

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Field Device Integration (FDI) –
Part 3: FDI Server

ITh STANDARD PREVIEW
(standards.iteh.ai)

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

<https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4aee-8289-419c061d4efc/iec-62769-3-2015>
IEC 62769-3:2015



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2015 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 60 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Field Device Integration (FDI) –
Part 3: FDI Server
(standards.iteh.ai)

Intégration des appareils de terrain (FDI) –
Partie 3: Serveur FDI
<https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4ace-8289-419c061d4efc/iec-62769-3-2015>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 25.040.40; 35.100

ISBN 978-2-8322-2639-1

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms, definitions, abbreviated terms and acronyms	9
3.1 Terms and definitions.....	9
3.2 Abbreviated terms and acronyms	9
4 Overview	9
5 Information Model.....	10
5.1 General.....	10
5.2 Online/Offline.....	11
5.2.1 Overview	11
5.2.2 Transfer to device.....	11
5.2.3 Transfer from device.....	11
5.3 Access privileges	12
5.4 Private Parameters	12
5.5 Locking.....	12
5.6 EditContext.....	13
5.6.1 Concept and usage model.....	13
5.6.2 Services	14
5.6.3 NodeIds.....	15
5.6.4 Reading.....	15
5.6.5 Writing.....	15
5.6.6 Writing dominant and dependent Variables	16
5.6.7 Actions (EDD METHODS).....	16
5.6.8 UIDs	17
5.6.9 Synchronization.....	17
5.7 Reading	17
5.7.1 General	17
5.7.2 Reading offline variables	18
5.7.3 Reading online variables	19
5.8 Writing	20
5.8.1 General	20
5.8.2 Write offline variables	20
5.8.3 Writing online variables	21
5.8.4 Writing to an EditContext.....	23
5.9 Subscription.....	24
5.9.1 General	24
5.9.2 Subscription of offline variables	24
5.9.3 Subscription of online variables	25
5.10 Device topology	27
5.10.1 General	27
5.10.2 Connection Points	27
5.10.3 Topology management	28
5.10.4 Topology scanning.....	31
5.10.5 Use of SCAN function.....	32

5.10.6	Validation of defined topology.....	32
5.11	User Interface Elements.....	33
5.11.1	User Interface Descriptions.....	33
5.11.2	User Interface Plug-ins.....	34
5.12	Actions.....	34
5.12.1	FDI Server – FDI Client interaction.....	34
5.12.2	Action state machine.....	37
5.12.3	Actions Proxies.....	38
5.12.4	Actions, EDD Actions and Actions Proxies.....	39
6	OPC UA services.....	40
6.1	OPC UA profiles.....	40
6.2	Service error information.....	40
6.2.1	Overview.....	40
6.2.2	OPC UA services and their response.....	41
6.2.3	Mappings of EDDL response codes to OPC UA service response.....	41
6.3	Parameter value update during write service request.....	42
6.4	Localization.....	42
6.5	Audit events.....	43
7	Communication.....	43
7.1	Notation.....	43
7.2	General.....	43
7.2.1	Concepts.....	43
7.2.2	Terms.....	45
7.3	Communication Service processing.....	46
7.3.1	Communication Service invocation.....	46
7.3.2	Analyze communication path.....	46
7.3.3	Manage communication relations.....	47
7.3.4	Communication service request mapping.....	47
7.3.5	Communication service request propagation.....	48
7.3.6	Communication error handling.....	49
7.4	FDI Communication Server specific handling.....	49
7.4.1	Discovery.....	49
7.4.2	Information Model synchronization.....	50
8	Parallel Execution within the FDI Server.....	50
8.1	Motivation.....	50
8.2	Internal structure of the EDD interpreter.....	50
8.3	Rules for running an EDD entity.....	51
Annex A (informative)	FDI Server functional structure.....	52
A.1	FDI functional elements.....	52
A.2	FDI Server extension.....	53
Annex B (informative)	Access privileges and user roles.....	55
B.1	User roles and usage case.....	55
B.2	Private data usage.....	56
Annex C (informative)	Parallel execution within the FDI Server – Examples.....	57
C.1	Simple example for a synchronous execution.....	57
C.2	Example for a concurrent execution.....	57
C.3	Deadlock detection in concurrent execution.....	59
	Bibliography.....	60

Figure 1 – FDI architecture diagram	8
Figure 2 – Locking services	13
Figure 3 – EditContext models	14
Figure 4 – EditContext for EDD Methods.....	17
Figure 5 – Offline variable read.....	18
Figure 6 – Online variable read	19
Figure 7 – Offline variable write immediate	21
Figure 8 – Online variable write immediate	22
Figure 9 – Write with EditContext.....	23
Figure 10 – Offline variable subscription	25
Figure 11 – Online variable subscription	26
Figure 12 – Topology with Network objects (non-normative)	27
Figure 13 – Add Device to topology	29
Figure 14 – Remove Device from topology.....	30
Figure 15 – Scan topology	31
Figure 16 – Action execution.....	36
Figure 17 – Action state machine.....	37
Figure 18 – System communication integration example	43
Figure 19 – FDI Communication Server integration example.....	44
Figure 20 – Gateway integration example	45
Figure 21 – Message propagation example scenario	48
Figure A.1 – Functional components of an FDI Server.....	52
Figure A.2 – FDI Server extensions	53
Figure B.1 – User roles and access privileges.....	55
Figure C.1 – Synchronous execution of two triggers.....	57
Figure C.2 – Concurrent execution of two triggers (step 1).....	57
Figure C.3 – Concurrent execution of two triggers (step 2).....	58
Figure C.4 – Concurrent execution of two triggers (step 3).....	58
Figure C.5 – Concurrent execution of two triggers (step 4).....	58
Figure C.6 – Concurrent execution of two triggers.....	59
Table 1 – Action states	37
Table 2 – Action state transitions	38
Table 3 – EDD Action types and the EDD constructs that use them	39
Table 4 – OPC UA severity bits and EDDL response codes TYPE	41

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI) –

Part 3: FDI Server

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
<https://standards.iteh.ai/catalog/standards/sist/d857cach-a7ae-4acc-8289-419c06114ef6/iec-62769-3:2015>
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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.

The text of this standard is based on the following documents:

CDV	Report on voting
65E/346/CDV	65E/423/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication 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 publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[IEC 62769-3:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4aee-8289-419c061d4efc/iec-62769-3-2015>

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.

IEC takes no position concerning the evidence, validity and scope of this patent right.

The holders of these patent rights have assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

- a) ABB Research Ltd
Claes Ryttoft
Affolterstrasse 4
Zurich, 8050
Switzerland
- b) Phoenix Contact GmbH & Co. KG
Intellectual Property, Licenses & Standards
Flachsmarktstrasse 8, 32825 Blomberg
Germany
<https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4aec-8289-IEC-62769-3:2015>
- c) Fisher Controls International LLC
John Dilger, Emerson Process Management LLLP
301 S. 1st Avenue, Marshalltown, Iowa 50158
USA
<https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4aec-8289-IEC-62769-3:2015>
- d) Rockwell Automation Technologies, Inc.
1 Allen-Bradley Drive
Mayfield Heights, Ohio 44124
USA

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. IEC shall not be held responsible for identifying any or all such patent rights.

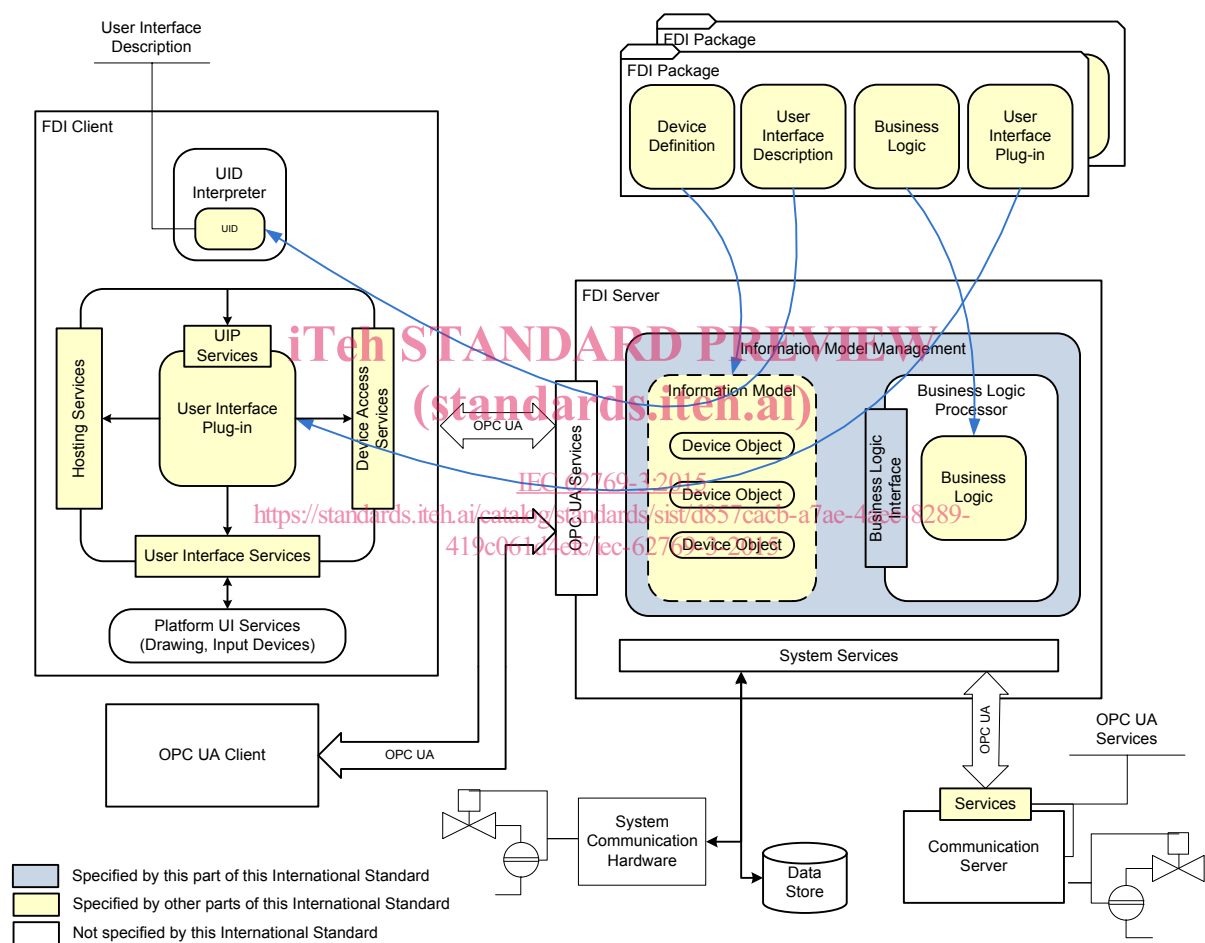
ISO (www.iso.org/patents) and IEC (<http://patents.iec.ch>) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

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.



IEC

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 (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 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 – Part 1: Overview*

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

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

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

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

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

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

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

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

NOTE IEC 62769-7 is technically identical to FDI-2027.
<https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4aec-8289-119c601e2274/iec-62769-3-2015>

3 Terms, definitions, abbreviated terms and acronyms

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.

3.1.1

Actions Proxy

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

3.2 Abbreviated terms and acronyms

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

4 Overview

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

¹ To be published.

² To be published.

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.

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.

5.2 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. [IEC 62769-3:2015](https://standards.iteh.ai/catalog/standards/sist/d857cacb-a7ae-4aec-8289-41260d4d4e02/iec-62769-3-2015)

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.

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.

5.3 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

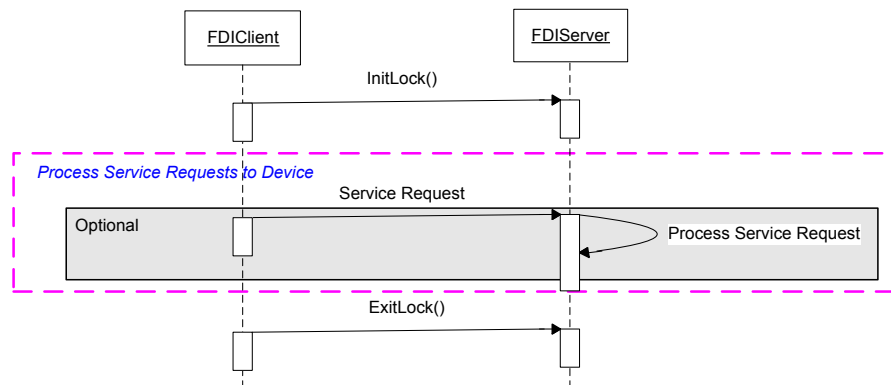
The FDI Server provides locking services to grant FDI Clients exclusive access to Device and Network elements in the Information Model. The locking services consist of a set of Methods and status information. The methods, and their behavior, are specified in IEC 62769-5.

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.



IEC

Figure 2 – Locking services

A service request that requires locking shall fail either partially or completely if no lock has been acquired by the FDI Client via InitLock prior to requesting the service. The FDI Client has to release the lock via ExitLock after all service requests have been completed.

NOTE A write operation will partially fail, i.e., it will return a status code for each variable in the set of variables to be written since some may belong to devices that are locked and some to devices that are not locked.

FDI Servers may queue InitLock requests until a service for which a lock has been created completes and the lock has been released. However, such an optimization is not part of the standard behavior required of an FDI Server.

5.6 EditContext

5.6.1 Concept and usage model

The FDI Server provides the EditContext model to interact with Clients during their editing task. The concept is closely related to UIDs and fulfills the needs for Server-driven UI dialogs based on EDDL rules.

An EditContext can be used to make changes to Variable Values visible to the Server without applying them to the online or offline representation of a Device. The Server will apply business logic associated to the edited Variable which – in some cases – causes changes to other Variable Values (e.g. if an engineering unit is changed) or the UID (e.g. a Variable becomes invisible). Thus the Client can use an EditContext to modify (edit) Parameters like engineering units, ranges and more, verify any side effects, and re-adjust the settings before applying the changes.

An FDI Server may implement different EditContext strategies:

- A single EditContext instance for all dialogues of an FDI Client.
- Multiple EditContext instances.
- Hierarchical EditContext instances.