IEC 62541-5

Edition 2.0 2015-03

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

IECNORM.COM : Click to view the full PDF of IEC 62541 5:2015

## OPC unified architecture – Part 5: Information Model

## Architecture unifiée OPC – Partie 5: Modèle d'informations

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 25.040.40; 35.100

ISBN 978-2-8322-2384-0

**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.**

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

CONTENTS

FOREWORD ..... 12
1 Scope ..... 14
2 Normative references ..... 14
3 Terms, definitions and conventions ..... 14
3.1 Terms and definitions ..... 14
3.2 Abbreviations and symbols ..... 14
3.3 Conventions for Node descriptions ..... 15
4 NodeIds and BrowseNames ..... 16
4.1 NodeIds ..... 16
4.2 BrowseNames ..... 16
5 Common Attributes ..... 17
5.1 General ..... 17
5.2 Objects ..... 17
5.3 Variables ..... 17
5.4 VariableTypes ..... 17
6 Standard ObjectTypes ..... 18
6.1 General ..... 18
6.2 BaseObjectType ..... 18
6.3 ObjectTypes for the Server Object ..... 18
6.3.1 ServerType ..... 18
6.3.2 ServerCapabilitiesType ..... 20
6.3.3 ServerDiagnosticsType ..... 22
6.3.4 SessionsDiagnosticsSummaryType ..... 23
6.3.5 SessionDiagnosticsObjectType ..... 24
6.3.6 VendorServerInfoType ..... 25
6.3.7 ServerRedundancyType ..... 25
6.3.8 TransparentRedundancyType ..... 25
6.3.9 NonTransparentRedundancyType ..... 26
6.3.10 NonTransparentNetworkRedundancyType ..... 26
6.3.11 OperationLimitsType ..... 27
6.3.12 AddressSpaceFileType ..... 29
6.3.13 NamespaceMetadataType ..... 29
6.3.14 NamespacesType ..... 31
6.4 ObjectTypes used as EventTypes ..... 31
6.4.1 General ..... 31
6.4.2 BaseEventType ..... 31
6.4.3 AuditEventType ..... 33
6.4.4 AuditSecurityEventType ..... 34
6.4.5 AuditChannelEventType ..... 35
6.4.6 AuditOpenSecureChannelEventType ..... 35
6.4.7 AuditSessionEventType ..... 36
6.4.8 AuditCreateSessionEventType ..... 36
6.4.9 AuditUrlMismatchEventType ..... 37
6.4.10 AuditActivateSessionEventType ..... 38
6.4.11 AuditCancelEventType ..... 38
6.4.12 AuditCertificateEventType ..... 39

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

6.4.13 AuditCertificateDataMismatchEventType ..... 39
6.4.14 AuditCertificateExpiredEventType ..... 39
6.4.15 AuditCertificateInvalidEventType ..... 40
6.4.16 AuditCertificateUntrustedEventType ..... 40
6.4.17 AuditCertificateRevokedEventType ..... 40
6.4.18 AuditCertificateMismatchEventType ..... 41
6.4.19 AuditNodeManagementEventType ..... 41
6.4.20 AuditAddNodesEventType ..... 42
6.4.21 AuditDeleteNodesEventType ..... 42
6.4.22 AuditAddReferencesEventType ..... 42
6.4.23 AuditDeleteReferencesEventType ..... 43
6.4.24 AuditUpdateEventType ..... 43
6.4.25 AuditWriteUpdateEventType ..... 44
6.4.26 AuditHistoryUpdateEventType ..... 44
6.4.27 AuditUpdateMethodEventType ..... 45
6.4.28 SystemEventType ..... 45
6.4.29 DeviceFailureEventType ..... 45
6.4.30 SystemStatusChangeEventType ..... 46
6.4.31 BaseModelChangeEventType ..... 46
6.4.32 GeneralModelChangeEventType ..... 46
6.4.33 SemanticChangeEventType ..... 47
6.4.34 EventQueueOverflowEventType ..... 47
6.4.35 ProgressEventType ..... 48
6.5 ModellingRuleType ..... 48
6.6 FolderType ..... 48
6.7 DataTypeEncodingType ..... 49
6.8 DataTypeSystemType ..... 49
6.9 AggregateFunctionType ..... 49
7 Standard VariableTypes ..... 50
7.1 General ..... 50
7.2 BaseVariableType ..... 50
7.3 PropertyType ..... 50
7.4 BaseDataVariableType ..... 50
7.5 ServerVendorCapabilityType ..... 51
7.6 DataTypeDictionaryType ..... 51
7.7 DataTypeDescriptionType ..... 52
7.8 ServerStatusType ..... 52
7.9 BuildInfoType ..... 52
7.10 ServerDiagnosticsSummaryType ..... 53
7.11 SamplingIntervalDiagnosticsArrayType ..... 53
7.12 SamplingIntervalDiagnosticsType ..... 54
7.13 SubscriptionDiagnosticsArrayType ..... 54
7.14 SubscriptionDiagnosticsType ..... 54
7.15 SessionDiagnosticsArrayType ..... 55
7.16 SessionDiagnosticsVariableType ..... 56
7.17 SessionSecurityDiagnosticsArrayType ..... 57
7.18 SessionSecurityDiagnosticsType ..... 58
7.19 OptionSetType ..... 58
8 Standard Objects and their Variables ..... 59

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

8.1 General ..... 59
8.2 Objects used to organise the AddressSpace structure ..... 59
8.2.1 Overview ..... 59
8.2.2 Root ..... 60
8.2.3 Views ..... 60
8.2.4 Objects ..... 61
8.2.5 Types ..... 61
8.2.6 ObjectTypes ..... 62
8.2.7 VariableTypes ..... 63
8.2.8 ReferenceTypes ..... 64
8.2.9 DataTypes ..... 64
8.2.10 OPC Binary ..... 66
8.2.11 XML Schema ..... 66
8.2.12 EventTypes ..... 66
8.3 Server Object and its containing Objects ..... 67
8.3.1 General ..... 67
8.3.2 Server Object ..... 68
8.4 ModellingRule Objects ..... 69
8.4.1 ExposesItsArray ..... 69
8.4.2 Mandatory ..... 69
8.4.3 Optional ..... 69
8.4.4 OptionalPlaceholder ..... 70
8.4.5 MandatoryPlaceholder ..... 70
9 Standard Methods ..... 70
9.1 GetMonitoredItems ..... 70
10 Standard Views ..... 71
11 Standard ReferenceTypes ..... 71
11.1 References ..... 71
11.2 HierarchicalReferences ..... 71
11.3 NonHierarchicalReferences ..... 71
11.4 HasChild ..... 72
11.5 Aggregates ..... 72
11.6 Organizes ..... 72
11.7 HasComponent ..... 73
11.8 HasOrderedComponent ..... 73
11.9 HasProperty ..... 73
11.10 HasSubtype ..... 73
11.11 HasModellingRule ..... 74
11.12 HasTypeDefinition ..... 74
11.13 HasEncoding ..... 74
11.14 HasDescription ..... 75
11.15 HasEventSource ..... 75
11.16 HasNotifier ..... 75
11.17 GeneratesEvent ..... 75
11.18 AlwaysGeneratesEvent ..... 76
12 Standard DataTypes ..... 76
12.1 Overview ..... 76
12.2 DataTypes defined in IEC 62541-3 ..... 76

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

12.3 DataTypes defined in IEC 62541-4 ..... 81
12.4 BuildInfo ..... 82
12.5 RedundancySupport ..... 82
12.6 ServerState ..... 83
12.7 RedundantServerDataType ..... 83
12.8 SamplingIntervalDiagnosticsDataType ..... 84
12.9 ServerDiagnosticsSummaryDataType ..... 84
12.10 ServerStatusDataType ..... 85
12.11 SessionDiagnosticsDataType ..... 86
12.12 SessionSecurityDiagnosticsDataType ..... 87
12.13 ServiceCounterDataType ..... 88
12.14 StatusResult ..... 88
12.15 SubscriptionDiagnosticsDataType ..... 89
12.16 ModelChangeStructureDataType ..... 90
12.17 SemanticChangeStructureDataType ..... 90
12.18 BitFieldMaskDataType ..... 91
12.19 NetworkGroupDataType ..... 91
12.20 EndpointUrlListDataType ..... 92
Annex A (informative) Design decisions when modelling the server information ..... 93
A.1 Overview ..... 93
A.2 ServerType and Server Object ..... 93
A.3 Typed complex Objects beneath the Server Object ..... 93
A.4 Properties versus DataVariables ..... 93
A.5 Complex Variables using complex DataTypes ..... 94
A.6 Complex Variables having an array ..... 94
A.7 Redundant information ..... 94
A.8 Usage of the BaseDataVariableType ..... 95
A.9 Subtyping ..... 95
A.10 Extensibility mechanism ..... 95
Annex B (normative) StateMachines ..... 96
B.1 General ..... 96
B.2 Examples of finite state machines ..... 96
B.2.1 Simple state machine ..... 96
B.2.2 State machine containing substates ..... 97
B.3 Definition of state machine ..... 98
B.4 Representation of state machines in the AddressSpace ..... 98
B.4.1 Overview ..... 98
B.4.2 StateMachineType ..... 99
B.4.3 StateVariableType ..... 100
B.4.4 TransitionVariableType ..... 101
B.4.5 FiniteStateMachineType ..... 101
B.4.6 FiniteStateVariableType ..... 102
B.4.7 FiniteTransitionVariableType ..... 103
B.4.8 StateType ..... 103
B.4.9 InitialStateType ..... 104
B.4.10 TransitionType ..... 105
B.4.11 FromState ..... 105
B.4.12 ToState ..... 106
B.4.13 HasCause ..... 106

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

B.4.14 HasEffect ..... 106
B.4.15 HasSubStateMachine ..... 107
B.4.16 TransitionEventType ..... 107
B.4.17 AuditUpdateStateEventType ..... 108
B.4.18 Special Restrictions on subtyping StateMachines ..... 108
B.4.19 Specific StatusCodes for StateMachines ..... 109
B.5 Examples of StateMachines in the AddressSpace ..... 110
B.5.1 StateMachineType using inheritance ..... 110
B.5.2 StateMachineType with a sub-machine using inheritance ..... 111
B.5.3 StateMachineType using containment ..... 112
B.5.4 Example of a StateMachine having Transition to SubStateMachine ..... 113
Annex C (normative) File Transfer ..... 115
C.1 Overview ..... 115
C.2 FileType ..... 115
C.3 Open ..... 116
C.4 Close ..... 117
C.5 Read ..... 117
C.6 Write ..... 118
C.7 GetPosition ..... 118
C.8 SetPosition ..... 119

Figure 1 – Standard AddressSpace Structure ..... 59
Figure 2 – Views Organization ..... 60
Figure 3 – Objects Organization ..... 61
Figure 4 – ObjectTypes Organization ..... 62
Figure 5 – VariableTypes Organization ..... 63
Figure 6 – ReferenceType Definitions ..... 64
Figure 7 – DataTypes Organization ..... 65
Figure 8 – EventTypes Organization ..... 67
Figure 9 – Excerpt of Diagnostic Information of the Server ..... 68
Figure B.1 – Example of a simple state machine ..... 97
Figure B.2 – Example of a state machine having a sub-machine ..... 97
Figure B.3 – The StateMachine Information Model ..... 99
Figure B.4 – Example of an initial State in a sub-machine ..... 104
Figure B.5 – Example of a StateMachineType using inheritance ..... 110
Figure B.6 – Example of a StateMachineType with a SubStateMachine using inheritance ..... 111
Figure B.7 – Example of a StateMachineType using containment ..... 112
Figure B.8 – Example of a state machine with transitions from sub-states ..... 113
Figure B.9 – Example of a StateMachineType having Transition to SubStateMachine ..... 114

Table 1 – Examples of DataTypes ..... 15
Table 2 – Type Definition Table ..... 16
Table 3 – Common Node Attributes ..... 17
Table 4 – Common Object Attributes ..... 17
Table 5 – Common Variable Attributes ..... 17

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Table 6 – Common VariableType Attributes ..... 18
Table 7 – BaseObjectType Definition ..... 18
Table 8 – ServerType Definition ..... 19
Table 9 – ServerCapabilitiesType Definition ..... 21
Table 10 – ServerDiagnosticsType Definition ..... 23
Table 11 – SessionsDiagnosticsSummaryType Definition ..... 24
Table 12 – SessionDiagnosticsObjectType Definition ..... 24
Table 13 – VendorServerInfoType Definition ..... 25
Table 14 – ServerRedundancyType Definition ..... 25
Table 15 – TransparentRedundancyType Definition ..... 25
Table 16 – NonTransparentRedundancyType Definition ..... 26
Table 17 – NonTransparentNetworkRedundancyType Definition ..... 27
Table 18 – OperationLimitsType Definition ..... 28
Table 19 – AddressSpaceFileType Definition ..... 29
Table 20 – NamespaceMetadataType Definition ..... 30
Table 21 – NamespacesType Definition ..... 31
Table 22 – BaseEventType Definition ..... 31
Table 23 – AuditEventType Definition ..... 34
Table 24 – AuditSecurityEventType Definition ..... 34
Table 25 – AuditChannelEventType Definition ..... 35
Table 26 – AuditOpenSecureChannelEventType Definition ..... 35
Table 27 – AuditSessionEventType Definition ..... 36
Table 28 – AuditCreateSessionEventType Definition ..... 37
Table 29 – AuditUrlMismatchEventType Definition ..... 37
Table 30 – AuditActivateSessionEventType Definition ..... 38
Table 31 – AuditCancelEventType Definition ..... 38
Table 32 – AuditCertificateEventType Definition ..... 39
Table 33 – AuditCertificateDataMismatchEventType Definition ..... 39
Table 34 – AuditCertificateExpiredEventType Definition ..... 40
Table 35 – AuditCertificateInvalidEventType Definition ..... 40
Table 36 – AuditCertificateUntrustedEventType Definition ..... 40
Table 37 – AuditCertificateRevokedEventType Definition ..... 41
Table 38 – AuditCertificateMismatchEventType Definition ..... 41
Table 39 – AuditNodeManagementEventType Definition ..... 41
Table 40 – AuditAddNodesEventType Definition ..... 42
Table 41 – AuditDeleteNodesEventType Definition ..... 42
Table 42 – AuditAddReferencesEventType Definition ..... 43
Table 43 – AuditDeleteReferencesEventType Definition ..... 43
Table 44 – AuditUpdateEventType Definition ..... 43
Table 45 – AuditWriteUpdateEventType Definition ..... 44
Table 46 – AuditHistoryUpdateEventType Definition ..... 44
Table 47 – AuditUpdateMethodEventType Definition ..... 45
Table 48 – SystemEventType Definition ..... 45

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Table 49 – DeviceFailureEventType Definition ..... 46
Table 50 – SystemStatusChangeEventType Definition ..... 46
Table 51 – BaseModelChangeEventType Definition ..... 46
Table 52 – GeneralModelChangeEventType Definition ..... 47
Table 53 – SemanticChangeEventType Definition ..... 47
Table 54 – EventQueueOverflowEventType Definition ..... 47
Table 55 – ProgressEventType Definition ..... 48
Table 56 – ModellingRuleType Definition ..... 48
Table 57 – FolderType Definition ..... 49
Table 58 – DataTypeEncodingType Definition ..... 49
Table 59 – DataTypeSystemType Definition ..... 49
Table 60 – AggregateFunctionType Definition ..... 49
Table 61 – BaseVariableType Definition ..... 50
Table 62 – PropertyType Definition ..... 50
Table 63 – BaseDataVariableType Definition ..... 51
Table 64 – ServerVendorCapabilityType Definition ..... 51
Table 65 – DataTypeDictionaryType Definition ..... 51
Table 66 – DataTypeDescriptionType Definition ..... 52
Table 67 – ServerStatusType Definition ..... 52
Table 68 – BuildInfoType Definition ..... 53
Table 69 – ServerDiagnosticsSummaryType Definition ..... 53
Table 70 – SamplingIntervalDiagnosticsArrayType Definition ..... 54
Table 71 – SamplingIntervalDiagnosticsType Definition ..... 54
Table 72 – SubscriptionDiagnosticsArrayType Definition ..... 54
Table 73 – SubscriptionDiagnosticsType Definition ..... 55
Table 74 – SessionDiagnosticsArrayType Definition ..... 55
Table 75 – SessionDiagnosticsVariableType Definition ..... 56
Table 76 – SessionSecurityDiagnosticsArrayType Definition ..... 58
Table 77 – SessionSecurityDiagnosticsType Definition ..... 58
Table 78 – OptionSetType Definition ..... 59
Table 79 – Root Definition ..... 60
Table 80 – Views Definition ..... 61
Table 81 – Objects Definition ..... 61
Table 82 – Types Definition ..... 62
Table 83 – ObjectTypes Definition ..... 63
Table 84 – VariableTypes Definition ..... 63
Table 85 – ReferenceTypes Definition ..... 64
Table 86 – DataTypes Definition ..... 66
Table 87 – OPC Binary Definition ..... 66
Table 88 – XML Schema Definition ..... 66
Table 89 – EventTypes Definition ..... 67
Table 90 – Server Definition ..... 69
Table 91 – ExposesItsArray Definition ..... 69

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Table 92 – Mandatory Definition ..... 69
Table 93 – Optional Definition ..... 70
Table 94 – OptionalPlaceholder Definition ..... 70
Table 95 – MandatoryPlaceholder Definition ..... 70
Table 96 – GetMonitoredItems Method AddressSpace Definition ..... 71
Table 97 – References ReferenceType ..... 71
Table 98 – HierarchicalReferences ReferenceType ..... 71
Table 99 – NonHierarchicalReferences ReferenceType ..... 72
Table 100 – HasChild ReferenceType ..... 72
Table 101 – Aggregates ReferenceType ..... 72
Table 102 – Organizes ReferenceType ..... 73
Table 103 – HasComponent ReferenceType ..... 73
Table 104 – HasOrderedComponent ReferenceType ..... 73
Table 105 – HasProperty ReferenceType ..... 73
Table 106 – HasSubtype ReferenceType ..... 74
Table 107 – HasModellingRule ReferenceType ..... 74
Table 108 – HasTypeDefinition ReferenceType ..... 74
Table 109 – HasEncoding ReferenceType ..... 74
Table 110 – HasDescription ReferenceType ..... 75
Table 111 – HasEventSource ReferenceType ..... 75
Table 112 – HasNotifier ReferenceType ..... 75
Table 113 – GeneratesEvent ReferenceType ..... 76
Table 114 – AlwaysGeneratesEvent ReferenceType ..... 76
Table 115 – IEC 62541-3 DataType Definitions ..... 77
Table 116 – BaseDataType Definition ..... 78
Table 117 – Structure Definition ..... 78
Table 118 – Enumeration Definition ..... 79
Table 119 – ByteString Definition ..... 79
Table 120 – Number Definition ..... 79
Table 121 – Double Definition ..... 79
Table 122 – Integer Definition ..... 80
Table 123 – DateTime Definition ..... 80
Table 124 – String Definition ..... 80
Table 125 – UInteger Definition ..... 80
Table 126 – Image Definition ..... 80
Table 127 – UInt64 Definition ..... 81
Table 128 – IEC 62541-4 DataType Definitions ..... 81
Table 129 – UserIdentityToken Definition ..... 82
Table 130 – BuildInfo Structure ..... 82
Table 131 – BuildInfo Definition ..... 82
Table 132 – RedundancySupport Values ..... 82
Table 133 – RedundancySupport Definition ..... 83
Table 134 – ServerState Values ..... 83

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Table 135 – ServerState Definition ..... 83
Table 136 – RedundantServerDataType Structure ..... 83
Table 137 – RedundantServerDataType Definition ..... 84
Table 138 – SamplingIntervalDiagnosticsDataType Structure ..... 84
Table 139 – SamplingIntervalDiagnosticsDataType Definition ..... 84
Table 140 – ServerDiagnosticsSummaryDataType Structure ..... 85
Table 141 – ServerDiagnosticsSummaryDataType Definition ..... 85
Table 142 – ServerStatusDataType Structure ..... 85
Table 143 – ServerStatusDataType Definition ..... 86
Table 144 – SessionDiagnosticsDataType Structure ..... 86
Table 145 – SessionDiagnosticsDataType Definition ..... 87
Table 146 – SessionSecurityDiagnosticsDataType Structure ..... 88
Table 147 – SessionSecurityDiagnosticsDataType Definition ..... 88
Table 148 – ServiceCounterDataType Structure ..... 88
Table 149 – ServiceCounterDataType Definition ..... 88
Table 150 – StatusResult Structure ..... 89
Table 151 – StatusResult Definition ..... 89
Table 152 – SubscriptionDiagnosticsDataType Structure ..... 89
Table 153 – SubscriptionDiagnosticsDataType Definition ..... 90
Table 154 – ModelChangeStructureDataType Structure ..... 90
Table 155 – ModelChangeStructureDataType Definition ..... 90
Table 156 – SemanticChangeStructureDataType Structure ..... 91
Table 157 – SemanticChangeStructureDataType Definition ..... 91
Table 158 – BitFieldMaskDataType Definition ..... 91
Table 159 – NetworkGroupDataType Structure ..... 91
Table 160 – NetworkGroupDataType Definition ..... 91
Table 161 – EndpointUrlListDataType Structure ..... 92
Table 162 – EndpointUrlListDataType Definition ..... 92
Table B.1 – StateMachineType Definition ..... 100
Table B.2 – StateVariableType Definition ..... 100
Table B.3 – TransitionVariableType Definition ..... 101
Table B.4 – FiniteStateMachineType Definition ..... 102
Table B.5 – FiniteStateVariableType Definition ..... 103
Table B.6 – FiniteTransitionVariableType Definition ..... 103
Table B.7 – StateType Definition ..... 104
Table B.8 – InitialStateType Definition ..... 105
Table B.9 – TransitionType Definition ..... 105
Table B.10 – FromState ReferenceType ..... 105
Table B.11 – ToState ReferenceType ..... 106
Table B.12 – HasCause ReferenceType ..... 106
Table B.13 – HasEffect ReferenceType ..... 107
Table B.14 – HasSubStateMachine ReferenceType ..... 107
Table B.15 – TransitionEventType ..... 108

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Table B.16 – AuditUpdateStateEventType ..... 108
Table B.17 – Specific StatusCodes for StateMachines ..... 109
Table C.1 – FileType ..... 115
Table C.2 – Open Method AddressSpace Definition ..... 117
Table C.3 – Close Method AddressSpace Definition ..... 117
Table C.4 – Read Method AddressSpace Definition ..... 118
Table C.5 – Write Method AddressSpace Definition ..... 118
Table C.6 – GetPosition Method AddressSpace Definition ..... 119
Table C.7 – SetPosition Method AddressSpace Definition ..... 119

IECNORM.COM : Click to view the full PDF of IEC 62541 5:2015

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.
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.
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.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

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 second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

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

a) Defined ProgressEventType in 6.4.35 identifying the progress of an operation such as a service call (issue number 0057);
b) Defined DataType called BitFieldMaskDataType in 12.18 representing a bit field where individual fields can be written without redefining other fields (issue number 0188);
c) Delete Property SamplingRateCount in ServerDiagnosticSummaryDataType (12.9) as it was not needed (issue number 0635);

d) Added the Property “EffectiveTransitionTime” to TransitionVariableType in B.4.4 (issue number 0728);

e) Introduced VariableType OptionSetType in 7.19 representing a bit mask and text defining the semantic of the individual bits (issue number 0983);

f) Added a new EventType called SystemStatusChangeEventType in 6.4.30 that can be used to indicate connection to the underlying system is lost (issue number 1416);

g) Added properties to ServerCapabilitiesType (6.3.2) describing the max array length and string length for variables as well as added an object for operation limits (max size of arrays when calling services (e.g. read)). Added type OperationLimitsType (6.3.11) containing that information (issue number 1451);

h) Added SecureChannelId to AuditActivateSessionEventType (6.4.10) and adapted text in various places (issue number 1492);

i) Added normative Annex C defining FileType and Methods used to transfer files (issue number 1502);

j) Added a Method GetMonitoredItems on ServerType (6.3.1) to receive information on monitored items (issue 1543);

k) Removed the concept of *ModelParent* from document as it is not that useful. The *NodeId* of the *ReferenceType* will be kept not breaking existing applications (issue numbers 1555 and 1556).

l) Added meta data for namespaces in ServerType (6.3.1) and created types for managing that (issue number 1702).

m) Added representations for ModellingRules OptionalPlaceholder in 8.4.4 and MandatoryPlaceholder in 8.4.5 (issue number 1831);

n) Added new types NonTransparentNetworkRedundancyType (6.3.10), NetworkGroupDataType (12.19) and EndpointUrlListDataType (12.20) to manage HotAndMiorrored redundancy. Added more description on redundancy and updated RedundancySupport enumeration in 12.5 (issue number 2031);

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

| CDV | Report on voting |
|---|---|
| 65E/376/CDV | 65E/404/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 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 publication will remain unchanged until the stability date indicated on the IEC web site 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 publication using a colour printer.**

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

# 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 standardised *Nodes* of a *Server*'s *AddressSpace*. These *Nodes* are standardised types as well as standardised 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*

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

# SOMMAIRE

AVANT-PROPOS ..... 130
1 Domaine d'application ..... 133
2 Références normatives ..... 133
3 Termes, définitions et conventions ..... 133
3.1 Termes et définitions ..... 133
3.2 Abréviations et symboles ..... 134
3.3 Conventions pour les descriptions de Nœuds ..... 134
4 NodeIds et BrowseNames ..... 135
4.1 NodeIds ..... 135
4.2 BrowseNames ..... 136
5 Attributs communs ..... 136
5.1 Généralités ..... 136
5.2 Objets ..... 136
5.3 Variables ..... 136
5.4 VariableTypes ..... 137
6 ObjectTypes (Types d'Objet) normalisés ..... 137
6.1 Généralités ..... 137
6.2 BaseObjectType ..... 137
6.3 ObjectTypes pour l'Objet Serveur (Server Object) ..... 138
6.3.1 ServerType ..... 138
6.3.2 ServerCapabilitiesType ..... 140
6.3.3 ServerDiagnosticsType ..... 142
6.3.4 SessionsDiagnosticsSummaryType ..... 143
6.3.5 SessionDiagnosticsObjectType ..... 143
6.3.6 VendorServerInfoType ..... 144
6.3.7 ServerRedundancyType ..... 144
6.3.8 TransparentRedundancyType ..... 144
6.3.9 NonTransparentRedundancyType ..... 145
6.3.10 NonTransparentNetworkRedundancyType ..... 146
6.3.11 OperationLimitsType ..... 147
6.3.12 AddressSpaceFileType ..... 148
6.3.13 NamespaceMetadataType ..... 148
6.3.14 NamespacesType ..... 150
6.4 ObjectTypes utilisés comme EventTypes ..... 150
6.4.1 Généralités ..... 150
6.4.2 BaseEventType ..... 150
6.4.3 AuditEventType ..... 153
6.4.4 AuditSecurityEventType ..... 154
6.4.5 AuditChannelEventType ..... 154
6.4.6 AuditOpenSecureChannelEventType ..... 155
6.4.7 AuditSessionEventType ..... 155
6.4.8 AuditCreateSessionEventType ..... 156
6.4.9 AuditUrlMismatchEventType ..... 157
6.4.10 AuditActivateSessionEventType ..... 157
6.4.11 AuditCancelEventType ..... 158
6.4.12 AuditCertificateEventType ..... 158

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

6.4.13 AuditCertificateDataMismatchEventType ..... 159
6.4.14 AuditCertificateExpiredEventType ..... 159
6.4.15 AuditCertificateInvalidEventType ..... 159
6.4.16 AuditCertificateUntrustedEventType ..... 160
6.4.17 AuditCertificateRevokedEventType ..... 160
6.4.18 AuditCertificateMismatchEventType ..... 160
6.4.19 AuditNodeManagementEventType ..... 161
6.4.20 AuditAddNodesEventType ..... 161
6.4.21 AuditDeleteNodesEventType ..... 162
6.4.22 AuditAddReferencesEventType ..... 162
6.4.23 AuditDeleteReferencesEventType ..... 162
6.4.24 AuditUpdateEventType ..... 163
6.4.25 AuditWriteUpdateEventType ..... 163
6.4.26 AuditHistoryUpdateEventType ..... 164
6.4.27 AuditUpdateMethodEventType ..... 164
6.4.28 SystemEventType ..... 165
6.4.29 DeviceFailureEventType ..... 165
6.4.30 SystemStatusChangeEventType ..... 166
6.4.31 BaseModelChangeEventType ..... 166
6.4.32 GeneralModelChangeEventType ..... 166
6.4.33 SemanticChangeEventType ..... 167
6.4.34 EventQueueOverflowEventType ..... 167
6.4.35 ProgressEventType ..... 167
6.5 ModellingRuleType ..... 168
6.6 FolderType ..... 168
6.7 DataTypeEncodingType ..... 169
6.8 DataTypeSystemType ..... 169
6.9 AggregateFunctionType ..... 169
7 VariableTypes normalisés ..... 170
7.1 Généralités ..... 170
7.2 BaseVariableType ..... 170
7.3 PropertyType ..... 170
7.4 BaseDataVariableType ..... 171
7.5 ServerVendorCapabilityType ..... 171
7.6 DataTypeDictionaryType ..... 171
7.7 DataTypeDescriptionType ..... 172
7.8 ServerStatusType ..... 172
7.9 BuildInfoType ..... 173
7.10 ServerDiagnosticsSummaryType ..... 173
7.11 SamplingIntervalDiagnosticsArrayType ..... 173
7.12 SamplingIntervalDiagnosticsType ..... 174
7.13 SubscriptionDiagnosticsArrayType ..... 174
7.14 SubscriptionDiagnosticsType ..... 174
7.15 SessionDiagnosticsArrayType ..... 175
7.16 SessionDiagnosticsVariableType ..... 176
7.17 SessionSecurityDiagnosticsArrayType ..... 177
7.18 SessionSecurityDiagnosticsType ..... 178
7.19 OptionSetType ..... 178
8 Objets normalisés et leurs Variables ..... 179

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

8.1 Généralités ..... 179
8.2 Objets utilisés pour organiser la structure de l'Espace d'Adresses ..... 179
8.2.1 Vue d'ensemble ..... 179
8.2.2 Racine (Root) ..... 180
8.2.3 Views (Vues) ..... 180
8.2.4 Objects (Objets) ..... 181
8.2.5 Types ..... 182
8.2.6 ObjectTypes ..... 182
8.2.7 VariableTypes ..... 183
8.2.8 ReferenceTypes ..... 184
8.2.9 DataTypes ..... 185
8.2.10 OPC Binary (OPC Binaire) ..... 187
8.2.11 XML Schema (Schéma XML) ..... 187
8.2.12 EventTypes ..... 187
8.3 Objet Server et ses objets contenants ..... 188
8.3.1 Généralités ..... 188
8.3.2 Objet Server ..... 189
8.4 Objets ModellingRule ..... 190
8.4.1 ExposesItsArray ..... 190
8.4.2 Mandatory (Obligatoire) ..... 190
8.4.3 Optional (Facultatif) ..... 191
8.4.4 OptionalPlaceholder ..... 191
8.4.5 MandatoryPlaceholder ..... 191
9 Méthodes normalisées ..... 191
9.1 GetMonitoredItems ..... 191
10 Vues normalisées ..... 192
11 ReferenceTypes normalisés ..... 192
11.1 Références ..... 192
11.2 HierarchicalReferences ..... 192
11.3 NonHierarchicalReferences ..... 193
11.4 HasChild ..... 193
11.5 Aggregates ..... 193
11.6 Organizes ..... 194
11.7 HasComponent ..... 194
11.8 HasOrderedComponent ..... 194
11.9 HasProperty ..... 195
11.10 HasSubtype ..... 195
11.11 HasModellingRule ..... 195
11.12 HasTypeDefinition ..... 195
11.13 HasEncoding ..... 196
11.14 HasDescription ..... 196
11.15 HasEventSource ..... 196
11.16 HasNotifier ..... 197
11.17 GeneratesEvent ..... 197
11.18 AlwaysGeneratesEvent ..... 197
12 DataTypes normalisés ..... 197
12.1 Vue d'ensemble ..... 197
12.2 DataTypes définis dans l'IEC 62541-3 ..... 197

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

12.3 DataTypes définis dans l'IEC 62541-4 ..... 202
12.4 BuildInfo ..... 203
12.5 RedundancySupport ..... 203
12.6 ServerState ..... 204
12.7 RedundantServerDataType ..... 204
12.8 SamplingIntervalDiagnosticsDataType ..... 205
12.9 ServerDiagnosticsSummaryDataType ..... 205
12.10 ServerStatusDataType ..... 206
12.11 SessionDiagnosticsDataType ..... 207
12.12 SessionSecurityDiagnosticsDataType ..... 208
12.13 ServiceCounterDataType ..... 209
12.14 StatusResult ..... 209
12.15 SubscriptionDiagnosticsDataType ..... 210
12.16 ModelChangeStructureDataType ..... 211
12.17 SemanticChangeStructureDataType ..... 212
12.18 BitFieldMaskDataType ..... 213
12.19 NetworkGroupDataType ..... 213
12.20 EndpointUrlListDataType ..... 213
Annexe A (informative) Décisions de conception pour modéliser les informations du Serveur ..... 214
A.1 Vue d'ensemble ..... 214
A.2 ServerType et Objet Server ..... 214
A.3 Objets complexes typés sous l'Objet Server ..... 214
A.4 Properties par rapport aux DataVariables ..... 214
A.5 Variables complexes utilisant des DataTypes complexes ..... 215
A.6 Variables complexes ayant une matrice ..... 215
A.7 Informations redondantes ..... 215
A.8 Utilisation du BaseDataVariableType ..... 216
A.9 Sous-typage ..... 216
A.10 Mécanisme d'extensibilité ..... 216
Annexe B (normative) Diagrammes d'états (StateMachines) ..... 217
B.1 Généralités ..... 217
B.2 Exemples de diagrammes d'états finis ..... 217
B.2.1 Diagramme d'états simple ..... 217
B.2.2 Diagramme d'états contenant des sous-états ..... 218
B.3 Définition de diagramme d'états ..... 219
B.4 Représentation des diagrammes d'états dans l'Espace d'Adresses ..... 219
B.4.1 Vue d'ensemble ..... 219
B.4.2 StateMachineType ..... 220
B.4.3 StateVariableType ..... 221
B.4.4 TransitionVariableType ..... 222
B.4.5 FiniteStateMachineType ..... 223
B.4.6 FiniteStateVariableType ..... 224
B.4.7 FiniteTransitionVariableType ..... 224
B.4.8 StateType ..... 225
B.4.9 InitialStateType ..... 225
B.4.10 TransitionType ..... 226
B.4.11 FromState ..... 226
B.4.12 ToState ..... 227

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

B.4.13 HasCause ..... 227
B.4.14 HasEffect ..... 228
B.4.15 HasSubStateMachine ..... 228
B.4.16 TransitionEventType ..... 229
B.4.17 AuditUpdateStateEventType ..... 229
B.4.18 Restrictions spéciales sur le sous-typage des StateMachines ..... 230
B.4.19 StatusCodes spécifiques pour StateMachines ..... 230
B.5 Exemples de StateMachines dans l'Espace d'Adresses ..... 231
B.5.1 StateMachineType utilisant la relation d'héritage ..... 231
B.5.2 StateMachineType avec un sous-diagramme utilisant la relation d'héritage ..... 233
B.5.3 StateMachineType utilisant la hiérarchie d'appartenance (ou emboîtement) ..... 235
B.5.4 Exemple de StateMachine ayant une Transition vers un SubStateMachine ..... 236
Annexe C (normative) Transfert de fichiers ..... 239
C.1 Vue d'ensemble ..... 239
C.2 FileType ..... 239
C.3 Open (Ouvrir) ..... 240
C.4 Close (Fermer) ..... 241
C.5 Read (Lecture) ..... 241
C.6 Write (Ecriture) ..... 242
C.7 GetPosition ..... 243
C.8 SetPosition ..... 243

Figure 1 – Structure normalisée de l'Espace d'Adresses ..... 180
Figure 2 – Organisation des Views ..... 181
Figure 3 – Organisation des Objects ..... 182
Figure 4 – Organisation des ObjectTypes ..... 183
Figure 5 – Organisation des VariableTypes ..... 184
Figure 6 – Définitions de ReferenceType ..... 185
Figure 7 – Organisation des DataTypes ..... 186
Figure 8 – Organisation des EventTypes ..... 188
Figure 9 – Extrait d'informations de diagnostic du Serveur ..... 189
Figure B.1 – Exemple d'un diagramme d'états simple ..... 218
Figure B.2 – Exemple de diagramme d'états ayant un sous-diagramme ..... 218
Figure B.3 – Modèle d'informations StateMachine ..... 220
Figure B.4 – Exemple d'État initial d'un sous-diagramme ..... 225
Figure B.5 – Exemple d'un StateMachineType utilisant la relation d'héritage ..... 231
Figure B.6 – Exemple d'un StateMachineType avec un SubStateMachine utilisant la relation d'héritage ..... 234
Figure B.7 – Exemple d'un StateMachineType utilisant la hiérarchie d'appartenance ..... 235
Figure B.8 – Exemple d'un diagramme d'états avec des transitions partant de sous-états ..... 236
Figure B.9 – Exemple d'un StateMachineType ayant une Transition vers un SubStateMachine ..... 238

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Tableau 1 – Exemples de DataTypes ..... 134
Tableau 2 – Tableau de Définition de Type ..... 135
Tableau 3 – Attributs de nœud communs ..... 136
Tableau 4 – Attributs d'objet communs ..... 136
Tableau 5 – Attributs de variable communs ..... 137
Tableau 6 – Attributs de VariableType communs ..... 137
Tableau 7 – Définition de BaseObjectType ..... 138
Tableau 8 – Définition de ServerType ..... 138
Tableau 9 – Définition de ServerCapabilitiesType ..... 140
Tableau 10 – Définition de ServerDiagnosticsType ..... 142
Tableau 11 – Définition de SessionsDiagnosticsSummaryType ..... 143
Tableau 12 – Définition de SessionDiagnosticsObjectType ..... 143
Tableau 13 – Définition de VendorServerInfoType ..... 144
Tableau 14 – Définition de ServerRedundancyType ..... 144
Tableau 15 – Définition de TransparentRedundancyType ..... 145
Tableau 16 – Définition de NonTransparentRedundancyType ..... 145
Tableau 17 – Définition de NonTransparentNetworkRedundancyType ..... 146
Tableau 18 – Définition de OperationLimitsType ..... 147
Tableau 19 – Définition de AddressSpaceFileType ..... 148
Tableau 20 – Définition de NamespaceMetadataType ..... 149
Tableau 21 – Définition de NamespacesType ..... 150
Tableau 22 – Définition de BaseEventType ..... 151
Tableau 23 – Définition de AuditEventType ..... 153
Tableau 24 – Définition de AuditSecurityEventType ..... 154
Tableau 25 – Définition de AuditChannelEventType ..... 154
Tableau 26 – Définition de AuditOpenSecureChannelEventType ..... 155
Tableau 27 – Définition de AuditSessionEventType ..... 156
Tableau 28 – Définition de AuditCreateSessionEventType ..... 156
Tableau 29 – Définition de AuditUrlMismatchEventType ..... 157
Tableau 30 – Définition de AuditActivateSessionEventType ..... 157
Tableau 31 – Définition de AuditCancelEventType ..... 158
Tableau 32 – Définition de AuditCertificateEventType ..... 158
Tableau 33 – Définition de AuditCertificateDataMismatchEventType ..... 159
Tableau 34 – Définition de AuditCertificateExpiredEventType ..... 159
Tableau 35 – Définition de AuditCertificateInvalidEventType ..... 160
Tableau 36 – Définition de AuditCertificateUntrustedEventType ..... 160
Tableau 37 – Définition de AuditCertificateRevokedEventType ..... 160
Tableau 38 – Définition de AuditCertificateMismatchEventType ..... 161
Tableau 39 – Définition de AuditNodeManagementEventType ..... 161
Tableau 40 – Définition de AuditAddNodesEventType ..... 161
Tableau 41 – Définition de AuditDeleteNodesEventType ..... 162
Tableau 42 – Définition de AuditAddReferencesEventType ..... 162
Tableau 43 – Définition de AuditDeleteReferencesEventType ..... 163

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Tableau 44 – Définition de AuditUpdateEventType ..... 163
Tableau 45 – Définition de AuditWriteUpdateEventType ..... 163
Tableau 46 – Définition de AuditHistoryUpdateEventType ..... 164
Tableau 47 – Définition de AuditUpdateMethodEventType ..... 165
Tableau 48 – Définition de SystemEventType ..... 165
Tableau 49 – Définition de DeviceFailureEventType ..... 165
Tableau 50 – Définition de SystemStatusChangeEventType ..... 166
Tableau 51 – Définition de BaseModelChangeEventType ..... 166
Tableau 52 – Définition de GeneralModelChangeEventType ..... 166
Tableau 53 – Définition de SemanticChangeEventType ..... 167
Tableau 54 – Définition de EventQueueOverflowEventType ..... 167
Tableau 55 – Définition de ProgressEventType ..... 168
Tableau 56 – Définition de ModellingRuleType ..... 168
Tableau 57 – Définition de FolderType ..... 169
Tableau 58 – Définition de DataTypeEncodingType ..... 169
Tableau 59 – Définition de DataTypeSystemType ..... 169
Tableau 60 – Définition de AggregateFunctionType ..... 169
Tableau 61 – Définition de BaseVariableType ..... 170
Tableau 62 – Définition de PropertyType ..... 170
Tableau 63 – Définition de BaseDataVariableType ..... 171
Tableau 64 – Définition de ServerVendorCapabilityType ..... 171
Tableau 65 – Définition de DataTypeDictionaryType ..... 172
Tableau 66 – Définition de DataTypeDescriptionType ..... 172
Tableau 67 – Définition de ServerStatusType ..... 172
Tableau 68 – Définition de BuildInfoType ..... 173
Tableau 69 – Définition de ServerDiagnosticsSummaryType ..... 173
Tableau 70 – Définition de SamplingIntervalDiagnosticsArrayType ..... 174
Tableau 71 – Définition de SamplingIntervalDiagnosticsType ..... 174
Tableau 72– Définition de SubscriptionDiagnosticsArrayType ..... 174
Tableau 73 – Définition de SubscriptionDiagnosticsType ..... 175
Tableau 74 – Définition de SessionDiagnosticsArrayType ..... 175
Tableau 75 – Définition de SessionDiagnosticsVariableType ..... 176
Tableau 76 – Définition de SessionSecurityDiagnosticsArrayType ..... 178
Tableau 77 – Définition de SessionSecurityDiagnosticsType ..... 178
Tableau 78 – Définition de OptionSetType ..... 179
Tableau 79 – Définition de Root ..... 180
Tableau 80 – Définition de Views ..... 181
Tableau 81 – Définition de Objects ..... 182
Tableau 82 – Définition de Types ..... 182
Tableau 83 – Définition de ObjectTypes ..... 183
Tableau 84 – Définition de VariableTypes ..... 184
Tableau 85 – Définition de ReferenceTypes ..... 185
Tableau 86 – Définition de DataTypes ..... 187

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015

Tableau 87 – Définition de OPC Binary ..... 187
Tableau 88 – Définition de XML Schema ..... 187
Tableau 89 – Définition de EventTypes ..... 188
Tableau 90 – Définition de Server ..... 190
Tableau 91 – Définition de ExposesItsArray ..... 190
Tableau 92 – Définition de Mandatory ..... 190
Tableau 93 – Définition de Optional ..... 191
Tableau 94 – Définition de OptionalPlaceholder ..... 191
Tableau 95 – Définition de MandatoryPlaceholder ..... 191
Tableau 96 – Définition de l'Espace d'Adresses pour la Méthode GetMonitoredItems ..... 192
Tableau 97 – ReferenceType References ..... 192
Tableau 98 – ReferenceType HierarchicalReferences ..... 193
Tableau 99 – ReferenceType NonHierarchicalReferences ..... 193
Tableau 100 – ReferenceType HasChild ..... 193
Tableau 101 – ReferenceType Aggregates ..... 194
Tableau 102 – ReferenceType Organizes ..... 194
Tableau 103 – ReferenceType HasComponent ..... 194
Tableau 104 – ReferenceType HasOrderedComponent ..... 194
Tableau 105 – ReferenceType HasProperty ..... 195
Tableau 106 – ReferenceType HasSubtype ..... 195
Tableau 107 – ReferenceType HasModellingRule ..... 195
Tableau 108 – ReferenceType HasTypeDefinition ..... 196
Tableau 109 – ReferenceType HasEncoding ..... 196
Tableau 110 – ReferenceType HasDescription ..... 196
Tableau 111 – ReferenceType HasEventSource ..... 196
Tableau 112 – ReferenceType HasNotifier ..... 197
Tableau 113 – ReferenceType GeneratesEvent ..... 197
Tableau 114 – ReferenceType AlwaysGeneratesEvent ..... 197
Tableau 115 – Définitions de DataType dans l'IEC 62541-3 ..... 198
Tableau 116 – Définition de BaseDataType ..... 199
Tableau 117 – Définition de Structure ..... 199
Tableau 118 – Définition de Enumeration ..... 200
Tableau 119 – Définition de ByteString ..... 200
Tableau 120 – Définition de Number ..... 200
Tableau 121 – Définition de Double ..... 200
Tableau 122 – Définition d'Integer ..... 201
Tableau 123 – Définition de DateTime ..... 201
Tableau 124 – Définition de String ..... 201
Tableau 125 – Définition d'UInteger ..... 201
Tableau 126 – Définition d'Image ..... 201
Tableau 127 – Définition d'UInt64 ..... 202
Tableau 128 – Définitions de DataType dans l'IEC 62541-4 ..... 202
Tableau 129 – Définition d'UserIdentityToken ..... 203

IECNORM.COM : Click to view the full PDF of IEC 62541-5:2015