



European Network of
Transmission System Operators
for Electricity

CRITICAL NETWORK ELEMENT DOCUMENT UML MODEL AND SCHEMA

2019-12-11
APPROVED DOCUMENT
VERSION 2.4

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39 which 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
41 the option provides.).

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	<p>Update of the UML model and the associated dependency tables following alignment with the CRAC document for capacity calculation processes:</p> <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	<p>Approved by MC</p> <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	<p>Following the maintenance request from EMFIP 54:</p> <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. <p>Changes due to the alignment between CRAC and CNE document:</p> <ul style="list-style-type: none"> • -Addition of a 0..* association between the RemedialAction_RegisteredResource class and the Analog class. • Addition of the optional

			<p>“currency_Unit.name” and “price_Measure_Unit.name” attributes at TimeSeries level</p> <ul style="list-style-type: none">-Addition of the optional “priceAmount” attribute at RemedialAction_Series levelmRID of Document, Series and Timeseries (ID_String type) was enlarged from 35 to 60 characters. <p>Approved by MC.</p>
2	4	2019/12/11	<p>Move process parts to Coordinated Capacity Calculation implementation guide. Keep UML document and schema part.</p> <p>Approved by MC.</p>

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INTRODUCTION

135 **1 Scope**

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

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

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

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

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

145 • Description of the business process;

146 • Use case of the business process;

147 • Sequence diagrams of the business process;

148 • List of the schema (XSD) to be used in the business process and versions of the
149 schema;

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

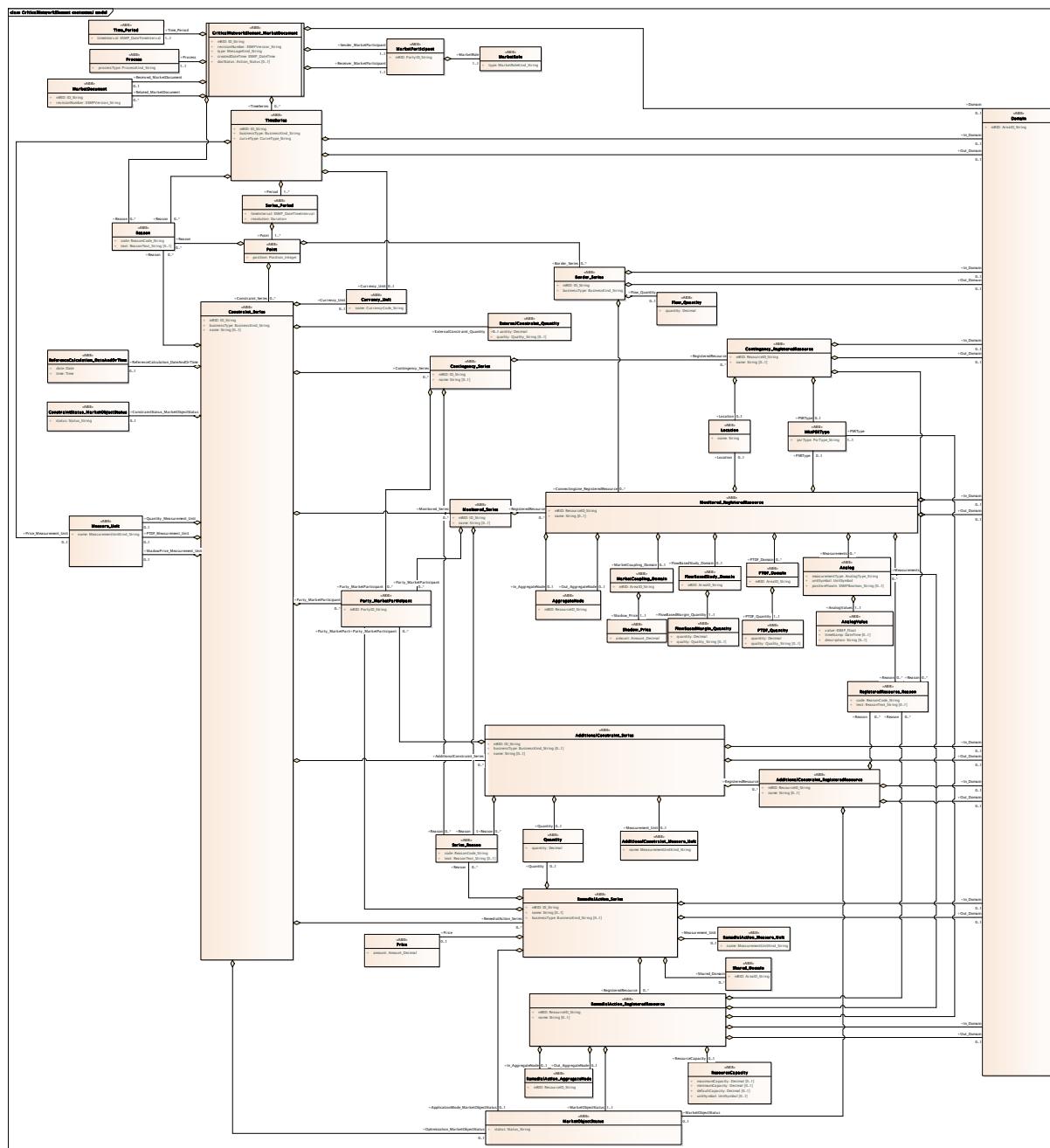
153

154 2 Critical Network Element contextual and assembly models

155 2.1 CriticalNetworkElement contextual model

156 2.1.1 Overview of the model

157 Figure 1 shows the model.



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162 **2.1.2 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
MktPSRTyp	TC57CIM::IEC62325::MarketManagement::MktPSRTyp
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
PTDF_Domain	TC57CIM::IEC62325::MarketManagement::Domain

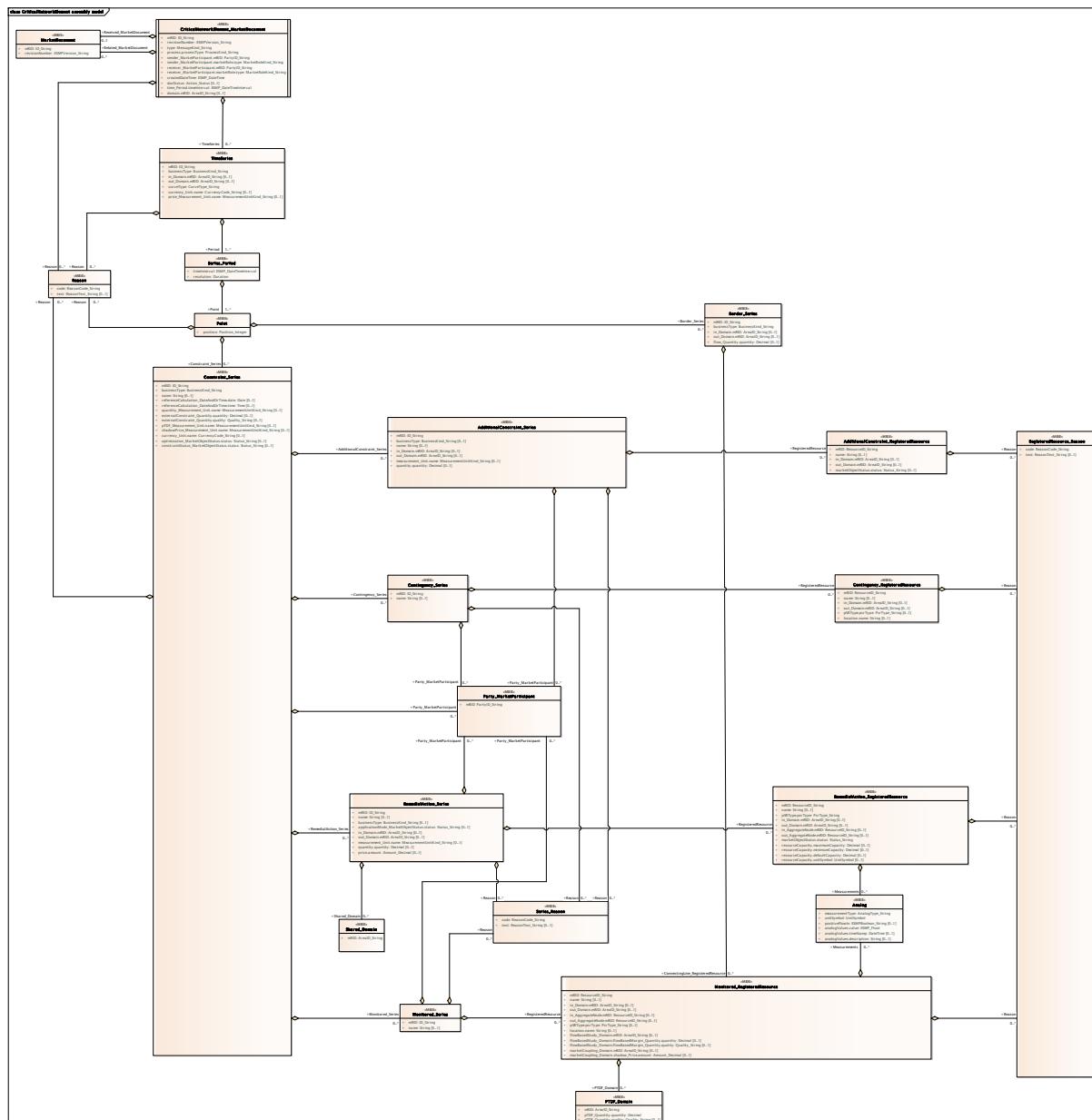
Name	Complete IsBasedOn Path
PTDF_Quantity	TC57CIM::IEC62325::MarketManagement::Quantity
Quantity	TC57CIM::IEC62325::MarketManagement::Quantity
Reason	TC57CIM::IEC62325::MarketManagement::Reason
ReferenceCalculation_DateAndOrTime	TC57CIM::IEC62325::MarketManagement::DateAndOrTime
RegisteredResource_Reason	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

167

168 2.2 CriticalNetworkElement assembly model

169 2.2.1 Overview of the model

170 Figure 2 shows the model.



171

172

173

174

175 **2.2.2 IsBasedOn relationships from the European style market profile**

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

178 **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

179

180

181 **2.2.3 Detailed CriticalNetworkElement assembly model**

182 **2.2.3.1 CriticalNetworkElement_MarketDocument root class**

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

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

188 Table 3 shows all attributes of CriticalNetworkElement_MarketDocument.

189 **Table 3 - Attributes of CriticalNetworkElement assembly
190 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.

191

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

194
195

**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.[]

196

197 **2.2.3.2 AdditionalConstraint_RegisteredResource**

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

199 Table 5 shows all attributes of AdditionalConstraint_RegisteredResource.

200
201 **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, ...

202

203 Table 6 shows all association ends of AdditionalConstraint_RegisteredResource with other
204 classes.

205 **Table 6 - Association ends of CriticalNetworkElement assembly**
206 **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..*]

207

208 **2.2.3.3 AdditionalConstraint_Series**

209 An additional constraint limiting capacity in the load flow study

210 Table 7 shows all attributes of AdditionalConstraint_Series.

211 **Table 7 - Attributes of CriticalNetworkElement assembly**
212 **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.

213

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

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

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

217

2.2.3.4 Analog

218 Analog represents an analog Measurement.

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

220 Table 9 shows all attributes of Analog.

221 **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.

224

225 2.2.3.5 Border_Series

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

229 Table 10 shows all attributes of Border_Series.

230 **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.

231

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

233 **Table 11 - Association ends of CriticalNetworkElement assembly model::Border_Series
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.[]

235

236 **2.2.3.6 Constraint_Series**

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

240 Table 12 shows all attributes of Constraint_Series.

241 **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.

242

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

244 **Table 13 - Association ends of CriticalNetworkElement assembly**
245 **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..*]

246

247 **2.2.3.7 Contingency_RegisteredResource**

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

250 Table 14 shows all attributes of Contingency_RegisteredResource.

251
252

**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]	pSRTyp.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.

253

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

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

Order	mult.	Class name / Role	Description
6	[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.[]

257

2.2.3.8 Contingency_Series

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

261 Table 16 shows all attributes of Contingency_Series.

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.

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

263

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

Table 17 - Association ends of CriticalNetworkElement assembly 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.]

267

2.2.3.9 MarketDocument

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

269 Table 18 shows all attributes of MarketDocument.

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.

273

274 2.2.3.10 Monitored_RegisteredResource

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

278 Table 19 shows all attributes of Monitored_RegisteredResource.

Table 19 - Attributes of CriticalNetworkElement assembly 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_TimeSseries. 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.
4	[0..1]	in_AggregateNode.mRID ResourceID_String	The unique identification of an AggregateNode. In the ESMP context, the "model authority" is defined as an authorized issuing office that provides an agreed identification coding scheme for market participant, domain, measurement point, resources (generator, lines, substations, etc.) identification. Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended. For CIMXML data files in RDF syntax conforming to IEC 61970-552 Edition 1, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. --- The identification of the aggregate node that is linked to the registered resource.

Order	mult.	Attribute name / Attribute type	Description
5	[0..1]	out_AggregateNode.mRID ResourceID_String	<p>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.</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>
9	[0..1]	flowBasedStudy_Domain.flowBasedMargin_Quantity.quantity Decimal	<p>The quantity value of remaining available margin of the critical network element identified in Monitored_RegisteredResource..</p> <p>The association role provides the information about what is expressed.</p> <p>--- The identification of the flow based study area linked to the critical network element.</p> <p>--- This is the associated RAM quantity of the critical network element for a flow based study domain.</p>
10	[0..1]	flowBasedStudy_Domain.flowBasedMargin_Quantity.quality Quality_String	<p>The description of the quality of the quantity.</p> <p>--- The identification of the flow based study area linked to the critical network element.</p> <p>--- This is the associated RAM quantity of the critical network element for a flow based study domain.</p>
11	[0..1]	marketCoupling_Domain.mRID AreaID_String	<p>The identification of the flow based market coupling area.</p> <p>The unique identification of the domain.</p> <p>--- The identification of the flow based market coupling domain impacted by the critical network element.</p>

Order	mult.	Attribute name / Attribute type	Description
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.

281

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

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

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.[]

285

2.2.3.11 Monitored_Series

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

289 Table 21 shows all attributes of Monitored_Series.

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.

291

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

Table 22 - Association ends of CriticalNetworkElement assembly 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..*]

295

2.2.3.12 Party_MarketParticipant

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

299 Table 23 shows all attributes of Party_MarketParticipant.

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.

302

2.2.3.13 Point

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

305 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.

307

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

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

Order	mult.	Class name / Role	Description
1	[0..*]	Border_Series Border_Series	The TimeSeries 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..*]

311

312 **2.2.3.14 PTDF_Domain**

313 The bidding zone impacted by the critical network element.

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

316 Table 26 shows all attributes of PTDF_Domain.

317 **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.

318

319 **2.2.3.15 Reason**

320 The motivation of an act.

321 Table 27 shows all attributes of Reason.

322 **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.

323

324 **2.2.3.16 RegisteredResource_Reason**

325 The reason information associated with a RegisteredResource providing motivation
326 information.

327 Table 28 shows all attributes of RegisteredResource_Reason.

328 **Table 28 - Attributes of CriticalNetworkElement assembly**
329 **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.

330

331 **2.2.3.17 RemedialAction_RegisteredResource**

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

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

336 Table 29 shows all attributes of RemedialAction_RegisteredResource.

337 **Table 29 - Attributes of CriticalNetworkElement assembly**
338 **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]	pSRTyp.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.

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

339

340 Table 30 shows all association ends of RemedialAction_RegisteredResource with other
341 classes.

342 **Table 30 - Association ends of CriticalNetworkElement assembly**
343 **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.[]

Order	mult.	Class name / Role	Description
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_RemasteredResource.[]

344

345 2.2.3.18 RemedialAction_Series

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

348 Table 31 shows all attributes of RemedialAction_Series.

349 **Table 31 - Attributes of CriticalNetworkElement assembly**
350 **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.
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.

351

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

353
354

**Table 32 - Association ends of CriticalNetworkElement assembly
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.[]

355

2.2.3.19 Series_Period

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

358 Table 33 shows all attributes of Series_Period.

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.

360

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

362 **Table 34 - Association ends of CriticalNetworkElement assembly model::Series_Period**
363 **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..*]

364

365 **2.2.3.20 Series_Reason**

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

367 Table 35 shows all attributes of Series_Reason.

368 **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.

369

370 **2.2.3.21 Shared_Domain**

371 The areas allowed to use the remedial action.

372 Table 36 shows all attributes of Shared_Domain.

373 **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.

374

375 **2.2.3.22 TimeSeries**

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

377 Table 37 shows all attributes of TimeSeries.

378 **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.

Order	mult.	Attribute name / Attribute type	Description
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.

379

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

381 **Table 38 - Association ends of CriticalNetworkElement assembly model::TimeSeries
382 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..*]

383

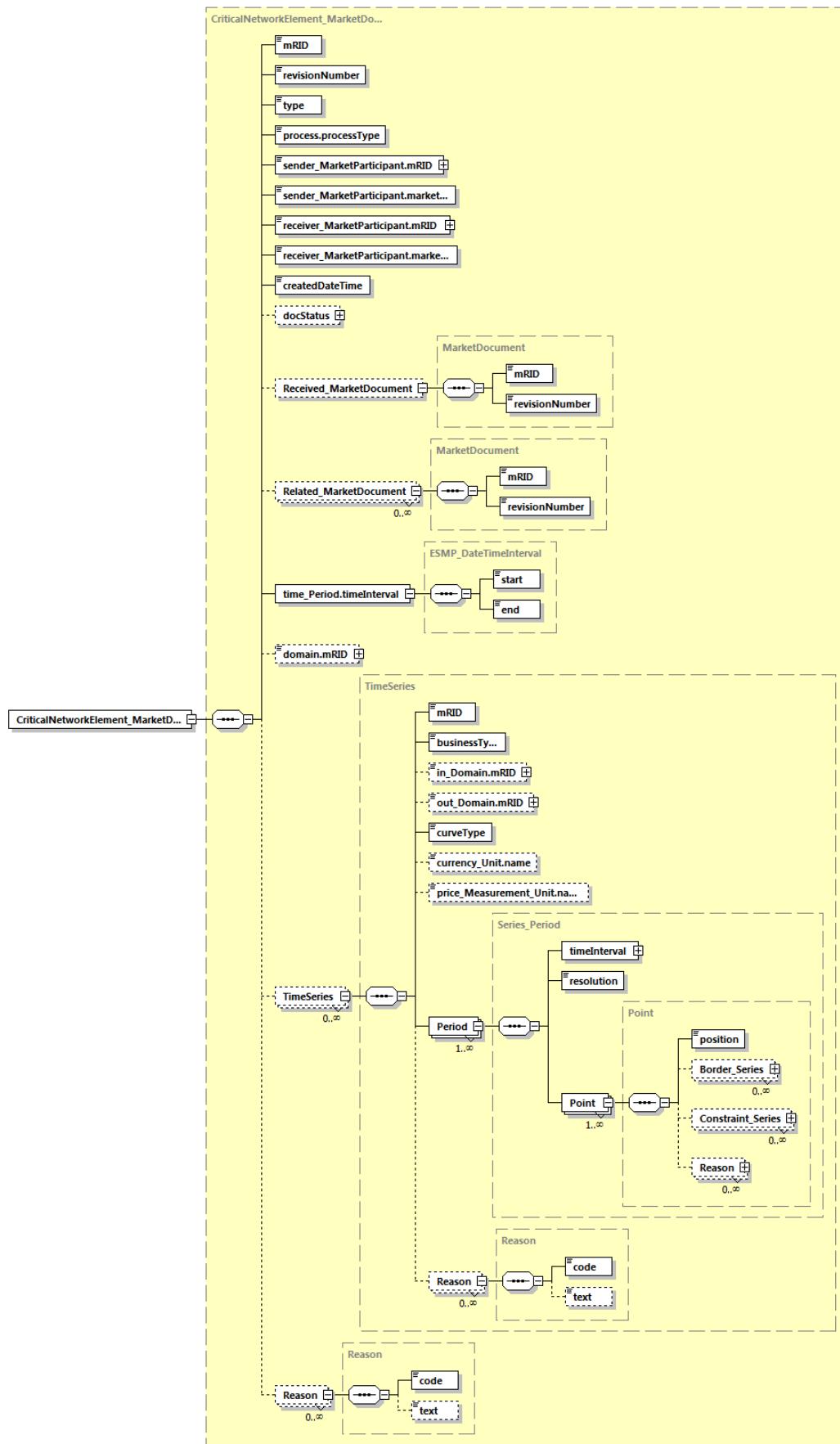
384 **2.2.4 Datatypes**

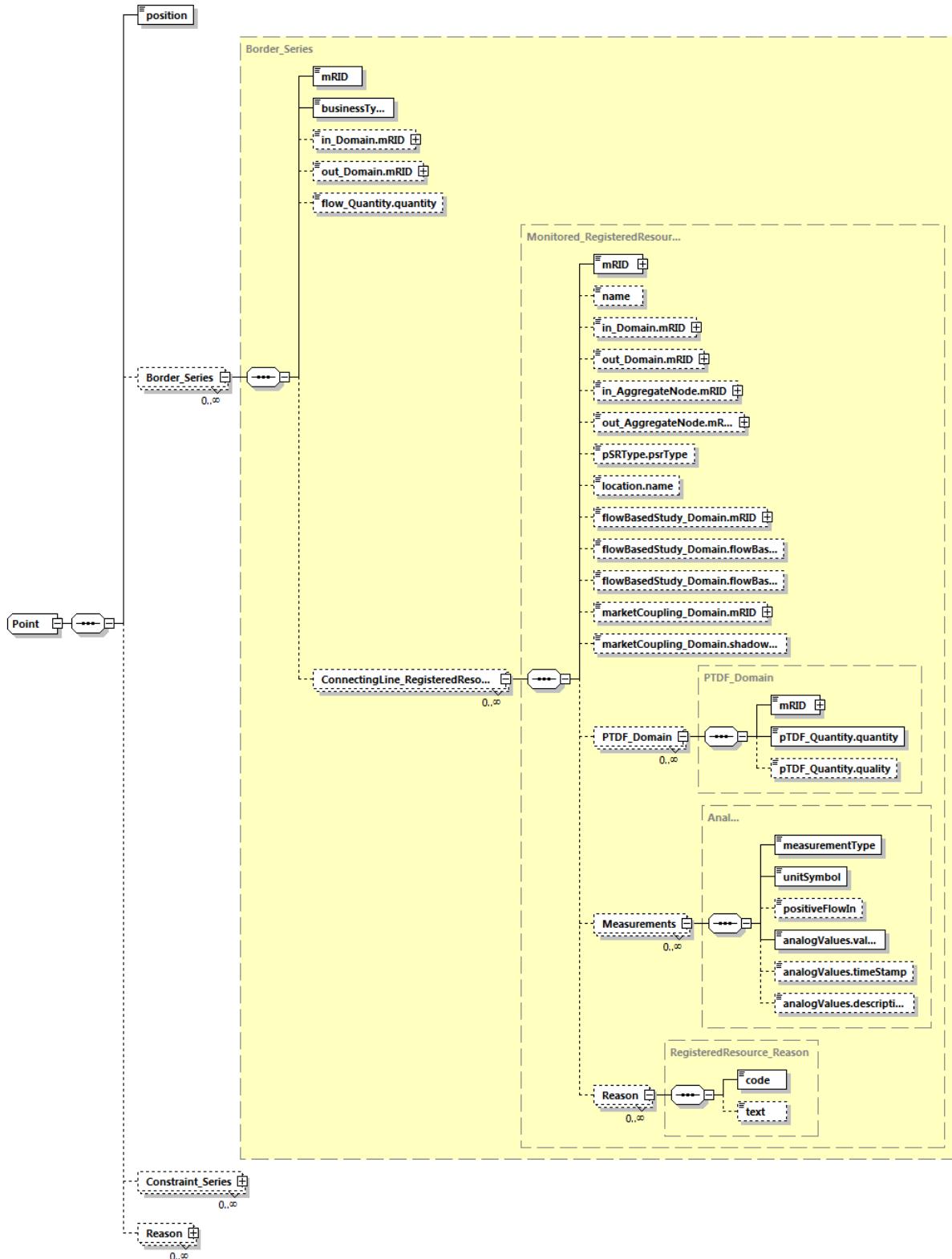
385 The list of datatypes used for the CriticalNetworkElement assembly model is as follows:

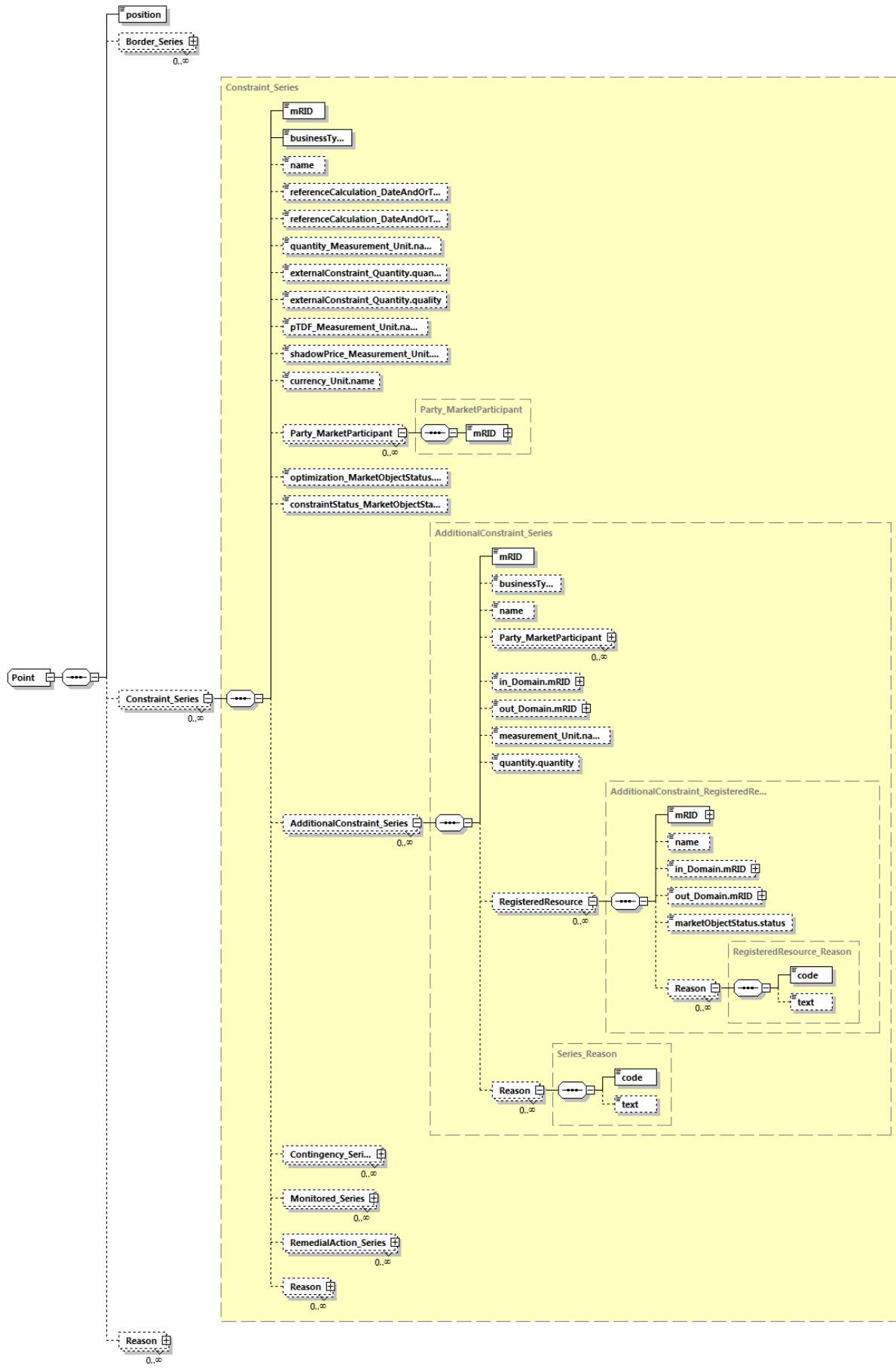
- 386 • Action_Status compound
- 387 • ESMP_DateTimeInterval compound
- 388 • Amount_Decimal datatype
- 389 • AnalogType_String datatype, codelist AnalogTypeList
- 390 • AreaID_String datatype, codelist CodingSchemeTypeList
- 391 • BusinessKind_String datatype, codelist BusinessTypeList
- 392 • CurrencyCode_String datatype, codelist CurrencyTypeList
- 393 • CurveType_String datatype, codelist CurveTypeList
- 394 • ESMP_DateTime datatype
- 395 • ESMP_Float datatype
- 396 • ESMPBoolean_String datatype, codelist IndicatorTypeList
- 397 • ESMPVersion_String datatype
- 398 • ID_String datatype
- 399 • MarketRoleKind_String datatype, codelist RoleTypeList

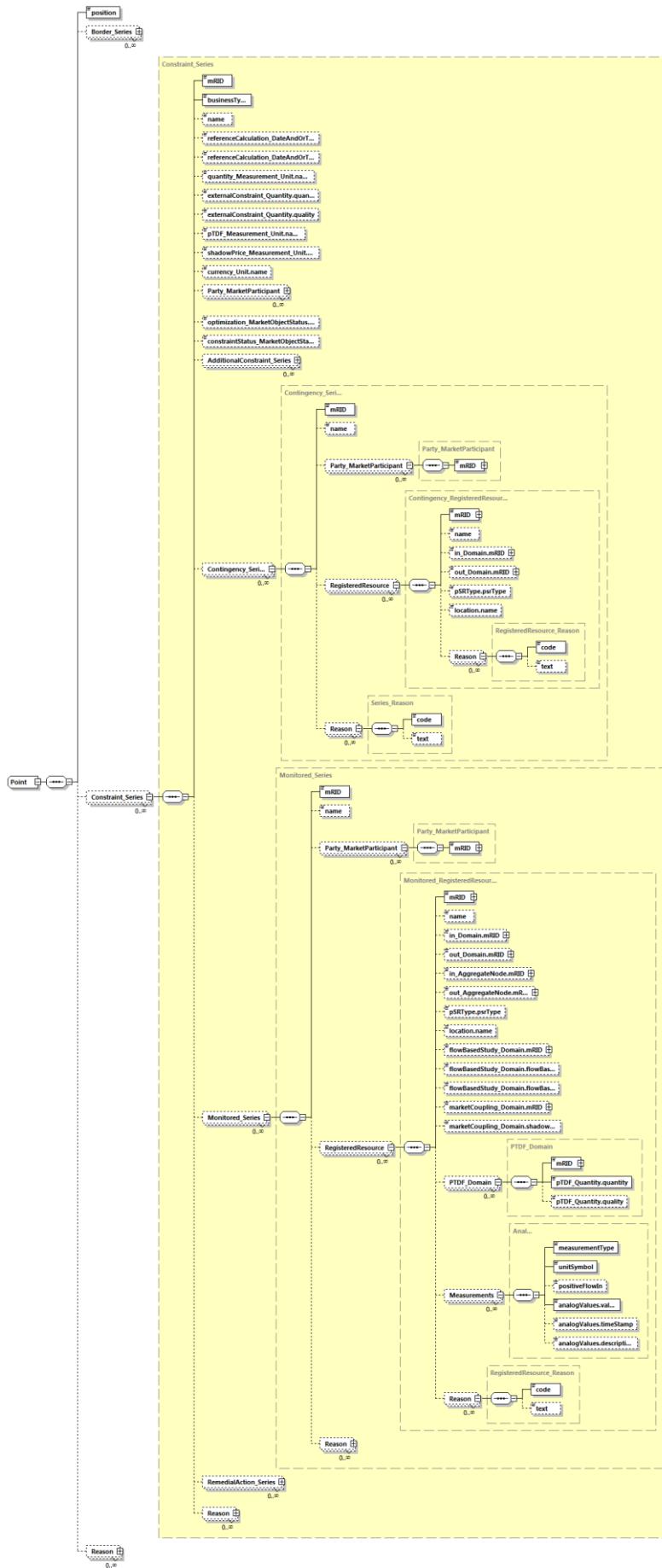
- 400 • MeasurementUnitKind_String datatype, codelist UnitOfMeasureTypeList
- 401 • MessageKind_String datatype, codelist MessageTypeList
- 402 • PartyID_String datatype, codelist CodingSchemeTypeList
- 403 • Position_Integer datatype
- 404 • ProcessKind_String datatype, codelist ProcessTypeList
- 405 • PsrType_String datatype, codelist AssetTypeList
- 406 • Quality_String datatype, codelist QualityTypeList
- 407 • ReasonCode_String datatype, codelist ReasonCodeTypeList
- 408 • ReasonText_String datatype
- 409 • ResourceID_String datatype, codelist CodingSchemeTypeList
- 410 • Status_String datatype, codelist StatusTypeList
- 411 • UnitSymbol datatype, codelist UnitSymbol
- 412 • YMDHM_DateTime datatype

415 2.2.5 CriticalNetworkElement_MarketDocument schema structure

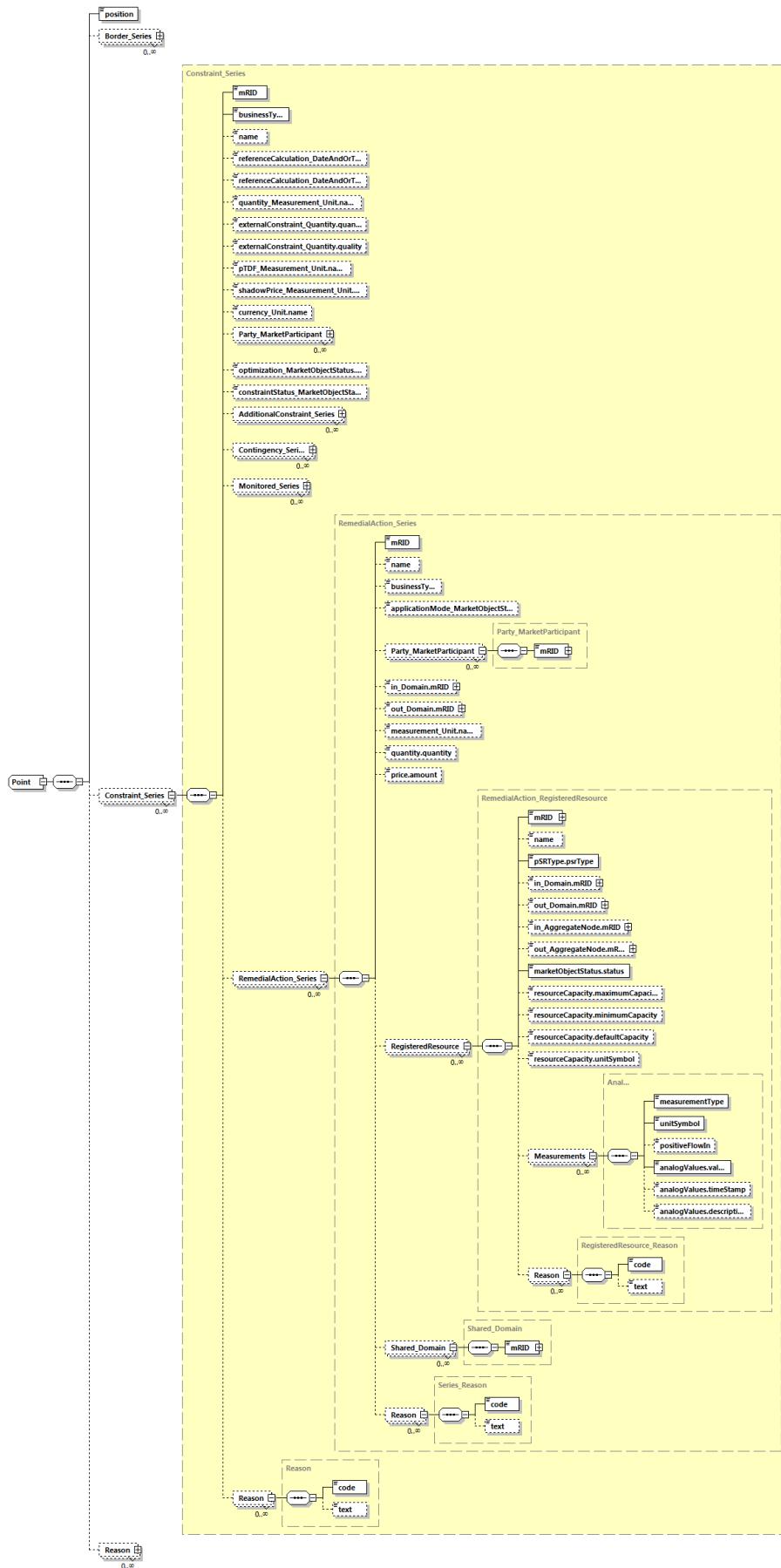








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427 **2.2.6 CriticalNetworkElement_MarketDocument XML schema**

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

429 urn:iec62325.351:tc57wg16:451-n:cnedocument:2:4

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:2:4"

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:2:4"

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"/>
```

```
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" type="Contingency_Series"  
684                                               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"/>
```

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

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

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

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

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

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1017      <xs:element name="position" type="Position_Integer"  
1018      minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-  
1019      schema-cim16#Point.position"/>  
1020          <xs:element name="Border_Series" type="Border_Series"  
1021          minOccurs="0" maxOccurs="unbounded"  
1022          sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1023          cim16#Point.Border_Series"/>  
1024              <xs:element name="Constraint_Series" type="Constraint_Series"  
1025              minOccurs="0" maxOccurs="unbounded"  
1026              sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1027              cim16#Point.Constraint_Series"/>  
1028                  <xs:element name="Reason" type="Reason" minOccurs="0"  
1029                  maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1030                  cim16#Point.Reason"/>  
1031          </xs:sequence>  
1032      </xs:complexType>  
1033      <xs:complexType name="PTDF_Domain"  
1034      sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Domain">  
1035          <xs:sequence>  
1036              <xs:element name="mRID" type="AreaID_String" minOccurs="1"  
1037              maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1038              cim16#IdentifiedObject.mRID"/>  
1039                  <xs:element name="pTDF_Quantity.quantity" type="xs:decimal"  
1040                  minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-  
1041                  schema-cim16#Quantity.quantity"/>  
1042                      <xs:element name="pTDF_Quantity.quality" type="Quality_String"  
1043                      minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-  
1044                      schema-cim16#Quantity.quality"/>  
1045          </xs:sequence>  
1046      </xs:complexType>  
1047      <xs:simpleType name="ReasonCode_String"  
1048      sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">  
1049          <xs:restriction base="ecl:ReasonCodeTypeList"/>  
1050      </xs:simpleType>  
1051      <xs:simpleType name="ReasonText_String"  
1052      sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">  
1053          <xs:restriction base="xs:string">  
1054              <xs:maxLength value="512"/>  
1055          </xs:restriction>  
1056      </xs:simpleType>  
1057      <xs:complexType name="Reason"  
1058      sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">  
1059          <xs:sequence>  
1060              <xs:element name="code" type="ReasonCode_String" minOccurs="1"  
1061              maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1062              cim16#Reason.code"/>  
1063                  <xs:element name="text" type="ReasonText_String" minOccurs="0"  
1064                  maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1065                  cim16#Reason.text"/>  
1066          </xs:sequence>  
1067      </xs:complexType>  
1068      <xs:complexType name="RegisteredResource_Reason"  
1069      sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">  
1070          <xs:sequence>  
1071              <xs:element name="code" type="ReasonCode_String" minOccurs="1"  
1072              maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1073              cim16#Reason.code"/>  
1074                  <xs:element name="text" type="ReasonText_String" minOccurs="0"  
1075                  maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-  
1076                  cim16#Reason.text"/>
```

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1077      </xs:sequence>
1078  </xs:complexType>
1079  <xs:complexType name="RemedialAction_RegisteredResource"
1080  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1081  cim16#RegisteredResource">
1082    <xs:sequence>
1083      <xs:element name="mRID" type="ResourceID_String" minOccurs="1"
1084      maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1085      cim16#IdentifiedObject.mRID"/>
1086        <xs:element name="name" type="xs:string" minOccurs="0"
1087        maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1088        cim16#IdentifiedObject.name"/>
1089        <xs:element name="pSRTyp.psrType" type="PsrType_String"
1090        minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1091        schema-cim16#MktPSRTyp.psrType"/>
1092          <xs:element name="in_Domain.mRID" type="AreaID_String"
1093          minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1094          schema-cim16#IdentifiedObject.mRID"/>
1095            <xs:element name="out_Domain.mRID" type="AreaID_String"
1096            minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1097            schema-cim16#IdentifiedObject.mRID"/>
1098              <xs:element name="in_AggregateNode.mRID"
1099              type="ResourceID_String" minOccurs="0" maxOccurs="1"
1100              sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1101              cim16#IdentifiedObject.mRID"/>
1102                <xs:element name="out_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="marketObjectStatus.status"
1107                  type="Status_String" minOccurs="1" maxOccurs="1"
1108                  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1109                  cim16#MarketObjectStatus.status"/>
1110                    <xs:element name="resourceCapacity.maximumCapacity"
1111                    type="xs:decimal" minOccurs="0" maxOccurs="1"
1112                    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1113                    cim16#ResourceCapacity.maximumCapacity"/>
1114                      <xs:element name="resourceCapacity.minimumCapacity"
1115                      type="xs:decimal" minOccurs="0" maxOccurs="1"
1116                      sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1117                      cim16#ResourceCapacity.minimumCapacity"/>
1118                        <xs:element name="resourceCapacity.defaultCapacity"
1119                        type="xs:decimal" minOccurs="0" maxOccurs="1"
1120                        sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1121                        cim16#ResourceCapacity.defaultCapacity"/>
1122                          <xs:element name="resourceCapacity.unitSymbol"
1123                          type="UnitSymbol" minOccurs="0" maxOccurs="1"
1124                          sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1125                          cim16#ResourceCapacity.unitSymbol"/>
1126                            <xs:element name="Measurements" type="Analog" minOccurs="0"
1127                            maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1128                            cim16#RegisteredResource.Measurements"/>
1129                              <xs:element name="Reason" type="RegisteredResource_Reason"
1130                              minOccurs="0" maxOccurs="unbounded"
1131                              sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1132                              cim16#RegisteredResource.Reason"/>
1133                                </xs:sequence>
1134  </xs:complexType>
1135  <xs:complexType name="RemedialAction_Series"
1136  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Series">
```

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1137      <xs:sequence>
1138          <xs:element name="mRID" type="ID_String" minOccurs="1"
1139          maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1140          cim16#IdentifiedObject.mRID"/>
1141          <xs:element name="name" type="xs:string" minOccurs="0"
1142          maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1143          cim16#IdentifiedObject.name"/>
1144          <xs:element name="businessType" type="BusinessKind_String"
1145          minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1146          schema-cim16#TimeSeries.businessType"/>
1147          <xs:element name="applicationMode_MarketObjectStatus.status"
1148          type="Status_String" minOccurs="0" maxOccurs="1"
1149          sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1150          cim16#MarketObjectStatus.status"/>
1151          <xs:element name="Party_MarketParticipant"
1152          type="Party_MarketParticipant" minOccurs="0" maxOccurs="unbounded"
1153          sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1154          cim16#Series.Party_MarketParticipant"/>
1155              <xs:element name="in_Domain.mRID" type="AreaID_String"
1156              minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1157              schema-cim16#IdentifiedObject.mRID"/>
1158              <xs:element name="out_Domain.mRID" type="AreaID_String"
1159              minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1160              schema-cim16#IdentifiedObject.mRID"/>
1161              <xs:element name="measurement_Unit.name"
1162              type="MeasurementUnitKind_String" minOccurs="0" maxOccurs="1"
1163              sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
1164                  <xs:element name="quantity.quantity" type="xs:decimal"
1165                  minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1166                  schema-cim16#Quantity.quantity"/>
1167                  <xs:element name="price.amount" type="Amount.Decimal"
1168                  minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1169                  schema-cim16#Price.amount"/>
1170                  <xs:element name="RegisteredResource"
1171                  type="RemedialAction_RegisteredResource" minOccurs="0" maxOccurs="unbounded"
1172                  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1173                  cim16#Series.RegisteredResource"/>
1174                  <xs:element name="Shared_Domain" type="Shared_Domain"
1175                  minOccurs="0" maxOccurs="unbounded"
1176                  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1177                  cim16#Series.Shared_Domain"/>
1178                  <xs:element name="Reason" type="Series_Reason" minOccurs="0"
1179                  maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1180                  cim16#Series.Reason"/>
1181          </xs:sequence>
1182      </xs:complexType>
1183      <xs:complexType name="Series_Period"
1184          sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Period">
1185          <xs:sequence>
1186              <xs:element name="timeInterval" type="ESMP_DateTimeInterval"
1187              minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
1188              schema-cim16#Period.timeInterval"/>
1189              <xs:element name="resolution" type="xs:duration" minOccurs="1"
1190              maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1191              cim16#Period.resolution"/>
1192              <xs:element name="Point" type="Point" minOccurs="1"
1193              maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
1194              cim16#Period.Point"/>
1195          </xs:sequence>
1196      </xs:complexType>
```

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