IEC 62769-150-1

Edition 2.0 2023-04
REDLINE VERSION

INTERNATIONAL STANDARD

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Field device integration (FDI)® –
Part 150-1: Profiles – ISA100 ~~WIRELESS~~

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INTERNATIONAL
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CONTENTS

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FIELD DEVICE INTEGRATION (FDI®) –

Part 150-1: Profiles – ISA100 ~~WIRELESS~~

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62769-150-1:2021. 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 62769-150-1 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 second edition cancels and replaces the first 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 namespace to Annex A.

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

Draft	Report on voting
65E/866/CDV	65E/923/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/standardsdev/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 "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- withdrawn,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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FIELD DEVICE INTEGRATION (FDI®) –

Part 150-1: Profiles – ISA100 ~~WIRELESS~~

1 Scope

This part of IEC 62769 specifies an FDI®[1] profile of IEC 62769 for IEC 62734 (ISA100 ~~WIRELESS~~.11a)[2].

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 62734:2014*: Industrial networks – Wireless communication network and communication profiles – ISA 100.11a*

IEC 61804 (all parts), *Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL)*

IEC TR 62541-2, *OPC unified architecture – Part 2: Security Model*

~~IEC 62541-6, OPC unified architecture – Part 6: Mappings~~

IEC 62541-100:2015, *OPC unified architecture – Part 100: Device Interface*

IEC 62734:2014*, Industrial networks – Wireless communication network and communication profiles – ISA 100.11a*

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

IEC 62769-4, *Field device integration (FDI®) – Part 4: FDI® Packages*

IEC 62769-5, *Field device integration (FDI®) – Part 5: ~~FDI~~ Information Model*

IEC 62769-6, *Field device integration (FDI®) – Part 6: ~~FDI~~ Technology Mapping*

IEC 62769-7, *Field device integration (FDI®) – Part 7: ~~FDI~~ Communication devices*

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[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] ISA100 WIRELESS™ is a trade name of the non-profit consortium Wireless Compliance Institute. This information is given for the convenience of users of this standard 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.

3   Terms, definitions, abbreviated terms and acronyms

3.1   Terms and definitions

~~No terms and definitions are listed in this document.~~

For the purposes of this document, the terms and definitions given in, IEC 61804 (all parts), IEC TR 62541-2, IEC 62541-100, IEC 62734, IEC 62769-4, IEC 62769-5, IEC 62769-7 and 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
Object
basic entity which defines standardized behavior and features in a ISA100 WIRELESS device

3.2   Abbreviated terms and acronyms

For the purposes of this specification, the following abbreviations apply.

EDD	Electronic Device Description
EDDL	Electronic Device Description Language (see IEC 61804 (all parts))
FDI®	Field Device Integration
FCG	FieldComm Group
XML	Extensible markup language (see REC-xml-20081126)
CFF	Common file format
UAP	User Application Process
UAPMO	User Application Process Management Object
DMO	Device Management Object
IM	Information Model
SM	System Manager
WCI	Wireless Compliance Institute
CP	Communication profile

4   Conventions

4.1   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.

4.2   XML syntax

XML syntax examples use font `Courier New`. The XML syntax is used to describe XML document schema.

Example: `<xs:simpleType name="ExampleType">`

4.3 Capitalizations

The IEC 62769 series uses capitalized terms to emphasize that these terms have a FDI® specific meaning.

Some of these terms using an acronym as a prefix for example

- FDI® Client, or
- FDI® Server.

Some of these terms are compound terms such as:

- Communication Servers, or
- Profile Package.

Parameter names or attributes are concatenated to a single term, where the original terms start in this term with a capital letter such as:

- ProtocolSupportFile or
- ProtocolType.

Parameter names or attributes can also be constructed by using an underscore character to concatenate two or more terms such as:

- DEVICE_REV or
- DEVICE_MODEL.

5 Profile for ISA100 WIRELESS

5.1 General

This profile specifies the protocol specifics needed for FDI® Packages describing communication servers, gateways and devices. ~~Requirements for Direct Access transfer service parameters are given in Annex B.~~

Annex B defines the XML schema for Direct Access Services.

5.2 Catalog profile

5.2.1 Protocol support file

5.2.1.1 Capability file

Each ISA100 WIRELESS FDI® Device Package shall contain a capability file. The capability file part is described in Table 1.

Table 1 – Capability file part

Parameter	Description
Content Type:	txt/plain
Root Namespace:	Not applicable
Source Relationship:	http://fdi-cooperation.com/2010/relationships/attachment-protocol
Filename:	Use file extension .CFF

~~5.2.1.2   FDI Communication Packages~~

~~The same rules as for FDI Device Packages applies.~~

5.2.2   CommunicationProfile definition

IEC 62769-4 defines a CommunicationProfileT string for the Catalog XML schema. The ISA100 WIRELESS specific value shall be "ISA100_Wireless".

5.2.3   Profile device

Not supported in this document.

5.2.4   Protocol version information

IEC 62769-4 defines an element type named InterfaceT for the Catalog XML schema. The element type InterfaceT contains an element named Version which is supposed to provide version information about the applied communication protocol profile. The value has to follow the IEC 62769-4 defined version information schema defined in the element type VersionT.

ISA100 WIRELESS defines the version of the protocol as a value of the parameter DMO.Comm_SW_Minor_Version. A value of 0 indicates protocol version 2009 and a value of 1 indicates protocol version 2011. The general rule is to use the value of DMO.Comm_SW_Minor_Version parameter as the major version part of VersionT and the value "0" for the minor version and build parts Table 2 shows the protocol version information:

Table 2 – Protocol Version Information

Protocol Version	InterfaceT Version value
ISA100 WIRELESS 2009	1.0.0
ISA100 WIRELESS 2011	2.0.0
The Protocol Version defined in a package is provided for informational purposes only, and shall not be used to determine the compatibility or applicability of a package to a device.	

5.3   Associating a Package with a device

5.3.1   Device type identification mapping

The purpose of device type identification mapping is to enable FDI® host systems to compare the scan result against the topology representation in the Information Model. FDI® host systems shall also be enabled to determine the FDI® Device Package that fits for a device entry contained in the scan result. This will enable the user of an FDI® host system to synchronize the Information Model with the actual installation.

The Communication Server implemented scan service (defined in 5.6.1.7 provides the scan result through an XML document (the schema is defined in Clause A.6).

The scan result contains device type identification and device instance identification.

FDI® host systems comparing the actual network topology configuration against the topology representation in the Information Model shall be enabled to handle the following situations:

a) The physical Device instance identified at a specific device address is not logically present in the Information Model (as Instance): Enable the FDI® Host system to find the appropriate FDI® Device Package according to the device catalog information.

b) The physical Device instance identified by the device address is logically present in the Information Model (as Instance): Enable the FDI® Host system to compare device type information presented in scan result (see the identification in Clause A.6) and the device type specific information of the Instance present in the Information Model.

The FDI® Device Package contains device type identification information that can be compared to scan result based on the Catalog Schema in IEC 62769-4 defining the XML (simple) element types "DeviceModel" and "Manufacturer".

As a result of the FDI® Package deployment the FDI® Package information is then present in the Information Model as the specified FunctionalGroup Identification containing SerialNumber and Tag (see 5.4.3).

The mapping between different device identification data sources is described in Table 3. Since scan results provided by the Communication Server can convey data that is produced by the device (firmware) the device type identification mapping shall be supported by providing corresponding data in the FDI® Device Package contained Catalog and Information Model.

Table 3 – Device identification information mapping

FDI® Device Package	Information Model	Communication Server provided scan result
Catalog specified type Manufacturer	FunctionalGroup: Identification Browse Name: Manufacturer	Element (path): ConnectionPoint/Identification Attribute: Manufacturer
Catalog specified type DeviceModel	FunctionalGroup: Identification Browse Name: DeviceModel	Element (path): ConnectionPoint/Identification Attribute: DeviceModel

ISA100 WIRELESS device types are uniquely identified by the parameters UAPMO.IDENT_NUMBER found in the UAPMO. The IDENT_NUMBER parameter contains the Vendor ID, Model ID and Device Revision. These parameters are used to associate a given device instance to an FDI® Device Package. These parameters are mapped to the FDI® Device Package Catalog according to Table 4.

Table 4 – Device type catalog mapping

Catalog Element	~~ISA100 WIRELESS~~ CP Mapping
Manufacturer element of InterfaceT (IEC 62769-4)	UAPMO.IDENT_NUMBER 0x00FFFFFF00000000 String format "0xdddddd" where dddddd is theVendor ID number in hexadecimal format.
DeviceModel element of InterfaceT (IEC 62769-4)	UAPMO.IDENT_NUMBER 0x00000000FFFF0000String format "0xdddd" where dddd is the Model ID number in hexadecimal format.
DeviceRevision element ListOfSupportedDeviceRevisionsT (IEC 62769-4)	UAPMO.IDENT_NUMBER 0x000000000000FFFF String format "x.0.0" where x is the Device Revision in decimal format (no leading zeros).

5.3.2   Device type revision mapping

IEC 62769-4 envisions a concept that allows to determine the compatibility between an FDI® Device Package and a Device. IEC 62769-4 specifies a life cycle management process bearing on a single version information provided for the entire device. Mapping of version information is defined in Table 4.

5.4   Information Model mapping

5.4.1   ProtocolType definition

In Table 5 a subtype of ProtocolType is defined to identify network communication using this profile.

Table 5 – Protocol type ISA100 WIRELESS

Attribute	Value				
BrowseName	ISA100_Wireless				
IsAbstract	False				
References	NodeClass	BrowseName	DataType	TypeDefinition	ModellingRule
Subtype of the ProtocolType defined in IEC 62541-100.					

5.4.2   DeviceType mapping

Each device type inherits the properties of DeviceType. The mapping of the inherited properties from DeviceType is defined in Table 6.

Table 6 – Inherited DeviceType property mapping

Property	ISA100 WIRELESS Mapping
SerialNumber	DMO.EUI_64 – 8 byte Extended Unique Identifier defined in DMO
RevisionCounter	UAPMO.Static_Revision_Level - 2 byte revision counter defined in UAPMO
Manufacturer	String taken from FDI® package catalog (ManufacturerName from PackageT)
Model	String taken from FDI® package catalog (Name of DeviceTypeT, which is a localized name)
DeviceManual	empty text string (not supported) [a]
DeviceRevision	DEV_REV (UAPMO)
SoftwareRevision	empty string (not defined)
HardwareRevision	empty string (not defined)
[a] Device manuals are exposed as attachments of the FDI® Device Package.	

5.4.3   FunctionalGroup identification definition

As defined in IEC 62541-100:2015, 5.3, each device representation in the FDI® Server hosted Information Model shall contain a protocol specific FunctionalGroup named Identification. This FunctionalGroup organizes variables found in the UAPMO of the device type instance. The FunctionalGroup Identification for ISA100 WIRELESS is defined in Table 7.

Table 7 – ISA100 Wireless Device Types identification attributes

BrowseName	DataType	Mandatory/Optional
MANUFAC_ID	UInt32	Mandatory
DEV_TYPE	UInt16	Mandatory
DEV_REV	UInt16	Mandatory
HARDWARE_REV	String	Optional
SOFTWARE_REV	String	Optional
ITS_VER	UInt16	Mandatory

5.4.4 BlockType property mapping

ISA100 WIRELESS device types are object oriented referred as block-oriented according to IEC 62541-100. IEC 62769-5 specifies the mapping of EDDL BLOCK_A elements to block types and instances.

The BLOCK_A maps as a subtype of the topology element BlockType and inherits the properties per IEC 62541-100. The mapping of the inherited properties of the BlockType is specified in Table 8.

Table 8 – Inherited BlockType property mapping

Property	ISA100 Wireless Mapping (Object ParameterSet)
RevisionCounter	ST_REV
ActualMode	MODE_BLK.ACTUAL
PermittedMode	MODE_BLK.PERMITTED
NormalMode	MODE_BLK.NORMAL
TargetMode	MODE_BLK.TARGET

5.4.5 Mapping to Object ParameterSet

The ParameterSet is relative to each Object. The ParameterSet includes all the parameters found in the PARAMETERS, LOCAL_PARAMETERS and LIST_ITEMS.

The browse name of the parameters found in the PARAMETERS and LOCAL_PARAMETERS is the member name in the respective lists. For example, ST_REV is the browse name of the Static Revision parameter. LIST_ITEMS do not have member names; therefore the browse name of each LIST in the LIST_ITEMS is the item name of the list.

5.5 Topology elements

5.5.1 ConnectionPoint definition

The ConnectionPoint type ConnectionPoint_ISA100_Wireless shall be used to identify ISA100 WIRELESS network communication and is defined in Table 9. The ConnectionPoint type ConnectionPoint_ISA100_Wireless is a sub type of the abstract type ConnectionPointType defined in IEC 62541-100.

The DevAddr property shall be the IPV6 (16 bytes) address of the device.

The DevMfg property shall be the 4-byte UAPMO.IDENT_NUMBER.VendorID, and can be used to help automate the process of assigning live devices in the scan list to offline placeholders.

The DevType property shall be the 2-byte UAPMO.IDENT_NUMBER.ModelID, and can be used to help automate the process of assigning live devices in the scan list to offline placeholders.

The DevRev property shall be the UAPMO.UAPMO.IDENT_NUMBER.DeviceRevision, and can be used to help automate the process of assigning live devices in the scan list to offline placeholders.

The DevTag property shall be the DMO.Tag_Name (16 characters).

The DevPollAddr property shall be the DMO.~~Short~~DMO.DL_Address_16_Bit (2 bytes).