

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Field Device Integration (FDI®) –  
Part 7: Communication Devices**

**Intégration des appareils de terrain (FDI®) –  
Partie 7: Appareils de Communication**

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STANDARD PREVIEW  
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## FIELD DEVICE INTEGRATION (FDI®) –

### Part 7: Communication Devices

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IEC 62769-7 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 ScanExtended Method.



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

Draft	Report on voting
65E/859/CDV	65E/916/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.

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# FIELD DEVICE INTEGRATION (FDI®) –

## Part 7: Communication Devices

### 1 Scope

This part of IEC 62769 specifies the elements implementing communication capabilities called Communication Devices.

The overall FDI®<sup>1</sup> architecture is illustrated in Figure 1. The architectural components that are within the scope of this document have been highlighted in this illustration. The document scope with respect to FDI® Packages is limited to Communication Devices. The Communication Server shown in Figure 1 is an example of a specific Communication Device.

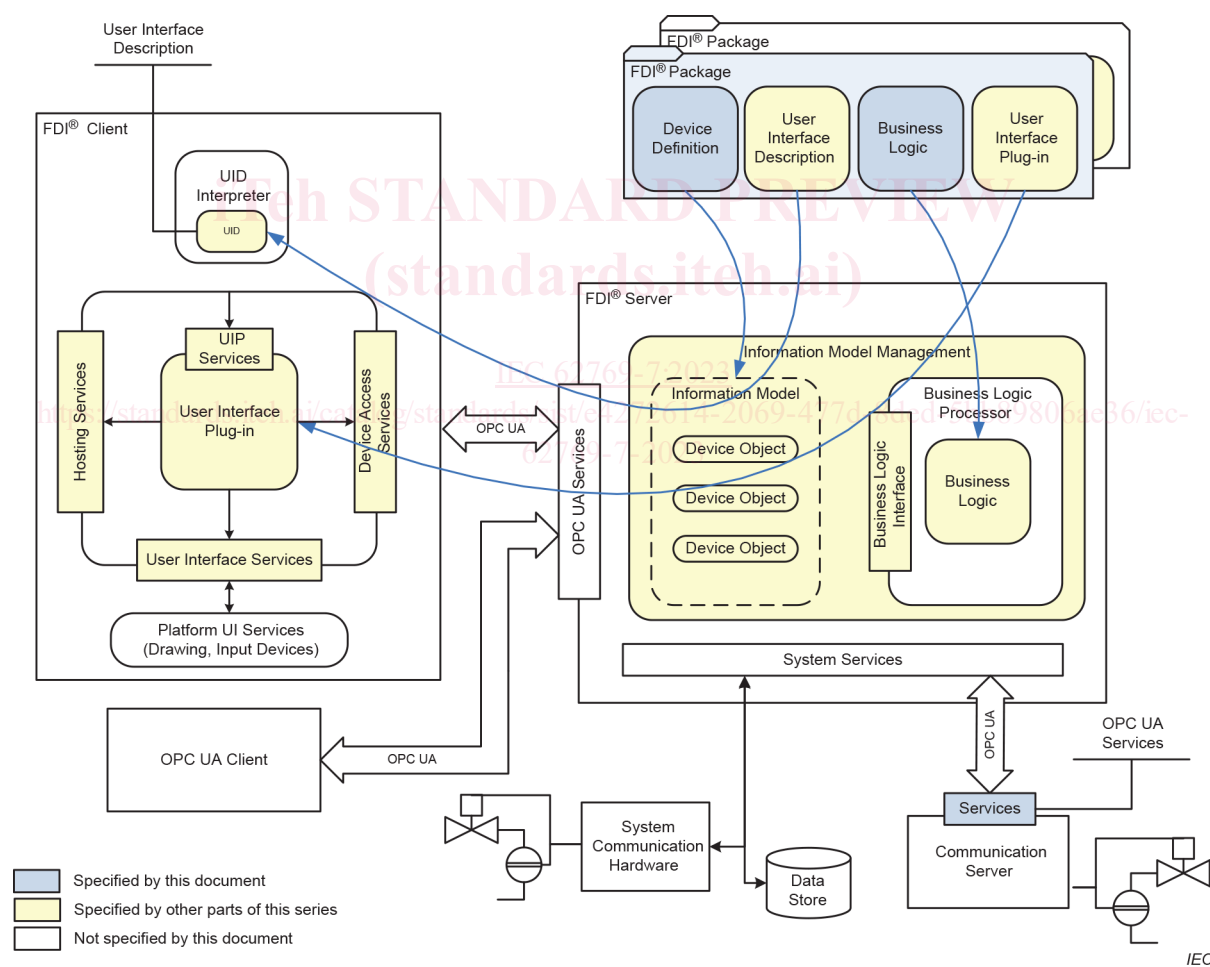


Figure 1 – FDI® architecture diagram

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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 TR 62541-1, *OPC Unified Architecture – Part 1: Overview and concepts*

IEC 62541-4, *OPC Unified Architecture – Part 4: Services*

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

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

IEC 62541-100, *OPC Unified Architecture – Part 100: Device Interface*

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

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

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

IEC 62769-4:2023, *Field Device Integration (FDI®) – Part 4: FDI® Packages*

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

## 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 62769-3, IEC 62541-6 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

#### 3.1.1

##### Gateway

Communication Device that enables to bridge between different physical networks or different protocols

### 3.2 Abbreviated terms and acronyms

For the purposes of this document, the abbreviated terms and acronyms given in IEC 62769-1, IEC 62541-6 and the following apply.

HTTP	Hypertext Transfer Protocol
IP	Internet Protocol
PHY	Physical communication hardware
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
URI	Uniform Resource Identifier

### 3.3 Conventions

#### 3.3.1 EDDL syntax

This part of IEC 62769 specifies content for the EDD component that is part of FDI® Communication Packages. The specification content using EDDL syntax uses the font `Courier New`. The EDDL syntax is used for method signature, variable, data structure and component declarations.

#### 3.3.2 Capitalizations

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

#### 3.3.3 Graphical notation

This document uses the graphical notation defined in IEC 62769-5.

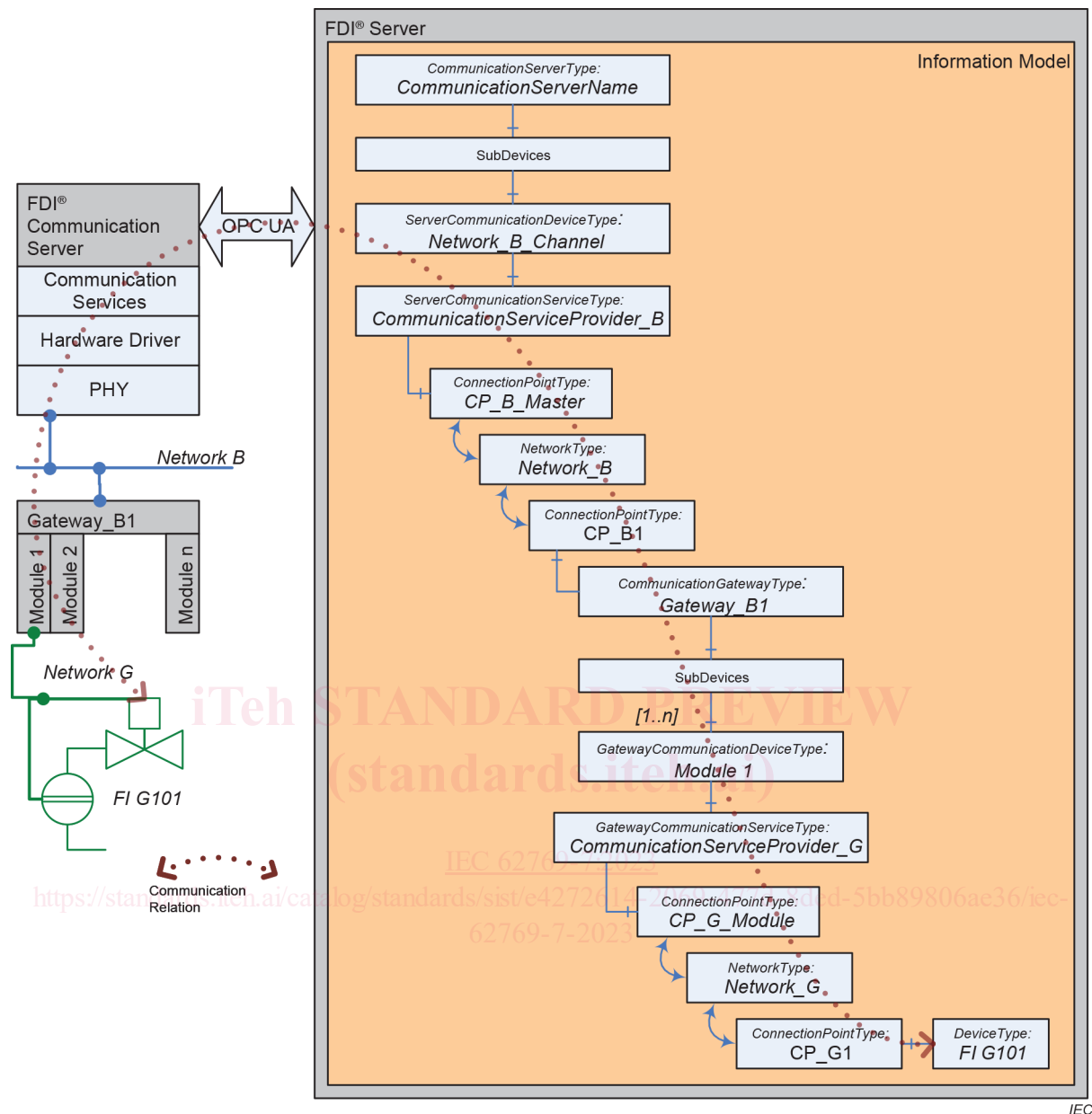
## 4 Overview

The abstract term FDI® Communication Device represents an entity implementing communication functions over a network using a specific protocol. The group of FDI® Communication Devices splits into two main groups.

- a) The FDI® Communication Server is a dedicated OPC UA Server providing access to one or more field device networks. The FDI® Communication Server is specified in Clause 7.
- b) The FDI® Communication Gateway enables to bridge between different physical networks or different protocols. The bridging business logic is implemented in the EDD component that is provided with an FDI® Communication Package. The FDI® Communication Gateway is specified in Clause 8.

NOTE The main differences between a Gateway and a Communication Server are as follows:

In terms of FDI®, the FDI® Communication Server is a dedicated OPC UA Server providing access to one or more field device networks. A Gateway is a Communication Device that enables to bridge between different physical networks or different protocols. The logical representation of a Gateway device within the FDI® Server hosted Information Model enables the FDI® Server to process communication in heterogeneous network topologies.



**Figure 2 – FDI® communication infrastructure architecture**

The FDI® Server hosted Information Model contains a representation of the network topology. (see also IEC 62769-5). The Information Model shown in Figure 2 is an example excerpt to illustrate how the Information Model used elements reflect the actual network topology.

- 1) The instance of `CommunicationServerType` (named `CommunicationServerName`) represents the FDI® Communication Server. The FDI® Communication Server implements physical communication network access (Communication hardware). Clause 7 describes related Information Model specifics, required FDI® Communication Package content and handling of elements therein. (For subdevices, see IEC 62769-5)
- 2) The instance of `ServerCommunicationDeviceType` and `ServerCommunication-ServiceType` (named `Network_B_Channel`) maps to the FDI® Communication Server implemented communication services. The `ServerCommunicationDeviceType` is specified in 7.3.3. The `ServerCommunicationServiceType` is specified in 7.3.4.
- 3) The instance of `CommunicationGatewayType` (named `Gateway_B1`) represents the physical Gateway. Clause 8 describes the related Information Model specifics, the required FDI® Package content and the handling of elements therein.

- 4) The instance of GatewayCommunicationDeviceType (named Module 1) maps to a physical or logical module enabling communication to the network to which this module is connected. The GatewayCommunicationDeviceType is specified in 8.3.2.3. The related Gateway specifics are described in Clause 8.
- 5) The instance of GatewayCommunicationServiceType (named CommunicationServiceProvider\_G) represents the Gateways' ability to process communication services. The Gateway specific implementation of GatewayCommunicationServiceType is based on Business Logic that enables to run communication services in heterogeneous communication networks.
- 6) A communication relation (more details are described in Clause 6) between a physical device and the device representation managed by the FDI® Server is always associated to communication service objects that are instances of a GatewayCommunicationServiceType or ServerCommunicationServiceType. The ability of instantiating multiple communication service objects supports protocols enables to operate multiple logical connections between a bus master and a device.
- 7) The Information Model represents the connections between the physical devices shown on the left side of Figure 2 based on instances of ConnectionPointType NetworkType and the depicted relations. ConnectionPointType and NetworkType are specified in IEC 62541-100.

## 5 FDI® Communication Package

### 5.1 General

The FDI® Server imports the FDI® Communication Package like any other FDI® Device Package. Clause 5 specifies the FDI® Communication Package details.

### 5.2 EDD

#### 5.2.1 General rules

[IEC 62769-7:2023](#)

The FDI® Communication Package contained EDD is not restricted but bound to a protocol specific profile (see IEC 62769-4:2023, Annex F).

The EDD elements as specified in the protocol specific profile documents (see IEC 62769-4:2023, Annex F), and provided with an FDI® Communication Package shall describe:

- a) Parameter and parameter structures. Mandatory protocol specific parameter definitions are found in the protocol specific profile documents (see IEC 62769-4: 2023, Annex F). The parameters shall contain any parameter that requires adjustment for proper communication service operation.
- b) Physical Layer identification. Protocol specific definitions are found in IEC 62769-4: 2023, Annex F.
- c) Communication Devices modularity: The modularity information shall be based on using the EDDL constructs COMPONENT (see IEC 61804-3).  
FDI® envisions Communication Device modularity to cope with communication hardware providing multiple physical or logical communication channels to access multiple logical or physical communication networks. Each module element of the whole Communication Device shall be described by a separate EDD element.
- d) The COMPONENT definition shall be used to support the system implemented topology configuration. Protocol specific definitions are found in the protocol specific profile documents (see IEC 62769-4:2023, Annex F). The related COMPONENT definitions are described in 5.2.2, 5.2.3, 5.2.4, and 5.2.7.
- e) The Business Logic shall contain a method enabled to validate the network (see 5.2.8). The validation function considers the elements only directly connected to the network. The validation function shall be referred by the EDDL specified CHECK\_CONFIGURATION attribute.

- f) The Business Logic can contain a method enabled to validate the module configuration (see 5.2.9) or the network configuration (see 5.2.8). The validation function considers the elements only directly connected to the related parent element in the topology. The validation function shall be referred by the EDDL specified CHECK\_CONFIGURATION attribute.
- g) Connection Point data: The Connection Point (see 5.2.4 and 5.2.6) shall be described through EDDL constructs COMPONENT, COLLECTION and VARIABLE. The COMPONENT definition associates the Connection Point element to the Communication Device. The VARIABLE definitions represent the properties of a specific Connection Point. The COLLECTION represents the Connection Point structure as such. Protocol specific definitions are found in IEC 62769-4:2023, Annex F. Annex A describes a convention for protocol specific annex creation.
- h) MENU:
- The Menu structure shall follow the Menu conventions for PC based applications according to IEC 61804-4, enabling access to
- 1) FDI® Communication Device Type (Bus) parameters: These parameters shall be made accessible by means of "offline\_root\_menu";
  - 2) Topology Configuration Dialogs shall be made available by means of the menu entry point "topology\_configuration".

### 5.2.2 Device component

Each FDI® Communication Package shall contain an EDD element describing the device.

```

COMPONENT <DeviceComponentId>
{
    LABEL "<Label>";
    CAN_DELETE TRUE;
    CHECK_CONFIGURATION <ValidateModules>;
    CLASSIFICATION NETWORK_COMPONENT;
    COMPONENT_RELATIONS
    {
        <CommunicationDeviceRelationId>
    }
}

COMPONENT_RELATION <CommunicationDeviceRelationId>
{
    LABEL "Relation type description";
    RELATION_TYPE CHILD_COMPONENT;
    ADDRESSING {<AddressVar>}
    COMPONENTS
    {
        <CommunicationDeviceComponentId>
        {
            AUTO_CREATE <autoCreate>;
            REQUIRED_RANGES
            {
                <AddressVar>{ MIN_VALUE <AddrMin>; MAX_VALUE <AddrMax>;}
            }
        }
    }
    MINIMUM_NUMBER <minNumber>;
    MAXIMUM_NUMBER <maxNumber>;
}

```