GENERATION AND LOAD SHIFT KEY DOCUMENT UML MODEL AND SCHEMA

2022-03-15
APPROVED DOCUMENT
VERSION 2.3
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## Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Release</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
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<tr>
<td>0</td>
<td>0</td>
<td>2015-12-18</td>
<td>First drafting of the document based on discussion with CGMES project team on data exchanges.</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>2016-01-16</td>
<td>Version taking into account the comments issued after WG EDI review.</td>
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<tr>
<td>1</td>
<td>0</td>
<td>2016-01-21</td>
<td>Version approved by the Market Committee.</td>
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<tr>
<td>2</td>
<td>0</td>
<td>2016-09-22</td>
<td>Addition of the interconnection shift key business type. Addition of Reason class at various levels to identify inconsistencies and errors in the sent document. Version approved by Market Committee</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2017-03-23</td>
<td>Addition of docStatus, Status and received_MarketDocument in the header to provide an anomaly report following the receiving of a GLSK document. Addition of Status attribute within RegisteredResource class to enable an action on a network element. Version submitted to Market Committee for approval</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2019/12/11</td>
<td>Move parts to Coordinated Capacity Calculation implementation guide. Keep UML document and schema part. Approved by MC.</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2022/03/15</td>
<td>Updates in XSD v2.2: mRID of Document, Series and Timeseries (ID_String type) was enlarged from 35 to 60 characters. Approved by MC.</td>
</tr>
</tbody>
</table>
Objective

The purpose of this document is to provide the contextual and assembly UML models and the schema of the generation and load shift key (GLSK).

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

Especially, the GSK and LSK are computed by the TSO in charge of the area and provided to the actors who needs to carry out network studies; these network studies could be coordinated capacity calculation, flow-based market coupling, network studies, etc.

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

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

- Description of the business process;
- Use case of the business process;
- Sequence diagrams of the business process;
- List of the schema (XSD) to be used in the business process and versions of the schema;

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

2.1.1 Overview of the model

Figure 1 shows the model.
2.1.2 IsBasedOn relationships from the European style market profile

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Complete IsBasedOn Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>AttributeInstanceComponent</td>
<td>TC57CIM::IEC62325::MarketManagement::AttributeInstanceComponent</td>
</tr>
<tr>
<td>Domain</td>
<td>TC57CIM::IEC62325::MarketManagement::Domain</td>
</tr>
<tr>
<td>FlowDirection</td>
<td>TC57CIM::IEC62325::MarketManagement::FlowDirection</td>
</tr>
<tr>
<td>GLSK_MarketDocument</td>
<td>TC57CIM::IEC62325::MarketManagement::MarketDocument</td>
</tr>
<tr>
<td>MarketObjectStatus</td>
<td>TC57CIM::IEC62325::MarketManagement::MarketObjectStatus</td>
</tr>
<tr>
<td>MarketParticipant</td>
<td>TC57CIM::IEC62325::MarketCommon::MarketParticipant</td>
</tr>
<tr>
<td>MarketRole</td>
<td>TC57CIM::IEC62325::MarketCommon::MarketRole</td>
</tr>
<tr>
<td>Measure_Unit</td>
<td>TC57CIM::IEC62325::MarketManagement::Unit</td>
</tr>
<tr>
<td>MktPSRTYPE</td>
<td>TC57CIM::IEC62325::MarketManagement::MktPSRTYPE</td>
</tr>
<tr>
<td>Point</td>
<td>TC57CIM::IEC62325::MarketManagement::Point</td>
</tr>
<tr>
<td>Process</td>
<td>TC57CIM::IEC62325::MarketManagement::Process</td>
</tr>
<tr>
<td>Quantity</td>
<td>TC57CIM::IEC62325::MarketManagement::Quantity</td>
</tr>
<tr>
<td>Reason</td>
<td>TC57CIM::IEC62325::MarketManagement::Reason</td>
</tr>
<tr>
<td>Received_MarketDocument</td>
<td>TC57CIM::IEC62325::MarketManagement::MarketDocument</td>
</tr>
<tr>
<td>RegisteredResource</td>
<td>TC57CIM::IEC62325::MarketCommon::RegisteredResource</td>
</tr>
<tr>
<td>ResourceCapacity</td>
<td>TC57CIM::IEC62325::MarketCommon::ResourceCapacity</td>
</tr>
<tr>
<td>Series_Period</td>
<td>TC57CIM::IEC62325::MarketManagement::Period</td>
</tr>
<tr>
<td>SK_ResourceCapacity</td>
<td>TC57CIM::IEC62325::MarketCommon::ResourceCapacity</td>
</tr>
<tr>
<td>SKBlock_TimeSeries</td>
<td>TC57CIM::IEC62325::MarketManagement::TimeSeries</td>
</tr>
<tr>
<td>Time_Period</td>
<td>TC57CIM::IEC62325::MarketManagement::Period</td>
</tr>
<tr>
<td>TimeSeries</td>
<td>TC57CIM::IEC62325::MarketManagement::TimeSeries</td>
</tr>
</tbody>
</table>
2.2 GLSK assembly model

2.2.1 Overview of the model

Figure 2 shows the model.
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>
<thead>
<tr>
<th>Name</th>
<th>Complete IsBasedOn Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLSK_MarketDocument</td>
<td>TC57CIM::IEC62325::MarketManagement::MarketDocument</td>
</tr>
<tr>
<td>Point</td>
<td>TC57CIM::IEC62325::MarketManagement::Point</td>
</tr>
<tr>
<td>Reason</td>
<td>TC57CIM::IEC62325::MarketManagement::Reason</td>
</tr>
<tr>
<td>RegisteredResource</td>
<td>TC57CIM::IEC62325::MarketCommon::RegisteredResource</td>
</tr>
<tr>
<td>Series_Period</td>
<td>TC57CIM::IEC62325::MarketManagement::Period</td>
</tr>
<tr>
<td>SKBlock_TimeSeries</td>
<td>TC57CIM::IEC62325::MarketManagement::TimeSeries</td>
</tr>
<tr>
<td>TimeSeries</td>
<td>TC57CIM::IEC62325::MarketManagement::TimeSeries</td>
</tr>
</tbody>
</table>

2.2.3 Detailed GLSK assembly model

2.2.3.1 GLSK_MarketDocument root class

This document enables to exchange information about the GSK and LSK factors.

- Generation shift key (GSK): list specifying those generators that shall contribute to the shift.
- Load shift key (LSK): list specifying those load that shall contribute to the shift in order to take into account the contribution of generators connected to lower voltage levels.

If GSK and LSK are defined, a participation factor is also given:
- G(a) Participation factor for generation nodes
- L(a) Participation factor for load nodes

The sum of G(a) and L(a) for each area has to be to 1 (i.e. 100%).

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

Table 3 shows all attributes of GLSK_MarketDocument.

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Attribute name / Attribute type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>[1..1]</td>
<td>mRID ID_String</td>
<td>The unique identification of the document being exchanged within a business process flow.</td>
</tr>
<tr>
<td>1</td>
<td>[1..1]</td>
<td>revisionNumber ESMVersion_String</td>
<td>The identification of the version that distinguishes one evolution of a document from another.</td>
</tr>
<tr>
<td>3</td>
<td>[0..1]</td>
<td>process.processType ProcessKind_String</td>
<td>The identification of the nature of process that the document addresses.</td>
</tr>
<tr>
<td>4</td>
<td>[1..1]</td>
<td>sender_MarketParticipant.mRID PartyID_String</td>
<td>The identification of a party in the energy market. --- Document owner.</td>
</tr>
<tr>
<td>5</td>
<td>[1..1]</td>
<td>sender_MarketParticipant.marketRole.type MarketRoleKind_String</td>
<td>The identification of the role played by a market player. --- Document owner.</td>
</tr>
</tbody>
</table>
Table 4 shows all association ends of GLSK_MarketDocument with other classes.

**Table 4 - Association ends of GLSK assembly model::GLSK_MarketDocument with other classes**

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Class name / Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>[0..*]</td>
<td>Reason</td>
<td>Association Based On: GLSK contextual model::Reason.Reason[0..*] GLSK contextual model::GLSK_MarketDocument.[]</td>
</tr>
</tbody>
</table>

2.2.3.2 Point

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

Table 5 shows all attributes of Point.

**Table 5 - Attributes of GLSK assembly model::Point**

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Attribute name / Attribute type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>[1..1]</td>
<td>position Position_Integer</td>
<td>A sequential value representing the relative position within a given time interval.</td>
</tr>
</tbody>
</table>
Table 6 shows all association ends of Point with other classes.

### Table 6 - Association ends of GLSK assembly model::Point with other classes

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Class name / Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[1..*]</td>
<td>SKBlock_TimeSeries</td>
<td>The TimeSeries provides additional information related to a Position within a given time interval. Association Based On: GLSK contextual model::SKBlock_TimeSeries.SKBlock_TimeSeries[1..*] GLSK contextual model::Point[]</td>
</tr>
<tr>
<td>2</td>
<td>[0..*]</td>
<td>Reason</td>
<td>The Reason information associated with a Point providing motivation information. Association Based On: GLSK contextual model::Reason.Reason[0..*] GLSK contextual model::Point[]</td>
</tr>
</tbody>
</table>

2.2.3.3 Reason

The motivation of an act.

Table 7 shows all attributes of Reason.

### Table 7 - Attributes of GLSK assembly model::Reason

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Attribute name / Attribute type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>[1..1]</td>
<td>code</td>
<td>ReasonCode_String The motivation of an act in coded form.</td>
</tr>
<tr>
<td>1</td>
<td>[0..1]</td>
<td>text</td>
<td>ReasonText_String The textual explanation corresponding to the reason code.</td>
</tr>
</tbody>
</table>

2.2.3.4 RegisteredResource

A resource that is registered through the market participant registration system. Examples include generating unit, load, and non-physical generator or load.

Table 8 shows all attributes of RegisteredResource.

### Table 8 - Attributes of GLSK assembly model::RegisteredResource

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Attribute name / Attribute type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>[1..1]</td>
<td>mRID</td>
<td>ResourceID_String The unique identification of a resource.</td>
</tr>
<tr>
<td>1</td>
<td>[0..1]</td>
<td>name</td>
<td>String The name is any free human readable and possibly non unique text naming the object.</td>
</tr>
<tr>
<td>2</td>
<td>[0..1]</td>
<td>sK_ResourceCapacity.defaultCapacity</td>
<td>Decimal Default capacity value of shift key.</td>
</tr>
<tr>
<td>3</td>
<td>[0..1]</td>
<td>resourceCapacity.maximumCapacity</td>
<td>Decimal The maximum capacity is used with the remaining available capacity, or merit order methods.</td>
</tr>
<tr>
<td>4</td>
<td>[0..1]</td>
<td>resourceCapacity.minimumCapacity</td>
<td>Decimal The minimum capacity is used with the remaining available capacity, or merit order methods.</td>
</tr>
<tr>
<td>5</td>
<td>[0..1]</td>
<td>marketObjectStatus.status</td>
<td>Status_String The action that can be realized on a registered resource like start/stop. --- The status of the registered resource, e.g. connected, disconnedted, outage, ...</td>
</tr>
</tbody>
</table>
Table 9 shows all association ends of RegisteredResource with other classes.

### Table 9 - Association ends of GLSK assembly model::RegisteredResource with other classes

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Class name / Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>[0..*]</td>
<td>Reason / Reason</td>
<td>The reason information associated with a RegisteredResource providing motivation information. Association Based On: GLSK contextual model::Reason.Reason[0..*] GLSK contextual model::RegisteredResource.[]</td>
</tr>
</tbody>
</table>

2.2.3.5 Series_Period

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

Table 10 shows all attributes of Series_Period.

### Table 10 - Attributes of GLSK assembly model::Series_Period

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

Table 11 shows all association ends of Series_Period with other classes.

### Table 11 - Association ends of GLSK assembly model::Series_Period with other classes

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Class name / Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>[1..*]</td>
<td>Point / Point</td>
<td>The Point information associated with a given Series_Period within a TimeSeries. Association Based On: GLSK contextual model::Point.Point[1..*] GLSK contextual model::Series_Period.[]</td>
</tr>
</tbody>
</table>

2.2.3.6 SKBlock_TimeSeries

The type of shift keys is defined in the BusinessType codelist.

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

In the ESMP profile, the TimeSeries provides not only time-ordered quantities but also time-ordered information.

Table 12 shows all attributes of SKBlock_TimeSeries.
### Table 12 - Attributes of GLSK assembly model::SKBlock_TimeSeries

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Attribute name / Attribute type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 0     | [1..1] | businessType
BusinessKind_String | The identification of the nature of the time series. |
| 1     | [1..1] | mktPSRType.psrType
PsrType_String | The coded type of a power system resource. The identification of the type of resource associated with a TimeSeries. |
| 2     | [0..1] | quantity.quantity
Decimal | The quantity value. The association role provides the information about what is expressed. The shift key value applicable to all resources. This is a value in the range [0,1]. The quantity information associated to a TimeSeries. |
| 3     | [0..1] | flowDirection.direction
DirectionKind_String | The coded identification of the direction of energy flow. For the merit order list (GSK or LSK), provide the information if the registered resource contributes either as "UP" or "DOWN" units. |
| 4     | [0..1] | measurement_Unit.name
MeasurementUnitKind_String | The identification of the formal code for a measurement unit (UN/ECE Recommendation 20). The unit of measure of the attributes based on ResourceCapacity class. |
| 5     | [0..1] | attributeInstanceComponent.position
Position_Integer | A sequential value representing a relative sequence number. To be used only for merit order participation factor. This attribute provides the identification of order in which the groups are called (1 is the first, 2 the second, etc.). |
| 6     | [0..1] | domain.mRID
AreaID_String | The unique identification of the domain. For interconnection shift key, the domain is used to identify the area contributing to the GLSK. The domain associated with a TimeSeries. |
| 7     | [0..1] | maximum_Quantity.quantity
Decimal | The quantity value. The association role provides the information about what is expressed. The maximum quantity that can be exchanged for interconnection shift key. The quantity information associated to a TimeSeries. |
| 8     | [0..1] | maximum_Measurement_Unit.name
MeasurementUnitKind_String | The identification of the formal code for a measurement unit (UN/ECE Recommendation 20). The unit of measure for the maximum quantity in SKBlock_TimeSeries. The unit of measure associated with the quantities in a TimeSeries. |

### Table 13 - Association ends of GLSK assembly model::SKBlock_TimeSeries with other classes

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Class name / Role</th>
<th>Description</th>
</tr>
</thead>
</table>
| 9     | [0..*] | RegisteredResource
RegisteredResource | The identification of a resource associated with a TimeSeries. Association Based On:
GLSK contextual model::RegisteredResource.RegisteredResource[0..*]
GLSK contextual model::SKBlock_TimeSeries.[] |
| 10    | [0..*] | Reason
Reason | The reason information associated with a TimeSeries providing motivation information. Association Based On:
GLSK contextual model::Reason.Reason[0..*]
GLSK contextual model::SKBlock_TimeSeries.[] |
2.2.3.7 TimeSeries

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

Table 14 shows all attributes of TimeSeries.

Table 14 - Attributes of GLSK assembly model::TimeSeries

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Attribute name / Attribute type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>[0..1]</td>
<td>mRID ID_String</td>
<td>A unique identification of the time series.</td>
</tr>
<tr>
<td>1</td>
<td>[0..1]</td>
<td>name String</td>
<td>The name is any free human readable and possibly non unique text naming the object.</td>
</tr>
<tr>
<td>2</td>
<td>[1..1]</td>
<td>subject_Domain.mRID AreaID_String</td>
<td>The unique identification of the domain. --- The identification of the area.</td>
</tr>
<tr>
<td>3</td>
<td>[1..1]</td>
<td>curveType CurveType_String</td>
<td>The identification of the coded representation of the type of curve being described.</td>
</tr>
</tbody>
</table>

Table 15 shows all association ends of TimeSeries with other classes.

Table 15 - Association ends of GLSK assembly model::TimeSeries with other classes

<table>
<thead>
<tr>
<th>Order</th>
<th>mult.</th>
<th>Class name / Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>[1..*]</td>
<td>Series_Period Period</td>
<td>The time interval and resolution for a period associated with a TimeSeries. Association Based On: GLSK contextual model::Series_Period.Period[1..*] GLSK contextual model::TimeSeries[.]</td>
</tr>
</tbody>
</table>

2.2.4 Datatypes

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

- Action_Status compound
- ESMP_DateTimeInterval compound
- AreaID_String datatype, codelist CodingSchemeTypeList
- BusinessKind_String datatype, codelist BusinessTypeList
- CurveType_String datatype, codelist CurveTypeList
- DirectionKind_String datatype, codelist DirectionTypeList
- ESMP_DateTime datatype
- ESMPVersion_String datatype
- ID_String datatype
- MarketRoleKind_String datatype, codelist RoleTypeList
- MeasurementUnitKind_String datatype, codelist UnitOfMeasureTypeList
- MessageKind_String datatype, codelist MessageTypeList
- PartyID_String datatype, codelist CodingSchemeTypeList
- Position_Integer datatype
- ProcessKind_String datatype, codelist ProcessTypeList
- PsrType_String datatype, codelist AssetTypeList
- ReasonCode_String datatype, codelist ReasonCodeTypeList
- ReasonText_String datatype
- ResourceID_String datatype, codelist CodingSchemeTypeList
- Status_String datatype, codelist StatusTypeList
- YMDHM_DateTime datatype
2.2.5 GLSK_MarketDocument XML schema structure

Figure 3 to Figure 5 provide the structure of the schema.

Figure 3 - GLSK schema structure 1/3
Figure 4 - GLSK schema structure 2/3
Figure 5 - GLSK schema structure 3/3
2.2.6 GLSK_MarketDocument XML schema

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

```xml
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:ecl="http://www.iec.ch/cimprofile"
    targetNamespace="urn:iec62325.351:tc57wg16:451-n:glskdocument:2:2"
    xmlns:sawsdl="http://www.w3.org/ns/sawsdl"
    xmlns:entsoe="http://www.entsoe.eu|@entso_e">
    <xs:import namespace="urn:entsoe.eu:wgedi-codelists" schemaLocation="urn-entsoe-eu-wgedi-codelists.xsd"/>
    <xs:simpleType name="ID_String" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">    <xs:restriction base="xs:string">
        <xs:maxLength value="60"/>
    </xs:restriction>
</xs:simpleType>
    <xs:simpleType name="ESMPVersion_String" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
        <xs:restriction base="xs:string">
            <xs:pattern value="[1-9][0-9]{0,2}"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="MessageKind_String" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
        <xs:restriction base="ecl:MessageTypelist"/>
    </xs:simpleType>
    <xs:simpleType name="ProcessKind_String" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
        <xs:restriction base="ecl:ProcessTypelist"/>
    </xs:simpleType>
    <xs:simpleType name="PartyID_String" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
        <xs:restriction base="xs:string">
            <xs:maxLength value="16"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="MarketRoleKind_String" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#String">
        <xs:extension base="ecl:RoleTypelist"/>
    </xs:complexType>
    <xs:simpleType name="ESMP_DateTime" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#DateTime">
        <xs:restriction base="xs:dateTime">
            <xs:pattern value="((((0[1-9][0-9])|([1-2][0-9]0)][0-9][0-9][-][0-9][0-9])[0-9][0-9]][12][0-9][301])|([0-9][0-9])([0-9][469])|((0[1-9][0-9])[0-9][0-9])(0[1-9][0-9])[0-9][0-9]][12][0-9][301])|([0-9][0-9])([0-9][469])|((0[1-9][0-9])[0-9][0-9])(0[1-9][0-9])[0-9][0-9]))|||(([0-9][0-9])|([1-2][0-9]0)][0-9][0-9][-][0-9][0-9])[0-9][0-9]][12][0-9][301])|([0-9][0-9])([0-9][469])|((0[1-9][0-9])[0-9][0-9])(0[1-9][0-9])[0-9][0-9]))|||(([0-9][0-9])|([1-2][0-9]0)][0-9][0-9][-][0-9][0-9])[0-9][0-9]][12][0-9][301])|([0-9][0-9])([0-9][469])|((0[1-9][0-9])[0-9][0-9])(0[1-9][0-9])[0-9][0-9]))|||(([0-9][0-9])|([1-2][0-9]0)][0-9][0-9][-][0-9][0-9])[0-9][0-9]][12][0-9][301])|([0-9][0-9])([0-9][469])|((0[1-9][0-9])[0-9][0-9])(0[1-9][0-9])[0-9][0-9]))|||(([0-9][0-9])|([1-2][0-9]0)][0-9][0-9][-][0-9][0-9])[0-9][0-9]][12][0-9][301])|([0-9][0-9])([0-9][469])|((0[1-9][0-9])[0-9][0-9])(0[1-9][0-9])[0-9][0-9))))>
```
```xml
<xs:element name="end" type="YMDHM_DateTime" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#DateTimeInterval.end"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="GLSK_MarketDocument">
  <xs:sequence>
    <xs:element name="mRID" type="ID_String" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#IdentifiedObject.mRID"/>
    <xs:element name="revisionNumber" type="ESMPVersion_String" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Document.revisionNumber"/>
    <xs:element name="MessageKind_String" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Document.type"/>
    <xs:element name="process.processType" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Process.processType"/>
    <xs:element name="sender_MarketParticipant.mRID" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#IdentifiedObject.mRID"/>
    <xs:element name="sender_MarketParticipant.marketRole.type" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
    <xs:element name="receiver_MarketParticipant.mRID" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#IdentifiedObject.mRID"/>
    <xs:element name="receiver_MarketParticipant.marketRole.type" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#MarketRole.type"/>
    <xs:element name="createdDateTime" type="ESMP_DateTime" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Document.createdDateTime"/>
    <xs:element name="docStatus" type="Action_Status" minOccurs="0" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Document.docStatus"/>
    <xs:element name="status" type="Action_Status" minOccurs="0" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Document.status"/>
    <xs:element name="received_MarketDocument.mRID" minOccurs="0" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#IdentifiedObject.mRID"/>
    <xs:element name="received_MarketDocument.revisionNumber" type="ESMPVersion_String" minOccurs="0" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Document.revisionNumber"/>
    <xs:element name="time_Period.timeInterval" type="ESMP_DateTimeInterval" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#Period.timeInterval"/>
    <xs:element name="domain.mRID" type="AreaID_String" minOccurs="1" maxOccurs="1" sawsd1:modelReference="http://iec/TC57/2013/CIM-schema-cim16#IdentifiedObject.mRID"/>
  </xs:sequence>
</xs:complexType>
```

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<xs:element name="TimeSeries" type="TimeSeries" minOccurs="1" maxOccurs="unbounded">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="Reason" type="Reason" minOccurs="0" maxOccurs="999999"/>
      <xs:element name="SKBlock_TimeSeries" type="SKBlock_TimeSeries" minOccurs="1" maxOccurs="unbounded"/>
      <xs:element name="Point" minOccurs="1" maxOccurs="1">
        <xs:complexType name="Point">
          <xs:sequence>
            <xs:element name="position" type="Position_Integer" minOccurs="1" maxOccurs="1"/>
            <xs:element name="SKBlock_TimeSeries" type="SKBlock_TimeSeries" minOccurs="1" maxOccurs="1"/>
            <xs:element name="Reason" type="Reason" minOccurs="0" maxOccurs="999999"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>

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<xs:extension base="ResourceID_String-base">
  <xs:attribute name="codingScheme" type="ecl:CodingSchemeTypeList" use="required"/>
</xs:extension>

<xs:complexType name="RegisteredResource">
  <xs:complexContent>
    <xs:extension base="cim16#IdentifiedObject">
      <xs:sequence>
        <xs:element name="ResourceID" type="cim16#String" maxOccurs="unbounded"/>
        <xs:element name="mRID" type="cim16#String" minOccurs="1" maxOccurs="1"/>
        <xs:element name="reason" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ResourceKind" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="serialNumber" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="businessKind" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="resourceStatus" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="assetKind" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="assetType" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="assetGroup" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="businessType" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="point" type="cim16#String" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPReason" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPID" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPDate" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPStart" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPEnd" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPStatus" minOccurs="0" maxOccurs="1"/>
        <xs:element name="ESMPResponseType" minOccurs="0" maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="Period">
  <xs:complexContent>
    <xs:restriction base="xs:dateTime">
      <xs:attribute name="resolution" type="xs:duration" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="Series">
  <xs:complexContent>
    <xs:restriction base="xs:duration">
      <xs:attribute name="resolution" type="xs:duration" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacity">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacityList">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacityDefault">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacityStatus">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacityStatusList">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacityDefaultList">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ResourceCapacityDefaultStatusList">
  <xs:complexContent>
    <xs:restriction base="xs:decimal">
      <xs:attribute name="resolution" type="xs:decimal" minOccurs="0" maxOccurs="1"/>
    </xs:restriction>
  </xs:complexContent>
</xs:complexType>
<?xml version="1.0" encoding="UTF-8"?>
<xs:simpleType name="DirectionKind_String">
  <xs:simpleType>
    <xs:restriction base="ecl:DirectionTypelist"/>
  </xs:simpleType>
</xs:simpleType>

<xs:complexType name="IdentifiedObject">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="Reason">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="RegisteredResource">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="SKBlock_TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:element name="businessType" type="BusinessKind_String">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:element>

<xs:element name="reason" type="Reason">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:element>

<xs:element name="registeredResource" type="RegisteredResource">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:element>

<xs:element name="skBlock" type="SKBlock">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:element>

<xs:element name="timeSeries" type="TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:element>

<xs:complexType name="AreaID_String">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#String">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#Unit">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#String">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#IdentifiedObject">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#Unit">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#IdentifiedObject">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
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    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#Unit">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#IdentifiedObject">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#Unit">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#IdentifiedObject">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#Unit">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#IdentifiedObject">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#Unit">
  <xs:simpleContent>
    <xs:extension base="ecl:IdentifiedObject">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="cim16#TimeSeries">
  <xs:simpleContent>
    <xs:extension base="ecl:SKBlock">
      <xs:attribute name="mRID" type="ID_String" minOccurs="1" maxOccurs="1"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:element name="name" type="xs:string" minOccurs="0" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#IdentifiedObject.name"/>
<xs:element name="subject_Domain.mRID" type="AreaID_String" minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#IdentifiedObject.mRID"/>
<xs:element name="curveType" type="CurveType_String" minOccurs="1" maxOccurs="1" sawsdl:modelReference="http://iec.ch/TC57/2013/CIM-schema-cim16#TimeSeries.curveType"/>
</xs:sequence>
</xs:complexType>
</xs:schema>