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OPC unified architecture –
Part 5: Information Model

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPC UNIFIED ARCHITECTURE –

Part 5: Information Model

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.
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International Standard IEC 62541-5 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Added Annex F on User Authentication. Describes the Role Information Model that also allows configuration of Roles.
b) Added new data types: "Union", "Decimal", "OptionSet", "DateString", "TimeString", "DurationString", NormalizedString", "DecimalString", and "AudioDataType".
c) Added Method to request a state change in a Server.
d) Added Method to set Subscription to persistent mode.
e) Added Method to request resending of data from a Subscription.
f) Added concept allowing to temporarily create a file to write to or read from a server in C.4.
g) Added new Variable type to support Selection Lists.
h) Added optional properties to FiniteStateMachineType to expose currently available states and transitions.
i) Added UrisVersion Property to ServerType. This version information can be used for session-less service invocation.

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

FDIS	Report on voting
65E/717/FDIS	65E/733/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

Throughout this document and the other parts of the IEC 62541 series, certain document conventions are used:

Italics are used to denote a defined term or definition that appears in Clause 3 in one of the parts of the series.

Italics are also used to denote the name of a service input or output parameter or the name of a structure or element of a structure that are usually defined in tables.

The *italicized terms and names* are also often written in camel-case (the practice of writing compound words or phrases in which the elements are joined without spaces, with each element's initial letter capitalized within the compound). For example the defined term is *AddressSpace* instead of Address Space. This makes it easier to understand that there is a single definition for *AddressSpace*, not separate definitions for Address and Space.

A list of all parts of the IEC 62541 series, published under the general title *OPC Unified Architecture*, 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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OPC UNIFIED ARCHITECTURE –

Part 5: Information Model

1 Scope

This part of IEC 62541 defines the Information Model of the OPC Unified Architecture. The Information Model describes standardized *Nodes* of a *Server*'s *AddressSpace*. These *Nodes* are standardized types as well as standardized instances used for diagnostics or as entry points to server-specific *Nodes*. Thus, the Information Model defines the *AddressSpace* of an empty OPC UA *Server*. However, it is not expected that all *Servers* will provide all of these *Nodes*.

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

IEC 62541-3, *OPC Unified Architecture – Part 3: Address Space Model*

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 62541-9, *OPC Unified Architecture – Part 9: Alarms and Conditions*

IEC 62541-10, *OPC Unified Architecture – Part 10: Programs*

IEC 62541-11, *OPC Unified Architecture – Part 11: Historical Access*

ISO/IEC/IEEE 60559:2011, *Information technology – Microprocessor Systems – Floating-Point arithmetic*

IETF RFC 2045, Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies
http://www.ietf.org/rfc/rfc2045.txt

IETF RFC 2046, Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types
https://www.ietf.org/rfc/rfc2046.txt

IETF RFC 2047, Multipurpose Internet Mail Extensions (MIME) Part Three: Message Header Extensions for Non-ASCII Text
http://www.ietf.org/rfc/rfc2047.txt

XML Schema Part 1: Structures
http://www.w3.org/TR/xmlschema-1/

XML Schema Part 2: Datatypes
http://www.w3.org/TR/xmlschema-2/

Xpath: XML Path Language
http://www.w3.org/TR/xpath/

IETF RFC 3629: UTF-8, a transformation format of ISO 10646
http://www.ietf.org/rfc/rfc3629.txt

IEC 62541-5

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

OPC unified architecture – Part 5: Information Model

Architecture unifiée OPC – Partie 5: Modèle d'information



IEC 62541-5:2020-07(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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OPC UNIFIED ARCHITECTURE –

Part 5: Information Model

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.
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International Standard IEC 62541-5 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Added Annex F on User Authentication. Describes the Role Information Model that also allows configuration of Roles.
b) Added new data types: "Union", "Decimal", "OptionSet", "DateString", "TimeString", "DurationString", NormalizedString", "DecimalString", and "AudioDataType".
c) Added Method to request a state change in a Server.
d) Added Method to set Subscription to persistent mode.

e) Added Method to request resending of data from a Subscription.

f) Added concept allowing to temporarily create a file to write to or read from a server in C.4.

g) Added new Variable type to support Selection Lists.

h) Added optional properties to FiniteStateMachineType to expose currently available states and transitions.

i) Added UrisVersion Property to ServerType. This version information can be used for session-less service invocation.

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

FDIS	Report on voting
65E/717/FDIS	65E/733/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

Throughout this document and the other parts of the IEC 62541 series, certain document conventions are used:

Italics are used to denote a defined term or definition that appears in Clause 3 in one of the parts of the series.

Italics are also used to denote the name of a service input or output parameter or the name of a structure or element of a structure that are usually defined in tables.

The *italicized terms and names* are also often written in camel-case (the practice of writing compound words or phrases in which the elements are joined without spaces, with each element's initial letter capitalized within the compound). For example the defined term is *AddressSpace* instead of Address Space. This makes it easier to understand that there is a single definition for *AddressSpace*, not separate definitions for Address and Space.

A list of all parts of the IEC 62541 series, published under the general title *OPC Unified Architecture*, 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.

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.

OPC UNIFIED ARCHITECTURE –

Part 5: Information Model

1 Scope

This part of IEC 62541 defines the Information Model of the OPC Unified Architecture. The Information Model describes standardized *Nodes* of a *Server*'s *AddressSpace*. These *Nodes* are standardized types as well as standardized instances used for diagnostics or as entry points to server-specific *Nodes*. Thus, the Information Model defines the *AddressSpace* of an empty OPC UA *Server*. However, it is not expected that all *Servers* will provide all of these *Nodes*.

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

IEC 62541-3, *OPC Unified Architecture – Part 3: Address Space Model*

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 62541-9, *OPC Unified Architecture – Part 9: Alarms and Conditions*

IEC 62541-10, *OPC Unified Architecture – Part 10: Programs*

IEC 62541-11, *OPC Unified Architecture – Part 11: Historical Access*

ISO/IEC/IEEE 60559:2011*, Information technology – Microprocessor Systems – Floating-Point arithmetic*

IETF RFC 2045, Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies
http://www.ietf.org/rfc/rfc2045.txt

IETF RFC 2046, Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types
https://www.ietf.org/rfc/rfc2046.txt

IETF RFC 2047, Multipurpose Internet Mail Extensions (MIME) Part Three: Message Header Extensions for Non-ASCII Text
http://www.ietf.org/rfc/rfc2047.txt

XML Schema Part 1: Structures
http://www.w3.org/TR/xmlschema-1/

XML Schema Part 2: Datatypes
http://www.w3.org/TR/xmlschema-2/

Xpath: XML Path Language
http://www.w3.org/TR/xpath/

IETF RFC 3629: UTF-8, a transformation format of ISO 10646
http://www.ietf.org/rfc/rfc3629.txt

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Partie 5: Modèle d'information

AVANT-PROPOS

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La Norme internationale IEC 62541-5 a été établie par le sous-comité 65E: Les dispositifs et leur intégration dans les systèmes de l'entreprise, du comité d'études 65 de l'IEC: Mesure, commande et automation dans les processus industriels.

Cette troisième édition annule et remplace la deuxième édition parue en 2015. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) ajout de l'Annexe F concernant l'Authentification des utilisateurs; description du Modèle d'information de rôle qui autorise également la configuration des Rôles;
b) ajout de nouveaux types de données: "Union", "Decimal", "OptionSet", "DateString", "TimeString", "DurationString", "NormalizedString", "DecimalString" et "AudioDataType";

c) ajout d'une méthode afin de demander un changement d'état dans un Serveur;

d) ajout d'une méthode afin de définir un Abonnement en mode persistant;

e) ajout d'une méthode afin de demander le renvoi de données à partir d'un Abonnement;

f) ajout en C.4 d'un concept permettant la création temporaire d'un fichier pour l'écriture ou la lecture sur un serveur;

g) ajout d'un nouveau type de Variable afin de prendre en charge les Listes de sélection;

h) ajout de propriétés facultatives au FiniteStateMachineType afin de présenter les états et transitions actuellement disponibles;

i) ajout d'une propriété UrisVersion au ServerType. Ces informations de version peuvent être utilisées pour l'invocation de services sans session.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
65E/717/FDIS	65E/733/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Tout au long du présent document et des autres parties de la série IEC 62541, certaines conventions documentaires sont utilisées:

Le format *italique* est utilisé pour mettre en évidence un terme défini ou une définition qui apparaît à l'Article 3 dans l'une des parties de la série.

Le format *italique* est également utilisé pour mettre en évidence le nom d'un paramètre d'entrée ou de sortie de service, ou le nom d'une structure ou d'un élément de structure habituellement défini dans les tableaux.

Par ailleurs, les *termes* et les *noms en italique* sont souvent écrits en camel-case (pratique qui consiste à joindre, sans espace, les éléments des mots ou expressions composés, la première lettre de chaque élément étant en majuscule). Par exemple, le terme défini est *AddressSpace* et non Espace d'adressage. Cela permet de mieux comprendre qu'il existe une définition unique pour *AddressSpace*, et non deux définitions distinctes pour Espace et pour Adressage.

Une liste de toutes les parties de la série IEC 62541, publiées sous le titre général *Acrhitecture unifiée OPC*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

IMPORTANT – Le logo *"colour inside"* qui se trouve sur la page de couverture de cette publication indique qu'elle contient des couleurs qui sont considérées comme utiles à une bonne compréhension de son contenu. Les utilisateurs devraient, par conséquent, imprimer cette publication en utilisant une imprimante couleur.

ARCHITECTURE UNIFIÉE OPC –

Partie 5: Modèle d'information

1 Domaine d'application

La présente partie de l'IEC 62541 définit le Modèle d'information de l'Architecture unifiée OPC. Le Modèle d'information décrit des *Nœuds* normalisés de l'*AddressSpace* d'un *Serveur*. Ces *Nœuds* sont des types normalisés ainsi que des instances normalisées utilisés pour le diagnostic ou comme des points d'entrée à des *Nœuds* spécifiques au serveur. Ainsi, le Modèle d'information définit l'*AddressSpace* d'un *Serveur* OPC UA vide. Cependant, tous les *Serveurs* ne sont pas supposés fournir la totalité de ces *Nœuds*.

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC TR 62541-1*, OPC Unified Architecture – Part 1: Overview and Concepts* (disponible en anglais seulement)

IEC 62541-3, *Architecture unifiée OPC – Partie 3:* Modèle d'espace d'adressage

IEC 62541-4, *Architecture unifiée OPC – Partie 4: Services*

IEC 62541-6, *Architecture unifiée OPC – Partie 6: Mappings*

IEC 62541-7, *Architecture unifiée OPC – Partie 7: Profils*

IEC 62541-9, *Architecture unifiée OPC – Partie 9: Alarmes et conditions*

IEC 62541-10, *Architecture unifiée OPC – Partie 10: Programmes*

IEC 62541-11, *Architecture unifiée OPC – Partie 11: Accès à l'historique*

ISO/IEC/IEEE 60559:2011, *Information technology – Microprocessor Systems – Floating-Point arithmetic* (disponible en anglais seulement)

https://www.iso.org/standard/57469.html

IETF RFC 2045: Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies
http://www.ietf.org/rfc/rfc2045.txt

IETF RFC 2046: Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types
https://www.ietf.org/rfc/rfc2046.txt

IETF RFC 2047: Multipurpose Internet Mail Extensions (MIME) Part Three: Message Header Extensions for Non-ASCII Text
http://www.ietf.org/rfc/rfc2047.txt

XML Schema Tome 1: Structures
http://www.w3.org/TR/xmlschema-1/

XML Schema Tome 2: Datatypes
http://www.w3.org/TR/xmlschema-2/

Xpath: XML Path Language
http://www.w3.org/TR/xpath/

IETF RFC 3629: UTF-8, a transformation format of ISO 10646
http://www.ietf.org/rfc/rfc3629.txt