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Field device integration (FDI) –
Part 3: **FDI** Server

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI) –

Part 3: ~~FDI~~ Server

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International Standard IEC 62769-3 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

- a) modification of the edit context concept to harmonize the IEC 61804 and the IEC 62769 series.

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

FDIS	Report on voting
65E/760/FDIS	65E/770/RVD

Full information on the voting for the approval of this International Standard 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.

A list of all parts in the IEC 62769 series, published under the general title *Field Device Integration (FDI)*, 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- withdrawn,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.

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INTRODUCTION

~~The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning~~

- ~~a) method for the Supplying and Installation of Device-Specific Functionalities, see Patent Family DE10357276;~~
- ~~b) method and device for accessing a functional module of automation system, see Patent Family EP2182418;~~
- ~~c) methods and apparatus to reduce memory requirements for process control system software applications, see Patent Family US2013232186;~~
- ~~d) extensible device object model, see Patent Family US12/893,680.~~

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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

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FIELD DEVICE INTEGRATION (FDI) –

Part 3: FDI Server

1 Scope

This part of IEC 62769 specifies the FDI Server. 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 figure.

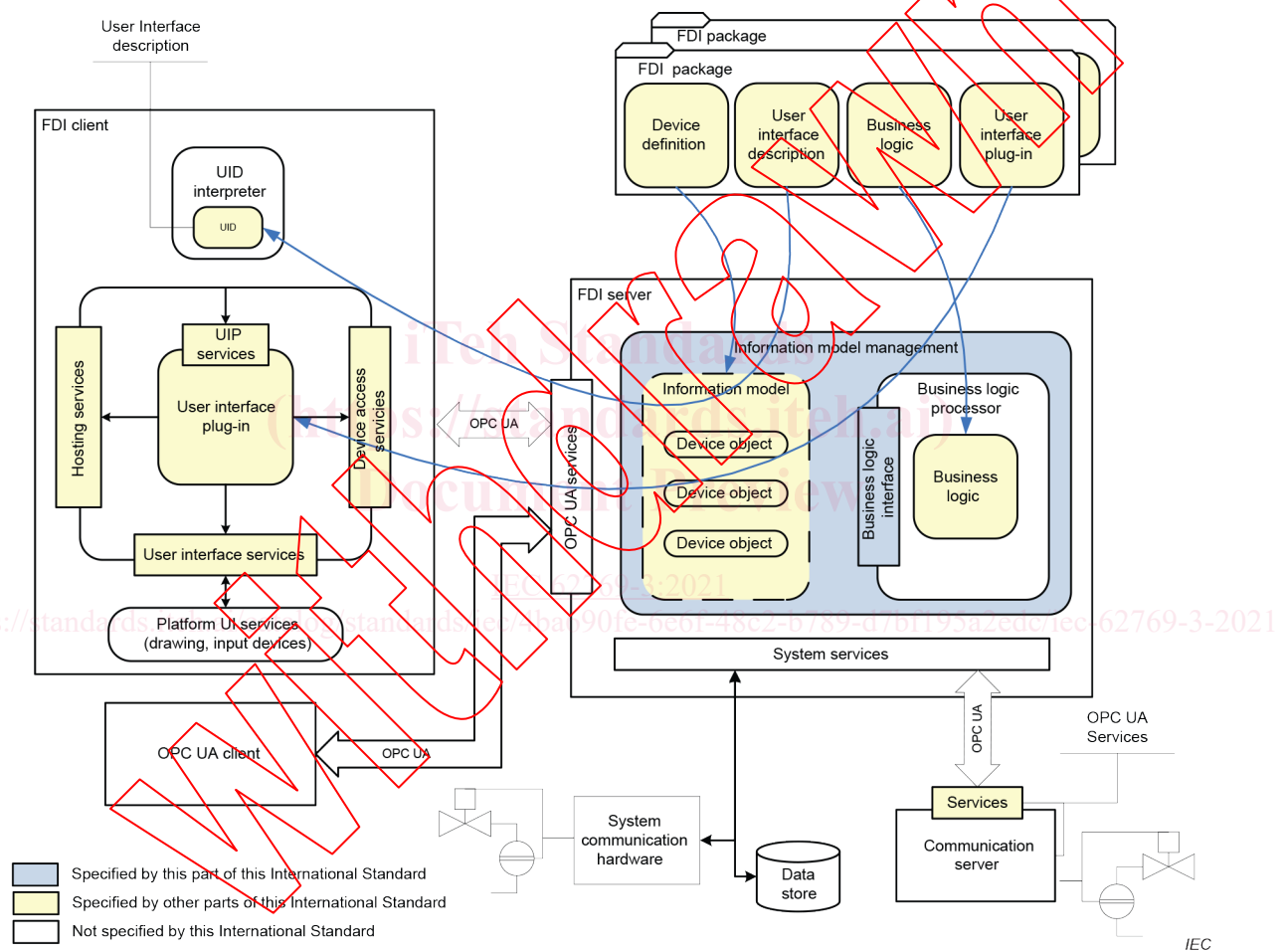


Figure 1 – FDI architecture diagram

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 61804 (all parts), *Function blocks (FB) for process control and electronic device description language (EDDL)*

~~IEC 61804-3¹, Function block (FB) for process control and Electronic Device Description Language (EDDL) – Part 3: EDDL syntax and semantics~~

~~IEC 61804-4², Function blocks (FB) for process control and Electronic Device Description Language (EDDL) – Part 4: EDD interpretation~~

IEC 61804-4:2020, Function blocks (FB) for process control and electronic device description language (EDDL) – Part 4: EDD interpretation

~~IEC 62541 (all parts), OPC unified architecture~~

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

IEC 62541-7, OPC unified architecture – Part 7: Profiles

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

~~NOTE – IEC 62769-1 is technically identical to FDI-2021.~~

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

~~NOTE – IEC 62769-2 is technically identical to FDI-2022.~~

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

~~NOTE – IEC 62769-4 is technically identical to FDI-2024.~~

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

~~NOTE – IEC 62769-5 is technically identical to FDI-2025.~~

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

~~NOTE – IEC 62769-7 is technically identical to FDI-2027.~~

3 Terms, definitions, abbreviated terms and ~~acronyms~~ conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62769-1 as well as the following 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>

3.1.1

Actions Proxy

internal FDI Server entity that encapsulates all the EDD Methods specified in an EDD Action definition

¹~~To be published.~~

²~~To be published.~~

3.2 Abbreviated terms ~~and acronyms~~

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

3.3 Conventions

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

4 Overview

The structure for an FDI Server is shown in Figure 1.

FDI Servers that support connectivity with third-party FDI Clients shall support OPC UA. A vendor can provide both an FDI Server and one or more FDI Clients. In this case, the FDI Clients can communicate with the FDI Server through proprietary protocols.

An FDI Server communicates with devices via Native Communication (see 7.2.1) and/or Communication Devices (see IEC 62769-7).

An FDI Server provides information to FDI Clients through an Information Model (see IEC 62769-5) as follows.

- The Information Model includes information about Device Types and Device Instances. The information for a Device Instance includes offline data (engineering data), as well as online data (values from the physical device).
- The Information Model is created using information from FDI Packages. However, not all of the information in an FDI Package is reflected in the Information Model.
- Referential integrity of the Information Model is maintained using information from FDI Packages.
- FDI Packages can contain Attachments that contain device manuals and protocol-specific information (see IEC 62769-4). Those Attachments, including device manuals and protocol-specific support files, are exposed via the Information Model.
- FDI Device Packages contain information about device types (see IEC 62769-4). Each device type defined in a package is mapped to a distinct DeviceType node in the Information Model.
- FDI Profile Packages are used to provide interaction with devices for which an FDI Device Package does not exist (see IEC 62769-4).
- Multiple revisions of an FDI Package generate distinct DeviceType nodes in the Information Model (see IEC 62769-4).

FDI Packages contain digital signatures that allow an FDI Server to authenticate their contents (see IEC 62769-4). An FDI Server shall not use an FDI Package if the digital signature provided by the FDI Package is invalid.

An FDI Server shall verify the FDI Technology Version (see IEC 62769-1) of any FDI Package it uses to ensure the FDI Package is compatible with the FDI Server.

The resulting functional structure of an FDI server is described in Annex A.

5 Information Model

5.1 General

The FDI Server shall use the Device Definition of an FDI Package to maintain the Information Model.

The Device Definition can contain conditional expressions. Conditional expressions are used when a certain aspect of the Device Definition is not static but rather is dependent on the state of the device. Whenever the online or offline values of a Device Instance are modified, the FDI Server shall re-evaluate the relevant conditional expressions and modify the Information Model accordingly.

The evaluation of conditional expressions can invalidate variables in the Information Model. The FDI Server shall change the AccessLevel attribute of invalidated variables such that they are neither readable nor writable and the status of these variables shall be set to bad. Read and write service requests for invalidated variables shall return a failure.

The Device Definition can specify relationships between variables in a device. These relationships can impact the value of variables in the Information Model.

The FDI Server shall generate DataChange Notifications to any FDI Clients that are subscribing to Information Model elements that have changed.

FDI Packages provide Business Logic that is used by the FDI Server to maintain the integrity of the Information Model. The Business Logic specified in an FDI Package can invoke builtin functions that shall be implemented by the FDI Server. The builtin functions that shall be implemented by the FDI Server are specified in IEC 61804-5.

5.2 Online/Offline

5.2.1 Overview

The Information Model maintained by the FDI Server contains online and offline values. The online values reflect values in a physical component/device. The offline values reflect values stored in a configuration database.

The offline values are updated through write service requests from an FDI Client or Business Logic executed by the FDI Server. The offline values are not updated when the FDI Server reads data from the device or writes data to the device.

The online values in the Information Model are not updated through write service requests. Successful write service requests through the Information Model result in value changes in the physical devices. The online values in the Information Model will then be updated as a result of read service requests or subscriptions.

FDI Servers can provide a server-specific mechanism for creating Device Instances without the presence of physical hardware. The FDI Server creates these instances using information in FDI Packages. All read/write requests for online values for Device Instances with no physical device shall return an error.

The transfer of information between the offline values and the physical device is supported through the TransferToDevice and TransferFromDevice methods in the Information Model. These Methods shall implement the download and upload procedures, respectively, as specified in IEC 61804-4. When no implementation is provided based on IEC 61804-4, then these Methods shall return Bad_NotSupported, as per IEC 62541-4.