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Enotna arhitektura OPC - 1. del: Pregled in koncepti

OPC unified architecture - Part 1: Overview and concepts

iTeh Standards

Ta slovenski standard je istoveten z: **prEN IEC 62541-1:2024**

Document Preview

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TITLE:

OPC Unified Architecture – Part 1: Overview and Concepts

PROPOSED STABILITY DATE: 2026

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CONTENTS

		Page
1		
2		
3		
4	1 Scope	1
5	2 Normative References	1
6	3 Terms, definitions, and abbreviations	2
7	3.1 Document conventions	2
8	3.2 Terms and definitions	2
9	3.3 Abbreviations	6
10	4 Structure of the OPC UA series	7
11	4.1 Specification organization	7
12	4.2 Specification parts	7
13	5 Overview	8
14	5.1 Scope	8
15	5.2 General	9
16	5.3 Design goals	9
17	5.4 Integrated models and services	11
18	5.4.1 Security model	11
19	5.4.2 Integrated AddressSpace model	12
20	5.4.3 Integrated object model	12
21	5.4.4 Integrated services	12
22	5.5 Sessions	13
23	6 Systems concepts	13
24	6.1 Client Server Overview	13
25	6.2 OPC UA Clients	14
26	6.3 OPC UA Servers	15
27	6.3.1 General	15
28	6.3.2 Real objects	15
29	6.3.3 Server application	15
30	6.3.4 OPC UA AddressSpace	15
31	6.3.5 Subscription entities	16
32	6.3.6 OPC UA Service Interface	16
33	6.3.7 Server to Server interactions	16
34	6.4 Redundancy	17
35	6.5 Publish-Subscribe	18
36	6.6 Synergy of models	18
37	6.7 Global Services	19
38	6.7.1 General	19
39	6.7.2 Discovery Services	19
40	6.7.3 Certificate Management	20
41	6.7.4 KeyCredential Management	20
42	6.7.5 Authorization Services	20
43	6.7.6 Device Onboarding	20
44	6.7.7 Alias Names	20
45	6.7.8 Security Key Service (SKS)	20
46	7 Client/Server Service Sets	20
47	7.1 General	20
48	7.2 Discovery Service Set	20
49	7.3 SecureChannel Service Set	21
50	7.4 Session Service Set	22

51	7.5	NodeManagement Service Set.....	22
52	7.6	View Service Set.....	22
53	7.7	Query Service Set.....	22
54	7.8	Attribute Service Set.....	22
55	7.9	Method Service Set.....	22
56	7.10	MonitoredItem Service Set.....	22
57	7.11	Subscription Service Set.....	23

58

59

60

61

FIGURES

62	Figure 1 – OPC UA target applications	10
63	Figure 2 – OPC UA System architecture	13
64	Figure 3 – OPC UA Client architecture	14
65	Figure 4 – OPC UA Server architecture	15
66	Figure 5 – Peer-to-peer interactions between Servers	17
67	Figure 6 – Chained Server example.....	17
68	Figure 7 – Integrated Client Server and PubSub models.....	19
69	Figure 8 – SecureChannel and Session Services	21

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OPC UNIFIED ARCHITECTURE –

Part 1: Overview and Concepts

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116 International Standard IEC 62541-1 has been prepared by subcommittee 65E: Devices and integration
117 in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and
118 automation.

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

CDV	Report on voting
65E/XX/CDV	65E/XX/RVC

120

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

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

124 Throughout this document and the other Parts of the series, certain document conventions are used:

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

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

134 A list of all parts of the IEC 62541 series is included in IEC 62541-1 clause 4 Structure of the OPC UA
135 series and published under the general title OPC Unified Architecture, can be found on the IEC website.

136 The committee has decided that the contents of this publication will remain unchanged until the stability
137 date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific
138 publication. At this date, the publication will be

- 139 • reconfirmed,
- 140 • withdrawn,
- 141 • replaced by a revised edition, or
- 142 • amended.

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144

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OPC Unified Architecture Specification

Part 1: Overview and Concepts

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154 **1 Scope**

155 This part of IEC 62541 presents the concepts and overview of the OPC Unified Architecture (OPC
156 UA). Reading this document is helpful to understand the remaining parts of this multi-part document
157 set. Each of the other parts is briefly explained along with a suggested reading order. Except for the
158 Term definitions in clause 3.2, this Part is non-normative.

159 **2 Normative References**

160 The following documents, in whole or in part, are normatively referenced in this document and are
161 indispensable for its application. For dated references, only the edition cited applies. For undated
162 references, the latest edition of the referenced document (including any amendments and errata)
163 applies.

164 IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related*
165 *systems*

166 <https://www.iec.ch/functionalsafety/standards/>

167 IEC 61784 3:2017, Industrial communication networks – Profiles – Part 3: Functional safety fieldbuses
168 – General rules and profile definitions

169 <https://webstore.iec.ch/publication/61165/>

170 IEC 62541-2, *OPC Unified Architecture – Part 2: Security*

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

172 IEC 62541-4, *OPC Unified Architecture – Part 4: Services*

173 IEC 62541-5, *OPC Unified Architecture – Part 5: Information Model*

174 IEC 62541-6, *OPC Unified Architecture – Part 6: Mappings*

175 IEC 62541-7, *OPC Unified Architecture – Part 7: Profiles*

176 IEC 62541-8, *OPC Unified Architecture – Part 8: Data Access*

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

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

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

180 IEC 62541-12, *OPC Unified Architecture – Part 12: Discovery and Global Services*

181 IEC 62541-13, *OPC Unified Architecture – Part 13: Aggregates*

182 IEC 62541-14, *OPC Unified Architecture – Part 14: PubSub*

183 IEC 62541-15, *OPC Unified Architecture - Part 15: Safety*

184	IEC 62541-16, <i>OPC Unified Architecture - Part 16: State Machines</i>
185	IEC 62541-17, <i>OPC Unified Architecture - Part 17: Alias Names</i>
186	IEC 62541-18, <i>OPC Unified Architecture - Part 18: Role-Based Security</i>
187	IEC 62541-19, <i>OPC Unified Architecture - Part 19: Dictionary References</i>
188	IEC 62541-20, <i>OPC Unified Architecture - Part 20: File Transfer</i>
189	IEC 62541-21, <i>OPC Unified Architecture - Part 21: Device Onboarding</i>
190	IEC 62541-22, <i>OPC Unified Architecture - Part 22: Base Network Model</i>
191	IEC 62541-23, <i>OPC Unified Architecture - Part 23: Common ReferenceTypes</i>
192	IEC 62541-24, <i>OPC Unified Architecture - Part 24: Scheduler</i>
193	X.509, X.509 Public Key Certificate Infrastructure
194	https://www.itu.int/rec/T-REC-X.509
195	

196 **3 Terms, definitions, and abbreviations**

197 **3.1 Document conventions**

198 Throughout this document and the referenced other Parts of the series, certain document conventions
199 are used.

200 Italics are used to denote a defined term or definition that appears in the “Terms and definition” clause
201 in one of the parts of the series.

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

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

209 **3.2 Terms and definitions**

210 For the purposes of this document, the following terms apply.

211 **3.2.1**

212 **AddressSpace**

213 collection of information that a *Server* makes visible to its *Clients*

214 Note 1 to entry: See IEC 62541-3 for a description of the contents and structure of the *Server AddressSpace*.

215 **3.2.2**

216 **Aggregate**

217 function that calculates derived values from *Raw data*

218 Note 1 to entry: Raw data may be from a historian or buffered real time data. Common Aggregates include averages over
219 a given time range, minimum over a time range and maximum over a time range.

220 **3.2.3**

221 **Alarm**

222 type of *Event* associated with a state condition that typically requires acknowledgement

223 Note 1 to entry: See IEC 62541-9 for a description of *Alarms*.

- 224 **3.2.4**
 225 **Attribute**
 226 primitive characteristic of a *Node*
- 227 Note 1 to entry: All *Attributes* are defined by OPC UA, and may not be defined by *Clients* or *Servers*. *Attributes* are the only
 228 elements in the *AddressSpace* permitted to have data values.
- 229 **3.2.5**
 230 **Broker**
 231 intermediary program module that routes *NetworkMessages* from *Publishers* to *Subscribers*
- 232 Note 1 to entry: *Brokers* are building blocks of *Message Oriented Middleware*.
- 233 **3.2.6**
 234 **Certificate**
 235 digitally signed data structure that contains a public key and an identity
- 236 Note 1 to entry: Certificates are used to identity for example *Clients*, *Servers*, users, and certificate authorities.
- 237 **3.2.7**
 238 **Client**
 239 software application that sends *Messages* to OPC UA *Servers* conforming to the *Services* specified in
 240 this set of specifications
- 241 **3.2.8**
 242 **Condition**
 243 generic term that is an extension to an *Event*
- 244 Note 1 to entry: A *Condition* represents the conditions of a system or one of its components and always exists in some
 245 state.
- 246 **3.2.9**
 247 **Communication Stack**
 248 layered set of software modules between the application and the hardware that provides various
 249 functions to encode, encrypt and format a *Message* for sending, and to decode, decrypt and unpack a
 250 *Message* that was received
- 251 **3.2.10**
 252 **Complex Data**
 253 data that is composed of elements of more than one primitive data type, such as a structure
- 254 **3.2.11**
 255 **DataSet**
 256 list of named data values
- 257 Note 1 to entry: A *DataSet* typically consists of *Event* fields or *Variable* values.
- 258 **3.2.12**
 259 **DataSetMessage**
 260 payload of a *NetworkMessage* created from a *DataSet*
- 261 Note 1 to entry: The *DataSetMessage* is an immutable payload of the *NetworkMessage* handed off to the *Message Oriented*
 262 *Middleware* (transport layer) for delivery by the *Publisher*. The *Subscriber* receives the *DataSetMessage* as the payload of a
 263 *NetworkMessage* from the *Publisher* with additional headers that may be supplied by the *Message Oriented Middleware* along
 264 the way.
- 265 **3.2.13**
 266 **Discovery**
 267 process by which *Client* obtains information about *Servers*, including endpoint and security information
- 268 **3.2.14**
 269 **Event**
 270 generic term used to describe an occurrence of some significance within a system or system
 271 component
- 272 **3.2.15**
 273 **EventNotifier**
 274 special *Attribute* of a *Node* that signifies that a *Client* may subscribe to that particular *Node* to receive
 275 *Notifications* of *Event* occurrences

- 276 **3.2.16**
 277 **Information Model**
 278 organizational framework that defines, characterizes, and relates information resources of a given
 279 system or set of systems.
- 280 Note 1 to entry: The core *AddressSpace* model supports the representation of *Information Models* in the *AddressSpace*.
 281 See IEC 62541-5 for a description of the base OPC UA *Information Model*.
- 282 **3.2.17**
 283 **Message**
 284 data unit conveyed between *Client* and *Server* that represents a specific *Service* request or response
- 285 **3.2.18**
 286 **Message Oriented Middleware**
 287 infrastructure supporting sending and receiving *NetworkMessages* between distributed systems
- 288 Note 1 to entry: An OPC UA *Application* may support different types of *Message Oriented Middleware* infrastructures and
 289 protocols like AMQP, MQTT, or UDP with IP multicast. Other types like DDS or XMPP can also be integrated into the OPC
 290 UA *PubSub* model.
- 291 **3.2.19**
 292 **Method**
 293 callable software function that is a component of an *Object*
- 294 **3.2.20**
 295 **MonitoredItem**
 296 *Client*-defined entity in the *Server* used to monitor *Attributes* or *EventNotifiers* for new values or *Event*
 297 occurrences and that generates *Notifications* for them
- 298 **3.2.21**
 299 **NetworkMessage**
 300 *DataSetMessages* and header to facilitate delivery, routing, security, and filtering
- 301 Note 1 to entry: The *Publisher* hands off the *NetworkMessage* to the *Message Oriented Middleware* (transport layer) to
 302 deliver *DataSetMessages* to the *Subscribers*.
- 303 Note 2 to entry: The term message is used with various connotations in the messaging world. The *Publisher* might like to
 304 think of the message as an immutable payload handed off to the *Message Oriented Middleware* for delivery. The *Subscriber*
 305 often thinks of the message as not only that immutable payload from the sender, but also various annotations supplied by
 306 the *Message Oriented Middleware* along the way. To avoid confusion the term *DataSetMessage* is used to mean the message
 307 as supplied by the *Publisher* for a *DataSet* and the term *NetworkMessage* is used to mean the *DataSetMessage* plus sections
 308 for annotation at the head and tail of the *DataSetMessage*.
- 309 **3.2.22**
 310 **Node**
 311 fundamental component of an *AddressSpace*
- 312 **3.2.23**
 313 **NodeClass**
 314 class of a *Node* in an *AddressSpace*
- 315 Note 1 to entry: *NodeClasses* define the metadata for the components of the OPC UA object model. They also define
 316 constructs, such as *Views*, that are used to organize the *AddressSpace*.
- 317 **3.2.24**
 318 **Notification**
 319 generic term for data that announces the detection of an *Event* or of a changed *Attribute* value;
 320 *Notifications* are sent in *NotificationMessages*.
- 321 **3.2.25**
 322 **NotificationMessage**
 323 *Message* published from a *Subscription* that contains one or more *Notifications*
- 324 **3.2.26**
 325 **Object**
 326 *Node* that represents a physical or abstract element of a system
- 327 Note 1 to entry: *Objects* are modelled using the OPC UA Object Model. Systems, subsystems, and devices are examples
 328 of *Objects*. An *Object* may be defined as an instance of an *ObjectType*.