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**Integracija procesne naprave (FDI) - 3. del: Strežnik**

Field Device Integration (FDI) - Part 3: Server

Feldgeräteintegration (FDI) - Teil 3: FDI-Server

Intégration des appareils de terrain (FDI) - Partie 3: Serveur

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<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	

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TITLE:

**Field Device Integration (FDI) - Part 3: Server**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIELD DEVICE INTEGRATION (FDI) –

## Part 3: Server

## FOREWORD

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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. 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.

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

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

183

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

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

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

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

- 194 • reconfirmed,
- 195 • withdrawn,
- 196 • replaced by a revised edition, or
- 197 • amended.

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## FIELD DEVICE INTEGRATION (FDI) –

### Part 3: 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.

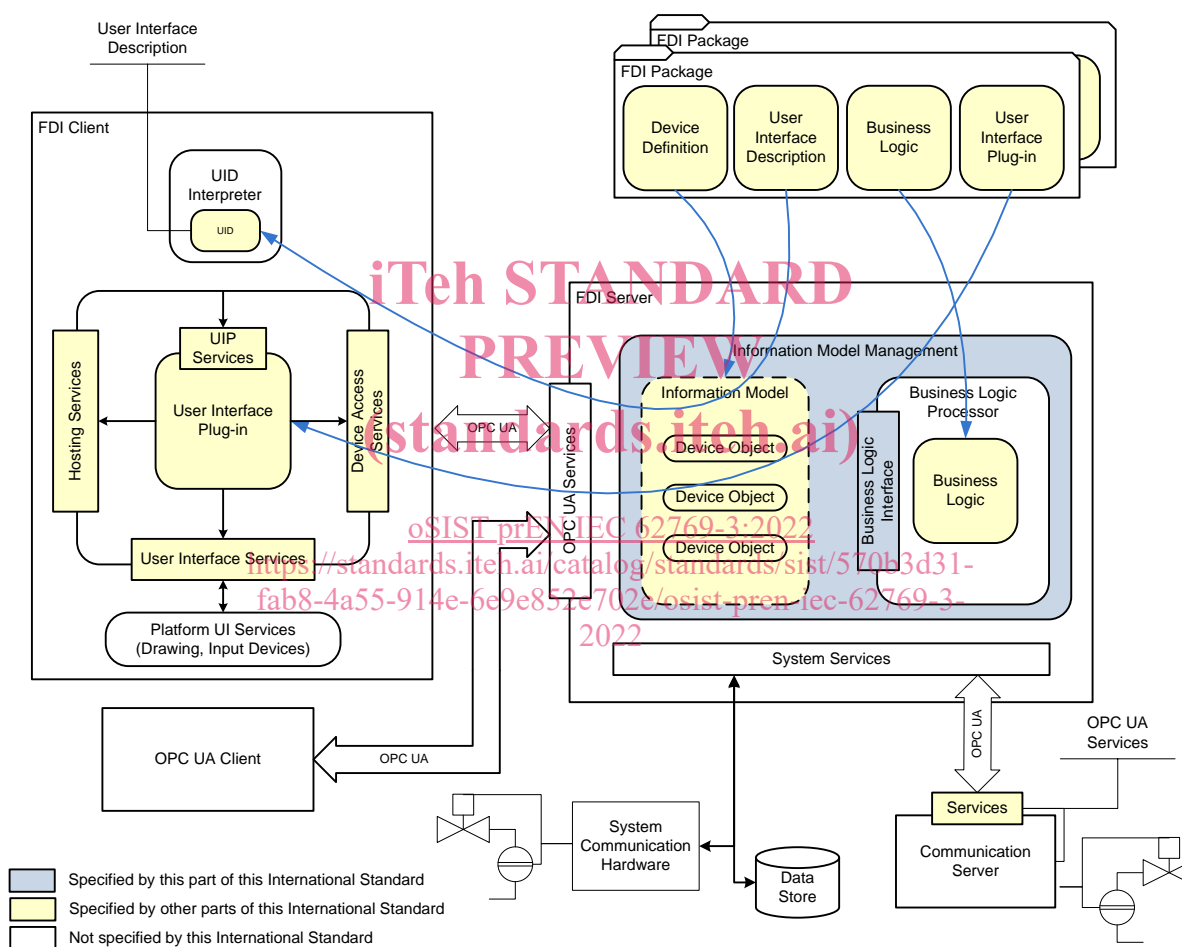


Figure 1 – FDI architecture diagram

#### 2 Normative references

The following documents, 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 61804-3, *Function blocks (FB) for process control and Electronic Device Description Language (EDDL) – Part 3: EDDL syntax and semantics*

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

218 IEC 61804-5, *Function blocks (FB) for process control and Electronic Device Description Language*  
 219 (EDDL) – Part 5: EDDL Builtin library

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

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

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

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

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

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

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

227

## 228 **3 Terms, definitions, abbreviated terms and acronyms**

### 229 **3.1 Terms and definitions**

230 For the purposes of this document, the terms and definitions given in IEC 62769-1 as well as the following  
 231 apply.

#### 232 **1.1.1**

#### 233 **Actions Proxy**

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

### 235 **3.2 Abbreviated terms and acronyms**

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

## 237 **4 Overview**

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

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

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

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

246 • The Information Model includes information about Device Types and Device Instances. The  
 247 information for a Device Instance includes offline data (engineering data), as well as online data  
 248 (values from the physical device).

249 • The Information Model is created using information from FDI Packages. However, not all of the  
 250 information in an FDI Package is reflected in the Information Model.

251 • 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 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.

## 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 built-in functions that shall be implemented by the FDI Server. The built-in 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, TransferFromDevice in the Information Model, and the INTERACTIVE\_TRANSFER\_TO\_DEVICE\_ACTION implementing the transfer including user interaction. 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.

The Device shall have been locked prior to invoking these methods, as specified in IEC 62769-5.

### 5.2.2 Transfer to device

The TransferToDevice method shall implement the download procedure as specified in IEC 61804-4. This transfers the offline values to the physical device.

As a general rule, the FDI Server should not change the Online variable node when writing a value to the device. The Online variable node should be updated only in the process of read operations or subscriptions. Notwithstanding, as specified in IEC 62769-5, the FDI Server will reset any cached Value for the target Nodes in the Information Model so that they will be re-read next time they are requested.

The status information returned for each variable included in the write service request is used to compose the TransferResult, as specified in IEC 62769-5.

### 5.2.3 Transfer from device

The TransferFromDevice method shall implement the upload procedure as specified in IEC 61804-4. This transfers the values from the physical device to the offline values.

If any read operations from the device fail during upload, the corresponding offline value shall not be modified.

The status information returned for each variable included in the read service request is used to compose the TransferResult, as specified in IEC 62769-5.

### 5.2.4 Interactive Transfer to device

The FDI Server implements the Interactive Transfer to Device as specified in IEC 61804-4. This transfers the offline values to the physical device. In contrast to the non-interactive download performed with the TransferToDevice method, the interactive download may invoke user interaction just before the download starts and after the download has been performed. The Interactive Transfer to device is started by an invocation of the INTERACTIVE\_TRANSFER\_TO\_DEVICE\_ACTION by the FDI Client using the InvokeAction service.

As a general rule, the FDI Server should not change the Online variable node when writing a value to the device. The Online variable node should be updated only in the process of read operations or subscriptions. Notwithstanding, as specified in IEC 62769-5, the FDI Server will reset any cached Value for the target Nodes in the Information Model so that they will be re-read next time they are requested.

### 5.3 Access privileges

Systems implement security and access policies based on a number of characteristics such as user role and plant area. FDI Servers use these policies, along with information in FDI Packages, to determine the access privileges granted to the user.

The elements of an FDI Package can be associated with one or more usage attributes. The FDI Server uses these attributes to set the UserAccessLevel attribute of Variables and the UserExecutable attribute of Methods. The usage attributes in an FDI Package are simply hints to be used by the FDI Server, i.e., they may be disregarded or overridden by the FDI Server. See also Annex B.

### 5.4 Private Parameters

The Parameters and Actions specified in an FDI Package may be declared private. Private Parameters and Actions shall not be browsable; they shall only be accessible through references from other elements of an FDI Package.

More specifically, the FDI Server shall support private Parameters and Actions as follows.

- The FDI Server shall create nodes in the Information Model for the private Parameters and Actions.
- The FDI Server shall not include information about private Parameters and Actions in a response to a Browse, BrowseNext, QueryFirst, or QueryNext service request.
- The FDI Server shall return the NodeIds of private Parameters and Actions when the name of a private Parameter or Action is passed to TranslateBrowsePathsToNodeIds.
- The FDI Server shall process a read/write service request for a private Parameter in the same way as it does for public (browsable) Parameters (see 5.7 and 5.8).
- The FDI Server shall execute private Actions in the same way as it does public (browsable) Actions (see 5.12).

An example of private parameters is parameters that should only be modified through an Action. These parameters should not be visible to FDI Clients to prevent direct access. FDI Clients invoke Actions to access these private parameters.

### 5.5 Locking

The FDI Server provides locking services to grant FDI Clients exclusive access to Device and Network elements in the Information Model. The locking services consist of a set of Methods and status information. The methods, and their behavior, are specified in IEC 62769-5.

The following behavior shall be implemented by the FDI Server to support locks.

- Locking applies to both online and offline nodes.
- Once locked by one FDI Client, any attempt to write to a Parameter or to execute an Action by another FDI Client shall be rejected.
- Locking is not required for read services.
- Parameters that are locked by one FDI Client can still be read by other FDI Clients, i.e., read requests on a Parameter that is locked are not rejected.

Internal use of the locking mechanism for maintaining the Information Model integrity is FDI Server vendor specific.

Figure 2 illustrates a locking sequence with multiple service invocations during the locked state.