	53
15.3	Device .....	53
15.3.1	General .....	53
15.3.2	Mapping to Attributes to a specific DeviceType Node .....	53
15.3.3	Mapping to Properties .....	53
15.3.4	Mapping to ParameterSet .....	54
15.3.5	Mapping to Functional Groups .....	54
15.3.6	Mapping to DeviceTypeImage .....	54
15.3.7	Mapping to Documentation .....	54
15.3.8	Mapping to ProtocolSupport .....	54
15.3.9	Mapping to ImageSet .....	55
15.3.10	Mapping to ActionSet .....	55
15.3.11	Mapping to MethodSet .....	55
15.4	Modular Device .....	55
15.5	Block .....	55

15.5.1	General .....	55
15.5.2	Mapping to Attributes.....	55
15.5.3	Mapping to ParameterSet .....	56
15.5.4	Mapping to Functional Groups .....	56
15.5.5	Mapping to ActionSet.....	56
15.5.6	Mapping to MethodSet.....	56
15.5.7	Instantiation rules .....	56
15.6	Parameter.....	56
15.6.1	General .....	56
15.6.2	Private Parameters .....	61
15.6.3	MIN_Value and MAX_Value.....	61
15.6.4	Engineering units.....	61
15.6.5	Enumerated Parameters .....	61
15.6.6	Bit-enumerated Parameters .....	61
15.6.7	Representation of records.....	62
15.6.8	Representation of arrays, and lists of Parameters with simple data types .....	63
15.6.9	Representation of values arrays, and lists of RECORD Parameters .....	63
15.6.10	Representation of COLLECTION and REFERENCE ARRAY .....	64
15.6.11	SCALING_FACTOR.....	64
15.6.12	EDDL CLASS Attributes on Parameters.....	64
15.7	Functional Groups.....	66
15.8	AXIS elements in UIDs.....	66
15.9	Actions .....	66
15.10	UIPs .....	67
15.11	Protocols, Networks and Connection Points .....	67
15.12	Semantic Identifies .....	67
15.13	DictionaryIds Property.....	68
15.14	MultiStateDictionaryEntryDiscreteType .....	68
15.15	GetNodeIdsByDictionaryEntryId .....	69
16	Profiles.....	70
Annex A (normative) Namespace and Mappings .....		71
Bibliography.....		72
Figure 1 – FDI® architecture diagram .....		11
Figure 2 – OPC UA graphical notation for NodeClasses.....		13
Figure 3 – OPC UA graphical notation for References.....		13
Figure 4 – OPC UA graphical notation example .....		14
Figure 5 – Optimized Type Reference .....		14
Figure 6 – OPC UA Devices example: Functional Groups .....		16
Figure 7 – OPC UA Devices example: Configurable components .....		16
Figure 8 – Example of an automation system.....		17
Figure 9 – Example of a Device topology .....		18
Figure 10 – Example Device Types representing a catalogue .....		19
Figure 11 – Example of concrete DictionaryEntryType and Object .....		20
Figure 12 – Example of DictionaryEntries .....		21
Figure 13 – Online component for access to device data .....		22
Figure 14 – Hierarchy of user interface Types.....		25

Figure 15 – Integration of Actions within a TopologyElement .....	28
Figure 16 – Action Service .....	30
Figure 17 – EditContext type and instance .....	35
Figure 18 – DirectDeviceAccessType .....	40
Figure 19 – DirectDeviceAccess instance .....	41
Figure 20 – OPC UA VariableTypes including OPC UA DataAccess .....	45
Figure 21 – Example: Complex variable representing a RECORD .....	62
Figure 22 – Complex variable representing a VALUE_ARRAY of RECORDs .....	63
Figure 23 – Example of EDDL CLASS Attributes in the FDI® OPC UA Information Model .....	65
Table 1 – DeviceHealth Mapping .....	23
Table 2 – DeviceType definition (excerpt applicable for Subclause 7.3.1) .....	23
Table 3 – DeviceType definition with DeviceHealth and DeviceHealthDiagnostics .....	24
Table 4 – UIDescriptionType Definition .....	25
Table 5 – UIPlugInType Definition .....	26
Table 6 – ActionType Definition .....	29
Table 7 – ActionServiceType Definition .....	29
Table 8 – InvokeAction Method Arguments .....	31
Table 9 – InvokeAction Method AddressSpace Definition .....	31
Table 10 – RespondAction Method Arguments .....	32
Table 11 – RespondAction Method AddressSpace Definition .....	32
Table 12 – AbortAction Method Arguments .....	32
Table 13 – AbortAction Method AddressSpace Definition .....	33
Table 14 – EditContextType Definition .....	34
Table 15 – GetEditContext Method Arguments .....	35
Table 16 – GetEditContext Method AddressSpace Definition .....	36
Table 17 – RegisterNodes Method Arguments .....	36
Table 18 – RegisterNodes Method AddressSpace Definition .....	36
Table 19 – RegistrationParameters DataType Structure .....	37
Table 20 – RegisterNodesResult DataType Structure .....	37
Table 21 – Apply Method Arguments .....	38
Table 22 – Apply Method AddressSpace Definition .....	38
Table 23 – ApplyResult DataType Structure .....	38
Table 24 – Reset Method Arguments .....	39
Table 25 – Reset Method AddressSpace Definition .....	39
Table 26 – Discard Method Arguments .....	39
Table 27 – Discard Method AddressSpace Definition .....	39
Table 28 – DirectDeviceAccessType Definition .....	41
Table 29 – DirectDeviceAccess Instance Definition .....	42
Table 30 – InitDirectAccess Method Arguments .....	42
Table 31 – InitDirectAccess Method AddressSpace Definition .....	42
Table 32 – EndDirectAccess Method Arguments .....	43

Table 33 – EndDirectAccess Method AddressSpace Definition.....	43
Table 34 – Transfer Method Arguments .....	43
Table 35 – Transfer Method AddressSpace Definition .....	44
Table 36 – ScalingFactor Property Definition .....	45
Table 37 – Min_Max_Values Property Definition .....	46
Table 38 – Variant_Range DataType Structure .....	46
Table 39 – Variant_Range Definition.....	46
Table 40 – StatusCode Bit Assignments .....	47
Table 41 – DataValue InfoBits.....	47
Table 42 – Good operation level result codes .....	48
Table 43 – Uncertain operation level result codes .....	49
Table 44 – Bad operation level result codes.....	49
Table 45 – LogAuditTrailMessage Method Arguments.....	52
Table 46 – LogAuditTrailMessage Method AddressSpace Definition .....	52
Table 47 – FDI ServerVersion Property Definition .....	52
Table 48 – DeviceType Property Mapping.....	54
Table 49 – Setting OPC UA Variable Attributes from EDDL variable attributes .....	57
Table 50 – Correspondence between EDDL and OPC UA standard data types .....	58
Table 51 – Definition of EddIDictionaryType.....	64
Table 52 – Definition of EddIDictionary Object .....	64
Table 53 – Definition of Parameter Class Attributes .....	65
Table 54 – DictionaryIds Definition.....	68
Table 55 – MultiStateDictionaryEntryDiscreteType definition.....	68
Table 56 – GetNodeIdsByDictionaryEntryId Method arguments.....	69
Table 57 – GetNodeIdsByDictionaryEntryId Method result codes .....	69
Table 58 – GetNodeIdsByDictionaryEntryId .....	69
Table 59 – FDI® Server Facet Definition.....	70
Table 60 – FDI® Client Facet Definition .....	70



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIELD DEVICE INTEGRATION (FDI®) –

## Part 5: FDI® Information Model

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62769-5:2021. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

IEC 62769-5 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2021. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) added INTERACTIVE\_TRANSFER\_TO\_DEVICE ACTION.

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

Draft	Report on voting
65E/858/CDV	65E/915/RVC

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.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

A list of all parts in the IEC 62769 series, published under the general title *Field device integration (FDI)*<sup>®</sup>, 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 [webstore.iec.ch](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.

**IMPORTANT – The "colour inside" logo on the cover page of this document 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

The IEC 62769 series has the general title *Field Device Integration (FDI)* and the following parts:

- Part 1: Overview
- Part 2: FDI Client
- Part 3: FDI Server
- Part 4: FDI Packages
- Part 5: FDI Information Model
- Part 6: FDI Technology Mapping
- Part 7: FDI Communication Devices
- Part 100: Profiles — Generic Protocol Extensions
- Part 101-1: Profiles — Foundation Fieldbus H1
- Part 101-2: Profiles — Foundation Fieldbus HSE
- Part 103-1: Profiles — PROFIBUS
- Part 103-4: Profiles — PROFINET
- Part 109-1: Profiles — HART and WirelessHART
- Part 115-2: Profiles — Protocol-specific Definitions for Modbus RTU
- Part 150-1: Profiles — ISA 100.11a

iteh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[IEC 62769-5:2023](https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023)

<https://standards.iteh.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023>

## FIELD DEVICE INTEGRATION (FDI®) –

### Part 5: FDI® Information Model

#### 1 Scope

This part of IEC 62769 defines the FDI®<sup>1</sup> Information Model. One of the main tasks of the Information Model is to reflect the topology of the automation system. Therefore, it represents the devices of the automation system as well as the connecting communication networks including their properties, relationships, and the operations that can be performed on them. The types in the AddressSpace of the FDI® Server constitute ~~a~~ some kind of catalogue, which is built from FDI® Packages.

The fundamental types for the FDI® Information Model are well defined in OPC UA for Devices (IEC 62541-100). The FDI® Information Model specifies extensions for a few special cases and otherwise explains how these types are used and how the contents are built from elements of DevicePackages.

The overall FDI® architecture is illustrated in Figure 1. The architectural components that are within the scope of this document have been highlighted in this illustration.

iTeh Standards  
(<https://standards.itih.ai>)  
Document Preview

[IEC 62769-5:2023](#)

<https://standards.itih.ai/catalog/standards/iec/745111ce-3bdb-4f3e-9f15-e7409dd8b2d9/iec-62769-5-2023>

---

<sup>1</sup> FDI® is a registered trademark of the non-profit organization Fieldbus Foundation, Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance does not require use of the trade name. Use of the trade name requires permission of the trade name holder.

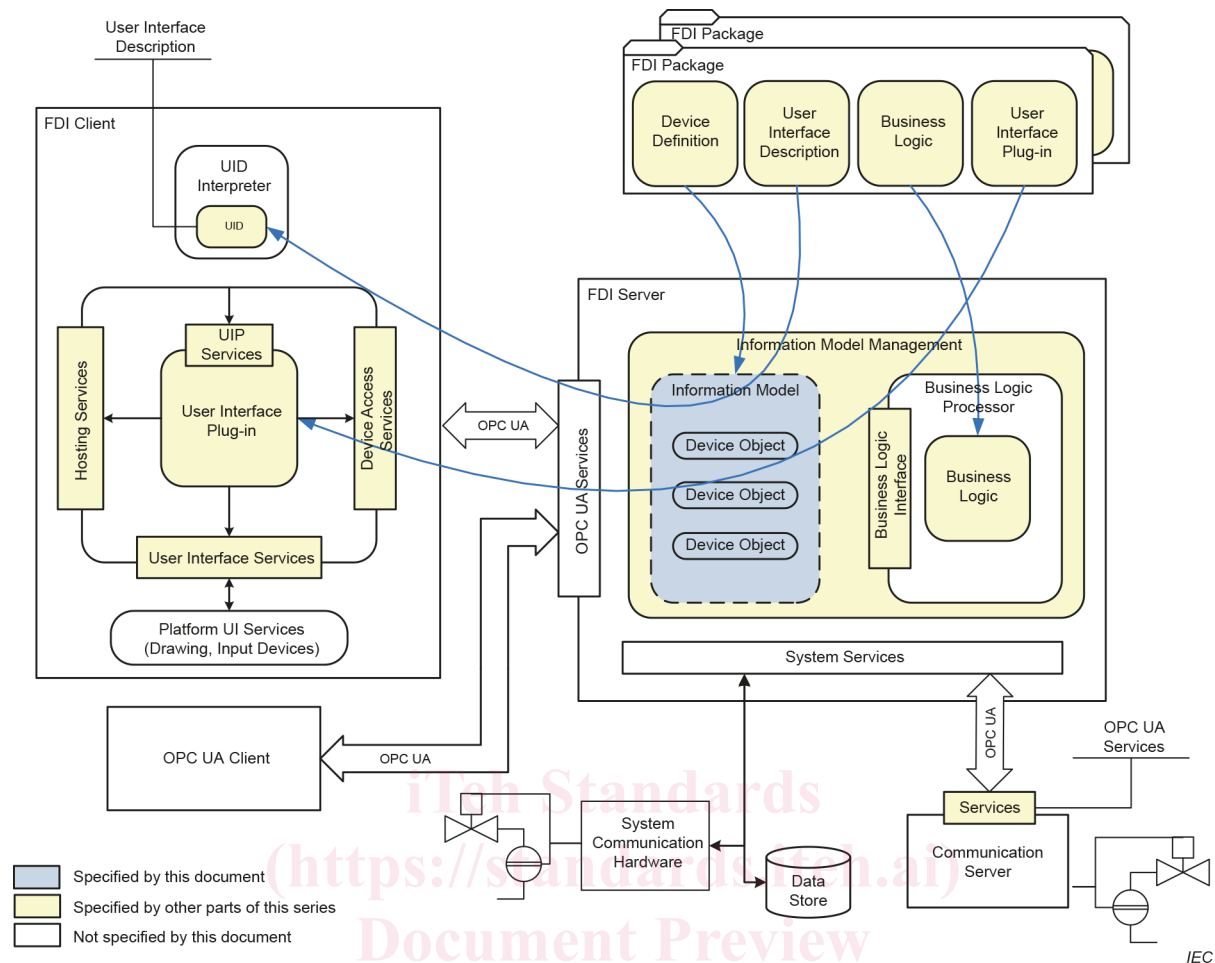


Figure 1 – FDI® architecture diagram

## 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, Industrial communication networks – Profiles – Part 1: Fieldbus profiles~~

IEC 61784-1-3:2023, *Industrial networks – Profiles – Part 1-3: Fieldbus profiles – Communication Profile Family 3*

IEC 61804-3, *Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 3: EDDL syntax and semantics*

IEC 61804-4, *Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 4: EDD interpretation*

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 62541-6, *OPC Unified Architecture – Part 6: Mappings*

IEC 62541-8, *OPC Unified Architecture – Part 8: Data Access*

IEC 62541-100, *OPC Unified Architecture – Part 100: ~~OPC UA for Devices~~ Device Interface*

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

IEC 62769-2, *Field Device Integration (FDI®) – Part 2: ~~FDI~~Client*

IEC 62769-3, *Field Device Integration (FDI®) – Part 3: Server*

IEC 62769-4, *Field Device Integration (FDI®) – Part 4: FDI® Packages*

IEC 62769-6, *Field Device Integration (FDI®) – Part 6: FDI® Technology Mappings*

IEC 62769-7, *Field Device Integration (FDI®) – Part 7: ~~FDI~~Communication Devices*

IEC 62769-1xx (all parts), *Field Device Integration (FDI®) – Part 1xx-y: Profiles*

OPC 10000-19, *OPC Unified Architecture – Part 19: Dictionary Reference*

### **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 and IEC 62769-3 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses: [http://www.iso.org/iso/iso\\_catalogue/catalogue\\_tc/catalogue\\_detail.htm?csnumber=82269](http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=82269)

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

#### **3.2 Abbreviated terms and acronyms**

For the purposes of this document, the abbreviated terms and acronyms given in IEC 62769-1 and the following apply.

HMI	Human Machine Interface
SCADA	Supervisory Control and Data Acquisition
TCP	Transmission Control Protocol

#### **3.3 Conventions**

~~For the purposes of this document, the conventions given in IEC 62769-1 apply.~~

##### **3.3.1 Capitalization**

Capitalization of the first letter of words is used in the IEC 62769 series to emphasize an FDI® defined term.