



European Network of
Transmission System Operators
for Electricity

CRITICAL NETWORK ELEMENT DOCUMENT UML MODEL AND SCHEMA

2020-03-18
APPROVED DOCUMENT
VERSION 2.5

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24 absolute prohibition of the specification.
- 25 - SHOULD: This word, or the adjective "RECOMMENDED", means that there may exist
26 valid reasons in particular circumstances to ignore a particular item, but the full
27 implications shall be understood and carefully weighed before choosing a different
28 course.
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32 carefully weighed before implementing any behaviour described with this label.
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37 prepared to interoperate with another implementation which does include the option,
38 though perhaps with reduced functionality. In the same vein an implementation which
39 does include a particular option **MUST** be prepared to interoperate with another
40 implementation which does not include the option (except, of course, for the feature the
41 option provides.).

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Revision History

| Version | Release | Date | Comments |
|---------|---------|------------|--|
| 0 | 0 | 2015-01-15 | Initial release |
| 1 | 0 | 2015-09-01 | Review by WG EDI and PT CGM |
| 1 | 1 | 2015-11-10 | Following the maintenance request from EMFIP, change to the UML model to enable "anonymous" publication. |
| 2 | 0 | 2017-10-24 | Update of the UML model and the associated dependency tables following alignment with the CRAC document for capacity calculation processes: <ul style="list-style-type: none"> - Addition of the classes present in the CRAC document with the related associations and attributes - Addition of a new Border_Series class to describe corners - Addition of a new ReferenceCalculation_DateAndOrTime class to describe reference dates used for capacity calculation |
| 2 | 1 | 2018-06-19 | 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 - Creation of an association between Border_Series and Point |
| 2 | 2 | 2018-10-10 | <ul style="list-style-type: none"> - Addition of a businessType attribute in the Border_Series class - Addition of an association between Border_Series and Monitored_RegisteredResource (ConnectingLine_RegisteredResource) |
| 2 | 3 | 2019-06-26 | Following the maintenance request from EMFIP 54: <ul style="list-style-type: none"> • Addition of a 0..1 constraint status attribute in Constraint_Series class to specify whether a constraint is presolved or not. • Addition of 0..1 psrType and location attributes in Contingency_RegisteredResource class and Monitored_RegisteredResource class to include the type and location of the network elements when downloading publications from transparency platform. • New dependency tables for the Flow-Based publication in TP. Changes due to the alignment between CRAC an CNE document: <ul style="list-style-type: none"> • -Addition of a 0..* association between the RemedialAction_RegisteredResource class and the Analog class. • Addition of the optional "currency_Unit.name" and "price_Measure_Unit.name" attributes at TimeSeries level • -Addition of the optional "priceAmount" attribute at RemedialAction_Series level • mRID of Document, Series and Timeseries (ID_String type) was enlarged from 35 to 60 characters. Approved by MC. |
| 2 | 4 | 2019/12/11 | Move process parts to Coordinated Capacity Calculation implementation guide. Keep UML document and schema part. Approved by MC. |
| 2 | 5 | 2020/03/18 | Added a new link between Contingency_RegisteredResource class and Analog class with cardinality 0..* Approved by MC |

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135

INTRODUCTION

136 **1 Scope**

137 The purpose of this document is to provide the contextual and assembly UML models and the
138 schema of the Critical Network Element (CNE).

139 The schema of the CNE_MarketDocument could be used in various business processes.

140 Especially, the Critical Network Elements need to be exchange for to determined cross border
141 capacities with the flow based approach.

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

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

- 146 • Description of the business process;
- 147 • Use case of the business process;
- 148 • Sequence diagrams of the business process;
- 149 • List of the schema (XSD) to be used in the business process and versions of the
150 schema;

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

154

161

162 **IsBasedOn relationships from the European style market profile**

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

165

Table 1 - IsBasedOn dependency

| Name | Complete IsBasedOn Path |
|---|---|
| AdditionalConstraint_Measure_Unit | TC57CIM::IEC62325::MarketManagement::Unit |
| AdditionalConstraint_RegisteredResource | TC57CIM::IEC62325::MarketCommon::RegisteredResource |
| AdditionalConstraint_Series | TC57CIM::IEC62325::MarketManagement::Series |
| AggregateNode | TC57CIM::IEC62325::MarketOperations::ReferenceData::AggregateNode |
| Analog | TC57CIM::IEC61970::Base::Meas::Analog |
| AnalogValue | TC57CIM::IEC61970::Base::Meas::AnalogValue |
| Border_Series | TC57CIM::IEC62325::MarketManagement::Series |
| Constraint_Series | TC57CIM::IEC62325::MarketManagement::Series |
| ConstraintStatus_MarketObjectStatus | TC57CIM::IEC62325::MarketManagement::MarketObjectStatus |
| Contingency_RegisteredResource | TC57CIM::IEC62325::MarketCommon::RegisteredResource |
| Contingency_Series | TC57CIM::IEC62325::MarketManagement::Series |
| CriticalNetworkElement_MarketDocument | TC57CIM::IEC62325::MarketManagement::MarketDocument |
| Currency_Unit | TC57CIM::IEC62325::MarketManagement::Unit |
| Domain | TC57CIM::IEC62325::MarketManagement::Domain |
| ExternalConstraint_Quantity | TC57CIM::IEC62325::MarketManagement::Quantity |
| Flow_Quantity | TC57CIM::IEC62325::MarketManagement::Quantity |
| FlowBasedMargin_Quantity | TC57CIM::IEC62325::MarketManagement::Quantity |
| FlowBasedStudy_Domain | TC57CIM::IEC62325::MarketManagement::Domain |
| Location | TC57CIM::IEC61968::Common::Location |
| MarketCoupling_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 |
| Process | TC57CIM::IEC62325::MarketManagement::Process |

| Name | Complete IsBasedOn Path |
|------------------------------------|---|
| PTDF_Domain | TC57CIM::IEC62325::MarketManagement::Domain |
| PTDF_Quantity | TC57CIM::IEC62325::MarketManagement::Quantity |
| Quantity | TC57CIM::IEC62325::MarketManagement::Quantity |
| Reason | TC57CIM::IEC62325::MarketManagement::Reason |
| ReferenceCalculation_DateAndOrTime | TC57CIM::IEC62325::MarketManagement::DateAndOrTime |
| 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 |
| RemedialAction_Series | TC57CIM::IEC62325::MarketManagement::Series |
| ResourceCapacity | TC57CIM::IEC62325::MarketCommon::ResourceCapacity |
| Series_Period | TC57CIM::IEC62325::MarketManagement::Period |
| Series_Reason | TC57CIM::IEC62325::MarketManagement::Reason |
| Shadow_Price | TC57CIM::IEC62325::MarketManagement::Price |
| Shared_Domain | TC57CIM::IEC62325::MarketManagement::Domain |
| Time_Period | TC57CIM::IEC62325::MarketManagement::Period |
| TimeSeries | TC57CIM::IEC62325::MarketManagement::TimeSeries |

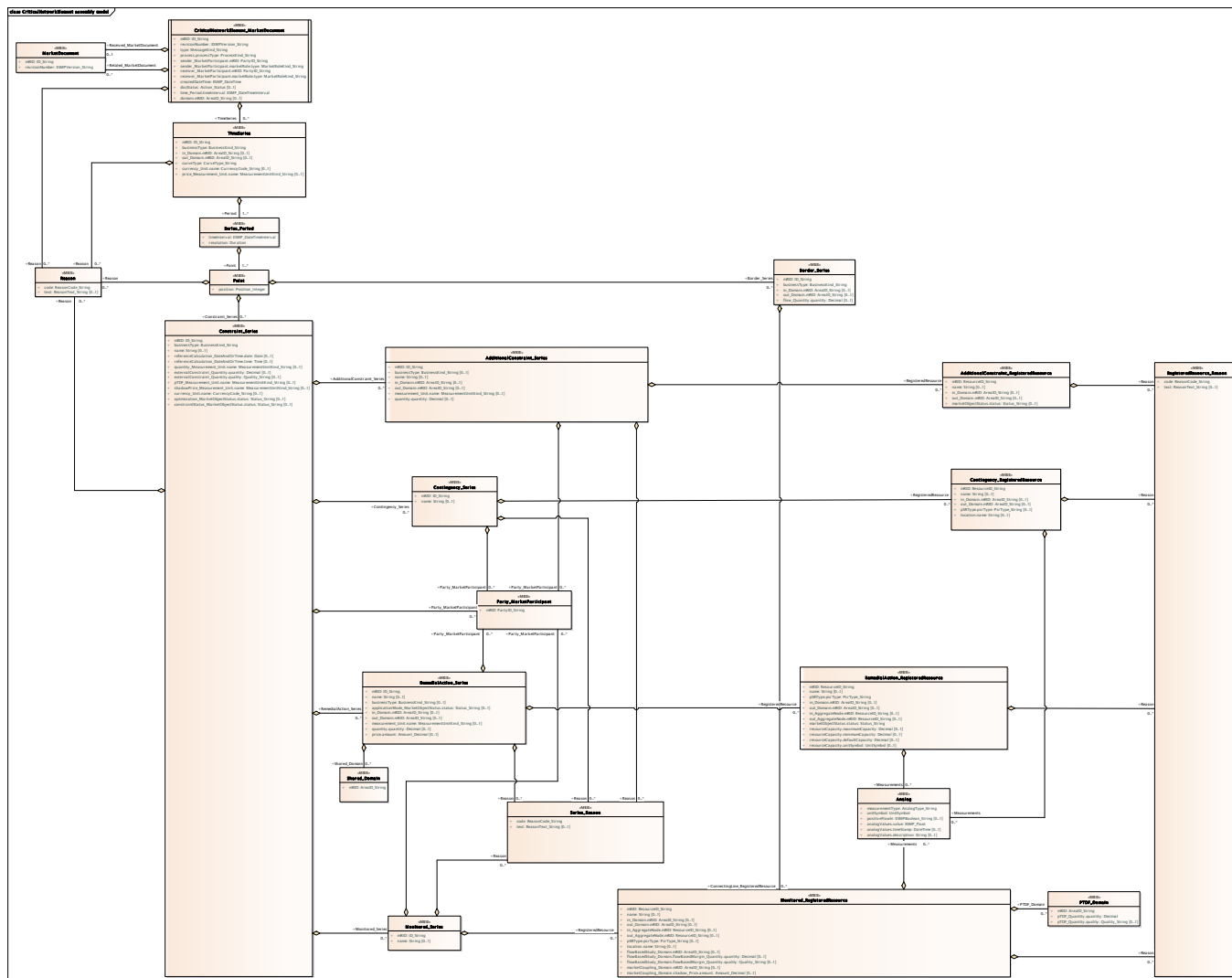
166

167

168 **2.2 CriticalNetworkElement assembly model**

169 **Overview of the model**

170 Figure 2 shows the model.



171

172

Figure 2 - CriticalNetworkElement assembly model

173

174 **IsBasedOn relationships from the European style market profile**

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

177

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 |
| Border_Series | TC57CIM::IEC62325::MarketManagement::Series |
| Constraint_Series | TC57CIM::IEC62325::MarketManagement::Series |
| Contingency_RegisteredResource | TC57CIM::IEC62325::MarketCommon::RegisteredResource |
| Contingency_Series | TC57CIM::IEC62325::MarketManagement::Series |
| CriticalNetworkElement_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 |
| PTDF_Domain | TC57CIM::IEC62325::MarketManagement::Domain |
| Reason | TC57CIM::IEC62325::MarketManagement::Reason |
| RegisteredResource_Reason | TC57CIM::IEC62325::MarketManagement::Reason |
| RemedialAction_RegisteredResource | TC57CIM::IEC62325::MarketCommon::RegisteredResource |
| RemedialAction_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 |

178

179

180 **Detailed CriticalNetworkElement assembly model**

181 **CriticalNetworkElement_MarketDocument root class**

182 This document provides the computed critical network elements to be used for capacity
183 allocation and publication. The critical network elements are the main limiting elements
184 identified after a coordinated network study.

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

187 Table 3 shows all attributes of CriticalNetworkElement_MarketDocument.

188 **Table 3 - Attributes of CriticalNetworkElement assembly**
189 **model::CriticalNetworkElement_MarketDocument**

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|--|
| 0 | [1..1] | mRID ID_String | The unique identification of the document being exchanged within a business process flow. |
| 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. |
| 12 | [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 critical 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. |
| 13 | [0..1] | domain.mRID AreaID_String | The unique identification of the domain. --- The identification of the domain that is covered in the critical network element document. It is in general the coordinated capacity determination area that is the subject of the schedule plan. |

190

191 Table 4 shows all association ends of CriticalNetworkElement_MarketDocument with other
192 classes.

193
194

**Table 4 - Association ends of CriticalNetworkElement assembly
model::CriticalNetworkElement_MarketDocument with other classes**

| Order | mult. | Class name / Role | Description |
|-------|--------|---|---|
| 10 | [0..1] | MarketDocument Received_MarketDocument | Association Based On: CriticalNetworkElement contextual model::MarketDocument.Received_MarketDocument[0..1] ----- CriticalNetworkElement contextual model::CriticalNetworkElement_MarketDocument.[] |
| 11 | [0..*] | MarketDocument Related_MarketDocument | The identification of an electronic document that is related to an electronic document header. Association Based On: CriticalNetworkElement contextual model::CriticalNetworkElement_MarketDocument.[] ----- CriticalNetworkElement contextual model::MarketDocument.Related_MarketDocument[0..*] |
| 14 | [0..*] | TimeSeries TimeSeries | The time series that is associated with an electronic document. Association Based On: CriticalNetworkElement contextual model::CriticalNetworkElement_MarketDocument.[] ----- CriticalNetworkElement contextual model::TimeSeries.TimeSeries[0..*] |
| 15 | [0..*] | Reason Reason | The Reason associated with the electronic document header providing different motivations for the creation of the document. Association Based On: CriticalNetworkElement contextual model::Reason.Reason[0..*] ----- CriticalNetworkElement contextual model::CriticalNetworkElement_MarketDocument.[] |

195

196 **AdditionalConstraint_RegisteredResource**

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

198 Table 5 shows all attributes of AdditionalConstraint_RegisteredResource.

199
200

**Table 5 - Attributes of CriticalNetworkElement assembly
model::AdditionalConstraint_RegisteredResource**

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|----------------------------------|---|
| 0 | [1..1] | mRID ResourceID_String | The unique identification of a resource. 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 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. |
| 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. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|--|--|
| 4 | [0..1] | marketObjectStatus.status Status_String | The status of the remedial action resource. It may be preventive or curative. 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 6 shows all association ends of AdditionalConstraint_RegisteredResource with other
203 classes.

204

205

**Table 6 - Association ends of CriticalNetworkElement 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: CriticalNetworkElement contextual model::AdditionalConstraint_RegisteredResource.[] ----- CriticalNetworkElement contextual model::RegisteredResource_Reason.Reason[0..*] |

206

207 AdditionalConstraint_Series

208 An additional constraint limiting capacity in the load flow study

209 Table 7 shows all attributes of AdditionalConstraint_Series.

210

211

**Table 7 - Attributes of CriticalNetworkElement assembly
model::AdditionalConstraint_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] | businessType BusinessKind_String | The identification of the nature of the time series. |
| 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 associated with a TimeSeries. |
| 5 | [0..1] | out_Domain.mRID AreaID_String | The unique identification of the domain. --- The domain associated with a TimeSeries. |
| 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 associated with the quantities in a TimeSeries. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---------------------------------|---|
| 7 | [0..1] | quantity.quantity Decimal | The quantity value. The association role provides the information about what is expressed. --- The quantity information associated to a TimeSeries. |

212

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

214

Table 8 - Association ends of CriticalNetworkElement assembly model::AdditionalConstraint_Series with other classes

215

| 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: CriticalNetworkElement contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CriticalNetworkElement contextual model::AdditionalConstraint_Series.[] |
| 8 | [0..*] | AdditionalConstraint_RegisteredResource RegisteredResource | The identification of a resource associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::AdditionalConstraint_RegisteredResource.RegisteredResource[0..*] ----- CriticalNetworkElement contextual model::AdditionalConstraint_Series.[] |
| 9 | [0..*] | Series_Reason Reason | The reason information associated with a TimeSeries providing motivation information. Association Based On: CriticalNetworkElement contextual model::Series_Reason.Reason[0..*] ----- CriticalNetworkElement contextual model::AdditionalConstraint_Series.[] |

216

217 Analog

218 Analog represents an analog Measurement.

219 Analog provides the analog measurements monitored for one specific
220 Monitored_RegisteredResource.

221 Table 9 shows all attributes of Analog.

222

Table 9 - Attributes of CriticalNetworkElement assembly model::Analog

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|--------------------------------------|--|
| 0 | [1..1] | measurementType AnalogType_String | Specifies the type of measurement. For example, this specifies if the measurement represents line flow, maximum line flow, reference line 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. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|------------------------------------|--|
| 3 | [1..1] | analogValues.value ESMP_Float | The value to supervise. --- Measurement to which this value is connected. |
| 4 | [0..1] | analogValues.timeStamp DateTime | The date and time to which the value refers to; it may be before or after the outage time (attribute position of class Point). --- Measurement to which this value is connected. |
| 5 | [0..1] | analogValues.description String | It provides information about when the measurement point is computed, i.e. before the outage, after the outage, after curative action, etc. --- Measurement to which this value is connected. |

223

224 **Border_Series**

225 This Series defines the specific maximum flow studied by the load flow calculation. It can either
226 be a maximum bilateral flow on a border, or a maximum/minimum Net Position between two
227 zones.

228 Table 10 shows all attributes of Border_Series.

229 **Table 10 - Attributes of CriticalNetworkElement assembly model::Border_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 | [1..1] | businessType BusinessKind_String | The identification of the nature of the time series. |
| 2 | [0..1] | in_Domain.mRID AreaID_String | The unique identification of the domain. --- The domain associated with a TimeSeries. |
| 3 | [0..1] | out_Domain.mRID AreaID_String | The unique identification of the domain. --- The domain associated with a TimeSeries. |
| 4 | [0..1] | flow_Quantity.quantity Decimal | The quantity value. The association role provides the information about what is expressed. --- The quantity information associated to a TimeSeries. |

230

231 Table 11 shows all association ends of Border_Series with other classes.

232 **Table 11 - Association ends of CriticalNetworkElement assembly model::Border_Series**
233 **with other classes**

| Order | mult. | Class name / Role | Description |
|-------|--------|---|---|
| 5 | [0..*] | Monitored_RegisteredResource ConnectingLine_RegisteredResource | The identification of a resource associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::Monitored_RegisteredResource.ConnectingLine_RegisteredResource[0..*] ----- CriticalNetworkElement contextual model::Border_Series.[] |

234

235 **Constraint_Series**

236 A set of constraint situations for one specific position which results from the critical network
237 elements determination process and which may have an impact on the market by inducing
238 congestions.

239 Table 12 shows all attributes of Constraint_Series.

240 **Table 12 - Attributes of CriticalNetworkElement assembly model::Constraint_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 | [1..1] | businessType BusinessKind_String | The identification of the nature of the time series. |
| 2 | [0..1] | name String | The name is any free human readable and possibly non unique text naming the object. |
| 3 | [0..1] | referenceCalculation_DateAndOrTime.date Date | The date as "YYYY-MM-DD", which conforms with ISO 8601. --- A date and/or time associated with a TimeSeries. |
| 4 | [0..1] | referenceCalculation_DateAndOrTime.time Time | The time as "hh:mm:ss.sssZ", which conforms with ISO 8601. --- A date and/or time associated with a TimeSeries. |
| 5 | [0..1] | quantity_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. |
| 6 | [0..1] | externalConstraint_Quantity.quantity Decimal | The quantity value associated to the business type of the Constraint_TimeSeries. The association role provides the information about what is expressed. --- The quantity information associated to a TimeSeries. |
| 7 | [0..1] | externalConstraint_Quantity.quality Quality_String | The description of the quality of the quantity. --- The quantity information associated to a TimeSeries. |
| 8 | [0..1] | pTDF_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. |
| 9 | [0..1] | shadowPrice_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. |
| 10 | [0..1] | currency_Unit.name CurrencyCode_String | The identification of the formal code for a currency (ISO 4217). --- The currency associated with a TimeSeries. |
| 12 | [0..1] | optimization_MarketObjectStatus.status Status_String | The status of the remedial action resource. It may be preventive or curative. The coded condition or position of an object with regard to its standing. --- The status of an object associated with a TimeSeries. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|--|
| 13 | [0..1] | constraintStatus_MarketObjectStatus.status Status_String | The coded condition or position of an object with regard to its standing. --- The status of an object associated with a TimeSeries. |

241

242 Table 13 shows all association ends of Constraint_Series with other classes.

243 **Table 13 - Association ends of CriticalNetworkElement assembly**
244 **model::Constraint_Series with other classes**

| Order | mult. | Class name / Role | Description |
|-------|--------|--|---|
| 11 | [0..*] | Party_MarketParticipant Party_MarketParticipant | The identification of a market participant associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::Constraint_Series.[] ----- CriticalNetworkElement contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] |
| 14 | [0..*] | AdditionalConstraint_Series AdditionalConstraint_Series | Association Based On: CriticalNetworkElement contextual model::AdditionalConstraint_Series.AdditionalConstraint_Series[0..*] ----- CriticalNetworkElement contextual model::Constraint_Series.[] |
| 15 | [0..*] | Contingency_Series Contingency_Series | Association Based On: CriticalNetworkElement contextual model::Constraint_Series.[] ----- CriticalNetworkElement contextual model::Contingency_Series.Contingency_Series[0..*] |
| 16 | [0..*] | Monitored_Series Monitored_Series | Association Based On: CriticalNetworkElement contextual model::Monitored_Series.Monitored_Series[0..*] ----- CriticalNetworkElement contextual model::Constraint_Series.[] |
| 17 | [0..*] | RemedialAction_Series RemedialAction_Series | Association Based On: CriticalNetworkElement contextual model::RemedialAction_Series.RemedialAction_Series[0..*] ----- CriticalNetworkElement contextual model::Constraint_Series.[] |
| 18 | [0..*] | Reason Reason | The reason information associated with a TimeSeries providing motivation information. Association Based On: CriticalNetworkElement contextual model::Constraint_Series.[] ----- CriticalNetworkElement contextual model::Reason.Reason[0..*] |

245

246 **Contingency_RegisteredResource**

247 This is one of the network elements which are in outage for the studied constraint situation
248 defined by the Constraint_Series.

249 Table 14 shows all attributes of Contingency_RegisteredResource.

250
251

Table 14 - Attributes of CriticalNetworkElement assembly model::Contingency_RegisteredResource

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|-----------------------------------|---|
| 0 | [1..1] | mRID ResourceID_String | This is one of the network elements which are in outage for the studied constraint situation defined by the Constraint_Time Series. 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 control 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 control area where an extremity of the resource is located. This is used to provide orientation information. |
| 4 | [0..1] | pSRType.psrType PsrType_String | The coded type of a power system resource. --- The identification of the type of resource associated with this RegisteredResource. |
| 5 | [0..1] | location.name String | The name is any free human readable and possibly non unique text naming the object. --- Location of this power system resource. |

252

253 Table 15 shows all association ends of Contingency_RegisteredResource with other classes.

254
255

Table 15 - Association ends of CriticalNetworkElement assembly model::Contingency_RegisteredResource with other classes

| Order | mult. | Class name / Role | Description |
|-------|--------|-------------------------------------|--|
| 6 | [0..*] | Analog Measurements | The power system resource that contains the measurement. Association Based On: CriticalNetworkElement contextual model::Analog.Measurements[0..*] ----- CriticalNetworkElement contextual model::Contingency_RegisteredResource.[] |
| 7 | [0..*] | RegisteredResource_Reason Reason | The reason information associated with a RegisteredResource providing motivation information. Association Based On: CriticalNetworkElement contextual model::RegisteredResource_Reason.Reason[0..*] ----- CriticalNetworkElement contextual model::Contingency_RegisteredResource.[] |

256

257 Contingency_Series

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

260 Table 16 shows all attributes of Contingency_Series.

261 **Table 16 - Attributes of CriticalNetworkElement assembly model::Contingency_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. |

262

263 Table 17 shows all association ends of Contingency_Series with other classes.

264 **Table 17 - Association ends of CriticalNetworkElement assembly**
265 **model::Contingency_Series with other 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: CriticalNetworkElement contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CriticalNetworkElement contextual model::Contingency_Series.[] |
| 3 | [0..*] | Contingency_RegisteredResource RegisteredResource | The identification of a resource associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::Contingency_RegisteredResource.RegisteredResource[0..*] ----- CriticalNetworkElement contextual model::Contingency_Series.[] |
| 4 | [0..*] | Series_Reason Reason | The reason information associated with a TimeSeries providing motivation information. Association Based On: CriticalNetworkElement contextual model::Series_Reason.Reason[0..*] ----- CriticalNetworkElement contextual model::Contingency_Series.[] |

266

267 **MarketDocument**

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

270 Table 18 shows all attributes of MarketDocument.

271 **Table 18 - Attributes of CriticalNetworkElement assembly model::MarketDocument**

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|--------------------------------------|---|
| 0 | [1..1] | mRID ID_String | The unique identification of the document being exchanged within a business process flow. In the ESMP context, the "model authority" is defined as a party (originator of the exchange) that provides an identification in the context of a business exchange such as document 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 | [1..1] | revisionNumber ESMPVersion_String | The identification of the version that distinguishes one evolution of a document from another. |

272

273 **Monitored_RegisteredResource**

274 This is the critical network element of the power network in the constraint situation described
275 by the Constraint_Series. Analog measurements are monitored for this resource to identify the
276 impact of this critical network element on the market.

277 Table 19 shows all attributes of Monitored_RegisteredResource.

278 **Table 19 - Attributes of CriticalNetworkElement assembly**
279 **model::Monitored_RegisteredResource**

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|----------------------------------|---|
| 0 | [1..1] | mRID ResourceID_String | This is the network element of the power network in the constraint situation described by the Constraint_TimeSeries. 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 control 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. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|--|
| 4 | [0..1] | in_AggregateNode.mRID ResourceID_String | <p>The unique identification of an AggregateNode.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>--- The identification of the aggregate node that is linked to the registered resource.</p> |
| 5 | [0..1] | out_AggregateNode.mRID ResourceID_String | <p>The unique identification of an AggregateNode.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>--- The identification of the aggregate node that is linked to the registered resource.</p> |
| 6 | [0..1] | pSRType.psrType PsrType_String | <p>The coded type of a power system resource.</p> <p>--- The identification of the type of resource associated with this RegisteredResource.</p> |
| 7 | [0..1] | location.name String | <p>The name is any free human readable and possibly non unique text naming the object.</p> <p>--- Location of this power system resource.</p> |
| 8 | [0..1] | flowBasedStudy_Domain.mRID AreaID_String | <p>The area used for running the flow based calculation.</p> <p>The unique identification of the domain.</p> <p>--- The identification of the flow based study area linked to the critical network element.</p> |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|--|---|
| 9 | [0..1] | flowBasedStudy_Domain.flowBasedMargin_Quantity.quantity Decimal | The quantity value of remaining available margin of the critical network element identified in Monitored_RegisteredResource.. The association role provides the information about what is expressed. --- The identification of the flow based study area linked to the critical network element. --- This is the associated RAM quantity of the critical network element for a flow based study domain. |
| 10 | [0..1] | flowBasedStudy_Domain.flowBasedMargin_Quantity.quality Quality_String | The description of the quality of the quantity. --- The identification of the flow based study area linked to the critical network element. --- This is the associated RAM quantity of the critical network element for a flow based study domain. |
| 11 | [0..1] | marketCoupling_Domain.mRID AreaID_String | The identification of the flow based market coupling area. The unique identification of the domain. --- The identification of the flow based market coupling domain impacted by the critical network element. |
| 12 | [0..1] | marketCoupling_Domain.shadow_Price.amount Amount_Decimal | A number of monetary units specified in a unit of currency. --- The identification of the flow based market coupling domain impacted by the critical network element. --- The impact of the critical network element on the variation of the social welfare of the market coupling domain. |

280

281 Table 20 shows all association ends of Monitored_RegisteredResource with other classes.

282

**Table 20 - Association ends of CriticalNetworkElement assembly
model::Monitored_RegisteredResource with other classes**

283

| Order | mult. | Class name / Role | Description |
|-------|--------|-------------------------------------|--|
| 13 | [0..*] | PTDF_Domain PTDF_Domain | The bidding zone impacted by the critical network element and for which a PTDF factor is calculated. Association Based On: CriticalNetworkElement contextual model::PTDF_Domain.PTDF_Domain[0..*] ----- CriticalNetworkElement contextual model::Monitored_RegisteredResource.[] |
| 14 | [0..*] | Analog Measurements | The monitored measurements for the critical network element. Association Based On: CriticalNetworkElement contextual model::Analog.Measurements[0..*] ----- CriticalNetworkElement contextual model::Monitored_RegisteredResource.[] |
| 15 | [0..*] | RegisteredResource_Reason Reason | The reason information associated with a RegisteredResource providing motivation information. Association Based On: CriticalNetworkElement contextual model::RegisteredResource_Reason.Reason[0..*] ----- CriticalNetworkElement contextual model::Monitored_RegisteredResource.[] |

284

285 **Monitored_Series**

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

288 Table 21 shows all attributes of Monitored_Series.

289 **Table 21 - Attributes of CriticalNetworkElement 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. |

290

291 Table 22 shows all association ends of Monitored_Series with other classes.

292 **Table 22 - Association ends of CriticalNetworkElement assembly
293 model::Monitored_Series with other 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: CriticalNetworkElement contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CriticalNetworkElement contextual model::Monitored_Series.[] |
| 3 | [0..*] | Monitored_RegisteredResource RegisteredResource | The identification of a resource associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::Monitored_RegisteredResource.RegisteredResource[0..*] ----- CriticalNetworkElement contextual model::Monitored_Series.[] |
| 4 | [0..*] | Series_Reason Reason | The reason information associated with a TimeSeries providing motivation information. Association Based On: CriticalNetworkElement contextual model::Monitored_Series.[] ----- CriticalNetworkElement contextual model::Series_Reason.Reason[0..*] |

294

295 **Party_MarketParticipant**

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

298 Table 23 shows all attributes of Party_MarketParticipant.

299
300

Table 23 - Attributes of CriticalNetworkElement assembly model::Party_MarketParticipant

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

301

Point

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

303 Table 24 shows all attributes of Point.

Table 24 - Attributes of CriticalNetworkElement 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. |

306

307 Table 25 shows all association ends of Point with other classes.

Table 25 - Association ends of CriticalNetworkElement assembly model::Point with other classes

| Order | mult. | Class name / Role | Description |
|-------|--------|--|--|
| 1 | [0..*] | Border_Series Border_Series | TheTimeSeries provides additional information related to a Position within a given time interval. Association Based On: CriticalNetworkElement contextual model::Border_Series.Border_Series[0..*] ----- CriticalNetworkElement contextual model::Point.[] |
| 2 | [0..*] | Constraint_Series Constraint_Series | Association Based On: CriticalNetworkElement contextual model::Constraint_Series.Constraint_Series[0..*] ----- CriticalNetworkElement contextual model::Point.[] |
| 3 | [0..*] | Reason Reason | The Reason information associated with a Point providing motivation information. Association Based On: CriticalNetworkElement contextual model::Point.[] ----- CriticalNetworkElement contextual model::Reason.Reason[0..*] |

310

PTDF_Domain

311 The bidding zone impacted by the critical network element.

312 A domain covering a number of related objects, such as market balance area, grid area, borders etc.

313 Table 26 shows all attributes of PTDF_Domain.

316 **Table 26 - Attributes of CriticalNetworkElement assembly model::PTDF_Domain**

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|--|
| 0 | [1..1] | mRID AreaID_String | The bidding zone impacted by the critical network element. The unique identification of the domain. |
| 1 | [1..1] | pTDF_Quantity.quantity Decimal | The PTDF factor value associated to the bidding zone for the critical network element. The association role provides the information about what is expressed. --- The PTDF factor value associated to the bidding zone for the critical network element. |
| 2 | [0..1] | pTDF_Quantity.quality Quality_String | The description of the quality of the quantity. --- The PTDF factor value associated to the bidding zone for the critical network element. |

317

318 **Reason**

319 The motivation of an act.

320 Table 27 shows all attributes of Reason.

321 **Table 27 - Attributes of CriticalNetworkElement 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. |

322

323 **RegisteredResource_Reason**

324 The reason information associated with a RegisteredResource providing motivation information.

325 Table 28 shows all attributes of RegisteredResource_Reason.

326 **Table 28 - Attributes of CriticalNetworkElement 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. |

328

329 **RemedialAction_RegisteredResource**

330 This is one of the network element on which remedial action are carried out to improve the
331 constraint situation. Those elements are used to remedy to critical constraints induced by the
332 constraint situation.

333 The type of the remedial action is also provided: generation, load and topology.

334 Table 29 shows all attributes of RemedialAction_RegisteredResource.

335
336

**Table 29 - Attributes of CriticalNetworkElement assembly
model::RemedialAction_RegisteredResource**

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|---|
| 0 | [1..1] | mRID ResourceID_String | This is one of the network element on which remedial action are carried out to improve the constraint situation. Those elements are used to remedy to critical constraints induced by the constraint situation. 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 | [1..1] | pSRType.psrType PsrType_String | The coded type of a power system resource. --- The identification of the type of resource associated with this RegisteredResource. |
| 3 | [0..1] | in_Domain.mRID AreaID_String | The unique identification of the domain. --- The control 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 control area where an extremity of the resource is located. This is used to provide orientation information. |
| 5 | [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. |
| 6 | [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. |
| 7 | [1..1] | marketObjectStatus.status Status_String | The status of the remedial action resource. It may be preventive or curative. The coded condition or position of an object with regard to its standing. --- The status of the registered resource, e.g. connected, disconnected, outage, ... |
| 8 | [0..1] | resourceCapacity.maximumCapacity Decimal | The maximum capacity. |
| 9 | [0..1] | resourceCapacity.minimumCapacity Decimal | The minimum capacity. |
| 10 | [0..1] | resourceCapacity.defaultCapacity Decimal | The default capacity. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|---|
| 11 | [0..1] | resourceCapacity.unitSymbol UnitSymbol | Unit selection for the capacity values. |

337

338 Table 30 shows all association ends of RemedialAction_RegisteredResource with other
339 classes.

340 **Table 30 - Association ends of CriticalNetworkElement assembly**
341 **model::RemedialAction_RegisteredResource with other classes**

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

342

343 RemedialAction_Series

344 A set of remedial actions provided to relieve a network constraint after applying the
345 contingencies provided in the Constraint_Series.

346 Table 31 shows all attributes of RemedialAction_Series.

347 **Table 31 - Attributes of CriticalNetworkElement assembly**
348 **model::RemedialAction_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. |
| 2 | [0..1] | businessType BusinessKind_String | The identification of the nature of the time series. |
| 3 | [0..1] | applicationMode_MarketObjectStatus.status Status_String | The status of the remedial action resource. It may be preventive or curative. The coded condition or position of an object with regard to its standing. --- The status of an object associated with a TimeSeries. |

| Order | mult. | Attribute name / Attribute type | Description |
|-------|--------|---|---|
| 5 | [0..1] | in_Domain.mRID AreaID_String | The unique identification of the domain. --- The domain associated with a TimeSeries. |
| 6 | [0..1] | out_Domain.mRID AreaID_String | The unique identification of the domain. --- The domain associated with a TimeSeries. |
| 7 | [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 quantities in a TimeSeries. |
| 8 | [0..1] | quantity.quantity Decimal | The quantity value. The association role provides the information about what is expressed. --- The quantity information associated to a TimeSeries. |
| 9 | [0..1] | price.amount Amount_Decimal | A number of monetary units specified in a unit of currency. --- The price information associated to a TimeSeries. |

349

350 Table 32 shows all association ends of RemedialAction_Series with other classes.

351 **Table 32 - Association ends of CriticalNetworkElement assembly**
352 **model::RemedialAction_Series with other classes**

| Order | mult. | Class name / Role | Description |
|-------|--------|---|---|
| 4 | [0..*] | Party_MarketParticipant Party_MarketParticipant | The identification of a market participant associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::Party_MarketParticipant.Party_MarketParticipant[0..*] ----- CriticalNetworkElement contextual model::RemedialAction_Series.[] |
| 10 | [0..*] | RemedialAction_RegisteredResource RegisteredResource | The identification of a resource associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::RemedialAction_Series.[] ----- CriticalNetworkElement contextual model::RemedialAction_RegisteredResource.RegisteredResource[0..*] |
| 11 | [0..*] | Shared_Domain Shared_Domain | The domain associated with a TimeSeries. Association Based On: CriticalNetworkElement contextual model::Shared_Domain.Shared_Domain[0..*] ----- CriticalNetworkElement contextual model::RemedialAction_Series.[] |
| 12 | [0..*] | Series_Reason Reason | The reason information associated with a TimeSeries providing motivation information. Association Based On: CriticalNetworkElement contextual model::Series_Reason.Reason[0..*] ----- CriticalNetworkElement contextual model::RemedialAction_Series.[] |

353

354 **Series_Period**

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

356 Table 33 shows all attributes of Series_Period.

357 **Table 33 - Attributes of CriticalNetworkElement 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. |

358

359 Table 34 shows all association ends of Series_Period with other classes.

360 **Table 34 - Association ends of CriticalNetworkElement assembly model::Series_Period**
361 **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: CriticalNetworkElement contextual model::Series_Period.[] ----- CriticalNetworkElement contextual model::Point.Point[1..*] |

362

363 **Series_Reason**

364 The reason information associated with a Series providing motivation information.

365 Table 35 shows all attributes of Series_Reason.

366 **Table 35 - Attributes of CriticalNetworkElement 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. |

367

368 **Shared_Domain**

369 The areas allowed to use the remedial action.

370 Table 36 shows all attributes of Shared_Domain.

371 **Table 36 - Attributes of CriticalNetworkElement assembly model::Shared_Domain**

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

372

373 **TimeSeries**

374 A set of time-ordered quantities being exchanged in relation to a product.

375 Table 37 shows all attributes of TimeSeries.

376 **Table 37 - Attributes of CriticalNetworkElement 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 | [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. |
| 3 | [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. |
| 4 | [1..1] | curveType CurveType_String | The identification of the coded representation of the type of curve being described. |
| 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. |

377

378 Table 38 shows all association ends of TimeSeries with other classes.

379 **Table 38 - Association ends of CriticalNetworkElement assembly model::TimeSeries**
380 **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: CriticalNetworkElement contextual model::TimeSeries.[] ----- CriticalNetworkElement contextual model::Series_Period.Period[1..*] |
| 8 | [0..*] | Reason Reason | At the TimeSeries level the reason code is used to enable processing of the reason text which, depending on market conditions, should be provided in intra day trading. In this context only one reason code has been defined (A48, modification reason). No other codes are permitted. Association Based On: CriticalNetworkElement contextual model::TimeSeries.[] ----- CriticalNetworkElement contextual model::Reason.Reason[0..*] |

381

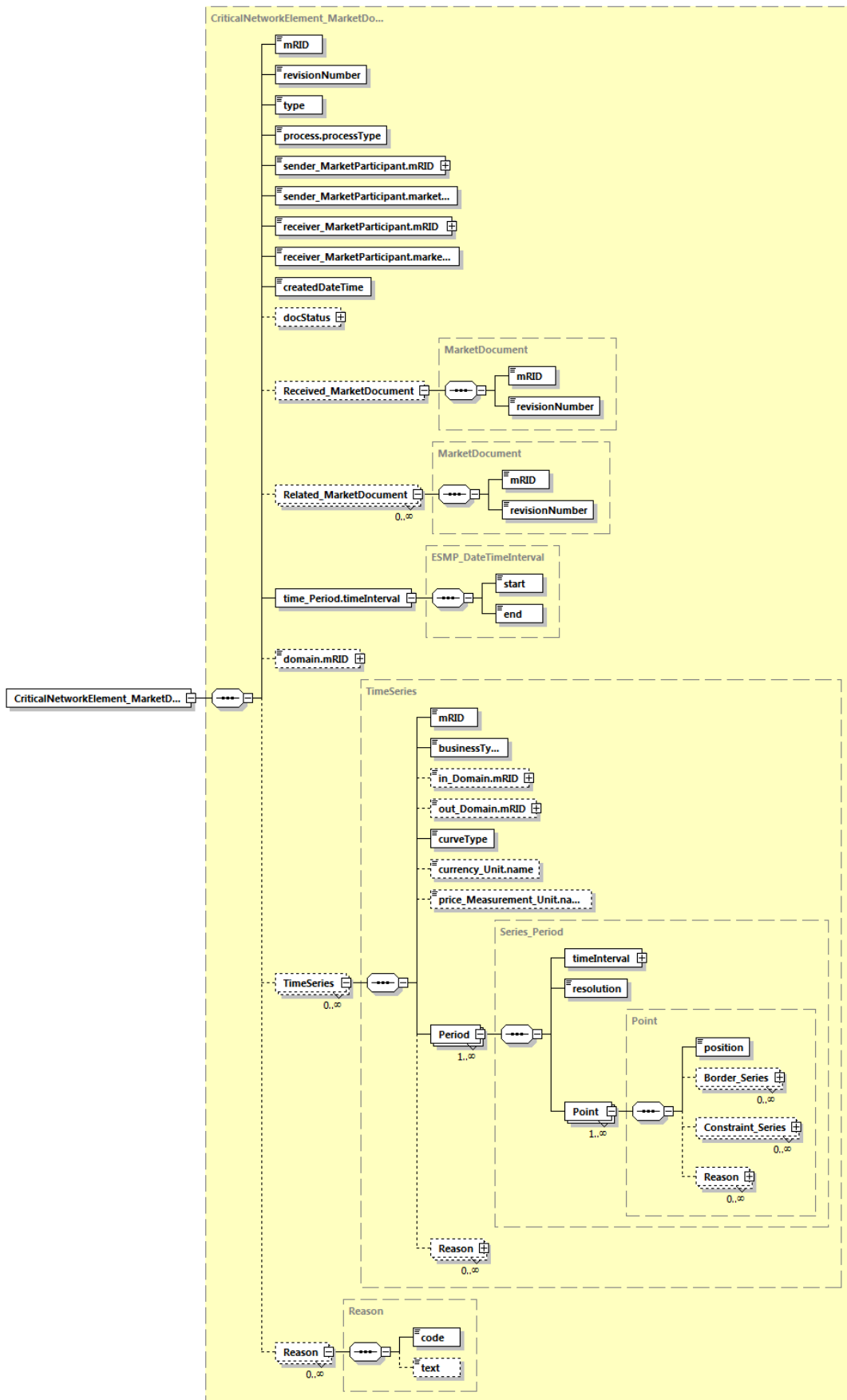
382

383 **Datatypes**

384 The list of datatypes used for the CriticalNetworkElement assembly model is as follows:

- 385 • Action_Status compound
- 386 • ESMP_DateTimeInterval compound
- 387 • Amount_Decimal datatype
- 388 • AnalogType_String datatype, codelist AnalogTypeList
- 389 • ArealID_String datatype, codelist CodingSchemeTypeList
- 390 • BusinessKind_String datatype, codelist BusinessTypeList
- 391 • CurrencyCode_String datatype, codelist CurrencyTypeList
- 392 • CurveType_String datatype, codelist CurveTypeList
- 393 • ESMP_DateTime datatype
- 394 • ESMP_Float datatype
- 395 • ESMPBoolean_String datatype, codelist IndicatorTypeList
- 396 • ESMPVersion_String datatype
- 397 • ID_String datatype
- 398 • MarketRoleKind_String datatype, codelist RoleTypeList
- 399 • MeasurementUnitKind_String datatype, codelist UnitOfMeasureTypeList
- 400 • MessageKind_String datatype, codelist MessageTypeList
- 401 • PartyID_String datatype, codelist CodingSchemeTypeList
- 402 • Position_Integer datatype
- 403 • ProcessKind_String datatype, codelist ProcessTypeList
- 404 • PsrType_String datatype, codelist AssetTypeList
- 405 • Quality_String datatype, codelist QualityTypeList
- 406 • ReasonCode_String datatype, codelist ReasonCodeTypeList
- 407 • ReasonText_String datatype
- 408 • ResourceID_String datatype, codelist CodingSchemeTypeList
- 409 • Status_String datatype, codelist StatusTypeList
- 410 • UnitSymbol datatype, codelist UnitSymbol
- 411 • YMDHM_DateTime datatype
- 412
- 413

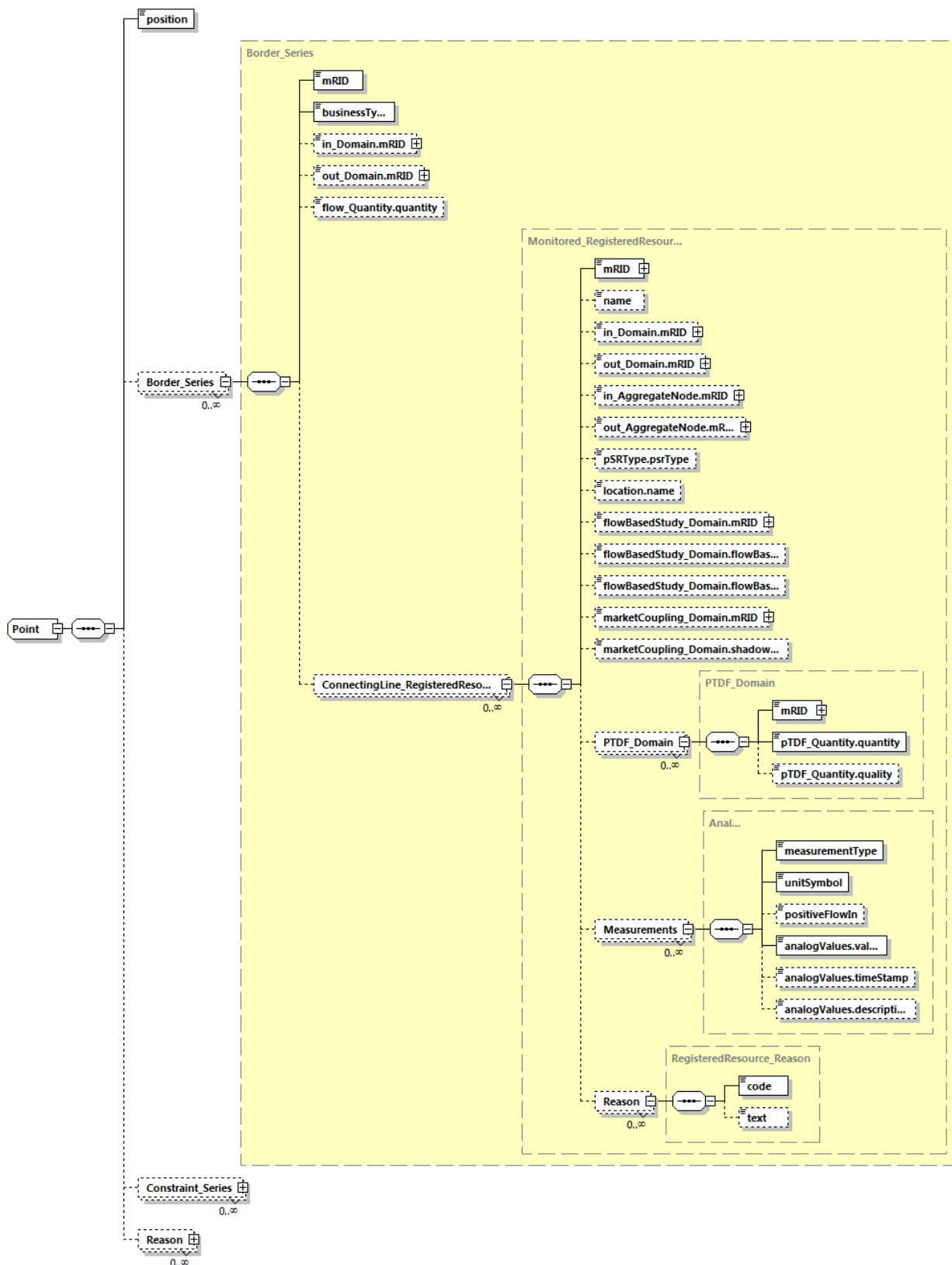
414 CriticalNetworkElement_MarketDocument schema structure



415
416

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Figure 3 - CriticalNetworkElement_MarketDocument schema structure 1/6

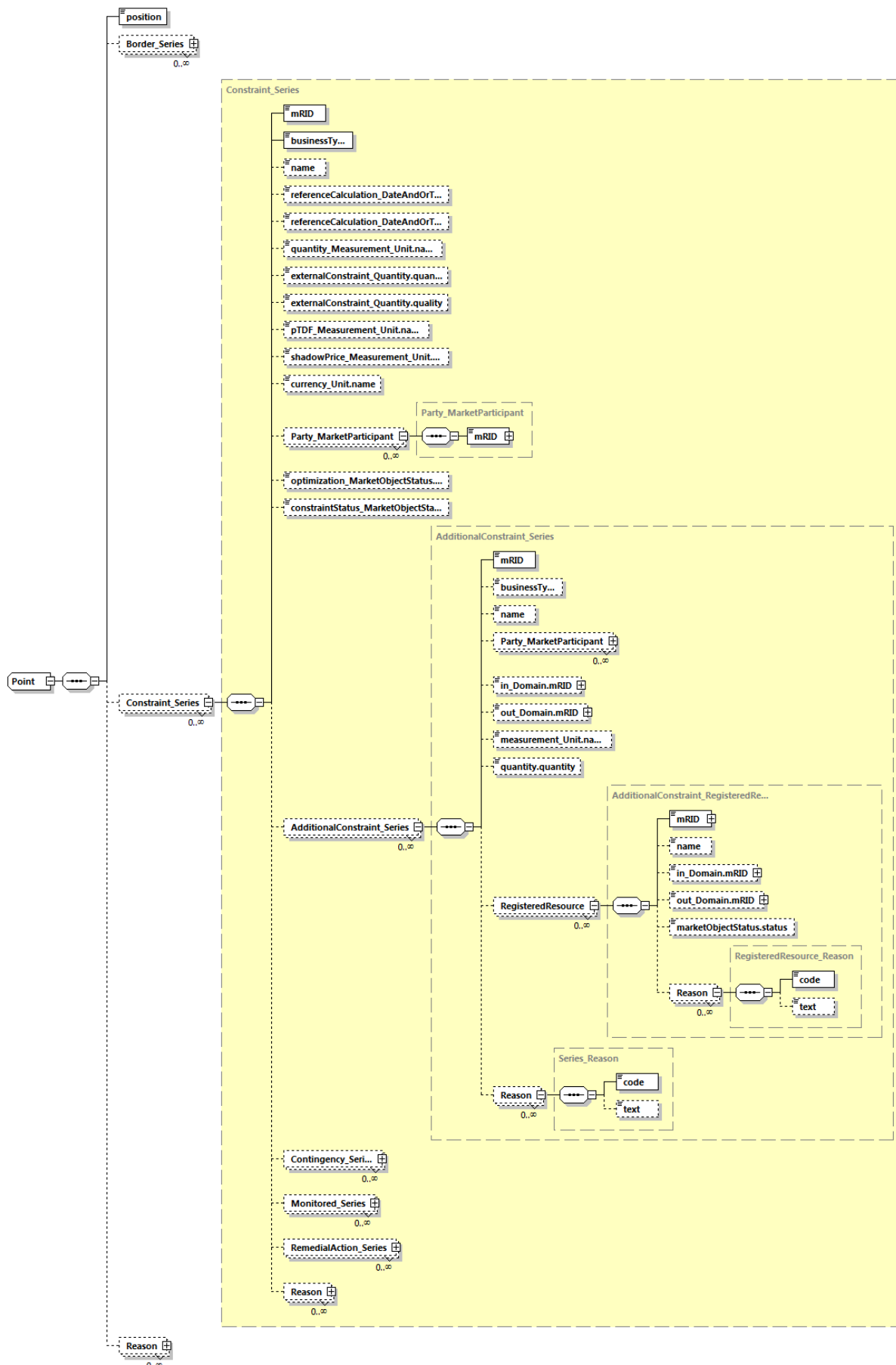


417
418

Figure 4 - CriticalNetworkElement_MarketDocument schema structure 2/6

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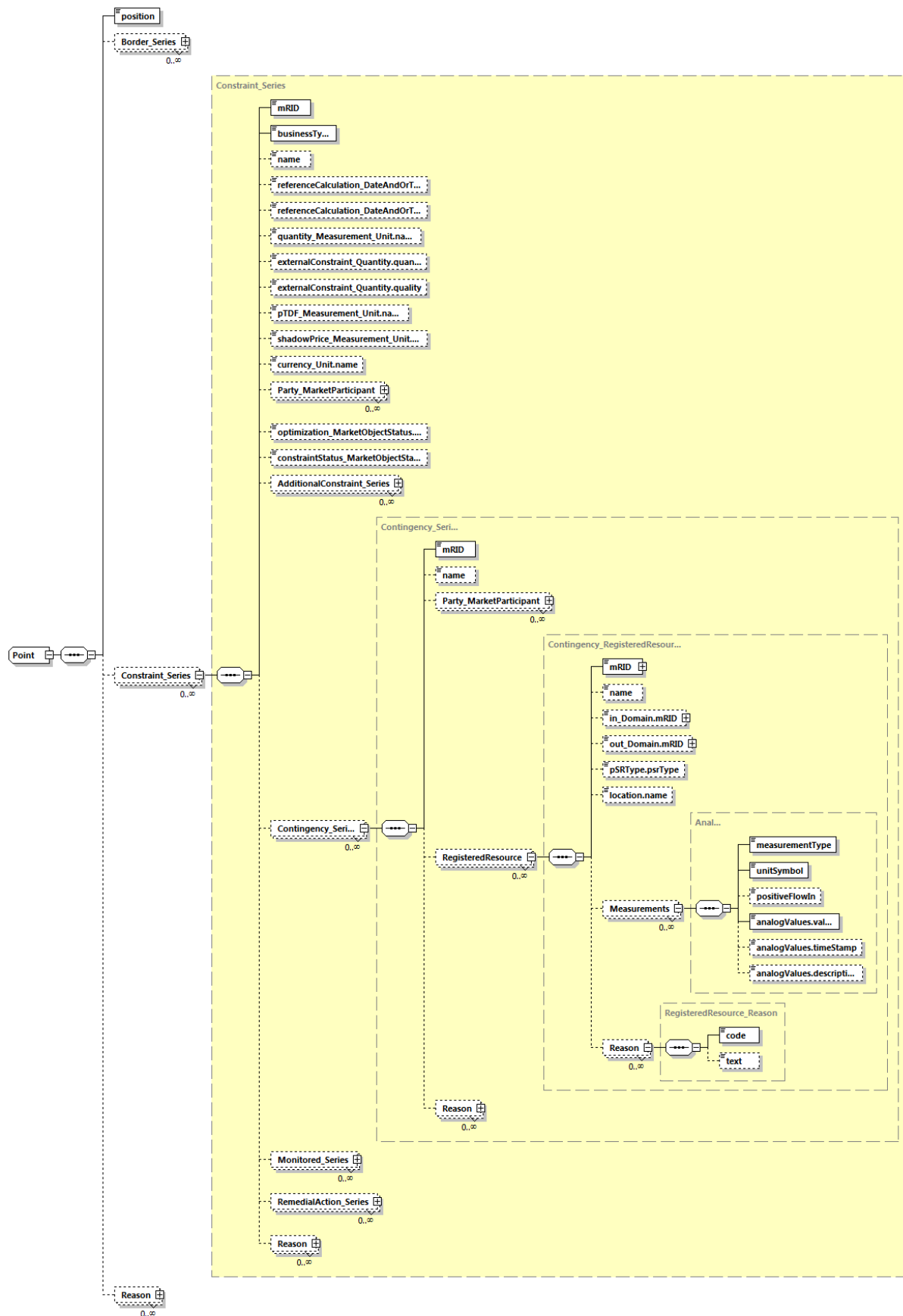


419
420

Figure 5 - CriticalNetworkElement_MarketDocument schema structure 3/6

Generated by XMLSpy

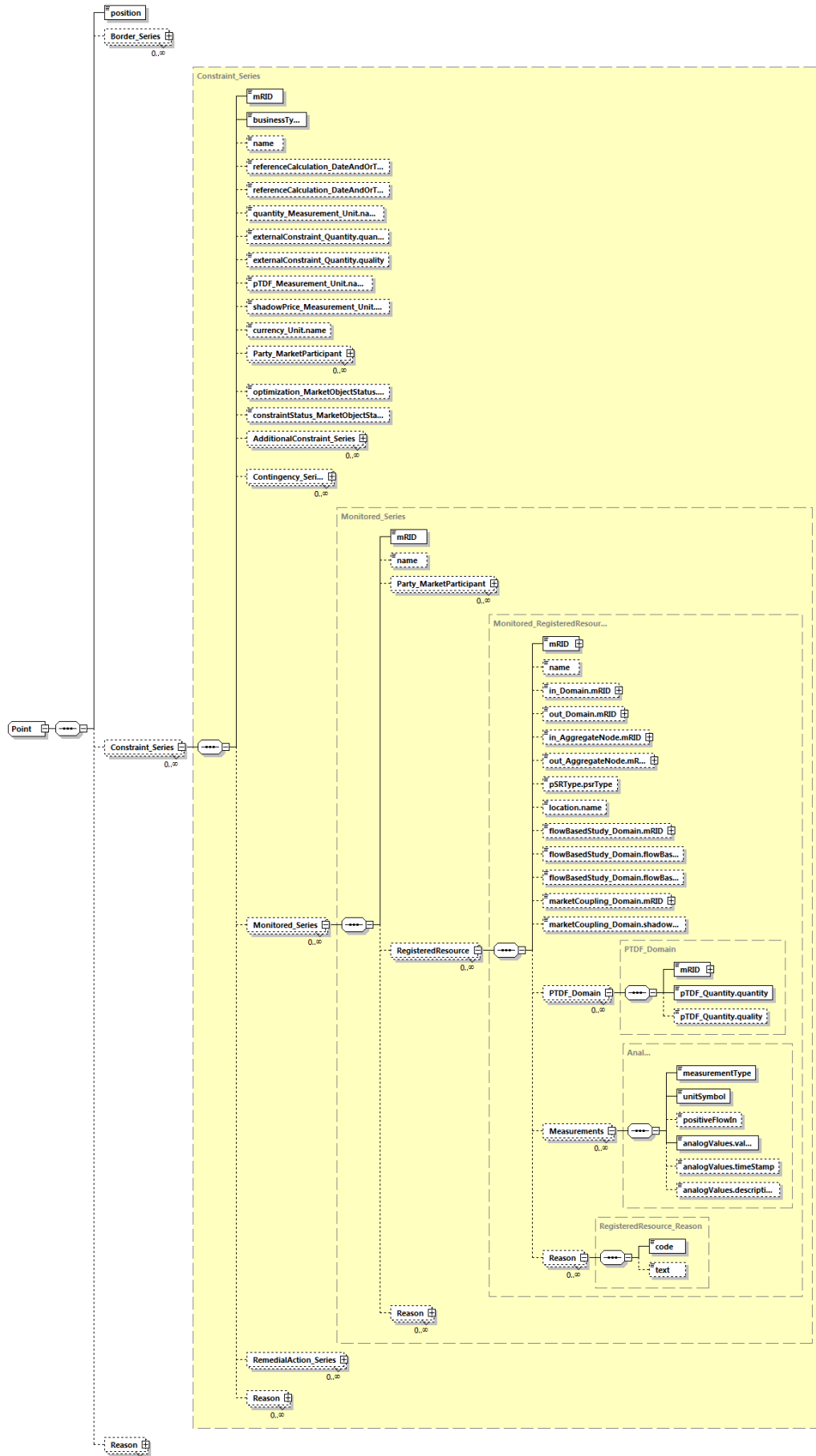
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421
422

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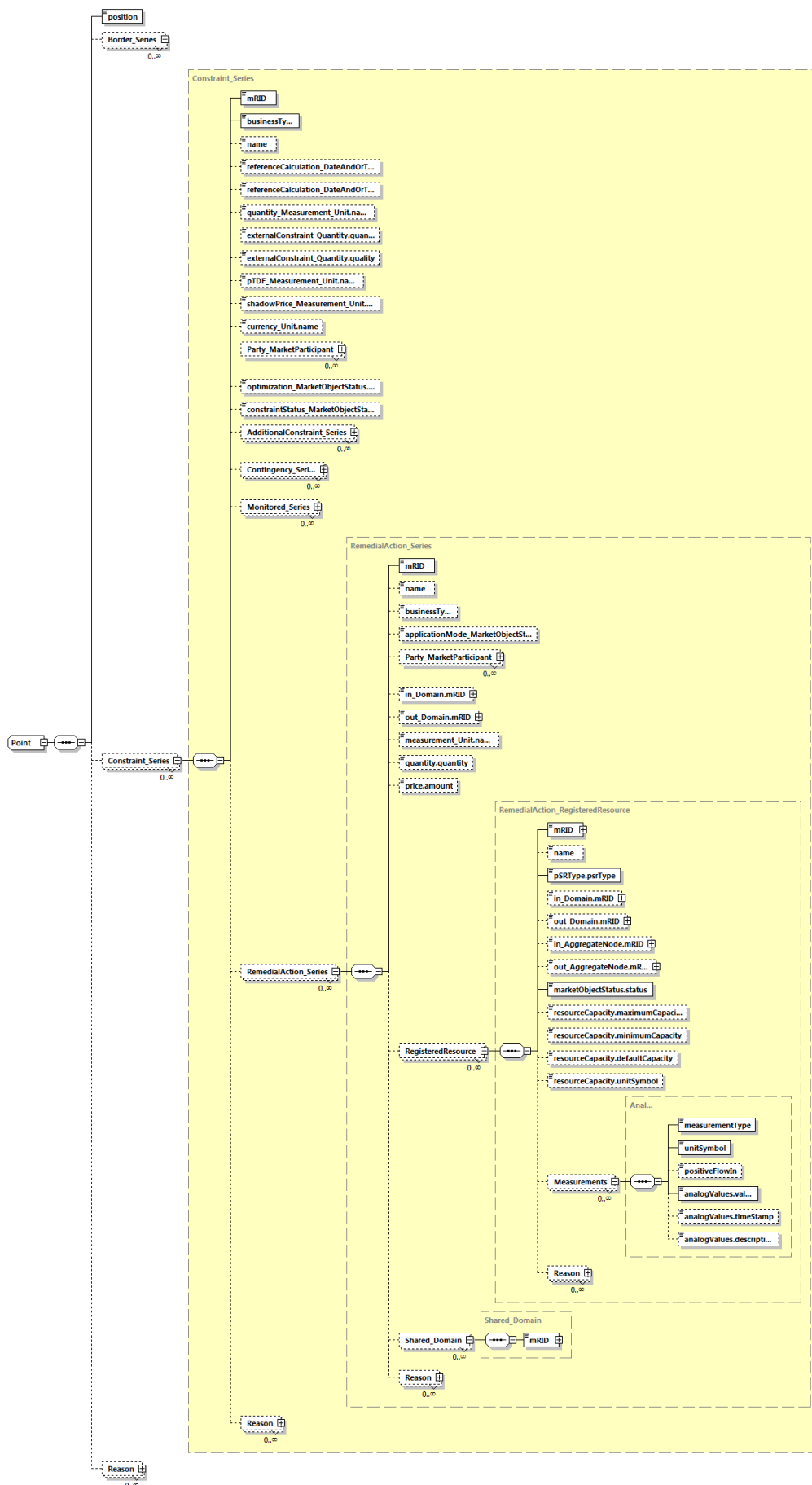
Figure 6 - CriticalNetworkElement_MarketDocument schema structure 4/6



423
424

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Figure 7 - CriticalNetworkElement_MarketDocument schema structure 5/6



425
426

Figure 8 - CriticalNetworkElement_MarketDocument schema structure 6/6

427 CriticalNetworkElement_MarketDocument XML schema

428 The XSD file to be used with this implementation guide is:

429 urn:iec62325.351:tc57wg16:451-n:cnedocument:2:5

430

```
431 <?xml version="1.0" encoding="utf-8"?>
```

```
432 <xs:schema xmlns:ecl="urn:entsoe.eu:wgedi:codelists"
```

```
433 xmlns="urn:iec62325.351:tc57wg16:451-n:cnedocument:2:5"
```

```
434 xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
```

```
435 xmlns:cimp="http://www.iec.ch/cimprofile"
```

```
436 xmlns:xs="http://www.w3.org/2001/XMLSchema"
```

```
437 targetNamespace="urn:iec62325.351:tc57wg16:451-n:cnedocument:2:5"
```

```
438 elementFormDefault="qualified" attributeFormDefault="unqualified">
```

```
439 <xs:import namespace="urn:entsoe.eu:wgedi:codelists" schemaLocation="urn-  
440 entsoe-eu-wgedi-codelists.xsd"/>
```

```
441 <xs:element name="CriticalNetworkElement_MarketDocument"
```

```
442 type="CriticalNetworkElement_MarketDocument"/>
```

```
443 <xs:simpleType name="ResourceID_String-base"
```

```
444 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
```

```
445 <xs:restriction base="xs:string">
```

```
446 <xs:maxLength value="60"/>
```

```
447 </xs:restriction>
```

```
448 </xs:simpleType>
```

```
449 <xs:complexType name="ResourceID_String"
```

```
450 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
```

```
451 <xs:simpleContent>
```

```
452 <xs:extension base="ResourceID_String-base">
```

```
453 <xs:attribute name="codingScheme"
```

```
454 type="ecl:CodingSchemeTypeList" use="required"/>
```

```
455 </xs:extension>
```

```
456 </xs:simpleContent>
```

```
457 </xs:complexType>
```

```
458 <xs:simpleType name="AreaID_String-base"
```

```
459 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
```

```
460 <xs:restriction base="xs:string">
```

```
461 <xs:maxLength value="18"/>
```

```
462 </xs:restriction>
```

```
463 </xs:simpleType>
```

```
464 <xs:complexType name="AreaID_String"
```

```
465 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
```

```
466 <xs:simpleContent>
```

```
467 <xs:extension base="AreaID_String-base">
```

```
468 <xs:attribute name="codingScheme"
```

```
469 type="ecl:CodingSchemeTypeList" use="required"/>
```

```
470 </xs:extension>
```

```
471 </xs:simpleContent>
```

```
472 </xs:complexType>
```

```
473 <xs:simpleType name="Status_String"
```

```
474 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
```

```
475 <xs:restriction base="ecl:StatusTypeList"/>
```

```
476 </xs:simpleType>
```

```
477 <xs:complexType name="AdditionalConstraint_RegisteredResource"
```

```
478 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
```

```
479 cim16#RegisteredResource">
```

```
480 <xs:sequence>
```

```
481 <xs:element name="mRID" type="ResourceID_String" minOccurs="1"
```

```
482 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
```

```
483 cim16#IdentifiedObject.mRID"/>
```

```
484         <xs:element name="name" type="xs:string" minOccurs="0"
485 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
486 cim16#IdentifiedObject.name"/>
487         <xs:element name="in_Domain.mRID" type="AreaID_String"
488 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
489 schema-cim16#IdentifiedObject.mRID"/>
490         <xs:element name="out_Domain.mRID" type="AreaID_String"
491 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
492 schema-cim16#IdentifiedObject.mRID"/>
493         <xs:element name="marketObjectStatus.status"
494 type="Status_String" minOccurs="0" maxOccurs="1"
495 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
496 cim16#MarketObjectStatus.status"/>
497         <xs:element name="Reason" type="RegisteredResource_Reason"
498 minOccurs="0" maxOccurs="unbounded"
499 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
500 cim16#RegisteredResource.Reason"/>
501     </xs:sequence>
502 </xs:complexType>
503 <xs:simpleType name="ID_String"
504 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
505     <xs:restriction base="xs:string">
506         <xs:maxLength value="60"/>
507     </xs:restriction>
508 </xs:simpleType>
509 <xs:simpleType name="BusinessKind_String"
510 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
511     <xs:restriction base="ecl:BusinessTypeList"/>
512 </xs:simpleType>
513 <xs:simpleType name="MeasurementUnitKind_String"
514 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
515     <xs:restriction base="ecl:UnitOfMeasureTypeList"/>
516 </xs:simpleType>
517 <xs:complexType name="AdditionalConstraint_Series"
518 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
519     <xs:sequence>
520         <xs:element name="mRID" type="ID_String" minOccurs="1"
521 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
522 cim16#IdentifiedObject.mRID"/>
523         <xs:element name="businessType" type="BusinessKind_String"
524 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
525 schema-cim16#TimeSeries.businessType"/>
526         <xs:element name="name" type="xs:string" minOccurs="0"
527 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
528 cim16#IdentifiedObject.name"/>
529         <xs:element name="Party_MarketParticipant"
530 type="Party_MarketParticipant" minOccurs="0" maxOccurs="unbounded"
531 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
532 cim16#Series.Party_MarketParticipant"/>
533         <xs:element name="in_Domain.mRID" type="AreaID_String"
534 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
535 schema-cim16#IdentifiedObject.mRID"/>
536         <xs:element name="out_Domain.mRID" type="AreaID_String"
537 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
538 schema-cim16#IdentifiedObject.mRID"/>
539         <xs:element name="measurement_Unit.name"
540 type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"
541 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
```



```

542         <xs:element name="quantity.quantity" type="xs:decimal"
543 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
544 schema-cim16#Quantity.quantity"/>
545         <xs:element name="RegisteredResource"
546 type="AdditionalConstraint_RegisteredResource" minOccurs="0" maxOccurs="unbounded"
547 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
548 cim16#Series.RegisteredResource"/>
549         <xs:element name="Reason" type="Series_Reason" minOccurs="0"
550 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
551 cim16#Series.Reason"/>
552     </xs:sequence>
553 </xs:complexType>
554 <xs:simpleType name="AnalogType_String"
555 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
556     <xs:restriction base="ecl:AnalogTypeList"/>
557 </xs:simpleType>
558 <xs:simpleType name="UnitSymbol"
559 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#UnitSymbol">
560     <xs:restriction base="ecl:UnitSymbol"/>
561 </xs:simpleType>
562 <xs:simpleType name="ESMPBoolean_String"
563 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
564     <xs:restriction base="ecl:IndicatorTypeList"/>
565 </xs:simpleType>
566 <xs:simpleType name="ESMP_Float"
567 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Float">
568     <xs:restriction base="xs:float">
569         <xs:pattern value="([0-9]*\.\?[0-9]*)"/>
570     </xs:restriction>
571 </xs:simpleType>
572 <xs:complexType name="Analog"
573 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Analog">
574     <xs:sequence>
575         <xs:element name="measurementType" type="AnalogType_String"
576 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
577 schema-cim16#Measurement.measurementType"/>
578         <xs:element name="unitSymbol" type="UnitSymbol" minOccurs="1"
579 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
580 cim16#Measurement.unitSymbol"/>
581         <xs:element name="positiveFlowIn" type="ESMPBoolean_String"
582 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
583 schema-cim16#Analog.positiveFlowIn"/>
584         <xs:element name="analogValues.value" type="ESMP_Float"
585 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
586 schema-cim16#AnalogValue.value"/>
587         <xs:element name="analogValues.timeStamp" type="xs:dateTime"
588 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
589 schema-cim16#MeasurementValue.timeStamp"/>
590         <xs:element name="analogValues.description" type="xs:string"
591 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
592 schema-cim16#IdentifiedObject.description"/>
593     </xs:sequence>
594 </xs:complexType>
595 <xs:complexType name="Border_Series"
596 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
597     <xs:sequence>
598         <xs:element name="mRID" type="ID_String" minOccurs="1"
599 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
600 cim16#IdentifiedObject.mRID"/>

```

```
601         <xs:element name="businessType" type="BusinessKind_String"
602 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
603 schema-cim16#TimeSeries.businessType"/>
604         <xs:element name="in_Domain.mRID" type="AreaID_String"
605 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
606 schema-cim16#IdentifiedObject.mRID"/>
607         <xs:element name="out_Domain.mRID" type="AreaID_String"
608 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
609 schema-cim16#IdentifiedObject.mRID"/>
610         <xs:element name="flow_Quantity.quantity" type="xs:decimal"
611 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
612 schema-cim16#Quantity.quantity"/>
613         <xs:element name="ConnectingLine_RegisteredResource"
614 type="Monitored_RegisteredResource" minOccurs="0" maxOccurs="unbounded"
615 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
616 cim16#Series.ConnectingLine_RegisteredResource"/>
617     </xs:sequence>
618 </xs:complexType>
619 <xs:simpleType name="Quality_String"
620 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
621     <xs:restriction base="ecl:QualityTypeList"/>
622 </xs:simpleType>
623 <xs:simpleType name="CurrencyCode_String"
624 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
625     <xs:restriction base="ecl:CurrencyTypeList"/>
626 </xs:simpleType>
627 <xs:complexType name="Constraint_Series"
628 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
629     <xs:sequence>
630         <xs:element name="mRID" type="ID_String" minOccurs="1"
631 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
632 cim16#IdentifiedObject.mRID"/>
633         <xs:element name="businessType" type="BusinessKind_String"
634 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
635 schema-cim16#TimeSeries.businessType"/>
636         <xs:element name="name" type="xs:string" minOccurs="0"
637 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
638 cim16#IdentifiedObject.name"/>
639         <xs:element name="referenceCalculation_DateAndOrTime.date"
640 type="xs:date" minOccurs="0" maxOccurs="1"
641 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
642 cim16#DateAndOrTime.date"/>
643         <xs:element name="referenceCalculation_DateAndOrTime.time"
644 type="xs:time" minOccurs="0" maxOccurs="1"
645 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
646 cim16#DateAndOrTime.time"/>
647         <xs:element name="quantity_Measurement_Unit.name"
648 type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"
649 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
650         <xs:element name="externalConstraint_Quantity.quantity"
651 type="xs:decimal" minOccurs="0" maxOccurs="1"
652 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
653 cim16#Quantity.quantity"/>
654         <xs:element name="externalConstraint_Quantity.quality"
655 type="Quality_String" minOccurs="0" maxOccurs="1"
656 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
657 cim16#Quantity.quality"/>
658         <xs:element name="pTDF_Measurement_Unit.name"
659 type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"
660 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
```

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661         <xs:element name="shadowPrice_Measurement_Unit.name"  
662 type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"  
663 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>  
664         <xs:element name="currency_Unit.name"  
665 type="CurrencyCode_String" minOccurs="0" maxOccurs="1"  
666 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>  
667         <xs:element name="Party_MarketParticipant"  
668 type="Party_MarketParticipant" minOccurs="0" maxOccurs="unbounded"  
669 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
670 cim16#Series.Party_MarketParticipant"/>  
671         <xs:element name="optimization_MarketObjectStatus.status"  
672 type="Status_String" minOccurs="0" maxOccurs="1"  
673 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
674 cim16#MarketObjectStatus.status"/>  
675         <xs:element name="constraintStatus_MarketObjectStatus.status"  
676 type="Status_String" minOccurs="0" maxOccurs="1"  
677 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
678 cim16#MarketObjectStatus.status"/>  
679         <xs:element name="AdditionalConstraint_Series"  
680 type="AdditionalConstraint_Series" minOccurs="0" maxOccurs="unbounded"  
681 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
682 cim16#Series.AdditionalConstraint_Series"/>  
683         <xs:element name="Contingency_Series"  
684 type="Contingency_Series" minOccurs="0" maxOccurs="unbounded"  
685 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
686 cim16#Series.Contingency_Series"/>  
687         <xs:element name="Monitored_Series" type="Monitored_Series"  
688 minOccurs="0" maxOccurs="unbounded"  
689 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
690 cim16#Series.Monitored_Series"/>  
691         <xs:element name="RemedialAction_Series"  
692 type="RemedialAction_Series" minOccurs="0" maxOccurs="unbounded"  
693 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
694 cim16#Series.RemedialAction_Series"/>  
695         <xs:element name="Reason" type="Reason" minOccurs="0"  
696 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
697 cim16#Series.Reason"/>  
698     </xs:sequence>  
699 </xs:complexType>  
700 <xs:simpleType name="PsrType_String"  
701 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">  
702     <xs:restriction base="ecl:AssetTypeList"/>  
703 </xs:simpleType>  
704 <xs:complexType name="Contingency_RegisteredResource"  
705 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
706 cim16#RegisteredResource">  
707     <xs:sequence>  
708         <xs:element name="mRID" type="ResourceID_String" minOccurs="1"  
709 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
710 cim16#IdentifiedObject.mRID"/>  
711         <xs:element name="name" type="xs:string" minOccurs="0"  
712 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
713 cim16#IdentifiedObject.name"/>  
714         <xs:element name="in_Domain.mRID" type="AreaID_String"  
715 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-  
716 schema-cim16#IdentifiedObject.mRID"/>  
717         <xs:element name="out_Domain.mRID" type="AreaID_String"  
718 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-  
719 schema-cim16#IdentifiedObject.mRID"/>
```

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720         <xs:element name="pSRType.psrType" type="PsrType_String"
721 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
722 schema-cim16#MktPSRType.psrType"/>
723         <xs:element name="location.name" type="xs:string"
724 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
725 schema-cim16#IdentifiedObject.name"/>
726         <xs:element name="Measurements" type="Analog" minOccurs="0"
727 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
728 cim16#RegisteredResource.Measurements"/>
729         <xs:element name="Reason" type="RegisteredResource_Reason"
730 minOccurs="0" maxOccurs="unbounded"
731 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
732 cim16#RegisteredResource.Reason"/>
733     </xs:sequence>
734 </xs:complexType>
735 <xs:complexType name="Contingency_Series"
736 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
737     <xs:sequence>
738         <xs:element name="mRID" type="ID_String" minOccurs="1"
739 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
740 cim16#IdentifiedObject.mRID"/>
741         <xs:element name="name" type="xs:string" minOccurs="0"
742 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
743 cim16#IdentifiedObject.name"/>
744         <xs:element name="Party_MarketParticipant"
745 type="Party_MarketParticipant" minOccurs="0" maxOccurs="unbounded"
746 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
747 cim16#Series.Party_MarketParticipant"/>
748         <xs:element name="RegisteredResource"
749 type="Contingency_RegisteredResource" minOccurs="0" maxOccurs="unbounded"
750 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
751 cim16#Series.RegisteredResource"/>
752         <xs:element name="Reason" type="Series_Reason" minOccurs="0"
753 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
754 cim16#Series.Reason"/>
755     </xs:sequence>
756 </xs:complexType>
757 <xs:simpleType name="ESMPVersion_String"
758 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
759     <xs:restriction base="xs:string">
760         <xs:pattern value="[1-9]([0-9]){0,2}"/>
761     </xs:restriction>
762 </xs:simpleType>
763 <xs:simpleType name="MessageKind_String"
764 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
765     <xs:restriction base="ecl:MessageTypeList"/>
766 </xs:simpleType>
767 <xs:simpleType name="ProcessKind_String"
768 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
769     <xs:restriction base="ecl:ProcessTypeList"/>
770 </xs:simpleType>
771 <xs:simpleType name="PartyID_String-base"
772 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
773     <xs:restriction base="xs:string">
774         <xs:maxLength value="16"/>
775     </xs:restriction>
776 </xs:simpleType>
777 <xs:complexType name="PartyID_String"
778 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
779     <xs:simpleContent>

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780         <xs:extension base="PartyID_String-base">
781             <xs:attribute name="codingScheme"
782 type="ecl:CodingSchemeTypeList" use="required"/>
783         </xs:extension>
784     </xs:simpleContent>
785 </xs:complexType>
786 <xs:simpleType name="MarketRoleKind_String"
787 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
788     <xs:restriction base="ecl:RoleTypeList"/>
789 </xs:simpleType>
790 <xs:simpleType name="ESMP_DateTime"
791 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
792     <xs:restriction base="xs:dateTime">
793         <xs:pattern value="((([0-9]{4})[\-](0[13578]|1[02]))[\-](0[1-
794 9]|[12][0-9]|3[01]))|(([0-9]{4})[\-]((0[469])|(11))[\-](0[1-9]|[12][0-
795 9]|30))T((([01][0-9]|2[0-3]):[0-5][0-9]:[0-5][0-
796 9])Z)|(((13579)[26][02468][048]|13579[01345789](0)[48]|13579[01345789][2468][0
797 48]|02468[048][02468][048]|02468[1235679](0)[48]|02468[1235679][2468][048]|[
798 0-9][0-9][13579][26])[\-](02)[\-](0[1-9]|1[0-9]|2[0-9])T((([01][0-9]|2[0-3]):[0-
799 5][0-9]:[0-5][0-
800 9])Z)|(((13579)[26][02468][1235679]|13579[01345789](0)[01235679]|13579[0134578
801 9][2468][1235679]|02468[048][02468][1235679]|02468[1235679](0)[01235679]|0246
802 8[1235679][2468][1235679]|0-9[0-9][13579][01345789])[\-](02)[\-](0[1-9]|1[0-
803 9]|2[0-8])T((([01][0-9]|2[0-3]):[0-5][0-9]:[0-5][0-9])Z)"/>
804     </xs:restriction>
805 </xs:simpleType>
806 <xs:complexType name="Action_Status"
807 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Status">
808     <xs:sequence>
809         <xs:element name="value" type="Status_String" minOccurs="1"
810 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
811 cim16#Status.value"/>
812     </xs:sequence>
813 </xs:complexType>
814 <xs:simpleType name="YMDHM_DateTime"
815 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
816     <xs:restriction base="xs:string">
817         <xs:pattern value="((([0-9]{4})[\-](0[13578]|1[02]))[\-](0[1-
818 9]|[12][0-9]|3[01]))|(([0-9]{4})[\-]((0[469])|(11))[\-](0[1-9]|[12][0-
819 9]|30))T((([01][0-9]|2[0-3]):[0-5][0-
820 9])Z)|(((13579)[26][02468][048]|13579[01345789](0)[48]|13579[01345789][2468][0
821 48]|02468[048][02468][048]|02468[1235679](0)[48]|02468[1235679][2468][048]|[
822 0-9][0-9][13579][26])[\-](02)[\-](0[1-9]|1[0-9]|2[0-9])T((([01][0-9]|2[0-3]):[0-
823 5][0-
824 9])Z)|(((13579)[26][02468][1235679]|13579[01345789](0)[01235679]|13579[0134578
825 9][2468][1235679]|02468[048][02468][1235679]|02468[1235679](0)[01235679]|0246
826 8[1235679][2468][1235679]|0-9[0-9][13579][01345789])[\-](02)[\-](0[1-9]|1[0-
827 9]|2[0-8])T((([01][0-9]|2[0-3]):[0-5][0-9])Z)"/>
828     </xs:restriction>
829 </xs:simpleType>
830 <xs:complexType name="ESMP_DateTimeInterval"
831 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTimeInterval">
832     <xs:sequence>
833         <xs:element name="start" type="YMDHM_DateTime" minOccurs="1"
834 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
835 cim16#DateTimeInterval.start"/>
836         <xs:element name="end" type="YMDHM_DateTime" minOccurs="1"
837 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
838 cim16#DateTimeInterval.end"/>
839     </xs:sequence>

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840         </xs:complexType>
841         <xs:complexType name="CriticalNetworkElement_MarketDocument"
842 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketDocument">
843             <xs:sequence>
844                 <xs:element name="mRID" type="ID_String" minOccurs="1"
845 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
846 cim16#IdentifiedObject.mRID"/>
847                 <xs:element name="revisionNumber" type="ESMPVersion_String"
848 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
849 schema-cim16#Document.revisionNumber"/>
850                 <xs:element name="type" type="MessageKind_String"
851 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
852 schema-cim16#Document.type"/>
853                 <xs:element name="process.processType"
854 type="ProcessKind_String" minOccurs="1" maxOccurs="1"
855 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
856 cim16#Process.processType"/>
857                 <xs:element name="sender_MarketParticipant.mRID"
858 type="PartyID_String" minOccurs="1" maxOccurs="1"
859 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
860 cim16#IdentifiedObject.mRID"/>
861                 <xs:element name="sender_MarketParticipant.marketRole.type"
862 type="MarketRoleKind_String" minOccurs="1" maxOccurs="1"
863 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
864                 <xs:element name="receiver_MarketParticipant.mRID"
865 type="PartyID_String" minOccurs="1" maxOccurs="1"
866 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
867 cim16#IdentifiedObject.mRID"/>
868                 <xs:element name="receiver_MarketParticipant.marketRole.type"
869 type="MarketRoleKind_String" minOccurs="1" maxOccurs="1"
870 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
871                 <xs:element name="createdDateTime" type="ESMP_DateTime"
872 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
873 schema-cim16#Document.createdDateTime"/>
874                 <xs:element name="docStatus" type="Action_Status"
875 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
876 schema-cim16#Document.docStatus"/>
877                 <xs:element name="Received_MarketDocument"
878 type="MarketDocument" minOccurs="0" maxOccurs="1"
879 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
880 cim16#MarketDocument.Received_MarketDocument"/>
881                 <xs:element name="Related_MarketDocument"
882 type="MarketDocument" minOccurs="0" maxOccurs="unbounded"
883 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
884 cim16#MarketDocument.Related_MarketDocument"/>
885                 <xs:element name="time_Period.timeInterval"
886 type="ESMP_DateTimeInterval" minOccurs="1" maxOccurs="1"
887 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
888 cim16#Period.timeInterval"/>
889                 <xs:element name="domain.mRID" type="AreaID_String"
890 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
891 schema-cim16#IdentifiedObject.mRID"/>
892                 <xs:element name="TimeSeries" type="TimeSeries" minOccurs="0"
893 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
894 cim16#MarketDocument.TimeSeries"/>
895                 <xs:element name="Reason" type="Reason" minOccurs="0"
896 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
897 cim16#MarketDocument.Reason"/>
898             </xs:sequence>
899         </xs:complexType>

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900     <xs:complexType name="MarketDocument"
901 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketDocument">
902     <xs:sequence>
903         <xs:element name="mRID" type="ID_String" minOccurs="1"
904 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
905 cim16#IdentifiedObject.mRID"/>
906         <xs:element name="revisionNumber" type="ESMPVersion_String"
907 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
908 schema-cim16#Document.revisionNumber"/>
909     </xs:sequence>
910 </xs:complexType>
911 <xs:simpleType name="Amount_Decimal"
912 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Decimal">
913     <xs:restriction base="xs:decimal">
914         <xs:totalDigits value="17"/>
915     </xs:restriction>
916 </xs:simpleType>
917 <xs:complexType name="Monitored_RegisteredResource"
918 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
919 cim16#RegisteredResource">
920     <xs:sequence>
921         <xs:element name="mRID" type="ResourceID_String" minOccurs="1"
922 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
923 cim16#IdentifiedObject.mRID"/>
924         <xs:element name="name" type="xs:string" minOccurs="0"
925 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
926 cim16#IdentifiedObject.name"/>
927         <xs:element name="in_Domain.mRID" type="AreaID_String"
928 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
929 schema-cim16#IdentifiedObject.mRID"/>
930         <xs:element name="out_Domain.mRID" type="AreaID_String"
931 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
932 schema-cim16#IdentifiedObject.mRID"/>
933         <xs:element name="in_AggregateNode.mRID"
934 type="ResourceID_String" minOccurs="0" maxOccurs="1"
935 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
936 cim16#IdentifiedObject.mRID"/>
937         <xs:element name="out_AggregateNode.mRID"
938 type="ResourceID_String" minOccurs="0" maxOccurs="1"
939 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
940 cim16#IdentifiedObject.mRID"/>
941         <xs:element name="psrType.psrType" type="PsrType_String"
942 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
943 schema-cim16#MktPSRType.psrType"/>
944         <xs:element name="location.name" type="xs:string"
945 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
946 schema-cim16#IdentifiedObject.name"/>
947         <xs:element name="flowBasedStudy_Domain.mRID"
948 type="AreaID_String" minOccurs="0" maxOccurs="1"
949 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
950 cim16#IdentifiedObject.mRID"/>
951         <xs:element
952 name="flowBasedStudy_Domain.flowBasedMargin_Quantity.quantity" type="xs:decimal"
953 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
954 schema-cim16#Quantity.quantity"/>
955         <xs:element
956 name="flowBasedStudy_Domain.flowBasedMargin_Quantity.quality"
957 type="Quality_String" minOccurs="0" maxOccurs="1"
958 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
959 cim16#Quantity.quality"/>

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960         <xs:element name="marketCoupling_Domain.mRID"  
961 type="AreaID_String" minOccurs="0" maxOccurs="1"  
962 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
963 cim16#IdentifiedObject.mRID"/>  
964         <xs:element name="marketCoupling_Domain.shadow_Price.amount"  
965 type="Amount_Decimal" minOccurs="0" maxOccurs="1"  
966 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Price.amount"/>  
967         <xs:element name="PTDF_Domain" type="PTDF_Domain"  
968 minOccurs="0" maxOccurs="unbounded"  
969 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
970 cim16#RegisteredResource.PTDF_Domain"/>  
971         <xs:element name="Measurements" type="Analog" minOccurs="0"  
972 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
973 cim16#RegisteredResource.Measurements"/>  
974         <xs:element name="Reason" type="RegisteredResource_Reason"  
975 minOccurs="0" maxOccurs="unbounded"  
976 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
977 cim16#RegisteredResource.Reason"/>  
978     </xs:sequence>  
979 </xs:complexType>  
980 <xs:complexType name="Monitored_Series"  
981 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">  
982     <xs:sequence>  
983         <xs:element name="mRID" type="ID_String" minOccurs="1"  
984 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
985 cim16#IdentifiedObject.mRID"/>  
986         <xs:element name="name" type="xs:string" minOccurs="0"  
987 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
988 cim16#IdentifiedObject.name"/>  
989         <xs:element name="Party_MarketParticipant"  
990 type="Party_MarketParticipant" minOccurs="0" maxOccurs="unbounded"  
991 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
992 cim16#Series.Party_MarketParticipant"/>  
993         <xs:element name="RegisteredResource"  
994 type="Monitored_RegisteredResource" minOccurs="0" maxOccurs="unbounded"  
995 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
996 cim16#Series.RegisteredResource"/>  
997         <xs:element name="Reason" type="Series_Reason" minOccurs="0"  
998 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
999 cim16#Series.Reason"/>  
1000     </xs:sequence>  
1001 </xs:complexType>  
1002 <xs:complexType name="Party_MarketParticipant"  
1003 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1004 cim16#MarketParticipant">  
1005     <xs:sequence>  
1006         <xs:element name="mRID" type="PartyID_String" minOccurs="1"  
1007 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1008 cim16#IdentifiedObject.mRID"/>  
1009     </xs:sequence>  
1010 </xs:complexType>  
1011 <xs:simpleType name="Position_Integer"  
1012 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Integer">  
1013     <xs:restriction base="xs:integer">  
1014         <xs:maxInclusive value="999999"/>  
1015         <xs:minInclusive value="1"/>  
1016     </xs:restriction>  
1017 </xs:simpleType>  
1018 <xs:complexType name="Point"  
1019 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Point">
```



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1020         <xs:sequence>
1021             <xs:element name="position" type="Position_Integer"
1022 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1023 schema-cim16#Point.position"/>
1024             <xs:element name="Border_Series" type="Border_Series"
1025 minOccurs="0" maxOccurs="unbounded"
1026 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1027 cim16#Point.Border_Series"/>
1028             <xs:element name="Constraint_Series" type="Constraint_Series"
1029 minOccurs="0" maxOccurs="unbounded"
1030 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1031 cim16#Point.Constraint_Series"/>
1032             <xs:element name="Reason" type="Reason" minOccurs="0"
1033 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1034 cim16#Point.Reason"/>
1035         </xs:sequence>
1036     </xs:complexType>
1037     <xs:complexType name="PTDF_Domain"
1038 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Domain">
1039         <xs:sequence>
1040             <xs:element name="mRID" type="AreaID_String" minOccurs="1"
1041 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1042 cim16#IdentifiedObject.mRID"/>
1043             <xs:element name="pTDF_Quantity.quantity" type="xs:decimal"
1044 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1045 schema-cim16#Quantity.quantity"/>
1046             <xs:element name="pTDF_Quantity.quality" type="Quality_String"
1047 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1048 schema-cim16#Quantity.quality"/>
1049         </xs:sequence>
1050     </xs:complexType>
1051     <xs:simpleType name="ReasonCode_String"
1052 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
1053         <xs:restriction base="ecl:ReasonCodeTypeList"/>
1054     </xs:simpleType>
1055     <xs:simpleType name="ReasonText_String"
1056 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
1057         <xs:restriction base="xs:string">
1058             <xs:maxLength value="512"/>
1059         </xs:restriction>
1060     </xs:simpleType>
1061     <xs:complexType name="Reason"
1062 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">
1063         <xs:sequence>
1064             <xs:element name="code" type="ReasonCode_String" minOccurs="1"
1065 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1066 cim16#Reason.code"/>
1067             <xs:element name="text" type="ReasonText_String" minOccurs="0"
1068 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1069 cim16#Reason.text"/>
1070         </xs:sequence>
1071     </xs:complexType>
1072     <xs:complexType name="RegisteredResource_Reason"
1073 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">
1074         <xs:sequence>
1075             <xs:element name="code" type="ReasonCode_String" minOccurs="1"
1076 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1077 cim16#Reason.code"/>

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1078         <xs:element name="text" type="ReasonText_String" minOccurs="0"
1079 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1080 cim16#Reason.text"/>
1081     </xs:sequence>
1082 </xs:complexType>
1083 <xs:complexType name="RemedialAction_RegisteredResource"
1084 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1085 cim16#RegisteredResource">
1086     <xs:sequence>
1087         <xs:element name="mRID" type="ResourceID_String" minOccurs="1"
1088 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1089 cim16#IdentifiedObject.mRID"/>
1090         <xs:element name="name" type="xs:string" minOccurs="0"
1091 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1092 cim16#IdentifiedObject.name"/>
1093         <xs:element name="pSRType.psrType" type="PsrType_String"
1094 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1095 schema-cim16#MktPSRType.psrType"/>
1096         <xs:element name="in_Domain.mRID" type="AreaID_String"
1097 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1098 schema-cim16#IdentifiedObject.mRID"/>
1099         <xs:element name="out_Domain.mRID" type="AreaID_String"
1100 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1101 schema-cim16#IdentifiedObject.mRID"/>
1102         <xs:element name="in_AggregateNode.mRID"
1103 type="ResourceID_String" minOccurs="0" maxOccurs="1"
1104 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1105 cim16#IdentifiedObject.mRID"/>
1106         <xs:element name="out_AggregateNode.mRID"
1107 type="ResourceID_String" minOccurs="0" maxOccurs="1"
1108 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1109 cim16#IdentifiedObject.mRID"/>
1110         <xs:element name="marketObjectStatus.status"
1111 type="Status_String" minOccurs="1" maxOccurs="1"
1112 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1113 cim16#MarketObjectStatus.status"/>
1114         <xs:element name="resourceCapacity.maximumCapacity"
1115 type="xs:decimal" minOccurs="0" maxOccurs="1"
1116 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1117 cim16#ResourceCapacity.maximumCapacity"/>
1118         <xs:element name="resourceCapacity.minimumCapacity"
1119 type="xs:decimal" minOccurs="0" maxOccurs="1"
1120 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1121 cim16#ResourceCapacity.minimumCapacity"/>
1122         <xs:element name="resourceCapacity.defaultCapacity"
1123 type="xs:decimal" minOccurs="0" maxOccurs="1"
1124 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1125 cim16#ResourceCapacity.defaultCapacity"/>
1126         <xs:element name="resourceCapacity.unitSymbol"
1127 type="UnitSymbol" minOccurs="0" maxOccurs="1"
1128 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1129 cim16#ResourceCapacity.unitSymbol"/>
1130         <xs:element name="Measurements" type="Analog" minOccurs="0"
1131 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1132 cim16#RegisteredResource.Measurements"/>
1133         <xs:element name="Reason" type="RegisteredResource_Reason"
1134 minOccurs="0" maxOccurs="unbounded"
1135 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1136 cim16#RegisteredResource.Reason"/>
1137     </xs:sequence>

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1138     </xs:complexType>
1139     <xs:complexType name="RemedialAction_Series"
1140 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
1141         <xs:sequence>
1142             <xs:element name="mRID" type="ID_String" minOccurs="1"
1143 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1144 cim16#IdentifiedObject.mRID"/>
1145             <xs:element name="name" type="xs:string" minOccurs="0"
1146 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1147 cim16#IdentifiedObject.name"/>
1148             <xs:element name="businessType" type="BusinessKind_String"
1149 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1150 schema-cim16#TimeSeries.businessType"/>
1151             <xs:element name="applicationMode_MarketObjectStatus.status"
1152 type="Status_String" minOccurs="0" maxOccurs="1"
1153 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1154 cim16#MarketObjectStatus.status"/>
1155             <xs:element name="Party_MarketParticipant"
1156 type="Party_MarketParticipant" minOccurs="0" maxOccurs="unbounded"
1157 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1158 cim16#Series.Party_MarketParticipant"/>
1159             <xs:element name="in_Domain.mRID" type="AreaID_String"
1160 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1161 schema-cim16#IdentifiedObject.mRID"/>
1162             <xs:element name="out_Domain.mRID" type="AreaID_String"
1163 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1164 schema-cim16#IdentifiedObject.mRID"/>
1165             <xs:element name="measurement_Unit.name"
1166 type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"
1167 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
1168             <xs:element name="quantity.quantity" type="xs:decimal"
1169 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1170 schema-cim16#Quantity.quantity"/>
1171             <xs:element name="price.amount" type="Amount_Decimal"
1172 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1173 schema-cim16#Price.amount"/>
1174             <xs:element name="RegisteredResource"
1175 type="RemedialAction_RegisteredResource" minOccurs="0" maxOccurs="unbounded"
1176 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1177 cim16#Series.RegisteredResource"/>
1178             <xs:element name="Shared_Domain" type="Shared_Domain"
1179 minOccurs="0" maxOccurs="unbounded"
1180 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1181 cim16#Series.Shared_Domain"/>
1182             <xs:element name="Reason" type="Series_Reason" minOccurs="0"
1183 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1184 cim16#Series.Reason"/>
1185         </xs:sequence>
1186     </xs:complexType>
1187     <xs:complexType name="Series_Period"
1188 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Period">
1189         <xs:sequence>
1190             <xs:element name="timeInterval" type="ESMP_DateTimeInterval"
1191 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1192 schema-cim16#Period.timeInterval"/>
1193             <xs:element name="resolution" type="xs:duration" minOccurs="1"
1194 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1195 cim16#Period.resolution"/>

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1196         <xs:element name="Point" type="Point" minOccurs="1"
1197 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1198 cim16#Period.Point"/>
1199     </xs:sequence>
1200 </xs:complexType>
1201 <xs:complexType name="Series_Reason"
1202 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">
1203     <xs:sequence>
1204         <xs:element name="code" type="ReasonCode_String" minOccurs="1"
1205 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1206 cim16#Reason.code"/>
1207         <xs:element name="text" type="ReasonText_String" minOccurs="0"
1208 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1209 cim16#Reason.text"/>
1210     </xs:sequence>
1211 </xs:complexType>
1212 <xs:complexType name="Shared_Domain"
1213 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Domain">
1214     <xs:sequence>
1215         <xs:element name="mRID" type="AreaID_String" minOccurs="1"
1216 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1217 cim16#IdentifiedObject.mRID"/>
1218     </xs:sequence>
1219 </xs:complexType>
1220 <xs:simpleType name="CurveType_String"
1221 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
1222     <xs:restriction base="ecl:CurveTypeList"/>
1223 </xs:simpleType>
1224 <xs:complexType name="TimeSeries"
1225 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#TimeSeries">
1226     <xs:sequence>
1227         <xs:element name="mRID" type="ID_String" minOccurs="1"
1228 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1229 cim16#IdentifiedObject.mRID"/>
1230         <xs:element name="businessType" type="BusinessKind_String"
1231 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1232 schema-cim16#TimeSeries.businessType"/>
1233         <xs:element name="in_Domain.mRID" type="AreaID_String"
1234 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1235 schema-cim16#IdentifiedObject.mRID"/>
1236         <xs:element name="out_Domain.mRID" type="AreaID_String"
1237 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1238 schema-cim16#IdentifiedObject.mRID"/>
1239         <xs:element name="curveType" type="CurveType_String"
1240 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1241 schema-cim16#TimeSeries.curveType"/>
1242         <xs:element name="currency_Unit.name"
1243 type="CurrencyCode_String" minOccurs="0" maxOccurs="1"
1244 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
1245         <xs:element name="price_Measurement_Unit.name"
1246 type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"
1247 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
1248         <xs:element name="Period" type="Series_Period" minOccurs="1"
1249 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1250 cim16#TimeSeries.Period"/>
1251         <xs:element name="Reason" type="Reason" minOccurs="0"
1252 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1253 cim16#TimeSeries.Reason"/>
1254     </xs:sequence>
1255 </xs:complexType>

```

1256 `</xs:schema>`
1257
1258