entsoe

European Network of
Transmission System Operators
for Electricity

OBJECT REGISTRY PROFILE SPECIFICATION

2026-03-09

APPROVED
VERSION 2.2.2

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18 The force of the following words is modified by the requirement level of the document in which
19 they are used.

20 • SHALL: This word, or the terms "REQUIRED" or "MUST", means that the definition is an
21   absolute requirement of the specification.

22 • SHALL NOT: This phrase, or the phrase "MUST NOT", means that the definition is an
23   absolute prohibition of the specification.

24 • SHOULD: This word, or the adjective "RECOMMENDED", means that there may exist valid
25   reasons in particular circumstances to ignore a particular item, but the full implications must
26   be understood and carefully weighed before choosing a different course.

27 • SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED", means that there may
28   exist valid reasons in particular circumstances when the particular behaviour is acceptable
29   or even useful, but the full implications should be understood and the case carefully weighed
30   before implementing any behaviour described with this label.

31 • MAY: This word, or the adjective "OPTIONAL", means that an item is truly optional.

32

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33   Revision History

Version	Date	Paragraph	Comments
1.0.0	2021-10-12		For CIM EG review
2.0.0	2021-11-15		SOC approved.
2.1.0	2022-09-21		SOC approved.
2.2.0-alpha	2024-03-20		For CIM WG review.
2.2.1-alpha	2024-09-07		For CIM WG review.
2.2.2	2026-03-09		CIM WG agreement.

34   CONTENTS

57

58   **List of figures**

60

61   **List of tables**

71

72 **1   Introduction**

73 The object registry profile enables and exchange of different codes and names that relate to
74 elements in the model.

75 **2   Application profile specification**

76 **2.1   Version information**

77 The content is generated from UML model file CIM17-2_CGMES31v01_PROF-
78 20v02_NC24v19_MS10v03_DES10v01.eap.

79 This edition is based on the IEC 61970 UML version 'IEC61970CIM17v40', dated '2020-08-24'.

80 - Title: Object Registry vocabulary

81 - Keyword: OR

82 - Description: This vocabulary is describing the object registry profile.

83 - Version IRI: https://ap-voc.cim4.eu/ObjectRegistry/2.2

84 - Version info: 2.2.5

85 - Prior version: http://entsoe.eu/ns/CIM/ObjectRegistry-EU/2.1

86 - Conforms to: urn:iso:std:iec:61970-600-2:ed-1|urn:iso:std:iec:61970-301:ed-
87   7:amd1|file://iec61970cim17v40_iec61968cim13v13a_iec62325cim03v17a.eap|urn:iso:
88   std:iec:61970-401:draft:ed-1|urn:iso:std:iec:61970-501:draft:ed-2|file://CIM17-
89   2_CGMES31v01_PROF-20v02_NC24v19_MS10v03_DES10v01.eap

90 - Identifier: 5f23093d-a317-486c-9be7-3b1fb5bcafff

91

92 **2.2   Constraints naming convention**

93 The naming of the rules shall not be used for machine processing. The rule names are just a
94 string. The naming convention of the constraints is as follows.

95 "{rule.Type}:{rule.Standard}:{rule.Profile}:{rule.Property}:{rule.Name}"

96 where

97 rule.Type: C – for constraint; R – for requirement

98 rule.Standard: the number of the standard e.g. 301 for 61970-301, 456 for 61970-456, 13 for
99 61968-13. 61970-600 specific constraints refer to 600 although they are related to one or
100 combination of the 61970-450 series profiles. For CSA profiles, CSA is used.

101 rule.Profile: the abbreviation of the profile, e.g. TP for Topology profile. If set to "ALL" the
102 constraint is applicable to all IEC 61970-600 profiles.

103 rule.Property: for UML classes, the name of the class, for attributes and associations, the name
104 of the class and attribute or association end, e.g. EnergyConsumer, IdentifiedObject.name, etc.
105 If set to "NA" the property is not applicable to a specific UML element.

106 rule.Name: the name of the rule. It is unique for the same property.

107 Example: C:600:ALL:IdentifiedObject.name:stringLength

108 ## 2.3 Profile constraints

109 This clause defines requirements and constraints that shall be fulfilled by applications that
110 conform to this document.

111 This document is the master for rules and constraints tagged "CSA". For the sake of self-
112 containment, the list below also includes a copy of the relevant rules from IEC 61970-452,
113 tagged "452".

114 • C:452:ALL:NA:datatypes

115 According to 61970-501, datatypes are not exchanged in the instance data. The
116 UnitMultiplier is 1 in cases none value is specified in the profile.

117 • R:452:ALL:NA:exchange

118 Optional and required attributes and associations must be imported and exported if they
119 are in the model file prior to import.

120 • R:452:ALL:NA:exchange1

121 If an optional attribute does not exist in the imported file, it does not have to be exported
122 in case exactly the same data set is exported, i.e. the tool is not obliged to automatically
123 provide this attribute. If the export is resulting from an action by the user performed after
124 the import, e.g. data processing or model update the export can contain optional
125 attributes.

126 • R:452:ALL:NA:exchange2

127 In most of the profiles the selection of optional and required attributes is made so as to
128 ensure a minimum set of required attributes without which the exchange does not fulfil
129 its basic purpose. Business processes governing different exchanges can require
130 mandatory exchange of certain optional attributes or associations. Optional and required
131 attributes and associations shall therefore be supported by applications which claim
132 conformance with certain functionalities of the IEC 61970-452. This provides flexibility
133 for the business processes to adapt to different business requirements and base the
134 exchanges on IEC 61970-452 compliant applications.

135 • R:452:ALL:NA:exchange3

136 An exporter may, at his or her discretion, produce a serialization containing additional
137 class data described by the CIM Schema but not required by this document provided
138 these data adhere to the conventions established in Clause 5.

139 • R:452:ALL:NA:exchange4

140 From the standpoint of the model import used by a data recipient, the document
141 describes a subset of the CIM that importing software shall be able to interpret in order
142 to import exported models. Data providers are free to exceed the minimum requirements
143 described herein as long as their resulting data files are compliant with the CIM Schema
144 and the conventions established in Clause 5. The document, therefore, describes
145 additional classes and class data that, although not required, exporters will, in all
146 likelihood, choose to include in their data files. The additional classes and data are
147 labelled as required (cardinality 1..1) or as optional (cardinality 0..1) to distinguish them
148 from their required counterparts. Please note, however, that data importers could
149 potentially receive data containing instances of any and all classes described by the
150 CIM Schema.

151 • R:452:ALL:NA:cardinality

152   The cardinality defined in the CIM model shall be followed, unless a more restrictive
153   cardinality is explicitly defined in this document. For instance, the cardinality on the
154   association between VoltageLevel and BaseVoltage indicates that a VoltageLevel shall
155   be associated with one and only one BaseVoltage, but a BaseVoltage can be associated
156   with zero to many VoltageLevels.

157   • R:452:ALL:NA:associations

158   Associations between classes referenced in this document and classes not referenced
159   here are not required regardless of cardinality.

160   • R:452:ALL:IdentifiedObject.name:rule

161   The attribute "name" inherited by many classes from the abstract class IdentifiedObject
162   is not required to be unique. It must be a human readable identifier without additional
163   embedded information that would need to be parsed. The attribute is used for purposes
164   such as User Interface and data exchange debugging. The MRID defined in the data
165   exchange format is the only unique and persistent identifier used for this data exchange.
166   The attribute IdentifiedObject.name is, however, always required for CoreEquipment
167   profile and Short Circuit profile.

168   • R:452:ALL:IdentifiedObject.description:rule

169   The attribute "description" inherited by many classes from the abstract class
170   IdentifiedObject must contain human readable text without additional embedded
171   information that would need to be parsed.

172   • R:452:ALL:NA:uniqueIdentifier

173   All IdentifiedObject-s shall have a persistent and globally unique identifier (Master
174   Resource Identifier - mRID).

175   • R:452:ALL:NA:unitMultiplier

176   For exchange of attributes defined using CIM Data Types (ActivePower, Susceptance,
177   etc.) a unit multiplier of 1 is used if the UnitMultiplier specified in this document is "none".

178   • C:452:ALL:IdentifiedObject.name:stringLength

179   The string IdentifiedObject.name has a maximum of 128 characters.

180   • C:452:ALL:IdentifiedObject.description:stringLength

181   The string IdentifiedObject.description is maximum 256 characters.

182   • C:452:ALL:NA:float

183   An attribute that is defined as float (e.g. has a type Float or a type which is a Datatype
184   with .value attribute of type Float) shall support ISO/IEC 60559:2020 for floating-point
185   arithmetic using single precision floating point. A single precision float supports 7
186   significant digits where the significant digits are described as an integer, or a decimal
187   number with 6 decimal digits. Two float values are equal when the significant with 7
188   digits are identical, e.g. 1234567 is equal 1.234567E6 and so are 1.2345678 and
189   1.234567E0.

190   • R:NC:ALL:NA:serialization

191   The profiles are defined in the EnterpriseArchitect application and have multiple artifacts
192   that describe them. The main artifacts are:

193   1)   the EAP file (EnterpriseArchitect project file),
194   2)   the profiles' specification document and
195   3)   the application profiles (RDFS and SHACL).

196 Due to the complexity of the profiles, there are various cross profile associations that,
197 from profiling and profile maintenance point of view, it is not practical to include the
198 complete inheritance structure in all profiles. If this is done the documentation provided
199 for all profiles would also include duplicated information on the description of classes
200 defined in other profiles. The following cases are often observed in profiles:

201   o   Case 1: An association end refers to an abstract class
202   o   Case 2: An abstract class (stereotyped with "Description") has an association
203   (direction to another class)
204   o   Case 3: An abstract class (not stereotyped with "Description") has an
205   association (direction to another class)
206   o   Case 4: An abstract class has attributes and subclasses are not in the profile

207 In all cases, the datasets shall only include the subtypes of the abstract classes with
208 the related properties (i.e. association or attributes) defined in the profile. The
209 information is taken from either canonical model or the profiles where complete
210 (expected) inheritance structure for the related abstract class is described. SHACL
211 based constraints include constraints only for the concrete classes that are subtypes of
212 the abstract class in the profile, and this can be used to inform which are the concrete
213 classes expected in a dataset that conforms to this profile.

214 It should be taken into account that this approach deviates from MVAL5 (IEC 61970-
215 600-1:2021), which creates multiple inheritance at serialization. For instance, with this
216 more explicit exchange the serialization of the association between abstract class
217 Equipment and abstract class Circuit for a PowerTransformer will be serialized as
218 follows:

219   o   for association

220 `<cim:PowerTransformer rdf:about="_c328f787-bc17-47ad-a59f-6ba7133340d0">`

221 `<nc:Equipment.Circut rdf:resource="#_9ced16ac-d076-4ef9-a241-a998a579e77b"/>`

222 `</cim:PowerTransformer>`

223   o   for attribute

224 `<cim:ACLineSegment rdf:about="_04f681aa-6999-4fb3-9775-acaa5eb7ceff">`

225 `<cim:Equipment.inService>true</cim:Equipment.inService>`

226 `</cim:ACLineSegment>`

227 The usage of rdf:ID or rdf:about depends on the stereotype of the class. rdf:about is
228 used if the class has the stereotype "Description".

229 An example of not allowed serialization, as the Equipment is an abstract class

230 `<cim:Equipment rdf:about="_c328f787-bc17-47ad-a59f-6ba7133340d0">`

231 `<nc:Equipment.Circut rdf:resource="#_9ced16ac-d076-4ef9-a241-a998a579e77b"/>`

232 `</cim:Equipment>`

233

234

235 ## 2.4 Metadata

236 ENTSO-E agreed to extend the header and metadata definitions by IEC 61970-552 Ed2. This
237 new header definitions rely on W3C recommendations which are used worldwide and are
238 positively recognised by the European Commission. The new definitions of the header mainly
239 use Provenance ontology (PROV-O), Time Ontology and Data Catalog Vocabulary (DCAT). The
240 global new header applicable for this profile is included in the metadata and document header
241 specification document.

242 The header vocabulary contains all attributes defined in IEC 61970-552. This is done only for
243 the purpose of having one vocabulary for header and to ensure transition for data exchanges
244 that are using IEC 61970-552:2016 header. This profile does not use IEC 61970-552:2016
245 header attributes and relies only on the extended attributes.

246 ### 2.4.1 Constraints

247 The identification of the constraints related to the metadata follows the same convention for
248 naming of the constraints as for profile constraints.

249 • R:CSA:ALL:wasAttributedTo:usage

250 The prov:wasAttributedTo should normally be the "X" EIC code of the actor or their URI
251 (prov:Agent).

252

253 ### 2.4.2 Reference metadata

254 The header defined for this profile requires availability of a set of reference metadata. For
255 instance, the attribute prov:wasGeneratedBy requires a reference to an activity which produced
256 the model or the related process. The activities are defined as reference metadata and their
257 identifiers are referenced from the header to enable the receiving entity to retrieve the "static"
258 (reference) information that is not modified frequently. This approach imposes a requirement
259 that both the sending entity and the receiving entity have access to a unique version of the
260 reference metadata. Therefore, each business process shall define which reference metadata
261 is used and where it is located.

262 ## 3 Detailed Profile Specification

263 ### 3.1 General

264 This package contains the equipment object registry profile.
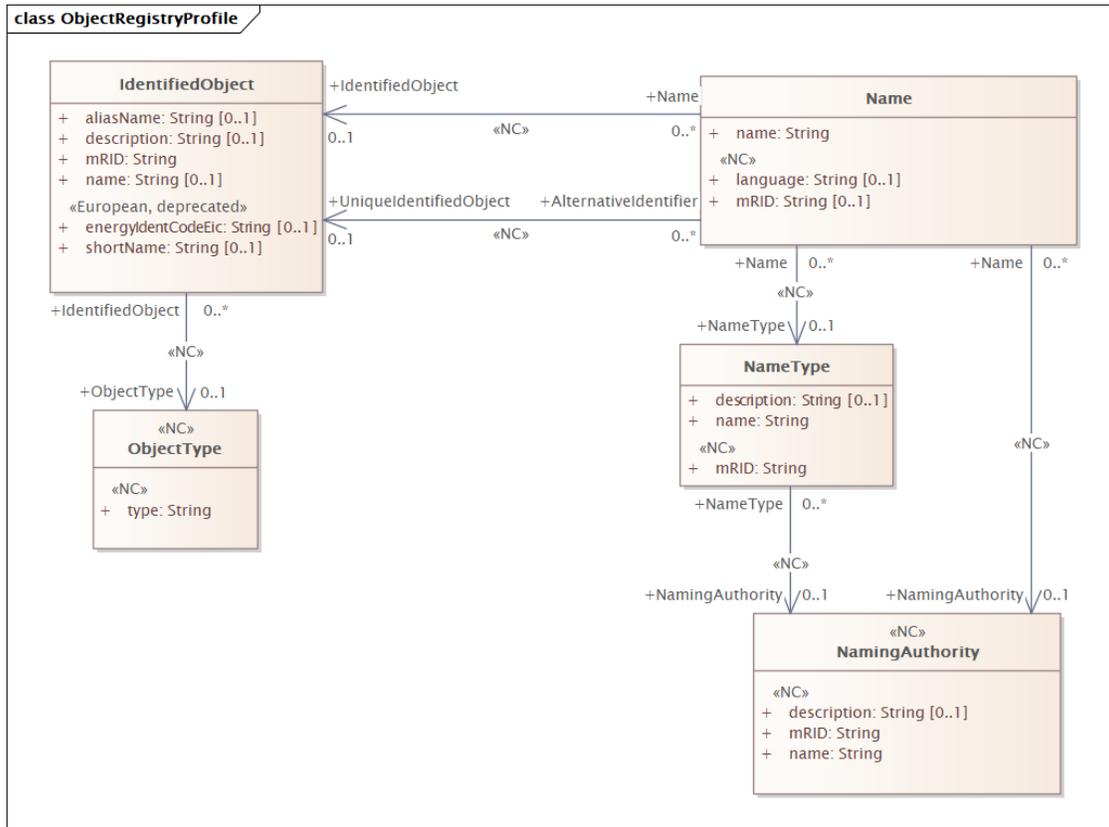
Figure 1 – Class diagram ObjectRegistryProfile::ObjectRegistryProfile

Figure 1: The diagram contains main classes related to the object registry profile.

3.2   IdentifiedObject root class

This is a root class to provide common identification for all classes needing identification and naming attributes.

Table 1 shows all attributes of IdentifiedObject.

Table 1 – Attributes of ObjectRegistryProfile::IdentifiedObject

name	mult	type	description
aliasName	0..1	String	The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy. The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time.
description	0..1	String	The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy.
mRID	1..1	String	Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC

name	mult	type	description
			4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
name	0..1	String	The name is any free human readable and possibly non unique text naming the object.
energyIdentCodeEic	0..1	String	(deprecated,European) The attribute is used for an exchange of the EIC code (Energy identification Code). The length of the string is 16 characters as defined by the EIC code. For details on EIC scheme please refer to ENTSO-E web site.
shortName	0..1	String	(deprecated,European) The attribute is used for an exchange of a human readable short name with length of the string 12 characters maximum.

273

274 Table 2 shows all association ends of IdentifiedObject with other classes.

275 **Table 2 – Association ends of ObjectRegistryProfile::IdentifiedObject with other classes**

mult from	name	mult to	type	description
0..*	ObjectType	0..1	ObjectType	(NC) The object type of the IdentifiedObject.

276

277 **3.3   Name root class**

278 The Name class provides the means to define any number of human readable names for an
279 object. A name is not to be used for defining inter-object relationships. For inter-object
280 relationships instead use the object identification 'mRID'.
281 Table 3 shows all attributes of Name.

282 **Table 3 – Attributes of ObjectRegistryProfile::Name**

name	mult	type	description
language	0..1	String	(NC) Shall be specified as an IETF BCP 47 language tag (e.g. en-US). Applies to the Name.name attribute. IETF language tags combine subtags from other standards such as ISO 639, ISO 15924, ISO 3166-1, and UN M.49. The tag structure has been standardized by the IETF in Best Current Practice (BCP) 47; the subtags are maintained by the IANA Language Subtag Registry.
mRID	0..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
name	1..1	String	Any free text that used as a name or alternative identifier of the object.

283

284 Table 4 shows all association ends of Name with other classes.

285 **Table 4 – Association ends of ObjectRegistryProfile::Name with other classes**

mult from	name	mult to	type	description
0..*	UniqueIdentifiedObject	0..1	IdentifiedObject	(NC) Identified object that this alternative identifier designates.
0..*	IdentifiedObject	0..1	IdentifiedObject	(NC) Identified object that this name designates.
0..*	NamingAuthority	0..1	NamingAuthority	(NC) Authority responsible for managing this name.
0..*	NameType	0..1	NameType	(NC) Type of this name.

286

287 ### 3.4 NameType root class

288 Type of name. Possible values for attribute 'name' are implementation dependent but standard
289 profiles may specify types. An enterprise may have multiple IT systems each having its own
290 local name for the same object, e.g. a planning system may have different names from an EMS.
291 An object may also have different names within the same IT system, e.g. localName as defined
292 in CIM version 14. The definition from CIM14 is:
293 The localName is a human readable name of the object. It is a free text name local to a node
294 in a naming hierarchy similar to a file directory structure. A power system related naming
295 hierarchy may be: Substation, VoltageLevel, Equipment etc. Children of the same parent in
296 such a hierarchy have names that typically are unique among them.
297 Table 5 shows all attributes of NameType.

298 **Table 5 – Attributes of ObjectRegistryProfile::NameType**

name	mult	type	description
name	1..1	String	Name of the name type.
description	0..1	String	Description of the name type.
mRID	1..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.

299
300 Table 6 shows all association ends of NameType with other classes.

301 **Table 6 – Association ends of ObjectRegistryProfile::NameType with other classes**

mult from	name	mult to	type	description
0..*	NamingAuthority	0..1	NamingAuthority	(NC) Authority responsible for managing this name type.

302

303 ### 3.5 (NC) NamingAuthority root class

304 Authority responsible for creation and management of names of a given name type and/or
305 name; typically an organization or an enterprise system.
306 Table 7 shows all attributes of NamingAuthority.

307 **Table 7 – Attributes of ObjectRegistryProfile::NamingAuthority**

name	mult	type	description
description	0..1	String	(NC) Description of the name authority.
mRID	1..1	String	(NC) Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
name	1..1	String	(NC) Name of the name authority.

308

3.6   (NC) ObjectType root class

310 Identifies the specialised type of an object when the instance object is serialised using a
311 generalised class. It may be useful when the object type is not otherwise included in the
312 exchange. For example, a Meter may be serialised as an EndDevice in message exchanges
313 and need to have the ObjectType.type be specified as 'Meter' to provide context to the message
314 receiver.
315 Table 8 shows all attributes of ObjectType.

316 **Table 8 – Attributes of ObjectRegistryProfile::ObjectType**

name	mult	type	description
type	1..1	String	(NC) The specialised type of an object when the instance object is serialised using a generalised class. For example, a Meter being serialised as an EndDevice in a message exchange should have the type attribute specified as 'Meter'.

317

3.7   String primitive

319 A string consisting of a sequence of characters. The character encoding is UTF-8. The string
320 length is unspecified and unlimited.

321

322

323 **Annex A (informative): Sample data**

324 **A.1 General**

325 This Annex is designed to illustrate the profile by using fragments of sample data. It is not meant
326 to be a complete set of examples covering all possibilities of using the profile. Defining a
327 complete set of test data is considered a separate activity to be performed for the purpose of
328 setting up interoperability testing and conformity related to this profile.

329 **A.2 Object Registry profile**

330 Test data files are available in the CIM WG SharePoint.

331