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

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

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.40; 35.100.05

ISBN 978-2-8322-6842-1

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FIELD DEVICE INTEGRATION (FDI®) –

Part 7: Communication Devices

FOREWORD

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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. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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 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- withdrawn,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 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 7: Communication Devices

1 Scope

This part of IEC 62769 specifies the elements implementing communication capabilities called Communication Devices ~~(IEC 62769-5)~~.

The overall FDI®[1] 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.

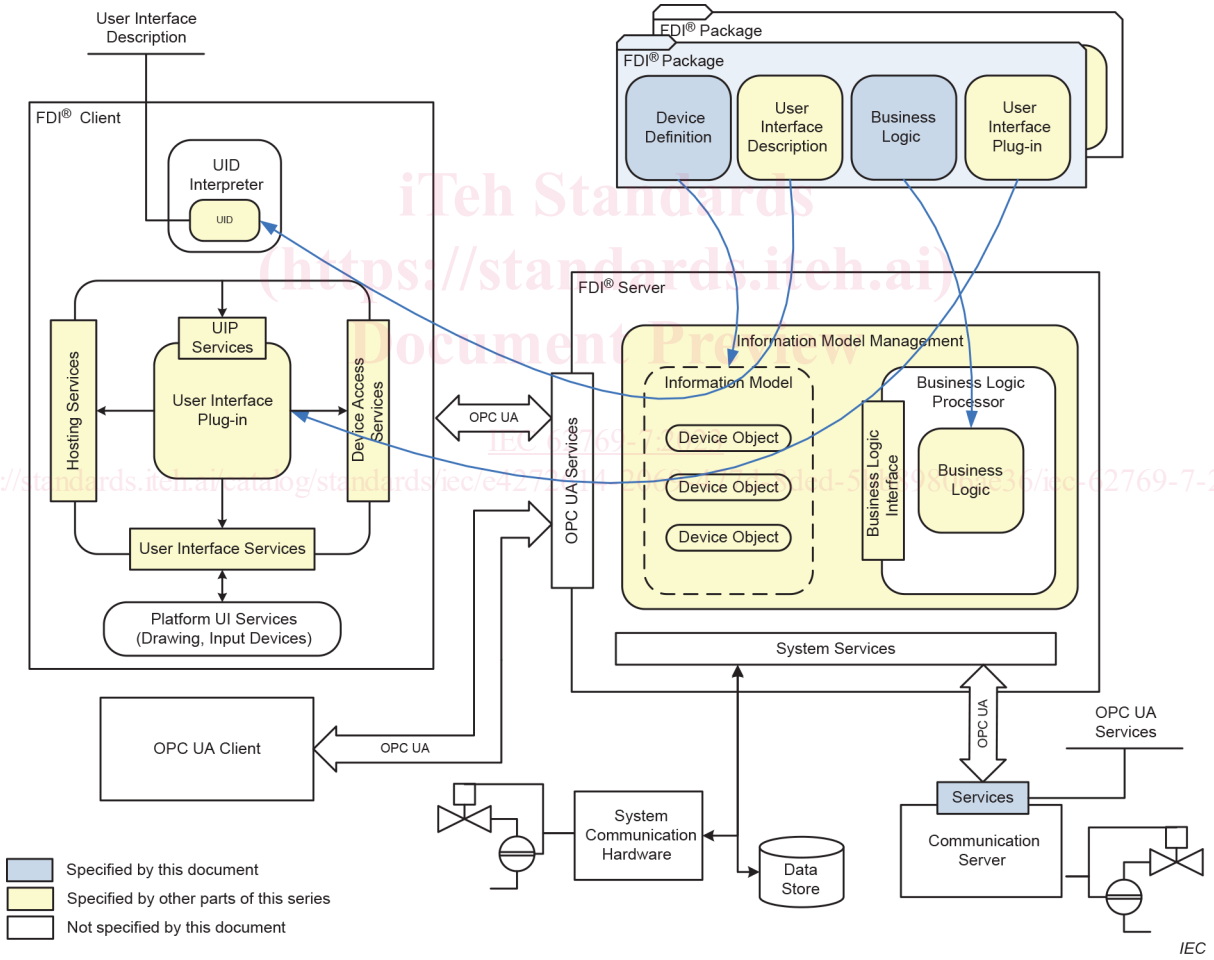

Figure 1 – FDI® architecture diagram

[1] 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.

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 61804-3, *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 (all parts), *OPC Unified Architecture*~~

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: ~~FDI~~ Client*

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

IEC 62769-4:~~2020~~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

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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

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

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.

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4 ~~General~~ 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.

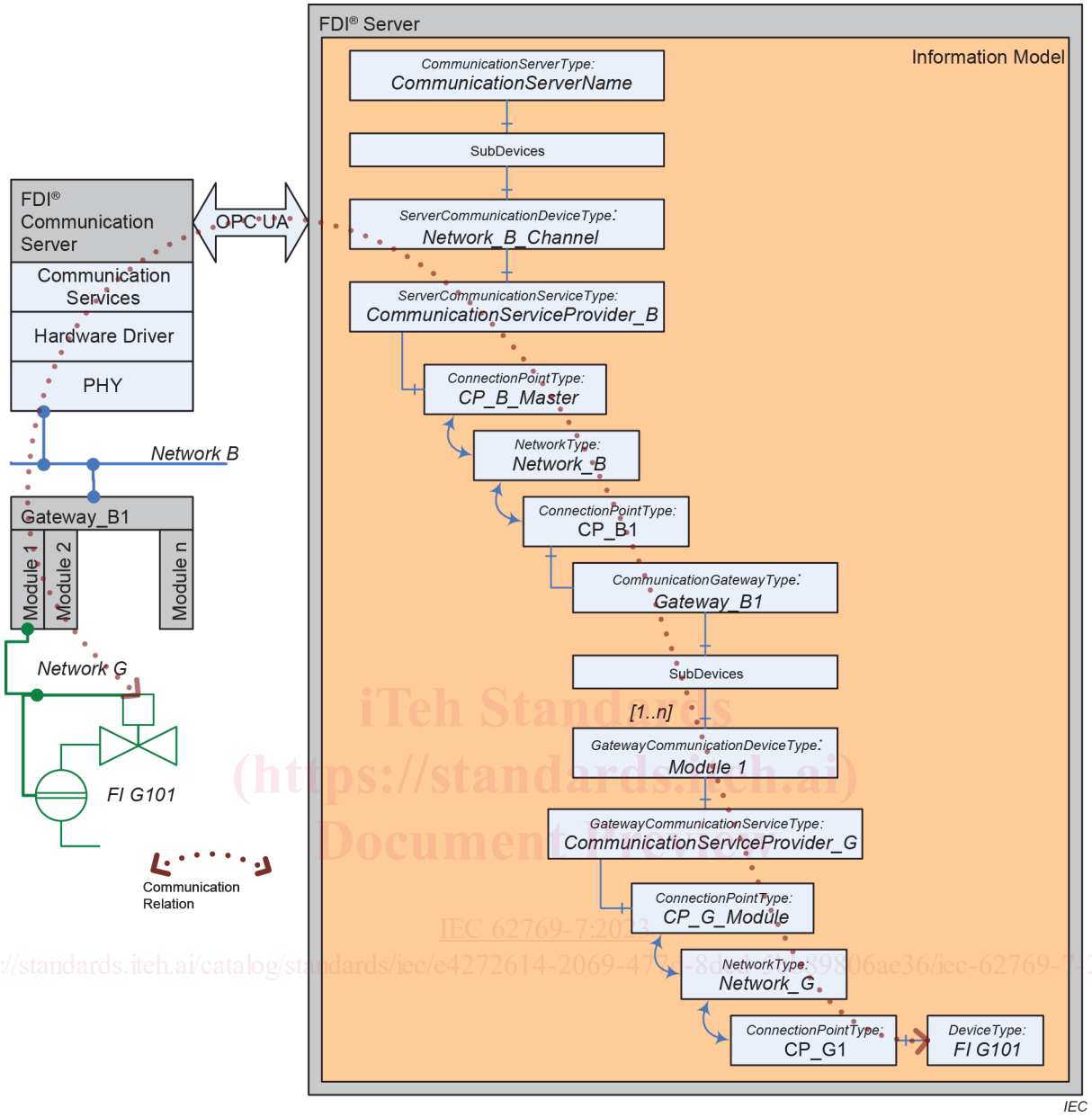

Figure 2 – FDI® communication infrastructure architecture

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.