European Network of
Transmission System Operators
for Electricity

HVDC LINK DOCUMENT
UML MODEL AND SCHEMA

2022-03-15
APPROVED DOCUMENT
VERSION 1.1

ENTSO-E HVDC Link document – UML model and schema
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Revision History

Version	Release	Date	Comments
0	0	2017-01-19	First drafting of the document.
1	0	2017-01-30	Version to be submitted to Market Committee following WG EDI meeting in March 2017.
1	1	2022-03-15	Updates in XSD v1.1: • Optional start and end date time attributes linked to Timeseries with cardinality 0..1 • ConnectingLine_registeredResource attribute in Timeseries level becomes optional • SchedulePeriod timeInterval in HVDCLink_MarketDoucment class becomes optional • New Reason class associated to Timeseries with cardinality 0..*. • mRID of Document, Series and Timeseries (ID_String type) was enlarged from 35 to 60 characters. Approved by MC.

61

62	**Objective**

| 63 | The purpose of this document is to provide the contextual and assembly UML models and the |
| 64 | schema of the HVDCLink_MarketDocument. |

| 65 | The schema of the HVDCLink_MarketDocument could be used in various business processes. |

| 66 | It is not the purpose of this document to describe all the use cases, sequence diagrams, |
| 67 | business processes, etc. for which this schema is to be used. |

| 68 | This document shall only be referenced in an implementation guide of a specific business |
| 69 | process. The content of the business process implementation guide shall be as follows: |

| 70 | • Description of the business process; |

| 71 | • Use case of the business process; |

| 72 | • Sequence diagrams of the business process; |

| 73 | • List of the schema (XSD) to be used in the business process and versions of the |
| 74 | schema; |
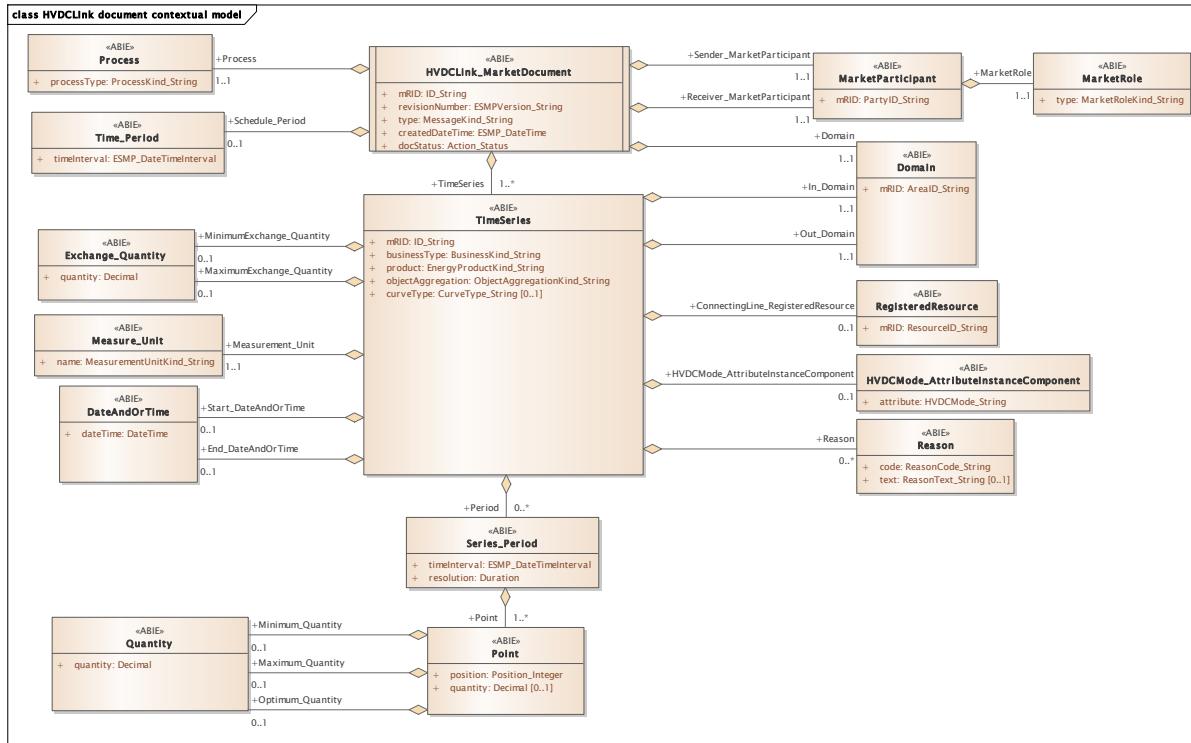
75	• For each schema, dependency tables providing the necessary information for the
76	generation of the XML instances, i.e. when the optional attributes are to be used, which
77	codes from which ENTSO-E codelist are to be used.

78 **HVDCLink_MarketDocument**

79 **2.1** **HVDCLink document contextual model**

80 **2.1.1** **Overview of the model**

81 Figure 1 shows the model.

82

83 **Figure 1 - HVDCLink document contextual model**

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85   **2.1.2   IsBasedOn relationships from the European style market profile**

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

88   **Table 1 - IsBasedOn dependency**

Name	Complete IsBasedOn Path
DateAndOrTime	TC57CIM::IEC62325::MarketManagement::DateAndOrTime
Domain	TC57CIM::IEC62325::MarketManagement::Domain
Exchange_Quantity	TC57CIM::IEC62325::MarketManagement::Quantity
HVDCLink_MarketDocument	TC57CIM::IEC62325::MarketManagement::MarketDocument
HVDCMode_AttributeInstanceComponent	TC57CIM::IEC62325::MarketManagement::AttributeInstanceComponent
MarketParticipant	TC57CIM::IEC62325::MarketCommon::MarketParticipant
MarketRole	TC57CIM::IEC62325::MarketCommon::MarketRole
Measure_Unit	TC57CIM::IEC62325::MarketManagement::Unit
Point	TC57CIM::IEC62325::MarketManagement::Point
Process	TC57CIM::IEC62325::MarketManagement::Process
Quantity	TC57CIM::IEC62325::MarketManagement::Quantity
Reason	TC57CIM::IEC62325::MarketManagement::Reason
RegisteredResource	TC57CIM::IEC62325::MarketCommon::RegisteredResource
Series_Period	TC57CIM::IEC62325::MarketManagement::Period
Time_Period	TC57CIM::IEC62325::MarketManagement::Period
TimeSeries	TC57CIM::IEC62325::MarketManagement::TimeSeries

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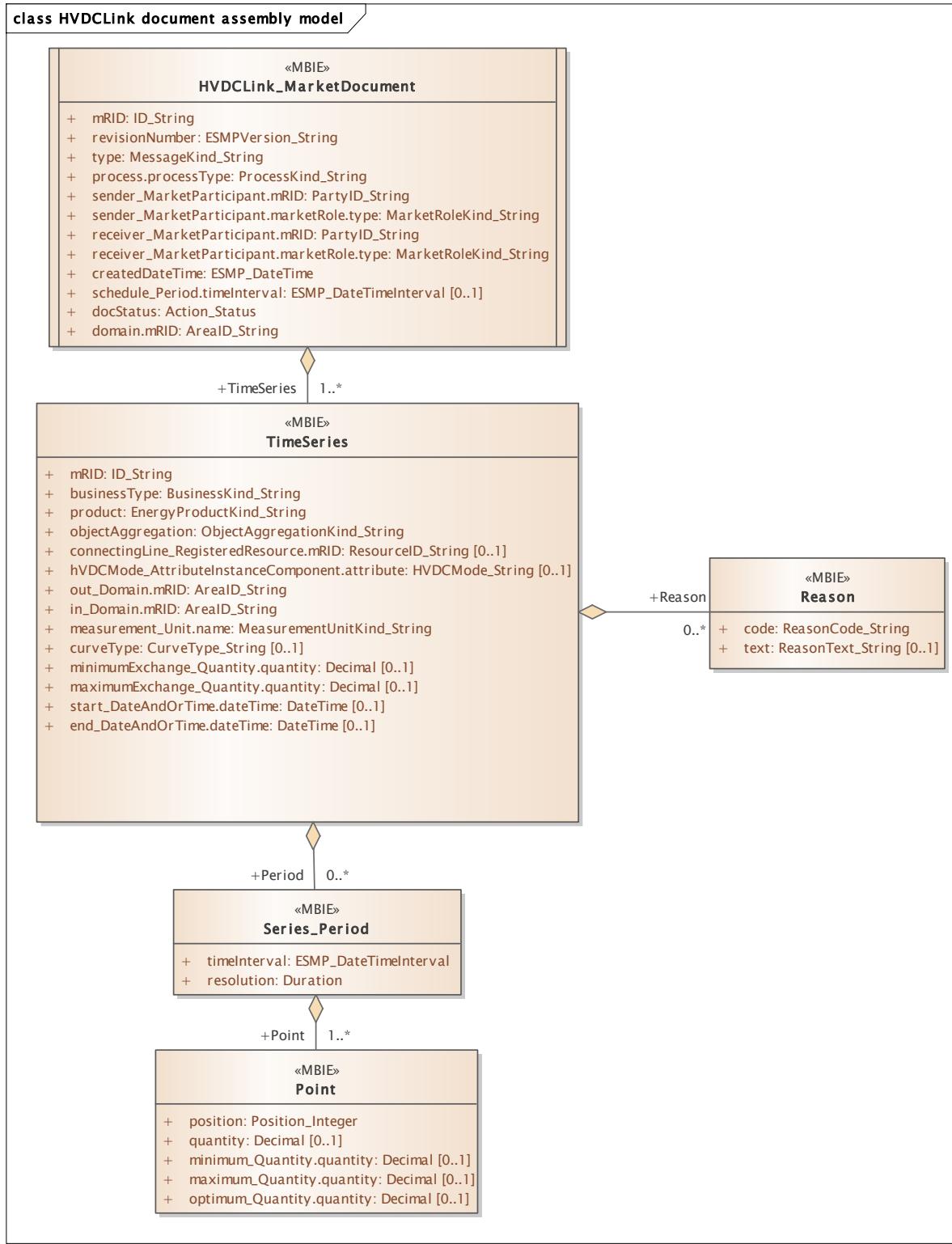
91   **2.2   HVDCLink document assembly model**

92   **2.2.1   Overview of the model**

93   Figure 2 shows the model.

94

95   **Figure 2 - HVDCLink document assembly model**

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2.2.2   IsBasedOn relationships from the European style market profile

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

Table 2 - IsBasedOn dependency

Name	Complete IsBasedOn Path
HVDCLink_MarketDocument	TC57CIM::IEC62325::MarketManagement::MarketDocument
Point	TC57CIM::IEC62325::MarketManagement::Point
Reason	TC57CIM::IEC62325::MarketManagement::Reason
Series_Period	TC57CIM::IEC62325::MarketManagement::Period
TimeSeries	TC57CIM::IEC62325::MarketManagement::TimeSeries

101

2.2.3   Detailed HVDCLink document assembly model

2.2.3.1   HVDCLink_MarketDocument root class

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

This document is to be used to exchange the following information for a HVDC link:

- operational power range through the HVDC link constraints document type

- power control mode through the HVDC operating mode document type

- power setpoint through the HVDC configuration document type

- operational table through the HVDC schedule document type

Table 3 shows all attributes of HVDCLink_MarketDocument.

Table 3 - Attributes of HVDCLink document assembly model::HVDCLink_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 depending upon the document type.
4	[1..1]	sender_MarketParticipant.mRID PartyID_String	The identification of a party in the energy market. --- The document owner.
5	[1..1]	sender_MarketParticipant.marketRole.type MarketRoleKind_String	The identification of the role played by a market player. --- The 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. --- The document recipient.

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Order	mult.	Attribute name / Attribute type	Description
7	[1..1]	receiver_MarketParticipant.marketRole.type MarketRoleKind_String	The identification of the role played by a market player. --- The 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]	schedule_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 schedule time interval.
10	[1..1]	docStatus Action_Status	The identification of the condition or position of the document with regard to its standing.
11	[1..1]	domain.mRID AreaID_String	The unique identification of the domain. --- The Domain associated with an electronic document header.

114

115 Table 4 shows all association ends of HVDCLink_MarketDocument with other classes.

116 **Table 4 - Association ends of HVDCLink document assembly**
117 **model::HVDCLink_MarketDocument with other classes**

Order	mult.	Class name / Role	Description
12	[1..*]	TimeSeries TimeSeries	Association Based On: HVDCLink document contextual model::HVDCLink_MarketDocument.[] ----- HVDCLink document contextual model::TimeSeries.TimeSeries[1..*]

118

119 **2.2.3.2   Point**

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

121 Table 5 shows all attributes of Point.

122 **Table 5 - Attributes of HVDCLink document 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.
1	[0..1]	quantity Decimal	The principal quantity identified for a point. --- The value of the scheduled product. This information is dependent. The attribute quantity is used in case there is only one quantity needed for a given market period, otherwise the optimum quantity is used.
2	[0..1]	minimum_Quantity.quantity Decimal	Quantity value. --- The minimum value of power exchange on the HVDC line for a scheduled point. This information is dependent of the document type.
3	[0..1]	maximum_Quantity.quantity Decimal	Quantity value. --- The maximum value of power exchange on the HVDC line for a scheduled point. This information is dependent of the document type.
4	[0..1]	optimum_Quantity.quantity Decimal	Quantity value. --- The value of the optimum power exchange on the HVDC line for a scheduled point. This information is dependent on the document type.

123

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124 **2.2.3.3   Reason**

125 The motivation of an act.

126 Table 6 shows all attributes of Reason.

127 **Table 6 - Attributes of HVDCLink document 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.

128

129 **2.2.3.4   Series_Period**

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

131 Table 7 shows all attributes of Series_Period.

132 **Table 7 - Attributes of HVDCLink document 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.

133

134 Table 8 shows all association ends of Series_Period with other classes.

135 **Table 8 - Association ends of HVDCLink document assembly model::Series_Period with**
136 **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: HVDCLink document contextual model::Series_Period.[] ----- HVDCLink document contextual model::Point.Point[1..*]

137

138 **2.2.3.5   TimeSeries**

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

140 Table 9 shows all attributes of TimeSeries.

141 **Table 9 - Attributes of HVDCLink document assembly model::TimeSeries**

Order	mult.	Attribute name / Attribute type	Description
0	[1..1]	mRID ID_String	A unique identification of the time series.
1	[1..1]	businessType BusinessKind_String	The identification of the nature of the time series.

Order	mult.	Attribute name / Attribute type	Description
2	[1..1]	product EnergyProductKind_String	The identification of the nature of an energy product such as power, energy, reactive power, etc.
3	[1..1]	objectAggregation ObjectAggregationKind_String	The identification of the domain that is the common denominator used to aggregate a time series.
4	[0..1]	connectingLine_RegisteredResource.mRID ResourceID_String	The unique identification of a resource. --- The identification of the HVDC link or group of HVDC links.
5	[0..1]	hVDCMode_AttributeInstanceComponent.attribute HVDCMode_String	The identification of an attribute for a given request component. --- A specific characteristic associated with a TimeSeries. This information provides the mode in which the HVDC link is set. This information is dependent of the document type.
6	[1..1]	out_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where the product is being extracted.
7	[1..1]	in_Domain.mRID AreaID_String	The unique identification of the domain. --- The area where the product is being delivered.
8	[1..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.
9	[0..1]	curveType CurveType_String	The identification of the coded representation of the type of curve being described.
10	[0..1]	minimumExchange_Quantity.quantity Decimal	The quantity value. --- The minimum value of a power exchange range between the In_Domain and the Out_Domain of the timeseries. This information is dependent of the document type.
11	[0..1]	maximumExchange_Quantity.quantity Decimal	The quantity value. --- The maximum value of a power exchange range between the In_Domain and the Out_Domain of the timeseries. This information is dependent of the document type.
12	[0..1]	start_DateAndOrTime.dateTime DateTime	Date and time as per ISO 8601 YYYY-MM-DDThh:mm:ss.sssZ. --- A date and/or time associated with a TimeSeries.
13	[0..1]	end_DateAndOrTime.dateTime DateTime	Date and time as per ISO 8601 YYYY-MM-DDThh:mm:ss.sssZ. --- A date and/or time associated with a TimeSeries.

142

143 Table 10 shows all association ends of TimeSeries with other classes.

144 **Table 10 - Association ends of HVDCLink document assembly model::TimeSeries with**
145 **other classes**

Order	mult.	Class name / Role	Description
14	[0..*]	Series_Period Period	The time interval and resolution for a period associated with a TimeSeries. Association Based On: HVDCLink document contextual model::TimeSeries.[] ----- HVDCLink document contextual model::Series_Period.Period[0..*]

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Order	mult.	Class name / Role	Description
15	[0..*]	Reason Reason	The reason information associated with a TimeSeries providing motivation information. Association Based On: HVDCLink document contextual model::Reason.Reason[0..*] ----- HVDCLink document contextual model::TimeSeries.[]

146

147   2.2.4   Datatypes
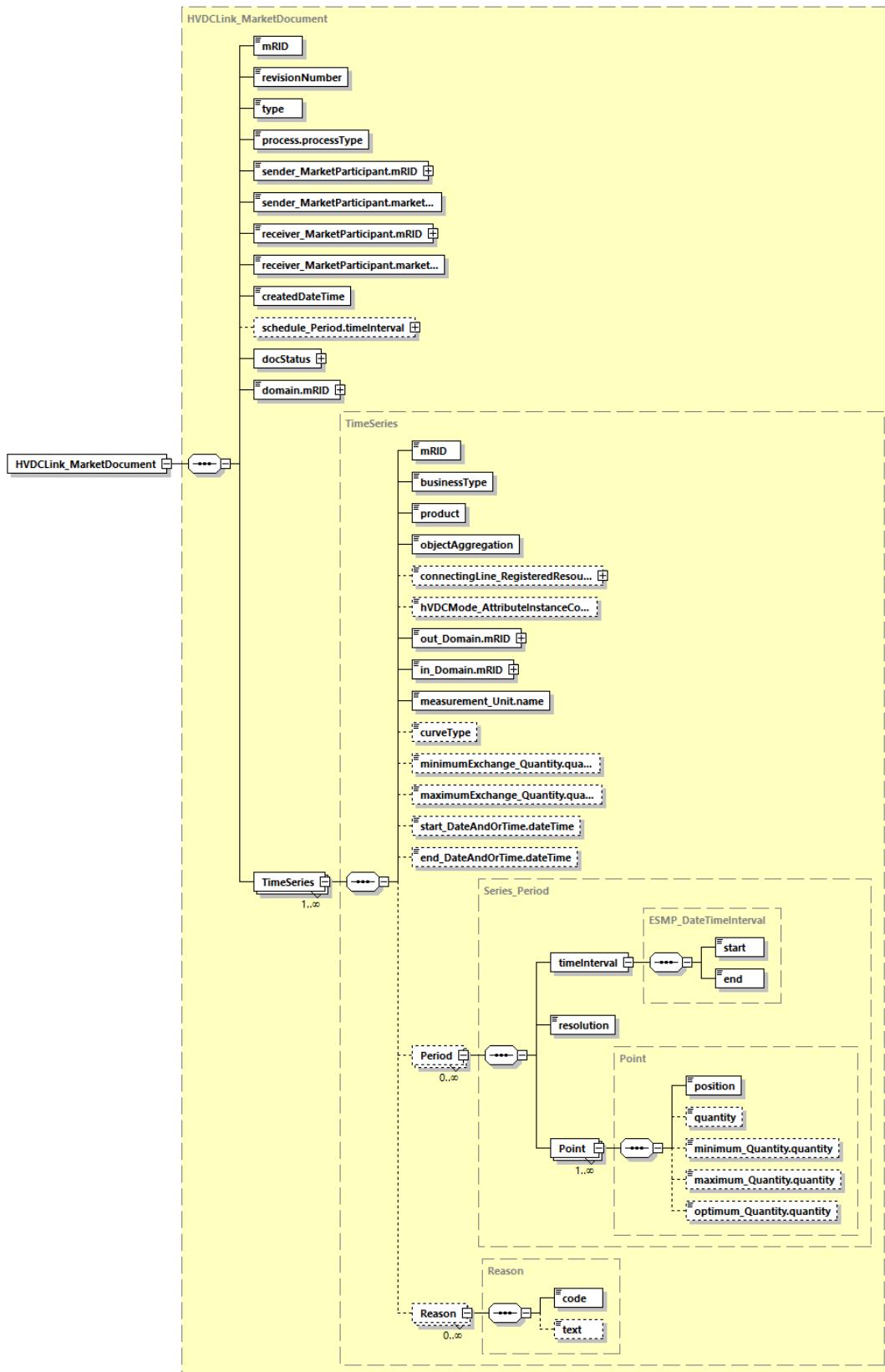
148   The list of datatypes used for the HVDCLink document assembly model is as follows:

149   •   Action_Status compound
150   •   ESMP_DateTimeInterval compound
151   •   AreaID_String datatype, codelist CodingSchemeTypeList
152   •   BusinessKind_String datatype, codelist BusinessTypeList
153   •   CurveType_String datatype, codelist CurveTypeList
154   •   EnergyProductKind_String datatype, codelist EnergyProductTypeList
155   •   ESMP_DateTime datatype
156   •   ESMPVersion_String datatype
157   •   HVDCMode_String datatype, codelist HVDCModeTypeList
158   •   ID_String datatype
159   •   MarketRoleKind_String datatype, codelist RoleTypeList
160   •   MeasurementUnitKind_String datatype, codelist UnitOfMeasureTypeList
161   •   MessageKind_String datatype, codelist MessageTypeList
162   •   ObjectAggregationKind_String datatype, codelist ObjectAggregationTypeList
163   •   PartyID_String datatype, codelist CodingSchemeTypeList
164   •   Position_Integer datatype
165   •   ProcessKind_String datatype, codelist ProcessTypeList
166   •   ReasonCode_String datatype, codelist ReasonCodeTypeList
167   •   ReasonText_String datatype
168   •   ResourceID_String datatype, codelist CodingSchemeTypeList
169   •   Status_String datatype, codelist StatusTypeList
170   •   YMDHM_DateTime datatype

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171   **2.3   HVDCLink_MarketDocument XML schema**

172   **2.3.1   HVDCLink_MarketDocument XML schema structure**

173   Figure 3 provides the structure of the schema.

174

Generated by XMLSpy   www.altova.com

175   **Figure 3 - HVDCLink_MarketDocument schema structure**

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176 **2.3.2 HVDCLink_MarketDocument XML schema**

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

178 urn:iec62325.351:tc57wg16:451-8:hvdclinkdocument:1:1

```
179 <?xml version="1.0" encoding="utf-8"?>
180 <xs:schema xmlns:ecl="urn:entsoe.eu:wgedi:codelists"
181 xmlns="urn:iec62325.351:tc57wg16:451-8:hvdclinkdocument:1:1"
182 xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
183 xmlns:cimp="http://www.iec.ch/cimprofile"
184 xmlns:xs="http://www.w3.org/2001/XMLSchema"
185 targetNamespace="urn:iec62325.351:tc57wg16:451-8:hvdclinkdocument:1:1"
186 elementFormDefault="qualified" attributeFormDefault="unqualified">
187         <xs:import namespace="urn:entsoe.eu:wgedi:codelists" schemaLocation="urn-
188 entsoe-eu-wgedi-codelists.xsd"/>
189         <xs:element name="HVDCLink_MarketDocument" type="HVDCLink_MarketDocument"/>
190         <xs:simpleType name="ID_String"
191 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
192                 <xs:restriction base="xs:string">
193                         <xs:maxLength value="60"/>
194                 </xs:restriction>
195         </xs:simpleType>
196         <xs:simpleType name="ESMPVersion_String"
197 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
198                 <xs:restriction base="xs:string">
199                         <xs:pattern value="[1-9]([0-9]){0,2}"/>
200                 </xs:restriction>
201         </xs:simpleType>
202         <xs:simpleType name="MessageKind_String"
203 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
204                 <xs:restriction base="ecl:MessageTypeList"/>
205         </xs:simpleType>
206         <xs:simpleType name="ProcessKind_String"
207 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
208                 <xs:restriction base="ecl:ProcessTypeList"/>
209         </xs:simpleType>
210         <xs:simpleType name="PartyID_String-base"
211 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
212                 <xs:restriction base="xs:string">
213                         <xs:maxLength value="16"/>
214                 </xs:restriction>
215         </xs:simpleType>
216         <xs:complexType name="PartyID_String"
217 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
218                 <xs:simpleContent>
219                         <xs:extension base="PartyID_String-base">
220                                 <xs:attribute name="codingScheme"
221 type="ecl:CodingSchemeTypeList" use="required"/>
222                         </xs:extension>
223                 </xs:simpleContent>
224         </xs:complexType>
225         <xs:simpleType name="MarketRoleKind_String"
226 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
227                 <xs:restriction base="ecl:RoleTypeList"/>
228         </xs:simpleType>
229         <xs:simpleType name="ESMP_DateTime"
230 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
231                 <xs:restriction base="xs:dateTime">
232                         <xs:pattern value="((([0-9]{4})[\-](0[13578]|1[02])[\-](0[1-
233 9]|[12][0-9]|3[01])|([0-9]{4})[\-]((0[469])|(11))[\-](0[1-9]|[12][0-
```

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```
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237  0-9][0-9][13579][26])[\-](02)[\-](0[1-9]|1[0-9]|2[0-9])T(([01][0-9]|2[0-3]):[0-
238  5][0-9]:[0-5][0-
239  9])Z)|((([13579][26][02468][1235679]|[13579][01345789](0)[01235679]|[13579][0134578
240  9][2468][1235679]|[02468][048][02468][1235679]|[02468][1235679](0)[01235679]|[0246
241  8][1235679][2468][1235679]|[0-9][0-9][13579][01345789])[\-](02)[\-](0[1-9]|1[0-
242  9]|2[0-8])T(([01][0-9]|2[0-3]):[0-5][0-9]:[0-5][0-9])Z)"/>
243                    </xs:restriction>
244               </xs:simpleType>
245               <xs:simpleType name="AreaID_String-base"
246  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
247                    <xs:restriction base="xs:string">
248                         <xs:maxLength value="18"/>
249                    </xs:restriction>
250               </xs:simpleType>
251               <xs:complexType name="AreaID_String"
252  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
253                    <xs:simpleContent>
254                         <xs:extension base="AreaID_String-base">
255                              <xs:attribute name="codingScheme"
256  type="ecl:CodingSchemeTypeList" use="required"/>
257                         </xs:extension>
258                    </xs:simpleContent>
259               </xs:complexType>
260               <xs:simpleType name="Status_String"
261  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
262                    <xs:restriction base="ecl:StatusTypeList"/>
263               </xs:simpleType>
264               <xs:complexType name="Action_Status"
265  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Status">
266                    <xs:sequence>
267                         <xs:element name="value" type="Status_String" minOccurs="1"
268  maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
269  cim16#Status.value"/>
270                    </xs:sequence>
271               </xs:complexType>
272               <xs:simpleType name="YMDHM_DateTime"
273  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
274                    <xs:restriction base="xs:string">
275                         <xs:pattern value="((([0-9]{4})[\-](0[13578]|1[02])[\-](0[1-
276  9]|[12][0-9]|3[01])|([0-9]{4})[\-]((0[469])|(11))[\-](0[1-9]|[12][0-
277  9]|30))T(([01][0-9]|2[0-3]):[0-5][0-
278  9])Z)|((([13579][26][02468][048]|[13579][01345789](0)[48]|[13579][01345789][2468][0
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280  0-9][0-9][13579][26])[\-](02)[\-](0[1-9]|1[0-9]|2[0-9])T(([01][0-9]|2[0-3]):[0-
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282  9])Z)|((([13579][26][02468][1235679]|[13579][01345789](0)[01235679]|[13579][0134578
283  9][2468][1235679]|[02468][048][02468][1235679]|[02468][1235679](0)[01235679]|[0246
284  8][1235679][2468][1235679]|[0-9][0-9][13579][01345789])[\-](02)[\-](0[1-9]|1[0-
285  9]|2[0-8])T(([01][0-9]|2[0-3]):[0-5][0-9])Z)"/>
286                    </xs:restriction>
287               </xs:simpleType>
288               <xs:complexType name="ESMP_DateTimeInterval"
289  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTimeInterval">
290                    <xs:sequence>
291                         <xs:element name="start" type="YMDHM_DateTime" minOccurs="1"
292  maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
293  cim16#DateTimeInterval.start"/>
```

```
294                     <xs:element name="end" type="YMDHM_DateTime" minOccurs="1"
295    maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
296    cim16#DateTimeInterval.end"/>
297                 </xs:sequence>
298         </xs:complexType>
299         <xs:complexType name="HVDCLink_MarketDocument"
300    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketDocument">
301                 <xs:sequence>
302                     <xs:element name="mRID" type="ID_String" minOccurs="1"
303    maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
304    cim16#IdentifiedObject.mRID"/>
305                     <xs:element name="revisionNumber" type="ESMPVersion_String"
306    minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
307    schema-cim16#Document.revisionNumber"/>
308                     <xs:element name="type" type="MessageKind_String" minOccurs="1"
309    maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
310    cim16#Document.type"/>
311                     <xs:element name="process.processType"
312    type="ProcessKind_String" minOccurs="1" maxOccurs="1"
313    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
314    cim16#Process.processType"/>
315                     <xs:element name="sender_MarketParticipant.mRID"
316    type="PartyID_String" minOccurs="1" maxOccurs="1"
317    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
318    cim16#IdentifiedObject.mRID"/>
319                     <xs:element name="sender_MarketParticipant.marketRole.type"
320    type="MarketRoleKind_String" minOccurs="1" maxOccurs="1"
321    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
322                     <xs:element name="receiver_MarketParticipant.mRID"
323    type="PartyID_String" minOccurs="1" maxOccurs="1"
324    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
325    cim16#IdentifiedObject.mRID"/>
326                     <xs:element name="receiver_MarketParticipant.marketRole.type"
327    type="MarketRoleKind_String" minOccurs="1" maxOccurs="1"
328    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
329                     <xs:element name="createdDateTime" type="ESMP_DateTime"
330    minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
331    schema-cim16#Document.createdDateTime"/>
332                     <xs:element name="schedule_Period.timeInterval"
333    type="ESMP_DateTimeInterval" minOccurs="0" maxOccurs="1"
334    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
335    cim16#Period.timeInterval"/>
336                     <xs:element name="docStatus" type="Action_Status" minOccurs="1"
337    maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
338    cim16#Document.docStatus"/>
339                     <xs:element name="domain.mRID" type="AreaID_String"
340    minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
341    schema-cim16#IdentifiedObject.mRID"/>
342                     <xs:element name="TimeSeries" type="TimeSeries" minOccurs="1"
343    maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
344    cim16#MarketDocument.TimeSeries"/>
345                 </xs:sequence>
346         </xs:complexType>
347         <xs:simpleType name="Position_Integer"
348    sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Integer">
349             <xs:restriction base="xs:integer">
350                 <xs:maxInclusive value="999999"/>
351                 <xs:minInclusive value="1"/>
352             </xs:restriction>
353         </xs:simpleType>
```

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```
354         <xs:complexType name="Point"
355 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Point">
356             <xs:sequence>
357                 <xs:element name="position" type="Position_Integer"
358 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
359 schema-cim16#Point.position"/>
360                 <xs:element name="quantity" type="xs:decimal" minOccurs="0"
361 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
362 cim16#Point.quantity"/>
363                 <xs:element name="minimum_Quantity.quantity" type="xs:decimal"
364 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
365 schema-cim16#Quantity.quantity"/>
366                 <xs:element name="maximum_Quantity.quantity" type="xs:decimal"
367 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
368 schema-cim16#Quantity.quantity"/>
369                 <xs:element name="optimum_Quantity.quantity" type="xs:decimal"
370 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
371 schema-cim16#Quantity.quantity"/>
372             </xs:sequence>
373         </xs:complexType>
374         <xs:simpleType name="ReasonCode_String"
375 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
376             <xs:restriction base="ecl:ReasonCodeTypeList"/>
377         </xs:simpleType>
378         <xs:simpleType name="ReasonText_String"
379 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
380             <xs:restriction base="xs:string">
381                 <xs:maxLength value="512"/>
382             </xs:restriction>
383         </xs:simpleType>
384         <xs:complexType name="Reason"
385 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Reason">
386             <xs:sequence>
387                 <xs:element name="code" type="ReasonCode_String" minOccurs="1"
388 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
389 cim16#Reason.code"/>
390                 <xs:element name="text" type="ReasonText_String" minOccurs="0"
391 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
392 cim16#Reason.text"/>
393             </xs:sequence>
394         </xs:complexType>
395         <xs:complexType name="Series_Period"
396 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Period">
397             <xs:sequence>
398                 <xs:element name="timeInterval" type="ESMP_DateTimeInterval"
399 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
400 schema-cim16#Period.timeInterval"/>
401                 <xs:element name="resolution" type="xs:duration" minOccurs="1"
402 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
403 cim16#Period.resolution"/>
404                 <xs:element name="Point" type="Point" minOccurs="1"
405 maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
406 cim16#Period.Point"/>
407             </xs:sequence>
408         </xs:complexType>
409         <xs:simpleType name="BusinessKind_String"
410 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
411             <xs:restriction base="ecl:BusinessTypeList"/>
412         </xs:simpleType>
```

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413         <xs:simpleType name="EnergyProductKind_String"
414 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
415             <xs:restriction base="ecl:EnergyProductTypeList"/>
416         </xs:simpleType>
417         <xs:simpleType name="ObjectAggregationKind_String"
418 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
419             <xs:restriction base="ecl:ObjectAggregationTypeList"/>
420         </xs:simpleType>
421         <xs:simpleType name="ResourceID_String-base"
422 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
423             <xs:restriction base="xs:string">
424                 <xs:maxLength value="60"/>
425             </xs:restriction>
426         </xs:simpleType>
427         <xs:complexType name="ResourceID_String"
428 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
429             <xs:simpleContent>
430                 <xs:extension base="ResourceID_String-base">
431                     <xs:attribute name="codingScheme"
432 type="ecl:CodingSchemeTypeList" use="required"/>
433                 </xs:extension>
434             </xs:simpleContent>
435         </xs:complexType>
436         <xs:simpleType name="HVDCMode_String"
437 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
438             <xs:restriction base="ecl:HVDCModeTypeList"/>
439         </xs:simpleType>
440         <xs:simpleType name="MeasurementUnitKind_String"
441 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
442             <xs:restriction base="ecl:UnitOfMeasureTypeList"/>
443         </xs:simpleType>
444         <xs:simpleType name="CurveType_String"
445 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
446             <xs:restriction base="ecl:CurveTypeList"/>
447         </xs:simpleType>
448         <xs:complexType name="TimeSeries"
449 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#TimeSeries">
450             <xs:sequence>
451                 <xs:element name="mRID" type="ID_String" minOccurs="1"
452 maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
453 cim16#IdentifiedObject.mRID"/>
454                 <xs:element name="businessType" type="BusinessKind_String"
455 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
456 schema-cim16#TimeSeries.businessType"/>
457                 <xs:element name="product" type="EnergyProductKind_String"
458 minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
459 schema-cim16#TimeSeries.product"/>
460                 <xs:element name="objectAggregation"
461 type="ObjectAggregationKind_String" minOccurs="1" maxOccurs="1"
462 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
463 cim16#TimeSeries.objectAggregation"/>
464                 <xs:element name="connectingLine_RegisteredResource.mRID"
465 type="ResourceID_String" minOccurs="0" maxOccurs="1"
466 sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
467 cim16#IdentifiedObject.mRID"/>
468                 <xs:element
469 name="hVDCMode_AttributeInstanceComponent.attribute" type="HVDCMode_String"
470 minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
471 schema-cim16#AttributeInstanceComponent.attribute"/>
```

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472                         <xs:element name="out_Domain.mRID" type="AreaID_String"
473  minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
474  schema-cim16#IdentifiedObject.mRID"/>
475                         <xs:element name="in_Domain.mRID" type="AreaID_String"
476  minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
477  schema-cim16#IdentifiedObject.mRID"/>
478                         <xs:element name="measurement_Unit.name"
479  type="MeasurementUnitKind_String" minOccurs="1" maxOccurs="1"
480  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#Unit.name"/>
481                         <xs:element name="curveType" type="CurveType_String"
482  minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-
483  schema-cim16#TimeSeries.curveType"/>
484                         <xs:element name="minimumExchange_Quantity.quantity"
485  type="xs:decimal" minOccurs="0" maxOccurs="1"
486  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
487  cim16#Quantity.quantity"/>
488                         <xs:element name="maximumExchange_Quantity.quantity"
489  type="xs:decimal" minOccurs="0" maxOccurs="1"
490  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
491  cim16#Quantity.quantity"/>
492                         <xs:element name="start_DateAndOrTime.dateTime"
493  type="xs:dateTime" minOccurs="0" maxOccurs="1"
494  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
495  cim16#DateAndOrTime.dateTime"/>
496                         <xs:element name="end_DateAndOrTime.dateTime"
497  type="xs:dateTime" minOccurs="0" maxOccurs="1"
498  sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
499  cim16#DateAndOrTime.dateTime"/>
500                         <xs:element name="Period" type="Series_Period" minOccurs="0"
501  maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
502  cim16#TimeSeries.Period"/>
503                         <xs:element name="Reason" type="Reason" minOccurs="0"
504  maxOccurs="unbounded" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-
505  cim16#TimeSeries.Reason"/>
506                 </xs:sequence>
507         </xs:complexType>
508  </xs:schema>
509
```