



European Network of
Transmission System Operators
for Electricity

**ENTSO-E
CONTINGENCY LIST, REMEDIAL
ACTIONS AND ADDITIONAL
CONSTRAINTS (CRAC)
DOCUMENT UML MODEL AND
SCHEMA**

2019-12-11
APPROVED DOCUMENT
VERSION 2.4

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39 implementation which does not include the option (except, of course, for the feature the
40 option provides.).

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Revision History

Version	Release	Date	Comments
1	0	2016-05-11	Approved by Market Committee
2	0	2017-01-10	Version to be submitted to Market Committee following EDI meeting of 11 th and 12 th of January 2017 DocStatus, Status attributes and Reason classes added to send CRAC anomaly report AdditionalConstraint_RegisteredResources class added to describe a phase shift angle
2	1	2017-10-24	Version to be submitted to Market Committee following EDI meeting of 24 th and 25 th of October 2017 <ul style="list-style-type: none"> - measurement_Unit.name and quantity.quantity attributes set to optional in the AdditionalConstraint_Series class - AggregateNodes added in the RemedialAction_RegisteredResource class - Related_MarketDocument association added at header level - Optimization_MarketObjectStatus attribute added at Series level
2	2	2018-06-19	Version approved by MC. <ul style="list-style-type: none"> - Addition of a MarketObjectStatus.status attribute in the AdditionalConstraint_RegisteredResource - Addition of a Monitored_Series - Addition of an association between the Party_MarketParticipant class and the sub_Series - In/out_Domain put to optional in the AdditionalConstraint_Series
2	3	2019-09-10	This version of the IG takes into account the changes applied on v2.4 of CRAC document. Just for information v2.3 and v2.2 are the same, but v2.3 of the xsd fixes a small bug. <ul style="list-style-type: none"> - pSRType.psrType in RemedialAction_RegisteredResource is optional - Analog class linked to RemedialAction_RegisteredResource class and Contingency_RegisteredResource class - New 0..1 price.Amount attribute within RemedialAction_Series - New 0..1 Related currency_Unit.name and 0..1 price_Measure_Unit.name within TimeSeries - New 0..1 MarketObjectStatus attribute linked to Contingency_RegisteredResource - Consequently small changes on the dependency tables and contextual and assembly models. - mRID of Document, Series and Timeseries (ID_String type) was enlarged from 35 to 60 characters. <p>Approved by MC.</p>
2	4	2019-12-11	Some parts of this IG were removed in order to avoid duplications with the new Coordinated Capacity Calculation IG. Approved by MC.

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116 **1 Introduction**

117 The purpose of this document is to provide the contextual and assembly UML models and the
118 schema of the CRAC_MarketDocument.

119 The schema of the CRAC_MarketDocument could be used in various business processes.

120 It is not the purpose of this document to describe all the use cases, sequence diagrams,
121 business processes, etc. for which this schema is to be used.

122 This document shall only be referenced in an implementation guide of a specific business
123 process. The content of the business process implementation guide shall be as follows:

- 124 • Description of the business process;
- 125 • Use case of the business process;
- 126 • Sequence diagrams of the business process;
- 127 • List of the schema (XSD) to be used in the business process and versions of the
128 schema;

129 For each schema, dependency tables providing the necessary information for the generation
130 of the XML instances, i.e. when the optional attributes are to be used, which codes from which
131 ENTSO-E codelist are to be used.

132

139

140

Figure 1 - CRAC contextual model

141 **2.1.2 IsBasedOn relationships from the European style market profile**

142 Table 1 shows the traceability dependency of the classes used in this package towards the
143 upper level.

144

Table 1 - IsBasedOn dependency

Name	Complete IsBasedOn Path
AdditionalConstraint_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
AdditionalConstraint_Series	TC57CIM::IEC62325::MarketManagement::Series
AdditionalConstraint_Domain	TC57CIM::IEC62325::MarketManagement::Domain
AggregateNode	TC57CIM::IEC62325::MarketOperations::ReferenceData::AggregateNode
Analog	TC57CIM::IEC61970::Base::Meas::Analog
AnalogValue	TC57CIM::IEC61970::Base::Meas::AnalogValue
Contingency_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
Contingency_Series	TC57CIM::IEC62325::MarketManagement::Series
ContingencyResource_MarketObjectStatus	TC57CIM::IEC62325::MarketManagement::MarketObjectStatus
CRAC_MarketDocument	TC57CIM::IEC62325::MarketManagement::MarketDocument
Currency_Unit	TC57CIM::IEC62325::MarketManagement::Unit
Domain	TC57CIM::IEC62325::MarketManagement::Domain
MarketDocument	TC57CIM::IEC62325::MarketManagement::MarketDocument
MarketObjectStatus	TC57CIM::IEC62325::MarketManagement::MarketObjectStatus
MarketParticipant	TC57CIM::IEC62325::MarketCommon::MarketParticipant
MarketRole	TC57CIM::IEC62325::MarketCommon::MarketRole
Measure_Unit	TC57CIM::IEC62325::MarketManagement::Unit
MktPSRType	TC57CIM::IEC62325::MarketManagement::MktPSRType
Monitored_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
Monitored_Series	TC57CIM::IEC62325::MarketManagement::Series
Party_MarketParticipant	TC57CIM::IEC62325::MarketCommon::MarketParticipant
Point	TC57CIM::IEC62325::MarketManagement::Point
Price	TC57CIM::IEC62325::MarketManagement::Price
Price_Measure_Unit	TC57CIM::IEC62325::MarketManagement::Unit
Process	TC57CIM::IEC62325::MarketManagement::Process
Quantity	TC57CIM::IEC62325::MarketManagement::Quantity
Reason	TC57CIM::IEC62325::MarketManagement::Reason
RegisteredResource_Reason	TC57CIM::IEC62325::MarketManagement::Reason
RemedialAction_AggregateNode	TC57CIM::IEC62325::MarketOperations::ReferenceData::AggregateNode
RemedialAction_Measure_Unit	TC57CIM::IEC62325::MarketManagement::Unit
RemedialAction_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource

Name	Complete IsBasedOn Path
RemedialAction_Series	TC57CIM::IEC62325::MarketManagement::Series
ResourceCapacity	TC57CIM::IEC62325::MarketCommon::ResourceCapacity
Series	TC57CIM::IEC62325::MarketManagement::Series
Series_Period	TC57CIM::IEC62325::MarketManagement::Period
Series_Reason	TC57CIM::IEC62325::MarketManagement::Reason
Shared_Domain	TC57CIM::IEC62325::MarketManagement::Domain
Time_Period	TC57CIM::IEC62325::MarketManagement::Period
TimeSeries	TC57CIM::IEC62325::MarketManagement::TimeSeries

145

146

152 **2.2.2 IsBasedOn relationships from the European style market profile**

153 Table 2 shows the traceability dependency of the classes used in this package towards the
154 upper level.

155 **Table 2 - IsBasedOn dependency**

Name	Complete IsBasedOn Path
AdditionalConstraint_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
AdditionalConstraint_Series	TC57CIM::IEC62325::MarketManagement::Series
Analog	TC57CIM::IEC61970::Base::Meas::Analog
Contingency_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
Contingency_Series	TC57CIM::IEC62325::MarketManagement::Series
CRAC_MarketDocument	TC57CIM::IEC62325::MarketManagement::MarketDocument
MarketDocument	TC57CIM::IEC62325::MarketManagement::MarketDocument
Monitored_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
Monitored_Series	TC57CIM::IEC62325::MarketManagement::Series
Party_MarketParticipant	TC57CIM::IEC62325::MarketCommon::MarketParticipant
Point	TC57CIM::IEC62325::MarketManagement::Point
Reason	TC57CIM::IEC62325::MarketManagement::Reason
RegisteredResource_Reason	TC57CIM::IEC62325::MarketManagement::Reason
RemedialAction_RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
RemedialAction_Series	TC57CIM::IEC62325::MarketManagement::Series
Series	TC57CIM::IEC62325::MarketManagement::Series
Series_Period	TC57CIM::IEC62325::MarketManagement::Period
Series_Reason	TC57CIM::IEC62325::MarketManagement::Reason
Shared_Domain	TC57CIM::IEC62325::MarketManagement::Domain
TimeSeries	TC57CIM::IEC62325::MarketManagement::TimeSeries

156

157

158 **2.2.3 Detailed CRAC assembly model**

159 **2.2.3.1 CRAC_MarketDocument root class**

160 This document provides the contingency lists, remedial actions and additional constraints to be
161 used for the coordinated capacity network studies.

162 Table 3 shows all attributes of CRAC_MarketDocument.

163 **Table 3 - Attributes of CRAC assembly model::CRAC_MarketDocument**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	The unique identification of the document being exchanged within the coordinated capacity calculation process.
1	[1..1]	revisionNumber ESMPVersion_String	The identification of the version that distinguishes one evolution of a document from another.
2	[1..1]	type MessageKind_String	The coded type of a document. The document type describes the principal characteristic of the document.
3	[1..1]	process.processType ProcessKind_String	The identification of the nature of process that the document addresses. --- The process dealt with in the document.
4	[1..1]	sender_MarketParticipant.mRID PartyID_String	The identification of a party in the energy market. --- Document owner.
5	[1..1]	sender_MarketParticipant.marketRole.type MarketRoleKind_String	The identification of the role played by a market player. --- Document owner. --- The role associated with a MarketParticipant.
6	[1..1]	receiver_MarketParticipant.mRID PartyID_String	The identification of a party in the energy market. --- Document recipient.
7	[1..1]	receiver_MarketParticipant.marketRole.type MarketRoleKind_String	The identification of the role played by a market player. --- Document recipient. --- The role associated with a MarketParticipant.
8	[1..1]	createdDateTime ESMP_DateTime	The date and time of the creation of the document.
9	[0..1]	docStatus Action_Status	The identification of the condition or position of the document with regard to its standing.
10	[0..1]	status Action_Status	Status of subject matter (e.g., Agreement, Work) this document represents. For status of the document itself, use 'docStatus' attribute.
13	[1..1]	time_Period.timeInterval ESMP_DateTimeInterval	The start and end date and time for a given interval. --- This information provides the start and end date and time of the constraint network elements study time interval. All time intervals for the time series in the document shall be within the total time interval for the study. The receiver will discard any time intervals outside the time period.
14	[1..1]	domain.mRID AreaID_String	The unique identification of the domain. --- The identification of the domain that is covered in the constraint network element document. It is in general the coordinated capacity determination area that is the subject of the schedule plan.

164

165 Table 4 shows all association ends of CRAC_MarketDocument with other classes.

166
167

Table 4 - Association ends of CRAC assembly model::CRAC_MarketDocument with other classes

Order	mult.	Class name / Role	Description
11	[0..1]	MarketDocument Received_MarketDocument	Association Based On: CRAC contextual model::MarketDocument.Received_MarketDocument[0..1] ----- CRAC contextual model::CRAC_MarketDocument.[]
12	[0..*]	MarketDocument Related_MarketDocument	The identification of an electronic document that is related to an electronic document header. Association Based On: CRAC contextual model::CRAC_MarketDocument.[] ----- CRAC contextual model::MarketDocument.Related_MarketDocument[0..*]
15	[0..*]	TimeSeries TimeSeries	The time series that is associated with an electronic document. Association Based On: CRAC contextual model::CRAC_MarketDocument.[] ----- CRAC contextual model::TimeSeries.TimeSeries[0..*]
16	[0..*]	Reason Reason	The Reason associated with the electronic document header providing different motivations for the creation of the document. Association Based On: CRAC contextual model::Reason.Reason[0..*] ----- CRAC contextual model::CRAC_MarketDocument.[]

168

169 2.2.3.2 AdditionalConstraint_RegisteredResource

170 This is a resource contributing to the relevant additional constraint.

171 Table 5 shows all attributes of AdditionalConstraint_RegisteredResource.

172 **Table 5 - Attributes of CRAC assembly**
173 **model::AdditionalConstraint_RegisteredResource**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ResourceID_String	The unique identification of a resource.
1	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.
2	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- The identification of the domain linked by the registered resource.
3	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- The identification of the domain linked by the registered resource.
4	[0..1]	marketObjectStatus.status Status_String	The coded application mode. --- The status of the registered resource, e.g. connected, disconnected, outage, ...

174

175 Table 6 shows all association ends of AdditionalConstraint_RegisteredResource with other
176 classes.

177
178

**Table 6 - Association ends of CRAC assembly
model::AdditionalConstraint_RegisteredResource with other classes**

Order	mult.	Class name / Role	Description
5	[0..*]	RegisteredResource_Reason Reason	The reason information associated with a RegisteredResource providing motivation information. Association Based On: CRAC contextual model::RegisteredResource_Reason.Reason[0..*] ----- CRAC contextual model::AdditionalConstraint_RegisteredResource.[]

179

180 2.2.3.3 AdditionalConstraint_Series

181 An additional constraint to be taken into account in the load flow study

182 Table 7 shows all attributes of AdditionalConstraint_Series.

183 **Table 7 - Attributes of CRAC assembly model::AdditionalConstraint_Series**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of the additional constraint.
1	[1..1]	businessType BusinessKind_String	The nature of the additional constraint
2	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.
4	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- The Domain identifying where energy of the External Constraint is going to.
5	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- The Domain identifying where the energy of the External Constraint comes from.
6	[0..1]	measurement_Unit.name MeasurementUnitKind_String	The identification of the formal code for a measurement unit (UN/ECE Recommendation 20). --- The unit of measure of the External Constraint quantity
7	[0..1]	quantity.quantity Decimal	The quantity value of the additional constraint --- The value of the External Constraint

184

185 Table 8 shows all association ends of AdditionalConstraint_Series with other classes.

186 **Table 8 - Association ends of CRAC assembly model::AdditionalConstraint_Series with
187 other classes**

Order	mult.	Class name / Role	Description
3	[0..*]	Party_MarketParticipant Party_MarketParticipant	The identification of a market participant associated with a TimeSeries. Association Based On: CRAC contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CRAC contextual model::AdditionalConstraint_Series.[]

Order	mult.	Class name / Role	Description
8	[0..*]	AdditionalConstraint_RegisteredResource RegisteredResource	The identification of a resource associated with a TimeSeries. Association Based On: CRAC contextual model::AdditionalConstraint_RegisteredResource.RegisteredResource[0..*] ----- CRAC contextual model::AdditionalConstraint_Series.[]
9	[0..*]	Series_Reason Reason	The reason information associated with a TimeSeries providing motivation information. Association Based On: CRAC contextual model::Series_Reason.Reason[0..*] ----- CRAC contextual model::AdditionalConstraint_Series.[]

188

189 2.2.3.4 Analog

190 Analog represents an analog Measurement.

191 Analog provides the analog measurements monitored for one specific
192 Monitored_RegisteredResource.

193 Table 9 shows all attributes of Analog.

194

Table 9 - Attributes of CRAC assembly model::Analog

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	measurementType AnalogType_String	Specifies the type of measurement. For example, it specifies if the measurement represents flow, maximum flow, reference flow, etc.
1	[1..1]	unitSymbol UnitSymbol	The unit of measure of the measured quantity.
2	[0..1]	positiveFlowIn ESMPBoolean_String	If true then this measurement is an active power, reactive power or current with the convention that a positive value measured at the Terminal means power is flowing into the related Monitored_RegisteredResource depending on the In_AggregateNode and the Out_AggregateNode.
3	[1..1]	analogValues.value ESMP_Float	The value to supervise. --- Measurement to which this value is connected.
4	[0..1]	analogValues.description String	The description of the measurementType and its associated value. --- Measurement to which this value is connected.

195

196 2.2.3.5 Contingency_RegisteredResource

197 This is one of the network elements which are in outage for the studied contingency defined in
198 the Series.

199 Table 10 shows all attributes of Contingency_RegisteredResource.

200

Table 10 - Attributes of CRAC assembly model::Contingency_RegisteredResource

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ResourceID_String	The unique identification of the resource in outage.
1	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.

Order	mult.	Attribute name / Attribute type	Description
2	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where an extremity of the resource is located. This is used to provide orientation information.
3	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where an extremity of the resource is located. This is used to provide orientation information.
4	[0..1]	marketObjectStatus.status Status_String	The coded condition or position of an object with regard to its standing. --- The status of the registered resource, e.g. connected, disconnected, outage, ...

201

202 Table 11 shows all association ends of Contingency_RegisteredResource with other classes.

203

204

Table 11 - Association ends of CRAC assembly model::Contingency_RegisteredResource with other classes

Order	mult.	Class name / Role	Description
5	[0..*]	Analog Measurements	The power system resource that contains the measurement. Association Based On: CRAC contextual model::Analog.Measurements[0..*] ----- CRAC contextual model::Contingency_RegisteredResource.[]
6	[0..*]	RegisteredResource_Reason Reason	The reason information associated with a RegisteredResource providing motivation information. Association Based On: CRAC contextual model::RegisteredResource_Reason.Reason[0..*] ----- CRAC contextual model::Contingency_RegisteredResource.[]

205

206 2.2.3.6 Contingency_Series

207 A contingency defined by a set of elements on which a modification is applied in order to
208 simulate a defect.

209 Table 12 shows all attributes of Contingency_Series.

210

Table 12 - Attributes of CRAC assembly model::Contingency_Series

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of the time series.
1	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.

211

212 Table 13 shows all association ends of Contingency_Series with other classes.

213 **Table 13 - Association ends of CRAC assembly model::Contingency_Series with other**
214 **classes**

Order	mult.	Class name / Role	Description
2	[0..*]	Party_MarketParticipant Party_MarketParticipant	The identification of a market participant associated with a TimeSeries. Association Based On: CRAC contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CRAC contextual model::Contingency_Series.[]
3	[0..*]	Contingency_RegisteredResource RegisteredResource	The identification of a resource associated with a TimeSeries. Association Based On: CRAC contextual model::Contingency_RegisteredResource.RegisteredResource[0..*] ----- CRAC contextual model::Contingency_Series.[]
4	[0..*]	Series_Reason Reason	The reason information associated with a TimeSeries providing motivation information. Association Based On: CRAC contextual model::Series_Reason.Reason[0..*] ----- CRAC contextual model::Contingency_Series.[]

215

216 2.2.3.7 MarketDocument

217 An electronic document containing the information necessary to satisfy the requirements of a
218 given business process.

219 Table 14 shows all attributes of MarketDocument.

220 **Table 14 - Attributes of CRAC assembly model::MarketDocument**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	The identification of the version that distinguishes one evolution of a document from another.
1	[1..1]	revisionNumber ESMPVersion_String	The identification of the version that distinguishes one evolution of a document from another.

221

222 2.2.3.8 Monitored_RegisteredResource

223 This is a network element to be monitored during the load flow study after applying the
224 contingencies described in the Series. analog measurements are monitored for this resource to
225 identify the network constraints.

226 Table 15 shows all attributes of Monitored_RegisteredResource.

227 **Table 15 - Attributes of CRAC assembly model::Monitored_RegisteredResource**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ResourceID_String	The unique identification of a resource.
1	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.

Order	mult.	Attribute name / Attribute type	Description
2	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where the flow measurement enters for the monitored resource.
3	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- The control area connected to the monitored resource where the flow measurement comes out.
4	[0..1]	in_AggregateNode.mRID ResourceID_String	The unique identification of an AggregateNode. In the ESMP context, the "model authority" is defined as an authorized issuing office that provides an agreed identification coding scheme for market participant, domain, measurement point, resources (generator, lines, substations, etc.) identification. 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 Edition 1, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. --- The identification of the aggregate node that is linked to the registered resource.
5	[0..1]	out_AggregateNode.mRID ResourceID_String	The unique identification of an AggregateNode. In the ESMP context, the "model authority" is defined as an authorized issuing office that provides an agreed identification coding scheme for market participant, domain, measurement point, resources (generator, lines, substations, etc.) identification. 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 Edition 1, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. --- The identification of the aggregate node that is linked to the registered resource.

228

229 Table 16 shows all association ends of Monitored_RegisteredResource with other classes.

230 **Table 16 - Association ends of CRAC assembly model::Monitored_RegisteredResource**
231 **with other classes**

Order	mult.	Class name / Role	Description
6	[0..*]	Analog Measurements	The monitored measurements of the monitored network element. Association Based On: CRAC contextual model::Analog.Measurements[0..*] ----- CRAC contextual model::Monitored_RegisteredResource.[]
7	[0..*]	RegisteredResource_Reason Reason	The reason information associated with a RegisteredResource providing motivation information. Association Based On: CRAC contextual model::RegisteredResource_Reason.Reason[0..*] ----- CRAC contextual model::Monitored_RegisteredResource.[]

232

233 2.2.3.9 Monitored_Series

234 A situation to be monitored defined by a set of elements on which a coupled monitoring must
235 be performed.

236 Table 17 shows all attributes of Monitored_Series.

237

Table 17 - Attributes of CRAC assembly model::Monitored_Series

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of the time series. In the ESMP context, the "model authority" is defined as a party (originator of the exchange) that provides a unique identification in the context of a business exchange such as time series identification, bid identification, ... Master resource identifier issued by a model authority. The mRID is globally unique within an exchange context. Global uniqueness is easily achieved by using a UUID for the mRID. It is strongly recommended to do this. For CIMXML data files in RDF syntax, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements.
1	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.

238

239 Table 18 shows all association ends of Monitored_Series with other classes.

Table 18 - Association ends of CRAC assembly model::Monitored_Series with other classes

240

241

Order	mult.	Class name / Role	Description
2	[0..*]	Party_MarketParticipant Party_MarketParticipant	The identification of a market participant associated with a TimeSeries. Association Based On: CRAC contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CRAC contextual model::Monitored_Series.[]
3	[0..*]	Monitored_RegisteredResource RegisteredResource	The identification of a resource associated with a TimeSeries. Association Based On: CRAC contextual model::Monitored_RegisteredResource.RegisteredResource[0..*] ----- CRAC contextual model::Monitored_Series.[]
4	[0..*]	Series_Reason Reason	The reason information associated with a TimeSeries providing motivation information. Association Based On: CRAC contextual model::Monitored_Series.[] ----- CRAC contextual model::Series_Reason.Reason[0..*]

242

243 2.2.3.10 Party_MarketParticipant

244 The identification of the limiting TSOs for the given contingency, obtained after the network
245 studies. It can also identify the TSO that provides the Series.

246 Table 19 shows all attributes of Party_MarketParticipant.

Table 19 - Attributes of CRAC assembly model::Party_MarketParticipant

247

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID PartyID_String	The identification of the limiting TSO associated to the TimeSeries.

248

249 2.2.3.11 Point

250 The identification of the values being addressed within a specific interval of time.

251 Table 20 shows all attributes of Point.

252 **Table 20 - Attributes of CRAC assembly model::Point**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	position Position_Integer	A sequential value representing the relative position within a given time interval.

253

254 Table 21 shows all association ends of Point with other classes.

255 **Table 21 - Association ends of CRAC assembly model::Point with other classes**

Order	mult.	Class name / Role	Description
1	[1..*]	Series Series	TheTimeSeries provides additional information related to a Position within a given time interval. Association Based On: CRAC contextual model::Series.Series[1..*] ----- CRAC contextual model::Point.[]
2	[0..*]	Reason Reason	The Reason information associated with a Point providing motivation information. Association Based On: CRAC contextual model::Point.[] ----- CRAC contextual model::Reason.Reason[0..*]

256

257 2.2.3.12 Reason

258 The coded motivation of an act.

259 Table 22 shows all attributes of Reason.

260 **Table 22 - Attributes of CRAC assembly model::Reason**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	code ReasonCode_String	The motivation of an act in coded form.
1	[0..1]	text ReasonText_String	The textual explanation corresponding to the reason code.

261

262 2.2.3.13 RegisteredResource_Reason

263 Comment related to a registered resource

264 Table 23 shows all attributes of RegisteredResource_Reason.

265 **Table 23 - Attributes of CRAC assembly model::RegisteredResource_Reason**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	code ReasonCode_String	The motivation of an act in coded form.
1	[0..1]	text ReasonText_String	The textual explanation corresponding to the reason code.

266

267 **2.2.3.14 RemedialAction_RegisteredResource**

268 This is one of the network element on which remedial action are carried out to improve the
269 constraint situation. Those elements are used to remedy to constraints induced by the constraint
270 situation.

271 Table 24 shows all attributes of RemedialAction_RegisteredResource.

272 **Table 24 - Attributes of CRAC assembly model::RemedialAction_RegisteredResource**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ResourceID_String	The unique identification of the remedial registered resource
1	[0..1]	name String	The name is any free human readable and possibly non unique text naming the object.
2	[0..1]	pSRType.psrType PsrType_String	The coded type of the registered resource. --- The coded type of the associated resource.
3	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where an extremity of the resource is located. This is used to provide orientation information.
4	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where an extremity of the resource is located. This is used to provide orientation information.
5	[0..1]	in_AggregateNode.mRID MeasurementPointID_String	The unique identification of an AggregateNode. In the ESMP context, the "model authority" is defined as an authorized issuing office that provides an agreed identification coding scheme for market participant, domain, measurement point, resources (generator, lines, substations, etc.) identification. 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 Edition 1, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. --- The identification of the aggregate node that is linked to the registered resource.
6	[0..1]	out_AggregateNode.mRID MeasurementPointID_String	The unique identification of an AggregateNode. In the ESMP context, the "model authority" is defined as an authorized issuing office that provides an agreed identification coding scheme for market participant, domain, measurement point, resources (generator, lines, substations, etc.) identification. 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 Edition 1, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. --- The identification of the aggregate node that is linked to the registered resource.
7	[1..1]	marketObjectStatus.status Status_String	The coded application mode. --- The action to be realized on a registered resource like open/close/stop or the nature of the capacity values like absolute/Relative in case the resource capacity element is used.
8	[0..1]	resourceCapacity.maximumCapacity Decimal	The maximum variation or target value of tap, generation or load
9	[0..1]	resourceCapacity.minimumCapacity Decimal	The minimum variation or target value of tap, generation or load

Order	mult.	Attribute name / Attribute type	Description
10	[0..1]	resourceCapacity.defaultCapacity Decimal	The variation or target value of tap, generation or load
11	[0..1]	resourceCapacity.unitSymbol UnitSymbol	Unit selection for the capacity values.

273

274 Table 25 shows all association ends of RemedialAction_RegisteredResource with other
275 classes.

276

**Table 25 - Association ends of CRAC assembly
model::RemedialAction_RegisteredResource with other classes**

277

Order	mult.	Class name / Role	Description
12	[0..*]	Analog Measurements	The power system resource that contains the measurement. Association Based On: CRAC contextual model::Analog.Measurements[0..*] ----- CRAC contextual model::RemedialAction_RegisteredResource.[]
13	[0..*]	RegisteredResource_Reason Reason	The reason information associated with a RegisteredResource providing motivation information. Association Based On: CRAC contextual model::RegisteredResource_Reason.Reason[0..*] ----- CRAC contextual model::RemedialAction_RegisteredResource.[]

278

279 2.2.3.15 RemedialAction_Series

280 A set of remedial actions provided to relieve a network constraint after applying the
281 contingencies provided in the Series or free to use by the capacity calculator.

282 Table 26 shows all attributes of RemedialAction_Series.

283

Table 26 - Attributes of CRAC assembly model::RemedialAction_Series

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of the set of remedial action.
1	[0..1]	name String	The free human readable name of the set of remedial actions.
2	[0..1]	businessType BusinessKind_String	The nature of the set of remedial actions.
3	[0..1]	applicationMode_MarketObjectStatus.status Status_String	The coded application mode. --- The condition of use of the remedial action. It can be preventive, curative or automatic.
4	[0..1]	availability_MarketObjectStatus.status Status_String	The coded application mode. --- The status of an object associated with a TimeSeries.
6	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- In case of Bilateral Exchange Remedial Action, the area where the energy is going to
7	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- In case of Bilateral Exchange Remedial Action, the area where the energy comes from

Order	mult.	Attribute name / Attribute type	Description
8	[0..1]	measurement_Unit.name MeasurementUnitKind_String	The identification of the formal code for a measurement unit (UN/ECE Recommendation 20). --- The unit of measure associated with the quantity if a Bilateral Exchange remedial action is described, or associated to the capacity values if the resource capacity element is used.
9	[0..1]	quantity.quantity Decimal	The quantity value of the additional constraint --- The value of a bilateral exchange used as remedial action
10	[0..1]	price.amount Amount_Decimal	A number of monetary units specified in a unit of currency. --- The price information associated to a TimeSeries.

284

285 Table 27 shows all association ends of RemedialAction_Series with other classes.

286 **Table 27 - Association ends of CRAC assembly model::RemedialAction_Series with**
287 **other classes**

Order	mult.	Class name / Role	Description
5	[0..*]	Party_MarketParticipant Party_MarketParticipant	The identification of a market participant associated with a TimeSeries. Association Based On: CRAC contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CRAC contextual model::RemedialAction_Series.[]
11	[0..*]	RemedialAction_RegisteredResource RegisteredResource	The registered resources on which remedial actions are carried out Association Based On: CRAC contextual model::RemedialAction_RegisteredResource.RegisteredResource[0..*] ----- CRAC contextual model::RemedialAction_Series.[]
12	[0..*]	Shared_Domain Shared_Domain	The area of the monitored network elements where the remedial action series can be used in case of a network security constraint. Association Based On: CRAC contextual model::Shared_Domain.Shared_Domain[0..*] ----- CRAC contextual model::RemedialAction_Series.[]
13	[0..*]	Series_Reason Reason	The reason information associated with a TimeSeries providing motivation information. Association Based On: CRAC contextual model::Series_Reason.Reason[0..*] ----- CRAC contextual model::RemedialAction_Series.[]

288

289 2.2.3.16 Series

290 The set of contingency network elements, monitored network elements, remedial actions and
291 additional constraints enabling to create a contingency.

292 Table 28 shows all attributes of Series.

293 **Table 28 - Attributes of CRAC assembly model::Series**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of a list of contingencies, a list of monitored registered resources or remedial actions.

Order	mult.	Attribute name / Attribute type	Description
1	[1..1]	businessType BusinessKind_String	The identification of the nature of the Series.
2	[0..1]	name String	The free human readable name of the Series.
4	[0..1]	optimization_MarketObjectStatus.status Status_String	The coded application mode. --- The status of an object associated with a TimeSeries.

294

295 Table 29 shows all association ends of Series with other classes.

296 **Table 29 - Association ends of CRAC assembly model::Series with other classes**

Order	mult.	Class name / Role	Description
3	[0..*]	Party_MarketParticipant Party_MarketParticipant	The identification of the limiting TSOs for the given network constraint situation, obtained after the network studies. It can also identify the TSO that provides the constraint_series. Association Based On: CRAC contextual model::Series.[] ----- CRAC contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*]
5	[0..*]	AdditionalConstraint_Series AdditionalConstraint_Series	An External Constraint to be taken (or taken) into account in the network studies associated to a Constraint Series Association Based On: CRAC contextual model::AdditionalConstraint_Series.AdditionalConstraint_Series[0..*] ----- CRAC contextual model::Series.[]
6	[0..*]	Contingency_Series Contingency_Series	Association Based On: CRAC contextual model::Contingency_Series.Contingency_Series[0..*] ----- CRAC contextual model::Series.[]
7	[0..*]	Monitored_Series Monitored_Series	Association Based On: CRAC contextual model::Monitored_Series.Monitored_Series[0..*] ----- CRAC contextual model::Series.[]
8	[0..*]	RemedialAction_Series RemedialAction_Series	A set of remedial actions provided for a given Constraint Situation or free to use by the capacity calculator if no outage and monitored elements are provided in the constraint series. Association Based On: CRAC contextual model::RemedialAction_Series.RemedialAction_Series[0..*] ----- CRAC contextual model::Series.[]
9	[0..*]	Reason Reason	The reason information associated with a Series providing motivation information. Association Based On: CRAC contextual model::Series.[] ----- CRAC contextual model::Reason.Reason[0..*]

297

298 2.2.3.17 Series_Period

299 The identification of the period of time corresponding to a given time interval and resolution.

300 Table 30 shows all attributes of Series_Period.

301

Table 30 - Attributes of CRAC assembly model::Series_Period

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	timeInterval ESMP_DateTimeInterval	The start and end time of the period.
1	[1..1]	resolution Duration	The definition of the number of units of time that compose an individual step within a period.

302

303 Table 31 shows all association ends of Series_Period with other classes.

304 **Table 31 - Association ends of CRAC assembly model::Series_Period with other classes**

Order	mult.	Class name / Role	Description
2	[1..*]	Point Point	The Point information associated with a given Series_Period.within a TimeSeries. Association Based On: CRAC contextual model::Series_Period.[] ----- CRAC contextual model::Point.Point[1..*]

305

306 2.2.3.18 Series_Reason

307 Comment related to a Series

308 Table 32 shows all attributes of Series_Reason.

309 **Table 32 - Attributes of CRAC assembly model::Series_Reason**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	code ReasonCode_String	The motivation of an act in coded form.
1	[0..1]	text ReasonText_String	The textual explanation corresponding to the reason code.

310

311 2.2.3.19 Shared_Domain

312 The areas allowed to use the remedial action.

313 Table 33 shows all attributes of Shared_Domain.

314 **Table 33 - Attributes of CRAC assembly model::Shared_Domain**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID AreaID_String	The unique identification of the domain.

315

316 2.2.3.20 TimeSeries

317 A set of time-ordered Series.

318 Table 34 shows all attributes of TimeSeries.

319

Table 34 - Attributes of CRAC assembly model::TimeSeries

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of the time series.
1	[1..1]	businessType BusinessKind_String	The identification of the nature of the time series.
2	[1..1]	curveType CurveType_String	The identification of the coded representation of the type of curve being described.
3	[0..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- In case of NTC determination process, this is the area of the related oriented border study in which the energy flows into.
4	[0..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- In case of NTC determination process, this is the area of the related oriented border study in which the energy comes from.
5	[0..1]	currency_Unit.name CurrencyCode_String	The identification of the formal code for a currency (ISO 4217). --- The currency associated with a TimeSeries.
6	[0..1]	price_Measurement_Unit.name MeasurementUnitKind_String	The identification of the formal code for a measurement unit (UN/ECE Recommendation 20). --- The unit of measure associated with the quantities in a TimeSeries.

320

321 Table 35 shows all association ends of TimeSeries with other classes.

Table 35 - Association ends of CRAC assembly model::TimeSeries with other classes

Order	mult.	Class name / Role	Description
7	[1..*]	Series_Period Period	The time interval and resolution for a period associated with a TimeSeries. Association Based On: CRAC contextual model::TimeSeries.[] ----- CRAC contextual model::Series_Period.Period[1..*]
8	[0..*]	Reason Reason	The reason information associated with a TimeSeries providing motivation information. Association Based On: CRAC contextual model::TimeSeries.[] ----- CRAC contextual model::Reason.Reason[0..*]

323

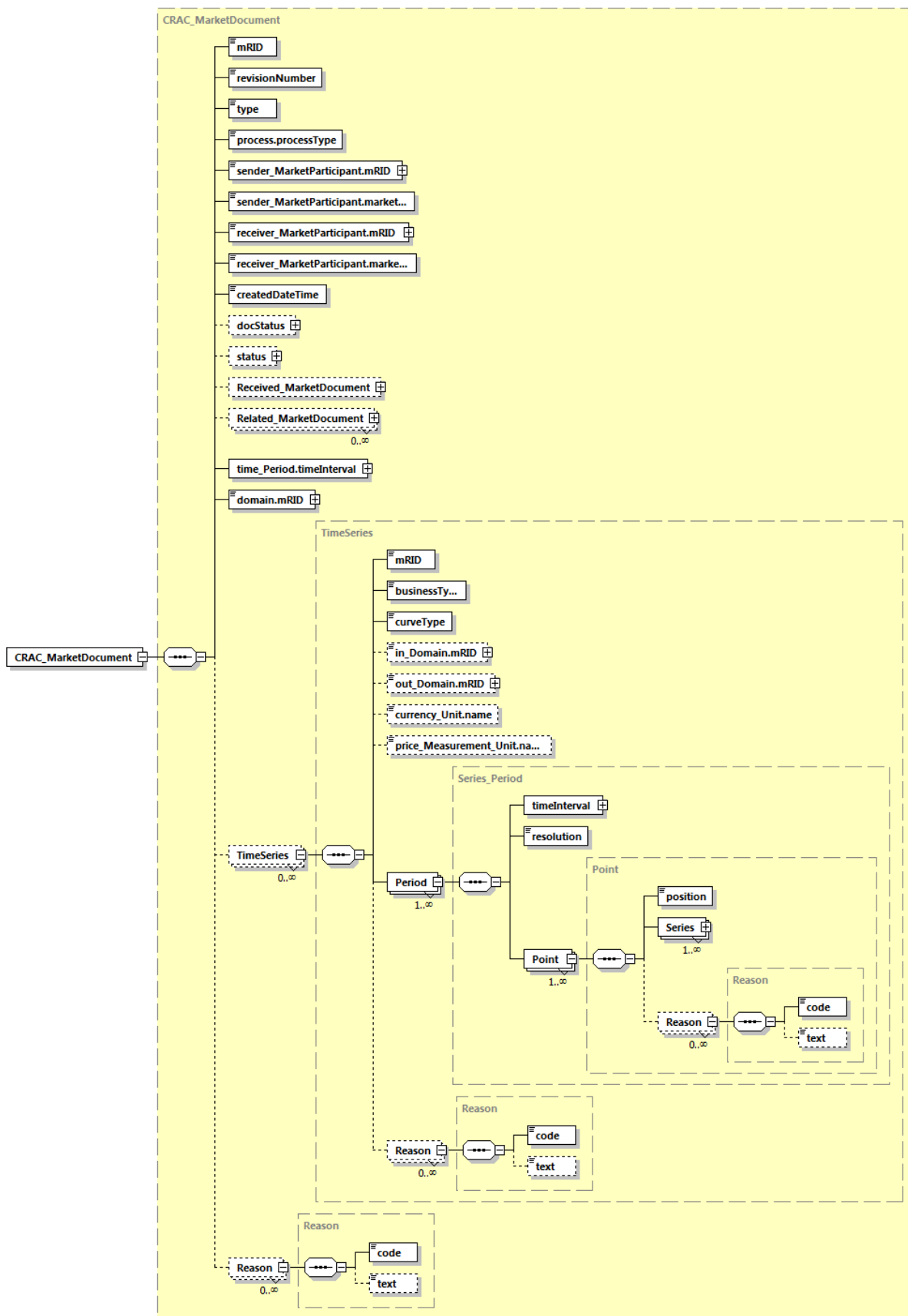
324 2.2.4 Datatypes

325 The list of datatypes used for the CRAC assembly model is as follows:

- 326 • Action_Status compound
- 327 • ESMP_DateTimeInterval compound
- 328 • Amount_Decimal datatype
- 329 • AnalogType_String datatype, codelist AnalogTypeList
- 330 • AreaID_String datatype, codelist CodingSchemeTypeList
- 331 • BusinessKind_String datatype, codelist BusinessTypeList
- 332 • CurrencyCode_String datatype, codelist CurrencyTypeList
- 333 • CurveType_String datatype, codelist CurveTypeList
- 334 • ESMP_DateTime datatype
- 335 • ESMP_Float datatype
- 336 • ESMPBoolean_String datatype, codelist IndicatorTypeList
- 337 • ESMPVersion_String datatype

- 338 • ID_String datatype
- 339 • MarketRoleKind_String datatype, codelist RoleTypeList
- 340 • MeasurementPointID_String datatype, codelist CodingSchemeTypeList
- 341 • MeasurementUnitKind_String datatype, codelist UnitOfMeasureTypeList
- 342 • MessageKind_String datatype, codelist MessageTypeList
- 343 • PartyID_String datatype, codelist CodingSchemeTypeList
- 344 • Position_Integer datatype
- 345 • ProcessKind_String datatype, codelist ProcessTypeList
- 346 • PsrType_String datatype, codelist AssetTypeList
- 347 • ReasonCode_String datatype, codelist ReasonCodeTypeList
- 348 • ReasonText_String datatype
- 349 • ResourceID_String datatype, codelist CodingSchemeTypeList
- 350 • Status_String datatype, codelist StatusTypeList
- 351 • UnitSymbol datatype, codelist UnitSymbol
- 352 • YMDHM_DateTime datatype
- 353
- 354

355 2.2.5 CRAC_MarketDocument XML schema structure



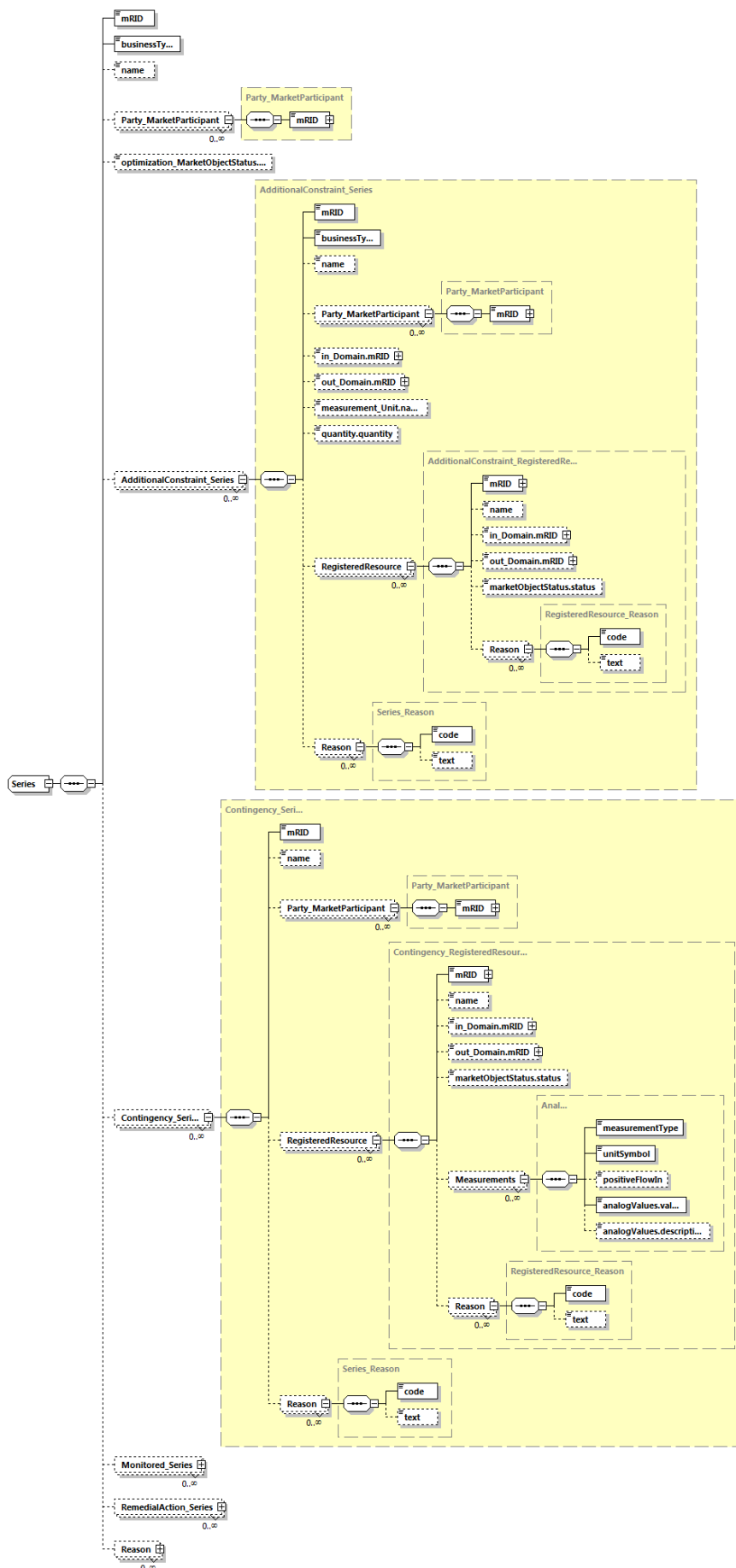
356

Generated by XMLSpy

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357

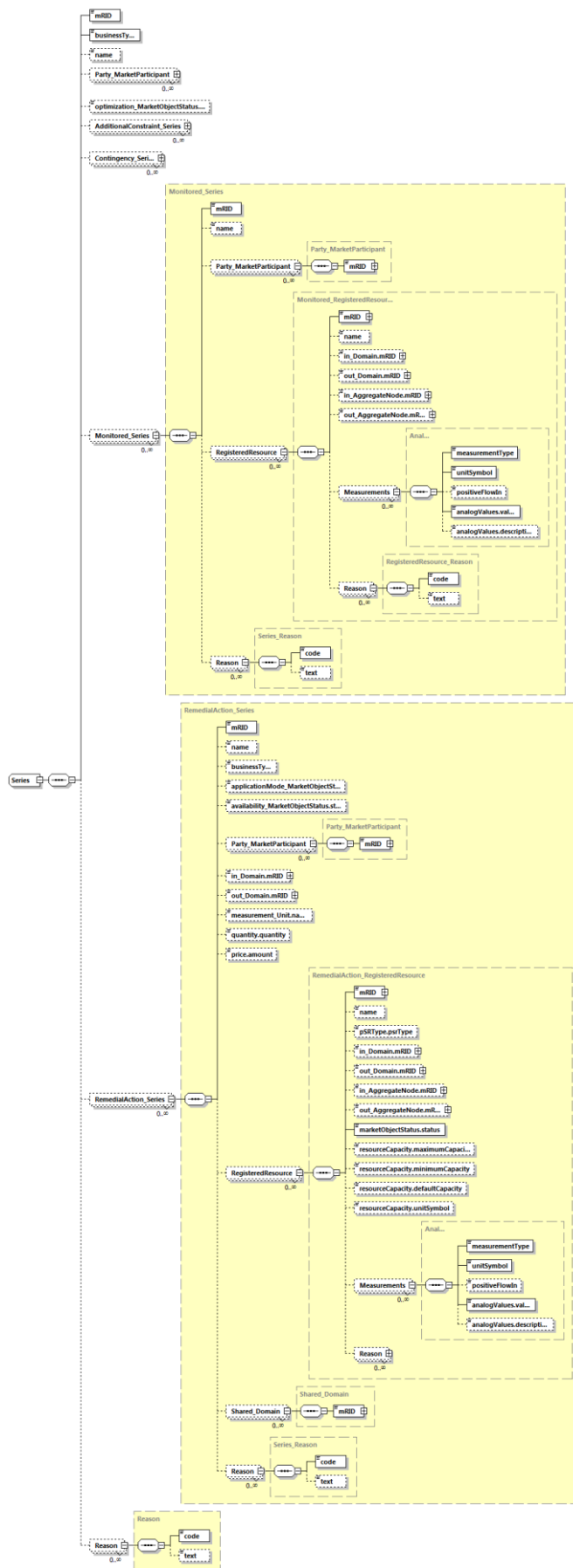
Figure 3 - CRAC_MarketDocument schema structure 1/3



358
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Figure 4 - CRAC_MarketDocument schema structure 2/3



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Figure 5 - CRAC_MarketDocument schema structure 3/3

360
 361
 362

363 2.2.6 CRAC_MarketDocument XML schema

364 The schema to be used to validate XML instances is to be identified by:

365 urn:iec62325.351:tc57wg16:451-n:CRACdocument:2:4

```
366 <?xml version="1.0" encoding="utf-8"?>
367 <xs:schema xmlns:ecl="urn:entsoe.eu:wgedi:codelists"
368 xmlns="urn:iec62325.351:tc57wg16:451-n:CRACdocument:2:4"
369 xmlns:sawSDL="http://www.w3.org/ns/sawSDL"
370 xmlns:cimp="http://www.iec.ch/cimprofile"
371 xmlns:xs="http://www.w3.org/2001/XMLSchema"
372 targetNamespace="urn:iec62325.351:tc57wg16:451-n:CRACdocument:2:4"
373 elementFormDefault="qualified" attributeFormDefault="unqualified">
374 <xs:import namespace="urn:entsoe.eu:wgedi:codelists" schemaLocation="urn-entsoe-
375 eu-wgedi-codelists.xsd"/>
376 <xs:element name="CRAC_MarketDocument" type="CRAC_MarketDocument"/>
377 <xs:simpleType name="ResourceID_String-base"
378 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
379 <xs:restriction base="xs:string">
380 <xs:maxLength value="60"/>
381 </xs:restriction>
382 </xs:simpleType>
383 <xs:complexType name="ResourceID_String"
384 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
385 <xs:simpleContent>
386 <xs:extension base="ResourceID_String-base">
387 <xs:attribute name="codingScheme" type="ecl:CodingSchemeTypeList" use="required"/>
388 </xs:extension>
389 </xs:simpleContent>
390 </xs:complexType>
391 <xs:simpleType name="AreaID_String-base"
392 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
393 <xs:restriction base="xs:string">
394 <xs:maxLength value="18"/>
395 </xs:restriction>
396 </xs:simpleType>
397 <xs:complexType name="AreaID_String"
398 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
399 <xs:simpleContent>
400 <xs:extension base="AreaID_String-base">
401 <xs:attribute name="codingScheme" type="ecl:CodingSchemeTypeList" use="required"/>
402 </xs:extension>
403 </xs:simpleContent>
404 </xs:complexType>
405 <xs:simpleType name="Status_String"
406 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
407 <xs:restriction base="ecl:StatusTypeList"/>
408 </xs:simpleType>
409 <xs:complexType name="AdditionalConstraint_RegisteredResource"
410 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-
411 cim16#RegisteredResource">
412 <xs:sequence>
413 <xs:element name="mRID" type="ResourceID_String" minOccurs="1" maxOccurs="1"
414 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-
415 cim16#IdentifiedObject.mRID"/>
416 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
417 sawSDL:modelReference="http://iec.ch/TC57/2013/CIM-schema-
418 cim16#IdentifiedObject.name"/>
```

```
419 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
420 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
421 cim16#IdentifiedObject.mRID"/>
422 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
423 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
424 cim16#IdentifiedObject.mRID"/>
425 <xs:element name="marketObjectStatus.status" type="Status_String" minOccurs="0"
426 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
427 cim16#MarketObjectStatus.status"/>
428 <xs:element name="Reason" type="RegisteredResource_Reason" minOccurs="0"
429 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
430 cim16#RegisteredResource.Reason"/>
431 </xs:sequence>
432 </xs:complexType>
433 <xs:simpleType name="ID_String"
434 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
435 <xs:restriction base="xs:string">
436 <xs:maxLength value="60"/>
437 </xs:restriction>
438 </xs:simpleType>
439 <xs:simpleType name="BusinessKind_String"
440 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
441 <xs:restriction base="ecl:BusinessTypeList"/>
442 </xs:simpleType>
443 <xs:simpleType name="MeasurementUnitKind_String"
444 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
445 <xs:restriction base="ecl:UnitOfMeasureTypeList"/>
446 </xs:simpleType>
447 <xs:complexType name="AdditionalConstraint_Series"
448 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
449 <xs:sequence>
450 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
451 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
452 cim16#IdentifiedObject.mRID"/>
453 <xs:element name="businessType" type="BusinessKind_String" minOccurs="1"
454 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
455 cim16#TimeSeries.businessType"/>
456 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
457 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
458 cim16#IdentifiedObject.name"/>
459 <xs:element name="Party_MarketParticipant" type="Party_MarketParticipant"
460 minOccurs="0" maxOccurs="unbounded"
461 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
462 cim16#Series.Party_MarketParticipant"/>
463 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
464 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
465 cim16#IdentifiedObject.mRID"/>
466 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
467 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
468 cim16#IdentifiedObject.mRID"/>
469 <xs:element name="measurement_Unit.name" type="MeasurementUnitKind_String"
470 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
471 schema-cim16#Unit.name"/>
472 <xs:element name="quantity.quantity" type="xs:decimal" minOccurs="0" maxOccurs="1"
473 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
474 cim16#Quantity.quantity"/>
475 <xs:element name="RegisteredResource"
476 type="AdditionalConstraint_RegisteredResource" minOccurs="0" maxOccurs="unbounded"
477 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
478 cim16#Series.RegisteredResource"/>
```



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479 <xs:element name="Reason" type="Series_Reason" minOccurs="0" maxOccurs="unbounded"
480 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series.Reason"/>
481 </xs:sequence>
482 </xs:complexType>
483 <xs:simpleType name="AnalogType_String"
484 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
485 <xs:restriction base="ecl:AnalogTypeList"/>
486 </xs:simpleType>
487 <xs:simpleType name="UnitSymbol"
488 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#UnitSymbol">
489 <xs:restriction base="ecl:UnitSymbol"/>
490 </xs:simpleType>
491 <xs:simpleType name="ESMPBoolean_String"
492 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
493 <xs:restriction base="ecl:IndicatorTypeList"/>
494 </xs:simpleType>
495 <xs:simpleType name="ESMP_Float"
496 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Float">
497 <xs:restriction base="xs:float">
498 <xs:pattern value="([0-9]*\.\?[0-9]*)"/>
499 </xs:restriction>
500 </xs:simpleType>
501 <xs:complexType name="Analog" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
502 schema-cim16#Analog">
503 <xs:sequence>
504 <xs:element name="measurementType" type="AnalogType_String" minOccurs="1"
505 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
506 cim16#Measurement.measurementType"/>
507 <xs:element name="unitSymbol" type="UnitSymbol" minOccurs="1" maxOccurs="1"
508 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
509 cim16#Measurement.unitSymbol"/>
510 <xs:element name="positiveFlowIn" type="ESMPBoolean_String" minOccurs="0"
511 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
512 cim16#Analog.positiveFlowIn"/>
513 <xs:element name="analogValues.value" type="ESMP_Float" minOccurs="1"
514 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
515 cim16#AnalogValue.value"/>
516 <xs:element name="analogValues.description" type="xs:string" minOccurs="0"
517 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
518 cim16#IdentifiedObject.description"/>
519 </xs:sequence>
520 </xs:complexType>
521 <xs:complexType name="Contingency_RegisteredResource"
522 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
523 cim16#RegisteredResource">
524 <xs:sequence>
525 <xs:element name="mRID" type="ResourceID_String" minOccurs="1" maxOccurs="1"
526 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
527 cim16#IdentifiedObject.mRID"/>
528 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
529 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
530 cim16#IdentifiedObject.name"/>
531 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
532 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
533 cim16#IdentifiedObject.mRID"/>
534 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
535 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
536 cim16#IdentifiedObject.mRID"/>
```

```

537 <xs:element name="marketObjectStatus.status" type="Status_String" minOccurs="0"
538 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
539 cim16#MarketObjectStatus.status"/>
540 <xs:element name="Measurements" type="Analog" minOccurs="0" maxOccurs="unbounded"
541 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
542 cim16#RegisteredResource.Measurements"/>
543 <xs:element name="Reason" type="RegisteredResource_Reason" minOccurs="0"
544 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
545 cim16#RegisteredResource.Reason"/>
546 </xs:sequence>
547 </xs:complexType>
548 <xs:complexType name="Contingency_Series"
549 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
550 <xs:sequence>
551 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
552 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
553 cim16#IdentifiedObject.mRID"/>
554 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
555 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
556 cim16#IdentifiedObject.name"/>
557 <xs:element name="Party_MarketParticipant" type="Party_MarketParticipant"
558 minOccurs="0" maxOccurs="unbounded"
559 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
560 cim16#Series.Party_MarketParticipant"/>
561 <xs:element name="RegisteredResource" type="Contingency_RegisteredResource"
562 minOccurs="0" maxOccurs="unbounded"
563 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
564 cim16#Series.RegisteredResource"/>
565 <xs:element name="Reason" type="Series_Reason" minOccurs="0" maxOccurs="unbounded"
566 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series.Reason"/>
567 </xs:sequence>
568 </xs:complexType>
569 <xs:simpleType name="ESMPVersion_String"
570 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
571 <xs:restriction base="xs:string">
572 <xs:pattern value="[1-9]([0-9]){0,2}"/>
573 </xs:restriction>
574 </xs:simpleType>
575 <xs:simpleType name="MessageKind_String"
576 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
577 <xs:restriction base="ecl:MessageTypeList"/>
578 </xs:simpleType>
579 <xs:simpleType name="ProcessKind_String"
580 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
581 <xs:restriction base="ecl:ProcessTypeList"/>
582 </xs:simpleType>
583 <xs:simpleType name="PartyID_String-base"
584 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
585 <xs:restriction base="xs:string">
586 <xs:maxLength value="16"/>
587 </xs:restriction>
588 </xs:simpleType>
589 <xs:complexType name="PartyID_String"
590 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
591 <xs:simpleContent>
592 <xs:extension base="PartyID_String-base">
593 <xs:attribute name="codingScheme" type="ecl:CodingSchemeTypeList" use="required"/>
594 </xs:extension>
595 </xs:simpleContent>
596 </xs:complexType>
    
```

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597 <xs:simpleType name="MarketRoleKind_String"
598 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
599 <xs:restriction base="ecl:RoleTypeList"/>
600 </xs:simpleType>
601 <xs:simpleType name="ESMP_DateTime"
602 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
603 <xs:restriction base="xs:dateTime">
604 <xs:pattern value="((([0-9]{4})[\-](0[13578]|1[02]))[\-](0[1-9]|[12][0-
605 9]|3[01]))|(([0-9]{4})[\-]((0[469])|(11))[\-](0[1-9]|[12][0-9]|30))T(([01][0-9]|2[0-
606 3]):[0-5][0-9]:[0-5][0-
607 9])Z)|((([13579][26][02468][048]|[13579][01345789](0)[48]|[13579][01345789][2468][0
608 48]|[02468][048][02468][048]|[02468][1235679](0)[48]|[02468][1235679][2468][048]|[
609 0-9][0-9][13579][26])[\-](02)[\-](0[1-9]|1[0-9]|2[0-9])T(([01][0-9]|2[0-3]):[0-
610 5][0-9]:[0-5][0-
611 9])Z)|((([13579][26][02468][1235679]|[13579][01345789](0)[01235679]|[13579][0134578
612 9][2468][1235679]|[02468][048][02468][1235679]|[02468][1235679](0)[01235679]|[0246
613 8][1235679][2468][1235679]|[0-9][0-9][13579][01345789])[\-](02)[\-](0[1-9]|1[0-
614 9]|2[0-8])T(([01][0-9]|2[0-3]):[0-5][0-9]:[0-5][0-9])Z)"/>
615 </xs:restriction>
616 </xs:simpleType>
617 <xs:complexType name="Action_Status"
618 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Status">
619 <xs:sequence>
620 <xs:element name="value" type="Status_String" minOccurs="1" maxOccurs="1"
621 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Status.value"/>
622 </xs:sequence>
623 </xs:complexType>
624 <xs:simpleType name="YMDHM_DateTime"
625 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
626 <xs:restriction base="xs:string">
627 <xs:pattern value="((([0-9]{4})[\-](0[13578]|1[02]))[\-](0[1-9]|[12][0-
628 9]|3[01]))|(([0-9]{4})[\-]((0[469])|(11))[\-](0[1-9]|[12][0-9]|30))T(([01][0-9]|2[0-
629 3]):[0-5][0-
630 9])Z)|((([13579][26][02468][048]|[13579][01345789](0)[48]|[13579][01345789][2468][0
631 48]|[02468][048][02468][048]|[02468][1235679](0)[48]|[02468][1235679][2468][048]|[
632 0-9][0-9][13579][26])[\-](02)[\-](0[1-9]|1[0-9]|2[0-9])T(([01][0-9]|2[0-3]):[0-
633 5][0-
634 9])Z)|((([13579][26][02468][1235679]|[13579][01345789](0)[01235679]|[13579][0134578
635 9][2468][1235679]|[02468][048][02468][1235679]|[02468][1235679](0)[01235679]|[0246
636 8][1235679][2468][1235679]|[0-9][0-9][13579][01345789])[\-](02)[\-](0[1-9]|1[0-
637 9]|2[0-8])T(([01][0-9]|2[0-3]):[0-5][0-9])Z)"/>
638 </xs:restriction>
639 </xs:simpleType>
640 <xs:complexType name="ESMP_DateTimeInterval"
641 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTimeInterval">
642 <xs:sequence>
643 <xs:element name="start" type="YMDHM_DateTime" minOccurs="1" maxOccurs="1"
644 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
645 cim16#DateTimeInterval.start"/>
646 <xs:element name="end" type="YMDHM_DateTime" minOccurs="1" maxOccurs="1"
647 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
648 cim16#DateTimeInterval.end"/>
649 </xs:sequence>
650 </xs:complexType>
651 <xs:complexType name="CRAC_MarketDocument"
652 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketDocument">
653 <xs:sequence>
654 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
655 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
656 cim16#IdentifiedObject.mRID"/>
    
```

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657 <xs:element name="revisionNumber" type="ESMPVersion_String" minOccurs="1"
658 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
659 cim16#Document.revisionNumber"/>
660 <xs:element name="type" type="MessageKind_String" minOccurs="1" maxOccurs="1"
661 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Document.type"/>
662 <xs:element name="process.processType" type="ProcessKind_String" minOccurs="1"
663 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
664 cim16#Process.processType"/>
665 <xs:element name="sender_MarketParticipant.mRID" type="PartyID_String"
666 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
667 schema-cim16#IdentifiedObject.mRID"/>
668 <xs:element name="sender_MarketParticipant.marketRole.type"
669 type="MarketRoleKind_String" minOccurs="1" maxOccurs="1"
670 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
671 <xs:element name="receiver_MarketParticipant.mRID" type="PartyID_String"
672 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
673 schema-cim16#IdentifiedObject.mRID"/>
674 <xs:element name="receiver_MarketParticipant.marketRole.type"
675 type="MarketRoleKind_String" minOccurs="1" maxOccurs="1"
676 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
677 <xs:element name="createdDateTime" type="ESMP_DateTime" minOccurs="1"
678 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
679 cim16#Document.createdDateTime"/>
680 <xs:element name="docStatus" type="Action_Status" minOccurs="0" maxOccurs="1"
681 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
682 cim16#Document.docStatus"/>
683 <xs:element name="status" type="Action_Status" minOccurs="0" maxOccurs="1"
684 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Document.status"/>
685 <xs:element name="Received_MarketDocument" type="MarketDocument" minOccurs="0"
686 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
687 cim16#MarketDocument.Received_MarketDocument"/>
688 <xs:element name="Related_MarketDocument" type="MarketDocument" minOccurs="0"
689 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
690 cim16#MarketDocument.Related_MarketDocument"/>
691 <xs:element name="time_Period.timeInterval" type="ESMP_DateTimeInterval"
692 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
693 schema-cim16#Period.timeInterval"/>
694 <xs:element name="domain.mRID" type="AreaID_String" minOccurs="1" maxOccurs="1"
695 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
696 cim16#IdentifiedObject.mRID"/>
697 <xs:element name="TimeSeries" type="TimeSeries" minOccurs="0"
698 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
699 cim16#MarketDocument.TimeSeries"/>
700 <xs:element name="Reason" type="Reason" minOccurs="0" maxOccurs="unbounded"
701 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
702 cim16#MarketDocument.Reason"/>
703 </xs:sequence>
704 </xs:complexType>
705 <xs:complexType name="MarketDocument"
706 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketDocument">
707 <xs:sequence>
708 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
709 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
710 cim16#IdentifiedObject.mRID"/>
711 <xs:element name="revisionNumber" type="ESMPVersion_String" minOccurs="1"
712 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
713 cim16#Document.revisionNumber"/>
714 </xs:sequence>
715 </xs:complexType>

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716 <xs:complexType name="Monitored_RegisteredResource"
717 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
718 cim16#RegisteredResource">
719 <xs:sequence>
720 <xs:element name="mRID" type="ResourceID_String" minOccurs="1" maxOccurs="1"
721 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
722 cim16#IdentifiedObject.mRID"/>
723 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
724 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
725 cim16#IdentifiedObject.name"/>
726 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
727 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
728 cim16#IdentifiedObject.mRID"/>
729 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
730 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
731 cim16#IdentifiedObject.mRID"/>
732 <xs:element name="in_AggregateNode.mRID" type="ResourceID_String" minOccurs="0"
733 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
734 cim16#IdentifiedObject.mRID"/>
735 <xs:element name="out_AggregateNode.mRID" type="ResourceID_String" minOccurs="0"
736 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
737 cim16#IdentifiedObject.mRID"/>
738 <xs:element name="Measurements" type="Analog" minOccurs="0" maxOccurs="unbounded"
739 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
740 cim16#RegisteredResource.Measurements"/>
741 <xs:element name="Reason" type="RegisteredResource_Reason" minOccurs="0"
742 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
743 cim16#RegisteredResource.Reason"/>
744 </xs:sequence>
745 </xs:complexType>
746 <xs:complexType name="Monitored_Series"
747 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
748 <xs:sequence>
749 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
750 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
751 cim16#IdentifiedObject.mRID"/>
752 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
753 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
754 cim16#IdentifiedObject.name"/>
755 <xs:element name="Party_MarketParticipant" type="Party_MarketParticipant"
756 minOccurs="0" maxOccurs="unbounded"
757 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
758 cim16#Series.Party_MarketParticipant"/>
759 <xs:element name="RegisteredResource" type="Monitored_RegisteredResource"
760 minOccurs="0" maxOccurs="unbounded"
761 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
762 cim16#Series.RegisteredResource"/>
763 <xs:element name="Reason" type="Series_Reason" minOccurs="0" maxOccurs="unbounded"
764 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series.Reason"/>
765 </xs:sequence>
766 </xs:complexType>
767 <xs:complexType name="Party_MarketParticipant"
768 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
769 cim16#MarketParticipant">
770 <xs:sequence>
771 <xs:element name="mRID" type="PartyID_String" minOccurs="1" maxOccurs="1"
772 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
773 cim16#IdentifiedObject.mRID"/>
774 </xs:sequence>
775 </xs:complexType>
    
```

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776 <xs:simpleType name="Position_Integer"
777 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Integer">
778 <xs:restriction base="xs:integer">
779 <xs:maxInclusive value="999999"/>
780 <xs:minInclusive value="1"/>
781 </xs:restriction>
782 </xs:simpleType>
783 <xs:complexType name="Point" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
784 schema-cim16#Point">
785 <xs:sequence>
786 <xs:element name="position" type="Position_Integer" minOccurs="1" maxOccurs="1"
787 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Point.position"/>
788 <xs:element name="Series" type="Series" minOccurs="1" maxOccurs="unbounded"
789 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Point.Series"/>
790 <xs:element name="Reason" type="Reason" minOccurs="0" maxOccurs="unbounded"
791 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Point.Reason"/>
792 </xs:sequence>
793 </xs:complexType>
794 <xs:simpleType name="ReasonCode_String"
795 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
796 <xs:restriction base="ecl:ReasonCodeTypeList"/>
797 </xs:simpleType>
798 <xs:simpleType name="ReasonText_String"
799 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
800 <xs:restriction base="xs:string">
801 <xs:maxLength value="512"/>
802 </xs:restriction>
803 </xs:simpleType>
804 <xs:complexType name="Reason" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
805 schema-cim16#Reason">
806 <xs:sequence>
807 <xs:element name="code" type="ReasonCode_String" minOccurs="1" maxOccurs="1"
808 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason.code"/>
809 <xs:element name="text" type="ReasonText_String" minOccurs="0" maxOccurs="1"
810 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason.text"/>
811 </xs:sequence>
812 </xs:complexType>
813 <xs:complexType name="RegisteredResource_Reason"
814 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">
815 <xs:sequence>
816 <xs:element name="code" type="ReasonCode_String" minOccurs="1" maxOccurs="1"
817 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason.code"/>
818 <xs:element name="text" type="ReasonText_String" minOccurs="0" maxOccurs="1"
819 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason.text"/>
820 </xs:sequence>
821 </xs:complexType>
822 <xs:simpleType name="PsrType_String"
823 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
824 <xs:restriction base="ecl:AssetTypeList"/>
825 </xs:simpleType>
826 <xs:complexType name="RemedialAction_RegisteredResource"
827 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
828 cim16#RegisteredResource">
829 <xs:sequence>
830 <xs:element name="mRID" type="ResourceID_String" minOccurs="1" maxOccurs="1"
831 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
832 cim16#IdentifiedObject.mRID"/>
833 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
834 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
835 cim16#IdentifiedObject.name"/>

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836 <xs:element name="pSRType.psrType" type="PsrType_String" minOccurs="0"
837 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
838 cim16#MktPSRType.psrType"/>
839 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
840 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
841 cim16#IdentifiedObject.mRID"/>
842 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
843 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
844 cim16#IdentifiedObject.mRID"/>
845 <xs:element name="in_AggregateNode.mRID" type="ResourceID_String" minOccurs="0"
846 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
847 cim16#IdentifiedObject.mRID"/>
848 <xs:element name="out_AggregateNode.mRID" type="ResourceID_String" minOccurs="0"
849 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
850 cim16#IdentifiedObject.mRID"/>
851 <xs:element name="marketObjectStatus.status" type="Status_String" minOccurs="1"
852 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
853 cim16#MarketObjectStatus.status"/>
854 <xs:element name="resourceCapacity.maximumCapacity" type="xs:decimal"
855 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
856 schema-cim16#ResourceCapacity.maximumCapacity"/>
857 <xs:element name="resourceCapacity.minimumCapacity" type="xs:decimal"
858 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
859 schema-cim16#ResourceCapacity.minimumCapacity"/>
860 <xs:element name="resourceCapacity.defaultCapacity" type="xs:decimal"
861 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
862 schema-cim16#ResourceCapacity.defaultCapacity"/>
863 <xs:element name="resourceCapacity.unitSymbol" type="UnitSymbol" minOccurs="0"
864 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
865 cim16#ResourceCapacity.unitSymbol"/>
866 <xs:element name="Measurements" type="Analog" minOccurs="0" maxOccurs="unbounded"
867 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
868 cim16#RegisteredResource.Measurements"/>
869 <xs:element name="Reason" type="RegisteredResource_Reason" minOccurs="0"
870 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
871 cim16#RegisteredResource.Reason"/>
872 </xs:sequence>
873 </xs:complexType>
874 <xs:simpleType name="Amount_Decimal"
875 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Decimal">
876 <xs:restriction base="xs:decimal">
877 <xs:totalDigits value="17"/>
878 </xs:restriction>
879 </xs:simpleType>
880 <xs:complexType name="RemedialAction_Series"
881 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
882 <xs:sequence>
883 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
884 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
885 cim16#IdentifiedObject.mRID"/>
886 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
887 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
888 cim16#IdentifiedObject.name"/>
889 <xs:element name="businessType" type="BusinessKind_String" minOccurs="0"
890 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
891 cim16#TimeSeries.businessType"/>
892 <xs:element name="applicationMode_MarketObjectStatus.status" type="Status_String"
893 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
894 schema-cim16#MarketObjectStatus.status"/>

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895 <xs:element name="availability_MarketObjectStatus.status" type="Status_String"
896 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
897 schema-cim16#MarketObjectStatus.status"/>
898 <xs:element name="Party_MarketParticipant" type="Party_MarketParticipant"
899 minOccurs="0" maxOccurs="unbounded"
900 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
901 cim16#Series.Party_MarketParticipant"/>
902 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
903 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
904 cim16#IdentifiedObject.mRID"/>
905 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
906 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
907 cim16#IdentifiedObject.mRID"/>
908 <xs:element name="measurement_Unit.name" type="MeasurementUnitKind_String"
909 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
910 schema-cim16#Unit.name"/>
911 <xs:element name="quantity.quantity" type="xs:decimal" minOccurs="0" maxOccurs="1"
912 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
913 cim16#Quantity.quantity"/>
914 <xs:element name="price.amount" type="Amount_Decimal" minOccurs="0" maxOccurs="1"
915 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Price.amount"/>
916 <xs:element name="RegisteredResource" type="RemedialAction_RegisteredResource"
917 minOccurs="0" maxOccurs="unbounded"
918 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
919 cim16#Series.RegisteredResource"/>
920 <xs:element name="Shared_Domain" type="Shared_Domain" minOccurs="0"
921 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
922 cim16#Series.Shared_Domain"/>
923 <xs:element name="Reason" type="Series_Reason" minOccurs="0" maxOccurs="unbounded"
924 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series.Reason"/>
925 </xs:sequence>
926 </xs:complexType>
927 <xs:complexType name="Series" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
928 schema-cim16#Series">
929 <xs:sequence>
930 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
931 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
932 cim16#IdentifiedObject.mRID"/>
933 <xs:element name="businessType" type="BusinessKind_String" minOccurs="1"
934 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
935 cim16#TimeSeries.businessType"/>
936 <xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1"
937 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
938 cim16#IdentifiedObject.name"/>
939 <xs:element name="Party_MarketParticipant" type="Party_MarketParticipant"
940 minOccurs="0" maxOccurs="unbounded"
941 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
942 cim16#Series.Party_MarketParticipant"/>
943 <xs:element name="optimization_MarketObjectStatus.status" type="Status_String"
944 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
945 schema-cim16#MarketObjectStatus.status"/>
946 <xs:element name="AdditionalConstraint_Series" type="AdditionalConstraint_Series"
947 minOccurs="0" maxOccurs="unbounded"
948 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
949 cim16#Series.AdditionalConstraint_Series"/>
950 <xs:element name="Contingency_Series" type="Contingency_Series" minOccurs="0"
951 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
952 cim16#Series.Contingency_Series"/>
    
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953 <xs:element name="Monitored_Series" type="Monitored_Series" minOccurs="0"
954 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
955 cim16#Series.Monitored_Series"/>
956 <xs:element name="RemedialAction_Series" type="RemedialAction_Series"
957 minOccurs="0" maxOccurs="unbounded"
958 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
959 cim16#Series.RemedialAction_Series"/>
960 <xs:element name="Reason" type="Reason" minOccurs="0" maxOccurs="unbounded"
961 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series.Reason"/>
962 </xs:sequence>
963 </xs:complexType>
964 <xs:complexType name="Series_Period"
965 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Period">
966 <xs:sequence>
967 <xs:element name="timeInterval" type="ESMP_DateTimeInterval" minOccurs="1"
968 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
969 cim16#Period.timeInterval"/>
970 <xs:element name="resolution" type="xs:duration" minOccurs="1" maxOccurs="1"
971 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
972 cim16#Period.resolution"/>
973 <xs:element name="Point" type="Point" minOccurs="1" maxOccurs="unbounded"
974 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Period.Point"/>
975 </xs:sequence>
976 </xs:complexType>
977 <xs:complexType name="Series_Reason"
978 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">
979 <xs:sequence>
980 <xs:element name="code" type="ReasonCode_String" minOccurs="1" maxOccurs="1"
981 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason.code"/>
982 <xs:element name="text" type="ReasonText_String" minOccurs="0" maxOccurs="1"
983 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason.text"/>
984 </xs:sequence>
985 </xs:complexType>
986 <xs:complexType name="Shared_Domain"
987 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Domain">
988 <xs:sequence>
989 <xs:element name="mRID" type="AreaID_String" minOccurs="1" maxOccurs="1"
990 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
991 cim16#IdentifiedObject.mRID"/>
992 </xs:sequence>
993 </xs:complexType>
994 <xs:simpleType name="CurveType_String"
995 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
996 <xs:restriction base="ecl:CurveTypeList"/>
997 </xs:simpleType>
998 <xs:simpleType name="CurrencyCode_String"
999 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
1000 <xs:restriction base="ecl:CurrencyTypeList"/>
1001 </xs:simpleType>
1002 <xs:complexType name="TimeSeries"
1003 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#TimeSeries">
1004 <xs:sequence>
1005 <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"
1006 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1007 cim16#IdentifiedObject.mRID"/>
1008 <xs:element name="businessType" type="BusinessKind_String" minOccurs="1"
1009 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1010 cim16#TimeSeries.businessType"/>

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1011 <xs:element name="curveType" type="CurveType_String" minOccurs="1" maxOccurs="1"
1012 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1013 cim16#TimeSeries.curveType"/>
1014 <xs:element name="in_Domain.mRID" type="AreaID_String" minOccurs="0" maxOccurs="1"
1015 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1016 cim16#IdentifiedObject.mRID"/>
1017 <xs:element name="out_Domain.mRID" type="AreaID_String" minOccurs="0"
1018 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1019 cim16#IdentifiedObject.mRID"/>
1020 <xs:element name="currency_Unit.name" type="CurrencyCode_String" minOccurs="0"
1021 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1022 cim16#Unit.name"/>
1023 <xs:element name="price_Measurement_Unit.name" type="MeasurementUnitKind_String"
1024 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1025 schema-cim16#Unit.name"/>
1026 <xs:element name="Period" type="Series_Period" minOccurs="1" maxOccurs="unbounded"
1027 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1028 cim16#TimeSeries.Period"/>
1029 <xs:element name="Reason" type="Reason" minOccurs="0" maxOccurs="unbounded"
1030 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1031 cim16#TimeSeries.Reason"/>
1032 </xs:sequence>
1033 </xs:complexType>
1034 </xs:schema>
```